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Prevalence of Mechanical Neck Pain among Beauty Service Business Employees in Karad

Aishwarya Bulbule\textsuperscript{1}, Sayali Gijare\textsuperscript{2}

\textsuperscript{1}Intern, Faculty of Physiotherapy, \textsuperscript{2}Assistant professor, Department of Paediatrics, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India

Abstract

Objective: To determine the prevalence of Mechanical neck pain among beauty service business employees in karad.

Method: A total 100 subjects were taken according to inclusion and exclusion criteria. Each subject was assessed by using Northwick park neck pain questionnaire.

Result: A statistical analysis showed that subjects were found to be prevalent for mechanical neck pain. Females are more prone for mechanical neck pain.

Conclusion: Out of the total subjects 31\% subjects were found to be prevalent for mechanical neck pain. Study shows that females are more prone for mechanical neck pain. According to various age groups individuals in 20-30 years had 39 \% pain, 30-40 years had 46 \% pain and 40-50 years have 15 \% pain.

Keywords: Mechanical neck pain, Beauty service business employees, Musculoskeletal disorders, awkward posture.

Introduction

Mechanical neck pain commonly arises insidiously and is generally multifactorial in origin, including one or more of the following; poor posture, anxiety, depression, neck strain and sporting or occupational activities.\textsuperscript{1} It is defined as “pain perceived anywhere in the posterior region of cervical spine, from the superior nuchal line to the first thoracic spinous process.”\textsuperscript{2}

Mechanical neck pain is present common in adult population.\textsuperscript{1} It refers to neck pain that does not radiate into the upper extremities but is confined to the cervical, occipital, or posterior scapular areas. Sometimes, this mechanical pain is associated with severe headaches that may radiate into the occipital, temporal, or periorbital regions. Mechanical neck pain can occur in many forms; it may be unilateral or bilateral, cause headaches, and lead to stiffness in one or all directions of cervical motions.\textsuperscript{4} Neck pain has multifactorial causes and in its impact on the individual. The origin and exact pathophysiologic mechanisms of chronic neck pain often remain obscure because trauma or severe degenerative conditions at working age found only in a few cases. Excessive physical strain may cause microtrauma in connective tissues, and psychosocial stress can cause increased muscular tension and pain.\textsuperscript{2}

Signs & Symptoms-

-Pain starts in occipital region radiate in nondermatomal pattern into shoulders and interscapular regions.

-Pain is often exacerbated by movement of cervical spine and shoulders.

-Headache often occurs & may worsen with emotional stress.

-Sleep disturbance is common.
- On physical examination -
  - Pain
  - Spasm
  - Tenderness
  - Decreased range of motion.

The work-related musculoskeletal disorders denote health problems of the locomotor apparatus i.e. muscles, nerves, tendons, joints, cartilages, a spinal disc and related tissues, which have been empirically shown or are suspected to have been associated with exposure to risk factors at a workplace.

A high prevalence of the work-related musculoskeletal disorders has been recorded among workers who are exposed to manual labour, work in unusual and restricted postures, repetitive and static work, vibrations and poor psychological and social conditions.

Work related musculoskeletal disorders are injuries or disorders of musculoskeletal tissues associated with workplace risk factors and are known by a variety of terms, including repetitive strain injuries & overuse injuries.

Musculoskeletal disorders have been described as the most common cause of severe long term pain & physical disability that may affects hundreds of millions of people across the world.

Awkward or fixed postures for longer periods can cause musculoskeletal disorders. Work and health have negative as well as positive effects on one another and it is important to minimize or even totally eliminate the mutual negative effects while promoting the positive effects.

According to World Health Organization (WHO 1994) health and work places are important issues which strongly relate to the health and being of the worker. The health problems can be controlled and avoided by improving working practices and conditions.

Beauticians like other workers encounter hazards in their work place that may adversely affect their health. They are mostly self employed or engaged in small scale salons where conditions of service are stringent and with no organized occupational health service.

Growth of beauty industry has increased dramatically in modern era but the problems like neck pain, shoulder pain, upper and lower back pain, joint pain, skin infections, headaches, etc may occur because of overusing prolonged awkward postures.

### Materials and Methodology

Subjects were selected from various beauty salons in Karad.

**Inclusion Criteria:**
- Beauticians.
- Both Females and males.
- Subject who are working for more than 6 hrs per day.

**Exclusion Criteria:**
- Any previous history of injury to cervical spine.
- Diagnosed case of cervical spondylolysis.

**Methodology**

Study was conducted among beauty service business employees in and around Karad. A total 100 subjects were taken according to inclusion and exclusion criteria. For participation in this research the subjects must be a beautician who worked for more than 6 hours per day. After taking ethical clearance from institutional ethics committee consents forms were given and taken consents from participants. The subjects were assessed by using Northwick Park Neck Pain Questionnaire. The scores were according to the answers given by the subjects with the help of same Questionnaire. Statistical analysis of collected data was done accordingly and hence result was obtained.

**Result**

### 1. Percentage of Mechanical neck pain.

<table>
<thead>
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<th>Pain</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Yes</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>69</td>
</tr>
</tbody>
</table>

Above table shows that 31% individuals are having mechanical neck pain.
2. Percentage of pain in males and females

Table 2 – Percentage in males and females.

<table>
<thead>
<tr>
<th>Pain</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Males</td>
<td>15</td>
</tr>
<tr>
<td>Females</td>
<td>17</td>
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</tbody>
</table>

Above table shows that Mechanical neck pain is present more in females than males.

3. Age Distribution

Table 3 – Age distribution

<table>
<thead>
<tr>
<th>Age group</th>
<th>Percentage</th>
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<tr>
<td>20-30</td>
<td>39</td>
</tr>
<tr>
<td>30-40</td>
<td>46</td>
</tr>
<tr>
<td>40-50</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
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</table>

The table shows percentage of pain in various age groups. Participants of age 20-30 years have 39% pain, 30-40 years have 46% pain and 40-50 years have 15% pain.

Discussion

This study ‘prevalence of mechanical neck pain among beauty service business employees in karad.’ was conducted to find out the prevalence of mechanical neck pain in beauty service employees and to find whether ratio of mechanical neck pain is more common in females or males. Previous literatures shows that Prolonged mechanical neck pain may lead to various serious disorders of neck hence there is necessity of evaluating prevalence of mechanical neck pain in beauty service employees as to minimize further complications.

The objectives of this study were to find the prevalence of mechanical neck pain in beauty service employees and to find whether ratio of mechanical neck pain is more common in females or males. Study was conducted among beauty service business employees in and around Karad Considering inclusion and exclusion criteria they were requested to participate in the study. Their demographic information was taken. For participation in this research, the subject must be a beautician who was working more than 6 hours per day.

The subjects was assessed by using Northwick Park Neck Pain Questionnaire. Statistical analysis of collected data was done accordingly so result shows that 31% individuals are having mechanical neck pain both males and females and percentage of pain is more in females than males, According to various age groups percentage of age 20-30 years have 39% pain, 30-40 years have 46% pain and 40-50 years have 15% pain,

Conclusion

Out of the total subjects 31% subjects were found to be prevalent for mechanical neck pain. Study shows that females are more prone for mechanical neck pain. According to various age groups individuals in 20-30 years had 39% pain, 30-40 years had 46% pain and 40-50 years have 15% pain.

Conflict of Interest – Do not have any conflicts of interest to declare.

Source of Funding- This study was funded by Krishna Institute of Medical Sciences deemed to be university, Karad.

Ethical Clearance- The institutional Ethics Committee has given permission to initiate the research project entitled- Prevalence of Mechanical Neck Pain among Beauty Service Business Employees in Karad.

References


Comparison of Immediate and Carry Over Effects of Kinesiotaping and Rigid Taping on Pain due to Latent Trigger Points of Upper Trapezius in Individuals with Forward Shoulder Posture: A Randomized Control Trial

Gaurang Baxi1, Akshata Jain2, Tushar Palekar3, Divya Gohil4, Seema Saini5, Soumik Basu1

1Associate Professor; 2Resident; 3Professor & Principal; 4Assistant Professor; 5Professor, Dr. D. Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Sant Tukaram Nagar, Pimpri, Pune

Abstract

Background: Forward shoulder posture is a common postural alteration seen in asymptomatic populations. Different taping techniques like kinesiotaping and rigid taping are proven to have an immediate beneficial effect in rounded shoulders. However, there is paucity of literature for upper quarter postural correction in healthy subjects who are at risk of developing musculoskeletal disorders due to altered posture. Hence this study explores the change in pain and pain pressure threshold values in asymptomatic individuals with forward shoulder posture after the application of kinesiotaping and rigid scapular taping. Method: 52 individuals with bilateral forward shoulder posture having latent trigger points in upper trapezius were randomly divided into two taping groups - kinesiotaping and rigid taping. Pain was assessed by using Numerical Pain Rating Scale (NPRS), and Pain pressure threshold (PPT) were assessed using a pressure algometer. Readings were taken immediately after taping, and at 2 weeks (6 treatment sessions). Outcome measures were again taken at 3 weeks, to see the carry over effects. Results: A significant decrease in the NPRS values and improvement in PPT scores was seen in both groups (p<0.001). However, there was no significant difference (p>0.05) seen in both NPRS and PPT when compared between both the treatment groups. Conclusion: Both Kinesiotaping and rigid taping have a beneficial effect on pain and pressure sensitivity of latent trigger points associated with forward shoulder posture.

Keywords: Forward Shoulder Posture, Kinesiotaping, Rigid Taping, Scapular taping, Taping, Trigger Point Taping

Introduction

Forward shoulder posture (FSP) arises due to muscular imbalance and abnormal scapular kinematics. Altered orientation of scapulae leads to abnormal changes in muscle length of periscapular muscles. Upper trapezius become tight and overactive with resultant inhibition and weakness of rhomboids and lower trapezius. These changes occur as a result of abnormal sustained posture or repetitive movements.

Muscular imbalance associated with FSP leads to reduced external rotation and posterior tipping of scapulæ. Studies have found a decrease in the activity of serratus anterior in rounded shoulders which contribute to the decreased upward rotation and greater anterior tilt. This reduces the suprahumeral space causing repetitive wear and tear of rotator cuff tendon during arm elevation leading to shoulder impingement and rotator cuff tears. This pattern is linked with shoulder and neck pain and contributes to occurrence of various musculoskeletal conditions like biceps tendon disorder, thoracic outlet syndrome etc.

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Myofascial changes due to abnormal posture and shortened muscles lead to development of painful trigger points. With time, these convert to latent trigger points with higher pressure pain thresholds. Satellite trigger points may develop at distant sites. Trigger points may be restricted to a single muscular unit or may be found in multiple muscles simultaneously. Trigger points can be classified as active, Latent and satellite. Latent Trigger points are tender only on palpation. They do not produce pain on rest but they are an indication of a shortened and contracted muscle with continuing motor unit activity. Latent trigger points in upper trapezius leads to delayed activation of the muscle, causing earlier activation of infraspinatus. This causes abnormal positioning of the humeral head during arm elevation increasing the chances of subacromial impingement.

Kinesiotape is an elastic tape which is been widely used to treat various musculoskeletal, neuromuscular and sports injuries. Studies have documented Kinesiotaping have a role in relieving pain, improving circulation, aiding lymphatic drainage, enhancing stability and proper posture and improving muscle function. It is also reported to have a beneficial effect in improving scapular alignment like acromial distance and total scapular distance in rounded shoulder distance.

Scapular Taping is rigid tape application first described by McConnell in subacromial impingement. It places the scapula in a retracted position, unloading the upper trapezius. Thus it can influence pain parameters like pressure sensitivity and discomfort. Limited studies have compared the effect of Kinesiotaping and rigid scapular taping on pain measures on trigger points associated with subjects having poor posture like rounded shoulders. This study was thus conducted to compare the effects of Kinesiotaping and Rigid Taping techniques on upper trapezius trigger points in FSP.

**Material and Method**

Ethical clearance was obtained from the Institutional ethical committee. of Dr. D. Y. Patil College of Physiotherapy, Pune. Individuals aged 18-30 years were screened for FSP. 52 participants fulfilling the inclusion criteria were recruited. After written consent, the participants were randomly assigned to any of the two treatment groups by stratified sampling.

Inclusion criteria were bilateral FSP (more than 2.5 cm on rounded shoulder distance measurement), full range of motion in the shoulder complex and presence of latent trigger points in upper trapezius.

Exclusion criteria were any history of Fracture around shoulder complex, Rheumatoid arthritis, presence of shoulder or neck pain, history of allergy to tape, hypersensitive skin and active trigger points in the upper trapezius.

Participants were divided into three stratas for homogeneity, based on the rounded shoulder posture assessment (RSP), measured as the linear distance from posterior border of acromion and the couch (patient in supine). Inter-observer reliability: 0.88 & intra-observer reliability: 0.91. Strata 1: RSP 2.6 - 5 cm; Strata 2: RSP 5.1 - 7.5 cm; Strata 3: RSP >7.6 cm. Participants were then randomly divided into two groups using autogenerated randomization by a computer software.

**Group A: Kinesiotaping**

Participants stood in a relaxed standing position with arms by side. Both scapulae were maximally retracted and held in this position while an “I” strip of kinesiotape was applied with 35-40 % stretch from anterior of acromion process upto the spinous process of T8-T9 vertebrae. The tape was maintained for 24 hours and was reapplied every 48 hours. A total of six sessions were given for 3 days per week, for two weeks.

**Group B: Rigid Taping**

Underwrap tape was applied without tension extending from middle of the clavicle anteriorly to the T8-T9 spinous process posteriorly. Participants were asked to retract both scapulae maximally and hold. The rigid tape was then applied by holding the bulk of upper trapezius with the left hand, while applying the tape with the right hand. Participants were asked to keep the tape for at least six hours, for a maximum of 24 hours. The tape was reapplied every 48 hours. A total of six sessions
were given for three days per week for two weeks.\textsuperscript{15}

The exercise protocol given to both the group was as follows:

1. Passive Stretching of pectoralis minor & major, upper trapezius
2. Strengthening Exercises for Scapular muscles

After six sessions, outcome measures were reassessed. Follow up was done after 21 days to see long term effects.

Outcome measures

1. Pain on Numerical Pain Rating Scale (NPRS).\textsuperscript{16}
2. Pressure pain threshold (PPT) by Pressure Algometer.\textsuperscript{16}

Data Analysis

Data was entered in excel and was analyzed using SPSS*25 statistical software. Quantitative data was summarized using descriptive statistics, qualitative data was expressed in percentages. Data was explored for normality. Difference in the mean NPRS and PPT values between the groups were analyzed using the independent Mann Whitney test. Wilcoxon signed ranked test was used to analyze changes in the NPRS & PPT values within the groups as data was not normally distributed. A value of p<0.05 at 95 % confidence interval was considered statistically significant.

Findings

52 participants were recruited for the study, 26 per group. Shoulder joint is used as study entity and as all the participants have bilateral FSP with latent trigger points. It can be thus considered that each group consisted of 52 shoulders, a total of 104 shoulders under study. The demographic characteristics of the participants are presented in Table 1.

Table 1: Demographics Parameters

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Group A (Kinesiotaping)</th>
<th>Group B (Rigid taping)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=26 (52 shoulders)</td>
<td>N=26(52 shoulders)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>21.5±1.884</td>
<td>21.15±2.200</td>
<td>0.263</td>
</tr>
<tr>
<td>Males (n)</td>
<td>26</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Female (n)</td>
<td>23</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

In this study, the intragroup analysis of mean NPRS values revealed significant improvement immediately post intervention, at 2 weeks & at 3 weeks in both groups (p<0.001) (Graph 1).
The interaction between pre-immediate post, 2 weeks, and follow-up results in each group for PPT was significant (p<0.001) for both groups (Graph 2).

The intergroup analysis revealed no significant difference in the mean difference NPRS & PPT Scores between the two groups at any level (Table 2).

**Table 2: Intergroup Comparison of Mean Difference of NPRS & PPT values**

<table>
<thead>
<tr>
<th></th>
<th>Mean NPRS Values</th>
<th></th>
<th>Mean PPT Values</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A</td>
<td>Group B</td>
<td>Group A</td>
<td>Group B</td>
</tr>
<tr>
<td>Mean difference</td>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
<td>P value</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>Pre- Post (n=52)</td>
<td>2.00+ 1.237</td>
<td>2.02+ 1.260</td>
<td><strong>0.949</strong></td>
<td>0.53+ 0.28</td>
</tr>
<tr>
<td>Pre- 2 weeks (n=52)</td>
<td>1.88+ 1.367</td>
<td>2.13+ 1.121</td>
<td><strong>0.497</strong></td>
<td>0.95+ 0.47</td>
</tr>
<tr>
<td>sre- 3 weeks (n=52)</td>
<td>2.19+ 1.314</td>
<td>2.54+ 1.179</td>
<td><strong>0.226</strong></td>
<td>0.95+ 0.48</td>
</tr>
</tbody>
</table>
Discussion

This study evaluates the immediate, short term and carryover effects of two different taping techniques along with exercises on pain, static scapular alignment in asymptomatic individuals with FSP. Taping has been an effective conservative modality for relieving pain recruiting muscles and proprioceptive function. These effects can be responsible in eliciting improvement in pain.

Numerical pain rating scale is a reliable measurement to assess pain and has shown a strong trend of improvement from baseline to the end of two weeks post treatment in both groups. However, there was no significant difference clinically and statistically in the NPRS values when measured at 2 weeks and at 3 weeks from baseline.

The precise mechanism behind the effect of Taping on pain is not fully understood. It may be attributed to the presynaptic inhibition of pain via the pain gate mechanism, as taping stimulates neuromuscular pathways by inducing a greater sensory feedback. The gate control theory also explains that an increase in Aβ fibre activity can mitigate the nociceptor input and thereby reduce pain. Another mechanism attributed to pain relief may be that scapular taping enhances early activation of middle and lower trapezius and serratus anterior. Thus reciprocally, it dampens the over activity associated with upper trapezius. This might explain the reduced discomfort and improved pain values in subjects after trigger point palpation.

Similar results were found in the pain pressure threshold values as there was significant increase in the pain sensitivity in both groups. There was no significant difference found between both group. The results of this study correlates with the finding on effects of Kinesiotaping on the pain sensitivity associated with myofascial trigger points. Wang et.al. reported positive effects of Kinesiotaping in subjects with upper trapezius trigger points, and immediate improvement in pain. Another study done by Chao reported significant improvement in pain pressure threshold after Kinesiotaping application in combination with manual pressure release compared to manual pressure release alone.

There are number of hypothetical mechanisms which indicate the probable analgesic mechanism behind Kinesiotaping. The gate control theory as explained above is the obvious and most fundamental approach to pain control. A study done by Daniel et al. revealed that there is an significant influence of scapular position on the PPT values of the upper trapezius. The study reported a lower mean PPT values in the subjects with a depressed and protracted scapulae. A depressed scapula places excessive stress on the elevators like upper trapezius and levator scapulae and influence muscular activity. The lower PPT values are due to the nociceptor sensitization in the upper trapezius. Release of nociceptor sensitizing substances like Bradyinin, Serotonin and prostaglandin are responsible for this. This explains how alteration in the scapular position can influence the pain pressure threshold in the associated muscles. This might be responsible in eliciting changes in the NPRS and PPT values. Both the taping applications were applied with scapulae in fully retracted position. Thus they provide resistance to the FSP and thus improve the retraction and upward rotation thereby reducing the stress over the upper trapezius. This helps inactivate myofascial trigger points in them. There is a paucity of literature on the effect of scapular rigid taping on pain in FSP.

There were few limitations of this study. Sample size could have been larger, and longer duration of follow up after treatment could be done. Future studies can also comparison of effect of different taping techniques on the static and dynamic scapular alignment in FSP. Also the effect of tape can be assessed on scapular kinematics and muscle activity in FSP.

Conclusion

Kinesiotaping and Rigid taping have an influence on the pain and pressure threshold in Latent trigger point and thus can lead to reduction in pain and improvement in pressure sensitivity in individuals with FSP. Both these taping methods can be used in improving symptoms associated with upper trapezius trigger points in individuals with FSP.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Institutional Sub-Ethics Committee of Dr. D. Y. Patil College of Physiotherapy, Pune.
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Research Article

Risk of Occupational Low Back Pain in Operating Room Staff

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Abstract

Background: Low back pain is one of the most common occupational across the globe with social and commercial implications as it increases absenteeism, reduced concentration and efficiency of the work, hence affects the economic sector. Operating room staff, which includes surgeons, assistants, staff nurses and surgical technician, is one of the most affected occupations amongst the health care industry. Excessive work requirements and exhausting work hours combined with use of incorrect ergonomics have shown to have been associated with low back pain. Hence this research is used to identify physical and environmental risks associated with low back pain in operating room staff.

Methodology: A cross-sectional survey using self-drafted pre-validated questionnaire, based on convenience sampling of about 70 operating room staff members were taken in this study.

Results: 60% of the subjects who has filled the questionnaire have reported at least one episode of low back pain at some point in their career. Of that 83% subjects reported of having pain on working days.

Conclusion: Excessive work load, the postural demand of the job, incorrect employment of ergonomics, decreased physical fitness, addictions, obesity etc. are all risk factors for occupational low back pain in operating room staff.

Keywords: Occupational, Low back pain, surgeons, operating room staff, ergonomics employment, staff nurse, surgical technician.

Introduction

Low back pain (LBP) is an important health problem in most of the countries across the globe. It is the most generic form of musculoskeletal disorders. Globally, the prevalence of LBP among general population ranges between 15 and 45 %. Report lifetime prevalence varies from 49% to 70% and point prevalence from 12% to 30% in Western countries. In India the prevalence of low back pain in young adults is 42.4%. The National Institute of Occupational Safety and Health (NIOSH-USA) classifies it as second among the ten most relevant health problems on the workplace (NIOSH 1997).

Some studies have demonstrated that LBP is one of the most common cause of visits to a physician. It reduces person’s activity limitation and causes an over decrease in the quality of life. It is not only a clinical but a social, economic, and public health problem affecting the population of various professions. Occupational low back pain is one of the most common health problems worldwide and serious form of LBP as it is associated with major consequences in terms of disability and frequent absence. Not only the health problem affects the efficiency of work but also the associated disability makes an individual reluctant to go back to work due to excess pain and in some cases may also make the individual bed ridden. This increase in number of sick leaves effects both, an individual and a community as a whole.
Amongst the healthcare workers, studies show, those working in the operating room, are associated with a higher risk of developing low back pain compared to any other departments\(^8,9\).

Operating staff includes surgeons, assisting surgeons, staff nurses and surgical technician who each have separate roles to play during a surgery. Operating on an individual not only requires knowledge but skills like dexterity, ability to carry out small delicate movements and working long exhausting hours with utmost concentration and dedication, besides operating on the patient, a surgeon’s work also comprises of making life changing and critical decision. This working for long exhaustive hours make them assume awkward postures for long duration of time, leading to over working of static muscle work. Hence this research is used to identify physical and environmental risks associated with low back pain in operating room staff.

**Methodology:** In this cross-sectional survey-based studies, healthy operating room staff were selected, i.e. surgeons, assisting surgeons, staff nurse and surgical technicians, in the age group of 25-50 years of age. Subjects having recent trauma, back ache, pre-existing back conditions were excluded from the study. Overweight and obese individuals were identified from their BMI values as per the NICE guidelines.

Study subjects were taken from multiple hospitals, both government and private set up from Mumbai and Pune, including Raja wadi hospital& D. Y. Patil hospital. For survey-based study that was conducted by self-made pre-validated questionnaire, which was then administered face to face & with the help of google forms.

The survey questionnaire contained domains such as:

- **Demographic data**
- **Lifestyle** (Addictions, sports participation, recreational activities, etc)
- **Work History**
- **Job Description** (describing different aspects of job example: Standing, stooping, Patient transfer, etc)
- **Employment of ergonomics**
- **Pain history**

**Ethical approval:** Ethical clearance was obtained by submitting a detailed methodology to D.Y. Patil University ethics committee. Written informed consent was taken from the subjects.

**Observations and Data Analysis:** Software requirements: - MS Word & MS Excel were used for data analysis and representation. The responses of the questionnaire were analyzed and tabulated in MS Excel. Qualitative analysis of the data was done, and the responses were expressed in terms of percentage and Mean ± Standard deviation.

**Job Description:** 80% of the samples were collected from the surgeons or assisting surgeons, 14.28 % were staff nurse and 5.7% were surgical technician.

**Pain:** Of the 70 subjects 68.5% subjects have reported experiencing occupational low back pain at least once in their lifetime. Of the 68.5 % that complained of having pain at least once, 79.16 % have reported the pain being insidious in onset whereas remaining 20.84% reported the pain of sudden onset. 83.33% of subjects complained pain on working days.

**Gender and Age distribution:** The sample included 44% female and 56 % of males in the study. Majority of the subjects belonged to the age group of 25-29 years with a mean age of 3.4 ± 9.45 SD.

**Obesity:** Of the 70 subjects, 6% of the subjects were under weight, 26 % were normal 45% were overweight and 23 % were obese.

**Job Analysis:** 80% subjects reported standing for long hours as the part of their job, 57.14% reported repeated bending and stooping as the part of their job, 20% twisting and rotating, 41.42% reported transferring a patient as a part of their job and 44.28% reported pulling up a patient from bed as a part of their job.

**Standing during a routine working day:** 81.37% of subjects stated that they have to stand for 5 or more than 5 hours on a routine working day.

**Employment of ergonomics:** 28.57% subjects reported using footstool during surgery,35.87% reported of shifting weights between the two legs during long standing hours.

**Sports and recreational activities:** when asked, 34% subjects said that they participate in sports or any
other recreational activity like gym, yoga, walking, swimming, jogging etc. at least 3 or more than 3 times a week.

**Physiotherapy:** only 16.66% of subjects that had occupational low back pain have taken physiotherapy for the same.

**Table 1: Job Analysis (subjects reported following ergonomic risk activities)**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing for long hours</td>
<td>80%</td>
</tr>
<tr>
<td>Bending &amp; stooping</td>
<td>57.14%</td>
</tr>
<tr>
<td>Twisting &amp; rotating</td>
<td>20%</td>
</tr>
<tr>
<td>Patient transfer to stretcher</td>
<td>41.43%</td>
</tr>
<tr>
<td>Patient ambulation</td>
<td>25.71%</td>
</tr>
<tr>
<td>Pulling up a patient</td>
<td>44.29%</td>
</tr>
<tr>
<td>Employment of ergonomics</td>
<td></td>
</tr>
<tr>
<td>Footstool</td>
<td>28.57%</td>
</tr>
<tr>
<td>Shift weights</td>
<td>35.87%</td>
</tr>
<tr>
<td>Lifting weights</td>
<td>33%</td>
</tr>
<tr>
<td>Bending</td>
<td>31.40%</td>
</tr>
<tr>
<td>Patient transfer</td>
<td>32.85%</td>
</tr>
<tr>
<td>Sitting supported</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Table 2: Other Risk factors**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports- Regular participation</td>
<td>34%</td>
</tr>
<tr>
<td>Addictions</td>
<td>17.14%</td>
</tr>
<tr>
<td>Weight Profile</td>
<td></td>
</tr>
<tr>
<td>over weight</td>
<td>45%</td>
</tr>
<tr>
<td>obesity</td>
<td>23%</td>
</tr>
</tbody>
</table>

Discussion: Low back pain has been described as one of the most common musculoskeletal pain among individuals globally. Our study had following findings.

**Demographic Details**

**Response Rate**

For the study, 220 questionnaires were distributed to surgeons we received a response rate of 31.9%. The reason for such low response rate of the study includes extremely hectic schedule of the profession, busy working day, absence from work and refusal to participate due to lackadaisical approach to research.

**STUDY SUBJECTS:** 80% surgeons, 14.28% staff nurse and 5.70 % surgical technicians.

**GENDER BASED DISTRIBUTION OF STUDY SUBJECTS:** 56% males, 46% females.

This correlates with the fact that general surgery, orthopaedic surgery and surgical technician are male dominant fields where as nursing and OBGY being female dominant.

**Prevalence**

The study revealed that 60% of the subject reported to have at least one episode of low back pain at some point in their career. Globally, the prevalence of LBP among general population ranges between 15 and 45 %. In India the prevalence of low back pain in young adults is 42.4%.

**Pain on Working Days**

Majority of them experienced low back pain on working days as compared to non-working days. According to the results of the survey 83% of the people who experienced LBP had pain on working days due to exhaustive job requirements. Additional work hours increase the risk of low back pain. A study done by Shwn-Huey Shieh et al. states that risk of low back pain increases by 35% for every additional daily work hour. It is the work environment that is a major risk factor for inducing pain. This environment includes height of the operating table, reaching for the tools, stooping during the surgery, lifting weight while rotating to transfer a patient etc.

**Personal Habits**

In this study 17 % of the subjects admitted having some or the other kind of addiction. A study done by Lindal et al. reported that frequency of low back pain and intervertebral disc problems in smokers was greater than in non-smokers. Addictions of alcohol, cigarettes and tobacco is known to cause vasoconstriction of the vessels and hence reduced blood flow. To an overworking tissue, which is easily damaged, reduced blood flow increases the risk and hence result in low back pain.
Association Between Low Back Pain And BMI Status.

Obesity increases the mechanical load on the spine by causing a higher compressive force or increased shear on the lumbar spine structures during various activities which may lead to low back pain. Also, obesity causes LBP through systemic chronic inflammation. Obesity is associated with increased production of cytokines and acute-phase reactants and with activation of proinflammatory pathways \(^{11}\), which, in turn, may lead to pain \(^{12}\). Obesity is also associated with disc degeneration \(^{13}\) and vertebral endplate changes \(^{14}\). Spinal mobility decreases with increasing body weight \(^{15}\), which may interfere with disc nutrition.

Physical Activity And Low Back Pain

In the study only 34% reported to have regularly participated in sports at 3 times a week and in other recreational activities like gym, yoga, walking, cycling, jogging and swimming on regular basis. Sedentary lifestyle is directly proportional to the incidence of low back pain; hence the physical activity and sports play a major role in preventing it. Due to sedentary lifestyle there is decrease in the energy expenditure and decreased levels of fitness leading to increased risk of low back pain.

Job Demand Analysis

Working in operating room, requires a lot of physical energy. The job description includes standing for long hours, assuming a position, bending, stooping, lifting weight above waist, transferring patient from stretcher, transferring patient from bed to chair and chair to bed, twisting and rotating, ambulating a patient repositioning a patient etc.

Among the 70 subjects, 81.37% subjects stand for over 5 hours on a routine working day. Prolonged standing has shown to induce low back pain in people \(^{16}\). It is reported that sustained standing causes excessive spinal loading, which in turn causes fatigue in the muscles, leaving them vulnerable to damage and risk due to secondary postural problems like low back pain.

57.14% reported that bending and stooping are the part of their daily job description. Bending causes both compression and tension on the structures of spine. Creep occurs when the back is subjected to sustained loading leading to deformation of spinal structures and increase the risk of injury.

20% of the subjects reported that twisting and rotating are a part of their job description. During rotating activities there are torsional forces created. The risk of injury to the low back increases when torsion is combined with axial compression and forward bending.

These activities of bending, stooping, twisting, rotating, and standing for long hours are required to do repeatedly and sometimes along with lifting heavy weights and hence entailing over working of static and dynamic postural muscles leading to low back pain.

Assuming faulty postures during surgery can cause excessive stress on the joints and weaken the soft tissues such as muscles and ligaments by stretching them beyond their limits. These activities also increase the intradiscal pressure during transfers and manoeuvres leading to increased risk of damage to the low back resulting in low back pain.

Low Back Pain And Physiotherapy

Of the 60% who experienced low back pain at least once in their career, 83.3% have not taken physiotherapy. Pain due to over working of the muscles can be avoided if activities are used with correct ergonomic habits and exercises. In the study, subjects were asked about the awareness of the ergonomic activities and if they follow it or no. Physiotherapy has been recognised to be the first step towards eradicating occupational risk factors for low back pain. Physical activity along with specific exercises to strengthen the local as well as global stabilizers go a long way in prevention as well as in management of low back pain. Short term management of low back pain can also effectively be managed through electro and manual therapy without any side effects.

Despite abundant evidence available to support the above-mentioned claims and despite the operating room staff being medical professionals themselves with easy access to physiotherapy services, the subjects in current study have not consulted a physical therapist for prevention/management of low back pain.

Conclusion

In conclusion, the result of the present study shows that 60% of the people who took the survey admitted to having LBP.
The postural demand of the job which includes long standing hours, incorrect work posture, less physical activity, ergonomically deficient work area are all contributing risk factors to LBP.

Personal habits like alcohol consumption, smoking etc. lifestyle habits, BMI (overweight & obesity), less physical activity, and reduced participation in recreational activities also contribute to low back pain.

Ergonomic modifications of work station, application of work principles, incorporating physical activities in terms of recreational sports can be useful in controlling low back pain.

**Recommendations**

Work site ergonomic assessment and subsequent modification for primary prevention of low back pain. Adaptable devices in OR, adjustable operating table, trolley would also help in preventing stooping. Work-Break schedule should be maintained to avoid static loading. Personal habits like increase in physical activities to maintain optimum body composition. Participating in recreational sports will not only help in physical fitness but also relaxation.

**Conflict of Interest.** There exists no conflict of interest in this research to the best of our knowledge

**Source of Funding:** No external funding solicited for the research.

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Telerehabilitation in India: Points to Ponder

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Abstract

Inaccessibility, dependency on caregivers and healthcare costs are challenges faced by the geriatric population in low and middle-income countries. Due to these factors, elders are unwilling to engage in rehabilitation and preventive health programs. Therefore there is a need to identify alternative methods of health promotion services and telerehabilitation is one such method. Hence, this pilot study aimed to identify the barriers to video conferencing, which is an easy method of telerehabilitation delivery. This study was a cross-sectional survey using interview and observation methods. The results suggest that training on using technology is essential. This study was done in a limited urban area and participants were educated and computer literate. It is anticipated that other populations may vary in their perceptions and hence further research is required. Establishment of prerequisites prior to actual delivery of telerehabilitation may potentially increase acceptability and hence sustainability.

Keywords- elderly, telehealth, videoconferencing, standardization

Introduction

Technological advancement in healthcare has increased life expectancy thereby increasing the number of people over the age of 60 years [1]. One of the problems with this increase in the number of elders is the challenges posed to the healthcare system of the country. Data shows that elderly dependency would increase from 13.1 in 2001 to 27.9 in 2051 [2] which may bring about greater medical, economic, and social challenges increasing the utilization of rehabilitation services. Inaccessibility, increased dependency on caregivers and the cost of health care among geriatric population [2, 3, 4, 5] are the most important challenge that low and middle-income countries including India are facing today. In India, currently disability prevention and health promotion programs are not covered by insurance and so clients have to bear the costs themselves [6, 7, 8]. Due to this factor, most elders are unwilling to engage in preventive health programs and health promotion activities informal settings which they perceive as an unnecessary economic burden. Therefore there is a need to identify alternative methods of rehabilitation and health promotion services. One such method described extensively in literature is telemedicine and its counterpart telerehabilitation [9, 10].

Telerehabilitation is different from telemedicine in the fact that it requires repeated, routine and frequent interaction with the therapist along with complete visualization of the client. Many of the exercises are done in standing and alignment of various joints starting from the ankle to neck needs to be visualized whereas telemedicine is often a consultation and the need for visualization is often a small localized part of the body. Although there have been several articles published in India on various methods of telerehabilitation and efforts have been made by NGOs and government agencies none of these have been sustainable. Hence, the objective of this study is to identify the reasons that elders may perceive as barriers during telerehabilitation via video conferencing.

Methodology

This pilot study was a cross-sectional survey using informal interview and observation of elders living
independently in the community. Permission from the Institutional Ethical Committee was obtained and twenty individuals over 60 years having accessibility to a computer with internet connection, with adequate cognition (Mini Mental State Examination (MMSE) score more than 23), who could understand and read English and follow commands for computer usage and exercise were invited to take part in the study through convenience sampling and awareness lectures. Elderly having visual, auditory and balance impairments and who were not independent of the basic activities of daily living and unable to understand the procedure were excluded. Informed consent was obtained from 11 participants. Repeated video conferencing sessions were conducted to optimize distance, furniture characteristics, bandwidth and lighting considering the 5th and 95th percentile of the population selected. Using Google hangout, a real time face to face interactive session was carried out in the presence of a physiotherapist at their residence. A set of exercises were delivered to the participants in the form of demonstration through video conferencing where the therapist and the participants were able to observe each other. An observational method was used to obtain information regarding furniture, size of laptop & room size at individual residences of the participants. An informal interview was carried out following the telerehabilitation sessions to understand the elder’s views on telephysiotherapy through video conferencing, the challenges encountered & the overall experience of the procedure. Data were analyzed using descriptive statistics.

**Results**

Three participants who had spacious homes were selected at first for delivery of telerehabilitation. Using available resources videoconferencing was conducted and optimization of viewing distance based on other characteristics was ascertained. The height of the participants varied from 4.11” to 6.1” and the table height ranged between 17”-30” and screen size of 14” and angle of the laptop screen to keyboard ranged between 85° and 90°. Ideal viewing was achieved at 15.5 feet between the tips of the toes to the camera.

Using the optimum dimension and available resources the procedure was replicated on 8 participants, video conferencing was conducted and optimization of viewing distance based on other characteristics was ascertained. The observations revealed that the participants used both laptop and desktop with screen size ranging from 13”– 20”. The chair height (seat Pan to Floor) ranged between 15” to 19” and table height ranged from 13” to 43” and the distance from the screen to person ranged between 7”-13” with an angle of camera ranged between 80° and 100°.

As evident from the data, for optimum viewing of the participant, several factors must be manipulated. Hence this would be difficult to apply to this cohort for various reasons as depict in Table 1 below. During the teleconferencing, several technical issues were encountered. These are listed in Table 2.

**Table 1: Challenges encountered during the telerehabilitation session**

<table>
<thead>
<tr>
<th>Challenges encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCREEN</td>
</tr>
<tr>
<td>Unavailability of the standard laptop or desktop size</td>
</tr>
<tr>
<td>CAMERA</td>
</tr>
<tr>
<td>The angle of view could not be measured accurately thereby the angle of the laptop screen to the keyboard was used.</td>
</tr>
<tr>
<td>FURNITURE</td>
</tr>
<tr>
<td>Unavailability of standard table height, adding filler material to increase the height of the table was cumbersome</td>
</tr>
<tr>
<td>SPACE</td>
</tr>
<tr>
<td>Unavailability of specific space dimensions</td>
</tr>
</tbody>
</table>
Table 2: Technical Issues encountered during telerehabilitation session

<table>
<thead>
<tr>
<th>Technical Issues encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity</td>
</tr>
<tr>
<td>Bandwidth issues in different rooms of the house, pausing of video</td>
</tr>
<tr>
<td>Time</td>
</tr>
<tr>
<td>Average time taken to set up the telerehabilitation platform was around 30mins</td>
</tr>
<tr>
<td>Ease Of Use</td>
</tr>
<tr>
<td>Elderly needed repeated instructions for understanding the process of video conferencing</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Lighting, poor audibility, call drop, difficulty in remembering the steps involved in video conferencing, there was lag during conversation and troubleshooting during a particular step used for video conferencing was difficult for the elderly. For delivering therapy the therapist required to see the whole person the opposite screen and this led difficulty in hearing commands</td>
</tr>
<tr>
<td>Teleconference Platform</td>
</tr>
<tr>
<td>The problem with the platform used for would get connected to both the mobile phone and the computer</td>
</tr>
</tbody>
</table>

On debriefing the elders through in-depth interview, it emerged that they were unaware of the potential benefits of the programme and hence were reluctant to invest time and energy to adhere to instructions and standardization. They believed that they were helping the researcher complete her study and did not perceive any benefits for themselves. Moreover, health promotion and illness prevention through active modes like exercise and food are only recently becoming popular. Traditionalists are still steeped in the treatment of illness rather than health promotion. Another factor is that the client’s perception of exercise is equated to yoga and/or walking.

**Discussion & Reflection**

The results and opinion from the participants of the present study suggest that training for both therapist and client on using the telerehabilitation method prior to actual delivery of the program is essential. In addition, an expert in the computer needs to be a part of the team for troubleshooting. The minimum bandwidth required is 2 Mbps for video conferencing for one location, the source of light should be opposite to the person with a minimum power of 80 watts/ or bright sunlight and adding an external mic would be beneficial. Furthermore, the instruction should be clear with good enunciation and at slow speed and single step commands. It is better if they work in a group as there is a spirit of competition and hence better adherence to therapy. This is a pilot study done in a limited urban area and participants were educated and computer literate. It is anticipated that other populations may vary in their perceptions and hence further research is required. Establishment of prerequisites prior to actual delivery of telerehabilitation may potentially increase acceptability and hence sustainability. These would be future objectives.

**Conflict of Interest:** The author(s) received no financial support for the research, authorship, and/or publication of this article

**Source of Funding:** Self

**Ethical Clearance:** The ethical clearance was obtained from the ethical committee of Smt. Kashibai Navale Medical College and General Hospital. The IEC number is SKNMC/Ethics/App/2015/215

**References**


Review Article

Influence of Variations in Seat Surface Inclination on Trunk Muscle Recruitment and Reaching Ability in Children with Spastic Cerebral Palsy: Systematic Review

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Abstract

Functional sitting is defined as a position in which children with Cerebral Palsy gain head-trunk and foot control with maximum degree of independent function while performing arm and hand movements during tasks. Aim of systematic review was to evaluate current evidence on effect of seat surface inclination on trunk muscle recruitment and manual reaching ability in children with spastic Cerebral Palsy (CP). Literature search was conducted through electronic databases which included Google Scholar, Pub Med, Science Direct, ERIC and Web of Science for studies performed from year 2004 to 2017. Reaching activity, seat surface inclination and spastic CP were used as keywords. In total 217 articles were identified through database search, out of which 208 were removed due to duplication or exclusion. Out of 217 studies, 9 were selected for this review from search in electronic databases. Literature search was performed from year 2004 referring to subject of interest up to 2017. Majority of the studies included in systematic review demonstrated that children with spastic CP sitting with an anterior incline demonstrated reduced postural sway which resulted in improved postural control. Reaching activity also improved with anterior inclination in these children in comparison with posterior inclination. However, these literatures did not highlight influence of seat surface inclination on trunk muscle recruitment in children with CP.

Keywords: Reaching activity, seat surface inclination and spastic cerebral palsy.

Introduction

CP is described as group of developmental disorders of movement and posture, causing activity limitations that are attributed to disturbances occurring in fetal or infant brain. It is most common physical disability with a prevalence of 33,000 children and incidence of about 1 in 500 birth.1 Atypical movement patterns, abnormal muscle tone and lack of postural control along with persistence of primitive reflex patterns interferes with movement quality. Postural dysfunction plays a key role in motor impairments further leading to lack of mobility.2 This causes them to spend majority of their time in either sitting or lying position which exposes them to risk of developing deformities and other related cardiovascular impairments.3 In children, trunk stability in sitting posture is primarily controlled by muscle recruitment, active muscle stiffness, and reflex responses resulting in highly coordinated muscle activation patterns.4 Inadequate control of trunk and proximal musculature may contribute to inefficient control of upper extremity of child with CP. Optimal sitting posture, especially one that promotes good postural alignment and stability, is a critical prerequisite to efficient motor control.5 Correct sitting posture reduces likelihood of tissue trauma and provides optimum position for feeding, respiratory and digestive function. It also aids head control which is essential for orientation, socialization and for child to develop cognitive and communication skills.6 One of

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the frequent activity limitations in children with CP include reaching and manipulation, which is essential for performing activities of daily living. 7

Ability to sit independently is fundamental for function but delayed in children with CP, due to poor trunk muscle recruitment, causing asymmetry in sitting posture. It has been recognized that proper seating, especially stabilization of pelvis and postural control of trunk, is an important factor contributing to voluntary control of upper extremity; similarly, an unstable seating posture can negatively influence development and refinement of upper-extremity motor control.

Facilitation of correct sitting position can be achieved with help of seating devices which provides correct alignment along with stability. These devices have a positive effect on postural control and enhances function of upper extremity. 8 Objective of this systematic review is to explore effect of seat surface inclination on trunk muscle recruitment and arm function in children with spastic CP in terms of manual reaching.

**Material and Method**

**Identification and selection of studies:**

Preferred Reporting items for Systematic reviews and Meta Analyses (PRISMA) was used for conducting this Systematic review. Literature search was performed using following databases: PubMed, Science Direct, Google scholar, ERIC & Web of Science. Keywords used for the search were “Reaching activity, seat surface inclination & Spastic CP”. Full text articles were compiled and evaluated for inclusion

**Inclusion criteria:**

All types of articles evaluating effect of seat surface inclination in children with spastic CP on reaching activity and on trunk muscle recruitment in age group of 0-17 years were included. Articles in only English language were included.

**Exclusion criteria:**

Articles evaluating other parameters apart from reaching activity and their effect on trunk muscle recruitment were considered as exclusion.

Literatures on neurological disorders other than CP were excluded.

Inclusion criteria were applied to article’s title, abstracts and full texts. In case article did not fit inclusion criteria, it was excluded from review.

**Study Sources:**

Literature search was performed referring to subject of interest from year 2004 to 2017, using following databases- Google scholar, Pub Med, ScienceDirect, ERIC and Web of Science using different key words. Keywords included reaching activity, seat surface inclination and spastic cerebral palsy.

**Study Selection:**

Records were identified through database search which included search engines like Google scholar (n=116), PUBMED (n = 45), Science Direct (n = 41), ERIC (n=8) & Web of Science (n=7). Out of 217 articles, 208 articles were removed due to duplication or exclusion criteria. 9 studies were included in present systematic review. Out of nine studies five were experimental studies, three were systematic review and one was meta-analysis.

**Data Collection Process:**

Full text were obtained for each article from above mentioned database. In total 217 articles were extracted but due to duplication 208 articles were removed. Finally 9 articles were included in our systematic review. Required details were systematically extracted from each study and findings are summarized based on their principal findings.

**Results & Discussion**

Objective of this systematic review was to evaluate studies investigating influence of seat surface inclination on manual reaching and trunk muscle recruitment in children with spastic CP. Nine articles were found that specifically evaluated reaching in children with CP upto 15 years of age.

**Participants characterization and research design:**

With regards to population of interest out of 9 studies, 8 studies compared performance of manual reaching in children with CP with that of typically developing children. However, only one study evaluated only children with CP. 8 These studies demonstrated that children with CP have a different pattern of movement as
compared to typically developing children with context to changes in inclination of supporting surfaces.7 Sample size varied from 7 to 58 children. Age group studied ranged from 1-20 years. Most of studies consisted 7-13 children per group i.e. an experimental group and a control group with typically developing children. Classification of CP was heterogeneous across studies, with variations in, functional capacity reported by GMFCS level varying from I-V.9-10 The study included children with spastic, hypotonic, dyskinetic, and ataxic CP. Degrees of inclination varied from 0°-30° anterior, horizontal and posterior.

**Measurements and procedure:**

Reaching activity was divided into phases such as reaching, grasping, transporting, and releasing object. Reaching movements were recorded with SIMI Motion System, Pediatric reach test & Electromagnetic Force Plate (Kistler 9286AA). Kinematic analysis were carried out with PedEMG software. Kinematic analysis of upper limb tasks is gold standard for evaluation of motion and provides accurate, reliable, quantitative, valid and sensitive data to quantify level of motor performance of individuals with movement disorders.12-13

Above mentioned studies evaluated spatiotemporal variables of reaching and trunk kinematics. Two studies used combination of kinematic and electromyographic analysis (EMG) of upper limbs and trunk. Electromyographic examination interprets normal and pathological conditions through study of muscles electrical activity.14 When arms are lifted muscles of neck and trunk are activated to keep trunk and head steady. Good postural response mechanism ensures that right muscles are activated at right time, in right sequence and with just right amount of force. Anterior inclined sitting position increases hand movement efficiency for children with spastic CP.

It is reported that children with CP have large activation of neck extensor’s muscles, while it causes little activation of thoracic and lumbar extensor muscles during sitting.7 Trunk hypotonia in children with Cerebral palsy is a common finding. Difficulties in functional activities is attributed to insufficient trunk control in children with cerebral palsy. These children present with weak postural muscles, inefficient balance reactions causing a delay in development of movement control.15 When trunk is stable, upper and lower limbs can be used optimally. To best of our knowledge there is no literature evaluating trunk muscle recruitment with changes in seat surface inclination. However, literature suggests that with improved trunk control there is better upper extremity function in terms of lifting objects from one place to other, moving of blocks, feeding activity etc, in children with CP.16

All studies showed that postural control improved in anterior inclined sitting. Anterior-inclined seat surface facilitates weight bearing through feet and thus improves postural stability and reaching efficiency of children with CP, while posterior inclined seat surfaces pose more postural challenges. Children with unilateral spastic CP benefit most in terms of less postural muscle activity, a better quality of reaching, and better postural stability during reaching from a forward tilted inclined position.

**Conclusions**

Present systematic review suggests strong evidence for use of anterior seat surface inclination for improving reaching activity in children with spastic CP. There is dearth of studies evaluating effect of seat surface inclination on muscle recruitment of trunk muscles.

**Future Recommendations:**

Further research needs to explore on specifications for anterior inclination in terms of degree of inclination required and its effect on trunk muscle recruitment along with its influence on arm function in children with spastic CP.

**Ethical Clearance:** Ethical approval was obtained from MGM Medical College Institutional Ethics Committee.

**Conflict of Interest:** Authors declared no conflicts of interest.

**Source of Funding:** Self

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Awareness about Exclusive Role of Postnatal Physical Therapy: A Preliminary Survey Conducted on Obstetricians at Aurangabad, Maharashtra

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Abstract

Background: Individual need based (INB) Pelvic floor muscle training and active care of Diastasis recti form the essential components of postnatal care and such care is included as exclusive component of postnatal Physiotherapy (PNPT). Lack of such awareness resulting into poor referrals for PNPT was hypothesized to be prevailing among our Obstetricians. Methods: This hypothesis was tested by conducting a brief survey on 105 obstetricians from Aurangabad using a brief questionnaire that included 8 questions. Results: The result showed that none of the questions was answered completely. Analysis of percentage values of options except those in Q.2, 6 & 7 was inferred as acceptance of our hypothesis. Those 6 subjects who referred patients for PNPT were found to be faculty members interacting with teaching Physiotherapy dept. This observation strongly recommended active participation of Physiotherapists to spread awareness about the exclusive components of PNPT among health professionals involved in maternal care.

Keywords: postnatal physiotherapy, women’s health, pelvic floor, diastasis recti, exercise, physical therapy

Introduction

Physiotherapy in “Women’s health” primarily addresses musculoskeletal issues related to obstetrics & Gynecology. To understand its concept, there is an utmost need to understand biomechanics and neurophysiology of all the muscles of the abdominal capsule (AC) i.e. diaphragm, abdominal and paraspinous muscles as well as pelvic floor muscles (PFM) embedded within its three components i.e. dome, lateral cylinder and sling respectively. These muscles are interlinked in series to form a kinetic chain with unique motor control because of which, affection of any one can trigger the dysfunction of other¹. Therefore, for effective management of any one component, it is mandatory to rule out or address (if identified) the involvement of rest of the component(s) of AC.

Remedial exercise is an effective health measure for PFM dysfunction², which commonly associates with vaginal labor. For postnatal PFM training a standard protocol of Kegal’s exercises is generally found to be used but its outcome is often observed to be uncertain. Many patients report development of late onset postnatal pelvic floor dysfunction (PFD)³ which could be because, while prescribing PFM exercise, the postnatal exposure to activities causing increased intra-abdominal pressure (IIAP) (e.g. repeated coughing, constipation related straining, indulging into high impact activities like sports etc) is not taken into account, hence justifies the utmost need of individual need based (INB) PFM exercises- not only for improving muscle strength or endurance but also for improving coordination⁴.

Diastasis recti (DR) is a common obstetrical manifestation and Physiotherapeutic intervention for the same is reported to show significant improvement within 18 hours postpartum.⁵ Since DR may associate with lumbopelvic pain⁶,⁷ and PFD⁸ it cannot be overlooked.
However, it is frequently observed that women after normal delivery avoid to attend postnatal clinic (PNC) unless there is any prevailing serious health issue like infected episiotomy scar etc; but even if they do, the assessment of DR is generally overlooked.

Freshly synthesized collagen fibers during the puerperal healing stage of DR and pelvic floor (after vaginal labor), are highly fragile, hence need maximum avoidance of activities which are likely to impose overstretch on them and jeopardize timely restoration of their tensile strength including risk of their nonreversible lengthening similar to overstretched rubber band. Therefore, puerperal care also needs mandatory ergonomic advise to avoid activities causing IIAP, including training in specific skills like “Knack” and/or “Splinting” maneuvers, to minimize the impact of IIAP on pelvic floor if patient is forced to indulge into such activities.

In addition, an altered i.e. “Butt gripping” posture is also found to be adopted during puerperium to avoid perineal stretch on painful episiotomy scar and such posture imposes risk of PFD therefore it is also essential to address postural alterations if any, during postnatal care.

Since all the aforesaid components such as prescribing PFM exercises as per INB protocol, active care of DR, protective ergonomic advise, prescription of protective skills against IIAP and postural corrections etc fall exclusively within the domain of Postnatal Physiotherapy (PNPT), inclusion of Physiotherapist becomes essential in the team offering postnatal care.

However, Physiotherapist is hardly found to be included in the team of professionals offering maternal care. Further, the team members focus only on PFM training by using a standard protocol of Kegel’s exercises and overlook DR though abdominal muscle and PFM status interlink. In fact, many Obstetricians do not offer or refer patients for postnatal PFM training, in spite of good awareness about its importance. Awareness about the importance of INB protocol of PFM training, and regular follow up of DR plus trend of referrals for PNPT were hypothesized to be lacking among the Obstetricians, hence formed the aim of this survey on practicing Obstetricians.

Method: A convenient sample size of 105 Obstetricians practicing in the city of Aurangabad, Maharashtra state, from 5 to 45 years (average 26 years) participated in the survey. Taking into account their busy schedule of clinical practice, the questionnaire used in this survey was kept as short as possible by limiting it to explore the following:

- i. Awareness about INB concept of PFM exercises
- ii. Strategies of postnatal care practice with regards to restoration of DR and PFM status
- iii. Trend of referrals for PNPT

After the informed consent each subject was requested to fill up a semi-structured questionnaire which included 8 questions under three subtitles as follows:

A. Agreement on the statement (Q 1-4): Options: agree / neither agrees nor disagrees / disagrees

B. Frequency of items considered during routine postnatal care practice (Q5-6): Options: Always / frequently / Sometimes / rarely / Never

C. Two Open ended questions (Q. 7 & 8)

The data collected was analyzed to percentage value of each option.

Result

Analysis showed the following result:

A :

Q 1. PFM exercises are mandatory postnatally even after C section: Agree 100 (95.23%) / neither agree or disagree 4 (3.8%) / not answered 1 (0.95%)

Q 2. It is not necessary to modify standard protocol of Kegal’s exercises as per individual need: Agree 50 (47.61%) / Not answered 55 (52.38%)

Q3: It is risky if DR fails to heal naturally: Agree 103 (98.09%) / not answered 2 (1.9%)

Q 4. Trend for referrals for PNPT is poor in India: Agree 101 (96.19%) / not answered 4 (3.8%)

B :

In your routine postnatal practice how often do you...
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Q5: assess DR during Postnatal Follow up (PNC)- Frequently: 53 (50.47%) / sometimes: 27 (25.71%) / Rarely: 22 (20.95%) / not answered: 3 (2.85%)

Q6: refer your clients for Physiotherapy for Postnatal care: Frequently: 7 (6.66%) / rarely: 4 (3.8%) / Not answered: 94 (89.52%)

C: Q7: who offers postnatal exercises to your clients: Garbhasanskara center 17 (16.919%), Physiotherapist 6 (5.71%) / Not answered 82 (78.09%)

All the 6 subjects who were referring patients to Physiotherapists for Postnatal exercises (Q. 7) were found to be serving as faculty members of the Medical College and had regular interaction with their teaching Physiotherapy department.

Q 8: How safe is it to leave DA to heal naturally? Very safe 91 (86.66%) / Not answered 14 (13.33)

Discussion

In spite of questionnaire being short with adequate time granted to reply, none of the 8 questions was answered completely. Out of 105 subjects, 55, 94 and 82 did not answer the question no. 2, 6 and 7 respectively. Such attitude of non-commitment was interpreted as speculations of the subjects regarding correct answers.

No conclusion could be drawn on the awareness about need of INB modification of standard Kegel’s protocol because 52.38% subjects did not answer. Since, remaining subjects agreed that such modification is not necessary, from the overall response, an inference was drawn that lack of awareness in this regards was prevailing.

Regarding DR, though there was strong agreement that it is risky if DR fails to heal naturally, 86.66% subjects stated that it is very safe to leave DR to heal naturally and none out of 105 felt it was “always” necessary to assess the same during postnatal follow up, suggesting lack of awareness about such need.

Regarding referrals for PNPT, only 5.71% subjects who were interacting with teaching Physiotherapy department, referred patients for PNPT; whereas, 96.19% agreement was found on poor trend of referrals to PNPT in India.

This study was conducted at Aurangabad, but similar scenario is also speculated at the remaining part of this country which is attributed to lack of interest shown by the Physiotherapists to establish specialty in Women’s health—which is very much unlike global scenario. This attitude is evident because there are least opportunities of higher education in this specialty whereas postgraduate education in many other specialties is already well established all over the country. Such neglect, has probably resulted into highly inadequate efforts on part of Physiotherapy professionals in creating awareness about the importance of exclusive components of PNPT among the team members involved in postnatal care. Physiotherapy is also found to be missing in our National program on maternal care where major focus is found to be offered to prevention of maternal mortality. Importance of PNPT would perhaps be felt if the government had also focused on “morbidity” associated with inadequate postnatal care of PFM and DR status resulting into lumbopelvic pain and PFD affecting quality of life, under the already prevailing cultural attitude of self neglect among women who suffer silently by accepting such consequences as part and parcel of parity.

Conclusion

Our hypothesis on lack of awareness about the importance of individual need based (INB) protocol of PFM exercises and need of regular follow up of DR among Obstetricians was accepted. The survey also showed agreement on the poor trend of referrals for PNPT in India.

Recommendation

It is high time that Physiotherapists in India make adequate efforts to spread awareness about the exclusive scope of PNPT. It is also strongly recommended that Physiotherapist should be included in each team involved in postnatal care including National programs on maternal health.

Conflict of Interest- None

Acknowledgement- None

Ethical Clearance: Ethical clearance was obtained from institutional ethic committee of MGM’s Institute of Physiotherapy, Aurangabad, Maharashtra, India

Source of Funding: Self
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Predictive Cutoff Values of Five Times Sit to Stand Test in Community Dwelling Elderly Individuals of India

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Abstract

Introduction: Lower extremity functioning is important for maintaining activity in community dwelling elderly individuals of India. Degenerative changes occur in many joints and this is combined with the loss of muscle mass, inhibits elderly people locomotion. Chronic conditions such as arthritis, orthopedic impairments, cardiac disorders, and reduced sensitivity of sensory organs are associated with varying degrees of disability. The assessment of physical mobility is an essential component of elderly individuals as the aging is necessarily accompanied with affected movements and loss of balance. Conventional physical examination includes the Five-Times-Sit-to-Stand Test and the Timed “Up & Go” Test. These tests are reliable and valid clinical tools, and performing them requires limited space in community settings. Predictive cut off points for standard measurements of lower extremity functioning would help identify elderly people who are not disabled but have a high risk of developing disability.

Objective: To define the standard performance of elderly people without gait disturbances in the Five-Times-Sit-To-Stand test and investigate its determinants.

Method: All the participants were collected from the Community Dwelling elderly people residing in Loni, Ahmednagar Rahata. They were screened according to the inclusion and exclusion criteria. Participants were briefed about the study and an informed written consent was obtained from the participants. Assessment was done by BMI, Five-Times-Sit-TO-Stand-Test. Assessment was done once to observe the Predictive risk of falls in community dwelling elderly individuals. A population-based sample of 100 community dwelling elderly individuals, 60 to 80 years of age, were studied using a clinical, neurological, and cognitive standardized protocol which included the Five-Times-Sit-To-Stand test.

Result: The sample included 100 individuals where 43 were males and 57 were females with a mean age of 68.17 ± 5.200 respectively (age range 60 to 80 years). The mean time score for the whole sample in the Five-Times-Sit-To-Stand Test was 16.2748 ± 3.3044 seconds with a range of 5 to 25 seconds. This assumption was tested using the method Kolmogorov and Smirnov (KS) in which the p value was > 0.9999, considered not significant. The Five-Times-Sit-To-Stand Test for males (16.118 ± 3.008 sec & 16.144 ± 2.526 sec) for females (16.123 ± 3.75 & 16.148 ± 2.60 sec). The ANOVA revealed that, the interaction between age and gender was not significant (p = >0.9999).

Conclusion: It was concluded that the Five-Times-Sit-TO-Stand-Test performance of elderly people over 60-80 years of age without apparent gait disturbances depends on age and other variables such as weight, height, BMI. Assessments of lower extremity functioning with Five-Times-Sit-to-Stand-Test, especially poor performance on the test, were good predictors of future disability in community dwelling elderly individuals of India.

Keywords: Elderly people, Five-Times-Sit-To-Stand-Test, Gait assessment, Risk of Fall, Screening.
Introduction

India is an aging society with the rate of growth of aging population exceeding the growth of general population. In India, it is estimated that the elderly in the age group of 60 and above is expected to increase from 71 million to 179 million in 2001-2031. Approximately one third of people over 65 years of age and 49% of people over 72 years and older fall each year. Fall rate among older adults is 10-15% which result in serious injury causing disability and death.

Fall evidence is higher in females as compared to males, the fact that women experience more loss in bone mineral density than men as a consequence of the menopause may be one explanation for differences in fall and fracture rates.

Chronic conditions such as arthritis, orthopedic impairments, cardiac disorders, and reduced sensitivity of sensory organs are associated with varying degrees of disability. These chronic conditions also predispose the older adult to a most feared and leading cause of disability for the elderly-falling. In addition, a decline in physical activity can occur that can lead to impaired balance abilities, decline in muscle strength, and decline in physical endurance.

The assessment of physical mobility is an essential component of elderly individuals as the aging is necessarily accompanied with affected movements and loss of balance. Physical mobility can be assessed by several measures which include conventional physical examination and laboratory testing procedure. The Laboratory testing procedures accurately measure multiple components of balance, gait and reliably separate fallers from non-fallers and predict future falls. However, these techniques are costly and unfeasible in most clinical settings. Whereas, the Conventional physical examination includes the Five-Times Sit-to-Stand Test and the Timed “Up & Go” Test. These tests are reliable and valid clinical tools, and performing them requires limited space in community settings. It has been frequently used to assess functional mobility in elderly individuals and has been found highly correlated with functional markers, namely, stair climbing; balance and walking speed; predictive of falls, and mortality.

Csuka and McCarty first described the use of the Sit-to-Stand Test as a measure of lower-extremity strength, force-generating capacity of muscle. The Sit-to-Stand Test is now commonly used to assess lower extremity strength and balance. The ability to stand from a chair is a crucial factor in independence in older adults living in the community. Slower Sit-to-Stand test have been shown to be helpful in predicting further disability. Physical therapists have important roles not only in the reduction of and adaptation to disability but also in the prevention of disability.

Hence, the study was carried out to determine the optimal cut off points of assessment of lower extremity functioning, for predicting the development of disability and to examine the benefits of using these test and for predicting the risk of disability in elderly people dwelling in the community.

Objectives

1. To assess Five-Times-Sit-To-Stand test in community dwelling elderly individuals of India.
2. To assess the predictive risk of falls in elderly individuals.

Methodology

A Observational study was conducted in the Community Dwelling elderly individuals of India. The study was approved by the Ethical Committee with reference no. PIMS/CPT/IEC/2018/551 at Dr. APJ Abdul Kalam College of Physiotherapy at Pravara Institute of Medical Sciences. The study was conducted during the period of four months among all the elderly individuals residing in Loni. The study was introduced after all the participants were informed about the research procedure. Detailed information regarding the nature of study was given to the participants before participation. Assessment was done by BMI, Five-Times-Sit-TO-Stand-Test. Data was collected, tabulated and descriptive, inferential statistics was used for statistical analysis. The ANOVA test was used to find the interaction between age and gender variables. This assumption was tested using the method Kolmogorov and Smirnov (KS) in which the p value was > 0.9999 considered not significant.
Result

Table no.1 mean value:

Five-Times-Sit-To-Stand Test scores in community dwelling elderly individuals of India.

<table>
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<tr>
<th>GENDER</th>
<th>AGE GROUP</th>
<th>NO.</th>
<th>MEAN+_SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>60-70</td>
<td>25</td>
<td>16.118+_2.947</td>
</tr>
<tr>
<td></td>
<td>71-80</td>
<td>19</td>
<td>16.1447+_2.4589</td>
</tr>
<tr>
<td>FEMALE</td>
<td>60-70</td>
<td>49</td>
<td>16.12387+_3.7206</td>
</tr>
<tr>
<td></td>
<td>71-80</td>
<td>7</td>
<td>16.1485+_2.40679</td>
</tr>
</tbody>
</table>

Table no. 2 : The distribution of male and Female according to the age group of 60-70 & 71-80

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-70</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>71-80</td>
<td>18</td>
<td>7</td>
</tr>
</tbody>
</table>

Table no. 3: The data are sampled from populations that follow Gaussian distributions. This assumption is tested using the method Kolmogorov and Smirnov (KS) in which the (p value is > 0.9999), considered not significant.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>KS</th>
<th>P VALUE</th>
<th>PASSED NORMALITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE (60-70)</td>
<td>0.1556</td>
<td>&gt;0.10</td>
<td>YES</td>
</tr>
<tr>
<td>MALE (71-80)</td>
<td>0.2186</td>
<td>0.0173</td>
<td>NO</td>
</tr>
<tr>
<td>FEMALE (60-70)</td>
<td>0.1334</td>
<td>0.0292</td>
<td>YES</td>
</tr>
<tr>
<td>FEMALE (71-80)</td>
<td>0.2147</td>
<td>&gt;0.10</td>
<td>NO</td>
</tr>
</tbody>
</table>

Discussion

The FTSS is a tool commonly used to assess the motor function, postural control, risk of falls, and effectiveness of intervention. Well-based Predictive Cut off values, if available, would assist the clinician’s interpretation of FTSS scores. The majority of published Predictive data come from studies with highly selected samples or with small samples of institutionalized elderly people. Data about the FTSS in population based samples are low.

Recently Bohannon published a descriptive meta-analysis of several studies on apparently normal individuals or including normal control groups, where no pathological condition could interfere on the TUG scores, to provide good reference values for this test. He was able to analyze the data of 4395 subjects obtained in 21 studies and the meta-analysis suggested that these data were rather homogeneous, but the variety of sample selection, inclusion and exclusion criteria, instructions, and methods of scoring is a limitation in interpreting results across studies.

Our study included 100 community dwelling individuals without gait disturbances on neurological exam, assessed with a well-defined procedure. We observed the previously established positive relationship between age and time score in the FTSS. Bohannon calculated 9.4 seconds as the mean time score in the
TUG for his 4395 cases; this figure is lower than the 10.2 seconds of our sample, but can be due to the difference between his age range: 60 to 99 years, and ours 60 to 80 years. However, his figures for the subjects older than 70 years are also lower than ours probably because the healthy volunteers are over-represented in his sample. We have also analyzed the FTSS stratified by gender, and confirmed that females have significantly higher scores for every age group. Other previous studies had reported this gender effect in several small samples of home dwelling individual, but with different patterns.

Newton et al examined 204 individuals aged 60 to 89 years and reported that females spent more time than males to perform the TUG in every age subgroup stratified by period. There is not a definite explanation for this gender difference, considered a common demographic effect, but muscle strength, which is required to get out of a chair, is lower in women and several studies have shown older women are more likely than older men to be disabled. As in previous studies, we found that FTSS scores in the elderly people without gait disturbances are strongly related to age. Other anthropometric variables, such as height, weight, BMI also demonstrated a significant effect in our study.

**Conclusion**

The study concluded that the FTSS performance of elderly people over 60-80 years of age without apparent gait disturbances depends on age and other variables such as weight, height, BMI. Assessments of lower extremity functioning with Five Times Sit to Stand Test, especially poor performance on the test, were good predictors of future disability in community dwelling elderly individual of India.

**Conflict of Interest - Nil**

**Source of Funding - Self**

**Ethical Clearance - Taken**

**References**

Stress among Traffic Police Personnel in the Coastal Region of South India

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1Associate Professor, 2MBBS Intern, 3Professor, 4Professor and Head of Department, Department of Community Medicine, Kasturba Medical College, Mangalore (Manipal Academy of Higher Education), Karnataka

Abstract

Background: Traffic police job is one such job where stress is synonymous with the work and involves a lot of skill, coordination and patience. The large vehicular density in Mangaluru due to being a port city and an industrial hub, leads to high movement of heavy vehicles and makes it one of the busiest place in its district which affects the mental wellbeing of the traffic personnel. The present study was done to estimate the level of stress among the traffic police personnel in Mangaluru. The study was conducted among the traffic police personnel of two police stations: Kadri being situated within the city premised and Surathkal, situated on a major national highway. Method: Data collection was done by organizing a camp. After taking the consent, information regarding the demographic details, habits, existing comorbid conditions was obtained and level of stress assessed using a structured questionnaire. Data were analysed using statistical package SPSS 16.0. Results were presented in the form of percentages and proportions, and p value <0.05 was considered to be statistically significant. Results: Maximum percentage of participants had a high stress level with 23.5% being < 30 years age. Higher levels of stress was associated with the place of posting i.e. urban and semi urban PS with p value <0.01. Conclusions: Higher level of stress was found in personnel in the younger age group and statistically significant association was seen between the stress levels with the personal habits (smoking and alcohol consumption) and place of posting.

Keywords: Traffic police personnel, Stress, Perceived Stress Level

Introduction

Traffic police job and stress is synonymous with the work and involves a lot of skill, coordination and patience. Stress is one factor which leads to imbalance between individual’s capabilities and the output, at the workplace. It is imperative that factors at the workplace go a long way in influencing an individual’s health- both physical and mental. International Labour Organisation points out a general rise in mental ill-health [1] due to stress at the workplace around the globe.

The effect of stress also manifests itself as absenteeism, reduction in productivity, increase in error rate, poor decision making. Stress is also the risk factor for many non-communicable diseases like diabetes and hypertension, which often manifests its first symptom in the form of an irreversible complication. Studies [2] have shown that failure to cope up with the stress has even led the officers to take extreme steps of committing suicide.

The traffic in the city of Mangaluru is a challenge to manage for any traffic police department. The large vehicular density due to being a port city and an industrial hub, leads to high movement of heavy vehicles and makes it one of the busiest place in its district. Over the
past one decade, the vehicular traffic in the city has risen manifold; however, there hasn’t been a proportional rise in the number of traffic policemen and infrastructure to manage this increased load, thus resulting in longer duty hours per officer. Mangalore being located in the Western Ghats has rainfall for about six months a year. This further adds to the suffering of a traffic personnel as their job involves regular duty on road irrespective of weather. Lack of traffic lights at most of the intersections forces them to direct the traffic manually, exposing them to the noxious gases and fumes from the traffic causing further health problems.

**Subjects and Method**

The present cross sectional study was conducted among the traffic police personnel from the city of Mangaluru in 2016. Mangaluru is one of the metropolitan city in the state of Karnataka and is the district headquarter with population of 6.8 million. Mangaluru is also a host to a large number of industries and a major port which further adds to the vehicular density. The vehicular density in the city has risen from 3.6 lakh in March 2014 to 4.5 lakh in March 2016 and the number is adding daily.

The study was conducted after being approved by the Institutional Ethics Committee, Kasturba Medical College (KMC), Mangaluru. Permission from the Assistant Police Commissioner, Mangaluru and the Dean of KMC, Mangaluru was obtained before the commencement of the study. Mangalore has 3 traffic police stations- Bunder (urban PS), Kadri (urban PS) and Surathkal (semi-urban PS) police stations (PS). Two PS, Kadri (urban PS) and Surathkal (semi-urban PS) was selected by simple random sampling for the study purpose. The Surathkal Police station is located at the National Highway acting as a major entry and exit point of the city connecting it with other major towns of the adjoining area and thus witnesses a high density of good carrying vehicles as well as small vehicles.

Similarly, Kadri Police station stands at a major traffic junction and market place within the city premises with a high density of small and medium weight vehicles. A camp was organized for 30 days at a convenient location from the PS and not more than 5 participants were called so that they can attend the camp according to their time and availability without affecting their job. The purpose of the study was explained to the study participants and a written informed consent was obtained from them. The sample size consisted of 68 personnel and sampling strategy used to recruit participant from the two PS was convenience sampling. The data collection tool used was a pretested semi-structured questionnaire which was formulated to find the stress among traffic policemen. The questionnaire consisted of two sections A and B, in which section A had questions related to the demographic details and personal habit of the study participants whereas section B had questions on stress assessment.

For the stress assessment, the perceived stress scale by Mind Garden was used. This scale is 5 point Likert scale and includes 10 direct questions about the current levels of experienced stress in the last one month. Questions are designed to tap the unpredictability, uncontrollability, and the overload the respondents find in their lives. Each response was graded on a scale of 0 to 4, zero being the lowest score and four being the highest. The score for all the questions was added up and a score of more than 20 was considered to be high stress.

Data was entered and analyzed using statistical package SPSS (Statistical package for social science) version 16.0. Analysis was done by using descriptive statistics and results were expressed in the form of ratio, proportions and percentages. Association was estimated using chi square test and p value <0.05 was considered to be statistically significant.

**Results**

The study shows that the surveyed population consisted of 68 participants from the two major police stations of Mangaluru city – 32 participants were from Kadri (urban) police station and 36 from Surathkal (semi-urban) police station. Of the total participants, 63(92.6%) were males. The mean age of the study participant was 37.9 (SD ± 9.8) years with minimum age being 24 years and maximum age being 59 years. Highest percentages (30.6%) of people were from the age group of 30-39, closely followed by the age group 40-49 (29.4%). The study included representatives of all designations, majority being police constables, 27(39.7%), followed by head constable, 24(35.3%). Most participants, 31 (45.6%) were in service for less than 10 years while 25 (36.8%) were in service for 10-20 years. Majority of the study participants were non-smokers 60 (88.3%) and did not consume alcohol 38
(55.9%). Out of the 30 participants consuming alcohol, 28 currently consume alcohol whereas 2 had quit it.

Table No. 1 depicts Perceived stress scale by Mind Garden \(^5\) and was used for assessment of stress levels among the participants. Maximum percentage of participants, i.e. 48.5% had a high stress level and 17.6% had very high stress level and an equal percentage had low stress level. Average stress level was observed in 16.2% of the study population.

**Table-1: Level of Stress of the Study Participants**

(N=68)

<table>
<thead>
<tr>
<th>Stress Score</th>
<th>Stress Level</th>
<th>Frequency N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>Low</td>
<td>12 (17.6)</td>
</tr>
<tr>
<td>12-15</td>
<td>Average</td>
<td>11 (16.2)</td>
</tr>
<tr>
<td>16-20</td>
<td>High</td>
<td>33 (48.5)</td>
</tr>
<tr>
<td>21-40</td>
<td>Very High</td>
<td>12 (17.6)</td>
</tr>
</tbody>
</table>

Table No. 2 shows that higher levels of stress was associated with the place of posting i.e. urban and semi urban PS with p value <0.01 and similarly personal habits of smoking and/or alcohol consumption also had a strong association with high stress levels. Higher stress levels were seen in age groups less than 30 years closely followed by 30-39 year age group. Statistically no significant association was found between stress and gender, designation or duration of service of the study participant.

**Table-2: Association of Demographic Details with level of stress**

(N=68)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequency (%)</th>
<th>Total Score</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;15 (no stress)</td>
<td>&gt;15 (stress)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Police Station</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kadri (urban PS)</td>
<td>32 (47.1)</td>
<td>17 (25)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Surathkal (semi-urban PS)</td>
<td>36 (52.9)</td>
<td>6 (8.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 (44)</td>
<td>25 (36.7)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>63 (92.6)</td>
<td>22 (32.3)</td>
<td>0.65</td>
</tr>
<tr>
<td>Females</td>
<td>5 (7.4)</td>
<td>1 (1.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41 (60.3)</td>
<td>4 (5.8)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>18 (26.5)</td>
<td>2 (3)</td>
<td>0.05</td>
</tr>
<tr>
<td>30-39</td>
<td>21 (30.9)</td>
<td>7 (10.3)</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>20 (29.4)</td>
<td>9 (13.2)</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>9 (13.2)</td>
<td>5 (7.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 (23.5)</td>
<td>14 (20.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (16.1)</td>
<td>4 (5.8)</td>
<td></td>
</tr>
<tr>
<td>Designation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASI</td>
<td>6(8.8)</td>
<td>3(4.4)</td>
<td>0.16</td>
</tr>
<tr>
<td>Head Constable</td>
<td>24(35.3)</td>
<td>9(13.2)</td>
<td></td>
</tr>
<tr>
<td>Home Guard</td>
<td>5(7.3)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Police Constable</td>
<td>27(39.7)</td>
<td>8(11.7)</td>
<td></td>
</tr>
<tr>
<td>Inspector/sub-inspector</td>
<td>6(8.8)</td>
<td>3(4.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19(28)</td>
<td>3(4.4)</td>
<td></td>
</tr>
<tr>
<td>Duration of service (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤10</td>
<td>31(45.6)</td>
<td>8(11.7)</td>
<td>0.12</td>
</tr>
<tr>
<td>10-20</td>
<td>25(36.8)</td>
<td>8(11.7)</td>
<td></td>
</tr>
<tr>
<td>&gt;20</td>
<td>12(17.6)</td>
<td>7 (10.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23(33.8)</td>
<td>17(25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19(28)</td>
<td>5(7.3)</td>
<td></td>
</tr>
<tr>
<td>Personal habits†</td>
<td></td>
<td></td>
<td>0.01*</td>
</tr>
<tr>
<td>Yes</td>
<td>30(44.1)</td>
<td>5(7.3)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>38(55.9)</td>
<td>18(26.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25(36.7)</td>
<td>20(29.4)</td>
<td></td>
</tr>
</tbody>
</table>

*statistically significant

†(Alcohol + Tobacco consumption)
Discussion

The present study was done among 68 traffic police personnel of Mangaluru city, Karnataka to assess their level of stress. Stress is a risk factor for many diseases and leads to addiction, but if screened and acted upon timely it can be prevented. The study uses 10 item Mind Garden Perceived Stress Scale (PSS) to screen the study participants and a cutoff of >15 shows high or very high stress.

In the present study, maximum participants were males (92.6%) and the highest number of participants (30.9%) belonged to the age group of 30-39 years, closely followed by 29.4% participants in the age group of 40-49 years, a similar study done by Almaleet et al. [7] and Selokaret al. [8] showed similar distribution of age group and had more number of males in their study. This could be explained by the fact that even after constant effort towards social equality and women empowerment the mindset that physically demanding job are not apt for women prevails in our country. Most parents prefer and encourage their male child over female child for physically demanding jobs of police force.

The present study recruited from all the sections of police department and had the highest number of participants (39.7%) from police constable. Consumption of tobacco smoking and alcohol was seen in 8.8% and 41.2% of the study participants. Similar finding was also seen in a study done in Puducherry by Saya et al. [9] where highest participation (56.08%) was seen from police constable class and 21.62%, 50.34% policemen were tobacco and alcohol consumer.

The present study highlights that the level of perceived stress is high among majority of the traffic policemen studied, with 48.5% participants reporting high and 17.6% participants reporting very high stress level. Similar trend of high (51%) and very high (32.8%) level of stress were observed among participants in the study done by Saya et al. [9]. Perceived stress, in general, has been found to be high among police personnel in India as elsewhere in the world, this fact has been advocated by analogous results seen in other studies where stress level was 73% [7]. High stress among the police personnel was restricted not only to India but to the other parts of the globe also, like Malaysia where overall prevalence of stress as 38.8%. [12]

Experience in profession teaches a person to better cope with the situation and this was seen in the present study where participants younger than <39 years of age showed higher levels of stress (44.0%). This finding is in sync with other studies [9,11] which indicated that stress was more among the younger age group. This finding could be due to being new to the job and having relatively less expertise in dealing with the work situation. The present study did not show a significant association between gender of the participant and level of stress and this is similar to study conducted by Selokaret al. [8]. It can, therefore, be commented that gender does not have an impact on level of stress in police personnel. A statistically significant association between the places of posting with the level of stress was found from the present study. Higher stress levels were seen in personnel posted at the Surathkal (semi-urban) PS than those posted at Kadri (urban). The reason for the above finding could be explained by the fact that Surathkal (semi-urban) PS, is located at a major national highway (NH66) which connects the port town of Mangaluru to the rest of Karnataka, and therefore handles large volumes of traffic of both heavy vehicles as compared to Kadri (urban) PS. As per the data obtained from the National Highway Authority of India, the highway witnessed total of 486 accidents resulting in 130 casualties [13], witnessing a higher number of accidents and the associated mortality may be a factor for emotional stress. Similar results were seen in a study conducted at Aligarh, where significant association was found between the levels of stress with the place of posting, with higher levels in rural areas posting [14].

Tobacco smoking and alcohol consumption is a popular stress buster and it is highlighted in the present study where statistically significant association between the stress levels and personal habit (smoking and alcohol consumption) was seen among the study participants. Another study conducted in Mumbai, showed similar significant association between personal habits and levels of stress. [7]

Stress is an inevitable truth of today’s world and cannot be eradicated from job, but successfully coping and minimizing could be the key to success. Frequent screening and counselling session must be conducted by trained professionals at regional level. Police personnel can be taught to manage stress by yoga and meditation. Instead of falling prey to tobacco and alcohol the person can be motivated to choose other healthier options.
A traffic policeman from Indore \cite{15} has found an innovative method to enjoy his job by emulating “moon walk” while controlling traffic and has become the style icon of the citizens and has inspired many youth to join the police force.

The infrastructure should be improved to lessen the traffic congestion. Density based automatic traffic signal controller can be installed on all congestion prone areas to lessen the workload on traffic personnel.

**Source(s) of Funding/support:** self

**Conflicting Interest:** None

**Ethical Clearance:** Approval from institutional ethics committee was obtained prior to the study.

**References**


Effectiveness of Supervised Versus Home based Physiotherapy Intervention in Patients with Chronic Obstructive Pulmonary Disease (COPD)

Bhoomi P Shah¹, Daxa Mishra², Jigar Mehta³

¹Assistant Professor, Vinayaka Institute of Physiotherapy, Bakrol-Anand, ²Professor, K.M.Patel Institute of Physiotherapy, Karamsad, ³Associate Professor, K.M.Patel Institute of Physiotherapy, Karamsad

Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is a systemic disease with multiple extra pulmonary manifestations including impeded skeletal muscle function, leading to decreased muscular strength. Peak expiratory flow rate (PEFR), pulmonary function test monitoring provide a daily objective measure of lung function. A great emphasis has been placed on health related quality of life (airway questionnaire 20) of COPD.

Objective: To evaluate the effect of supervised versus home based physiotherapy intervention in stable COPD patients.

Methodology: Convenient sampling was used, data were collected from chest medicine department in Shree Krishna Hospital as per the inclusion and exclusion criteria fulfilled with written consent was taken. Patient were divided in to 2 groups, supervised group and home based group (40 in each group). Baseline data were taken from each patients (symptom limited walk test, quadriceps muscle strength, peak expiratory flow rate, pulmonary function test, airway questionnaire 20). Follow up assessment was taken at the end of 4th week.

Result: 80 patients were enrolled to receive home based group (n=40) or supervised group (n=40), independent T –Test and paired T-Test and BI –variant analysis done. All parameter significantly improve in supervised group (mean difference [95%CI],p<0.001),FEV1/FVC ratio ( means different [95%CI],p=0.001) than the home based exercise group.

Conclusion: Study concluded that supervised physiotherapy group had statistical significant changes seen in pulmonary function, quality of life as well muscle strength and symptom limited walk test than the home base physiotherapy group in stable COPD patients.

Keywords : COPD, pulmonary function test, airway questionnaire 20, quadriceps muscle strength.

Introduction

Chronic obstructive pulmonary disease (COPD) is defined as “a disease state characterized by the presence of airflow obstruction due to chronic bronchitis or emphysema”. COPD is one of the leading causes of morbidity and mortality in industrialized and developing countries and is currently the 4th leading cause of death in US after cardiovascular disease, tumors and cerebrovascular disease. The WHO estimated that COPD is at present the 7th leading cause of death and disability worldwide but will rise to 3rd position, all over the world by 2020. The disease is distinctly higher in males, with its prevalence’s on the rise in developing countries like Asia and Africa. On an average in India COPD patients spent about 15% of his income on smoking products and up to 30% on disease management. The characteristic physiological abnormality in COPD is a decrease in maximum expiratory flow with the development of symptom of breathlessness, test of overall lung mechanics, such as FEV1, PEFR and airway resistance become abnormal in patients with COPD. Patients with COPD and additionally contributes in limiting their exercise capacity and quality of life.
The health–related quality of life (HRQOL) determine health status of an individual that is the quality of life affected by specific health status\(^8\). It encompasses the impact of functioning, home management, social and family relations\(^12-14\). Physiotherapy is often required to reduce WOB, including non–invasive ventilation to prevent intubation, hospitalization, morbidity, mortality. In stable disease, quality of life is primarily affected by breathlessness, exercise limitation and the interaction of depression and fatigue\(^15-17\). Whereas, functional capacity and health status of COPD suffers showed significant improvement with an implementation of pulmonary rehabilitation program, irrespective of change in FEV1 value. This indicates that functional capacity and health status are important factors for physical limitations rather than alteration in lung function values. Thus, to improve efficacy of treatment strategies, it is essential to lay down collaborative management approach for patients with stable COPD\(^12-14\).

**Aim of the study** is to evaluate the effectiveness of supervised and a home-based physiotherapy intervention on pulmonary functions, peripheral muscle strength and endurance, Quality of Life [QoL] (airway questionnaire 20) in stable COPD.

**Material and Methodology**

The study proposal was prepared and the approval to conduct the study was obtained from the Ethical Committee of H M Patel Center for Medical care and Education, Karamsad. In Present study convenient sampling was done, who were coming to chest medicine department of Shree Krishna Hospital, Karamsad. The study was conducted on 80 patients who were full filling the Inclusion and exclusion criteria.

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusive criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 40 and above ,either sex</td>
<td>Haemodynamically unstable</td>
</tr>
<tr>
<td>Able to follow commands</td>
<td>Cardiac disorders</td>
</tr>
<tr>
<td>Clinically stable</td>
<td>Musculoskeletal disorders</td>
</tr>
<tr>
<td></td>
<td>Impaired cognitive functions</td>
</tr>
</tbody>
</table>

Each patient was followed for the period of 4 weeks. All patients would be clinically stable with no recent exacerbations and might be taking an optimal drug management therapy for COPD. The participants who were residing 10-15 km near to Shree Krishna Hospital, were divided as per criteria into 2 groups, those willing to come for physiotherapy were included in the supervision group and those who were residing far from the hospital and unwilling to come for physiotherapy were included in the control group. Were given the home exercise programme (HEP) regarding the same. The physical therapy protocol were pursed lip breathing, coughing, thoracic mobility exercise, stair climbing and walking. All the exercises were demonstrated and made to be practiced by the patient so as to make them able to perform these exercise at home from the above mentioned protocol themselves. All the patients were advised to do 15 repetitions meanwhile walking, they had to walk at least 10 min. each day. All the patients were given a diary containing details of type and frequency of exercises they had to perform on daily basis. And were advised to put a tick mark.

Patients (of supervised group) were asked to visit Shree Krishna Hospital 2 days /week for 4 weeks. Day before follow up, all patients of both the groups were informed about their hospital follow up which was scheduled for at the end of 4th week.

**Outcome measure were** Exercise tolerance (symptom limited walk test), Peak expiratory flow rate, Quadriceps Muscle Strength, Pulmonary function test, Health-related quality of life (Airway questioner 20),

**Results**

For the data analysis STATA/MP version13 software was used. In current study effect of supervised physiotherapy and home based physiotherapy in COPD patient were analyzed. In present study total 80 participants, 40 in each group were recruited. Out of the 40 patients in the HBG there were 36 males and 4 females, whereas in SBG there were 34 males and 6 females.

<p>| Table no 1: Baseline characteristics of both the groups |</p>
<table>
<thead>
<tr>
<th>N=40</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(in year)</td>
<td>HBG</td>
<td>63.75</td>
<td>8.854</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>65.50</td>
<td>9.038</td>
</tr>
<tr>
<td>BMI(Height/cm²)</td>
<td>HBG</td>
<td>21.26</td>
<td>1.887</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>21.78</td>
<td>2.55</td>
</tr>
<tr>
<td>Duration of COPD</td>
<td>HBG</td>
<td>11.38</td>
<td>1.23</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>11.48</td>
<td>1.39</td>
</tr>
</tbody>
</table>
Independent t test was used to compare the effectiveness of physiotherapy in HBG with the SBG at the end of the 4 week.

When the difference of mean was calculated between the groups at the end of the intervention, it showed statistically significant improvement in all the outcome measures.

**Table no 2: Comparison of mean difference of outcome measures between both the groups**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td></td>
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<tr>
<td>SLWT</td>
<td>HBG</td>
<td>-2.350</td>
<td>23.851</td>
<td>-9.978</td>
<td>5.278</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>-50.875</td>
<td>33.342</td>
<td>-61.538</td>
<td>-40.212</td>
</tr>
<tr>
<td>PEFR</td>
<td>HBG</td>
<td>-23.007</td>
<td>27.621</td>
<td>-47.359</td>
<td>-29.691</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>-38.525</td>
<td>27.621</td>
<td>-47.359</td>
<td>-29.691</td>
</tr>
<tr>
<td>Airway questioner 20</td>
<td>HBG</td>
<td>3.550</td>
<td>1.648</td>
<td>3.023</td>
<td>4.077</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>8.825</td>
<td>1.781</td>
<td>8.255</td>
<td>9.395</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>HBG</td>
<td>2.830</td>
<td>5.233</td>
<td>1.156</td>
<td>4.503</td>
</tr>
<tr>
<td></td>
<td>SBG</td>
<td>2.830</td>
<td>5.233</td>
<td>1.156</td>
<td>4.503</td>
</tr>
<tr>
<td>QMS</td>
<td>HBG (rt)</td>
<td>-0.537</td>
<td>.437</td>
<td>-0.677</td>
<td>-0.398</td>
</tr>
<tr>
<td></td>
<td>(lt)</td>
<td>-0.6025</td>
<td>.4822</td>
<td>-.7567</td>
<td>-.4483</td>
</tr>
<tr>
<td></td>
<td>SBG (rt)</td>
<td>-1.120</td>
<td>.415</td>
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<td>-0.987</td>
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<tr>
<td></td>
<td>(lt)</td>
<td>-1.2125</td>
<td>.4853</td>
<td>-1.3677</td>
<td>-1.0573</td>
</tr>
</tbody>
</table>

**Discussion**

COPD prevalence is known to be high in in all over the world. Reviewed literature suggest that COPD should not be considered a localized pulmonary disorder but a systemic disease that involves several extra pulmonary tissue as well ,which actually limit their functional capacity and health status.

BMI- Hypoxia has been shown to stimulate the production of inflammatory mediators and to contribute to the development of malnutrition in COPD patients\textsuperscript{19,20}

**Duration of COPD**

It has been reported that it can take >30 years to lose enough lung function to experience symptoms. In this study both group has mean duration of the COPD was 11years and so there is definite reduction in their functional capacity was seen\textsuperscript{21}.

**GENDER**

Smoking in male is a dominant risk factor for development of COPD conversely it is substantially lower in women regards to Indian community society \textsuperscript{23-25}.

**SYMPTOM LIMITED WALK TEST**

In SBG mean TD is improved up to 44.63% and in RT improved up to 30% .HBG mean TD improved 1.74% and RT improved 25% . SLWT was improved in SBG as compared to HBG. It was not statically significant in HBG. The reason for this may be that participants of this study ranged from mild to severe variety of COPD and they suffered of this condition for 11 years on an average. As a result while performing this test, some of
the patients of both the groups were allowed to walk for lesser time because of breathlessness. Immediately after SLWT, they showed greater rise in RR and RPE only whereas no significant change occurred in circulatory response that is PR and BP. It is in agreement that mainly dyspnea precipitated on walking influence RR and RPE in order to meet excessive energy requirement of body that put more demand on respiratory system\textsuperscript{26-28}.

QMS

As mentioned earlier COPD considered a systemic disease that involves several extra pulmonary tissue and as a result the skeletal muscle too loses its strength indirectly.\textsuperscript{29} It has been shown that skeletal muscle dysfunction simple deconditioning occurs in mild chronic obstructive pulmonary disease and is likely to be due to other confounding factors such as hypoxia or malnutrition.

PEFR

Both the groups showed improved PEFR. This could be because when force full expiration lungs become enlarged, the diaphragm is displaced downward and is unable to contract efficiency, furthermore, the chest wall will be enlarged, causing increased FRC and making accessory muscles less efficient as well\textsuperscript{30}. These changes contribute to shortness of breath which is commonly encountered in every patient with COPD.

FEV\textsubscript{1}/FVC

Improvement in FEV\textsubscript{1}/FVC was seen in both group. It may be because of ongoing bronchodilators treatment and physiotherapy treatment. According to spirometry health care center providers said that in that pulmonary component is characterized by airflow limitation that is not fully reversible However, a low baseline FEV\textsubscript{1} increases the probability of a subsequent improvement, especially if it is expressed as a relative change.\textsuperscript{31,32}

AIRWAY QUESTIONNAIER 20

Functional capacity indicates the maximal potential to perform, daily activities. It comprises eating, bathing, standing, sitting, walking, movement intensity etc. Such activities require combined efforts of heart, lungs and circulation to deliver oxygen to the muscle mass which is metabolically active. The health-related quality of life (HRQOL) encompasses the impact of affected QOL on his/her ability to perform activities of daily living such as social role functioning, home management, social and family relationships, self-care, mobility, recreational activities and hobbies\textsuperscript{18}.

Conclusion

This study concluded that supervised physiotherapy group had statistical significant changes seen in pulmonary function, quality of life as well muscle strength than the home base physiotherapy group in stable COPD patients.

Limitation

Small sample size and small duration of the study were limitation of the present study.

Further Study

Rehabilitation protocol can be used for 3 month and 6 month of rehabilitation will be analysis with same parameters, to know the long term effect of same parameters.

Source of Funding: (Self) Chest Medicine OPD, Shree Krishan Hospital, Karmsad, Anand

Conflict of Interest: Nil

Reference

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10. Sin DD, Man SF. Skeletal muscle weakness, reduced exercise tolerance, and COPD: is systemic inflammation the missing link?.


Review Article

Screening Instrument for Clinical Diagnosis of Peripheral Neuropathy in Diabetes-A Review

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Abstract

Background- Distal symmetrical polyneuropathy is the most common type of peripheral neuropathy and accounts for 75% of neuropathies in patients with diabetes. Painless paresthesia with impairment of vibration, joint position, touch and pressure sensations along with loss of ankle reflex is the characteristic feature of distal symmetrical polyneuropathy. Many diagnostic tests have been designed to screen and diagnose peripheral neuropathy in individuals with diabetes. But there exist a disagreement as to which is the most appropriate and reliable clinical neuropathy scale for peripheral neuropathy in patients with diabetes. Many studies have been conducted to find the reliability and validity of various scales but no study has been conducted to find the most appropriate scale for diagnosing diabetic neuropathy. Objective - The objective of the review was to combine all the reliable and valid clinical neuropathy scales to find the most appropriate scale. Materials and Method- Scales like NSS, NDS, DNE, CNE, MNSI, TCNS and NTSS 6 were studied and compared. Conclusion- It was concluded that MNSI is the most reliable and valid scale for diagnosis of diabetic neuropathy.

Keywords – Peripheral neuropathy, diabetes, screening instrument, diabetic neuropathy.

Introduction

Distal symmetric polyneuropathy (PNP) is a very common complication of diabetes and is considered to be a major causal factor in the majority of foot ulcers in patients with diabetes. Peripheral sensorimotor polyneuropathy (DSP) is a frequent complication of both type 1 and type 2 diabetes. The pathological hallmark of DSP is progressive nerve fiber loss of both large and small fibers. Diabetic peripheral neuropathy (DPN) is a microvascular complication that occurred in 54% of patients with type 1 and 45% of patients with type 2 diabetes mellitus (DM) in the Rochester Diabetic Neuropathy Study.

DPN is largely concerned with the feet and lower limbs, although in some severe cases the hands may also be affected. Typically, it is a chronic, symmetrical and length-dependent condition, compromising multiple nerves. DPN of the limbs may involve large fibre nerves, small-fibre nerve or both. Most patients, however, have both large-and small-nerve fibre damages in DPN of the limbs.

Various clinical scoring systems used for screening DPN may involve symptom scoring, sign scoring or both. They can enhance the diagnostic accuracy because individual examination findings from different simple diagnostic tests are combined into a composite examination score. These diagnostic tests in DPN help in diagnosis of DPN.

The purpose of a diagnostic test is to establish the presence (or absence) of disease as a basis for treatment decisions in symptomatic or screen positive individuals. The target population for diagnostic tests is symptomatic individuals or asymptomatic individuals with positive
screening test scores. Method may be invasive and expensive but it is necessary to establish diagnosis. The result is chosen towards high specificity and usually provides an accurate diagnosis.

Two characteristics define the accuracy of a test—‘Sensitivity’ describes the ability of a test to correctly detect disease. ‘Specificity’ describes the ability of a test to correctly identify absence of disease. Sensitivity and specificity are considered to be stable properties of a test. They do not vary with pre-test probability of disease, also called base rate or prevalence, Pr. In contrast with these test characteristics, the predictive value is not a stable property and varies with the pre-test probability given by positive predictive value and negative predictive value.

Various diagnostic tests have been designed to diagnose diabetic neuropathy. It is however necessary to find out the appropriate one for diagnosing neuropathy in diabetes.

**Neuropathy Symptom Score**

The NSS initially consists of symptoms of muscle weakness, sensory disturbances, autonomic symptoms and can be further divided into 17 items. An NSS score of ≥ 1 could be considered abnormal. Another scoring system also for assessing neurological symptoms is named NSP, which contains 34 test categories, where an abnormal score is defined as ≥ 97.5 percentile. However, both scores are developed for general neuropathy rather than specifically for DPN. Reliability of NSS is 0.74.1

A Study done by A Chawla, G Bhasin validated Neuropathy Symptoms Score and Neuropathy Disability Score. This study was planned to validate the NSS+NDS as per “Young et al” criterion in clinical diagnosis with the standard well validated screening method of measuring vibration perception threshold (VPT). 135 patients out of total 855 patients who had NSS 5-6 (mild symptoms) or NDS 5-6 but if sum of NDS + NSS was > 10 were then evaluated by biothesiometry to validate this score. VPT > 15 volts was taken as cut off for mild DPN & VPT >25 volts was considered as significant DPN. Applying NDS+NSS >10 could pick up early DPN in 96 out of 135 total subjects (sensitivity of 71.1% & specificity of 90%). This has a +ve predictive value of 57.14% & -ve predictive value of 94.32% as validated & documented by biothesiometer. It was concluded that NSS & NDS can be an important bed side tool in the clinics for early diagnosis of DPN with a sensitivity of 71.1% & specificity of 90%. It is simple, acceptable, reproducible & validated.6

**Neuropathy Disability Score**

The NDS can be used to assess the signs of neuropathy by 35 items for both sides. The evaluation is derived from cranial nerve damage, muscle strength, reflex loss, and loss of sensation. However, some items have been found not to be essentially abnormal in DPN and therefore, the neuropathy impairment score (NIS), revised on the basis of the NDS, has been proposed. Considering that the typical DPN is a distal symmetric sensorimotor polyneuropathy, the neuropathy impairment score in the lower limbs (NIS-LL), as a subset of the NIS for the lower limbs, has been adopted in the evaluation of peripheral neuropathy. The performance of the NIS-LL in the detection of DPN is almost similar to that of the NDS but the main drawback is too much emphasis on the motor nerve function. In addition, no recognized diagnostic threshold for neuropathy has been set. So another scoring system, the revised NDS can be used. It includes the ankle reflex, vibration, pin-prick and temperature (cold tuning fork) sensation at both sides of the great toes with a maximum score of 10 points. People with an NDS of six points or more are considered to show abnormal reactions. The reliability of NDS is 0.9451.

In the study by Naomi Weintrob et al on bedside Neuropathy Disability Score (NDS) compared to quantitative sensory testing for measurement of diabetic neuropathy in children, adolescents, and young adults with type 1 diabetes compared the bedside neuropathy disability score (NDS) with quantitative sensory testing (QST) for screening for DPN in youth with type 1 diabetes mellitus. 166 patients aged 10 to 34 years were evaluated for DPN by the NDS and QST. The NDS significantly correlated with age at testing, diabetes duration, and long-term and current HbA1c levels and with the presence of microalbuminuria and diabetic retinopathy. Analysis of the QST variables yielded significant correlations of vibration and warm sensation with age at testing and of vibration with diabetes duration and retinopathy, none of the quantitative tests correlated with glycemic control. It was concluded that the stronger association of the NDS with glycemic control and other microvascular complications compared to the perception thresholds, and its shorter time of
performance and lack of costly equipment, makes the NDS the preferred method for measuring DPN.

**Diabetic Neuropathy Examination**

The DNE is an examination adapted from the NDS, in which only eight items were retained. In this examination, only the right side of the limb is examined, and the maximum score is 16 points. The score contains two items concerning muscle strength, one concerning reflexes, and five concerning sensation (8 items). Each item is scored from 0 to 2 (0 is normal and 2 severely disturbed). The maximum score is 16. A score of greater than 3 points is defined as positive for PNP. The reliability of DNE is 0.78.\[1\]

Jan-Willem G. Meijer in his study evaluated the discriminative power of the Diabetic Neuropathy Symptom (DNS) and Diabetic Neuropathy Examination (DNE) scores for diagnosing diabetic polyneuropathy (PNP) and their relation with cardiovascular autonomic function testing (cAFT) and electro-diagnostic studies (EDS). Three groups were selected: 24 diabetic patients with neuropathic foot ulcers (DU), 24 diabetic patients without clinical neuropathy or ulcers (DC), and 21 control subjects without diabetes (C). In all participants, the DNS and DNE scores were assessed and heart rate variability [HRV], baroreflex sensitivity, and EDS were performed (Nerve Conduction Sum [NCS] score; muscle fiber conduction velocity: fastest/slowest ratio [F/S ratio]). The results were significant for correlations between NCS and DNE score and F/S ratio and DNE score which was 0.62 and 0.62 respectively. It was concluded that the DNE, easy to perform, hierarchical, and sensitive for PNP, and patient scores are more differentiated. DNE scores allow discrimination between patients with and without diabetic PNP.

**Clinical Neurological Examination**

The CNE is a composite scoring system for measurement of sensory signs and reflexes in the lower limb. It involves clinical testing of sensory dysfunction (pinprick, light touch, vibration, and position sense) of the feet, the anatomic level below which light touch sensation is impaired, muscle strength of the feet and ankle reflexes.

Two versions of CNE are available. In the older one, the maximal score of the CNE is 33 points. A total score of zero can be graded as no polyneuropathy, one to nine as mild, 10 to 18 as moderate, and 19 to 33 as severe polyneuropathy. The other version, with a maximal score of 37 points is quantified on the basis of the older one, but the diagnostic criteria have not been presented in detail.\[2\]

**Michigan Neuropathy Screening Instrument**

The MNSI is an instrument including two parts, a questionnaire with 15 questions and a foot examination. The questionnaire inquires about positive (pain, temperature sensation, tingling) and negative (numbness) sensory symptoms, cramps and muscle weakness, foot ulcers or cracks and amputation. Neuropathy can be defined as 7 or more positive responses on the MNSI questionnaire. Compared with the questionnaire, the foot examination is more frequently used. It encompasses foot appearance and foot ulcers, ankle reflex and the 128-Hz tuning fork test. The maximum score of the foot examination is eight points and bilateral limbs are independently scored. An MNSI examination score of equal to or greater than 2 is positive for PNP. MNSI scores of 1.5, 2.0, 2.5 and 3.0 were assessed as cut-off values. Sensitivities were 79%, 65%, 50% and 35% and specificities were 65%, 83%, 91% and 94%, respectively. MNSI has reliability of 0.81.\[3\]

W. H. Herman et al in their study studied subjects with Type 1 diabetes. MNSI was administered to individuals with type 1 diabetes and was reassessed after a follow up of 6 and half years and sensitivity and specificity was found out. It was concluded that the MNSI is a simple, non-invasive and valid measure of distal symmetrical peripheral neuropathy when compared with gold standard diagnostic testing that includes neurological examinations performed by board-certified neurologists and standardized electrophysiology examinations. The MNSI can be used in clinical practice and in large clinical trials to assess distal symmetrical peripheral neuropathy.\[3\]

**Toronto Clinical Scoring System**

Also called the Toronto clinical neuropathy score (TCNS), the system was first adopted by a research group in Toronto for the screening of DPN. Toronto CSS was developed initially for use in another study of simple screening tests for DSP. It was designed as a simple way to stratify patients to ensure that a diverse population with a broad spectrum of DSP entered the study with a minimum number of 50 subjects per group.
Toronto CSS was based on classic neurological history and examination techniques and designed to be simple and relevant to the clinician. Elements were chosen for the Toronto CSS by local expert opinion based on a consensus of neurologists and diabetologists. TCSS consists of three parts: symptom scores, reflex scores and sensory test scores. Sensory testing was performed on the first toe. Symptom scores: present-1; absent-0. Reflex scores: absent-2; reduced-1, normal-0. Sensory test score: abnormal-1. Normal-0. Total scores range from normal - 0 to maximum of 19. Components of the scale are foot symptoms scores—Pain, Numbness, Tingling, Weakness and Ataxia. Upper-limb symptoms—Reflexes, Knee reflexes and Ankle reflexes and sensory testing—Pinprick, Temperature, Light touch, Vibration and Position. Classification for DPN have also been proposed according to the TCSS score: 0 to 5 points, without DPN; 6-8, mild DPN; 9 to 11 points, moderate DPN; and 12 to 19 points, severe DPN.

Vera Bril and colleagues in their study validated the Toronto Clinical Scoring System for Diabetic Polyneuropathy. The aim of the study was to determine the validity of the Toronto Clinical Scoring System (CSS) in reflecting the presence and severity of DPN determined by myelinated fiber density (FD) on sural nerve biopsy. 89 patients with both type 1 and type 2 diabetes were included in this cross-sectional, observational cohort study. Morphological severity of DSP was expressed as the FD in the sural nerve biopsy. Toronto CSS was applied to all patients to determine a clinical neuropathy score. General linear regression models were used to assess the relationship between the morphological severity of DSP and the Toronto CSS. The Toronto CSS showed a significant negative correlation with sural nerve FD ($R^2$ = 0.256, $P < 0.0001$). Toronto CSS was lower in those with better glycemic control (HbA1c <8%). Sural nerve FD and the Toronto CSS showed strong correlations with electrophysiology, by both summed amplitude and summed conduction velocity values. They concluded that Toronto CSS is a valid instrument to reflect the presence and severity of DSP as measured by sural nerve morphology and electrophysiology. Toronto CSS may prove useful in documenting and monitoring DSP in the clinic and in clinical research trials.

**Neuropathy Total Symptom Score**

The NTSS-6 questionnaire was developed after a review of a MEDLINE search identifying available questionnaires and literature in English, based on patient descriptors for the symptoms of DPN. The principal instruments reviewed included those used in the study of pain and DPN. Neuropathy sensory symptoms: (1) numbness and/or insensitivity; (2) pricking and/or tingling; (3) burning sensation; (4) aching pain and/or tightness; (5) sharp, shooting, lancinating pain; and (6) allodynia and/or hyperalgesia. Possible scores for the NTSS-6 range from 0 to 21.96. A score $>0$ indicates the presence of $>1$ sensory symptom. Clinically significant symptoms are defined as an NTSS-6 total score $>6$ points. The definition derives from the logic that the total score must exceed the presence of the following: 6 symptoms with at least mild intensity and occasional frequency, 3 symptoms with at least moderate intensity and occasional frequency, or 2 symptoms with severe intensity and occasional frequency. A higher score indicates worse symptoms.

In a study by Edward J. Bastyr III, the aim of this study was to develop and validate the Neuropathy Total Symptom Score-6. The NTSS-6 was administered 8 times over a 1-year period to DPN patients. The NTSS-6’s reliability (determined by internal consistency and test-retest reproducibility), construct validity, convergent validity and minimally clinically important differences (MCIDs) were determined ($r = 0.519-0.708, P < 0.001$); change in Neuropathy Impairment Score of the Lower Limbs and composite nerve function scores ($P < 0.007$), and categories of the Clinical Global Impressions ($P < 0.001$). The within- and between-groups MCIDs for the total NTSS-6 total scores were -1.26 and 0.97 points, respectively. It was concluded that NTSS-6 provided a valid assessment of neuropathy sensory symptoms in this sample of patients with DM and DPN which suggests it to be useful for symptom evaluation in clinical trials and practice. The NTSS-6 showed good internal consistency, test-retest reliability, and construct validity. The overall conclusion was that the MNSI demonstrated greater reliability and was distinguished from other scales because of questionnaire associated with patients’ symptoms and took into account physical appearance of the patient.

**Conflict of Interest – None**

**Source of Funding – Self**
Ethical Clearance – Taken from college committee

References


Effect of Neuromuscular Training on Star Excursion Balance Test and Single Leg Hop Test in Collegiate Female Basketball Players

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Abstract

Background: Neuromuscular Training (NMT) which incorporates both plyometric exercises and core strengthening is widely used to enhance strength, conditioning, health and fitness by improving performance.

Purpose: To examine if the Neuromuscular training will be effective in improving dynamic balance.

Methodology: 40 healthy collegiate female basketball players (mean age 20.08±1.27 years; mean Height, 161.75±3.12; mean mass 53.6±2.6 kg) participated in the study and were randomly divided in two groups Experimental (n=20) and Control (n=20). A test-retest design was used to evaluate the differences between both the groups on dynamic stability (Star excursion balance test), dynamic balance (single leg hop & hold distance test) Control group followed their routine training and Experimental group underwent a neuromuscular training for 7 weeks. After 7 weeks of training post measures were taken.

Result and Conclusion: Following 7 weeks of NMT only the experimental group demonstrated significant performance on all the testing variables as compared with the control group(p<0.05).

Keywords: Core stability, core strengthening, injury prevention training, Plyometric training.

Introduction

Basketball is a highly demanding and competitive sport. It requires players to habitually address physical contact and various situations involving balance instability such as basketball specific accelerations and decelerations, rapid changes in direction, side cutting & dribbling and defense position recovery. The consequences of majority of these explosive movement patterns, is the subsequent impact which occurs on landing. This puts excessive varus and valgus stresses on knee and spine which in turn is responsible for the majority of lower extremity and spinal injuries. Ample evidences also suggest that female athletes involved in jumping and cutting sports such as basketball, handball injure their anterior cruciate ligament (ACL) 4-6 times more frequently than their male counterparts due to quadriceps dominance. With such a high level of injury in female players, it becomes necessary to formulate an intervention which can minimize the risk of injury.

Neuromuscular Training (NMT) is an intervention that is widely used in strength, conditioning, health and fitness, and rehabilitation industries. As it is hypothesized that it will lead to improvement in performance and reduction in the incidences of injuries. NMT is one of the vital components in the strength and conditioning field. Significant improvement in lower limb strength and core strength has been documented as a result of

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NMT. Application of a NMTP that puts emphasis on core stability exercise is advocated to prevent lower extremity injury, namely in female athletes who have deficits in trunk proprioception and neuromuscular control.[3] Importantly, poor core muscle strength and decreased muscular synergy of the trunk and hip stabilizers have been theorized to decrease performance in power activities and to increase the incidence of injury.[4]

Strong core muscles can provide a stable platform that allows more powerful and efficient movement of the limbs.[5] It is believed that strengthening core muscles is important for maintaining good jumping and running form.[6] The abdominal muscles are mainly functioning as an elastic band cum a corset during jumping and running. The abdominal muscles are working concentrically, eccentrically, and statically to produce ideal intermuscular coordination to maintain efficient running and jumping form. [7] The purpose of this study was to determine the effect of 7 weeks of neuromuscular training on various performance variables in female basketball players.

**Method**

This study was a 7-weeks training study. A test-retest design was used to identify the effects of NMT. The NMT group performed 3 sessions of 3 core exercises and 8 plyometric jumps per week for 7 weeks. On field testing lasted 30 minutes on each subject in the control group and 45 minutes on each subject in the NMT group.

**Inclusion Criteria:**

- Subjects: Female basketball players between 17 to 24 years of age who have participated at University level
- Subject who take part in training at least 3 times a week on regular bases
- No history of lower extremity injury
- Asymptomatic subject with weak back muscles.
- Has been exercising regularly for last six months.
- Has been participating in organized sports for the last two or three years.

**Exclusion Criteria:**

- Subjects with musculoskeletal injuries like ligament injuries, muscle injuries etc.
- Back pain
- Recent acute medical illness
- Hamstring Tightness.
- No h/o injury in past 6 months.
- Athletes undergoing rehabilitation after injury.
- Athletes having any balance problems confirmed by equilibrium tests.

**Subjects:**

40 healthy interuniversity female basketball players initially qualified and volunteered to participate in the study (mean age 20.08±1.27 years; mean Height, 161.75±3.12; mean mass 53.6±2.6 kg). All the volunteers were recruited from GNDU campus, Amritsar. The subjects were randomly divided into 2 groups: Control (n=20) and NMT (n=20). 40 participants performed pre-training tests. Pre-training tests includes star excursion balance test and single leg hop & hold test. The experimental protocol and potential risks of the study were explained to each subject both verbally and in writing before their informed consent was obtained. The study was approved by the institutional ethical committee (IEC). Experimental group engaged in NMTP for 7 weeks which includes following protocol.

**Procedure:**

**Star excursion balance test (SEBT):**

It is a type of dynamic stability testing. The SEBT involves having a participant maintain a base of support with one leg while maximally reaching in different directions with the opposite leg without compromising base of support of stance leg. Researchers have provided evidences that the SEBT is sensitive for screening musculoskeletal impairments, such as chronic ankle instability, quadriceps strength deficits. Patients with anterior cruciate ligament reconstruction showed marked decrease in reaching distance during performance of SEBT.
Single leg hop and hold distance test:

It is a field test that is used to test the dynamic balance of an athlete. Single leg hop jump and hold test involves the subject to stand on one leg and hoped forward as far as possible while landing on same leg. There is a marked decrease in the forward hop distance in patients with quadriceps strength deficiency.

Neuromuscular Training Protocol:

**Core Exercises**

1. Quadruped with Alternate Arm/Leg Raises
2. Prone plank
3. Side plank

**Plyometric Jumps**

1. Wall Jumps
2. Squat Jumps
3. Tuck Jumps
4. Broad Jumps
5. Barrier Jumps
6. Jump into Bounding
7. Vertical jump
8. 180° jump

Statistical Analysis

All dependent variables were entered into Statistical Package for Social Sciences (SPSS Inc., Chicago, Ill). Significance was defined as p ≤ 0.05. Paired t test was conducted for all the variables of within the groups. Unpaired t test was run to find intergroup differences between two groups before and after the training.

**Results**

NMT had significant influence on SEBT, single leg hop jump test.

Table 1. Demographic information (mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Control group (G1) n=20</th>
<th>Experimental group (G2) n=20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>20.8±1.27</td>
<td>18.85±2.3</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.75 ±3.12</td>
<td>156.05±4.47</td>
</tr>
<tr>
<td>Body mass (kg)</td>
<td>53.6±2.6</td>
<td>51.01±3.7</td>
</tr>
<tr>
<td>BMI</td>
<td>20.39±1.4</td>
<td>20.98±1.6</td>
</tr>
</tbody>
</table>

Table 2. Star Excursion Balance Test: Paired t-test

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>SEM</th>
<th>t-value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>100.898</td>
<td>8.535</td>
<td>1.908</td>
<td>0.046</td>
<td>0.964</td>
</tr>
<tr>
<td>Post test</td>
<td>100.878</td>
<td>8.908</td>
<td>1.991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>98.302</td>
<td>6.945</td>
<td>1.553</td>
<td>11.547</td>
<td>0.000*</td>
</tr>
<tr>
<td>Post test</td>
<td>102.398</td>
<td>6.418</td>
<td>1.435</td>
<td></td>
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</tr>
</tbody>
</table>

* Significant effect, p≤0.05, NS = Non Significant (p>0.05)
Table 3. Single Leg Hop & Hold Distance Test: Paired t-test

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>SEM</th>
<th>t- value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>153.850</td>
<td>16.490</td>
<td>3.687</td>
<td>0.183</td>
<td>0.857</td>
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<tr>
<td>Post test</td>
<td>153.650</td>
<td>17.281</td>
<td>3.864</td>
<td></td>
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<tr>
<td>Experimental</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>142.800</td>
<td>20.106</td>
<td>4.495</td>
<td>24.464</td>
<td>0.000*</td>
</tr>
<tr>
<td>Post test</td>
<td>151.200</td>
<td>19.489</td>
<td>4.358</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant effect, p≤0.05, NS = Non Significant (p>0.05)

**Star excursion balance test**

After 7 weeks of duration there was not much difference in the pre and post reading of the control group. While a significant interaction was found, t=7.406, p =0.015 when an unpaired t-test was applied to compare the means of both the groups. Table 2 shows that NMT group has improved their average reach distance compared with the control group.

**Single leg hop and hold distance test:**

After 7 weeks of duration there was not much difference in the pre and post reading of the control group. While a significant interaction was found, t=7.415, p =0.002 when an unpaired t-test was applied to compare the mean of both the groups. Table 4 shows that NMT group has improved their average reach distance compared with the control group.

**Discussion**

The aim of this study was to determine the influence of NMT on dynamic balance in basketball players. It was expected that NMT would positively influence star excursion balance test and single leg hop & hold distance test.

Star excursion balance test parameter was used to assess the dynamic balance. Prior to training both the experimental and the control groups of female athletes demonstrated similar performance on the SEBT in all measured variables. After 7 weeks of duration there was not much difference in the pre and post readings of the control group. While a statistically significant difference (p=0.015) was found in the pre and post reading of NMT group.

Single leg hop and hold distance test was used to measure the average forward jump distance. In single leg hop jump test after 7 weeks of duration there was not much difference in the pre and post readings of the control group. While a statistically significant difference (p=0.02) was found in the NMT group.

**Limitation of the study:**

Limitation of the study was that the protocol which was used only of 7 weeks so if we would have taken the protocol of more than 7 weeks with advance training it could be the better option and it would have been shown better results.

**Conclusion**

After 7 weeks of training to female basketball players all the parameters were assessed. Experimental group (G2) showed better results and statistically significant than their other competitors who were in control group (G1). Further research is needed to evaluate long term efficacy of NMT in improving running performance and endurance of core muscles.

**Conflict of Interest:** There was not any conflict of interest in conducting this study. This study was free from editorial influence.

**Source of Funding:** This study was self-funded.

**Acknowledgment:** The authors are thankful of their participants. The permission was taken from ethical committee of Guru Nanak Dev University, Amritsar, Punjab (India).

**References**


Comparison of Quadriceps to Hamstring Strength Ratio in Patients with Osteoarthritis of Knee and Healthy Adults

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²Masters of Physiotherapy Student, Physiotherapy School and center TNMC and BYL Nair Hospital, Mumbai Central

Abstract

Background: Osteoarthritis (OA) is the most common degenerative joint disease, affecting the weight bearing joints, knee being the most commonly affected. Quadriceps weakness is found to be one of the factors associated with Osteoarthritis of knee, along with other contributing factors like, age, heredity, biochemical changes in articular cartilage, obesity and biomechanical compressive loads that lead to joint damage. Many studies in the management of Osteoarthritis of knee emphasize on the strengthening of Quadriceps, however, little attention is given to the hamstrings muscle. An optimal quadriceps to hamstring strength ratio is required for effective functioning of the knee joint, which is not studied adequately in the literature.

Objectives: Weakness is said to be one of the risk factors for the onset as well as the progression of osteoarthritis. Weakness of the muscles around the knee joint, thus need to be evaluated in details as it can be easily ameliorated as compared to other non-modifiable risk factor like age or gender.

Method: It is a cross-sectional observational study, with a total of 132 subjects. 66 patients with bilateral Osteoarthritis of knee and 66 age and gender matched controls. The quadriceps and hamstring isometric strength were assessed using the Baseline Hydraulic Hand held dynamometer. The radiological severity of OA knee was assessed by a senior radiologist of the institute, using the Kellgren Lawrence scale; which was co-related with the Q:H ratio.

Conclusion: The ratio of isometric strength of Quadriceps to Hamstring is significantly lower in patients with osteoarthritis of knee as compared to healthy adults.

There is no co-relation of Quadriceps to hamstring strength ratio and radiological severity of Osteoarthritis of knee.

Keywords: Knee Osteoarthritis, Quadriceps to hamstring ratio, Hand held dynamometer, Kellgren Lawrence Scale.

Introduction

Osteoarthritis is the degeneration of articular cartilage and underlying bone, occurring most commonly in the weight bearing joints, knee being the most affected. Osteoarthritis (OA) has a prevalence rate of 17% to 60.6% in India and its incidence increases with age making it a major contributor to disability in the elderly [1]. Women are more affected and burdened by osteoarthritis of knee. [2,3] The incidence of knee OA increases by age and further increase with longer lifetime and higher average weight of the population [4].

The most common symptoms are chronic pain, joint stiffness, swelling and muscle weakness. [5]
The radiological diagnosis and severity of osteoarthritis of knee is widely done using the Kellgren Lawrence scale. The Kellgren and Lawrence system is a common method of classifying the severity of knee osteoarthritis (OA) using five grades. This classification was proposed by Kellgren et al. in 1957 and later accepted by WHO in 1961. [6]

Many factors contribute to the development of knee OA, including heredity, biochemical changes in articular cartilage, age, obesity and biomechanical compressive loads that lead to joint damage. Along with these factors, Quadriceps weakness is found to be associated with knee osteoarthritis.

Quadriceps and hamstring are the muscles that surround the knee joint, and have a key role in maintaining the dynamic stability of the knee joint. Adequate strength of quadriceps and hamstrings is necessary for fundamental activities of daily living such as rising from chair, squatting, walking, and climbing steps. Both muscle groups stabilize the knee joint and protect it from stress.

Quadriceps weakness potentially could contribute to increased impulse loading of the knee joint. The quadriceps muscle also is the primary dynamic stabilizer of the knee in the sagittal plane. Therefore it is possible that weakness of the quadriceps, either absolute or relative to the hamstrings may adversely redistribute compressive and shear stress at the knee joint. [7]

An optimal quadriceps-to-hamstring muscle torque ratio (Q/H ratio) balances the muscle forces around the knee joint contributing to normal joint mechanics. A low ratio might affect the functioning of persons with OA and the progression of the disease. Thus, strength assessment of muscles around the knee joint forms an important part of evaluation of osteoarthritis of knee.

Hand held dynamometer (HHD) is an objective, reliable and validated measure of muscle strength. [8] It is small and portable, and measures strength objectively in kilograms, pounds or newton. The hand held dynamometer is much less expensive and efficient to measure the isometric muscle strength at a particular angle as compared to the isokinetic machine. [9] The isokinetic machine being costly and bulkier, the HHD becomes an easier less cumbersome option.

### Materials and Method

**Study design:** Cross-sectional observational study

**Participants:**

The approval of the institutional ethics committee was taken for carrying out the study.

The participants were screened based on the inclusion and exclusion criteria and then included in the study. A written informed consent was taken from all the participants.

<table>
<thead>
<tr>
<th>For OA knee Patients</th>
<th>For Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inclusion criteria:</strong></td>
<td><strong>Inclusion criteria:</strong></td>
</tr>
<tr>
<td>• Males and females in the age group of 40-60yrs selected according to the clinical criteria of American college of rheumatology. [9]</td>
<td>• All individuals in the age group of 40-60 yrs. Not complaining of knee pain since last 6 months and</td>
</tr>
<tr>
<td>• Those willing to participate.</td>
<td>• Not fitting in the ACR criteria for diagnosis of Osteoarthritis of knee. People who were ready to participate in the study. (The control group was age and gender matched.)</td>
</tr>
<tr>
<td><strong>Exclusion criteria:</strong></td>
<td><strong>Exclusion criteria:</strong></td>
</tr>
<tr>
<td>• Patients with history of neurologic dysfunction, self-reported unstable cardiac condition, or total knee replacement (TKR; either knee for control subjects or sample population)</td>
<td>• Any limb length discrepancy</td>
</tr>
<tr>
<td>• Any limb length discrepancy</td>
<td>• Low back pain since last 6 months</td>
</tr>
<tr>
<td>• Low back pain since last 6 months</td>
<td>• Individuals engaged in sports or exercises since last 6 months.</td>
</tr>
<tr>
<td>• Individuals engaged in sports or exercises since last 6 months.</td>
<td>• Patients with VAS score &gt;7</td>
</tr>
</tbody>
</table>
Outcome Measures

Isometric Quadriceps & Hamstring strength assessed using the Baseline hydraulic Hand held dynamometer.

Radiographic Classification of severity of osteoarthritis of knee using the Kellgren Lawrence scale. (Assessed by a radiologist of the institution.)

Assessment:

All measurements were performed with the subject in sitting position on a high plinth with the thigh horizontal and the knee at the edge of the table with the hip knee at 90° angle. The subject was asked to hold the edge of the plinth for stability. [10]

The examiner was seated in front of the subject with one of the feet against the wall, to be able to better resist the muscle contraction. [10]

The hand held dynamometer was held perpendicular to the limb surface and turned so that the examiner couldn’t see the scale during testing. The readings were noted by another assessor.

Prior to testing, subjects were given a practice trial of one submaximal contraction in order to familiarize the subject to the testing procedure. After 2 mins. of rest, testing was done.

For Quadriceps testing:

Knee was positioned in 90° and maintained in the position using a standard goniometer, the HHD was held on anterior part of lower leg, above the talo-tibial joint line. Patients were asked to do a maximal isometric contraction, held for 5 seconds. [10]

For Hamstring testing:

At 90° of knee flexion, the HHD was held on the posterior aspect 1-2cms above the lateral malleolus.

After a rest period of 10 mins. the readings were obtained from the other leg. [10] From each leg 3 readings were recorded for both quadriceps and hamstrings with 1 minute rest after each contraction.

The mean of the isometric strength values was recorded in “kg” and the ratio was obtained by dividing the mean quadriceps to mean hamstrings strength.

The subjects were then classified on the basis of stage of OA according to the Kellgren’s Lawrence scale by a radiologist of the institution, the examiner was blinded. The obtained data of Q: H ratio was then correlated with the grade of Osteoarthritis.
Data Analysis:

Data was analyzed using the Graph pad prism 7 software.

Descriptive analysis of the data was done.

The data was checked for normality using the Shapiro-Wilk test. The data did not pass normality, thus, non-parametric tests were used.

The 2 groups studied were named as:

Group 1: Osteoarthritis of knee.

Group 2: Age and gender matched control group.

The Quadriceps to hamstring strength ratio of Group 1 was compared with Q: H of the group 2 using the Mann-Whitney U test at 95% confidence interval (C.I).

The Q: H ratio of GROUP 1 was co-related with the Kellgren Lawrence grade of radiological severity of OA Knee using the spearman co-relation test.

Findings

• There were total 132 participants in the study, 66 in group 1: subjects with osteoarthritis of knee and 66 in group 2: Age and gender matched healthy individual.

• The mean age of participants in group 1 was 52.2 ± 6.59 and that of group 2 was 48.98 ± 6.33.

• A total of 66 participants in group 1 consisted of 68% females (45) and 32% males (21) while in group 2 67% females (44) and 33% males (22).

• The mean Q: H ratio of group 1 was 1.425 ± 0.385 and that of group 2 was 1.48 ± 0.212

• As the data did not pass the Shapiro-Wilk test for normality, non-parametric test was used i.e. the Mann-Whitney U test. There was a significant difference in the Q:H ratio of the two groups, the p value was significant at 95% confidence interval.

• The Kellgren Lawrence grade of radiological severity of Osteoarthritis of knee was co-related to the Q: H ratio using the spearman co-relation test the r value was -0.06752 it was not significant at 95% confidence interval.

Bar graph showing comparison of Q:H ratio in group 1 and 2

Scatter plot showing no linear association between Q:H ratio and KL grade

Figure 3

Figure 4
Discussion

Quadriceps to Hamstring strength ratio:

The mean Q: H ratio in group 1 was 1.425 with standard deviation (S.D) 0.385; whereas the Q:H ratio of subjects in group 2 was 1.47 ± 0.21. The difference between the two means was compared using the Mann Whitney test, which showed a significant difference at 95% confidence interval.

In the present study, the Quadriceps to hamstring ratio in patients with osteoarthritis of knee was less as compared to the age and gender matched controls.

This result is consistent with the study by Karen W. Hayes and Judith Falconer. In their study on 43 patients with physician diagnosed Osteoarthritis of knee, they assessed the Q: H ratio using the hand held dynamometer and the mean Q: H ratio in patients with OA knee was 1.43 ± 0.39 as compared to the healthy adults in whom the ratio was 2. This decline in the ratio was attributed to pain which caused the reflex inhibition and thus reduced strength. [11]

In another study by Kathy Hall, Karen Hayes and Judith Falconer the effect of pain and joint enlargement was studied on the Q: H ratio in patients with OA knee as compared to healthy adults. In a group of 21 patients the Q: H ratio was studied and compared to age, gender and dominance of leg matched controls. The Q: H ratio was compared in both the groups using the unpaired t test and found to be significantly different. Further the Q: H ratio was co-related with age, pain and joint effusion and only joint enlargement co-related to Q: H ratio in the OA knee group. Their study concluded that joint enlargement may have an effect on the Q: H ratio in OA knee individuals, while age and pain did not show an effect on the ratio. [12]

Q:H ratio and KL grade:

Ruhdorfer A et al, did an extensive study on OA knee patients, to assess the disparity in muscles of the thigh between the symptomatic and asymptomatic knee, across various grades of osteoarthritis of knee. In a sample of 3,809 subjects with osteoarthritis of knee, the scores of isometric strength of quadriceps and hamstring was compared using covariance model between symptomatic and asymptomatic knee , the Kellgren Lawrence grade and pain subscale of WOMAC (Western Ontario McMaster universities Osteoarthritis Index).

The study concluded that there was no direct association between strength and radiographic severity of OA, but Knee symptoms particularly pain, is a relevant determinant of muscle strength of quadriceps and hamstring. [13]

The results of our study are consistent with the above study, wherein there is no linear association of the Quadriceps to hamstring strength ratio and the Kellgren Lawrence scale of radiological severity of osteoarthritis of knee.

Bedson J et al showed that radiographic osteoarthritis is an imprecise guide of pain and disability. [14] Another study by Muraki S et al, concluded that, women tend to have knee pain even without radiological joint space narrowing unlike men, in whom knee pain strongly associated with joint space narrowing. [15]

Conclusion

The ratio of isometric strength of Quadriceps to Hamstring is significantly lower in patients with osteoarthritis of knee as compared to healthy adults.

There is no co-relation of Quadriceps to hamstring strength ratio and radiological severity of Osteoarthritis of knee.

Conflict of Interest: None

Source of Funding: None

Ethical Clearance: The ethical clearance for the study was obtained from Institutional ethics committee, Ethics committee for Academic Research Project. (ECARP)

Acknowledgement: My sincere and heartfelt thanks to the Head of department of physiotherapy Mrs. Chhaya Verma, for her constant support and encouragement.

I would like to thank the HOD of radiology department, Dr. Dev Shetty for his crucial contribution in the study. Also an immense gratitude to all the participants of the study.

References


Awareness of Parents for Need of Sensory Integration Therapy

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²Associate Professor, H.O.D, PG & Research, Department of Rehabilitation Science, Holy Cross College, Thiruchirapali

Abstract

Aim: To create awareness about the need of Sensory Integration Therapy (SIT) to the parents of children with autism.

Objectives:
- To help parents to know the need for sensory integration therapy in children with autism so that it can help in early intervention
- To create awareness to the parents that some of the behaviors that their child exhibits are sensory problems and that their child needs sensory integration therapy for the same
- To make the parents aware about the sensory problems so that they can help their child at home

Methodology: A cross sectional study. Thirty parents of children who were diagnosed to have autism were considered for the study. A questionnaire was prepared consisting of 77 closed ended questions covering all the aspects of sensory integration dysfunction. After pilot study, the questionnaire was administered to parents of children with autism. The responses from the parents were tabulated and analyzed. The reliability of the questionnaire was assessed using split half method and validity using content validity method.

Results: Majority of the parents (50.9%) were not aware about the need for sensory integration therapy in children with autism and only 34.08 % of the parents are aware, whereas 15.2 % of the parents are not sure about whether their child needs sensory integration therapy for the same.

Conclusion: The questionnaire has helped in creating awareness among parents for the need of sensory integration therapy in children with autism spectrum disorders. Further steps needed to create awareness among parents of children with autism spectrum disorder which is important for early intervention of the problem.

Keywords: Autism, Sensory Processing Dysfunction, Sensory Integration Therapy.

Introduction

Autism is one of the spectrums of disorder characterized by a severe and pervasive impairment in communication and socialization. It is characterized by behaviors like being aloof and withdrawn, able to communicate only in repetitious utterances, (Kanner, 1943). They will have marked impairment in the use of multiple non-verbal behaviors such as eye - eye gaze, facial expression, body postures and gestures to regulate social interaction (DSM IV, 1994); the child also exhibits failure to develop peer relationship appropriate to the developmental period. Many children with autism are also hypersensitive or hyposensitive to light, noise and touch. These sensory differences are also called as sensory processing disorder (SPD) or sensory integration dysfunction (SID). Such children may over
or under react to visual, tactile and oral input, to the point where they will be unable to take part in activities of daily living.

**Sensory Processing or Sensory Integration (SI).**

Sensory processing refers to our ability to take in information through our senses (tactile, proprioception, olfactory, gustatory, visual and auditory), organize, interpret that information, and make a meaningful response. Sensory integration is the ability to take in information through the senses of touch, movement, smell, taste, vision, hearing, and to combine the resulting perceptions with prior information, memories and knowledge already stored in the brain, in order to derive coherent meaning from processing the stimuli. Sensory integration is an innate biological process and refers to the integration and interpretation of sensory stimulation from the environment by the brain. Sensory integration is the organization of sensation for use (Ayres, 1979).

**Sensory Integration Dysfunction**

Sensory integration dysfunction is known as difficulty processing information through the senses. Sensory integration dysfunction is a neurological disability in which the brain is unable to accurately process the information coming in from the senses. Sensory integration problems can affect the functions of tactile, auditory more commonly, but gustatory, visual, olfactory, vestibular and proprioception may also be affected. Sensory integrative dysfunction is a disorder in which sensory input is not integrated or organized appropriately in the brain and may produce varying degrees of problems in developing, information and behavior (Cindy, 1995)

**Sensory Integration Therapy**

Sensory integration therapy essentially involves specific sensory activities that are intended to help the patient regulate his or her sensory response. SIT involves the gentle exposure to various sensory stimuli. The aim is to strengthen, balance and develop the CNS processing of sensory stimuli. Sensory integration therapy uses enhanced sensory input combined with planned motor output through which a child experiences success. The emphasis is on non-cognitive which means that one work with the child’s reactions rather than practice specific skills. The professional who can help children with sensory integration dysfunction are occupational therapist. If only the parent can notice the sensory problems of their child at home they can bring the child for early intervention so that sensory integration therapy can be given to help the child overcome the problem of sensory integration dysfunction

A study planned by Fazlioğlu and Baran (2008) at the Trakya University Training and Research Center for Mentally and Physically Handicapped Children in Turkey, investigated the effect of a sensory integration therapy program on sensory problems of children with autism. The children with autism in the age range of 7 to 11 years were assessed initially on a checklist, Sensory Evaluation Form for Children with Autism, developed to evaluate sensory characteristics of children with autism, and at the end of the study, participants were assessed again on the checklist. It was statistically known that the sensory integration therapy program had a positive effect on children with autism.

Ottenbacher (1982) using quantitative revising methods showed that subjects participating in sensory integration therapy performed significantly better than members in the control groups who did not receive sensory integration therapy.

Lisa Jo Rudy (2007) who studied whether SIT really works, concluded that outcomes of SIT was not always positive but could elicit major changes. Though many believe SIT is subjectively effective in educational and clinical settings, research to support its effectiveness is scant.

Arun Banic (1990) in his project on “Educating parents on prevention, identification and management of disabled children” has stressed the role of professionals in creating awareness.

**Material and Method**

**Subjects**

Thirty parents of children who were diagnosed to have autism were considered for the study.

Illiterate parents were not taken into consideration. Parents were not selected on the basis of their occupation or economic status. Parents who were a resident of Chennai were preferred. Parents were considered irrespective of their cultural background, and the emotional status of parent regarding the child was not considered.
Materials

A questionnaire was prepared on consultation with a psychologist and under the guidance of an occupational therapist. The questionnaire consisted of 77 closed-ended questions. The questionnaire was prepared in such a way that it covered all the aspects of sensory integration dysfunction.

Procedure

The questionnaire was first given to five qualified occupational therapists for refining the study. The questionnaire was administered to five parents of children with autism as a pilot study. After the pilot study the questionnaire was refined to suit the needs of the study.

Then the questionnaire was given to the parents of children with autism in a few special schools and to some parents during their clinical visits. Questionnaires were filled by giving it to the parents. It was collected a few minutes after. The parents were asked to read the questions and tick in the allotted box appropriately. Instructions were given that, if they are aware about the need of SIT, they have to tick (√) either ‘YES’ or ‘NO’ or ‘NOT SURE’. The questionnaires were collected back from the parents and the responses were tabulated and analyzed.

Findings & Results

The response of the questions of each parent i.e. ‘YES’ or ‘NO’ or ‘NOT SURE’ were tabulated. The percentage were calculated according to the number of ‘YES’ or ‘NO’ or ‘NOT SURE’ responses from the questionnaire. The percentage of the responses was calculated for each question separately.

<table>
<thead>
<tr>
<th>Q</th>
<th>Y(%)</th>
<th>N(%)</th>
<th>NS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>50</td>
<td>43.3</td>
<td>6.6</td>
</tr>
<tr>
<td>Q2</td>
<td>50</td>
<td>46.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Q3</td>
<td>26.6</td>
<td>63.3</td>
<td>10</td>
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<tr>
<td>Q4</td>
<td>43.3</td>
<td>50</td>
<td>6.6</td>
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<td>43.3</td>
<td>50</td>
<td>6.6</td>
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<td>Q6</td>
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<td>23.3</td>
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<td>Q7</td>
<td>23.3</td>
<td>66.6</td>
<td>10</td>
</tr>
<tr>
<td>Q8</td>
<td>23.3</td>
<td>70</td>
<td>6.6</td>
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<tr>
<td>Q9</td>
<td>33.3</td>
<td>60</td>
<td>6.6</td>
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<tr>
<td>Q10</td>
<td>30</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Q11</td>
<td>32.3</td>
<td>56.6</td>
<td>10</td>
</tr>
<tr>
<td>Q12</td>
<td>40</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Q13</td>
<td>30</td>
<td>56.6</td>
<td>13.3</td>
</tr>
<tr>
<td>Q14</td>
<td>43.3</td>
<td>46.6</td>
<td>10</td>
</tr>
</tbody>
</table>

Analysis of the Score Sheet of the Samples

Based on analysis of the questionnaire of all the domains, the results show that 34.08% of the parents are aware about the need for sensory integration therapy in children with autism spectrum disorder and 50.9% are not aware and 15.2% of the parents are not sure about the sensory problems of the child and whether, the child needs sensory integration therapy for the same.
Analysis of questions on Tactile Sensation

Based on the analysis, 36.46 % of parents were aware and 53.47 % were not aware about whether their child needs SI therapy for the tactile problems and 10.84 % were not sure of their answer.

Analysis of questions on Auditory Sensation

Based on the analysis, 38.29 % of the parents were aware and 51.65 % were not aware whether their child needs SI therapy for the auditory problems and 9.96 % were not sure.

Analysis of questions on Olfactory Sensation

Based on the analysis, 28.07 % of the parents were aware and 50.44 % were not aware whether their child needs SI therapy for the olfactory problems and 21.4 % were not sure.

Analysis of questions on Visual Sensation

Based on the analysis, 33.59 % of the parents were aware and 48.85 % were not aware whether their child needs SI therapy for the visual problems and 18.01 % were not sure.

Analysis of questions on Gustatory Sensation

Based on the analysis, 34.95 % of the parents were aware and 44.96 % were not aware whether their child needs SI therapy for the gustatory problems and 21.08 % were not sure.

Analysis of questions on Vestibular Sensation

Based on the analysis, 38.15 % of the parents were aware and 46.33 % were not aware whether their child needs SI therapy for the gustatory problems and 15.41 % were not sure.

Analysis of questions on Muscle Tone

Based on the analysis, 21.62 % of the parents were aware and 59.97 % were not aware whether their child needs SI therapy for the muscle tone and 18.3 % were not sure.

Analysis of questions on Coordination

Based on the analysis, 32.18 % of the parents were aware and 51.63 % were not aware whether their child needs SI therapy for coordination and 16.06 % were not sure.

Analysis of questions on Reflex Integration

Based on the analysis, 19.95 % of the parents were aware and 59.95 % were not aware whether their child needs SI therapy for reflex integration and 20 % were not sure.

Figure 1: Graph showing the percentage of responses of parents in each domain

Analysis on reliability and validity of the questionnaire

The reliability of the questionnaire was assessed by the split half method; the calculated ‘r’ value is 0.82. This shows that there is a good correlation in the variables. Thus the questionnaire is reliable. The validity of the questionnaire was assessed by using content validity method. The content validity obtained by the experts in the field shows good validity.

Table 2: Shows the percentage of responses of parents in each domain

<table>
<thead>
<tr>
<th>SYSTEMS</th>
<th>YES (%)</th>
<th>NO (%)</th>
<th>NOT SURE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tactile Sensation</td>
<td>36.46</td>
<td>53.47</td>
<td>10.84</td>
</tr>
<tr>
<td>Auditory Sensation</td>
<td>38.29</td>
<td>51.65</td>
<td>9.96</td>
</tr>
<tr>
<td>Olfactory Sensation</td>
<td>28.07</td>
<td>50.44</td>
<td>21.4</td>
</tr>
<tr>
<td>Visual Sensation</td>
<td>33.59</td>
<td>48.85</td>
<td>18.01</td>
</tr>
<tr>
<td>Gustatory Sensation</td>
<td>34.95</td>
<td>44.96</td>
<td>21.08</td>
</tr>
<tr>
<td>Vestibular Sensation</td>
<td>38.15</td>
<td>46.33</td>
<td>15.41</td>
</tr>
<tr>
<td>Muscle Tone</td>
<td>21.62</td>
<td>59.97</td>
<td>18.3</td>
</tr>
<tr>
<td>Coordination</td>
<td>32.18</td>
<td>51.63</td>
<td>16.06</td>
</tr>
<tr>
<td>Reflex Integration</td>
<td>19.95</td>
<td>59.95</td>
<td>20</td>
</tr>
</tbody>
</table>
This study makes use of only a limited number of subjects and so the results cannot be generalized.

Emotional status of the mother regarding the child was not taken into consideration

The knowledge of the parents regarding the problem was not taken into consideration

The responses varied very much as the amount of awareness varied depending on the awareness in each school

Discussion

The present study was aimed to find out whether parents of children with autism know that the sensory integration dysfunctions of their child can be managed by giving sensory integration therapy and to create awareness among parents for the need of sensory integration therapy in children with autism spectrum disorders.

It can be observed that not much importance has been given to find out whether parents have awareness regarding the need for sensory integration therapy and also for creating awareness among the parents for the need for sensory integration therapy in children with autism spectrum disorders. A project by Arun B, (1990) has stressed the role of the professionals in creating awareness among the parents for the identification and management of disabled children.

Based on statistical analysis it was found that about 50% of the parents are not aware of the need of sensory integration therapy in children with autism while 34% of parents are aware and 15% of parents are not sure whether children who exhibit sensory integration dysfunction need sensory integration therapy for their improvement. This indicates the need for creating awareness among the parents for the need of sensory integration therapy. It was found statistically that the awareness of parents was more in auditory sensation and vestibular sensation than tactile sensation and the awareness was less in gustatory, visual and coordination problems than tactile sensation. The awareness of parents for coordination and reflex integration were poorer than for olfactory sensation for which the awareness was poorer than for visual sensation. The maximum numbers of parents were not aware for the need of SIT for muscle tone and reflex integration problems and a minimum number of parents were observed to be not aware for the need of sensory integration therapy in children with gustatory, visual and vestibular problems. About 50 % of the parents were not aware of the need of sensory integration therapy in children with auditory, olfactory and coordination problems. This indicates that most parents don’t notice problems of tiredness or that of lacking adequate protective reactions while falling which again stresses on the need for creating awareness. A maximum number of parents were found to be not sure of the need for sensory integration therapy in children with problems of olfactory, vestibular and reflex integration. And 10 % of the parents were found to be not sure for the need of sensory integration dysfunction in children with tactile and auditory problems. About 18% of the parents are not sure whether SIT is necessary for problems of coordination, visual discrimination and continuous spinning or swirling movements of their children.

Recommendation:

It can be concluded by this study that 34.08 % of the parents are aware about the need for sensory integration therapy in children with autism spectrum disorders and 50.9 % are not aware and 15.2 % of the parents are not sure about whether their child needs sensory integration therapy for the same. Hence awareness of sensory integration therapy becomes necessary.

Conclusion

The questionnaire has helped in creating awareness among parents for the need of sensory integration therapy in children with autism spectrum disorders. Further steps needed to create awareness among parents of children with autism spectrum disorder which is important for early intervention of the problem.

Conflict of Interest: No Conflict of Interest

Source of Funding: Self Funding

Ethical Clearance- Taken from.

University Ethical: Committee.

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Job V/s. Home Demands: A Comparative Study between Life Satisfaction, Physical and Mental Stress in Indian Housewives and Employed Women

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¹Intern, ²Assistant Professor, Department of Rehabilitation Science, Jamia Hamdard, New Delhi

Abstract

Objectives: Woman consistently experiences more stress, anxiety, lifestyle changes, various health problems, and work-related musculoskeletal disorders. Hence a need was felt to understand the problems related physical, psychosocial and satisfaction from life in Indian housewives and Employed Women.

Methodology

156 (Employed women-78, housewives-78) were assessed using the following questionnaires.

1) Perceived Stress Scale
2) Satisfaction with Life Scale (SWLS)
3) Visual Analogue Scale
4) Musculoskeletal Discomfort Form
5) Researcher’s Assisted Questionnaire

Results: The findings of present study shows that in total 156 (employed women -78 and housewives-78) mental stress (PSS) is higher in housewives that is 61% as compared to employed women that is 39%. Life satisfaction (LSS) higher in employed women that are 56% as compared to employed women that is 44%. Maximum Housewives reported discomfort in knee and back area while employed women in neck region and back.

Conclusion: PSS had higher stress level in housewives than employed women. LSS had higher life satisfaction in employed women than housewives .knee and back are highly affected areas of discomfort and pain among housewives and neck region and back area in employed women.

Keywords: Employed Women, Housewives, Life Satisfaction, Stress

Introduction

Woman consistently experience more stress, anxiety and psychological distress, musculoskeletal disorder (MSDs) they may also encounter psychosocial problems such as time pressure, and stressful work. WHO defines health as a state of physical “complete physical, mental and social wellbeing and merely the absence of disease or infirmity”. Mental health has been reported as an important factor influencing an individual’s various behaviors, activities, happiness and performance. Mental health can be defined as the ability to make adequate social and emotional adjustments to the environment, on the plane of reality. The interface between the workplace and the family life is more stressful for the women who work outside the home and they have to perform both familial as well as professional roles. This in turn, leads to stress of a person and affects mental health. It is a general assumption that a good job can contribute to overall quality of life through increased income and more satisfying .In one of the important
studies working women reported higher scores on general health, life satisfaction and self-esteem and lower score hopelessness, insecurity, and anxiety.³

Musculoskeletal disorders (MSDs), are one of the most common health concern for working people. The roles of personal and environmental factor in relation to MSD, particularly lower back pain, have been widely examined demographic variable (gender, age socioeconomic status); physical work demands (e.g. Constrained posture, repetitive movements) and Psychosocial work condition. ⁴

Materials and Method

Study Design

A cross-sectional survey was used

Subjects

A convenience sample of 156 (Employed women-78, Housewives-78) female were included.

All female in the age group 35-55 years working in office, college, school and housewives willing to participate were eligible for inclusion. Female who are mentally and physically challenged, unable to respond to the questions (due to hearing problems or any other reason) and not willing to participate were excluded.

Procedure

Necessary permission was obtained from the medical superintendent of the Holy family Hospital to conduct the study. The purpose of study was explained to all eligible participants in their local language. Verbal consent and written consent was obtained from all who elected to participate in the survey. Data was collected by face to face interview method using different questionnaires. Questionnaires were filled by the investigators at the time of interview. Following that all participants were explained about different problems related to Life satisfaction, Physical and Mental stress. At last they were given an occupational therapy education booklet explaining occupational therapy program for the safe, healthy, and efficient lifestyle, emphasizing the physical, mental and psychosocial wellbeing of women’s.

Outcome Measures / Scales

- Perceived Stress Scale (PSS)

The Perceived Stress Scale (PSS) is used as psychological instrument for measuring the perception of Stress. It is a measure of the degree for the situations in one’s life which are appraised as stressful. The questions in the PSS comprises about the feelings and thoughts during the last month. PSS scores are obtained by reversing responses (e.g. 0=4, 1=3, 2=2, 3=1&4=0) to the four positively stated items.⁸

- Satisfaction with Life Scale (SWLS)

The satisfaction with life scale was developed as a measure of the judgmental component of subjective wellbeing. A five item scale design to measure global cognitive judgments of one’s life satisfaction categorized as 7- strongly agree, 6-agree, 5-slightly agree, 4-neither agree or disagree, 3-slightly disagree, 2-disagree, 1- strongly disagree.¹⁰

- Visual analog scale (VAS)

The vas is a measure of the intensity of pain (Huskisson, 1982). It is usually a 10cm line with anchors of “no pain” and ‘worst pain possible’ with a score of zero and ten. The person rates the intensity of their pain on the VAS by marking the line at the point that best describes the intensity of their pain. The VAS is a simple, widely used self-report measure that has excellent reliability and validity.²⁴

- Musculoskeletal Discomfort Form

Well accepted Questionnaire for the analysis of musculoskeletal symptoms in an ergonomic and occupational health context. The questions are choice variants and may be either self-administered or used in the interviews. These questions concentrate on symptoms most often encountered in occupational settings. The reliability of questionnaire has been shown to be acceptable.²³

- Researcher’s Assisted Questionnaire

The questionnaire was a set of 6 questions for housewives and employed women. The questions comprised of the factors affecting mental stress and satisfaction from the life. The set of 6 questions asked with each housewife and employed woman.

Data Analysis

Complete data was gathered in the form of a master chart on Microsoft excel 2010. The statistical analysis
was conducted using statistical package for the social science 21(SPSSv.21).statistical significance at p≤0.00 was assumed .A paired – sample-test was conducted to compare the effect of quality of life and stress level among housewives and employed women .Descriptive analysis included percentages, means and SD.

Findings

Table 1: T- test values for different factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Housewife N=78</th>
<th>Employed women N=78</th>
<th>t-value</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>PSS</td>
<td>31.5641</td>
<td>2.3836</td>
<td>14.0641</td>
<td>4.249705</td>
</tr>
<tr>
<td>SWLS</td>
<td>20.25641</td>
<td>8.1741</td>
<td>28.01282</td>
<td>6.853748</td>
</tr>
</tbody>
</table>

(*significant at 0.00 levels: NS: Not Significant)

PERCENTAGE ANALYSIS

1. Life satisfaction and Higher stress level in Housewives and Employed women

<table>
<thead>
<tr>
<th>S.no.</th>
<th>EMPLOYED WOMEN</th>
<th>HOUSEWIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Life Satisfaction</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>b) Higher Stress Level</td>
<td>39%</td>
<td>61%</td>
</tr>
</tbody>
</table>

2. Factors affecting mental level and life satisfaction among housewives

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>HOUSEWIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of family support</td>
<td>26%</td>
</tr>
<tr>
<td>Financial security</td>
<td>13%</td>
</tr>
<tr>
<td>Inequality at home</td>
<td>9%</td>
</tr>
<tr>
<td>Low dignity</td>
<td>8%</td>
</tr>
<tr>
<td>Ego of male counterpart</td>
<td>6%</td>
</tr>
<tr>
<td>Non utilization of talent</td>
<td>38%</td>
</tr>
</tbody>
</table>

3. Factors affecting mental level and life satisfaction among Employed Women

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>EMPLOYED WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of family support</td>
<td>40%</td>
</tr>
<tr>
<td>Discrimination at work</td>
<td>17%</td>
</tr>
<tr>
<td>Challenge to safety, life and security</td>
<td>11%</td>
</tr>
<tr>
<td>Non-utilization of talent</td>
<td>5%</td>
</tr>
<tr>
<td>Low dignity</td>
<td>14%</td>
</tr>
<tr>
<td>Ego of male counterpart</td>
<td>13%</td>
</tr>
</tbody>
</table>

• Distribution of areas of pain and discomfort

[Graph: 1 Areas of distribution of pain]
Discussion

This study was set out to investigate and compare the life satisfaction, physical stress, mental stress among Indian housewives and employed women. The sample of 156 Indian women were taken, 78 from each category. The sample was analyzed on the basis of different factors and their comparison among the two groups.

Among physical stress the women were assessed on the basis on musculoskeletal discomfort and pain.

Musculoskeletal discomfort was analyzed using MSD, where areas of distribution of discomfort were marked by both groups of women. It was investigated that most of the housewives reported discomfort in Knee and Back area. However shoulder and cervical area were also prominent areas of discomfort among housewives. On analyzing the discomfort in employed women, the major problematic areas of discomfort were neck region and back.

Physical health status involved work related musculoskeletal discomfort and pain.

Musculoskeletal discomfort was analyzed by musculoskeletal discomfort form, where areas of distribution of discomfort were marked.

Similar results were shown by A. Chandrasakaran, who conducted a study to gather information about musculoskeletal problems in women. The study concluded low back complain had the highest prevalence (57.8%), followed by (44.8%) shoulder, neck (29.7%) 17.

The intensity of pain was measured by vas scale. Intensity of pain mostly ranging from 3 to 4 among both the groups, however intensity of pain varitated from 2 to 7 in many women.

The mental stress was analyzed using PSS. On the analysis of Mental stress (according to PSS) among two group samples of woman, it was found that the mental stress in housewives were on higher side that is 61% of housewives were having higher mental stress as compared to employed women that is 39%. When the comparative T test were done to compare the stress level among two groups, the results were highly significant (0.00).

The similar result was also found by Muntazir Maqbool Kermani 2016 did a study to examine the stress among employed women and housewives. The mean for the stress level of employed women was 60.78 and for a housewife was 43.3 which concluded that the mean has a higher among employed women in comparison to housewives. 6

In this study, the satisfaction from life were taken as one comparative factor among employed women and housewives, to know the life satisfaction level among two groups. On the life satisfaction analysis on the basis of LSS, it was found that the Indian employed women had more satisfaction from the life as compared to housewives. On percentage analysis among two groups, 56% of the employed women were having life satisfaction as compared to housewives that is 44%. On T test comparison the results were highly significant (0.00).

In this study we tried to figure out the most common factors among Indian housewives and employed women which were the common cause of mental stress and lower life satisfaction. The women sample (all 156) were analyzed by percentage analysis on the basis of answers given by them through Researcher’s Assisted Questionnaire (a set of six factors for each woman two groups).

The similar result were also found by Muhammad Arshad in 2015, did a study to examine to measure the life satisfaction among employed women and housewives. The result shown that the working women are satisfied more than the housewives. 8

When the factors analyzed, it was found that negligence of talent (38%) and lack of family support (26%) were the most common factors among 78
housewives resulting higher mental stress and lower life satisfaction among them. However Financial insecurity, inequality at home, low dignity, ego of male counterpart were also found as stress reinforcing factors among some housewives.

Juggling between work, home and personal life was the most common factor that is 40% of employed had this as major cause of their low life satisfaction and higher mental stress. However family duties, challenges of safety, discrimination at work, lack of family support were also found as strong reinforce for higher mental stress among Indian employed women.

In this study, on the basis of results from analysis on T test and percentage analysis, the major problems and causes of lower life satisfaction and higher physical and mental stress were identified, according to the problem areas of women and their priority in home and job, they were explained, demonstrated and given suggestions and solutions which could help them to live a happy healthy life, highly satisfied from life with minimal mental stress.

The result were shown by Harilal A in 2017, did a study on stress level among working women and housewives. stress level of working women with a mean value of 27.1667 and the housewife with a mean value of 24.08889 when compared with various factors of stress, self-role, distance is high for working women (6.5667) and lower for housewives (5.662). the mean value for stress arising due to personal adequacy is 7.0000 for working women and 606778 for housewives.

**Conclusion**

In our comparative study on physical, mental stress and life satisfaction among two groups of women, the musculoskeletal discomfort and pain were found in both the groups. Neck area was the most affected area of discomfort among employed women whereas knee and back were most problematic area of discomfort in housewives.

When the mental stress was analyzed, housewives were having more mental stress than employed women.

Employed women were found more satisfied with their life as compared to housewives.

Negligence of talent, Lack of family support were the most common cause of mental stress and lower life satisfaction in housewives whereas Juggling between work, home and personal life were the most common factor for mental stress among employed women.

A women plays so many roles of daughter, sister, wife, daughter in law etc. and for ages has been a multitasked, the one who cook food, does domestic work, raises kids, and cares for everyone, she works 24x7 but never complains. Her tasks and challenges have increased and hardened multifold juggling between career, family kids society, personal health, desires etc.

Therefore it is most important to identify, to care, and to solve the problems of Indian women.

**Conflicts of Interest:** The authors report no conflicts of interest in this work.

**Findings Sources:** Self

**Ethical Clearance:** Necessary permission was obtained from the head of superintendent to conduct the study. Verbal consent and written consent were obtained from all the women who elected to participate in the survey.

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Abstract

**Background:** Cervicogenic headache sufferers complain of headache and neck pain. They present with changes in biomechanics of cervical spine. This study aims to find the role of alignment specific exercises in cervicogenic headache.

**Study Method:** After ethical clearance and informed consent, 60 eligible subjects were allocated based on sagittal radiograph into 3 groups 1. Straightened spine, 2. Kyphotic spine and 3. Normally aligned spine. Examination includes neck range of motion, numeric pain rating scale, neck disability scores and cervical core endurance. They had alignment specific exercises and assessed on day 1, end of 4th and 6th weeks.

**Results:** Out of 60 subjects, 24 had a straightened spine while 19 had normal and 17 had kyphotic spines. At end of 6 weeks, all groups responded to individualized treatment. The straightened spine group had an improvement in all parameters except the Craniocervical flexion test score which was better in the normal group. Numeric Pain Rating Scale and Neck Disability Index reduced significantly. Performance index of Craniocervical flexion test and Range of Motion improved in all. The percentage of test positives in Cervical Flexion Rotation Test dropped in all the groups.

**Conclusion:** The study concludes that alignment specific exercises have a significant role in decreasing the severity of cervicogenic headaches. Each group individually had good improvements but between groups the response was statistically not different.

**Keywords:** C1- C2 mobility, cervical flexion rotation test, cervical spine alignment, cervicogenic headache, craniocervical flexors, craniocervical flexion test.

Introduction

“Cervicogenic headache (CGH) is a secondary type of headache caused by a disorder of the cervical spine and any of its components (bone, soft tissue elements or disc), usually associated with neck pain” (1) (International Classification of Headache Disorders (2)). The prevalence is 0.4%-2.5% and incidence is 14-18% in all variants of headaches (3). It is four times more common in women (4).

CGH subjects have symptoms in neck and spread to the head (unilateral and not side-shifting) and may begin on waking up or can worsen as the day progresses. Precipitated with neck movements and sustained neck postures. Observed in any age but increases in frequency and intensity over years. It may or may not be associated with history of neck trauma or cervical degenerative disease (5).

Nociceptive afferents from the upper cervical spinal nerves converge with afferents of first division of the
trigeminal nerve in trigeminocervical nucleus caudalis located at spinal gray matter (C1–C3). Exchange of nociceptive information from upper cervical spinal nerves and the ophthalmic division of the trigeminal nerve facilitate symptoms to the forehead, temple or orbit producing cervicogenic headache (6).

In CGH subjects might have upper cervical joint dysfunction, craniocervical flexors impairments, scapular postural muscles, cervical ROM and kinesthesia (7). Mechanical stability of the cervical spine is maintained by Neck muscles (80%) and osseoligamentous system (20%) (8). Forward head posture (FHP) is associated with cervicogenic headaches (9) leading to capsular strain, shortening of superficial flexors, anterior neck muscles and sub-occipital muscles stretch.

Craniocervical flexion (CCF) exercise (6weeks) was equally effective to manipulation at reducing the frequency and intensity of headache and neck pain, and the effects were maintained for 1 year (Jull and colleagues). Since there is a significant association between spinal alignment and Cervicogenic headache, this study was aimed at the role of alignment specific exercise on pain and disability in persons with CGH of different cervical alignments.

**Material and Method**

After ethical clearance and informed consent, persons with headache, painful or restricted neck ranges and tender cervical spines were taken into the study. Patients with neurological symptoms, migraine, hypermobile joints, and inflammatory conditions were excluded. Subjects were examined to assess neck range of motion, numeric pain rating scale, neck disability scores, flexion rotation test and cervical core endurance. Eligible subjects were enrolled into three groups based on sagittal radiograph 1.Straightened spine, 2. Kyphotic spine and 3. Normally aligned spine. All subjects were given curve-specific exercises which included deep neck flexor activation and stabilization, co activation of cervical extensors, scapular muscle integration, and manual muscle release methods for tightened fascia around sub occipital, cervical and upper thoracic regions. Mobilization of the cervical spine was performed on all the patients. Reassessment was done at the end of 4th and 6th week. Results of each assessment were tabulated and subjected to analysis.

**Flow chart**

```
Patients' screening

Informed consent

Baseline measurements

Grouped into 3 groups (n=60)

Normal spine

Kyphotic spine

Straightened spine

Alignment exercises

Reassessment
```

**Figur 1: Flow chart**
Cervical flexion rotation test (CFRT): In supine position, cervical spine end of ranges of rotations estimated by firm resistance encountered by the therapist or the onset of pain. The test was considered positive when the visually estimated range of rotation was reduced by more than 10° from the anticipated normal range of 44°. (7)

Cranio-cervical flexion test: Crook-lying, the subject was instructed to perform a gentle and slow head nodding action on pressure cell (20 mmHg). The pressure gauge was held in front of the subject to monitor changes facilitating the contraction of deep cervical flexor muscles. Test is valid if the subject hold for 10 seconds with minimal or no compensatory strategies. Performance was scored by the pressure level that the subjects were able to achieve (activation score) and hold for 10s in 10 repetitions (holding capacity). The performance index (PI) was calculated by multiplying the activation score by the number of successful repetitions. (1)

Radiographic analysis: For curvature classification, a line was drawn to connect the midpoint of the C2 inferior end plate and C7 superior end plate. The centers of each vertebral body from C3 to C6 were located by connecting the diagonals of each vertebral body in the sagittal plane, and the distance from each center to line was measured (10).

Common exercises for all groups:

1. Deep neck flexor strengthening (pressure biofeedback): The inflated cuff of the pressure biofeedback unit was placed under the neck, set at 20mmHg, and asked to maintain. Progression: 2mm Hg increment.

2. Mobilization of C1-C2 joints, Headache SNAG’s: Therapist standing beside the patient in seated position. Head was cradled between therapist’s body and right forearm if standing on right. A gentle pressure was applied in ventral direction on C2 spinous process while the skull remains stable, and maintained for 10s.3. Craniocervical flexion exercises: Head nodding action slowly and gently in crook lying position and hold for 10s, In order to prevent superficial muscle activation and maintain the normal lordosis, a towel placed under the neck. Progression: Bilateral shoulder raise with chin tuck.

4. Scapular stabilization, integration exercises: subjects should retract their scapulae while maintaining their shoulders in 90° and 120° of elevation in prone position.

5. Scapular elevation and adduction exercises, Sub occipital release techniques, intervertebral mobilizations, Diaphragmatic breathing exercises, postural correction

Curve specific exercises adaptations for groups:

NORMAL SPINE: In addition to the above, cervical extension exercises in prone lying, phoenix position and maintaining position for 10s. Progressed using theraband.
STRAIGHTENED SPINE: Chin tuck exercises in prone while maintaining this position extension of neck as progression and maintain.

RESISTED SPINE EXTENSION EXERCISES IN PHOENIX POSITION: Prone on elbow, chin retracted and encouraged to perform cervical extension, progressed by resistance of therapist’s hands or a theraband and maintain static contraction.

QUADRIPOD: extension of cervical spine and maintain the contraction.

KYPHOTIC SPINE: In prone chin tuck, retraction and axial elongation.

AXIAL ELONGATION/ VERTICALIZATION: Erect sitting on a chair, chin retracted, and the patient is asked to push the therapist’s hand superiorly or try reaching the ceiling.

Quadripod position and chin tuck. Progression: Use of theraband.

FOLLOW UP:

Initial 2 weeks: 3 times/week, each session 30 minutes, includes C1-C2 mobilization and cervical core pressure biofeedback training.

2-4 weeks: 2 times/week, each session 45 minutes, Progression of exercises, pressure biofeedback training, scapular stabilization, cervical core stability and mobilization techniques.

4-6 weeks: Alignment restoration, core stabilization exercises and postural reeducation.

Results and Discussion

Total 432 subjects were screened, 60 eligible subjects (17 males - 20 to 65 years, 43 females - 27 to 56 years) were enrolled into the study after informed consent. 24 had a straightened spine (16 females, 8 males) while 19 (13 females, 6 males) with normal and 17 subjects (14 females, 3 males) had kyphotic spines on radiological evaluation. This finding of a predominant straightened spine is supported by the findings of Nagasawa who used X-rays to find types of cervical spines in headache and concluded that straightened spines are common. (11)

Current study population had mean age of 39.4± 10.8, these findings correlate with study published by Dr. Biondi who had mentioned the mean age of CGH as 42.9 (4).

CFRT test results showed variations within and between groups during 1st, 4th and 6th weeks, indicating changes in hypo mobility of upper cervical spine. Subjects had a positive CFRT test at 1st week and dropped down significantly (Table: 1). At the end of 6 weeks, the reduced percentage of positive CFRT indicates an improvement in the upper cervical mobility. This finding correlates with the findings of Prachi Wade, who, in her study postulated that mobilization of this joint could contribute to the reduction of headaches caused from cervical joint dysfunction. (12)

Table 1: Percentage of population showing positive on CFRT in each group

<table>
<thead>
<tr>
<th>Population percentage</th>
<th>STRAIGHTENED (n=24)</th>
<th>NORMAL (n=19)</th>
<th>KYPHOTIC (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4th week</td>
<td>12.5</td>
<td>31.6</td>
<td>35.3</td>
</tr>
<tr>
<td>6th week</td>
<td>0</td>
<td>5.26</td>
<td>12</td>
</tr>
</tbody>
</table>

NPRS and NDI scores reduced more in straightened spine group than normal and kyphotic spine groups. Normal spine group had better improvement than other groups on CCFT and ROM (See table: 2, 3 & 4). The NPRS and NDI scores all the groups were analyzed by Friedman’s testing. Chi square values in straightened spine were more than other groups. (Table number 2, 3 & 4). There was significant reduction in the NPRS and NDI scores. These findings correlated with the findings of James R. Dunning in his 2016 study concluded that patients had lower scores on NPRS and NDI after 6 weeks of treatment (1).
Results of CCFT and Cervical ROM within group in straightened spine, normal spine and kyphotic spine were displayed below. The results were analyzed using repeated measure ANOVA. Change in results of parameters from 1st to 6th week was highly significant within groups.

**Table 2: Study parameter results of straightened spine during 1st 4th and 6th week**

<table>
<thead>
<tr>
<th>PARAMETER (MEAN±S.D)</th>
<th>STRAIGHTENED (MEAN±S.D)</th>
<th>CHI-SQUARE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st week</td>
<td>4th week</td>
</tr>
<tr>
<td>NPRS</td>
<td>6.91±0.92</td>
<td>2.70±1.08</td>
</tr>
<tr>
<td>NDI</td>
<td>17.29±2.94</td>
<td>7.87±3.81</td>
</tr>
<tr>
<td>CCFT in seconds</td>
<td>224.29±67.01</td>
<td>313.79±68.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rom in degrees (MEAN±S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLX</td>
</tr>
<tr>
<td>EXT</td>
</tr>
<tr>
<td>RROT</td>
</tr>
<tr>
<td>LROT</td>
</tr>
<tr>
<td>RLAT</td>
</tr>
<tr>
<td>LLAT</td>
</tr>
</tbody>
</table>

**Table 3: Study parameter results of Normal spine during 1st 4th and 6th week**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>NORMAL (MEAN±S.D)</th>
<th>CHI-SQUARE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>NPRS</td>
<td>6.84±1.25</td>
<td>3.1±1.14</td>
</tr>
<tr>
<td>NDI</td>
<td>15.84±3.94</td>
<td>7.47±3.11</td>
</tr>
<tr>
<td>CCFT in seconds</td>
<td>207.05±75.65</td>
<td>273.89±69.88</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rom in degrees (MEAN±S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLX</td>
</tr>
<tr>
<td>EXT</td>
</tr>
<tr>
<td>RROT</td>
</tr>
<tr>
<td>LROT</td>
</tr>
<tr>
<td>RLAT</td>
</tr>
<tr>
<td>LLAT</td>
</tr>
</tbody>
</table>
Table 4: Study parameter results of Kyphotic spine during 1st 4th and 6th week

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>KYPHOTIC (MEAN±S.D)</th>
<th>1st week</th>
<th>4th week</th>
<th>6th week</th>
<th>chi-square</th>
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</thead>
<tbody>
<tr>
<td>NPRS</td>
<td>7.17±1.18</td>
<td>3.52±1.80</td>
<td>2.29±2.14</td>
<td></td>
<td>22.738</td>
</tr>
<tr>
<td>NDI</td>
<td>15.58±3.98</td>
<td>6.82±3.45</td>
<td>3.17±2.48</td>
<td></td>
<td>29.939</td>
</tr>
<tr>
<td>CCFT in seconds</td>
<td>203.88±74.22</td>
<td>268.11±68.71</td>
<td>327.29±45.26</td>
<td></td>
<td>66.656</td>
</tr>
<tr>
<td>Rom in degrees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71.17±7.40</td>
</tr>
<tr>
<td>FLX</td>
<td>41.47±10.11</td>
<td>58.52±8.24</td>
<td>64.11±5.65</td>
<td></td>
<td>79.451</td>
</tr>
<tr>
<td>EXT</td>
<td>41.17±13.52</td>
<td>53.23±9.17</td>
<td>57.94±5.60</td>
<td></td>
<td>39.263</td>
</tr>
<tr>
<td>RROT</td>
<td>49.41±7.88</td>
<td>67.05±8.30</td>
<td>71.17±7.40</td>
<td></td>
<td>62.943</td>
</tr>
<tr>
<td>LROT</td>
<td>55±10.15</td>
<td>70.29±6.72</td>
<td>75.29±5.44</td>
<td></td>
<td>58.239</td>
</tr>
<tr>
<td>RLAT</td>
<td>35.29±5.14</td>
<td>41.17±3.32</td>
<td>42.94±2.53</td>
<td></td>
<td>39.188</td>
</tr>
<tr>
<td>LLAT</td>
<td>37.05±6.62</td>
<td>42.35±2.57</td>
<td>43.52±2.34</td>
<td></td>
<td>16.547</td>
</tr>
</tbody>
</table>

1st week, 4th week and 6th week results of the NPRS and NDI scores between groups was analyzed using Kruskal-Wallis test. Difference in results within groups is clinically and statistically significant but the difference between groups was not significant (table: 7).

Table 5: Study parameter results of NPRS and NDI between groups

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>WEEK 1</th>
<th>WEEK 4</th>
<th>WEEK 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chi. Square (X²)</td>
<td>P VALUE</td>
<td>Chi. Square (X²)</td>
</tr>
<tr>
<td>NPRS SCORE</td>
<td>0.972</td>
<td>0.615</td>
<td>2.474</td>
</tr>
<tr>
<td>NDI SCORE</td>
<td>3.039</td>
<td>0.219</td>
<td>0.809</td>
</tr>
</tbody>
</table>

Other parameters like CCFT, ROM between groups were analyzed using ANOVA. The results of straightened spine, normal spine and kyphotic spine were displayed below. The differences in results of CCFT were highly significant between groups. All ROMs of cervical spine improved and the differences in results between groups were insignificant.

The improvement in the CCFT values indicate that cervical core strengthening exercises played a vital role in maintaining the posture, achieved mobility and correcting the muscle imbalances. Dong Yeon Kang, in his study, concluded that deep cervical flexor training with a pressure biofeedback unit is useful for maintaining neck mobility and muscular endurance in people with FHP. These findings also correlate with the findings of Jull and colleagues who in their study concluded that 6 weeks of the CCF exercise was as effective as manipulation in reducing the frequency and intensity of headache and neck pain. The mechanism by which this exercise contributes to pain relief is through improvement of the contractile capacity of the deep cervical flexor muscles and their role in supporting the cervical lordosis as well as improvement in the coordination between the superficial and deep layers of the neck flexor muscles.
Table 6: Study parameter results between the groups

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>WEEK 1</th>
<th></th>
<th>WEEK 4</th>
<th></th>
<th>WEEK 6</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F VALUE</td>
<td>P VALUE</td>
<td>F VALUE</td>
<td>P VALUE</td>
<td>F VALUE</td>
<td>P VALUE</td>
</tr>
<tr>
<td>CCFT in seconds</td>
<td>0.498</td>
<td>0.61</td>
<td>2.786</td>
<td>0.07</td>
<td>3.391</td>
<td>0.041</td>
</tr>
<tr>
<td>Rom in degrees</td>
<td>1.265</td>
<td>0.29</td>
<td>0.841</td>
<td>0.436</td>
<td>2.436</td>
<td>0.097</td>
</tr>
<tr>
<td>FLX</td>
<td>0.008</td>
<td>0.992</td>
<td>0.303</td>
<td>0.74</td>
<td>0.227</td>
<td>0.797</td>
</tr>
<tr>
<td>EXT</td>
<td>0.452</td>
<td>0.638</td>
<td>0.167</td>
<td>0.847</td>
<td>0.788</td>
<td>0.46</td>
</tr>
<tr>
<td>RROT</td>
<td>0.103</td>
<td>0.902</td>
<td>0.107</td>
<td>0.898</td>
<td>0.293</td>
<td>0.747</td>
</tr>
<tr>
<td>LROT</td>
<td>0.418</td>
<td>0.661</td>
<td>1.399</td>
<td>0.255</td>
<td>1.547</td>
<td>0.222</td>
</tr>
<tr>
<td>RLAT</td>
<td>0.336</td>
<td>0.716</td>
<td>0.018</td>
<td>0.983</td>
<td>2.239</td>
<td>0.116</td>
</tr>
<tr>
<td>LLAT</td>
<td>0.336</td>
<td>0.716</td>
<td>0.018</td>
<td>0.983</td>
<td>2.239</td>
<td>0.116</td>
</tr>
</tbody>
</table>

There was an improvement in the cervical spine ROM in all the groups. This shows that treating both articular and muscular impairments is required. This finding can be correlated with the findings of study by Petersen SM. (15).

The improvement that occurred as a result of participation in the study included improvement of the CCFT score, increased cervical spine ROM, decrease in the pain and disability (NPRS and NDI score) and negation of the CFRT. Though there was a significant improvement in all the parameters in each group individually observed, there was no statistically significant correlation in the responses between the groups. This indicates that each group responded best to the exercises prescribed.

**Conclusion**

The results show that all the patients reported a significant reduction in neck pain, headache and disability. They also showed an improvement in ROM and endurance. This indicates that alignment specific exercises help in reducing the pain and disability in CGH in addition to helping in maintaining the achieved effects for a longer time.

**Conflict of Interest:** No conflict of Interest

**Source of Funding:** Self

**List of abbreviations:**

CGH: cervicogenic headache

CFRT: cervical flexion rotation test

CCFT: craniovertebral flexion test

NPRS: numeric pain rating scale

NDI: neck disability index

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7. Hall BKHD. Clinical evaluation of cervicogenic


Effect of Craniosacral Therapy in Treatment of Cervical Spondylosis

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Abstract

Study design: Pre-post experimental study design. Background: Degenerative changes around neck involve ligaments and cartilages. These are the major reasons behind cervical root involvement and dysfunction. These in long run can have adverse effects like-vision disorder, hypertension and much more. Objective: Hence, present study was undertaken to add on to available treatment methods for cervical spondylosis and to find out the effectiveness of Craniosacral therapy (CST) for treating cervical spondylosis. Procedure: In this study, 30 participants were recruited based on inclusion and exclusion criteria. CST was administered to them for a period of 2 weeks, 3 sessions per week. Pre and post assessment were taken using following outcome measures-Neck Disability Index (NDI), Range of Motion (ROM), Numerical Pain Rating Scale (NPRS) Results: There was significant decrease in NDI and NPRS in patients which is suggestive of improving their quality of life. Also, cervical ROM was found to be significantly increased amongst these participants. The outcome of NDI, NPRS and Cervical ROM was statistically analyzed. It was found to be effective with highly significant P value <0.001 using SPSS software v.25. Conclusion: Craniosacral therapy (CST) is an effective treatment and can be used for treating patients with cervical spondylosis.

Keywords: Cervical spondylosis, Craniosacral therapy, Neck Disability Index (NDI), Numerical Pain Rating Scale (NPRS), Range of Motion (ROM).

Introduction

Wide base with clumsy hands and jerky gait with stooped posture of elder people has been explained throughout the ages. Similarly, pain in the neck and upper limb has turned out to be an ever-present condition occurring with aging which is “pain in the neck” is the commonly quoted term in our language as a “figure of speech”.¹ Some authors also quoted cervical spondylosis as “Mother” to myelopathy and radiculopathy. Patients that present with neck pain have symptoms which can be classified on mechanical basis or posture. Aetiological factors which are generally less understood and usually occur with multiple factors, like- postural abnormality, depression, anxiety, strain at the neck region, due to playing sports or occupation related activity and much more.²,³,⁴ Investigations that are generally used for diagnosing cervical spondylosis include plain x-ray or other radiographic investigations of cervical spine. There appears loss of normal cervical lordosis, which is suggestive of muscle spasm, reduced joint space, osteophyte lipping around the involved vertebrae. These are some of the typical findings and are clearly an indicative of degenerative changes at vertebral level.⁵ Degenerative changes of and around the cervical spine, can also involve ligament and cartilaginous structure. These changes are usually the leading reason to cervical root and cervical cord dysfunction.⁶ But many a times these degenerative changes may remain asymptomatic. A study says that radiographic evidence of cervical spondylosis with no distinct symptoms are seen more commonly, the incidence is of 50% in the age group of 30-40 years and 85% in the age ranging between 40-
Human body reacts to any sort of changes in the body. This abnormal state is responded by the body by bridging bony deposits which are produced in and around the vertebrae known as marginal osteophytes. If the process continues to be successful and undergoes completion can result in ‘auto-fusion’.5

Biomechanics: With cervical spondylosis, as the chronicity of the condition increases, the disc continues to lose its height ventrally and increased kyphotic posture. Which results in increased loading, increase in moment arm around or at the center point of rotation. However, alteration of posture increases axial loading, which then along the course of cervical spine leads to changes at the ventral column of the spine. Due to these changes, the stabilizing structures are not able to maintain these loads as there is transfer of stress to the surrounding bony structures. When an axial load is applied there is loss of normal lordotic posture which gives rise to a greater moment arm at the point of rotation. There will be induced progression of kyphotic posture if further loading of axial spine occurs.7

Fig 1: Biomechanical Changes in Cervical Spine due to cervical spondylosis

Effects of Cervical Spondylosis

Neck Pain: Cervical spondylosis leads to increased mechanical stresses on at the cartilaginous end plate on vertebral body lip. It result in sub periosteal bone formation that harms nervous tissues. There might also occur thickening of the bone and ligaments, ligamentum flavum is most commonly affected. 8 Degenerative changes, increased mechanical stress and loading on the bone, osteophyte formation, thickening of the ligaments all of these contribute to neck pain.

Postural changes: Loss of normal lordotic cervical curvature occurs with increased chronicity of the condition. This alters the load bearing at the vertebral level and accelerates the condition leading to further deterioration. Along, with increased kyphotic posture, there also occurs a change in the head and neck alignment. i.e., anterior translation of the head with respect to cervical spine. This in general terms is called as- Forward Head Posture. Accompanying the said two postural changes is the protracted shoulder. Also, with protracted shoulders there occurs tightness of pectoralis minor muscle.9

Reduced Cervical range of motion (ROM): Change in posture, position of vertebrae with respect to the condition also has an effect on muscles. Alteration in motor function occurs with cervical spondylosis. Dysfunction of deep cervical flexor muscles and inappropriate length of muscles connected to neck region along with pain are one of the major contributing factors to reduced cervical flexion and extension ranges.10,11,12,13 Considering so many ill-effects of one single condition, one can imagine its effect on one’s quality of life. Hence, aim of this study was to study the effect of craniosacral therapy in treatment of cervical spondylosis.

Method

Ethical clearance was obtained from the Institutional Ethical Committee. 30 participants meeting the inclusion and exclusion criteria and who were willing to participate in the study were included.

Inclusion criteria

- Patients willing to participate
- Age group 30 to 50 years.
- Patients diagnosed with cervical spondylosis by orthopedic.
- Patients with impaired Neck Disability Index score < 40%.
- Positive Spurling’s test.

Exclusion criteria

- Recent fractures
- Visual impairment
- Surgery if any, done

The subjects were then assessed for the outcome measures using NPRS, NDI and Cervical ROM pre-intervention. After this procedure, craniosacral therapy was administered to them for a period of 2 weeks;
sessions per week post which patients were assessed again for the said outcomes.

**Intervention Procedure**

Before starting with the test participants were instructed not to undergo any other intervention for neck pain.

**Intervention included following techniques:**

- Still Point Induction
- Occipital Decompression
- Cranial Vault with Traction
- Still Point Induction

**Still Point Induction**

The head was cradled with cupped hands so that the temporal mastoid process did rest on thenar eminences and fingers extended caudally along the neck. Thumbs touched together and listen for the cranial rhythm at the mastoids. On cranial flexion the mastoids approximated, on extension they separated. This motion was felt at the elbow at triceps level. Following the motion of flexion by subtly compressing thenars together to accompany the mastoids as they approximate. Then, they gently but firmly resisted the separation of the mastoids as cranial extension began. The same procedure was then repeated. After a few cycles quick pulsations were felt as the craniosacral system began to disorganize, and then the rhythm did stop.

**Occipital Decompression**

Head was the hands and ring finger was placed under the occiput pointing into the ring of the atlas. The head was allowed to relax onto the therapist’s fingers until the suboccipital musculature lets it in, in the posterior ring. Once the release is felt, both the pinky fingers were used to reach up to the either side of the external occipital crest and gentle traction was applied. This traction was continued down the dural tube.

**Cranial Vault with Traction**

In the vault hold, the patient was in supine and the therapist comfortably seated at the side of patient’s head. Fingers and thumbs “fanned out” so that the fifth fingers were in contact with the patient’s occipital squama. The fourth fingers were in contact with the occiput, just posterior to the occipitomastoid sutures. The third fingers were applied to the mastoid processes of the temporal bones with the fingertips running inferiorly over the mastoid tips. Neither of the fourth or third fingers actually overlay the occipitomastoid sutures. These fingers were parallel to the suture on both sides. The patient’s external ear pinna was straddled by the space between your third and index fingers. The index fingers were allowed to rest anterior to the ear so that their tips approximately overlay the temporomandibular joints bilaterally, depending, of course, upon head size and finger length. Your thumbs were placed over the region of the great sphenoid wings, while your palms were allowed to gently rest over the temporal squama, the temporoparietal sutures and the parietal bones.
Results

A total of 30 subjects were recruited for the study. In our study we considered cervical as a single entity and all the subjects having neck pain. They were evaluated before and after at 2 weeks. The demographic characteristics of the participants were presented in Table 1 & 2. There is a positive significant difference in mean difference of all cervical range of motions, the pre and post assessment of these ranges show an increase of range of motion (p<0.001) (Table 3). In the present study, the intragroup analysis of mean NPRS and NDI values in the subjects which revealed significant improvement at 2 weeks (p<0.001) and also revealed significant decrease in the mean difference of NPRS and NDI scores between the pre and post assessment of the subjects (Table 4).

Table 1: Gender and Age distribution of subjects in study group

<table>
<thead>
<tr>
<th>GENDER</th>
<th>No. of Patients</th>
<th>Percentage (%)</th>
<th>AGE</th>
<th>No. of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>20</td>
<td>30-40</td>
<td>22</td>
<td>73.33</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>80</td>
<td>41-50</td>
<td>8</td>
<td>26.67</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Comparison of pre and post assessment Cervical Range of Motions (ROM), NPRS and NDI in study group.

<table>
<thead>
<tr>
<th>Cervical Ranges</th>
<th>Flexion</th>
<th>Extension</th>
<th>Rt. Lat. Flexion</th>
<th>Lt. Lat. Flexion</th>
<th>Right Rotation</th>
<th>Left Rotation</th>
<th>NPRS</th>
<th>NDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>25.8</td>
<td>34.57</td>
<td>24.97</td>
<td>26.63</td>
<td>49.7</td>
<td>50.7</td>
<td>58.33</td>
<td>8.2</td>
</tr>
<tr>
<td>Post</td>
<td>43.7</td>
<td>53.63</td>
<td>42.8</td>
<td>42.97</td>
<td>72.2</td>
<td>72.53</td>
<td>10.2</td>
<td>1.23</td>
</tr>
<tr>
<td>p Value</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t Value</td>
<td>18.30</td>
<td>16.67</td>
<td>18.41</td>
<td>15.58</td>
<td>10.74</td>
<td>10.57</td>
<td>4.84</td>
<td>4.79</td>
</tr>
</tbody>
</table>

Graph 1: Gender and Age Distribution of Patients Participating in the Study

Graph 2: Pre and Post ranges of Cervical ROM, NPRS and NDI of all the patients
Discussion

The craniosacral therapy (CST) is an osteopath foundation of John Upledger. This technique was usually practiced by osteopaths and chiropractors. CST is a form of ‘subtle’ therapy which involves light touch which holds the skull. CST manipulation has an effect on the circulation of CSF, which leads to profound therapeutic effects. Certain studies state that specific manual therapy techniques including Craniosacral therapy can induce an improved effect on health, healing can occur from acquired injuries of the spine and nerves. The soft touch, gentle traction and various techniques induces pain reduction and there was also increase in cervical ranges and improvement in neck functions. CST has an effect on broad nociceptive and low-threshold mechanosensory innervations of the fasciae. While applying CST, fasciae are also treated which induces decrease of muscle tension, muscle tone of intrafascial muscle cells and increases parasympathetic nervous system response. Pain relief causes deep relaxation of the participants muscles. The result of our study has been supported also by Heidemarie Haller et al. where 54 participants were included and treated with CST for chronic neck pain for a period of 8 weeks. The study concluded that CST has a significant effect in reducing pain and improving functional disability of the participants suffering from chronic neck pain. Craniosacral therapy has also been useful in relieving pain due to fibromyalgia. 92 patients were included and treated with CST for 20 weeks. Patients were assessed for pain intensity and heart rate variability. At the end patients were re-assessed and the study concluded that CST had a positive effect on pain intensity. Another reason for pain reduction was proposed by Adelaida Maria Castro-Sanchez which stated that CST leads to alterations in the levels of hemoglobin and oxygen saturation, serum potassium, systolic BP, lactic acid and magnesium which has its role in pain alteration. Also, the treatment focuses on connective tissues of the skull, spine and CSF. These structures have influence on central nervous system from physiological as well as via autonomic nervous system. Greenman concluded that reduction in pain due to CST is due to reduction in articular and membranous restrictions, which reduces neural entrapment at the base of the skull. This enhances amplitude of cranial rhythm, reduces venous congestion and improves spinal cord motion. Another possible mechanism given for pain reduction is “healing touch.”

With this “healing touch,” the goal is in maintaining the balance of vital energy fields of the body. Which is based on the concept of therapist’s healing force affecting on the patient’s recovery.

Conclusion

Craniosacral Therapy has a therapeutic effect on reducing pain, improving cervical range of motion and improving overall cervical function amongst people with cervical spondylosis.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Institutional Sub-Ethics Committee of Dr. D. Y. Patil College of Physiotherapy, Pune.

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Prevalence of Restless Leg Syndrome in Nurses

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Abstract

Objectives: The purpose of the study is to assess the prevalence of RLS in nursing population. This study will help to find out the prevalence of RLS along with its varying intensities that is severe, moderate, mild, or none in nursing population.

Method: Ethical clearance was obtained from institutional ethical committee. A Total of 80 consecutive nurses aged between 20 to 80 years were interviewed. They were selected according to the inclusion and exclusion criteria. They were allowed to fill the restless leg syndrome rating scale which conclusion was made.

Results: The Results obtained by RLS rating scale stated that majority of nurses experienced moderate RLS (31%), mild (43%) severe (18%), very severe (5%) none (3%).

Conclusion: It was found that restless leg syndrome occurs in nurses. Maximum nurses affected showed mild sensations according to RLS scale.

Keywords: RLS, nurses, sleep, iron deficit, prolong standing.

Introduction

Restless Leg Syndrome

Ekobom syndrome which is called as (RLS) restless less leg syndrome is named after neurologist karl-axen-Ekbon.¹ Restless legs syndrome (RLS) is a neurological movement disorder, related to sensory-motor disorder in which irresistible to move legs² prevalence of RLS is more severe in renal end stage disease followed by iron deficiency and pregnant women.³ Symptoms are mild and inconvenience which lead to sleep disturbasance at night. Symptoms mainly occur at night and when the person not doing any activity. Symptoms are mostly unpleasant, burning, pulling, crawling, needle prickling⁴ when sensation are feel a there is a very strong urge to move legs which are affected. People who prolong stand, sit for long time such as desk manager, driving car, teachers, travelling for long time etc.⁵ symptoms worsen when lying or sitting with unusual feeling called ‘paraesthesia’ that occur in legs deeply. Hence, the symptoms are relieved by moving legs, gentle stretching or by walking temporarily. People with RLS is closely related to sleep disorder called periodic limb movement that occur when muscles get involuntarily tightly twitch. It occurs 80 percent to 90 percent of people who have RLS. Restless leg syndrome occurs in both male and female, but female are highly affected.⁶ Depending upon severity, and symptoms RLS can be classified as mild, moderate or severe⁷.

Types.
1. Early onset (age-45 years)
   Symptoms are gradually progress by daily occurrence.
   Symptoms are usually not occurred on daily basis till age of 40-65 years.
2. Late onset
   Symptoms are quickly and occur more often.
Symptoms appear daily and progressively rapidly.

3. Primary
   Occur independently

4. Secondary
   Precipitate by other disorder.

Risk factor
   - Iron deficiency
   - Several medications that contain antihistamine, antidepressant tranquilizers

   - Family history
   - Pregnant women who have anemia
   - End stage kidney disease
   - Stress. [6]

Pathophysiology

There would be abnormality in body use and storage of iron and dopamine in restless leg syndrome which could involve change in dopamine ruptures.

For tyrosine hydroxylase, iron is necessary co-factor, which is rate limiting enzyme in dopamine depression synthesis.

Number of dopamine D2 receptor binding sites, furthermore may decrease. Increased cortical excitability and subcortical inhibition studies showed by electrophysiological and magnetic brain stimulator at site of CNS dysfunction in subcortical loci were suggested. Imaging point were located in brainstem, cerebellum and thalamus in functional magnetic resonance.

Causes of RLS

Causes of RLS are neurological disorders, medical disorder and drugs and chemical in that are as follows:

1. Neurological disorder
   - Poliomyelities
   - Lumbosacral radiculopathies
   - Parkinson disease
   - Hyperekplexia(also known as startle disease that is exaggerated surprise characterised by stimuli and hypertonia)
   - Amyotrophic lateral sclerosis
   - Polyneuropathies

2. Medical disorder
   - Diabetes mellitus
   - Gastrectomy
   - Hypothyroidism
   - Cancer
   - Peripheral vascular disease
   - Uraemia
   - Amenia-iron and folate
   - Cancer

3. Drugs and chemical
   - Lithium
   - Caffeine
   - Calcium channel antagonist e.g.- nifedipine
   - Neurolepsy[4]

Clinical Diagnostic Criteria For RLS

Essential Criteria

- Urge to move legs, usually accompanied by or caused by comfortable sensation in legs.

- The urge to move or unpleasant sensation are partially or totally relieved by movement such as walking or stretching at least as long as activity continues.

- Urge to move or unpleasant sensation are worse in evening or night than during day or only occur in evening or night.

Supportive Features

- Dopaminergic responsiveness.

- Presence of PLM in sleep or in wakefulness.

- Positive family history.

Associated Features

- Usually progressive in clinical course

- Sleep disturbance. [9]

Materials and Methodology

Type of study- Observational study. Study design- Survey, Place of study- Krishna institute of medical sciences deemed to be university, Sample size-80, Sampling Method-Simple random sampling, Duration
Inclusion criteria was Nursing population between age group 20-45, nurses whose sleep is affected, nurses with cramping sensation at night. Exclusion Criteria was Nurses with musculoskeletal problems. The nurses assessed by RLS rating scale. Statistical analysis of collected data was done. So the study shows that restless leg syndrome is present in nurses and the percentage of sensation is mild.

Conclusion

The present study concluded that there restless leg syndrome occur in nurses. This study shows that number of nurses affected by mild sensation according to restless leg syndrome scale.

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of the present study.

Source of Funding: None

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Prevalence of Soft Tissue Dysfunctions of Lower Limb in Cab Drivers

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Background: Prolonged static posture and vibrating environment in cab drivers causes strain on musculoskeletal system especially lower limbs.

Objectives: This observational study was used to observe the percentage of cab drivers having soft tissue dysfunctions of lower limb.

Materials and Method: 100 cab drivers of age group 25-45 who are driving since 5 years were selected and were assessed using Postural Examination Chart and Lower Extremity Function Scale for soft tissue dysfunction.

Results: According to Lower Extremity Function Scale Score, 55% of cab drivers had soft tissue dysfunction of lower limb and according to Postural Examination Chart, 100% cab drivers had normal postural alignment.

Conclusion: We found that 55% cab drivers had soft tissue dysfunction of lower limb.

Keywords: Prolonged static posture, Musculoskeletal Disorders, Soft tissue dysfunction.

Introduction

Musculoskeletal disorders are disorders which occur due to injury to muscle, tendon, ligament, nervous system, blood vessel, joint, cartilage and bone.¹ Musculoskeletal disorders include tendonitis, tenosynovitis, epicondylitis, bursitis, sciatica, osteoarthritis, myalgia, low back pain and other idiopathic pain syndrome, and these conditions may cause inflammation and degeneration of musculoskeletal system and neurovascular system.

Musculoskeletal disorders (MSD) are one amongst the most common causes of work-related disability. Previously was also called as recurrent trauma and stress injury. Involvement of physical function can also affect mental health and normal life adaptations.

Following occupational respiratory diseases, MSD is the second cause of disability.¹

They are disorders of various etiologies. Physical and mechanical risk factors include inappropriate body posture, manual handling, heavy lifting, strenuous tasks, local vibration and general vibration of great force or movement repetition.²

The highest prevalence of MSDs is amongst cab driver’s comparative to other jobs. As cab driver’s are continuously in fixed postures for longer periods of time so, they suffer from Musculoskeletal disorders because of forces acting on the joints such as lumbar vertebra, knees, ankles and all joints of the body.¹

Cab driving can be the source of leg and foot problems as it induces fatigue and alters sensorimotor control of muscles of foot. The plantarflexors (gastrocnemius and soleus) play a vital role to adjust the force exerted by foot on the accelerator pedal. And dorsiflexors (tibialis anterior and posterior) muscles maintain the foot position on the accelerator. The brake reaction behaviour to a collision could be affected when using a cruise controller(CC) or adaptive cruise controller(ACC). In driving conditions, the right foot stays on floor of vehicle and is not close to brake. When an emergency braking reaction is needed in CC/ACC condition, the break reaction time can be delayed.³

The trained drivers are more prone to harms due to increased duration of sitting and vibration exposure. The various stresses on body occur due to driver’s seat, control mechanisms and vibration generated. As large
continuous jerks and forces transfer more through lower limb and spine, it is more prone to damage.  

Prolonged driving or static posture in confined space and vibrating environment causes postural strain on musculoskeletal system. It can be uncomfortable and the stress causing it increases susceptibility to injury/pain.

An association between MSDs and duration of driving is supported by several studies.  

As after long periods of rest, the mechanically demanding activities lead to more tiring of muscles and ligaments of lower back. In addition, unhygienic food, lack of exercise and smoking leads to low back pain. At later stage, body nutrition lacks which leads to less nutrition in spinal disc and makes it more prone to mechanical stresses.

Postural examination will assess the postural abnormalities and significant deformity may be noted. Any deformity may be a precursor of soft tissue dysfunction.

Tests for flexibility and muscle length will help to know about shortening or lengthening of muscle and range of motion.

Lower extremity functional scale is a scale consisting of set of questionnaires used to know the level of difficulties while performing every activity.

The total score of the questionnaire will let us know the level of difficulty. The lower the score and the greater will be the disability.

Less score will be indicative of soft tissue dysfunction in lower limb.

**Materials and Methodolgy**

This was a observational study of Prevalence of soft tissue dysfunction of lower limb in cab drivers.

100 cab drivers who fulfilled inclusion and exclusion criteria were selected and prior consent was taken. The nature of study was explained to subjects and those willing to participate were included. Data was collected using Lower Extremity Functional Scale (LEFS) and postural examination chart in which participants clarified that which one (hip/femur, knees, ankle/feet) was painful in the last 5 years. Further they were asked some questions and were screened clinically to confirm the diagnosis.

**Result**

According to Lower Extremity Function Scale Score, 55 % of cab drivers had soft tissue dysfunction of lower limb and according to Postural Examination Chart, 100 % cab drivers had normal postural alignment.

**Discussion**

This study “Prevalence of soft tissue dysfunctions of lower limb in cab drivers” was conducted to find out the affected number of population amongst cab drivers. It was useful to know that continuous vibrations and fixed postures during long route driving leads to abnormal stresses on lumbar vertebrae, hip, knees and ankles. This various stresses on body occurs due to driver’s seat, control mechanisms and vibrations generated.

This causes postural strain on musculoskeletal system and makes the lower extremity more susceptible to injury/pain.

The objectives of the study were -

To determine the soft tissue dysfunctions of lower limb in cab drivers.

The study was conducted amongst cab drivers of age group 25-45 years who were driving cab since 5 years and was carried amongst those who had negative history of trauma or accident.

**Prior consent was taken.**

Assessment was done by using Postural Examination Chart, Tests for flexibility and muscle length and Lower Extremity Functional Scale, the results were recorded and were used for statistical analysis.

We observed that among the study population, 55 % of population had soft tissue dysfunction of lower limb and total population had normal plumb alignment.

And according to age wise,

Individuals with age more than 30 years had prevalence of 37 % and with age less than 30 years had prevalence of 18 %.

**Conflict of Interest** : Nil

**Source of Funding** : Self
Ethical Clearance: Taken from “Institutional Ethics Committee of Krishna Institute of Medical Sciences.”

References


A Study to Evaluate the Reaction Time According to the Duration of Diabetes

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²Associate Professor, MIP College of Physiotherapy, Latur, MH

Abstract

Background: Globally, as of 2010, an estimated 285 million people had diabetes, with type 2 making up about 90% of the cases.¹ Diabetes mellitus affects the various systems of the body like the somatosensory, auditory system and slows psychomotor and cognitive responses all of which together may affect the reaction time. Reaction time is the time taken by the individual to react or respond to applied stimuli. Slowing of these reaction times affects the everyday tasks such as balance, increasing probability of a slip or fall. Impaired peripheral sensations and declined cognitive function, due to affection of central nervous system are the important factors for increased reaction times in diabetic individuals. One of the largest implications of increased reaction time is in the area of slips and falls. Falls are incurred by most of the diabetic population and are a common source of morbidity and mortality. Hence the assessment and improvement of reaction time constitutes an important part of management of individuals with type II diabetes.

Methodology: 60 subjects with type II diabetes were selected for the study and screened through inclusion and exclusion criteria. The subjects were briefed about the study and consent taken. They are divided into two groups group A with duration diabetes below 5 years & group B with duration diabetes above 5 years. The patients are assessed with Reach test.

Results: Group A have mean value is 9.09 cm and Standard deviation of 2.897928313 and Group B have mean value are 15.92 and standard deviation of 3.809492077. The t-test value is 7.82 AND p-value is less than 0.001. The statistical analysis confirms that there is a slowing down of reaction time in group B than group A.

Conclusion: The study concluded that the patients with five years or more duration of diabetes have slowing of reaction time than less duration diabetes. This statistical analysis confirms that there is a slowing down of reaction time in group B than group A.

Keywords: Diabetes, Reaction time, Reach Test and Type II diabetes.

Introduction

Globally, as of 2010, an estimated 285 million people had diabetes, with type 2 making up about 90% of the cases.¹ Its incidence is increasing rapidly, and by 2030, this number is estimated to almost double.² Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030.³ The increase in incidence in developing countries follows the trend of urbanization and lifestyle changes. India has more diabetics than any other country in the world, according to the International Diabetes Foundation,⁴ although more recent data suggest that China has even more.⁴ The disease affects more than 50 million Indians - 7.1% of the nation’s adults - and

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Diabetes mellitus, or simply diabetes, is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger). Type II DM results from insulin resistance a condition in which cells fail to use insulin properly sometimes combined with an absolute insulin deficiency. This form was previously referred to as non insulin-dependent diabetes mellitus (NIDDM) or “adult-onset diabetes”.

Type II diabetes mellitus is characterized by insulin resistance which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately. Type 2 diabetes is the most common type. In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity. At this stage, hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduce glucose production by the liver.

Diabetes mellitus affects the various systems of the body like the somatosensory, auditory system and slows psychomotor and cognitive responses all of which together may affect the reaction time. The possible mechanism for this finding could be due to increased blood glucose associated with diabetes that causes chemical changes in the nerves and damages blood vessels that carry oxygen and nutrients to the nerves. Excessive glucose metabolism causes decrease in nitric oxide in nerves that dilates blood vessels and low levels of nitric oxide may lead to constriction of blood vessels supplying the nerves in diabetic patients. Raised blood glucose affects many metabolic pathways in the nerves leading to an accumulation of sorbitol and depletion of myoinositol. These changes impair the nerve’s ability to transmit signals. The axonal degeneration of both myelinated and unmyelinated fibres, axon shrinkage, axonal fragmentation, thickening of basement membrane and micro thrombi are responsible for the delayed motor nerve conduction velocity and hence, the increased reaction time.

Reaction time is the time taken by the individual to react or respond to a applied stimuli. Slowing of these reaction times affects the everyday tasks such as balance, increasing probability of a slip or a fall. Impaired peripheral sensations and declined cognitive function, due to affection of central nervous system are the important factors for increased reaction times in diabetic individuals. One of the largest implications of increased reaction time is in the area of slips and falls. Falls are incurred by most of the diabetic population and are a common source of morbidity and mortality. Hence the assessment and improvement of reaction time constitutes an important part of management of individuals with type II diabetes.

**Methodology**

60 subjects with type II diabetes were selected for the study and screened through inclusion and exclusion criteria. The subjects were briefed about the study and consent taken. They are divided into two groups group A with duration diabetes below 5 years & group B with duration diabetes above 5 years. Materials used in the study were ruler, table and chair. The inclusion criteria were type ii diabetes patients, middle age between 40 to 60 years, Old age between 60 to 80 years and Both male & female. The exclusion criteria were Un-cooperative patients, Patients age group below 40 and above 80 year and Any associated neurological, musculoskeletal, cardio respiratory conditions that prevent from the test.

**Procedure**

30cm wooden rulers were used to perform the test. The subject made to sit on a chair or stool with elbow supported on a table with wrist outside the table. The forearms were placed in mid-prone position. The ruler placed between the thumb and the index finger such that the finger and thumb are close but not touching the ruler. The 0cm mark on the ruler coincided with the borders of the fingers. These changes impair the nerve’s ability to transmit signals. The axonal degeneration of both myelinated and unmyelinated fibres, axon shrinkage, axonal fragmentation, thickening of basement membrane and micro thrombi are responsible for the delayed motor nerve conduction velocity and hence, the increased reaction time.

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\[ t = \sqrt{\frac{2d}{g}} \]

\[ d = \text{the distance the ruler fell in centimeter}, \]
\[ g = \text{the acceleration of gravity (9.8 m/s}^2), \]
\[ t = \text{the time the ruler was falling (seconds)} \]
**Statistical Analysis**

**Table: Comparison of group A and B**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MEAN (IN CMS)</th>
<th>S.D</th>
<th>t-value</th>
<th>P- VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP A</td>
<td>9.09</td>
<td>2.897928313</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROUP B</td>
<td>15.92</td>
<td>3.809492077</td>
<td>7.82</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

**Discussion**

Individuals with diabetes often have neurological side effects that affect the peripheral nervous system. However, the increase in whole body movement reaction time seen in adults with diabetes in this study cannot solely be related to peripheral nervous system changes due to diabetes. Even when motor nerve conductions slow from 50.0 m/s to 40.0 m/s (as seen in nerve conduction testing here), signal transmission time for a 1 m long nerve increases only 5 ms, which does not account for a 200 ms increase in movement reaction time. An additional slowing has to be occurring in the processing of the signals by the central nervous system. Deficits in the central nervous system (CNS) of those with diabetes may also be seen in cognitive deficits.

Reaction time measurement includes the latency in the sensory neural code traversing peripheral and central pathways; perceptive, cognitive and volitional processing; a motor signal again traversing both central and peripheral neuronal structures; and finally, the latency in end effector (e.g., muscle) activation. Unless there is a greatly lessened sensitivity or loss of the sensory receptors for a given modality, a stimulus well above perceptual threshold, will, by its very nature of being super threshold, produce a strong neuronal signal in the peripheral nerve sub serving the location stimulated.

We can conclude that diabetes does affect reaction times, although the type and severity of the slowing may be related to the difficulty of the task and the prevalence of central and peripheral nerve deficits seen as side effects of diabetes.

R.niruba et al conducted study on Assessment of Auditory and Visual Reaction Time in Type 2 Diabetics –A Case Control Study. The study was conducted which included 40 type 2 diabetic subjects. The mean age of type 2 diabetic subjects was 49.8 years and that of control 44.8 years cases and controls were age matched. PC1000Hz reaction timer was used to measure auditory and visual reaction time. Paired t-test was applied for two groups for significance difference. The visual reaction time was significant with p value = .001 and for auditory reaction time p value =.000. The study conclude that the Auditory and visual reaction was prolonged in type 2 diabetics on oral medication when compared with non diabetics of same age group. It could be because of the neuropathic changes in diabetes. This can be routinely applied to monitor neuropathic changes in diabetes and its prognosis with treatment.

Samantha J Richerson, et al; conducted study on comparative study of reaction times between type II diabetics and non-diabetics; He compared the reaction time between normal and type ii diabetic patients. 37 subjects with type II diabetes are included and reaction time to plantar touch and lateral body movement are measured. Whole body reaction time has been shown to be a sensitive indicator of differences between young adults, healthy mature adults, and mature diabetic adults. Additionally, the increased reaction time seen in this modality for subjects with diabetes may be one cause of increased slips and falls in this group. The study conclude that the patient with five or more duration have slowing of reaction time than less duration diabetes. Group A have mean value are 9.09 cm and Standard deviation of 2.897928313 and Group B have mean value are 15.92 and standard deviation of 3.809492077. This statistical analysis confirms that there is a slowing down of reaction time in group B than group A.

**Conclusion**

The study conclude that the patient with five or more duration have slowing of reaction time than less duration diabetes. Group A have mean value are 9.09 cm and Standard deviation of 2.897928313 and Group B have mean value are 15.92 and standard deviation of
3.809492077. p Value is less than 0.00. This statistical analysis confirms that there is a slowing down of reaction time in group B than group A.

**Conflict of Interest:** There is no conflict of interest between the authors

**Source of Funding:** Nil

**Ethical Clearance:** This research study is given clearance under Ethical committee headed by Principal, Maharashtra Institute of Physiotherapy, Latur.

**References**

Kinematic Variation on Stairs of Differing Dimensions during Stair Climbing among Knee Pain Population

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Abstract

stair climbing creates demands on activity of daily living, the ability to do it efficiently is important to an individual’s quality of life. The biomechanical variation due to architectural barrier can cause changes on stair gait as a result of pain and/ or modifications on the range of motion. Objectives: (i) To measure kinematic knee ROM using coach’s eye feedback tool, (ii) To identify the normal tread depth and riser height in relation to normal kinematics. Methodology: A group of 30 subjects including male and female having knee pain with the mean age 41.75 (±5.784) were analyzed. The groups underwent kinematic analysis while climbing up the stairs by step over step pattern in their own storey buildings. Reflective markers were attached. Videos were captured in the sagittal plane by the video recorder utilizing the coach’s eye feedback tool. The level of pain was measured using visual analogue scale. Results: ROM over Riser–Height (r=0.8816, strong positive correlation), ROM over Tread–Depth (r=0.0933, weak positive correlation), ROM over VAS Score (r=0.694, moderate positive correlation). Conclusion: Stair dimensions, therefore, appeared to influence the angular kinematics of the lower limb during stair climbing.

Keywords: stair ascent, step over step, coach’s eye, weight acceptance phase, VAS- visual analogue scale, ROM- range of motion, architectural barrier

Introduction

Urbanization has been accelerating the demand of living space. Urban housing is substandard and characterized by problems such as household crowding i.e. dwelling units in cities are typically small because of lack of space and much smaller than house in suburbs or rural areas. This forces many people to live in close quarters within a particular dwelling unit.[1] Stairs can be dangerous and can be barrier to accessibility unless they are designed or modified which will further reduce health, mobility and activity.[2][3]

The difficulty with stair climbing is attributable to increased demands, which are reflected in larger forces, powers, moments and ranges of motion consistently at the knee joint. The biomechanical variation due to architectural barrier can cause changes on stair gait as a result of pain and/ or modifications on the range of motion.[4][5] Consumer product safety commission – estimated millions of deaths due to stair falls, so uniformity in stair dimension is an point of additional concern to enhance low energy expenditure and low rate of missteps.[5]

Without the use of video capture, it is likely that assessment using visual evaluation techniques is less than optimal and may lead to incorrect assessment or misdiagnosis. However a normal human eye can capture 4-6 frames per second whereas a video camera can capture around 30 frames per second due to which observation can be done in a slow motion, frame by frame analysis.[6][7] Coach’s Eye feedback tool can be used by individual physical therapists as a breakthrough assistive tool in outpatient orthopedic settings for use in both rehabilitating and training athletes of various disciplines.[8]
Therefore, understanding biomechanics and loading of each element during movement using motion analysis is helpful for studying disease etiology, making decision about treatment & evaluating treatment effects.\cite{9,10}

**Materials and Method**

30 participants (age: 41.75±5.784 years) signed an informed consent form approved by the institutional review board. Participants who are able to climb 12 steps, age between 35 and 45 years, Chronic Unilateral knee pain are included. Presence of any known disorders such as hormonal imbalance, Musculoskeletal disorders, Neurological impairment and Cardio-vascular abnormalities are excluded.

Before the selection criteria patients were ruled out for soft tissue injuries by following special test: Valgus Stress Test (MCL), Varus Stress Test (LCL), Anterior Drawer Test (ACL), Posterior Drawer Test (PCL), McMurry’s Test (meniscus), Clark’s Sign Test (PFPS), Apley’s Distraction Test (Ligament sprain).

Kinematic angle of knee joint during the weight acceptance phase of stair ascent was collected by recording the video in sagittal plane through coach’s eye feedback tool. Riser Height & Tread Depth were measured.

The environment was free from traffic and external distractions with adequate lighting. Reflective markers are attached at axis for range of motion on lower extremity using yellow colored tape which can be patched & removed easily. It was placed on right or left greater trochanter & another on the lateral femoral condyle & lateral malleolus.
Upon receiving a visual cue from the experimenter, participants began stair ascent starting with their right leg (onto the lower-level step) in a step-over-step manner. They stopped ascending once they reached the end of the stairs. The difference was considered statistically significant at a p value of <0.05.

**Result**

All the data were expressed as a mean ± standard deviation (SD). A student’s version Statistical package for Social Science (SPSS) version 20.0 software for Windows was used for the statistical analysis. The level of significance was set at p<0.05 for all statistical tests.

Table 1 indicates mean & SD will be used to assess the outcome measures Range of motion, tread depth, riser height and VAS score in multi-storey dwellers with knee pain. The mean value for riser height and tread depth was 18.333 ±1.530 and 24.19 ±0.748 respectively. The mean value for knee range of motion during stair ascent was 104.566 ±4.825 in sagittal plane.

<table>
<thead>
<tr>
<th>DOMAIN</th>
<th>SUM (Σ)</th>
<th>MEAN (X̄)</th>
<th>SD (s)</th>
<th>SE (SĒ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>1247</td>
<td>41.566</td>
<td>±5.462</td>
<td>0.997</td>
</tr>
<tr>
<td>YEARS OF RESIDING</td>
<td>270.8</td>
<td>9.026</td>
<td>±3.198</td>
<td>0.583</td>
</tr>
<tr>
<td>RISER HEIGHT</td>
<td>550</td>
<td>18.333</td>
<td>±1.530</td>
<td>0.279</td>
</tr>
<tr>
<td>TREAD DEPTH</td>
<td>725.7</td>
<td>24.19</td>
<td>±0.748</td>
<td>0.136</td>
</tr>
<tr>
<td>KNEE ROM</td>
<td>3137</td>
<td>104.566</td>
<td>±4.825</td>
<td>0.881</td>
</tr>
<tr>
<td>VAS SCORE</td>
<td>116</td>
<td>3.866</td>
<td>±1.279</td>
<td></td>
</tr>
</tbody>
</table>

(ROM- range of motion, VAS- visual Analogue Scale, SD- standard deviation, SE- standard error of mean)

Table 2 indicates Correlation (r) and r² values to assess the relationship between changes in ROM over the changes in VAS Riser Height & Tread Depth. During stair ascent, the range of motion varied considerably in relation to different riser height and tread depth dimension. Depending upon the staircase climbed, knee flexion angle varied from as low as 90° and as high as 1090, required to complete the stepping task.

The significant values of VAS determined the intensity of pain due to repeated stair climbing activity. Following are illustrations of knee range of motion showed in figures: 5, 6 and 7 with distinct stair dimension.
Table 2: Correlation (r) and $r^2$ values analysis for the relationship between changes in ROM over the changes in VAS, Riser Height & Tread Depth (n=30)

<table>
<thead>
<tr>
<th></th>
<th>Pearson's correlation-coefficient</th>
<th>$\sum(X - M_x)^2$</th>
<th>$\sum(Y - M_y)^2$</th>
<th>$\sum(X - M_x)(Y - M_y)$</th>
<th>$R$</th>
<th>$r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROM over Riser Height</td>
<td>0.8816</td>
<td>67.927</td>
<td>675.367</td>
<td>188.833</td>
<td>0.8816</td>
<td>0.777</td>
</tr>
<tr>
<td>ROM over Tread Depth</td>
<td>0.0933</td>
<td>16.247</td>
<td>675.367</td>
<td>9.77</td>
<td>0.0933</td>
<td>0.008</td>
</tr>
<tr>
<td>ROM with VAS</td>
<td>0.694</td>
<td>47.467</td>
<td>675.367</td>
<td>124.267</td>
<td>0.694</td>
<td>0.481</td>
</tr>
</tbody>
</table>

(VAS- visual analogue scale, ROM- range of motion, r- correlation coefficient)

Figure 8: correlation of Range of Motion over Riser-Height indicates the value of Pearson’s correlation coefficient ($r= 0.8816$). This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa). The value of $R^2$, the coefficient of determination, is 0.7772.

Figure 9: correlation of Range of Motion over Tread-Depth indicates the value of Pearson’s correlation coefficient ($r= 0.0933$). Although technically a positive correlation, the relationship between the variables is weak (the nearer the value is to zero, the weaker the relationship). The value of $R^2$, the coefficient of determination, is 0.0087.

Figure 10: correlation of Range of Motion over Visual-Analogue Scale indicates the value of Pearson’s correlation coefficient ($r= 0.694$). This is a moderate positive correlation, which means there is a tendency for high X variable scores go with high Y variable scores.
(and vice versa). The value of $R^2$, the coefficient of determination, is 0.4816.

**Discussion**

Study was aimed to investigate the change in the kinematic angle of knee joint during weight acceptance phase in relation to distinct tread depth and riser height. The results showed positive correlations in between the variables. Stair climbing places much higher loads on knee joint does so a better understanding of biomechanics is important. Previous studies have revealed the impact of loading during weight acceptance phase at knee joint can lead to increase ground reaction forces in anterior to posterior, posterior to anterior and middle to anterior. [11] This study was unique in providing biomechanical analysis of kinematics in context to tread depth and riser height during stair climbing. Investigators have suggested that 83° to 90° of knee flexion are required in stair-climbing. [12]

Angular analysis undertaken has suggested that stair dimension is one of the important factor has been mirrored in this study. C.H. Irvine (2010) examined stair users perceptions of what are acceptable or preferable stairway designs (Riser heights below 6 inches and above 8 inches should not be allowed. Run depths more than 13 inches and less than 10 inches should not be allowed). Depending upon the staircase climbed, knee flexion angle as high as 109° was required to complete the stepping task in the current study.

Considering the mechanical factors stairs are responsible to induce shear stress on the cartilage which speeds up the degenerative process, increased joint force reaction and load on cartilage. People developed with instability in the knee joint putting more stress, in already unstable joint undoubtedly cause more pain and damage. [9][11]

Circle of loading probably has effect on the knee joint due to repetitive stair climbing. During leveled walking the center of mass is propelled horizontally whereas during stair ascent the center of mass is propelled both horizontally and more vertically while controlling medio-lateral motion ultimately leads to increased lower limb joint demands due to which dynamic balance is difficult to maintain. [14][15]

Cultural bias, Less sample size, Lack of prior research studies, High-tech equipments are some of the limitations of the study.

**Conclusion**

Stair dimensions, therefore, appeared to influence the angular kinematics of the lower limb during stair climbing.

Understanding the contribution of each component of stair ascent provides foundation to understand compensatory mechanisms used by the impaired individuals and developing effective rehabilitation strategies to help restore the mobility.

**Future Recommendations:**

Future studies should include the comparison of muscle strength with the knee range of motion to find out whether the weakness of musculatures around knee joint are responsible to increase joint loading and biomechanical alteration. Knee extensors, ankle planter-flexors and hip abductors are important contributors of stair ascent as they induce vertical propulsion and forward propulsion. Moreover the strength relation with the knee range of motion should be studied extensively.

**THE OXFORD COLLEGE OF PHYSIOTHERAPY,**

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**Review Board on Ethics for Research**

**Review Category:** Exemption from Review

**Expedited Review Full Review**

We hereby declare that the project titled, “Kinematic variation with distinct tread depth & riser height in unilateral knee pain among community stair climbing population.” Carried out by MS. Ruchi Dubey, of IInd Year M.P.T. has been brought forward for scrutiny to the board members.

**Involvement of Special groups:** No

**Type of Study:** Descriptive Co-Relational study

**AV Needs:** Yes

After analyzing the objectives, subjects involved and the methodology of the study, the following conclusions were drawn. The study does not cause any mental or physical harm to the subjects involved and
there are no risks involved in the study. The performance of the study procedure will not cause any injury to the subjects. The board has evaluated and confirmed that the experimenter is trained and qualified in measuring outcome. The informed consent form ensures that the experimenter explains the procedure of the study to the subjects, their voluntary participations is confirmed and the identification of subjects is maintained confidential.

More over the finding of the study will benefit similar subjects, the profession and the society. Hence the review board has no objections on the conduct of the study.

Chairman: Dr. C. Prabhu
Vice Chairman: Prof. Ahamed Thajudeen

Source of Funding: Self

Conflicts of Interest Statement:

Manuscript title: “Kinematic Variation On Stairs Of Differing Dimensions During Stair Climbing Among Knee Pain Population”

I certify that there is NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers’ bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Author name: Ruchi S Dubey, Musculoskeletal Disorders and Sports, The Oxford College of Physiotherapy, Bangalore

References

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Impact of Physiotherapy Care on Peak Expiratory Flow Rate among Postnatal Women with Normal Vaginal Delivery

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Abstract

Introduction: The present study was designed to assess peak expiratory flow rate on postnatal normal vaginal delivery women. All types of hormonal changes occur in women especially during reproductive life. To assess Peak Expiratory Flow Rate was after third day of normal delivery. These would also help to predict any existing pulmonary function test during various phases of women’s life.

Method: Quasi experimental, convenient sampling and sample size of 15 subjects. Subjects of 19-25 years, primipara women were included in the study. The exclusion criteria were any cardiovascular diseases, women who underwent caesarean, chest wall deformity and multiple pregnancies. The subjects were perform daily active exercises under the guidance of physiotherapist after 24 hours of delivery. After discharge from hospital they were instructed to follow the exercises in the home and noted in the chart. PEFR values are noted 3rd, 15th and 45th post operative day for data analysis.

Results: There was a decrease in mean PEFR as the normal delivery women in advanced from third day and increase in PEFR in 45th day, both being statistically significant.

Conclusion: The study showed significant increase in PEFR in the postnatal women compared 3rd day and 45th day. We stress the importance of regular graded active exercises in the postpartum period for the speedy recovery of these changes.

Keywords: Postnatal normal vaginal delivery women, postnatal exercise and peak expiratory flow rate.

Introduction

The period after delivery is called puerperium or postpartum period, where local and systemic changes caused by pregnancy and delivery return to the pre pregnancy state. The puerperium period classified as immediate (1 to 10 days after birth), late (from 11 to 45 days) and remote (more than 45 days) totally last for 6-8 weeks1. A change in hormonal (progesterone, oestrogen and relaxin) level occurs during pregnancy which causes uterine growth. This in turn causes stretching (more than 50% of the original length) of abdominal muscle, mainly rectus abdominis. Other abdominal muscles are transverse abdominis, external oblique abdominis and internal oblique abdominis2. These muscles are extending from the xiphoid process to the symphysis, subjected to various changes during pregnancy. When the foetus grows the abdominal wall expands, the linea alba elongates and curves round. This leads to separation of umbilicus1. The distending abdomen causes changes in centre of gravity, as the muscle fibre permits the stretch, but the collagen component such as aponeurosis, fibrous sheaths, intersection and the linea alba under goes hormonally mediated structural change to provide the necessary temporary extensibility. The distance between two rectus abdominis muscle can be seen to widen throughout a pregnancy and the linea alba may even split under strain3.
In pregnancy there will be anterior pelvic tilt with or without lumbar lordosis. As there is change in posture it affect the insertion angle of pelvic and abdominal muscle. As it affects the postural biomechanics, it also influences the support of the abdominal and pelvic organ. When the pregnancy progresses, there is further lengthening of abdominal muscle reduces the force vector of that muscle which results in decreased contraction strength. The anterior abdominal muscles are responsible for forceful expiration in the normal human. The normal values of peak expiratory flow rate range from approximately 440-500 L/ minute for women in their reproductive years.

Descending of diaphragm is impeded by enlarging uterus at the time of third trimester in many pregnant women. In fact it actually displaces the diaphragm upward by 4cm or more. Due to stretching of abdominal muscles there was a decrease in peak expiratory flow rate from first to third trimester and immediate after delivery. But there are no changes in post natal period of life. In early 1900’s more attention was given to weakness of abdominal muscles and its management by obstetric community. After Childbirth, physiotherapy managements are designed to reduce the impairment, maintain or regain function to help in her day to day activities. Activation of abdominal and pelvic floor muscle can included as a component in exercise program by all physiotherapist. But advance training and Mentoring need true expertise. A study reported changes in the maternal peak expiration flow rate after delivery and it is adaptive in nature. Knowledge of the physiological changes in the pulmonary functions during normal pregnancy and also after delivery is needed to evaluate the respiratory function after delivery.

Many researchers use Peak Expiratory Flow Rate (PEFR) as an important PFT as it is economically efficient. It is a small hand held device. An individual takes a full inspiration and blows out as forcibly as possible into an instrument called a peak flow meter during measurement. It measures the maximal gas flow during exhalation in litres per minute (LPM). It is a non-invasive and cheap method of measurement of lung function. It is a useful tool in the diagnosis and management of asthma recommended by British Thoracic Society. There many techniques to improve PEFR. Active cycle of breathing exercises including expiration technique is a method which is a commonly used. It is economical of time, effective and efficient for improvement of cardiovascular respiratory fitness.

Post-partum pelvic floor muscle exercises are emphasised by kegel’s in 1948. There is well documented effect of post-partum exercises on restoring of pelvic floor and cardiac function after childbirth. But its effect on pulmonary function is not documented.

Also the postural corrections are important to maintain the respiratory function. The back care is essential for postnatal women. All the postural corrections are done to the patient after delivery. The postnatal exercises are maintaining the correct posture and improve the abdominal muscles strength. Thus this study aims to identify effect of the postnatal exercises to improve the peak expiratory flow rate value in postnatal women with the normal vaginal delivery.

**Methodology**

This is an quasi experimental type of study done for 8 weeks in srm medical hospital and research centre, kattankulathur, Kanchipuram, India. A total of 15 primiparawomen between the age of 19-25 were selected from the postnatal ward of SRM hospital.

**Inclusion Criteria**

- Informed consent
- Age 19-25 years
- Primipara women

**Exclusion Criteria**

- Cardiovascular diseases
- Women who underwent caesarian
- Chest wall injuries
- Multiple pregnancies

**Procedure:**

After obtaining ethical clearance, informed consent was taken with knowledge of the subjects. The subjects were perform daily active exercises under the guidance of physiotherapist after 24 hours of delivery. After discharge from hospital they were instructed to follow the exercises in the home and noted in the chart whether they are doing or not. The exercises are deep breathing exercise, ankle toe movements, knee rolling, breast care, back care, breast feeding technique and kegel’s exercise.

**Outcome Measures:**

Peak Expiratory Flow Rate
Data Analysis

the peak expiratory flow rate value obtained from the postnatal women’s were tabulated and entered in MS-excel spread sheet. The data was analyzed using descriptive statistics and ANOVA with IBM SPSS statistics version 22.

Results

The table-1 shows significant increase in Peak Expiratory Flow Rate from the 3rd day to 45th day which was 2.63 l/m on 3rd day, 3.21 l/m on 15th day, 3.74 l/m on 30th day and 4.25 l/m on 45th day among post-natal normal vaginal delivery women.

Table-1: Peak expiratory flow rate of post-natal women with normal vaginal delivery

<table>
<thead>
<tr>
<th>DAYS</th>
<th>MEAN</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Sig.(2tailed) P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>2.6367E2</td>
<td>15</td>
<td>59.74549</td>
<td>.000</td>
</tr>
<tr>
<td>15th</td>
<td>3.2100E2</td>
<td>15</td>
<td>46.98784</td>
<td>.000</td>
</tr>
<tr>
<td>30th</td>
<td>3.7467E2</td>
<td>15</td>
<td>31.47940</td>
<td>.000</td>
</tr>
<tr>
<td>45th</td>
<td>4.2533E2</td>
<td>15</td>
<td>22.39792</td>
<td>.000</td>
</tr>
</tbody>
</table>

The above table shows the peak expiratory flow rate of post-natal women with normal vaginal delivery. And it was 2.63 l/m on 3rd day, 3.21 l/m on 15th day, 3.74 l/m on 30th day and 4.25 l/m on 45th day.

Discussion

The study was aimed to find out the impact of physiotherapy care and post-natal exercises in the Peak Expiratory Flow Rate among postnatal women with normal vaginal delivery. According to Sarawgi A et al described reduced abdominal muscle strength and PEFR after delivery may be caused by restriction of anatomical structure of rib cage. In the present study shows the result of postnatal exercises were progressively increases the Peak Expiratory Flow Rate from 3rd to 45th day of postnatal period among normal vaginal delivery women at (P<0.05).

Diaphragmatic elevation and enlarging pregnant uterus in late pregnancy results in decreased functional residual capacity but diaphragmatic excursion and therefore vital capacity remain unaltered. Inspiratory reserve volume is reduced early in pregnancy, as a result of tidal volume, but increases in third trimester, as a result of reduced functional residual capacity. Peak expiratory flow rate and forced expiratory volume in second (FEV1) affected by pregnancy. There are no any significant changes in third trimester and immediate postpartum period. Dr Monika Bansal found that reduced contraction force of abdominal muscles and internal intercostal muscles might be one of the causes for reduced Peak Expiratory Flow Rate and the other cause is restrictions of diaphragmatic movement in vertical direction which is caused by enlarging gravid uterus. Chinko B.C. says that gravid uterus has notable effect on the lung function of a pregnant lady. Peak expiratory flow rate is reduced in pregnancy as in advanced gestation (second and third trimester) there would be obstruction of airway caused by the gravid uterus. This present study is shows improvement in Peak expiratory flow rate in postnatal period by the increase in strength of expiratory muscle which leads to recovery of pulmonary function.

Mrunal S. Phatak, stated that mother who were doing exercises after delivery, return to normal in the case of physical strength and psychological stability two times faster than who were not doing exercises. When strengthening program is added to postnatal care, it improves the muscle strength and mass. Known advantage of exercise trainings were increased physical function and quality of life. But postnatal exercise did not commonly advised in our community. Postnatal period is important period for physician to encourage
physical activity to prevent weight gain and to reduce stress and therefore provide useful exercise goal for the remaining years of their life. Exercise improves the cardiovascular strength and emotional well-being of postnatal women. Breastfeeding contribute much less for weight loss after delivery due to more calorie intake and less activity. Combination of exercise and proper diet can help to lose weight and maintain a lean body structure. **S. Kouhkan** proved that there is definite change in vertebral column alignment in all trimesters of pregnancy. When pregnancy progresses there is increase in lumbar and thoracic curvature and in pelvic tilt angles. Hence postural care has to be insisted for pregnant women who include exercises and suitable supports. Although change in vertebral curvature is inevitable during gestation, it is important to maintain the curvature to minimal level as it helps to quicker return to optimal position.

In present study concluded that deep breathing exercises and postural corrections done during postnatal period help to improve postnatal mother’s oxygen carrying capacity and forced expiration after postpartum period. **Hanky Park, Msc, PT**, stated that movement of diaphragm and activation of the pelvic floor muscles related with breathing pattern. In addition to that, respiration is much more efficient during contraction of the Pelvic floor Muscles. Therefore Pelvic Floor Muscle strength training program should be included in pulmonary rehabilitation programs.

A recent study concluded that postnatal exercises increase the lung functions. As abdominal pressure increases, pelvic floor muscles also contracts. So they suggest the pelvic floor muscles exercises to improve lung function. The pelvic floor muscles contractions produced forced expiration when situation requiring increased abdominal internal pressure and the situations is nose blowing, coughing and sneezing. In this study the peak expiratory flow rate measured by the process of forced expiration after maximal inspiration. All patients should be assessed individually and physiotherapy care should be based on their individual need.

**Conclusion**

The study concluded that there is significant increase in Peak Expiratory Flow Rate from 3rd day to 45th day with post natal exercises among post natal women with normal vaginal delivery. Therefore the study shows that physiotherapy care is essential to improve the Peak Expiratory Flow Rate in post natal women.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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Effects of Kinesiotaping in Improving Motor Function in Shuttle Cock Players after Acl Reconstruction

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Abstract

Aims & Objectives:- To study effects of kinesiotaping in shuttlecock players on pain and functional outcome after ACL reconstruction Sample Size: 90 patients (40 in each group), Study Design: Interventional Study, Study setting: A 1950 bedded tertiary care teaching hospital with well equipped medical and surgical intensive care unit and musculoskeletal department, Sample and Sampling Method: 90 patients were randomly selected and assigned in 2 groups, as Group 1(control group), Group 2 (Interventional group) in equal numbers The total subjects of 90 were included in the study the inclusion & exclusion criteria were inclusion criteria: Age: 14-20 years, Sex: Male and Female both, Only Shuttle cock players, Players who have undergone ACL Reconstruction. Exclusion criteria: Age: below 14 and above 20 years, Other than Shuttle cock players, Reconstruction of other Ligaments, Other surgeries over knee.

Result: There has been significant decrease (p<0.05) of mean knee varus angle peak in both functional activities, especially during squat (pre-KT: 198.2±1.30; post-KT: 189.6±0.55). There has also been VAS decrease during both activities up/ down step (pre-KT: 4; post-KT: 0) and squat (pre-KT: 3; post-KT: 0)

Conclusion: Neither KT® nor athletic tape had a statistically significant effect on performance on the hopping test, the single limb hurdle, dynamic balance, and SEBT tests. However, athletic taping caused a significant decrease in performance in vertical jump and standing heel rise tests while KT® did not limit functional performance. This study offers information that may stimulate new design of ankle taping methods by using different materials and further research may help to reduce uncertainty of the effects of various types of ankle taping on functional performance.

Keywords: Kinesiotaping, Acl, Motor Functions, Rom, Kt Taping, Gars, Valgus, Proprioception.

Introduction

Shuttle cock is a fast-paced sport involving jumps, lunges and unanticipated changes of direction and acceleration¹. An epidemiological review of lower limb injuries in shuttle cock can help establish the extent of the problem of injury in the sport and highlight potential injury mechanisms, which can then inform future injury prevention measures². In Shuttle cock players, males sustained more acute meniscal tear medial (59%), cruciate ligament sprains (66%), knee abrasions (63%), bucket handle tears (75%) and quadriceps tendon sprains (63%) than females.³ The most common causes of injury were movements involving turning (i.e., turning, changing direction, shifting weight, pivot, or twist) followed by general movements (i.e., running, moving sideways or backwards, rather than specific shuttle cock movements of lunging or landing from jumps.⁴ The greatest number of anterior cruciate ligament (ACL) injuries occurred in the 16–20 year age-group.⁵

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Injury to the anterior cruciate ligament (ACL) produces distinct changes in lower extremity kinetics and energetics during gait. Whereas healthy individuals walk with an extensor torque at the knee between 10 and 45% of the stance phase, individuals with recent ACL deficiency walk with an extensor torque lasting nearly the entire stance phase. Over the next several years the extensor torque at the knee becomes reduced in ACL-deficient individuals and in many cases becomes a flexor torque.

In the phase of early rehabilitation in ACL reconstruction, in addition to drug therapies, different treatment methods such as cold application, leg elevation, knee brace, elastic bandage, compression socks, continuous passive motion (CPM) therapy, ankle pumping exercises, patellar mobilization, isometric exercises, and electrical stimulation are applied. In this phase, it is endeavoured to reduce inflammation, swelling and pain, increase proprioception, muscular strength, and ROM in lower extremities, ensure tissue healing, and ease fatigue. The kinesiotaping method is a definitive rehabilitative taping technique that is designed to facilitate the body’s natural healing process while providing support and stability to muscles and joints without restricting body’s ROM. The kinesiotaping method is a therapeutic taping technique not only offering the support to the patient, but also rehabilitating the affected condition as well. It also targets different receptors within the somatosensory system. KT tape alleviates pain and facilitates lymphatic drainage by microscopically lifting the skin. This lifting effect forms convolutions in the skin thus increasing interstitial space and allowing for a decrease in inflammation. However, the effects of KT practice after ACL reconstruction are under-recognized.

**Aims & Objective**

-To determine effects of kinesiotaping in shuttlecock players on pain and functional outcome after ACL reconstruction

**Source of Data**

Acharya Vinobha Bhave Rural Hospital

Ravi Nair Physiotherapy College, Sawangi Meghe OPD, Wardha

**Method of Collection of Data:**

Ninety shuttlecock Players of 14-20 years of age with the h/o ACL reconstruction were taken and screened by using a questionnaire given for their inclusion in the study and assessed for gait pattern by using gait assessment rating scale (GARS) and muscle strength. Patients were randomized into two groups. Group A (45 patients will receive kinesio taping along with exercises) and Group B (45 patients will receive only exercises).

The players were explained about the respective procedures which they would be undergoing for a period of 4 weeks and were made to sign a consent form before their participation in the study.

**Sample Size:** 90

**Sampling Design:** simple random sampling

**Statistical Analysis:** selected data was analyzed by chisquare test, student’s paired t-test, student’s unpaired t-test.

**Criteria for Sample Collection:**

**Inclusion Criteria:**

Age: 14-20 years

Sex: Both Genders

Only Shuttle cock players.

Players who have undergone ACL Reconstruction.

**Exclusion Criteria:**

Age: below 14 and above 20 years.

Other than Shuttle cock players.

Reconstruction of other Ligaments.

Other surgeries over knee.

**Study Design:** Comparative Study

**Study Duration:** 8 Months

**Outcome Measures:**

GAIT ASSESSMENT RATING SCALE (GARS)

MUSCLE STRENGTH (MMT)
**Tools Used:**
- Kinesiology Tapes
- Inner Tapes.
- Weight Cuffs
- Exercise Mat
- Pillows
- Gait Assessment Rating Scale (GARS)

**Methodology**

**Procedure:**

Ninety Shuttle cock Players with the h/o ACL reconstruction will be assessed for gait pattern by using gait assessment rating scale (GARS) and divided into 2 groups of 45 players each. Group A (45 patients will bemange by using kinesio taping along with exercises) and Group B (45 patients will bemange by using only exercises).

The treatment was as one session per day for 6 days a week for 4 weeks. Before starting the treatment the strength of muscles and ROM around hip joint, knee joint and ankle and foot joint was assessed by using assessment proforma in the physiotherapy department. The A group which is going to receive kinesio-taping plus exercises. The kinesio-tape was applied on the 1st day of every week and was removed on 3rd day of every week with isometric exercises was allowed in these 3 days of taping and followed by the ACL rehab exercises for rest of the week. The assessment was taken on 1st day of every week and last day of 4th week. After checking the muscle strength and joint ROM, the player has receive all exercises to improve strength of muscles and increasing RMO for 30 minute session for 4 weeks.

**Table 1: Data Analysis of Pre & Post Kt Taping**

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Pre-KT</th>
<th>Post-KT</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>189.4±0.55</td>
<td>186.2±1.30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>(Mean±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squat</td>
<td>198.2±1.30</td>
<td>189.6±0.55</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>(Mean±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS (Step)</td>
<td>3</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>VAS (Squat)</td>
<td>4</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>

**Table 2: Visual Analog Scale Before And After Kinesio Taping during Functional Tasks**

<table>
<thead>
<tr>
<th>Task</th>
<th>Pre-Test</th>
<th>Post-Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>189.4±0.55</td>
<td>186.2±1.30</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>(Mean±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squat</td>
<td>198.2±1.30</td>
<td>189.6±0.55</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>(Mean±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS</td>
<td>3</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>(Step)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS (Squat)</td>
<td>4</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>

There has been significant decrease (p<0.05) of mean knee varus angle peak in both functional activities, especially during squat (pre-KT: 198.2±1.30; post-KT:189.6±0.55). There has also been VAS decrease during both activities up/ down step (pre-KT: 4; post-KT: 0) and squat (pre-KT: 3; post-KT: 0)
TABLE 3 BALANCE TEST SCORES (cm).

<table>
<thead>
<tr>
<th>Tests</th>
<th>Without taping</th>
<th>Kinesio Taping</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEBT Anterior (cm)</td>
<td>76.32 ± 2.11</td>
<td>81.14 ± 3.19</td>
</tr>
<tr>
<td>SEBT Anteromedial (cm)</td>
<td>70.72 ± 2.01</td>
<td>68.80 ± 2.16</td>
</tr>
<tr>
<td>SEBT Medial (cm)</td>
<td>75.10 ± 8.57</td>
<td>74.05 ± 8.02</td>
</tr>
<tr>
<td>SEBT Posteromedial (cm)</td>
<td>72.01 ± 7.16</td>
<td>75.39 ± 7.39</td>
</tr>
<tr>
<td>SEBT Posterior (cm)</td>
<td>82.63 ± 5.90</td>
<td>84.80 ± 6.40</td>
</tr>
<tr>
<td>SEBT Posterolateral (cm)</td>
<td>83.87 ± 7.90</td>
<td>89.94 ± 7.82</td>
</tr>
<tr>
<td>SEBT Lateral (cm)</td>
<td>76.41 ± 5.44</td>
<td>78.65 ± 4.58</td>
</tr>
<tr>
<td>SEBT Anterolateral (cm)</td>
<td>81.65 ± 6.28</td>
<td>81.52 ± 5.48</td>
</tr>
</tbody>
</table>

Discussion

The results of the current study showed that KT® did not cause any decrease in performance on any of the functional tests performed by athletes with chronic inversion ankle sprains. This is in agreement with other studies that reported similar conclusions as a result of the utilization of external ankle supports.6,7 There were no significant differences in performance by athletes with placebo taping and without taping conditions on any of the functional performance tests. Similarly, Sawkins et al.8,9 found no significant effects of placebo taping in their study. However, in the study conducted by Sawkins et al.,9,10,11 participants reported improved perceptions of stability, confidence, and reassurance with the placebo tape in place while performing functional tests.

The SportKAT 3000 is a fully computerized dynamic platform with forward-backward and side-to-side tilting that evaluates subjects’ reactions to different types of surface displacement. It is designed for static and dynamic balance assessment and training. In the current study, there were no significant differences among all taping conditions for dynamic balance measurement. In static balance assessments, subjects who had Kinesio Tex® Tape applied demonstrated statistically significant lower balance index scores (the lower balance score, the better success) than those who wore either placebo taping or no tape. However, it was stated that there was no change in performance in either static or dynamic balance function regardless of the taping technique used in studies by Greene&Hilman,10,11,12 Hume&Gerrard,14,15,16 and Hopper et al.15,16 In these studies balance ability was measured by taking stabilometric recordings in single leg stance position.19,20

Cordova et al stated that “lace-up style ankle support and traditional adhesive tape application incorporate material anterior and posterior to the talocrural joint axis”.21,22,23 This may restrict plantar flexion ROM that could contribute to a diminished vertical jump height. Vertical jump height could become impaired if the external ankle support decreases functional ROM. Subjects in the current study who were taped with athletic tape demonstrated vertical jump heights that were significantly lower than subjects with other conditions, perhaps due to the restriction of plantar flexion as described above. Mayhew22,23 examined the effects of closed basketweave taping application on the vertical jump, 50-yd sprint, standing long jump, and the Illinois agility run. He reported that the taping application significantly impaired vertical and long jump ability and concluded that the taping application significantly reduced performance when plantar flexion of the ankle was required. In the current study; despite of the statistically significant negative effects of athletic taping on vertical jumping, KT did not produce any statistically significant negative effects.

The hopping test and the single limb hurdle test are useful functional performance tests because they require multiple demands such as muscular strength, neuromuscular coordination, and joint stability.23,24 In this study the authors found no significant difference between outcomes in the hopping or single limb hurdle tests in athletes with athletic tape and KT®, both of them were to be found no different than the performance of athletes with placebo taping. The current findings are in
agreement with Sawkins et al. who found no significant difference (p= 0.865) by comparing performance on the hopping test in those with placebo taping compared to non-taped controls.\textsuperscript{23,24}

SEBT was used as a dynamic postural control measurement. SEBT was chosen because it is a reliable test that assesses dynamic stability in multiple planes.\textsuperscript{25} Hardy et al. used a prophylactic ankle brace as an external ankle support and they found that the bracing condition had no effect on any of the SEBT directional measures. The findings of the current investigation findings are in agreement with Hardy et al, as there was no significant difference in performance on the SEBT among athletes with all tape conditions.\textsuperscript{26}

**Conclusion**

Neither KT\textsuperscript{®} nor athletic tape had a statistically significant effect on performance on the hopping test, the single limb hurdle, dynamic balance, and SEBT tests. However, athletic taping caused a significant decrease in performance in vertical jump and standing heel rise tests while KT\textsuperscript{®} did not limit functional performance. This study offers information that may stimulate new design of ankle taping methods by using different materials and further research may help to reduce uncertainty of the effects of various types of ankle taping on functional performance.

**Ethical Clearance**- IT Has Been Obtained By Datta Meghe Ethical Committee, DMIMS, Sawangi Meghe Wardha

**Conflict of Interest**: Nil

**Source of Funding**: Self

**References**


Assessment of Physical Health among Security Guards Working in Krishna Hospital, Karad-A Cross-Sectional Study

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¹Final Year, Faculty of Physiotherapy, ²Associate Professor, ³Assistant Professor, Department of Musculoskeletal Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India

Abstract

Background: It is essential to find out the physical fitness among the security guards to prevent the complications related to their health. This study was conducted to identify fitness characteristics of security guards in Krishna Hospital, Karad. This study was designed to determine a fitness profile for security guards and provided meaningful insight into fitness levels before engaging in any physical training program.

Objectives of the study was to assess body anthropometry, flexibility, agility, muscular strength, muscular power, muscular endurance and aerobic capacity in security guards of age group 30-45 years working in Krishna hospital, Karad.

Material and method: In this cross-sectional study 36 security guards were assessed for body anthropometry by body mass index and body fat percentage, flexibility by sit and reach test, agility by modified-t test, muscular strength by bench press and leg press, muscular power by vertical jump test, muscular endurance by partial curl-up test and push up test and aerobic capacity by six-minute walk test.

Results: The body anthropometry- body mass index was found to be 52.8% and body fat percentage was 97.2% . The flexibility was found to be 38.9% and agility was 52.8%. Muscular strength of upper body was found to be 58.3% and lower body was 91.7%. Muscular power was 94.4% and endurance of abdominal was 52.8% and endurance of upper body was 50%. The aerobic capacity was significant among the subjects (p= <0.0001).

Conclusion: The study concluded that body composition, muscular endurance, muscular power and aerobic capacity was found normal but flexibility, agility and muscular strength was poor amongst security guards working in Krishna hospital, Karad.

Keyword: security guard, body composition, flexibility, agility, muscular performance, aerobic capacity.

Introduction

It has been identified that the one of the growing occupation in today’s era is security guard. So, the importance of the population is been highlighted. Basically, security guard are defined as a private employed person, who are uniformed and they are personally hired or paid to protect the certain area of property as well as people via various method such as direct or indirect method.¹

The duty of security guard includes monitoring, guiding or maintaining the area and most importantly is to prevent from the crimes. Many alternate terms has been used for security guard like security officers,
private police, bodyguard, etc. Security guards are the one who have high risk which they involve at work such as crime and violence, which affect their well-being. Accordingly the physical fitness of security guard cannot be compromised. So, security guard should be trained for ideal exercise programming which will be required in their daily task.¹

Physical fitness plays an important part in mental, physical and social well-being and retarded the ageing process.² Reduce physical fitness have negative impact on individual as well as society which leads to risk factors like hypertension, coronary heart disease, respiratory problems to health.³ Individual of all ages can improve their physical fitness by participating in various activities like walking, running, etc.⁴ Physical fitness is consisted of skill-related, health-related and physiologic components. Skill-related components include agility, balance, co-ordination, speed, power and reaction time. Health-related components include cardio- respiratory endurance, muscular endurance, muscular strength, body composition and flexibility.⁵

Physical fitness can be defined as the ability to carry out daily tasks with strength and vigilance, without any fatigue and with adequate energy to enjoy leisure-time pursuits and to meet unforeseen emergencies.²

This study has been done to look for the physical fitness of security guards as it may leads to many health problems further. Various tests are done to check physical fitness of security guard like body composition, flexibility, agility, muscular strength, muscular endurance, muscular power and aerobic capacity.

Aim and Objectives

Aim: To assess physical fitness amongst security guards working in Krishna hospital, Karad.

Objectives:

To assess body anthropometry on security guards in Krishna hospital, Karad.

To assess flexibility and agility on security guards in Krishna hospital, Karad

To assess muscular strength, muscular power and muscular endurance on security guards in Krishna hospital, Karad.

To assess aerobic capacity on security guards in Krishna hospital, Karad.

Materials and Methodology

Type of study: Observational study. Study design: Cross sectional study, Place of study: Krishna hospital, Karad, Sample size: 36, Sampling method: Simple random sampling, Study duration: 3 month

Materials: Stopwatch, Chair, Sphygmomanometer, Inch tape, Chalk, A cones, Skinfold thickness calliper, Weighing machine, A box, Ruler scale, A measuring strip (4.5 inch), Mat

Inclusion criteria: the security guards of KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED TO BE UNIVERSITY, KARAD, Age group: 30-45 years, Both male and females.

Exclusion criteria: Individuals not willing to participate, individuals with any systemic illness or any psychological illness.

Outcome measures: Body mass index, Body fat percentage (measured by skinfold caliper), Sit and reach test, Modified T-test, Free weight flat bench press and leg press, Vertical jump test, Partial curl-up test and maximal push-up test, 6-minute walk test.

Procedure: 36 subjects aged between 30 to 45 years both male and female were selected for the study. Individuals not willing to participate and with any systemic illness or psychological illness were excluded. Written consent was taken from subjects those willing to participate. The conclusion was done based on the Body mass index, Body fat percentage (measure by calliper), Sit and reach test, Modified T-test, Free weight flat bench press and leg press, Vertical jump test, Partial curl-up test and maximal push-up test, 6-minute walk test.

Statistical Analysis

Age distribution in the study:

Table no.1: age distribution

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-33</td>
<td>13</td>
<td>36.1</td>
</tr>
<tr>
<td>34-37</td>
<td>5</td>
<td>13.9</td>
</tr>
<tr>
<td>38-41</td>
<td>9</td>
<td>25.0</td>
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<tr>
<td>42-45</td>
<td>9</td>
<td>25.0</td>
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<tr>
<td>Total</td>
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</tr>
</tbody>
</table>
Gender distribution in the study:

Table no. 2: gender distribution

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>32</td>
<td>88.9</td>
</tr>
<tr>
<td>Female</td>
<td>04</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Body anthropometry:

Table no. 3: body anthropometry

<table>
<thead>
<tr>
<th>Body anthropometry</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
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<tr>
<td>Body mass index</td>
<td>Normal</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Obesity</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36</td>
</tr>
<tr>
<td>Body fat percentage</td>
<td>Moderately overweight</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36</td>
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</tbody>
</table>

Flexibility and Agility:

Table no. 4: flexibility and agility

<table>
<thead>
<tr>
<th>Flexibility (Sit and reach test)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td>Very Good</td>
<td>9</td>
<td>25.0</td>
</tr>
<tr>
<td>Good</td>
<td>10</td>
<td>27.8</td>
</tr>
<tr>
<td>Fair</td>
<td>14</td>
<td>38.9</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agility (modified T-test)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>13</td>
<td>36.1</td>
</tr>
<tr>
<td>Poor</td>
<td>19</td>
<td>52.8</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Muscular performance

**Table no. 5: Muscular performance**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Muscular strength (bench press)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>21</td>
<td>58.3</td>
</tr>
<tr>
<td>Average</td>
<td>8</td>
<td>22.2</td>
</tr>
<tr>
<td>Fair</td>
<td>7</td>
<td>19.4</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
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<tr>
<td><strong>Muscular strength (leg press)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>33</td>
<td>91.7</td>
</tr>
<tr>
<td>Fair</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Muscular power (vertical jump test)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>34</td>
<td>94.4</td>
</tr>
<tr>
<td>Advanced beginner</td>
<td>2</td>
<td>5.6</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Muscular endurance (partial curl-up test)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>19</td>
<td>52.8</td>
</tr>
<tr>
<td>Very Good</td>
<td>4</td>
<td>11.1</td>
</tr>
<tr>
<td>Fair</td>
<td>13</td>
<td>36.1</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Muscular endurance (maximal push-up test)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>18</td>
<td>50.0</td>
</tr>
<tr>
<td>Very Good</td>
<td>4</td>
<td>11.1</td>
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<tr>
<td>Fair</td>
<td>14</td>
<td>38.9</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Aerobic capacity (six-minute walk test):

**Table no. 6: six-minute walk test**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before</th>
<th>After</th>
<th>Mean difference</th>
<th>95% CI of difference</th>
<th>t-value</th>
<th>p-value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP</td>
<td>121.25 ± 2.19</td>
<td>126.94 ± 4.01</td>
<td>5.69</td>
<td>4.54 – 6.85</td>
<td>10.01</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>DBP</td>
<td>81.25 ± 2.19</td>
<td>86.81 ± 3.81</td>
<td>5.56</td>
<td>4.43 – 6.68</td>
<td>10.0</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>72.67 ± 0.67</td>
<td>80.31 ± 3.21</td>
<td>7.64</td>
<td>6.51 – 8.77</td>
<td>13.73</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0.0 ± 0.0</td>
<td>1.31 ± 0.70</td>
<td>1.30</td>
<td>1.06 – 1.55</td>
<td>11.03</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SpO2</td>
<td>98.55 ± 0.50</td>
<td>98.69 ± 0.46</td>
<td>0.13</td>
<td>0.32 – 0.04</td>
<td>1.53</td>
<td>0.13</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
Discussion

This study “Assessment of physical health amongst security guards working in Krishna hospital, karad “ was conducted to find out the fitness amongst security guards. It was useful to know the effect of physical health like musculoskeletal disorder, cardio-respiratory disorder etc. amongst security guards. Aim was to assess the physical health amongst security guards working in Krishna hospital, Karad. In this study, 36 subjects were included on the basis of inclusive and exclusive criteria. In that 32 were male and 4 were female aged between 30-45 years. According to the result obtained after conducting physical health examination conclusion was made with the help of statistical analysis. Body composition: Boyce et al. has found out that body composition increases over a year of police service. Several study had indicated that increase in body composition can affect the health due to excess body fat which affect the occupational performance. The present study noted that there was 52.8% normal body mass index and 97.2%normal body fat percentage because they were physically fit in some aspect. Flexibility and Agility: Flexibility included flexibility of hamstring extensibility and agility which involves speed, co-ordination and balance. Sit and reach test was used to check flexibility and modified t test was used to check agility of the subject. In this study, flexibility showed 38.9% were showing poor result and agility showed 52.8% poor result. The result was found poor may be due to lack of abdominal muscle strength and lack of physical activity. Muscular performance: Muscular performance includes muscular strength, muscle power and muscular endurance. If any of the one is impact then there is limitation of activity which will occur or there is increases risk of dysfunction. Muscular strength: Muscular strength for both upper as well as lower limb was tested using bench press and leg press respectively. The result obtained was poor in 58.3% for upper body strength and 91.7% for lower body strength. It may be due to lack of extensibility and tightness of the muscle. Muscular power: Muscular power is obtained by vertical jump test. It required external forces and distance covered in particular time.94.9% of total number of subjects were able to perform vertical jump test. Muscular endurance: Endurance is the ability to perform low-intensity, repetitive or sustained activities over a prolonged period of time. Partial curl-up test and push-up test was used to check the muscular endurance of abdominal muscle group and upper body endurance respectively. In partial curl-up test 52.8% had good endurance. In push-up test 50% of them had good endurance. Endurance is classified to muscular and cardiopulmonary endurance as partial curl-up and push-up test was used for muscular endurance. So, six minute walk test can be used to know the cardiopulmonary endurance of the subject. Six-minute walk test: Various physiological parameters like blood pressure, pluse rate, fatigue, dyspnea and spo2 need to be examined prior as well as after the test conducted. The mean distance walked by the subjects was 637.91m (SD=55.17).

Conclusion

The study concluded that body composition, muscular endurance, muscular power and aerobic capacity was found normal but flexibility, agility and muscular strength was poor amongst security guards between the age of 30-45 years working in Krishna hospital, karad.

Conflict of Interest: The authors declare that there are no conflict of interest concerning the content of the present study.

Source of Funding: This study was self funded.

Ethical Clearance: The study was approved by the institutional ethics committee of KIMSDU.

References


Original Article

Effect of Customized Splint and Soft Tissue Mobilization Exercises in Carpal Tunnel Syndrome

Vishva D. Bhuva1, Vaishali Jagtap2

1Student of Final Year B.P.Th, 2Assistant Professor; Department of Musculoskeletal Sciences, Faculty of Physiotherapy, KIMS “Deemed To Be University” Karad, Maharashtra, India

Abstract

Objective: To find effect of Customized Splint and Soft tissue mobilization Exercises in Carpal Tunnel Syndrome. Methods: 30 Subjects Diagnosed with CTS were screened and were divided into 2 group. i.e, Group A Subjects were given Customized Splint, Ultrasound and Exercises and Group B Subjects were given Soft tissue Mobilization, Ultrasound, Exercises. The interpretation of the study was done on the basis of Comparing pre-test and post-test assessment of VAS and FSS. Result: Within group comparison result, FSS and VAS were found to be statistically extremely significant in both the groups (p < 0.0001). Whereas between the group comparison result showed that group A was statistically significant in reducing FSS score (p = 0.01), VAS (on rest) score (p = 0.0008) and VAS (on activity) score (p = 0.016) than Group B. Conclusion: It was concluded that group A and Group B showed significant reduction in FSS and VAS scores in Subjects with CTS. But from this Study Group A was found to be more effective than Group B.

Key Words: Carpal Tunnel Syndrome, Customized Splint, Soft tissue Mobilization, Ultrasound, Exercises, VAS, FSS.

Introduction

Carpal Tunnel Syndrome (CTS) is a form of Compression neuropathy at the carpal tunnel in the wrist. It results in sensory and motor impairments in the distribution of median nerve of the hand. This is a syndrome Characterised by the Compression of the median nerve as it passes beneath the flexor retinaculum. Symptoms of CTS primarily include Nocturnal Pain, Paresthesias, Weakness, Atrophy of the thenar muscles, Numbness and Tingling in the region of hand, especially in the thumb, index and middle fingers. Carpal Tunnel may be result of any space occupying lesion. Some of the Common Causes found are overuse injuries of wrist joint (Computer key boards), Ganglia or Haematoma at the wrist, Connective tissue disorders like amyloidosis, Endocrinial Disorder Primarily Diabetes mellitus and Hypothyroidism, Hormonal abnormality like acromegaly, Pregnancy, Idiopathic, Inflammatory causes like rheumatoid arthritis, wrist Osteoarthritis, Post-traumatic causes like Bone thickening after a colles Fracture. Prevalence of clinically and electro physiologically confirmed CTS was 2.7% in general Population. In a study done on CTS was found to be a fairly common condition in working-aged people, caused due to physical occupational activities as in forceful and repetitive movements of hand and wrist or use of hand-held powerful vibratory instruments. In another study it was concluded that the severity of CTS was found to be more severe with age. Varied treatments are used for CTS. Medical treatments used are Nonsteroidal anti-inflammatory drug, Corticosteroid injection and Surgery. Physiotherapy Treatments include Ultrasound, Laser, Soft tissue Mobilization, Customized Splint, Carpal bone mobilization, Cryotherapy, TENS, and Stretching.

Fabricated Customized Splint that supports the wrist and MCP joints in neutral may be more effective than a wrist cock-up splint. Splint is restricts movement and
maintain the wrist and hand in the best anatomic position for minimizing carpal tunnel pressure. Fabricated splint place the wrist and MCP joint in a neutral position. Wrist position may not be the only thing considered during Splinting. When fingers are actively flexed, specifically metacarpophalangeal (MCP) joints. The Lumbrical muscles migrate into the carpal tunnel and increased pressure in carpal tunnel.

Ultrasound is assumed to have thermal effects on the target tissue resulting in an increase in blood flow, local metabolism and tissue regeneration, and reducing inflammation, oedema Pain. Functional Status Scale (FSS) and Visual Analogue Scale (VAS) showed good reliability and Validity.

Soft tissue mobilization Exercises Used Combined with Ultrasound and Exercises (Stretching of the arm, hand and fingers) treatment. Tendon gliding exercises helps reduce pressure over Carpal Tunnel. They provide sufficient movement between the median nerve and the flexor tendons preventing adhesions. Mobilizing the median nerve increases blood supply to the nerve, which helps in regeneration of nerve, and therefore improves conduction along the nerve.

Exercises Stretching of the arm, hand and finger helps reduce Compression in the Carpal Tunnel, Joint posture decreases compression intermittently, and thereby increasing blood flow May and reducing ischemic effects on the median nerve.

**Materials and Method**

An approval for the Study was obtained from the Protocol committee and institutional Ethical committee of KIMSDU. Subjects who fulfilled the inclusion and Exclusion Criteria were divided into two groups. Pre and Post-test assessment was taken by using VAS and FSS to assess the patients. A total 26 patients (19 Female and 7 Male) were diagnosed with CTS with a duration between 2 to 5 months. CTS was bilateral in 4 Patients. Patients were included with subjective symptoms like Nocturnal Pain, numbness, Paresthesias, tingling in the region of hand, especially in the thumb, index and middle fingers. Physical Examination included Carpal Compression test, Phalen’s (wrist flexion) test, Tinel sign (percussion test) and Tow point Discrimination test. Exclusion criteria were Open wound or skin disease, Hand Surgery, Traumatic Condition, Wrist Fracture, Infection, Thyroid disease, Diabetes mellitus. All Patients required Subjective Symptoms and either positive Carpal Compression test or Phalen’s test for inclusion in the study.

**Customized Splint:**

Fabricated Splint place the wrist and MCP joint in a neutral position. All subjects were instructed to wear the assigned splint every night for 4 Weeks.

![Fig 1: Subject wearing customized splint](image)

**Soft Tissue Mobilization:**

During tendon gliding Exercises, the fingers are placed in five different positions like. Straight hand, Hook fist, full fist, table top, and straight fist. During the median nerve gliding exercise, the median nerve was mobilized by putting the hand and wrist in six different positions including; Wrist in neutral position, Fingers and thumb in flexion; Wrist in neutral position, Fingers and thumb extended; Wrist and fingers extended, thumb in neutral position; Wrist, fingers and thumb extended; Forearm in supination; The opposite hand applies a gentle stretch to the thumb. During these exercise, the neck and the shoulder is held in neutral position, and the elbow supinated and 90 degree flexed. Each position will be held for a duration of 5 to 30 sec. The exercise was performed as one sessions daily. Each exercise was repeated of 10 times at each session. Exercise session will be continued for a duration of 4 weeks.

**Ultrasound:**

Ultrasound Treatment was given for a period of 15 minutes per session covering area over the carpal tunnel with a frequency of 1 MHz and intensity of 1.0 W/cm² using pulsed mode. One time for each session for four weeks.

**Exercises:**

Hold all these position for about 30 sec. All Exercises
given Daily for 4 weeks duration.

1. Hands in prayer position

Palms and fingers of both hand to be pressed, fingers positioned away from ulnar deviation. Press both palms close together with fingers spread apart. Repeat it by pressing metacarpals of each fingers. Pull fingers back hyperextended, and thereby increasing distance between fingers of each hand.

2. Arms extended overhead with fingers interlocked:

Interlocking fingers with the right thumb base over the left and base of the fingers in contact. Turn palms outwards and stretching the arms forward and upwards. Lock elbows keeping arms straight. Raise trunk by lifting the arms and pulling arms back further. Repeat it with left thumb over the right.

3. Push-Off From a Wall:

The patient is standing several feet away from a wall and gently push the patient directly forward towards the direction of wall. Instruct the Patient to catch himself/herself with equal weight on both hands, allowing the elbows in flexion under control as the trunk moving towards the wall. Then ask the patient to quickly push away from the wall with both hands, Catch the patient if he/she falls backwards, and then pushing the patient forward again repeating the Sequence.

Outcome Measures

1. Visual Analogue Scale (VAS)

Pain Measurement by means of a Visual Analogue Scale on which the Patients could indicate their assessment along a 10 cm line ranging from 0 (No Pain at all) to 10 (Most severe Pain).

<table>
<thead>
<tr>
<th>Table 1: Data of FSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSS</td>
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<tr>
<td>-----</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Group A</td>
</tr>
<tr>
<td>Group B</td>
</tr>
<tr>
<td>p value (Pre-Pre) and (Post-Post)</td>
</tr>
<tr>
<td>Inference</td>
</tr>
</tbody>
</table>

Functional Status Scale (FSS)

The Primary Outcome measure, the Carpal Tunnel Syndrome FSS is a Subjective Questionnaire. The 8 item FSS (e.g., Writing, Buttoning). Response Options range from 1 Point (no symptoms or no difficulty performing activities) to 5 points (most severe pain or unable to perform activity). Subjects with bilateral CTS is instruct to answer the Questions with regard to the hand that was being studied; higher scores indicate greater impairment or disability. This measure is highly reproducible, internally Consistent, Valid, and responsive to Clinical Change.

In the present study the pre-test mean of FSS was 31.13±5.30 in Group A, 29.93±5.21 in Group B, whereas post-test mean FSS was 12.80±1.93 in Group A, 14.67±2.05 in Group B. Within group analysis of FSS revealed statistically reduction in post-test FSS score for both the groups. This was done by using Paired t-test. Group A (p<0.0001), Group B (p<0.0001) which is extremely significant. Between group analysis of FSS was done by using Unpaired t-test. Pre-test analysis showed no significant difference between Group A and Group B (p=0.53) Post-test analysis showed significant difference between Group A and Group B (p=0.01).
In the present study the pre-test mean of VAS (on rest) was $3.56\pm1.97$ in Group A, $4.72\pm1.30$ in Group B, whereas post-test mean VAS (on rest) was $0.88\pm0.99$ in Group A, $2.33\pm0.97$ in Group B. Within group analysis of VAS (on rest) revealed statistically reduction in post-test VAS (on rest) score for both the groups. This was done by using Paired t-test. Group A ($p<0.0001$), Group B ($p<0.0001$) which is extremely significant. Between group analysis of VAS (on rest) was done by using Unpaired t-test. Pre-test analysis showed no significant difference between Group A and Group B ($p=0.06$) Post-test analysis showed extremely significant difference between Group A and Group B ($p=0.0008$).

<table>
<thead>
<tr>
<th>Table 2: Data of VAS (On rest)</th>
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<tbody>
<tr>
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<td>Group A</td>
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<tr>
<td>Group B</td>
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<tr>
<td><strong>p value</strong> (Pre-Pre) and (Post-Post)</td>
</tr>
<tr>
<td><strong>Inference</strong></td>
</tr>
</tbody>
</table>

In the present study the pre-test mean of VAS (on activity) was $6.92\pm1.46$ in Group A, $6.27\pm1.83$ in Group B, whereas post-test mean VAS (on activity) was $2.02\pm1.36$ in Group A, $3.30\pm1.36$ in Group B. Within group analysis of VAS (on activity) revealed statistically reduction in post-test VAS (on activity) score for both the groups. This was done by using Paired t-test. Group A ($p<0.0001$), Group B ($p<0.0001$) which is extremely significant. Between group analysis of VAS (on activity) was done by using Unpaired t-test. Pre-test analysis showed no significant difference between Group A and Group B ($p=0.26$) Post-test analysis showed significant difference between Group A and Group B ($p=0.016$).

<table>
<thead>
<tr>
<th>Table 3: Data of VAS (On activity)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAS (On activity)</strong></td>
</tr>
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<td><strong>Pre-test</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Group A</td>
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<td><strong>p value</strong> (Pre-Pre) and (Post-Post)</td>
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<tr>
<td><strong>Inference</strong></td>
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</tbody>
</table>
Discussion

This Study “Effect of Customized Splint and Soft tissue Mobilization Exercises in Carpal Tunnel Syndrome” was conducted to compare the two treatments that is Conventional training and Experimental training and find out which is the best for CTS. CTS is most common condition affecting median nerve. CTS can cause Numbness, Tingling, Pain, Paresthesias, Weakness and it affects normal function of the patient.

The Objectives of the Study were to find Effect of Customised Splint in Carpal Tunnel Syndrome. To find Effect of Soft tissue Mobilization Exercises, Ultrasound in Carpal Tunnel Syndrome. To find Effect of Customised Splint, and Ultrasound in Carpal Tunnel Syndrome.

The Study was conducted with 30 Subjects. The Subjects were divided into two groups. Prior consent was taken from them. They were splitted into Conventional training group and Experimental group. The interventions were carried out for daily for four weeks. The outcome measures for this study were FSS and VAS. The Subjects in Experimental group received Customized Splint, Ultrasound and exercises. The Subjects in Conventional group received Soft tissue mobilization Exercises, Ultrasound and exercises. The result of this study showed that there was significant minimizing Carpal tunnel pressure and reducing the pain after 4 weeks of intervention in both the group.

Brininger TL et al. Efficacy of a Fabricated Customized Splint and Tendon and Nerve gliding Exercises for the treatment of the Carpal Tunnel Syndrome: A Randomized Controlled Trial. A study was done to compare the effects of a neutral wrist and metacarpophalangeal (MCP) Splint with a wrist cock-up splint with and without exercises, for the treatment of carpal tunnel syndrome (CTS).1

In this study Fabricated Customized Splint, Ultrasound and Exercises was used for treatment. Splint is restricts movement and maintain the wrist and hand in the best anatomic position for minimizing carpal tunnel pressure. Fabricated splint place the wrist and MCP joint in a neutral position. Wrist position may not be the only thing considered during Splinting. When fingers are actively flexed, specifically metacarpophalangeal (MCP) joints. The Lumbrical muscles migrate into the carpal tunnel and increased pressure in carpal tunnel. Ultrasound is assumed to have thermal effects on the target tissue resulting in an increase in blood flow, local metabolism and tissue regeneration, and reducing inflammation, oedema Pain. Functional Status Scale and Visual Analogue Scale showed good reliability and Validity.

Akalin E et al. Treatment of Carpal Tunnel Syndrome with Nerve and Tendon Gliding Exercises. A Study was done to the effect of nerve and tendon gliding exercises in carpal tunnel syndrome.12

In this Study Soft tissue mobilization Exercises Used Combined with Ultrasound and Exercises (Stretching of the arm, hand and fingers) treatment. Tendon gliding exercises may provide sufficient movement between the median nerve and the flexor tendon to prevent adhesions. And the median nerve gliding exercises may increase blood flow to the nerve. Which help nerve regeneration and improve nerve conduction. Stretching of the arm, hand and fingers may reduce Compression in the carpal tunnel. Joint posture may decrease intermittent compression and blood flow. May be improved to decrease ischemic effects on the median nerve.

This accounts to better improvement with Experimental group (Customized Splint, Ultrasound, Exercises) as Compared to conventional training (Soft tissue Mobilization Exercises, Ultrasound, Exercises).

Conclusion

On the basis of the result of our study it was concluded that Experimental group was more effective than the Conventional group. Hence, there is significant effect of Customized Splint and Soft tissue Mobilization Exercises in Carpal Tunnel Syndrome.

Conflicts of Interest : The author declare that there are no conflicts of interest concerning the content of the present study.

Funding: This research received no specific grant from any funding agency in the public, commercial or not for profit sector.

Ethical Clearance : An approval for the Study was obtained from the Protocol committee and institutional Ethical committee of KIMSDU.

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15. Gillian A. Hawker, Samra Mian, Tetyana Kendzerska, Melissa French: Measure of Adult Pain Visual Analog Scale for Pain (VAS Pain), Numeric Rating Pain Scale For Pain (NRS Pain), McGill Pain Questionnaire (MCQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain


Evaluation of Levels of Cardio-Respiratory Fitness in Physiotherapy Students of Gujarat between 18-23 Years – A Cross Sectional Study

Vivek H. Ramanandi1, Juhi K. Panchal2, Himangini Chauhan2, Prema Karan3, Monali Machhi3, Zarana Shah3

1Sr. Lecturer, Ph.D. Scholar, 2Lecturer, Satish Goswami College of Physiotherapy, Ahmedabad, 3Intern, Pioneer Physiotherapy College, Vadodara

Abstract

Cardio-respiratory fitness is an integral component strongly associated with various health outcomes. The professional demands of physiotherapy profession require the therapist to engage in activities which demand good amount of strength, endurance and flexibility. A reasonably high level of physical fitness is required to carry out the routine job activities of a physiotherapist. However, in curriculum and during academic years no particular attention is given to physical fitness of physiotherapy students. The aim of this cross sectional study was to evaluate the cardio-respiratory fitness of students of physiotherapy and to find out correlation between BMI and performance in 6MWT in physiotherapy students. Results of this study suggest that the physiotherapy students are having less physical and cardio-vascular fitness as compared to the normal population and it may be recommended that physical fitness of students must carry some weightage in the evaluation process during the course of studies.

Keywords: Fitness, Physiotherapy, Six minute walk test, RPE, BMI.

Introduction

Cardio-respiratory fitness is defined as, “The ability of the circulatory and respiratory system to supply fuel during sustains physical activity and to eliminate fatigue products after supplying fuel”. Cardio-respiratory fitness is an integral component strongly associated with various health outcomes, including cardiovascular diseases. Low cardio-respiratory fitness is a prominent behavioural risk factor for cardiovascular diseases, morbidity and mortality. Exercise improves the Respiratory System by increasing the amount of oxygen that is inhaled and distributed to tissue and makes it more efficient.

In today’s society as technology advances and young adults search for an optimal use of their time, chances of accelerated process of change in their lifestyle by providing comfort and minimal effort in all areas increases, thus increasing chances of sedentarism. Youth is decisive period in human life because of multiple physiological and psychological changes which could determine health related habits in later age.

Students of physiotherapy are a relevant target group associated with community health promotion as they will be responsible for health promotion in the general population. The professional demand of physiotherapy profession require the therapist to engage in activities which demand good amount of strength, endurance and flexibility while working with the patients in hospital. These reasonably high level of physical activities requires physical fitness to carry out the routine job activities for a physiotherapist. For serving as a role model for people, a physiotherapist needs to have a good level of physical fitness to meet their job associated as well as social responsibilities.

However, in curriculum and during academic years no particular attention is given to physical fitness of...
physiotherapy students. Gracia Lanzuela et al. have conducted a study in their study to find out the levels of absence of physical activity and have suggested that universities and colleges are very important units where health and lifestyle contexts should be studied. Therefore, as student of physiotherapy, it is necessary that they understand the demand of profession and levels of their actual physical fitness levels.

The aim of our study is to evaluate the cardio-respiratory fitness of students of physiotherapy by using 6 minute walk test (6MWT) and Rate of Perceived Exertion (RPE). This study also tries to evaluate the cardiovascular response to 6MWT in physiotherapy students and to find out correlation between BMI and performance in 6MWT in physiotherapy students.

Method

This Cross sectional Observational Study was conducted at Satish Goswami College of Physiotherapy, Ahmedabad and Pioneer Physiotherapy College, Vadodara during October-2018 to December-2018. A convenient sample comprising 225 students of 18-23 years of age who can understand the RPE scale and who were willing to sign informed consent were included in the study. Any student with history of chronic medical or cardio-respiratory condition, any other musculoskeletal or neurological condition which may hamper the performance of 6MWT and who was unwilling to participate in the study were excluded.

The subjects were then instructed about the 6MWT and RPE scale and were examined to record pre-test heart rate (HR), blood pressure (BP), SPO2 and RPE. The subjects were given a demo for 6MWT and the procedure was conducted as per the standard protocol as guided by American thoracic society. SPO2 and HR were recorded during test at 3 minutes and all the above mentioned parameters were again recorded after the completion of test. Weight and height were recorded using digital weighing machine and wall mounted stadiometer for calculating body mass index (BMI). Distance covered in 6MWT and Borg’s RPE score were considered as primary outcomes.

Data of the study was analyzed using MSOffice 2010 excel and IBM SPSS statistics ver. 20 to calculate descriptive parameters included in the study. Correlation coefficient were calculated using Pearson's bivariate correlation coefficient in IBM SPSS statistics ver. 20.

Table 1 shows the descriptive statistics for the study sample. The sample consisted of total 225 subjects, out of which 175 were female and 50 were male students of physiotherapy. Table 2 shows the values of HR taken before, during and immediately after testing; RR before and after the test performance; SpO2 (%) and RPE before, during and after 6MWT and systolic and diastolic BP before and after 6 MWT for all subjects across all age and gender groups.

<table>
<thead>
<tr>
<th>Table 1: DESCRIPTIVE STATISTICS</th>
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<tr>
<td>SUBJECT CHARACTERISTICS</td>
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</tr>
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<td>Age: 20-21 years</td>
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<tr>
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<tr>
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<td>Figure 1: Materials used in the study</td>
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<td>Figure 2: Examination of subject before 6 minute walk test</td>
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<td>Figure 3: Spo2 Measurement during the 6 minute walk test</td>
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Analysis & Results

**TABLE 1 : DESCRIPTIVE STATISTICS**

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<td>BMI (kg/m2)</td>
<td>21.09</td>
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Data of the study was analyzed using MSOffice 2010 excel and IBM SPSS statistics ver. 20 to calculate descriptive parameters included in the study. Correlation co-efficient were calculated using Pearson’s bivariate correlation co-efficient in IBM SPSS statistics ver. 20.

Table-1 shows the descriptive statistics for the study sample. The sample consisted of total 225 subjects, out of which 175 were female and 50 were male students of physiotherapy.

**TABLE 2 : VALUES OF STUDY PARAMETERS ACROSS AGE GROUPS AND GENDER**

<table>
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<th>AGE GROUP</th>
<th>18-19 YEARS</th>
<th>20-21 YEARS</th>
<th>22-23 YEARS</th>
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<td>M</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>n=74</td>
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<td>n=56</td>
</tr>
<tr>
<td>PRE-HR (bpm)</td>
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<td>13.9</td>
<td>89.73</td>
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<tr>
<td>TEST-HR (bpm)</td>
<td>91.77</td>
<td>95.8</td>
<td>97.82</td>
</tr>
<tr>
<td>POST-HR (bpm)</td>
<td>89.62</td>
<td>21.6</td>
<td>97.91</td>
</tr>
<tr>
<td>PRE-RR (bpm)</td>
<td>17.72</td>
<td>3.73</td>
<td>16.55</td>
</tr>
<tr>
<td>POST-RR (bpm)</td>
<td>23.35</td>
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<tr>
<td>PRE-SPO2 (%)</td>
<td>95.8</td>
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<tr>
<td>TEST-SPO2 (%)</td>
<td>92.72</td>
<td>4.11</td>
<td>96.45</td>
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<tr>
<td>POST-SPO2 (%)</td>
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<td>PRE-DBP (mmHg)</td>
<td>70.43</td>
<td>12.12</td>
<td>79.04</td>
</tr>
<tr>
<td>POST-DBP (mmHg)</td>
<td>70.57</td>
<td>80.91</td>
<td>80.91</td>
</tr>
<tr>
<td>6MWD(m)</td>
<td>394.66</td>
<td>61.49</td>
<td>438.73</td>
</tr>
</tbody>
</table>

Table 2 shows the values of HR taken before, during and immediately after testing; RR before and after the test performance; SpO2 (%) and RPE before, during and after 6MWT and systolic and diastolic BP before and after 6MWT for all subjects across all age and gender groups.
TABLE 3: CORRELATION BETWEEN BMI AND 6 MINUTE WALK DISTANCE

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th>18-19 YEARS</th>
<th>20-21 YEARS</th>
<th>22-23 YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td>-0.154</td>
<td>0.035</td>
<td>0.026</td>
</tr>
<tr>
<td>MALE</td>
<td>-0.696</td>
<td>-0.616</td>
<td>-0.47</td>
</tr>
<tr>
<td>PEARSON’S CORRELATION COEFFICIENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Significance (2 tailed)</td>
<td>0.221</td>
<td>0.017</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Table 3 shows the values of Pearson’s bivariate correlation co-efficient for correlation between BMI and 6 minutes walk distance for all subjects in all age and gender groups.

TABLE 4: COMPARISON OF MEANS FOR SAMPLE STATISTICS WITH POH ET AL.

<table>
<thead>
<tr>
<th>GENDER</th>
<th>STATISTICS</th>
<th>STUDY SAMPLE</th>
<th>Poh et al.13</th>
<th>90 TH PERCENTILE Poh et al. (MEAN + 1.2 SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=225)</td>
<td>(n=175)</td>
</tr>
<tr>
<td>FEMALE</td>
<td>MEAN</td>
<td>402.5486</td>
<td>538</td>
<td>636.4</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(58.17422)</td>
<td>(82)</td>
<td></td>
</tr>
<tr>
<td>MALE</td>
<td>MEAN</td>
<td>443.0424</td>
<td>586</td>
<td>737.2</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(56.3238)</td>
<td>(126)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows the comparison of means of distance covered in 6 minutes by the study population as compared to norms established by Poh et al. for the Asian population based upon the regression equation for calculation to predict 6 minute walk distance. Comparison of the observed outcomes with the 90th percentile of the population of Poh et al. is also shown.

Discussion

This study compared the values of distance covered by subjects in 6MWT with the normative data available. We found out the values of HR, SBP, DBP, RR and RPE before, during and after the performance of 6MWT. This study also correlated the BMI of subjects with the distance covered in 6 minutes. The result of the study was in agreement with the study hypothesis that physiotherapy students are having lower levels of cardio-respiratory fitness as it was indicated by the outcome comparisons.

The primary outcome measure was the total distance covered in the 6MWT which represents the cardio-respiratory fitness in normal individuals. A short 6-minute walk distance (6MWD) fairly accurately predicts morbidity and mortality from heart or lung disease. The 6MWT is a useful measure of functional capacity, targeted at people with at least moderately severe impairment. Secondary measures included fatigue and dyspnea, measured with a Borg scale and arterial oxygen saturation measured via pulse oximetry.

In our study we found out the 6 minute walk distance to be in the range of 344-460 meters for female in all age groups with mean and SD values of 402.5486 ± 58.17442 meters. For male subjects the range was between 387-499 meters with mean and SD 443.0424 ± 56.3238 meters. The walking distance covered was compared to the available statistics derived from the study done in Singapore by Poh et al. in year 2006, on the convenience sample of 35 subjects between age of 45-85 years and as compared to that our sample showed lesser values of 6 minute walk distance. This is in support of the study by Multani NK et al that the physiotherapy students are having less physical and cardio-vascular fitness as compared to the normal population. They also described that poor level of endurance of physiotherapy students is also an important cause of concern. Endurance is very important to fulfil the workload and demands of physiotherapy profession. Even the academic activities require long standing hours during practical sessions and clinical training.
In our study we found negative co-relation of the BMI and 6 minute walk distance for females in age group 18-19 years where as male subjects in all the age groups showed negative correlation with 6 minute walk distance. Obesity increases the workload for a given amount of exercise, probably resulting in the shorter distance walked in participants with a higher body weight or BMI.

We found out that the secondary parameters such as HR, RR, BP and SpO2 were significantly impacted by the subjects’ lifestyle. It is important to consider the lifestyle differences like sedentary and active life styles as formulating an exercise protocol especially when the BP and HR can’t be monitored using mobile HR monitor. There is a significant difference between the RR and the BPs post performance between the sedentary and non sedentary population. This proves that work level is also a factor in cardiopulmonary responses. As we know, people with desk jobs, less physical activity and sedentary lifestyle is a known risk factor for CAD. Hence, in a preventive scenario, therapists may be encouraged to walk.

The incremental responses in HR, RR and BP were seen to be coinciding with previous studies showing similar findings and suggestive of normal physiological responses to the exercise induced stresses. Also according to Borg, there is a significant correlation between the RPE and the approx HR. Preferably, target HR should always be between 65%-80% of the maximum predicted HR calculated by the formula. This is the optimum HR for good aerobic exercise according to the American College of Sports Medicine (ACSM).

Thus, this study enlightens the areas which are unexplored in the Indian scenario, especially, the levels of cardio pulmonary fitness in Physiotherapy students. When the professional demands of physiotherapy profession are high, the educational curriculum is not emphasising the need of fitness thereby increases the level of low fitness in students. There is a need to improve the fitness of physiotherapy students by making changes in the curriculum and teaching methodologies. To implement the things effectively, it may be recommended that physical fitness of students.

**Conclusion and Suggestions for Future Research**

This study has determined the levels of cardio-respiratory fitness in young physiotherapy students of 18-23 years age studying in Satish Goswami College of Physiotherapy, Ahmedabad and Pioneer Physiotherapy College, Vadodara. It shows that cardio-respiratory fitness level of physiotherapy students is not satisfactory as compared to the physical demands of the profession. There is a need to improve the fitness of physiotherapy students by making changes in the curriculum and teaching methodologies.

Results also suggested negative co-relation between BMI and 6 minute walk distance, thereby indicating relative sedentary lifestyle in study population. So, it is necessary to control obesity and improve youth fitness levels especially in physiotherapists who are supposed to work in the field of health and wellness in future.

The scope of study can be expanded by increasing the sample size and more male subjects so that the sample can be representative of the population.

**Acknowledgement:** The authors would like to acknowledge the support and enthusiasm of the students who participated from both the colleges. Special gratefulness is extended to Dr. Ranveer Kr. Mahato (PT), Principal, Pioneer Physiotherapy College for allowing research at their institute.

**Conflict of Interest:** No potential conflict of interest.

**Source of Funding:** No funding received.

**Ethical Clearance:** Taken from Institutional Ethical Committee of Satish Goswami College of Physiotherapy vide SGCP/IEC/2018/003 dated, 7th September, 2018.

**References**


Effectiveness of Training with Different Sizes of Pen on Writing Capacity in School Going Children

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Abstract

Introduction- Handwriting is an essential life skill. Handwriting problems tend to increase the gripping pressure which would affect the writing speed and legibility. Some researchers say that the gripping pressure is believed to be dependent on the contact area of the pen with the fingers, or the diameter of the grip area. So the present study was conducted in order to rule out the effect of different grip sizes of pen on writing capacity in school going children’s.

Objective- To find effect of training with different grip sizes of pen on writing capacity in school going children.

Materials and Method- 124 school going students of Krishna English Medium School, Karad, of standard 5th and 6th were selected as subjects. Students were divided in 4 groups 31 in each group. Pre interventional writing capacity was taken by giving students a paragraph to write for 30 minutes with daily used pen. Each group were given pen of different diameter group A-0.8mm, group B-10mm, group C-12mm and group D-14mm.Every student was trained for 1 month with the provided diameter of pen by advising them to write daily for 30 minutes. Post interventional writing capacity was taken by asking students to write the same paragraph which was given for pre intervention for 30 minutes but with provided diameter pen. The number words written were calculated.

Result- Pen of all diameters showed improvement in writing capacity post interventional. But there was extremely significant difference in writing capacity post interventional in group D(14 mm) P value (<0.0001)

Conclusion- Students can use pen of diameter 14 mm for writing as it helps in improving the writing capacity without giving tension on the muscles of the hand.

Keywords – anthropometric measurement, pen size, writing capacity, school students.

Introduction

Handwriting is one of the important skills required to children in school; but about 10%–34% of school-going children fail to achieve this skill.

Introduction

It is a result of two primary movements, wrist movement horizontally and finger movements vertically horizontal, with rightward translation of the whole arm.

Handwriting difficulties have a huge impact on children psychosocial development, hand musculature, speed of writing, completing the work in time, pain in hand after writing, difficulty in writing for long time.

Handwriting difficulty without neurological or intellectual disabilities is often termed “dysgraphia” which leads to poor legibility and reduces the speed of
There are many disorders accompanied with writing. Out of which “ballpoint pen tenosynovitis” or “writer’s cramp” is the Disorders of the neck, shoulders and arms associated with writing task.\(^5,^6,^7\)

Writer’s Cramp is a disorder which is caused by cramp or spasm of certain muscles of hand and forearm. This is characterised by over activation of involuntary muscles during handwriting.\(^8,^9,^{10}\)

Cardinal symptoms of writer’s cramp are:

1) Muscle hyper activation during handwriting.
2) Irregular or jerky script.
3) Slow and awkward pen movement.

There are different types of pen grip such as dynamic tripod grip, lateral (thumb) tripod grip, dynamic quadripod grip, lateral (thumb) quadripod grip.\(^11\)

The “dynamic-tripod” is one of the most common ways to hold a writing instrument.

In this the thumb, index finger and middle finger function together to grasp the writing instrument.\(^12\)

During writing, the muscle load is more on the thumb, forefinger and middle finger, which hold the pen body.\(^13\)

As proper pen grip is important proper pen grip size is also important because inappropriate pen size grip can cause excessive flexion or extension of thumb or finger which may cause forearm strain and even elbow tendinitis.\(^14\)

Students have to appear for their exams. Scoring of the examination marks dependent on completion of paper and a presentation in good handwriting. These both factors are thought to be highly dependent on sizes of pens used while writing. The increased size of the grip area and the flared shape of the grip, are believed to be effective in reducing the muscle load during writing.\(^13\)

Handwriting problems tend to increase the gripping pressure which would affect the writing speed and legibility. Handgrip pressure is the forceful voluntary flexion of all fingers under normal biokinetic conditions.\(^15\)

Some researchers says that the gripping pressure is believed to be dependent on the contact area of the pen with the fingers, or the diameter of the grip area.\(^16\)

Therefore increase in grip diameter of pen, help in reducing the gripping pressure, as well as muscle load placed on the neck, shoulders and arm during writing operations.\(^17\)

So the present study was conducted in order to rule out the effect of different grip sizes of pen on writing capacity in school going children’s.

**MATERIALS AND METHODOLOGY AND PROCEDURE**

124 school going students of standard 5\(^{th}\) and 6\(^{th}\) were selected. Students were divided in 4 groups 31 in each group. Pre interventional writing capacity was taken by giving students a paragraph to write for 30 minutes with daily used pen. Later each group were given pen of different diameter group A-0.8mm, group B-10mm, group C-12mm and group D-14mm. Every student was trained for 1 month with the provided diameter of pen by advising them to write daily for 30 minutes. Post interventional writing capacity was taken by asking students to write the same paragraph which was given for pre intervention for 30 minutes but with provided diameter pen.

**Data Analysis**

**PRE AND POST INTERPRETATION OF WRITING CAPACITY**
Table no 1. pre and post interpretation of writing capacity

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>PRE-TREATMENT</th>
<th>POST TREATMENT</th>
<th>‘t’</th>
<th>DF</th>
<th>P</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td>SEM</td>
<td>Mean±SD</td>
<td>SEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>286.61±51.104</td>
<td>9.178</td>
<td>330.93±113.76</td>
<td>20.433</td>
<td>2.573</td>
<td>30</td>
</tr>
<tr>
<td>B</td>
<td>316.45±87.540</td>
<td>15.723</td>
<td>250.19±87.540</td>
<td>15.723</td>
<td>3.612</td>
<td>30</td>
</tr>
<tr>
<td>C</td>
<td>286.41±86.769</td>
<td>15.584</td>
<td>315.48±94.443</td>
<td>16.962</td>
<td>2.109</td>
<td>30</td>
</tr>
<tr>
<td>D</td>
<td>237.02±58.622</td>
<td>9.770</td>
<td>353.83±124.71</td>
<td>22.398</td>
<td>4.787</td>
<td>30</td>
</tr>
</tbody>
</table>

The pre interventional value of writing capacity of Group A is 286.61±51.104, Group B is 316.45±87.540, Group C is 286.41±86.769 and Group D is 237.02±58.622 respectively, whereas post interventional values of writing capacity of Group A is 330.93±113.76, Group B is 250.19±87.540, Group C is 315.48±94.443 and Group D is 353.83±124.71 respectively.

Intra –Group results were statistically significant in Group A and Group C, whereas Group B was very significant and Group D was considered extremely significant. This was done by Paired T test.

ANOVA ANALYSIS OF POST WRITING CAPACITY

Table no 2. ANOVA post analysis

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>MEAN±SD</th>
<th>P VALUE</th>
<th>F VALUE</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>330.93±113.76</td>
<td>0.0047</td>
<td>4.539</td>
<td>Very Significant</td>
</tr>
<tr>
<td>Group B</td>
<td>259.87±79.479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group C</td>
<td>315.48±94.443</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group D</td>
<td>353.83±124.71</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The post interpretation of writing capacity of group A was 330.93±113.76, group B was 259.87±79.479, group C was 315.48±94.443 and group D was 353.83±124.71 respectively. Post interpretation showed statistical significance in all the groups but group D was extremely significant with mean greater than other groups and P value 0.0047 , F value 4.539.

Discussion

Handwriting difficulties in students are considered as problematic as it can restrict students in achieving there goals. Many studies stated that diameter of the pen is one of the cause for the handwriting difficulties faced by the children. The purpose of the present study was to find out the effectiveness of training with different size of pen on writing capacity in school going children.

In this study 124 school going students were selected randomly as a subject. Students were divided in 4 groups 31 in each group. Each group 1 different size of pen was given to each and every subject .Pre treatment outcome measures with daily used pen for writing capacity was taken by CHES-M scoring and anthropometric
measurement of hand was taken. Later the students were trained for one month with the provided pen and then again the post outcome measure was taken.

Out of 124 involved subjects there were 18 male and 13 female in group A, 17 male and 14 female in group B, 15 male and 16 female in group C, and 16 male and 15 female in group D.

Intra group comparison (within group) was analysed statistically using paired t test, inter group comparison (between group) was analysed statistically using ANOVA test and correlation of anthropometric measurement was found with pearson’s correlation.

In the present study for writing capacity, Intra group statistical analysis revealed statistically increase in writing capacity post interventionally for all the groups. Intra –Group results were statistically significant in Group A (P= 0.0153) and Group C (P=0.0434), whereas Group B (P=0.0011) was very significant and Group D (P<0.0001) was considered extremely significant.

Inter group comparison of post intervention was analyzed statistically using ANOVA test. The post interpretation of writing capacity of group A was 330.935±113.76, group B was 259.870±79.479, group C was 315.483±94.443 and group D was 353.838±124.71 respectively. This showed that in all the four groups there was a very significant difference with ‘P’ value 0.0047 and ‘F’ value 4.539. But as the mean value of Group D is greater than the other groups this suggest that the Group d is effective as compared to other groups which denotes pen of diameter 14 mm.

Correlation of writing capacity with anthropometric measurement was found by pearson’s correlation which suggested that in all the groups there is positive value of correlation but by ‘p’ value as it is greater than 0.05 we can say that there is no significant correlation of anthropometric measurement with writing capacity in group A, B and C. The correlation coefficient of group A,B,C is 0.2859,0.05160,0.2445 respectively and ‘f’ value 2.582,0.0773,1.844 respectively. whereas in group D there is statistical significance among length and width as ‘p’ value is less than 0.05 (0.0001< 0.05) and coefficient correlation is 0.6827 with ‘f’ value 25.317.

Use of appropriate size of pen while writing will help the students to decrease the load on the muscles of the hand and avoid handwriting problems such as Students will not experience pain after writing for long time, There will be increase in speed of writing. Inappropriate size of pen will cause excessive flexion or extension of fingers which may lead to forearm strain or elbow tendinitis.

Udo, K., Otani, T., Udo, A. and Yoshinaga, published a paper in industrial health in 2000 saying that increasing the gripping area or increasing the pen diameter in the gripping area can reduce the muscle load of the hand. The new pen used in this study was ranging from 11.9 -13.6 in diameter at the bottom of the pen. And The EMG of the flexor pollicis brevis and the pain scores for the thumb,forefinger, middle finger, forearm and shoulder for the new pen were significantly lower than the conventional pen. These results suggest that in an hour of continuous writing, the new pen ranging from 11.9-13.6 reduces the muscle load on the upper limb, and therefore reduces fatigue in this area.20

In this study attempt was made to find the effect of training with different size of pen such as 0.8m ,10mm ,12mm,14mm on writing capacity. Out of which pen of diameter 14 mm showed significant improvement in writing speed thus decreasing the tension on the muscles of hand and avoiding pain while writing.

Conclusion

The present study provided the evidence to support the use of pen of size 14 mm for writing which will help in reducing the load on the muscles of hand while writing.

In addition result supported that the pen of size 14 mm is more effective in improving the writing capacity in school going children. Hence alternative hypothesis is proved.

Ethical Clearance: Ethical clearance was taken from Krishna institute of medical sciences deemed university on date 24/11/201.

Ethical Number- KIMSDU/IEC/03/2017

Source Funding – Self Funding

Conflict of Interest - Nil

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Efficacy of Aerobic Dance Exercise and Dietary Advice in Adolescent Overweight Obese School Children in Karad

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Abstract

Background: Childhood obesity is growing health concern among adolescent children. It is essential to design an exercise programme for children to prevent the complications related to their health. This study was designed to incorporate a fitness programme with dietary advice in obese school going children.

Objectives: Objectives of the study were to determine the efficacy of aerobic dance exercise and to determine the efficacy of aerobic dance exercise and dietary advice and also to compare the efficacy between all these above treatment protocol.

Material and Method: In this experimental study, obese children were assessed for BMI and WHR, and BAQ. The children were divided into 2 groups, Group A was given aerobic dance exercise and group B was given aerobic dance exercise along with dietary advice.

Results: Within the group statistical analysis of BMI, WHR and BAQ for group A and B (p =0.000) the results were significant. Between the group analysis for BMI for Group A and Group B was significant (p=0.0044). Analysis for WHR for Group A and Group B was not significant (p=0.437). Analysis of BAQ for Group A and Group B (p= <0.0001) was very significant.

Conclusion: The study concluded that aerobic dance exercises and aerobic dance exercises along with dietary advice were found effective in reducing BMI and increasing awareness of body image and attitude. Aerobic exercise with dietary advice was more effective than aerobic exercises alone in reducing weight in overweight and obese school going children.

Keyword: obesity, school children, body composition, dietary advice, body image, aerobics.

Introduction

Obesity is an exaggeration of normal adiposity and it is also used to define excess body fat. India is a fast growing economy, currently undergoing major epidemiological, nutritional and demographic transitions. These transitions tend to promote obesity in all age groups including childhood. The term overweight refers to excess body fat for a particular height whereas the term obesity is used to define excess body fat.¹

Obesity primarily occurs either due to excess calorie intake or insufficient physical activity or both.¹Most of the time personal lifestyle choices as well as cultural, environmental, and behavioural factors, significantly influence obesity.²

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DOI Number: 10.5958/0973-5674.2019.00107.2
Childhood obesity is associated with a plethora of psychosocial disorders and health risks including cardiovascular disease risk factors. Childhood obesity is a forerunner of metabolic syndrome, poor physical health, mental disorders, respiratory problems and glucose intolerance all of which will track into adulthood. Furthermore, various genetic, behavioral interventions and environmental factors play a role in its pathogenesis.

The incidence of juvenile obesity has dramatically increased worldwide in the last fifty years, mainly as a result of a physically inactive lifestyle and inappropriate diet habits. Pathophysiology of obesity is a progressive phenomenon.

Effects of aerobic exercises include improvement in metabolism, decrease in body weight, and decrease in fat mass as well as waist circumference. Studies have shown that physical activity decreases the risk of overweight and obesity. School based physical activity interventions (physical activity promotion and reduced television viewing) may help children maintain a healthy weight.

Many studies have shown that interventions with longer duration can have beneficial effects on obesity. For health benefits children and youth (should accumulate at least 60 minutes of moderate to vigorous physical activity daily.

Further, although it is generally accepted that regular physical activity provides substantial health benefits in obese adolescents, it is unclear that which type of exercise is capable of eliciting the greatest health benefits to obese children.

Diet is considered to play a vital role in controlling obesity. Interventions aiming to increase fruit and vegetable intake, improve school lunches and/or promote water consumption is shown to be effective.

Low energy dense foods (e.g. wholegrain cereals and cereal products; foods rich in non-starch polysaccharides and dietary fiber) show conflicting results in controlling adolescent obesity, but the mechanistic data are compelling.

Aim and Objectives

Aim: Efficacy of aerobic dance exercise and dietary advice in adolescent overweight and obese school children in Karad.

Objectives:
- To determine the efficacy of aerobic dance exercise.
- To determine the efficacy of aerobic dance exercise and dietary advice.
- To compare the efficacy between all these above treatment protocol.

Materials and Methodology

- Materials used
  - Data Collection Sheet
  - Consent Form
  - Weighing Machine
  - Inch tape
  - Music player
- Methodology

Study Type: Experimental study.
Study Design: Comparative study (Pre treatment and Post Treatment)
Place of Study: Karad.
Sampling Method:
Simple Random Sampling.
Sample Size:
\[ n = \frac{4 \sqrt{pq}}{L^2} \]
Total number of subjects in study \( n = 60 \)

Inclusion Criteria
- Both girls and boys
- BMI > 25
- Age group between 10-15 years.

Exclusion Criteria
- Child suffering from any systemic illness.
- Disabled children.

Outcome Measures
1. BMI
2. Waist hip ratio
3. Body attitude questionnaire

Procedure:
- 60 obese adolescent kids were selected between the age of 10-15 years with BMI > 25.
- Selected 60 kids with their parents were given counseling in order make them aware about the
ill effects of overweight and obesity & its short term & long term ill effects.

• Proper explanation were given to the parents to make them understand about the motive of the study.
• The consent form was given and was filled by the kids with the help of their parents.
• The kids were divided into 3 groups through simple random sampling.
• The selected children were divided into 2 groups (A & B).
• Group A children treatment protocol were aerobic dance exercise. Aerobic dance exercises were given after warm up and followed by cool down exercises and was observed for 6 weeks.
• Group B children’s were given aerobic dance exercise along with dietary advice for 6 weeks.
• At last we had compared the efficacy of the treatment protocol in children of both the groups.

Pre-test and Post-test BMI, WHR and BAQ Test were done.

Each exercise is given for 45 min for 5 days/week for a duration of 6 weeks.

Statistical Analysis

Table 1: Sex wise Distribution of Study Population

<table>
<thead>
<tr>
<th>Sex</th>
<th>Group A</th>
<th></th>
<th>Group B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>30.0</td>
<td>12</td>
<td>40.0</td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>70.0</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2: Comparison between Pre and Post assessment of study variables in study population.

<table>
<thead>
<tr>
<th>Group</th>
<th>Study Variables</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df.</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Group A</td>
<td>Pre BMI – Post BMI</td>
<td>.92933</td>
<td>.44350</td>
<td>.08097</td>
<td>.76373</td>
<td>1.09494</td>
</tr>
<tr>
<td></td>
<td>Pre WHR – Post WHR</td>
<td>.00600</td>
<td>.00621</td>
<td>.00113</td>
<td>.00368</td>
<td>.00832</td>
</tr>
<tr>
<td>Group B</td>
<td>Pre BMI – Post BMI</td>
<td>1.86000</td>
<td>.99351</td>
<td>.18139</td>
<td>1.48902</td>
<td>2.23098</td>
</tr>
<tr>
<td></td>
<td>Pre WHR – Post WHR</td>
<td>.01000</td>
<td>.00910</td>
<td>.00166</td>
<td>.00660</td>
<td>.01340</td>
</tr>
</tbody>
</table>
### Table 3: Paired t-test Evaluation between Pre and Post Assessment among Study Variables.

<table>
<thead>
<tr>
<th>Study Variables</th>
<th>Mean</th>
<th>Paired Differences</th>
<th>T</th>
<th>d.f</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>95% Confidence Interval of the Difference</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>Pre &amp; Post</td>
<td>0.87</td>
<td>0.68</td>
<td>0.12</td>
<td>(1.12)</td>
</tr>
<tr>
<td>Disparagement</td>
<td>Pre &amp; Post</td>
<td>0.77</td>
<td>0.68</td>
<td>0.12</td>
<td>(1.02)</td>
</tr>
<tr>
<td>Feeling fat</td>
<td>Pre &amp; Post</td>
<td>0.07</td>
<td>0.25</td>
<td>0.05</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Salience</td>
<td>Pre &amp; Post</td>
<td>0.57</td>
<td>0.50</td>
<td>0.09</td>
<td>(0.75)</td>
</tr>
<tr>
<td>Lower body fatness</td>
<td>Pre &amp; Post</td>
<td>0.20</td>
<td>0.48</td>
<td>0.09</td>
<td>(0.38)</td>
</tr>
<tr>
<td>Strength and fitness</td>
<td>Pre &amp; Post</td>
<td>0.63</td>
<td>0.61</td>
<td>0.11</td>
<td>(0.86)</td>
</tr>
</tbody>
</table>

Significant When P<0.05

Table no 3 represents paired t-test of pre- & post assessment of control group. Here according to BMI, we state that t-value was 11.477 & p < 0.05 hence we said that there was statistical significance between pre BMI & post BMI. Here according to WHR we state that t-value was 5.288 & p < 0.05 hence we said that there was statistical significant between pre-WHR & post WHR.

### Table 4: Paired t-test Evaluation between Pre and Post Assessment among Study Variables.

<table>
<thead>
<tr>
<th>Study Variables</th>
<th>Mean</th>
<th>Paired Differences</th>
<th>T</th>
<th>d.f</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>95% Confidence Interval of the Difference</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td>Attractiveness</td>
<td>Pre &amp; Post</td>
<td>1.09</td>
<td>.20</td>
<td>-.71</td>
<td>1.51</td>
</tr>
<tr>
<td>Disparagement</td>
<td>Pre &amp; Post</td>
<td>.73</td>
<td>.87</td>
<td>.16</td>
<td>-1.06</td>
</tr>
<tr>
<td>Feeling fat</td>
<td>Pre &amp; Post</td>
<td>.47</td>
<td>.51</td>
<td>.09</td>
<td>-.66</td>
</tr>
<tr>
<td>Salience</td>
<td>Pre &amp; Post</td>
<td>.77</td>
<td>.90</td>
<td>.16</td>
<td>-1.10</td>
</tr>
<tr>
<td>Lower body fatness</td>
<td>Pre &amp; Post</td>
<td>.60</td>
<td>.62</td>
<td>.11</td>
<td>-.83</td>
</tr>
<tr>
<td>Strength and fitness</td>
<td>Pre &amp; Post</td>
<td>.53</td>
<td>.63</td>
<td>.11</td>
<td>-.77</td>
</tr>
</tbody>
</table>

Significant When P<0.05
Result

Here majority of all study variables had statistical significant while comparing pre with post assessment com after applying paired t-test.

Table 5: Comparison between Pre and Post BMI and WHR of Group A and Group B

<table>
<thead>
<tr>
<th>Group A vs. Group B</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre BMI Group A</td>
<td>29.32</td>
<td>1.97</td>
<td>0.917</td>
<td>0.3629</td>
</tr>
<tr>
<td>Pre BMI Group B</td>
<td>28.92</td>
<td>1.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post BMI Group A</td>
<td>28.39</td>
<td>1.97</td>
<td>2.96</td>
<td>0.0044</td>
</tr>
<tr>
<td>Post BMI Group B</td>
<td>27.06</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre WHR Group A</td>
<td>0.857</td>
<td>0.038</td>
<td></td>
<td>0.3464</td>
</tr>
<tr>
<td>Pre WHR Group B</td>
<td>0.853</td>
<td>0.037</td>
<td></td>
<td>0.7302</td>
</tr>
<tr>
<td>Post WHR Group A</td>
<td>0.851</td>
<td>0.011</td>
<td></td>
<td>0.7827</td>
</tr>
<tr>
<td>Post WHR Group B</td>
<td>0.843</td>
<td>0.04</td>
<td></td>
<td>0.437</td>
</tr>
</tbody>
</table>

Result

The P-value of Pre BMI of group A and B was 0.3629. Hence on behalf of p-value we can state there was no statistical significance between Pre BMI of Group A and Pre BMI of Group B.

The P-value of Post BMI of group A and B was 0.0044. Hence on behalf of p-value we can state there was statistical significance between Post BMI of Group A and Post BMI of Group B.

Table 6: Correlation among Study variables of group A & group B

<table>
<thead>
<tr>
<th>Group</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Variables</td>
<td>N</td>
<td>Correlation</td>
</tr>
<tr>
<td>attractiveness</td>
<td>Pre &amp; Post</td>
<td>.732</td>
</tr>
<tr>
<td>disparagement</td>
<td>Pre &amp; Post</td>
<td>.711</td>
</tr>
<tr>
<td>Feeling fat</td>
<td>Pre &amp; Post</td>
<td>.962</td>
</tr>
<tr>
<td>Salience</td>
<td>Pre &amp; Post</td>
<td>.918</td>
</tr>
<tr>
<td>Lower body fatness</td>
<td>Pre &amp; Post</td>
<td>.897</td>
</tr>
<tr>
<td>Strength and fitness</td>
<td>Pre &amp; Post</td>
<td>.716</td>
</tr>
</tbody>
</table>

Significant When P<0.05
Result

The correlation coefficient between pre and post values of group A and B study variables was significant and positive.

Discussion

The present study “Efficacy Of Aerobic Dance Exercise And Dietary Advice In Adolescent Overweight Obese School Children In Karad” was designed to test the hypothesis that participation in 6 weeks of aerobic dance along with dietary advice would significantly improve body attitude and decrease BMI in 10 to 15 year old children with initially low body attitude and high BMI and to compare the difference between aerobic dance exercise and aerobic dance exercise and diet.

The objectives of the study were to determine the effectiveness of aerobic dance exercise alone and with dietary advice and to compare the effectiveness between both these treatments.

The effect of aerobic dance intervention on body image and physical self perceptions in adolescent girls and boys after treatment duration of 6 weeks was significant with reduced body image dissatisfaction and enhanced physical self perceptions and there was significant effect of exercises on the individuals which increased their self-confidence. This was significant by BAQ.8

The effect of dietary intake and physical activity of overweight or obese adolescents incorporated important dietary and lifestyle behaviour trends among adolescents focusing on the importance of not skipping the breakfast and not reducing the meal frequency and eating little but with a gap of 2 hours. This will maintain the normal physiology of the body and help in maintaining weight and reduce the prevalence of obesity and reduce the BMI if done as a lifestyle change.2

Aerobic Training scheduled for obese children showed that the aerobic exercise training significantly improved the child’s physical fitness. It reduced the WHR along with improving muscular endurance, flexibility and reducing the overall percent of body-fat and including other aerobic exercises along with dance aerobics will attain maximum health related physical fitness.11

This study showed that effect of aerobic exercise along with dietary changes was more effective than aerobic exercise alone as diet plays an important role in maintaining the physical fitness of the body by increasing the metabolism of the body and reducing the storage of fat, thus improving physical fitness and endurance of the child. Therefore, the child can be free from long term effects and sequel of obesity in future life.

Group A was given the following aerobic dance exercises:

- Jumping jacks, High knees, Skaters, Butt- kicks, Jump forward and Jog back, V step, squat-jumps, Irish kicks, disco roll, twist to side and jump.

Group B was given the above aerobic dance exercises and added dietary advice.

Pre and post treatment BMI, Waist Hip Ratio, BAQ values were recorded and used for statistical analysis.

Within the group comparison,

1. BMI, WHR and BAQ–
   - Group A – p value -0.000
   - Group B – p value – 0.000

Post training there was significant improvement noted in BMI, WHR and BAQ in both the groups.

Between the group comparison,

1. BMI –
   - p value – 0.0044
2. WHR
   - p value – 0.437
3. BAQ – p value - <0.0001

Post- training there was significant improvement in BAQ and BMI of group A and B except for WHR.

In previous studies,

1. Effect of 6 week aerobic dance intervention on body image and physical self perceptions in adolescent girls after treatment duration of 6 weeks it significantly reduced body image dissatisfaction and enhanced physical self perceptions and there was significant effect of exercises on the individuals which increased their self-confidence.

2. Study of Dietary intake and physical activity of normal weight and overweight or obese adolescents
revealed important dietary and lifestyle behaviour trends among adolescents focusing on the importance of not skipping breakfast and not reducing the meal frequency and eating little but with a gap of 2 hours will maintain the normal physiology of the body and help in maintaining weight.

3. A study entitled aerobic Training schedule for obese children reported that the aerobic exercise training significantly improving the child’s physical fitness such as muscular endurance, flexibility and percent body-fat and it is recommended to include other aerobic exercises along with dance aerobic to attain maximum health related physical fitness.

The previous studies did not include obese children and intervention of aerobic dance or combined aerobic dance and dietary advice. In their studies, and this made a need to study changes in weight as per BMI, WHR and BAQ which obtained significant results. And this concluded with no significant decrease in WHR but a significant decrease in BMI and BAQ

**Conclusion**

Present study concluded that aerobic dance exercises and aerobic dance exercises along with dietary advice were found effective in reducing BMI and increasing awareness of body image and attitude.

Therefore, aerobic exercise with dietary advice was more effective than aerobic exercises alone in reducing weight in overweight and obese school going children.

**Conflict of Interest:** There is no conflict of interest concerning the content of the study.

**Source of Funding:** This study was self funded.

**Ethical Clearance:** The study was approved by the institutional ethics committee of KIMSDU.

**References**


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A Survey on Breastfeeding Practices on Neonatal Health Status

Trusha S Goti1, S Anandh2

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Abstract

Objectives: To observe practices of exclusive breastfeeding and total period of breastfeeding among mothers with children under age group of 2 years in rural Karad, Maharashtra.

Method: Ethical clearance was obtained from institutional ethical committee. A Total of 79 consecutive females aged between 20 to 35 years were interviewed. They were selected according to the inclusion and exclusion criteria. They were allowed to fill the self Questionnaires (Questionnaire mothers knowledge regarding breastfeeding and Socio demographic variable of breastfeeding) from which conclusion was made.

Results: The study concluded that 84% of total number of subjects was having knowledge regarding exclusive breastfeeding practices and remaining 16% did not have knowledge regarding exclusive breastfeeding and Maximum duration of breastfeeding.

Conclusion: The study concluded that the mothers have a very good knowledge towards exclusive breastfeeding. Mothers were insisted to continue Maximum years of breastfeeding till 2 years into practice. Despite of mothers age, socioeconomic status, education, employment status they had an overall idea regarding exclusive breastfeeding and maximum duration of breastfeeding.

Keywords: Exclusive breastfeeding, knowledge, Mothers, Neonatal Health status.

Introduction

Breastfeeding: Breastfeeding is important for lifelong health and well being and it is the original form of infant feeding. It provides unique nutritional, immunological, psychological and child spacing benefits1.

Exclusive Breastfeeding

Exclusive breastfeeding is defined as infants feeding with human milk without of any other liquids or solids2. The World Health Organization recommended the practices of exclusive breastfeeding of infants for the first 6 months after birth to continue breastfeeding with diet up to more than 2 years3. The importance of exclusive breastfeeding and immunological and nutritional values of breast milk is a continuous health education4.

Benefits of Breastfeeding

Breast feeding benefits both mother and baby4. Breast milk contains has all the nutrients a baby needs for normal growth and development, in an optimum proportion and in a form that is easily digested and absorbed which make it nutritional superiority. Carbohydrates like Lactose have high concentration in breast milk. Galactocerebrosides are formed from galactose. Breast milk has a high and electrolytes a water content of 88% therefore a breastfed baby does not require any additional water in the first few months of life even in summer months. Breast milk has a number of protective factors like immunoglobulin, mainly secretary IgA, macrophages, lymphocytes, lactoferrin, lysozyme and other protective substances which make it immunologically superiority.
The protein content of breast milk is low (0.9-1.1 g / dL) as the baby cannot effectively metabolize a high protein load. Most of the protein is lactalbumin and lactaglobulin, as it is easily digested.

Composition of Breast Milk

The Composition of breast milk varies at different stages and after birth to suit the needs of the baby. Milk of a mother who has delivered a preterm baby is different from milk of a mother delivered term baby. Breast milk provides immunological protection, proteins, nutrition in infants to ensure health.

1. Colostrum: Colostrum is the milk secreted during the 3-4 days after delivery. It is yellow and thick.

2. Transitional milk: Transitional milk is the milk secreted and after 3-4 days and until two weeks.

3. Mature milk: Mature milk follows transitional milk. It is thinner and watery.

4. Preterm milk: preterm milk is the milk of a mother who delivers prematurely.

5. Fore milk: Fore milk is the milk secreted at the start of a feed.

6. Hind milk: Hind milk comes later towards the end of feed and is richer in fat content and Provides more energy, and satisfies the baby’s hunger.

Importance of Breastfeeding

Breastfeeding benefits babies by giving the best start for a healthy life and is healthy and well being for both mothers and babies. It also has economic benefits for the whole family and society.

WHO BREASTFEEDING WEEK

Date: 1 – 7 August - World breastfeeding week is celebrated every year from 1 to 7 August to encourage breastfeeding and improve the health of babies around the world.

Materials and Methodology:

Type of study- Observational study, Study design- Survey, Place of study- Krishna institute of medical sciences deemed to be university, Sample size-79, Sampling method- Convenience Sampling, Duration of study- 3 months. Inclusion criteria:

Multipara mothers post delivery, Multiparous mothers with children below 2 years, Age group above 20 to 35 years. Exclusion criteria: Mothers who cannot feed due to ill health/communicable diseases etc. Mothers with long lasting psychiatric problems. Outcome measures: Self Answering Questionnaires - Mothers knowledge regarding breastfeeding & Socio demographic variables of breastfeeding mothers.

Procedure: 79 consecutive females aged between 20 to 35 years were interviewed. They were selected according to the inclusion and exclusion criteria. They were allowed to fill the Self answering Questionnaire-Mothers knowledge regarding breastfeeding and Socio demographic variable of breastfeeding. The results have been computed for conclusion.

Findings

AGE GROUP OF MOTHERS

Table no.1: Age group of mothers

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of women</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>34</td>
<td>43%</td>
</tr>
<tr>
<td>26-30</td>
<td>31</td>
<td>39%</td>
</tr>
<tr>
<td>&gt;31</td>
<td>14</td>
<td>18%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>

EDUCATION STATUS OF MOTHERS

Table no.2: Education status of mothers

<table>
<thead>
<tr>
<th>Education</th>
<th>No. of women</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>4</td>
<td>5%</td>
</tr>
<tr>
<td>Primary</td>
<td>28</td>
<td>35%</td>
</tr>
<tr>
<td>Secondary</td>
<td>33</td>
<td>42%</td>
</tr>
<tr>
<td>Higher secondary</td>
<td>8</td>
<td>10%</td>
</tr>
<tr>
<td>Degree</td>
<td>6</td>
<td>8%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>
### GRAVIDA STATUS OF MOTHERS

Table no. 3: Gravida status of mothers

<table>
<thead>
<tr>
<th>Gravida</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravida 2</td>
<td>47</td>
<td>60%</td>
</tr>
<tr>
<td>Gravida 3</td>
<td>23</td>
<td>29%</td>
</tr>
<tr>
<td>Gravida 4</td>
<td>9</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>

### MOTHERS PRACTICES TOWARDS EXCLUSIVE BREASTFEEDING

Table no. 4: mothers practices towards exclusive breastfeeding

<table>
<thead>
<tr>
<th>Exclusive breastfeeding</th>
<th>No. of women</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>42</td>
<td>53%</td>
</tr>
<tr>
<td>No</td>
<td>37</td>
<td>47%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>

### MOTHERS PRACTICES TOWARDS MAXIMUM DURATION OF BREASTFEEDING

Table no. 5: Mothers practices towards maximum duration of breastfeeding

<table>
<thead>
<tr>
<th>Maximum duration</th>
<th>No. of women</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>22</td>
<td>28%</td>
</tr>
<tr>
<td>&lt;2 year</td>
<td>36</td>
<td>45%</td>
</tr>
<tr>
<td>&gt;2 year</td>
<td>21</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>

### MOTHER’S KNOWLEDGE REGARDING BREASTFEEDING

Table no. 6: Mothers knowledge regarding breastfeeding

<table>
<thead>
<tr>
<th>Mother’s knowledge regarding breastfeeding</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>66</td>
<td>84%</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>16%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Result

The subjects aged between 20 to 25 year were subtotal of 43%, 26 to 30 year were subtotal of 39% and above 31 year were subtotal of 18%. The socioeconomic status of upper class were 2%, upper middle class were 9%, middle class were 47%, lower class were 23% and lower middle class were 19%. The large sum of unemployment subject were 94%, while employment subjects were 6%. The maximum amount of subjects were educated upto secondary with 42%, primary education that were 35% of subjects, 10% of subjects were educated upto higher secondary and only 8% of subjects held degree and 5% of subjects were illiterate. 60% of subjects had gravida 2, gravida 3 were 29% of subjects, gravida 4 were 11% of subjects. Exclusive breastfeeding were 53% of subjects while 47% of subjects did not do exclusive breastfeeding. Maximum duration of breastfeeding were more than 2 year by 27% of subjects, 45% of subjects did breastfeeding for less than 2 year while 28% of subjects did breastfeeding for less than 1 year.

### Discussion

This study “A Survey on breastfeeding practices to promote neonatal health status” was conducted during period of breastfeeding. The study was conducted in Krishna hospital karad. All the mothers who have children below 2 years were included in this study. Inspite of awareness or the influence of the society it’s found mothers efforts towards exclusive breastfeeding is lowered or does not take precautions for exclusive breastfeeding. The breastfeeding practices of mothers vary with relation to their health status, employment status and any other influencing factors pertaining to them. Promoting breastfeeding practices in a WHO initiative and so continuous education and awareness is being promoted for neonatal wellbeing among mothers.

The study included 79 subjects. The socio demographic factors consisting of age, gravida, education, religion, socio economic status was recorded. As per the inclusion/exclusion criteria a survey was conducted among mothers in Karad. The questionnaire of mother’s knowledge regarding breastfeeding variables and practices was recorded. The recorded data was interrelated as per the duration of exclusive breastfeeding completion for 6 months, total duration to which child has been breastfeed and other influencing
factors of breastfeeding practices and conclusion was made.

Inclusion criteria was Multipara mothers post delivery, Multiparous mothers with children below 2 years, Age group above 20 to 35 years. Exclusion Criteria was Mothers who cannot feed due to ill health/communicable diseases etc. Mothers with long lasting psychiatric problems.

The study shows 53% of total number of subjects followed exclusive breastfeeding and 47% of total number of subjects did not followed. This can be due to lack of knowledge and guidance. Other factors like education of the mother and due to health problems exclusive breastfeeding can be affected.

Ideal breastfeeding duration should be done for 2 years but this has been reduced to 6 months to 1 year. The reasons can be lack of time, reduced health status of the mother and modern new techniques of breastfeeding. The study shows 27% for more than 2 years, 45% for less than 2 years and 28% for less than 1 year duration of exclusive breastfeeding.

Exclusive breastfeeding can be affected due to lack of knowledge and guidance, even the education of the mother and health problems can lead to reduce exclusive breastfeeding. In Today era there is lack of time, reduced health status and modern new techniques of breastfeeding have a impact on exclusive breastfeeding.

The study shows 43% of total Number of subjects were included in age group between 20 to 25 years, 39% of total number of subjects were included in age group between 26 to 30 years and remaining 18% of total number of subjects were aged above 31 years.

Socioeconomic status can also have impact on exclusive breastfeeding. The study shows 19% of upper class, 9% of upper middle class, 47% of middle class, 23% of lower class and 2% of lower middle class were included.

Education of the mothers and employee status affects the exclusive breastfeeding directly or indirectly exclusive breastfeeding. In this study 94% were unemployed and 6% were employed subjects.

The study shows 5% of illiterate, 35% of primary education, 42% of secondary education, 10% of higher secondary education and remaining 8% graduates were included.

The Survey concluded that 84% of total number of subjects was having knowledge and remaining 16% did not have knowledge regarding exclusive breastfeeding and maximum duration of breastfeeding.

Conclusion

The present study concluded that the mothers have a very good knowledge towards exclusive breastfeeding. Mothers were insisted to continue Maximum years of breastfeeding till 2 years into practice.

Despite of mothers age, socioeconomic status, education, employment status they had an overall idea regarding exclusive breastfeeding and maximum duration of breastfeeding.

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of the present study.

Source of Funding: This study was self funded.

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Original Article

Influence of Cooking Methods on Physical Fitness in Urban and Rural Women

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Abstract

Background: Key difference between rural and urban household is the adaptation of new cooking technologies and fuels. Rural areas use traditional cooking utensils such as deep cooking pot, clay water pot, and earthenware while utensils generally used in urban areas are stainless steel, Teflon and microwave compatible plastics and glass for cooking. Nutritional deficiency not only lead to severe illness but also physical development, psychic behavior and susceptibility to infection. Much of the urban population and all rural population still use traditional cooking utensils such as clay and aluminum pots. Unlike modern utensils, traditional one do not have a protective layer of inert material to prevent contamination of food.

Objectives: To study physical fitness in rural population using traditional methods.

To study physical fitness in urban population using modern methods

To find out difference of physical fitness in rural and urban population

Method: Ethical clearance was obtained from the Institutional Ethical Committee. 190 subjects were selected between the age group 25 to 50 years, all female. They were selected according to inclusion and exclusion criteria. They were made to perform physical fitness tests based on strength, power and endurance. According to which conclusion was made.

Result: a statistical analysis for rural women was significant depending on physical fitness tests while it was not significant for urban women.

Conclusion: the majority of participants who were more physically fit were from rural population. The study concluded that there is a difference between the physical fitness in rural and urban women. As there are different methods of cooking, there is a difference in the fitness levels as well.

Keywords: rural women, urban women, traditional, modern, cooking methods.

Introduction

Key difference between rural and urban household is the adaptation of new cooking technologies and fuels.¹

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These cooking methods affect the level of minerals and vitamins.² Types of stoves and fuels differ between rural and urban population, urban participants are more likely to use LPG and charcoal while rural participants use wood.¹ Utensils play an important role for the provision of nutrients. Rural areas use traditional cooking utensils such as deep cooking pot, clay water pot, and earthenware while utensils generally used in urban areas are stainless steel, Teflon and microwave compatible plastics and glass for cooking.⁸
What are micronutrients? Micronutrients is the collective term applied to essential vitamins and trace minerals. They include vitamin A, calcium, iodine, iron and zinc. Micronutrient status includes all age groups including children, adults and elders. Micronutrient deficiencies may lead to nutritional anemia.

Vitamin deficiency may lead to corneal destruction among children of age group of 6 months and 6 years. 20% of children are at severe risk of death from infections and 2% are blinded or suffer from severe sight impairment. Deficiency of iron leading to anemia leads to a fifth of mortality rate in neonates and a tenth of mortality rate in mother. Iodine deficiency creates a public health problem in about 1.5 billion people. Babies born are either mentally, retarded, physically stunted, deaf or paralyzed.

Natural killer cells play a key role in natural immunity against tumor. Nutritional deficiency may lead to impaired functional activity of natural killer cells as they play an important role in natural immunity against tumor and infected cells.

Nutritional deficiency not only lead to severe illness but also physical development, psychic behavior and susceptibility to infection. However, there is presence of heavy metals in food which is cooked in utensils without a protective covering that is traditional cooking utensils. Although they can be found in high concentration in body, a number of heavy metals such as aluminum, beryllium, cadmium, lead and mercury have no biological function. Others such as copper, arsenic, iron and nickel are considered essential at low concentration but toxic at high. Food can be contaminated during the different stages of agricultural processing however transformation process requires the use of utensils and ingredients responsible for the presence of heavy metals in food. In most developing countries, much of the urban population and all rural population still use traditional cooking utensils such as clay and aluminum pots. Unlike modern utensils, traditional one do not have a protective layer of inert material to prevent contamination of food. There is a relation between what people eat and their nutritional and nutritional status. This correlation widely depends on cooking method. Cooking methods induces significant changes in chemical composition, that influences concentration and bioavailability of bioactive compounds in vegetables. Men who maintained or improved their physical fitness were less likely to die from all causes and cardiovascular disease than persistently unfit men. Unfit men should be encroached to start a physical program. Lack of nutritional knowledge and due to low intake nutrition rich food it may lead to hampered physical performance in respective population. There are gaps in knowledge concerning lack of harmonized and comparable data on food intake, lack of understanding regarding eating attitudes that leads to physical fitness among individuals.

However, nutrition is utilized maximum with the dietary diversity, as micronutrient malnutrition remains a serious nutritional concern in developing countries. This is a study for the influence of cooking methods on physical fitness in rural and urban women.

**Materials and Methodology**

Type of study : observational study
Study design : Analytic
Place of study: Krishna Institute of Medical Sciences Deemed to be University, Karad
Sample size: $n = (p_1q_1) + (p_2q_2) \times 7.84$
\[ (p_1-p_2)^2 \]
Sampling method: simple random sampling
Study duration: 3 months

**Inclusion Criteria**

Subjects using traditional cooking method in rural area
Subjects using modern cooking method in urban area
Age group : 25-50 years

**Exclusion Criteria**

Subjects with known case of health disorders
Subjects with congenital diseases and disorders
Subjects migrating between rural and urban area

**Materials**

Data collection sheet
Consent form
Pen
Paper
Chalk
Inch tape
Findings

The study was conducted with 190 subjects. They were divided into 2 groups, split in rural and urban population. Study was carried out for 3 months. Outcome measures were strength test – leg press, power test – vertical jump test and endurance test – trunk curl up test. While comparing the groups, in strength test, there were more number of rural subjects in average, good and excellent categories showing greater amount of strength in rural women as compared to urban women. In power test, there were more number of rural subjects in advanced, intermediate and advanced intermediate categories while there were more number of urban women in advanced beginner category; showing that rural women had more power as compared to urban women. In endurance test, rural women exceeded in excellent and very good category while more number of urban women were present in fair category.

After calculations, it was concluded that rural women were better in physical activity in all the three categories that is strength, power and endurance as compared to urban women.

Conclusion

We conclude that rural women were more physically fit than urban women depending on physical activity test. By comparison of strength, power and endurance tests, there were more number of rural women physically fit as compared to urban women.

Conflict of Interest: There was no conflict of interest carried out during the study of the influence of cooking methods on physical activity in rural and urban women.

Source of Funding: Source of funding is by self.

Ethical Clearance: The Institutional Ethics Committee has given permission to initiate the research project entitled INFLUENCE OF COOKING METHODS ON PHYSICAL FITNESS IN RURAL AND URBAN WOMEN.

References

Effect of Total Motion Release on Pain and Function in Subjects with Acute Low Back Pain: A Pilot Study

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²Bachelor in Physiotherapy, KAHER Institute of Physiotherapy, Belgaum

Abstract

Background: Low back pain is common cause for sickness absenteeism seen worldwide. Most of the time Low back pain is non-specific in nature having no definite cause behind it. About 60-80% of adults present with low back pain at some point of their life.¹ The purpose of this study is to check the effectiveness of Total Motion Release on pain and functional disability in subjects with Non-Specific Low Back Pain.

Method: Seventeen participants within the age group of 20-45 years with a history of acute low back pain with symptoms present for less than 3 weeks were recruited in the study as a sample of convenience as per the inclusion criteria. The outcome measures used for the study was Modified Oswestry disability Questionnaire (MODQ), Visual Analogue Scale (VAS) and Modified Schober’s method.

Results: There was significant improvement seen in the outcome measures taken pre and post intervention.

Conclusion: Total Motion Release in combination with Hot Moist Pack provided significant benefit in terms of pain relief and functional disability.

Keywords: Acute Low Back Pain, Total Motion Release, Nonspecific, Contralateral exercises.

Introduction

Low back pain is the most frequent problem people suffering in their life.¹ Low back pain is defined as pain and discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain.² Low back pain can be non-specific in nature due to unidentifiable cause. Non-specific low back pain has been ranked first common for disability on the years lived with disability (YLD) metrics and it is the 2nd most common cause for pain reported after headache.³,⁴ Individual between the age of 30 and 40 are more likely to have to have low back pain due to degenerative changes occurring with age.⁵

The major risk factors for low back pain are age, gender, psychological factors such as stress, anxiety and depression, occupational factor, obesity, sedentary lifestyle, cigarette smoking, decreased flexibility and mobility of muscles, postural habits, the way of lifting and transporting weights, and domestic activities such prolonged watching TV and videogaming.⁶ Other risk factor can be due to certain activity like, doing jogging or running on uneven surface or wrong way to lifting heavy weight.⁷

The cause of low back pain is difficult to determine and the degree of pain is most of the time completely unrelated to extent of damage to tissue or muscle in the body. Although the cause is different for people of different ages living different lifestyle, it can be divided in to following type : It can be caused by injury , disturbance, sprain or irritation caused to the large nerve root in the lower back, Severe backache can be caused by injury to small nerves at the low back pain , A deep ache is felt at the back when there is strain of erector spinae muscle, One of the leading cause of backache is

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injury to the bones, ligaments or joints in the vicinity. Injury or dislocation of intervertebral disc. Causes for low back pain can be due to trauma, postural defect, degenerative, metabolic, obesity.

There are certain biomechanical and structural inadequacy of lumbosacral joint like maximum weight bearing on L5-S1 segment, centre of gravity passes through sacral, ligament, muscles, vascular supply around the joint.

Lumbar region has number of functions such as movement which occur at the joint, provide stability and protection to the lumbar region. In standing, the function of the lumbar is to support the upper body weight. Back pain can be localized to a specific point, diffuse-larger area, radicular and referred.

The distribution of weight of the bony structure from head to pelvis is significantly influenced by gravitational forces. The lumbar lordotic curve helps in reducing incidence of low back pain. The day to day activities insert excessive compression and shearing stress on the lumbar spine and also insert tensile stress on muscular and ligamentous structures. If there is increase in anterior tilting the shearing force also increases, the force diminishes with flattening of back. Hence the shearing stress is reduced as a result of protective spasm of extensors leading to flattening of lumbar curve following strain. Flexion at lumbar spine put maximum strain on the lumbar ligament.

There are several manual therapy techniques like McKenzie mobilization, positional release technique, muscle energy technique etc, and electrotherapy equipments like IFT, TENS, ultrasound etc helpful in improving pain and disability in subjects presenting with low back pain. The development of a manual therapy technique is in progress that will be used for management of low back ache which was earlier used for management of only neck and shoulder.

One of the manual therapy technique is Total Motion Release (TMR). This technique was invented by Tom-Dalonzo Baker. This technique is used to evaluate and treat the asymmetries present in the body. It is cost-effective and the patient does not require therapist assistance. The time taken for this technique is also less. In this technique treatment is given to unaffected side thus relieving symptoms of affected side. It is very simple technique in which patient is made to perform five motion they are: arm raise, trunk twist, leg raise, sit to stand and toe reach.

Methodology

It was A Pilot Study, 17 subjects were participated within the age group of 20-45 year on the basis of inclusion and exclusion criteria.

Patient diagnosed with non-specific low back with symptoms less than 3 week. participated in the study voluntarily.

Ethical clearance was obtained from the institutional ethical community before commencing the study. Informed consent was taken from the subjects. The outcome measures were assessed after and before the treatment. Visual Analogue Scale were taken for pain, Modified Oswestry Disability Questionnaire was used for disability score. Modified Schober’s scale was used for lumbar range.

Before the treatment subjects were asked to mark their pain on Visual Analogue Scale. Fill the Modified Oswestry Disability Questionnaire and Lumbar Range of Motion were taken.

After the assessment subjects were given Total Motion Release technique in combination with Hot Moist Pack for 45 minutes of 5 session daily.

Results

Statistical analysis was done by using statistical package of social science(SPSS) version 23 using paired t test. The Statistical analysis of pain on Visual Analogue Scale, Modified Oswestry Disability Questionnaire and Lumbar Range of Motion was carried out to find the degree of significance between them.

Table 1: Comparison of the pre and post values of Visual Analogue Scale:-

<table>
<thead>
<tr>
<th>Variable</th>
<th>PRETEST (SD)</th>
<th>Post Test (SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>1.67</td>
<td>1.36</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Mean difference=3.82, t value=17.857, p value=0.001(significant)
TABLE 2: Comparison of the pre and post values of Modified Oswestry Disability Questionnaire:-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretest (SD)</th>
<th>Post test (SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODQ</td>
<td>0.22±0.06</td>
<td>0.04±0.04</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Mean difference=0.18, t value=16.807, P value=0.001 (significant)

TABLE 3: Comparison of the pre and post values of Lumbar Range of Motion:-

<table>
<thead>
<tr>
<th>Lumbar Flexion</th>
<th>Pre test SD</th>
<th>Post test SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.18</td>
<td>1.11</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

Mean difference=0.91, t value=7.999, P value=0.001 (significant)

TABLE 4: Comparison of the pre and post values of Lumbar Range of Motion:-

<table>
<thead>
<tr>
<th>Lumbar Extension</th>
<th>Pre test SD</th>
<th>Post test SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.65</td>
<td>0.89</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

Mean difference=1.21, t value=8.120, P value=0.001 (significant)

TABLE 5: Comparison of the pre and post values of Lumbar Range of Motion:-

<table>
<thead>
<tr>
<th>Lumbar right lateral flexion</th>
<th>Pre test SD</th>
<th>Post test SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05</td>
<td>2.29</td>
<td>0.693</td>
<td></td>
</tr>
</tbody>
</table>

Mean difference=0.22, t value=0.403, P value=0.693 (non-significant)

TABLE 6: Comparison of the pre and post values of Lumbar Range of Motion:-

<table>
<thead>
<tr>
<th>Lumbar left lateral flexion</th>
<th>Pre test SD</th>
<th>Post test SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.58</td>
<td>2.31</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

Mean difference=7.86, t value=4.18, P value=0.001 (significant)

Discussion

Globally the Low Back Pain is one among the 10th leading cause of disease burden measured by disability adjusted life year and 2nd most common cause for pain reported after headache.3,5

The present study is conducted to check the effect of Total Motion Release technique on pain and disability in individuals with Acute Non-Specific Low Back Pain symptoms for less than 3 weeks using Visual Analogue Scale, Modified Oswestery Disability Questionnaire and Range of Motion using Modified Schober’s method. This study included 17 participants within the age group of 20-45 years who were given Total Motion Release in combination with Hot Moist Pack on a daily basis for 5 days.

The present study showed significant reduction in pain after giving the above intervention. The mean value of Visual Analogue Scale indicated changes post treatment and lower values for post-treatment outcomes and also the standard deviation shows the consistency with post treatment value which is less than the pre-treatment value. The correlation value also indicated significant association between the two variables since the test has revealed a strong relationship having 85.1% movement in same direction with at 5% significant level. Since there is paucity in literature suggesting the exact mechanism behind the pain reduction of untrained side, there is a future scope for research for knowing the exact mechanism behind it. There is no strong evidence suggesting the reason behind pain reduction on the affected side after giving treatment to unaffected side. Although there are evidences that suggest that there is strength improvement on the untrained extremity using contralateral exercise. Cross Education Phenomena helps improve the strength on the contralateral side by mechanism of motor irradiation from both
interhemispheric and ipsilateral corticospinal fibres and is majorly due to neural adaptation. Previous studies have concluded that joint and muscle proprioceptors get stimulated due to joint movement and isometric muscle contraction, in which the nociceptors afferents are blocked or inhibited at the dorsal of the spinal cord due to large diameter axons carrying mechanoreceptor afferents causing pain relief as a result of Gate control theory. Based on the above evidence there can be a strong relation of Total Motion Release on pain which is due to the coordinated movement and muscle contraction which might be activating the pain gate theory.

SD French et al in 2000 supported that application of heat wrap therapy helped in reducing pain and disability for a shorter period of time but when it was combined with exercises there was further improvement in function. This might be one more reason in reduction of pain as a present study included the combination of Hot Moist Pack and Total Motion Release. Hot moist pack are superficial heating modality. It causes local rise in temperature which results in increased circulation, relieving pain. It also makes skin supple and increases elasticity of connective tissue when combined with stretching. In the present study Hot Moist Pack was used hence it can be presumed that this might have been contributed in pain relief.

A study conducted on effectiveness of various osteopathic treatment approach on acute mechanical low back pain demonstrated that Positional release technique (PRT), Myofascial release (MFR), Muscle energy technique (MET) etc. were found to be effective in treating the subjects suffering from low back pain. Positional release technique (PRT) is a type of manual therapy used to improve Range Of Motion and reduce pain by maintaining the constant pressure on the tender point and the patient is made to maintain the position that is opposite to offending movement or position of comfort as a result of which there is inhibition of pain receptor thus relieving pain. TMR may also works on the above concept of movement mechanism which is given to relieve the pain on the affected side by given movement on unaffected side. Yet it is difficult to conclude the mechanism by which pain may reduce by giving movement on the unaffected side reduce the pain in affected side.

A study conducted on the initial effects of a Mulligan’s mobilization with movement technique on range of movement and pressure pain threshold in pain-limited shoulders conclude that Manual Therapy treatment is seen to have significant immediate effect on pain and Range of Motion.

A study done to compare the effect of total motion release and traditional warm up exercises to improve shoulder internal and external rotation range of motion in baseball players, showed that there was significant increase in bilateral internal and external rotation ranges in the group of subjects treated with total motion release. The researcher in this study also noticed that the time taken by the group treated with total motion release was lesser than the group treated with traditional warm up exercises. In current study the correlation value indicated significant association between the two variable since the test revealed strong relationship having 63.3% for lumbar flexion and 72.5% for lumbar extension in the same direction 5% significant level. This indicated that there was significant improvement in lumbar flexion and extension but in this current study did not show significant improvement in lumbar lateral flexion.

In the present study Modified Schober’s Method was used to assess the lumbar range of motion. Many studies have shown that this technique has better validity and reliability to assessing the lumbar Range of motion.

There was significant improvement in the functional ability in all the subjects as per Modified Oswestry Disability Questionnaire (MODQ) scoring. A study conducted on comparison of Modified Oswestry Disability Questionnaire and The Quebec Back Pain Disability Scale by Fritz and Irrgang concluded that the Modified Oswestry Disability Questionnaire has shown more reliability than Quebec Back Pain Disability Scale. The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less than the pre-treatment value. The correlation value also indicated significant association between the two variables since the test has revealed a strong relationship having 71.7% movement in the same direction with at 5% significance level (i.e. 0.001 < 0.05). On this basis it can be concluded that after giving Total Motion Release there was improvement in function disability caused as a result low back pain.
Conclusion

The pilot study conducted to know the effectiveness of Total Motion Release in combination with Hot Moist Pack on pain and disability on subjects with acute low back pain provided significant benefit in terms of pain relief and functional disability and also significant improvement in lumbar flexion and extension.

Limitation:

• Small Sample Size.
• Study was confined to nonspecific acute low back pain.
• Follow up effects were not monitored.

Future Scope:

• Conduct the study with large number of sample size.
• Conduct the study with specific condition.
• Conduct the study for chronic low back pain.
• Studies with longer duration are recommended with longer follow-up period to assess long term benefits.

Source of Funding : Self
Conflict of Interest : Nil

References

5. https://www.healthline.com/symptom/low-back-pain
12. www.totalmotionrelease.com
Effect of Cigarette Smoking on Neck Flexor and Extensor Endurance Capacity- A Pilot Study

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Abstract

Background and Objective: Weak neck muscles and decreased range of motion in the cervical region are some of the key factors associated with neck pain and disability. Cigarette smoking is known to cause health ailments affecting the cardiorespiratory system and additionally it is inclined to cause a damaging effect on skeletal structures as well, contemplating the destructive impact of smoking on muscles, we conducted a study with an objective to find the effect of smoking on neck flexor and extensor endurance capacity.

Methods: 24 healthy male participants were divided into smoking and non-smoking groups. The neck flexor and extensor endurance capacity was measured using the neck muscle endurance tests. The outcome parameters were compared between smokers and non-smoking group.

Result: The Cigarette smoking group showed significant reduction in neck flexor and extensor endurance as compared to the nonsmoking participants (p<0.05).

Conclusion: Endurance capacity of neck flexors and extensor muscles is reduced in participants who smoked as compared to those who did no smoke.

Keywords: Cigarette smoking, muscle strength, neck flexor and extensor endurance test.

Introduction

An extensive volume of information has been collected on the issues of tobacco and health around the world.1 According to world health organization, tobacco smoking leads to the premature death of approximately 6 million people over the world.2 Smoking is four times more in men than in women globally, and the deleterious substances present in tobacco products cause a variety of health diseases.3 Apart from involving the cardiopulmonary system, smoking is additionally known to cause skeletal muscle dysfunction as well. According to Degens H et al., there is a patho-physiological alteration in the skeletal muscles which hampers the contractile functioning of these muscles in smokers.4

Several studies have reported that weak neck muscle strength and endurance has been associated with neck pain and reduced mobility in the cervical region resulting in disability and smoking is one of the predisposing factor that affects muscles. Contemplating the adverse impacts of tobacco smoke on the musculoskeletal system, particularly the muscles, there is a need to know in the case of smoking causes any changes in the endurance capacity of neck muscles. We are not aware of any previous research that has investigated and predicted the endurance capacity of the neck flexors and extensor muscles among smokers and non-smokers. Hence the aim and objective of this study is find the effect of smoking on neck flexor and extensor endurance capacity.

Materials and Method

This study was conducted in the Physiotherapy Department of College of Applied Medical Sciences, University of Hail, Saudi Arabia. Ethical clearance was taken from the college of medicine in the university of Hail. 24 healthy male participants with a mean age of 21 years were included in the study. 12 participants with a history of smoking were allotted to group S and 12 non-smoking participants were included in group NS.
Assessment of the neck muscle endurance capacity with respect to flexors and extensors was evaluated by a blinded assessor utilizing the neck flexor and extensor endurance test.

The inclusion criteria of this study comprised of healthy male participants with or without a history of smoking.

Participants having positive Neuro-muscular signs (abnormalities on dermatomes myotomes and reflexes) in the neck and upper limb or systemic, muscular, connective tissue and cognitive disorders were excluded. Participants who had a history of cervical region injury in the last six months were also excluded from the study.

Procedure of the test

Neck Flexor Muscle Endurance Test (NFET test): NFME was tested with participant in supine position, he was then asked to tuck his chin maximally and preserve this isometric contraction amid the test. Presently, with the chin maximally tucked and maintained isometrically, the participant was then requested to lift his head and neck by roughly 2.5 cm over the plinth and maintain this head and chin position. During the test, oral commands such as “tuck your chin” or “hold your head up” were given till the participant could no longer hold it, the Holding time was recorded in seconds utilizing a stopwatch. The test would be discontinued, if he moved his head or if the head rested on the investigator’s hand for more than one second. The test was aborted if the skin folds opened up due to a loss of chin tuck, or if the participant indicated fatigue or pain.

Neck Extensor Endurance Test (NEET): This test was done with the participant in the prone position and arms by his side. The head was made to protrude off the plinth and supported on a stool that was put close to the head end of the plinth. The upper thoracic spine was stabilized with a therapy belt that was fastened and tightened over the T6 vertebral level. A 2 Kg’ weight was suspended from the headband fixed around the participant’s head which hung to just short of the floor. The test started when the participant was instructed to retract his chin and hold the head firm in level position while the stool support was gradually removed. The participant was encouraged to hold the test position for as long as possible and the endurance time was noted utilizing a stop watch. The test was discontinued if the participant failed to maintain his head in a stable horizontal position or if the suspended weight touched the floor. The test was ceased if the participant lost his chin tuck position for over three seconds or if he experienced pain and fatigue. After completion of this test, the participant was asked to rest in prone with his head supported for 1 minute and then to sit up. A single trial was done during each test in order to prevent neck pain or fatigue due to repeated testing and the hold time recording was measured in seconds. A minimum of 5-minute rest period was allowed between measurements.

Result

Comparison of parameters between smoking and nonsmoking subjects are summarized in table 1. A total of 24 men participated in the study and comparison of neck flexor and extensor endurance capacity between smoking and nonsmoking men were done. The mean age (mean±std dev) of the nonsmoking group was 21.4±0.51 and that of smoking was 21.5±0.52, there was no significant difference of age between the groups (p=0.31). Mann Whitney’s U test was done to evaluate the difference in endurance response for neck muscles between the groups. Among the participants, those who smoked had significantly lower neck flexor and extensor endurance capacity than those who did not smoke. The median scores of neck flexor endurance between Group NS and S were 44.6 seconds and 35.07 seconds respectively and there was significant difference between groups u=29, z=2.4, p<0.05. Similarly, the medians scores of Group NS and S were 189.9 seconds and 129 seconds respectively for the neck extensor endurance test and a significant difference was found between the groups u=36, z=2.04, p<0.05.

Table 1: Between groups differences for age and neck muscle endurance tests

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Non Smoking (Group NS)</th>
<th>Smoking (Group S)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean±SD)</td>
<td>21.4±0.51</td>
<td>21.5±0.52</td>
<td>0.31</td>
</tr>
<tr>
<td>NFET (sec) **</td>
<td>44.6</td>
<td>35.07</td>
<td>0.01</td>
</tr>
<tr>
<td>NEET(sec) **</td>
<td>189.9</td>
<td>129</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Differences between groups were analyzed with a Student unpaired t test*, Mann–Whitney U test** & Sig. p<0.05,
Discussion

The finding of this study reveals, a significant reduction in the neck muscle endurance capacity (NEET & NFET) in smokers as compared to the non-smoking individuals. Some of the studies have correlated the unpropitious effect of cigarette smoking on the muscle strength. Kumar and Kumar reported that, in comparison to the non-smoking athletes, cigarette smoking athletes between the age range of 19-30 years have significant decrease in strength and flexibility of muscles when evaluated by the Kraus-Webber fitness test. According to Kok et al, smoking is inversely related to knee muscle strength and in addition, 100 g of smoking a week reduced 2.9 % of knee muscle strength among males and 5.0% in women. So also, Saito et al in one of his study found that, smoking affects grip muscle strength in Japanese men.

According to Kruger et al, protein degradation in the skeletal muscle pathways of mice were found when they were exposed to smoke, in addition a time-dependent reduction in muscle mass, muscle cross-sectional area, and oxidative fibers were reported in these mouse model which were bared to smoke. As per Degens H, et al, the constituents of the cigarette smoke alongside systemic inflammatory mediators cause shrink in muscle mass due to enhancement in proteolysis and inhibition of protein synthesis. In addition, diminished skeletal muscle contractile endurance in smokers may result from impeded oxygen distribution to the mitochondria and capacity of the mitochondria to produce ATP because of inaction of carbon monoxide with myoglobin, hemoglobin, and other elements of the respiratory chain.

The inimical impact of tobacco smoke on muscle structure and its function may be the explanation behind the hampered neck flexor and extensor endurance capacity in this study. This review condenses the proof that, neck muscle endurance is significantly reduced in smokers when compared to the nonsmokers. In addition, the finding of this examination demonstrates an increase in the extensor endurance capacity as compared to the neck flexors was observed in both the groups.

Limitations of the study

Few of the important limitations in the present study must be recognized. The participants recruited for this study were limited to men and the sample size studied were less. Physical activity status, nutritional deficits and anthropometric measurements which influences the muscular skeletal structures were not taken into consideration. The cigarette packs per year was also not studied.

Scope of the study

The impact of acute and chronic smoking on the endurance capacity of the neck muscles in both the gender need to be analyzed separately.

In summary, this study surmises neck flexors and the extensors muscle endurance capacity relates with occasion of cigarette smoking. The endurance capacity of neck flexors and extensors is altogether decreased in smokers when contrasted with nonsmokers. To show this effect, further prospective studies on larger population is needed.

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References


Effective Treatment of Seborrheric Dermatitis

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Abstract

Today, anyone can get skin diseases, most typically seborrheic dermatitis. It is a fairly common disease and people can get sick, especially those with neurological diseases or have a weak immune system. We can limit our chances of getting sick and reducing our risk factors if we know how to use the method of timely prevention and suitable treatment. This is the disease that many patients have to suffer and try to seek for themselves a good place to treat. In addition to the new therapies, oriental one has been known as a savior of many pieces of life and have brought to bear this severe disease. The paper is based on recent journals as well as the survey data of 100 respondents who are living in some areas of Vietnam. During the time of February of 2019, this research was written and found out some great ways that can help to improve people’s health. From then on, some effective solutions have been recommended with the purpose to make our life a better place and to contribute to the development of the country.

Key-words: Prevention, Seboherric Dermatitis, OrientalTherapy

Introduction

Seborrheic dermatitis is a persistent disease and difficult to treat, often confused with other skin diseases such as contact dermatitis, allergy or psoriasis, etc. The lesions caused by dermatitis are constantly flaking and can cause hair loss. Newborns can spread to the whole body very badly. In addition to affecting aesthetics and quality of life, it greatly affects the psychology of patients. According Tames (2018), “the prevalence of seborrheic dermatitis among adults” in the general population is about 1-10%. It is rather common in men than in women and the causes still remain unknown.

Content

Definition of seborrheic dermatitis

Seborrheic dermatitis is a chronic scabby skin disorder that occurs in children and adults, in areas with many active sebaceous glands such as scalp, face, ears, upper body and folds. The disease is characterized by erythema and scab. The cause of seborrheic dermatitis is unknown, but due to many factors such as normal fungi living on our bodies, genes, stress, the health of each person and living people in a cold and dry climate.

It is a skin disease that causes our skin to dry, red, and scaly. The disease often affects the skin or oil secretions, most commonly in areas of the face, chest and back. However, in some cases, the disease may also occur in areas of thick and dry skin. This is a non-infectious disease that doesn’t affect your health too much, but it can affect our appearance and make us uncomfortable. Seborrheic dermatitis usually persists for a long time and requires persistent treatment, repeated many times to reduce.

Signs and symptoms of seborrheic dermatitis

Its signs and symptoms vary with age. For adults and young people, there is a slightly yellowish erythematous patch, covered by scaly scales and the scales are easily separated on the skin. It can be seen on the eyebrows, cheekbones, curly ears and folds after the outer ear, chest, etc. On the scalp, we often see something like dry dandruff, yellow and pink scales, and even in the beard. The patients may feel itching, especially in the scalp. For young children or infants, there are common dry scales on the scalp, with reddish-yellow patches covered with scales. Children may have something like that on facial, eyelid, nose and diaper areas (Fig 1).
In fact, dermatitis usually occurs slowly, does not happen abruptly, so many patients are unable to recognize that they have dermatitis until more severe symptoms appear. Early identification of symptoms of dermatitis through the following 4 signs.

First, redness increases on the skin in the shapes of yellow or white scales. Some types of scales are similar to dandruff, contain a lot of oil and stick to the skin. Second, patients clearly feel more oil on the skin than usual. They may feel itchy when scratching and experience bleeding. Third, the skin is very vulnerable, with patches on the inflamed skin. Fourth, when the weather becomes dry, the skin produces more sebum. The inflammation area can spread to other areas. For example, the forehead area between the eyebrows can spread to the eyebrows or hair, shedding eyebrows, hair loss.

Methods to support the treatment of dermatitis

In order to overcome the inflammation of oily dermatitis, patients can choose Western medicine methods, use folk tips or support treatment with Oriental medicine. Each method has certain advantages and disadvantages.

Treating oily dermatitis with Western medicine only resolves “the surface” of disease. With psychological desire to quickly eliminate symptoms, when suffering from dermatitis, many patients tend to look to the pharmacy. Accordingly, patients are often prescribed some drugs by the doctors. For oily dermatitis in the head, patients can use anti-fungal shampoo 2-3 times a week and it can be used for long-term maintenance. In severe cases, a mild anti-inflammatory solution or gel may be applied for 1-2 weeks. If the injury due to oil dermatitis in the face, patients can use anti-inflammatory cream or lotion and apply for 1-2 weeks. The advantage of this the treatment is quick and convenient. However, we cannot solve the causes of disease, but only support to remove external symptoms. When we stop using the drug, there is a high risk of recurrence. In addition, long-term use of topical anti-inflammatory drugs can cause side effects such as stretch marks, acne, vasodilation, skin atrophy, etc.

Treatment of dermatitis at home is also applied by some people even though the risk of infection from raw materials is not guaranteed. In the folk treasure circulated for generations, there have been benign, simple and easy-to-implement remedies that work for patients with acute dermatitis such as fresh lemon, aloe vera or honey. Using lemon peel in combination with white wine, alum, fresh turmeric and fine salt to create a mixture that can apply on face and inflamed skin. Using aloe vera gel to rub on lesions of dermatitis with the desire to cool the wound, even many people apply it many times a day. Then, using honey to mix with a little water to make face cream is said to reduce swelling and irritation. The first advantage is that the materials are easy to find, simple to implement, easy to apply, cheap. But, these folk remedies have not been verified, moreover, over time the disease has changed quite a lot, probably no longer suitable. Not to mention, time for results from folk tips is rather long.

Oriental medicine remedies often bring long-term effects, reducing the possibility of relapse. The remedies are studied and developed based on traditional medicine capable of overcoming the disadvantages of Western medicine is leaving no side effects. Accordingly, the remedy is prepared from more than 100 traditional remedies, a benign herbal medicine with clean herbal ingredients taken from herbal specialized areas across the country. Some ingredients are extracted from turmeric, enicus japonicus, betel nut, lophatherum gracile, etc. in order to make something like paste. It has effect of drainage, keratosis, scarring and reduce oil secretion, pore ventilation. It also helps to complete disappearance of symptoms of the disease (Fig 2).
The medication in which ingredients including honeysuckle, dandelion, sophora, origan, etc. is used to make in order to help inflammation, cool liver, enhance the detoxification function of the liver and eliminate kidney toxicity. The body completely eliminates the toxins will help prevent the disease for a long time.

**Methodology**

Thanks to the support of 100 respondents who are presently living in Vietnam, a survey was conducted online at https://surveynuts.com. Using the form of direct interview and method of completing questionnaires, the role of traditional therapy has clearly affirmed. The paper was also based on the collected data and knowledge of related journals.

**Results**

Some questions have been designed to help us understand the symptoms and causes of the disease that patients suffer from in order to find out effective solutions to prevent and treat it in a right way. When they get sick, they all find some therapies to cure. According to the result of question 2, the number of patients seeking treatment is rather equal since they chose either “go to hospital” or “use oriental therapy” (Table 1).

<table>
<thead>
<tr>
<th>Questions</th>
<th>The number of 100 respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>Very often</td>
</tr>
<tr>
<td>1. How often do you get seborrheic dermatitis?</td>
<td>15</td>
</tr>
<tr>
<td>2. When you have seborrheic dermatitis, what do you usually do?</td>
<td>Go to hospital</td>
</tr>
<tr>
<td></td>
<td>43</td>
</tr>
<tr>
<td>3. What do you think about treating seborrheic dermatitis by Western therapy?</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4. What do you think about treating seborrheic dermatitis by traditional therapy?</td>
<td>0</td>
</tr>
<tr>
<td>5. What do you think about treating seborrheic dermatitis by Oriental therapy?</td>
<td>Very good</td>
</tr>
<tr>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>

Responding to the third question, most patients expressed dissatisfaction with the modern method. Most respondents selected the option “Normal” (69%), while only 9% chose “Not good”, a few chose “Very good” or “Not good” in order with the ratio of 1% and 21%. This may take us into deep consideration why they have made their decision like that. When comparing the fourth question and the fifth question, it is clear that the patients still believe in oriental medicine.
And to clarify the reason why most patients chose Oriental therapy, two questions have been designed online with open-ended form, that is, they can answer according to their personal views. The first question is: “In your opinion, why did you choose Oriental therapy?” Most of the respondents think this therapy is much more effective than other medications.

And to better define why the patients chose the hospital and the modern method of treatment, the second question was mentioned: “Why did you choose a hospital for advanced treatment?”. Most of them think that they still feel reluctant to choose the most effective method. Some argue that they do not have a lot of authentic information and evidence about the level of trust in the oriental medicine method. Some said that they trusted the modern therapy since it takes a short time to treat the symptoms. Some information and research about this therapy also affect their choices.

**Solutions**

According to medical research, apple cider vinegar, coconut oil and aloe vera are the 3 most commonly used ingredients when treating seborrheic dermatitis.

First is tea tree oil since the minerals in tea tree oil have antibacterial, anti-inflammatory properties, which are good for treating seborrheic dermatitis. Tea tree oil should be diluted with coconut oil or olive oil to dilute the concentration before applying it to the affected skin. “Tea oil shampoo” is also a good way to treat and decrease the symptoms.

Second is olive oil. Patients can apply an adequate amount onto the palm of their hand, apply to the skin where seborrheic dermatitis appears, massage gently and leave for 1 hour. Then use a soft bristle brush to remove the dandruff scab, scaly skin on the head. Brush gently, thoroughly and then clean the skin with a dedicated shampoo as usual.

Third is coconut oil since it can be combined with many other oils such as strawberry oil, borage or pomegranate seed oil to reduce itching and redness symptoms. Special nutrients from coconut oil have antibacterial ability for skin.

Next is aloe vera due to its effectiveness. The anti-inflammatory properties of aloe vera are very high and this property is rather good for treating seborrheic dermatitis. The essence of aloe vera can prevent the disease from spreading more, reducing the effects of the disease.

Apple cider vinegar is also another choice. It is no stranger to many women, the use of apple cider vinegar is also known more than beauty and skin care. It helps with anti-inflammatory, softening of the skin, providing essential vitamins for the skin. It can be used to treat seborrheic dermatitis by washing your hair. Just rub the apple cider vinegar over your scalp, massage gently for 5 minutes and then rinse with water, persistently apply for a long time to see the results.

Besides, patients are also encouraged to eat plenty of suitable foods, drink 2 to 3 liters of water a day. They should limit eating something such as hot spicy food, greasy food, oil seeds (sesame, peanuts) or instant foods. They should also stop drinking beer, alcohol, coffee, tobacco and stimulants. “Dietary changes” are beneficial in the treatment and Tamer (2018) mentioned that patients should eat foods rich in vitamin B, salmon, vegetables and fruits.

One thing rather important is to do exercise regularly and gently. Patients should avoid dust and wind blowing directly into the affected area. They should not abuse the air-conditioned environment and avoid staying up late or working too hard.

**Conclusion**

In sum, the incidence of skin diseases in general, seborrheic dermatitis in particular has a high increasing trend in recent years. Until now, modern medicine has not been able to unify the cause of the discomforting disease. For people who suffer from this disease, the new studies mainly directly affect the areas of temporary relief and symptoms of temporary discomfort, but have not been able to fully cure the disease. Oriental remedy for treating this disease has really shown its high efficiency that patients should use for better health.

**Conflict of Interest:** People who are suffering from seborrheic dermatitis may be interested in this paper. They may find some good information from our work.

**Source of Funding:** The paper was completed with the support of our FPT University.

**Ethical Clearance:** We are ensuring the quality and integrity of our research. The ideas and opinions expressed in this paper are our effort. By writing this,
we surely respect the confidentiality and anonymity of our research respondents since they participated in our study voluntarily.

References


Why I Choose to Study Physiotherapy Course as My Career?  
An Asian Perspective

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Abstract

Background: physiotherapy profession plays a significant role in a health care team especially in planning rehabilitation regime and achieving maximum independency for the patient. Nevertheless, recent surveys reported unequal ratio between patient to physiotherapist which may potentially reduce the time taken for a patient to be treated or even the quality of treatment. Hence, the objective of the current study is to determine the factors and perception of Asian student towards physiotherapy career.

Methodology: This was a cross-sectional survey based on purposive sampling with 105 student participation. Ethical clearance was obtained prior to the study. Questionnaires were given to the physiotherapy students and then, the responses were analyzed.

Results: ‘Desire to help others’, ‘Opportunity to interact with other people’ and ‘Job availability’ have been the most influencing factors. In the perception analysis, ‘A help to society’, ‘Professional status’ and ‘Professional autonomy’ were chosen.

Conclusion: Our study finding suggests more proactive approach should be taken to increase the awareness of the public especially the parents, teachers, academic counsellors and media towards physiotherapy profession.

Keywords: physiotherapy student, physiotherapy course, physiotherapy career, health care

Introduction

Physiotherapist is one of the significant team player in a multidisciplinary health care team as they function in developing rehabilitation regime and reestablish one’s maximum movement capability and functional independency. According to the Charted Society of Physiotherapy, 2017, physiotherapists are those who assist and rehabilitate a wide variety of all ages people at any stage of life when movement and function affected by ageing, trauma, diseases, disorders, conditions or environmental factors. The role of physiotherapy consists of encouraging and educating health and wellbeing of every person and general public; reducing impairments, disabilities and functional dependency as well as rehabilitating and restore the movements, maximum function of daily living and improve the quality of every individual. ¹

In the recent years, physiotherapy has proven to be a significant health care need as there is a constant demands of physiotherapist supply and establishment of plenty physiotherapy schools in order to cope the demands. Evidently, the physiotherapy workforce has shown an increase from 46 000 in 2011 to 57 000 in Singapore, with increase of more than 55% were estimated from 2011 to 2020. ² In Malaysia, there is 2,281 physiotherapists with 1,425 of them in the government hospitals and settings while 856 are working in private hospitals. The Malaysian Health Ministry have reported that the current number of physiotherapists in Malaysia is significant lacking as the population of the country is emerging. Higher ratios of physiotherapist to patient in Malaysia with 1:13 000 is worrisome as each physiotherapist would have to manage an average of 15 to 20 patients in a day. Due to high number of patients to be treated, physiotherapist might not be able to treat the patient with more quality and holistic approach which may lead to reduction in rehabilitation effectiveness.

The factors that influence an individual to choose over the course to pursue or career pathways depends on multiple factors such as gender related jobs, salary, opportunities, family influences or even passion. In addition, the perception of the individual on a particular course also influences the choice of career. Nevertheless, this perception of the individual changes comparing
Many research has been conducted in countries all over the world about the factors and perception of student choosing physiotherapy. However, there is little to no research have been conducted among Asian physiotherapy students. According to the research by Kandasamy, 2012, culture differences, the health care system of a country or even country’s population highly influences the physiotherapy practices and profession development. Thus, the objective of the current study is to determine the factors and perceptions of Asian student in choosing Physiotherapy course as their career pathways.

Methodology

Study design

This is a cross sectional survey based on purposive sampling method to determine the factors and perception influencing Asian student when selecting to study the physiotherapy course. In this study, the purposive sampling method was used to reach out to the Asian students through the few contacted ones who are in the specific country to overcome the geological factor. For example, the survey link was sent to two respondents in Japan and they were asked to relay the link to others in their class or acquaintances who falls under the characteristics mentioned.

Participants

A total of 105 physiotherapist students, consist of 73 females (69.52%) and 32 males (30.48%) aged 17 to 26 participated in the study. Students in the current study participated from Asian country such as Malaysia, Japan, Indonesia, Taiwan, Hong Kong, Thailand, Korea, Philippines, Brunei, Pakistan, Singapore and India. The inclusion criteria for the current study is physiotherapy student aged between 16 to 26 years and currently pursing degree or diploma in Physiotherapy from Asian countries. Students with diploma who have worked as practicing physiotherapists before joining the degree, unable to speak or understand English or Bahasa Malaysia and double degree students were excluded from the current study. A detailed explanation was given to the participants and a digital consent was obtained prior the data collection. The participants were allowed to ask questions to further understand the study and participation was purely voluntary. The ethical clearance for the current study were obtained from INTI International University research committee.

Questionnaire

A questionnaire was constructed based on the previous similar research study by Mkondo, Mudzi, & Mbumbo. Pilot study was conducted prior to the study among 5 students to test the reliability and validity of the survey. The questionnaires consist of 3 parts; Part A – Demographic details, Part B – Factors influencing Asian physiotherapy students in choosing to study physiotherapy and Part C – Perceptions influencing Asian physiotherapy students in choosing to study physiotherapy. For part B and C, a 5 point Likert scale were used.

Data Analysis

The data were collected and analysed using the descriptive statistics. Analysis of the data were represented with frequencies and percentages. The results were displayed as pie charts and bar graphs using Microsoft Excel 2010.

Results

Totally 105 physiotherapy students participated in this study. Based on the demographic analysis, most of the respondents are 21 years old (27.62%). High number of participants were female with 69.52%. Majority participants were from Malaysia (62.86%) and high participants in the survey were from Year 3 Physiotherapy student with 38.10%.

From our current study findings, family members (31.43%) played the greatest role in relaying the idea of the course to the students followed by the media (21.9%) and through the academic counsellors (17.14%). “Received treatment from a physiotherapist” came in fourth at 14.29% whereas the method least experienced by the students was by having a trip to a physiotherapy centre (0.95%) (Figure 1).

Based on the factors that influences Asian physiotherapy student to take up the physiotherapy course, the most commonly choosed answers were “Desire to help others” (80.00%), “Opportunity to interact with other people” (70.48%) and “Job availability” (68.57%). These three factors were
indicated as “Extremely important” and “Very Important” by more than 60% of the responses. Factors such as “Professional status”, “Interest in sports and athletic injuries”, “Professional autonomy”, “Potential for good salary”, “Encouragement from parents”, “Prior to entrance in the medicine course” and “Always wanted to be a physiotherapist” came after the three top factors in a descending order (Figure 2).

Whereas in the survey analyzing the Perceptions Influencing Asian Physiotherapy Students in choosing to study physiotherapy, “A help to society” (75.24%), “Professional status” (53.16%) and “Professional autonomy” (54.29) were the top three perceptions of physiotherapy that influenced the Asian physiotherapy students while selecting the course. The participants had selected these perceptions as “Extremely relevant” and “Very relevant”. Perceptions “Involvement in sports and fitness team” and “Stepping stone for medical field” follows in a descending method (Figure 3).

Figure 4 shows the distribution of factors influencing the students to not continue physiotherapy as a career. From the survey, 68.75% of student have listed ‘Different interest’. Low salary, no professional autonomy, not professionally recognised and not respected by the multidisciplinary team is tied as the second most influential factors (31.25%). Low job availability secured as the third with 25% and the rest followed by ‘Too much work’, ‘Reduced patience’, ‘Lack of government support’ and ‘Long working hours’.

**Figure 1: Method of knowing the physiotherapy course**

**Figure 2: Factors Influencing Asian Physiotherapy Students in choosing to study physiotherapy**

**Figure 3: Perceptions Influencing Asian Physiotherapy Students in choosing to study physiotherapy**

**Figure 4: Factors influencing students to not continue physiotherapy as a career**

**Discussion**

The unequal ratio of patient to physiotherapist especially in Asian country conveys the need and demand for more physiotherapist graduates. Based on the current study findings, 31.43% have shown that the bigger influence in deciding which course to embark decided based on the family member suggestions. This finding is similar to previous studies on the choice of career by undergraduate highly linked with the influence of family members especially the parents in decision making of career choice and occupational expectations.
Media has gained second place with 21.9% with the emerging use of internet among the youth these days. These students are more exposed to the recent updates, trends and the job demands which might highly influence the career choice. Comparably, another study examining the relationship between exposure of media and career preferences have shown a significant result. Academic counsellors also play an important role in advising and helping the students to choose the best career to suit them. In the current study, 17.14% of students have chosen their choice of career based on the recommendations and suggestion from the academic counsellor. In another study that examine the factors influencing the choice of nursing profession among the Hong Kong school students, academic counsellors have been said to be the major influencing factors. The findings above suggest that it is important for parents, mass media and academic counsellor to take a huge role in prompting and advising the best career for the students. More education and awareness on the physiotherapy profession among the public and social media might be an eye opener for many to choose and persuade physiotherapy as choice of their career.

In the survey to understand the factors influencing Asian physiotherapy students to take up the course, “Desire to help others” (80.00%), “Opportunity to interact with other people” (70.48%) and “Job availability” (68.57%) were identified as the top reason. In the survey conducted by Mkondo, Mudzi & Mbambo, 2007 among Zimbabwe students in choosing physiotherapy career, 68% responded to “The results I obtained at A-Levels”, 67% of them selected “Job availability” while 60% of them selected “Desire to help others”. In the analysis on the level of importance of the factors individually for the Zimbabwe students, “Desire to help others” was listed as third most important factor while for the Asian students, that factor came up as the first. The first two factors influencing the Asian students’ choice (“Desire to help others” and “Opportunity to interact with other people”) are well correlated as the Asian students want to help others while also being keen in interacting with them. This can be seen as an opposite to the Zimbabwe students as factor “Opportunity to interact with other people” was oddly placed ninth while “Desire to help others” was placed third. The only explanation given was that they Zimbabwe students were only interested in helping those who were ill to get better. “Job availability” have been another top factor in influencing the course selection for both the Asian and Zimbabwe. Job security have been a definite concern especially with the increase of living cost in Asia. The availability of the demand and market for the growth of the physiotherapy profession unquestionably influence the choice of career and future planning.

Based on the perception analysis towards physiotherapy among the Asian physiotherapy high number participants, 75.24%, chose “A help to society”, followed by ‘Professional status’ with 56.19% and ‘Professional autonomy’ with 54.29%. The findings of the current study were similar with previous study that reported that students chose physiotherapy course due to the ‘Caring for patients’, ‘Job availability’, ‘Variety in work content’ and ‘High levels of team work’. The current study also suggested that to increase the number of students to uptake the physiotherapy course, larger publicity about the physiotherapy career, improved staffing levels, better working environments and increased work flexibility are required. With these, more number of students will be exposed to the physiotherapy profession as well as be an eye opener of the importance and need of physiotherapy in medical especially in rehabilitation areas.

As the survey was also conducted to analyse the factors that might influence the students not to continue physiotherapy as a career upon graduating, Figure 10 shows the distribution of factors influencing the students to not continue physiotherapy as a career, a high percentage of 68.75% choosed “Different interest” as the major factor. Low salary, no professional autonomy, not professionally recognised and not respected by the multidisciplinary team is tied as the second most influential factors (31.25%). The reason could be possibly due to the tradition of referrals from the doctors are still being enforced as physiotherapist lose the autonomy and freedom in choosing the best treatment for the patient and indirectly, this leads to the dependency upon the doctors. We also deduced that low salary have also contributed to the students not pursuing the physiotherapy career. Perhaps, the Physiotherapy Association or bodies should take more role in creating a healthy working environment for the physiotherapist with profession autonomy and more freedom in planning the treatment plan for the patient. Necessary salary review and adjustment could also have been done in order to standardize the salary range especially among the young graduates and create more interest among the
students to join the physiotherapy profession.

**Conclusion**

The study findings show that there is need to increase the interest of the students to the physiotherapy profession. Proactive measures such as awareness on physiotherapy profession, introducing and sharing knowledge about the profession to parents and academic counsellors, creating more write ups and journal on the importance of physiotherapy profession in acknowledging the need of physiotherapy especially in the multidisciplinary team should be more efficient.

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Influence of Duration of Caregiving on the Burden and Quality of Life of Informal Caregivers of Stroke Survivors

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Abstract

Introduction: Providing care to stroke survivors takes a huge toll on caregivers, both physically and emotionally. This study evaluated the influence of duration of caregiving on the burden and Quality of Life (QOL) of informal caregivers (CGs) of stroke survivors.

Material and Method: The cross-sectional survey study recruited 100 consenting stroke survivors and their CGs using purposive sampling technique. Caregiving duration and daily caregiving hours were assessed using data capture form. Burden and QOL were assessed with Zarit burden interview and WHOQOL BREF respectively. Data were analysed with Chi-square and Kruskal-Wallis as tests of associations and differences between variables respectively using SPSS version 20 at p=0.05 alpha.

Findings: The CGs comprised 56(56%) females and 44(44%) males with mean age of 31.73± 12. About 31% of the CGs had mild burden while 53% had good QOL. Significant association exist between daily caregiving hours and each of CGs QOL (X²=14.716; P=0.003) and burden (X²=18.23; P=0.003). There were significant differences in the QOL and Burden of CGs based on the daily hours of caregiving (P<0.05) but not based on caregiving duration (P>0.05).

Conclusion: Stroke CGs who perform caregiving tasks for twelve or more daily caregiving hours are likely to experience enormous burden and deterioration of their QOL. But duration of caregiving in months or years has no significant influence on the burden and QOL of CGs.

Keywords: stroke, caregiving, duration, daily hours, caregiver, burden, quality of life.

Introduction

The participation of informal caregivers (CGs) in the provision of care to stroke survivors helps in achieving rehabilitation goals.¹ Caring for stroke survivors can be very challenging to the CGs both physically and psychologically,¹² and this has made CGs to experience severe burden with deterioration of their Quality of Life (QOL).¹³,4,5,6,7,8,9 Most of the times, CGs are placed under undue to pressure to provide constant care to stroke patients which may be far beyond what they can cope.¹⁰ A recent review has revealed that most stroke CGs experienced severe burden with associated reduction in their QOL.¹¹ Duration of caregiving is one factor that has gain considerable attention over the years as a potential source of severe burden to CGs.⁴,6,7,9,¹¹ Duration of caregiving is comprised basically of 2 major components, the daily hours of providing care,⁵,6,7,⁹ and the total duration of caregiving [in weeks, months and years].⁷,¹¹ Outcomes of studies have consistently shown that increase in daily caregiving hours was associated with severe CGs burden,³,⁴,6,⁷ and deterioration of CGs QOL.¹²,¹³ Interestingly, however, there is insufficient

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information and a confusion concerning influence of total duration of caregiving on the burden and QOL of the CGs. Elsewhere, a study has reported that duration of caregiving was not associated with CG burden. Other studies gave conflicting reports on the influence of stroke duration on CG burden. Further research is therefore required to give more information on the possible connection between caregiving duration and each of CG burden and QOL.

Material and Method

The cross-sectional survey study recruited stroke survivors and their CGs from the out-patient physiotherapy departments of Aminu Kano Teaching Hospital (AKTH) and Murtala Muhammad Specialist Hospital (MMSH) and Muhammad Abdullahi Wase Specialist Hospitals (MAWSH). Included in the study are CGs who are directly involved in giving informal care to the stroke survivors. All paid CGs (e.g. house help) were excluded from the study.

Data collection procedure

Ethical approval was sought and obtained from ethical committees of AKTH (NHREC/12/08/2008/ AKTH/EC/2028) and Kano state ministry of health for MMSH and MAWSH (ref: MOH/OFF/797/T.1/727). The consents of participants were sought and obtained.

Assessment of caregiving duration

For the purpose this study, duration of caregiving was categorized as follows

- Less than six (6) months
- Six (6) -12 months
- Greater than 12 months

Furthermore, the daily caregiving hours was categorized as follows

- Less than six (6) hours
- Six (6) -12 hours
- Greater than 12 hours

Burden was assessed with Zarit Burden Interview which contained 22 items and each item was scored on a 5-point Likert scale from 0= ‘never’ to 4= ‘nearly always’. The total score ranged from 0 to 88. Scores were also categorized as follows: 0-20 = little or no burden, 21-40 = mild to moderate burden, 41-60 = moderate to severe burden, 61-88 = severe burden.

QOL was assessed with WHOQOL BREF. The 26 items on the instrument were scored from 1 to 5 with the exception of questions Q3, Q4 and Q26 that are reverse coded. The raw scores of all the items of a domain were then summed up to obtain a domain raw score. The mean score of each domain was then obtained (lowest = 1 and highest = 5). Each mean domain score was transformed to range of 4-20 by multiplying it by 4. On the transformation table, the QOL score (0-100) corresponds with the raw domain score and the transformed mean domain score. The overall QOL of each CG was obtained as the average of 4 domain scores (0-100) with higher scores indicating better QOL. The overall QOL score was also categorized for the purpose of analysis into poor, average and good.

Data analysis

Kruskal Wallis analysis was used to find the differences in burden and QOL among the 3 categories of caregiving durations and daily caregiving hours. Post hoc analysis was done using Mann-Whitney u test. Chi-square/fisher’s exact tests assessed association between Burden/QOL and each of ‘duration of caregiving’ and ‘daily caregiving hours’. All statistical analyses were conducted with SPSS version 20.0 at alpha level of 0.05.

Findings

Characteristics of stroke CGs

A total of 100 CGs took part in this study, 56(56%) females and 44(44%) males. Their mean age was 31.73±12(Confidence interval [CI] =29.35-34years), age range 17years - 70 years. Thirty seven of CGs had tertiary education and 38% are daughters of the stroke survivors as presented in Table 1.

Table 1: Characteristics of CGs

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>FREQUENCY (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Femal</td>
<td>56(56)</td>
</tr>
<tr>
<td>Male</td>
<td>44(44)</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>10(10)</td>
</tr>
<tr>
<td>Secondary</td>
<td>33(33)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>37(37)</td>
</tr>
<tr>
<td>None</td>
<td>20(20)</td>
</tr>
<tr>
<td>Relationship</td>
<td></td>
</tr>
</tbody>
</table>
Characteristics of stroke survivors

One hundred stroke survivors participated in this study, 42(42%) males and 58(58%) females. Their mean age was 60.23 years, age range 30-100 years. Fifty 53 (53%) were unemployed, 45 (45%) had informal education, and 59 (59%) had stroke for more than 1 year as presented in table 2. In Table 3, majority of the CGs gave direct care to the stroke survivors’ for the sake of uniformity. 60% of the CGs helped to bath them, 82% transport them to the hospital, 71% help them with their home exercises.

Levels of CG burden

In this study 31% of the CGs experienced little burden, 31% had mild burden, 27% had moderate burden and about 11% had severe burden. When the raw burden scores were analyzed, the mean score was 35.07±22.13, (95% CI 30.68-39.46).

Levels of CG QOL

This study found that 10% of the CGs had poor QOL, 37% average QOL, and 53% had good QOL. When the raw (uncategorized) scores of QOL was analysed, mean score was 69.60 ± 14.92, (95% CI: 66.6-72.6) range 32.75-100.

Cont... Table 1: Characteristics of CGs

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>FREQUENCY (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wife</td>
<td>1(1)</td>
</tr>
<tr>
<td>Husband</td>
<td>6(6)</td>
</tr>
<tr>
<td>Brother</td>
<td>4(4)</td>
</tr>
<tr>
<td>Sister</td>
<td>6(6)</td>
</tr>
<tr>
<td>Son</td>
<td>25(25)</td>
</tr>
<tr>
<td>Daughter</td>
<td>38(38)</td>
</tr>
<tr>
<td>Father</td>
<td>0</td>
</tr>
<tr>
<td>Mother</td>
<td>4(4)</td>
</tr>
<tr>
<td>Other</td>
<td>15(15)</td>
</tr>
</tbody>
</table>

% = percent

Table 2: Characteristics of stroke survivors

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>FREQUENCY (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42(42)</td>
</tr>
<tr>
<td>Female</td>
<td>58(58)</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>9(9)</td>
</tr>
<tr>
<td>Secondary</td>
<td>18(18)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>27(27)</td>
</tr>
<tr>
<td>Informal</td>
<td>45(45)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
</tr>
<tr>
<td>Civil servant</td>
<td>27(27)</td>
</tr>
<tr>
<td>Self employed</td>
<td>20(20)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>53(53)</td>
</tr>
<tr>
<td>Stroke duration</td>
<td></td>
</tr>
<tr>
<td>Less than 6 month</td>
<td>29(29)</td>
</tr>
<tr>
<td>6-1 year</td>
<td>12(12)</td>
</tr>
<tr>
<td>Greater than 1 year</td>
<td>59(59)</td>
</tr>
</tbody>
</table>

% = percent

Table 3: Direct and indirect care to patient

<table>
<thead>
<tr>
<th>Caregiving tasks</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct care of patient</td>
<td>N(%)</td>
<td>N(%)</td>
</tr>
<tr>
<td>Bathing</td>
<td>60(60)</td>
<td>40(40)</td>
</tr>
<tr>
<td>Dressing</td>
<td>59(59)</td>
<td>41(41)</td>
</tr>
<tr>
<td>Feeding</td>
<td>43(43)</td>
<td>57(57)</td>
</tr>
<tr>
<td>Grooming</td>
<td>50(50)</td>
<td>50(50)</td>
</tr>
<tr>
<td>Lifting</td>
<td>49(49)</td>
<td>51(51)</td>
</tr>
<tr>
<td>Transfer</td>
<td>55(55)</td>
<td>45(45)</td>
</tr>
<tr>
<td>Help with toilet</td>
<td>57(57)</td>
<td>43(43)</td>
</tr>
<tr>
<td>Giving medication</td>
<td>66(66)</td>
<td>34(34)</td>
</tr>
<tr>
<td>Help with home exercise</td>
<td>79(79)</td>
<td>21(21)</td>
</tr>
<tr>
<td>Transport to hospital</td>
<td>82(82)</td>
<td>18(18)</td>
</tr>
<tr>
<td>Moving around house</td>
<td>55(55)</td>
<td>45(45)</td>
</tr>
</tbody>
</table>

Indirect care of patient

<table>
<thead>
<tr>
<th>Caregiving tasks</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running errands</td>
<td>46(46)</td>
<td>54(54)</td>
</tr>
<tr>
<td>Increase chores</td>
<td>60(60)</td>
<td>40(40)</td>
</tr>
<tr>
<td>Financial support</td>
<td>39(39)</td>
<td>61(61)</td>
</tr>
<tr>
<td>Keeping company</td>
<td>91(91)</td>
<td>9(9)</td>
</tr>
<tr>
<td>Emotional support</td>
<td>92(92)</td>
<td>8(8)</td>
</tr>
</tbody>
</table>
Association between caregiving hours/duration and each of burden and QOL

Table 4 showed significant association between daily caregiving hours and each of CGs QOL ($X^2=14.716; P=0.003$) and burden ($X^2=18.23; P=0.003$). But there was no significant association between duration of caregiving and each of the burden and QOL of the CGs ($P>0.05$).

In table 5, there was significant difference in the QOL of CGs based on daily hours of caregiving ($X^2=7.96; P=0.019$). Post hoc analysis with Man-Whitney U test found that CGs who spent more than 12 daily hours suffered significantly worse QOL when compared with those who spent less than 6 hours ($U=671. P=0.036$) and those that spent between 6-12 daily caregiving hours ($U=134, P=0.015$). But there was no significant difference in QOL between CGs who spend less than 6 daily hours and those that spent between 6-12hours ($U=238.500, P=0.195$).

Kruskal - Wallis test showed that difference exist in the amount of burden experienced by CGs based on the 3 categories of daily caregiving hours spent ($X^2 =10.347; P=0.006$). Post hoc analysis with Man-Whitney U test found that CGs who spent greater than 12 hours experienced significantly greater burden when compared with CGs who spent less than 6 daily hours ($U=550.5, P=0.002$). But there was no significant difference in caregiving burden between CGs who spend less than 6 daily hours and those that spent between 6-12hours ($U=290.5, P=0.705$); And between 6-12 caregiving hours and greater than 12 caregiving hours ($U=164.500, P=0.07$).

Table 4: Association between caregiving duration and each of CG QOL and burden

<table>
<thead>
<tr>
<th>Caregiving Duration</th>
<th>QOL categories</th>
<th>X²/fishers</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Average</td>
<td>Good</td>
</tr>
<tr>
<td>Less than 6 month</td>
<td>4</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>6 month-1 year</td>
<td>2</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Greater than 1 year</td>
<td>4</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Daily Caregiving Hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 6hrs</td>
<td>1</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>6-12hrs</td>
<td>1</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Greater than 12hrs</td>
<td>8</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Caregiving Duration</th>
<th>CG Burden Categories</th>
<th>X²/fishers</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Little Burden</td>
<td>Mild Burden</td>
<td>Moderate Burden</td>
</tr>
<tr>
<td>Less than 6 month</td>
<td>15</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>6 month-1 year</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Greater than 1 year</td>
<td>10</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Daily Caregiving Hrs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 6hrs</td>
<td>21</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>6-12hrs</td>
<td>4</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Greater than 12hrs</td>
<td>5</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>

*significant, Hrs= Hours, Fisher=fishers exact test
Table 5: Kruskal-Wallis Test for differences in QOL of CGs based on duration and daily hours of caregiving

<table>
<thead>
<tr>
<th>Caregiving Duration</th>
<th>N</th>
<th>Mean Rank QOL score</th>
<th>X^2</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6 month</td>
<td>45</td>
<td>55.13</td>
<td>2.095</td>
<td>0.35</td>
</tr>
<tr>
<td>6 month-1 year</td>
<td>19</td>
<td>46.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than 1 year</td>
<td>36</td>
<td>46.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Caregiving Hrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 6 hours</td>
<td>48</td>
<td>53.49</td>
<td>7.96</td>
<td>0.019*</td>
</tr>
<tr>
<td>6 hours-12 hours</td>
<td>14</td>
<td>64.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than 12 hrs</td>
<td>38</td>
<td>40.68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Caregiving Duration</th>
<th>N</th>
<th>Mean Rank Burden score</th>
<th>X^2</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6 month</td>
<td>45</td>
<td>51.87</td>
<td>0.185</td>
<td>0.912</td>
</tr>
<tr>
<td>6 month-1 year</td>
<td>19</td>
<td>49.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than 1 year</td>
<td>36</td>
<td>49.22</td>
<td></td>
<td></td>
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<tr>
<td>Daily Caregiving Hrs</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Less than 6 hours</td>
<td>48</td>
<td>42.02</td>
<td>10.347</td>
<td>*0.006</td>
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<td>6 hours-12 hours</td>
<td>14</td>
<td>45.31</td>
<td></td>
<td></td>
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<tr>
<td>Greater than 12 hrs</td>
<td>38</td>
<td>61.68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*significant, Hrs=Hours, N=frequency

Discussion

This study found that most the CGs experienced mild to moderate burden. This implies that the participants in this study were not overwhelmed by the burden of providing care to the stroke survivors. The possible reason for the outcome above could be due to the fact that most of the CGs are young, educated and children of the stroke survivors. These mentioned factors may have helped the CGs in this study to cope better with caregiving burden.

In the same vein, it is observed in this study that majority of the CGs had good QOL. The possible reason for the high levels of QOL in most of the CGs could be because most of the stroke survivors in this study had their strokes more than 1 year ago and it is possible that many of them are now independent in some activities of daily living and walking function which may reduce the burden of care that could have been placed on their CGs. It could also be due the low levels of burden experienced by most of the CGs.

This study found significant association between daily caregiving hours and CGs QOL. It was further observed that CGs who spent more than 12 daily caregiving hours suffered significantly worse qualities of life when compared with those who spent less than 6 daily hours and those that spent between 6-12 daily caregiving hours. The implication of this finding is that CGs who engaged in doing direct caregiving tasks for 12 daily hours or more, every day, are more likely to have reduced QOL. This outcome is in line with findings of previous researches in which increase in daily caregiving hours leads to deterioration of CGs QOL.12,13

In addition, significant association exists between daily caregiving hours and CGs burden. It was further observed that significant difference exists between the burden experienced by the CGs who spend less than 6 daily hours and those that spent more than 12 daily
caregiving hours. The implication of this finding is that only CGs who spent more than 12 daily caregiving hours are likely to experience significant caregiving burden. This is probably one of the reasons why most of the CGs in this study experienced mild to moderate caregiving burden because majority of them spent less than 6 daily caregiving hours. This outcome is in line with the results of many studies in which increase in daily caregiving hours was found to be associated with severe CGs burden.3,4,6,7

It was finally observed in this study that duration of caregiving (months and years) was neither associated with the burden nor with the QOL of the CGs. It was further observed that there was no significant difference in the burden experienced or the QOL of CGs based on the duration of caregiving. The implication of this finding is that spending shorter or lengthier duration (in months or years) in the provision of informal care to stroke survivors is not likely to produce any significant influence in the burden experienced by the CGs and or on their QOL. A study 7 also found that total duration of caregiving was not related to the degree of CGs burden. Based on the outcome of this study, it is now clear that duration of caregiving for stroke survivors has no significant influence on either of the burden or QOL of the CGs.

**Conclusion**

Stroke CGs who perform direct caregiving tasks for twelve or more hours daily are likely to experience enormous burden and deterioration of QOL. CG’s education should incorporate the need for CGs to include frequent rest between the daily caregiving tasks or to seek for more helping hands in order to reduce strain on themselves.

**Conflict of Interest :** The entire authors have no conflict of interest to declare

**Source of Funding :** This study did not receive any funding from either public or private institutions.

**References**

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Effects of Positions of Pressure Biofeedback Unit on Lumbopelvic Rotation during Prone Hip Medial Rotation

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Abstract

Background: Previous studies demonstrated that feedback tool using a pressure biofeedback unit (PBU) decreased uncontrolled lumbopelvic movements such as anterior or lateral pelvic tilt during lower limb movements.

Objective: The aim of this study is to compare the amounts of lumbopelvic rotation (LPR) and HMR before start of LPR during prone hip medial rotation (HMR) according to position of PBU in people with lower back pain.

Method: Sixteen subjects with lower back pain performed the prone HMR in each condition as follows; 1) without PBU (WPBU), 2) with PBU under the center of lumbopelvic region (CLPR), and 3) with PBU under the side of lumbopelvic region (SLPR). A 3-dimensional motion-analysis system with six cameras was used to measure the angle of LPR and HMR before start of LPR during prone HMR. Dependent variables were collected three times during prone HMR in each condition.

Results: The results showed significant differences among the three conditions in the angles of LPR and HMR before start of LPR (p < 0.05). The results of the post hoc test showed significantly less angle of LPR under CLPR and SLPR conditions than under WPBU condition (p < 0.016). The angle of HMR before start of LPR was significantly greater in SLPR than WPBU condition (p < 0.016).

Conclusion: When PBU are used to control the lumbopelvic movement, clinicians must select which position of PBU is most effective for decreasing the uncontrolled lumbopelvic movement according to the type of limb movement and the movement plane of lumbopelvic region.

Keywords: feedback, hip medial rotation, lower back pain, lower limb movement, lumbopelvic motion.

Introduction

Impaired lumbopelvic motion associated with limb movement may be defined as early or excessive motion in specific-direction of lumbopelvic region.¹ Repeated uncontrolled lumbopelvic motions (ULM) during functional activities causes accumulation of the tissue stress in specific lumbopeelvic region and eventually lower back pain (LBP) symptoms.² ⁴ In some studies, people with LBP demonstrated earlier and greater lumbopeelvic motion and increase symptoms compared to people without LBP during lower limb movement.⁵ ⁶ Also, when ULM pattern is modified, people report a decrease in LBP symptoms during lower limb movement.⁷ ⁹ Thus, an individualized training program for people with LBP to minimize ULM during lower limb movements that are associated with symptoms is a key concept to interventions based on the movement system impairment model.¹⁰ In particular, Because of
the anatomical proximity and interconnections of the hip and lumbopelvic region, a number of researchers have been interested in the relationship between rotation movement of hip and LBP. In previous studies, when active hip medial or lateral rotation in prone position causes increased LBP symptoms, restricting lumbopelvic motion through various methods (eg. tactile feedback by therapist or patient’s hand and verbal cue) decreased symptoms in most of people with LBP.

In previous studies, when active hip medial or lateral rotation in prone position causes increased LBP symptoms, restricting lumbopelvic motion through various methods (eg. tactile feedback by therapist or patient’s hand and verbal cue) decreased symptoms in most of people with LBP.

A pressure biofeedback unit (PBU) commonly has been used in clinical practice to provide a feedback lumbopelvic stabilization exercises during various lower limb movements. The unit consists of an inflatable air bag connected to a pressure gauge by a catheter. When it is placed beneath the body segments, changes in body position are reflected in changes of pressure. This provides feedback to control the unwanted lumbopelvic movement during stabilizing exercise with lower limb movements. In previous studies, researchers demonstrated that feedback tool using a PBU decreased ULM in sagittal or frontal plane (eg, anterior or lateral pelvic tilt) during lower limb movements. However, there was no study to determine the effectiveness of feedback tool using PBU on lumbopelvic movement in transverse plane during prone hip medial rotation (HMR) in people with LBP.

Usually, ULM in sagittal or frontal plane during lower limb movements could be decrease by maintaining the constant pressure of a PBU with located beneath middle of lumbopelvic region. However, ULM in transverse plane during lower limb movements may not be able to control using a PBU located beneath middle of lumbopelvic region. Connerford and Motttram recommended visual feedback using two PBU or a PBU and folded towel on the other side of the spine to manage ULM in the transverse plane during lowering the bent leg out to the side in supine position. Koh et al. suggested that maintaining the pressure of PBU placing the air bag on a posterior-lateral lumbopelvic region against wall may be more effective than placing under the lateral lumbopelvic region during clam exercise (CE) in the side-lying position. Although different methods using a PBU according to position of lower limb movement were suggested in order to control the ULM in transverse plane during lower limb movement, there was no study to compare the lumbopelvic movement in transverse plane during prone hip medial rotation (HMR) according to the position of a PBU. Thus, the purpose of this investigation is to compare the amount of lumbopelvic rotation (LPR) and HMR before start of LPR, during prone HMR according to position of PBU in people with LBP.

Method

Participants

The 16 subjects with LBP (female: 8, male: 8) participated in this study. Each participant with LBP was recruited via bulletin board on hallway at the university. The inclusion criteria were to be over 15% of Oswestry Disability Index and reported chronic or recurrent LBP of more than 12 months. Subjects were excluded from this study if they reported having a disc herniation, spinal fracture or surgery, and a hip pathology. After Subjects listened to explanations about experimental procedures, all provided informed consent. The Institutional Review Board (IRB) at Joongbu University approved all procedures in this study. The characteristics of participants with LBP were represented in Table 1.

Instruments

We used a 3-dimensional motion-analysis system with six cameras (BTS Smart-DX500, Milan, Italy) to measure the angle of LPR and HMR before start of LPR during prone HMR. Kinematic data were analyzed using motion-capture software (BTS SMART-Analyzer, Milan, Italy). A PBU (Stabilizer Pressure Biofeedback unit, Chattanooga Group Inc, Hixson, TN, USA), consisting of an inflatable air bag connected to a pressure gauge, was used to provide feedback to control the lumbopelvic movement during prone HMR. The 16 subjects with LBP (female: 8, male: 8) participated in this study. Each participant with LBP was recruited via bulletin board on hallway at the university. The inclusion criteria were to be over 15% of Oswestry Disability Index and reported chronic or recurrent LBP of more than 12 months. Subjects were excluded from this study if they reported having a disc herniation, spinal fracture or surgery, and a hip pathology. After Subjects listened to explanations about experimental procedures, all provided informed consent. The Institutional Review Board (IRB) at Joongbu University approved all procedures in this study. The characteristics of participants with LBP were represented in Table 1.

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We used a 3-dimensional motion-analysis system with six cameras (BTS Smart-DX500, Milan, Italy) to measure the angle of LPR and HMR before start of LPR during prone HMR. Kinematic data were analyzed using motion-capture software (BTS SMART-Analyzer, Milan, Italy). A PBU (Stabilizer Pressure Biofeedback unit, Chattanooga Group Inc, Hixson, TN, USA), consisting of an inflatable air bag connected to a pressure gauge, was used to provide feedback to control the lumbopelvic movement during prone HMR.

Procedures

We explained and demonstrated the prone HMR in each condition as follows; 1) without PBU, 2) with PBU under the center of lumbopelvic region (CLPR), and 3) with PBU under the side of lumbopelvic region (SLPR). Then, subjects practiced each condition for 5 min for familiarization. After familiarization of prone HMR in each condition, six reflective markers were placed on right and left posterior superior iliac spine (PSIS), floor mat 30 cm away from the PSIS in side of testing lower limb, fibular head, lateral malleolus, and floor mat 30 cm away from fibular head. The subjects were asked to position in prone with knee flexed approximately 90 degrees with hip in neutral rotation and without adduction/adduction in tested lower
limb. For prone HMR without PBU, subjects were asked to rotate medially their hip so to bring their foot away from midline as far as possible, and then return it to the starting position (Figure 1A). Subjects were allotted 10 seconds to complete these movements at a self-selected. For prone HMR with PBU under CLPR, an air-bag of PBU was placed under the abdomen (centered about the umbilicus). The PBU was inflated until the base pressure reached 40 mm Hg in prone position with the knees flexed at 90°. And the subject monitored this pressure during prone HMR to ensure that it remained 40 mm Hg as possible as he or she could (Figure 1B). For prone HMR with PBU under SLPR, an air-bag of PBU was placed under one side of the lumbopelvic region and a folded towel was placed on the other side. Then, the PBU was inflated until the base pressure reached 40 mm Hg in prone position with the knees flexed at 90°. And the subject monitored this pressure during prone HMR to ensure that it remained 40 mm Hg as possible as he or she could (Figure 1C).

The order of condition was counterbalanced to control for fatigue or learning effect. The prone HMR in each condition was performed three times with 30-s resting intervals. To avoid fatigue or learning effect, the participants were given a 5-min rest periods between prone HMR in each condition.

Data proceeding and collection

The kinematic data were collected at a sampling rate of 100 Hz. A fourth-order, dual-pass, Butterworth filter with a cutoff frequency of 2.0 Hz was initially used to filter the data. The raw data were then filtered at subject-specific cut-off frequency to calculate the movement event and time. Pelvic segment was defined as a plane in transverse plane consisting of three markers, the bilateral PSIS and one marker on the floor. Lower leg segment was defined as a plane among the fibular head and the lateral malleolus markers and another marker on the floor. The start and ends of movement and the movement times for the pelvic and lower leg segments were calculated. The parameters for starts and ends of movement were similar those used in previous studies of prone HMR.5,7

The start of LPR was defined as the point when both the angular change of the pelvic segment in transverse plane exceeded 0.5°, and 15% of maximum angular velocity in lumbopelvic segment was exceeded. The end of LPR defined as the first point at which the angle reached 99% of its maximum angle or the end of lower leg motion. The start of movement of HMR was defined as the point when both the angular change of the lower leg segment exceeded 1.5°, and 5% of maximum angular velocity in the lower leg segment was exceeded. The end of HMR was defined as the first point at which the angle reached 99% of maximum rotation angle in lower leg segment.

The total angle of LPR was calculated as the change in angle of pelvic segment in transverse plane from the start to final position during prone HMR. The HMR were calculated as the change in angle of lower leg segment relative to the rotation of pelvic segment in the transverse plane of pelvic and lower leg segments, respectively, from the start to final position during prone HMR. To provide an indication of lumbopelvic timing, the amount of HMR completed prior to the start of pelvic segment rotation.

Statistical Analysis

The means of the amount of LPR and HMR before start of LPR in three trials were used for analysis. All variables were assessed for normality using the Kolmogorov-Smirnov test, prior to statistical analysis. As the data presented normal distribution, a one-way repeated-measures analysis of variance (ANOVA) was used. All significance testing was set at p < 0.05. If a main effect was found, post hoc pair-wise comparisons with a Bonferroni correction (p < 0.016) were used for multiple comparisons. SPSS software (SPSS, Chicago, IL, USA) was used for the statistical analysis.

Results

The results showed significant differences among the three positons of PBU in the angles of LPR and HMR before start of LPR (p < 0.05) (Table 2). The results of the post hoc test showed significantly less angle of LPR under CLPR and SLPR conditions than under WPBU condition, and less that under SLPR than under CLPR (p<.016) (Figure 2A). The angle of HMR before start of LPR were significantly greater in SLPR than WPBU condition (p < 0.016) (Figure 2B).
Table 1. General characteristics of subjects. (N=16)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>23.75±2.65</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>167.69±7.18</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>66.38±11.00</td>
</tr>
<tr>
<td>ODIa (%)</td>
<td>19.55±3.81</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation.

a Oswestry Disability Index

Table 2. Means of the angles of LPR, HMR before start of LPR, and HMR during prone HMR in three positions of PBU.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Position of PBU</th>
<th>F</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WPBU</td>
<td>CLPR</td>
<td>SLPR</td>
</tr>
<tr>
<td>LPR</td>
<td>5.34±2.74</td>
<td>3.30±1.61</td>
<td>2.55±1.47</td>
</tr>
<tr>
<td>HMR before start of LPR</td>
<td>18.15±6.21</td>
<td>21.89±6.89</td>
<td>23.67±7.39</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation.

LPR: lumbopelvic rotation; HMR: hip medial rotation; WPUB: without pressure biofeedback unit; CLPR: center of lumbopelvic region; SLPR: side of lumbopelvic region.

*p values from the one-way repeated analysis of variance (ANOVA).

Figure 1. Prone HMR without PBU (A) with PBU under CLPR (B) and with PBU under SLPR (C).

Figure 2. The angles of LPR (A), HMR before start of LPR (B) during prone HMR in three positions of PBU.
LPR: lumbopelvic rotation; HMR: hip medial rotation; WPUB: without pressure biofeedback unit; CLPR: center of lumbopelvic region; SLPR: side of lumbopelvic region. *Significant difference at p = 0.016.

**Discussion**

The purpose of our study was to compare the angles of LPR and HMR before start of LPR during prone HMR in three positions of PBU in subjects with LBP. Some researchers have demonstrated effectiveness of various feedback tools on lumbopelvic movement during lower limb movement. Park et al. reported that pelvic rotation was significantly reduced, by 3.0°, during active straight leg raising (ASLR), using the subject’s own tactile feedback touching his/her pelvic, compared with conventional ASLR. Koh et al. found that CE with palpation and visual feedback significantly reduced angle of pelvic rotation by 3.6°, compared with conventional CE. In a study by Scholtes et al., the therapist’s verbal and tactile feedback during prone hip lateral rotation (HLR) decreased the angle of lumbopelvic rotation by 2.8° in people with LBP. We found that LPR was significantly reduced by 2.8° and 2.0° in the SLPR and CLPR compared with the WPBU, respectively. Although it is not possible to directly compare the results of the present study with aforementioned research due to differing lower limb movements, feedback tools, and severity of LBP symptoms, feedback using a PBU decreased LPR as previous studies. Comerford and Mottram defined the uncontrolled lumbopelvic rotation as follows: lumbopelvic begins to rotate to follow the hip movement before 30° of HMR before start of LPR during prone HMR. As they mentioned, our results showed the angles of HMR before start of LPR during prone HMR in all conditions were less than 30° in people with LBP.

In the present study, prone HMR with PBU in SLPR and CLPR compared in WPBU conditions significantly reduced the LPR. The angle of LPR was the least in prone HMR with PBU in SLPR condition among three conditions. The possible cause of these results may be that the using a PBU in SLPR could monitor lumbopelvic motion in the transverse plane more effectively than in WPBU and CLPR during prone HMR. If the hip medially rotates in right leg, it causes the left rotation of lumbopelvic region, inducing to increase pressure of PBU placed under right of lumbopelvic region in SLPR condition. Then, we asked to subjects to make efforts to maintain the pressure of PBU consistently during prone HMR. However, the prone HMR in CLPR condition might be not effective in reducing LPR in the transverse plane. We inferred that subjects may make efforts to maintain the pressure of PBU using abdominal hollowing or bracing recruiting transverse abdominal or all abdominal muscles in CLPR condition. Therefore, when PBU are used to control the ULM in transverse plane during prone HMR, it is recommended to place PBU under SLPR to effectively decrease the LPR.

Repeated ULM during functional activities causes accumulation of the tissue stress in specific lumbopelvic region and eventually LBP symptoms. Muller and Maluf explained that physical stress level is a composite value including the amount of stress, direction of stress and time factors such as duration, number of repetitions, and the rate at which stress is applied to tissues of the body. Thus, the timing as well as amount of lumbopelvic motion during lower limb movement is a potential contributing factor to LBP. Scholtes reported that HLR angle at the start of lumbopelvic rotation were 6.8° and 4.5° in people without and with LBP during prone HLR, respectively and the therapist’s verbal and tactile feedback during prone HLR increased HLR at the start of LPR by 6.4° in people with LBP. We found that prone HMR with PBU in SLPR compared in WPBU condition significantly increased by 5.5° in the HMR before start of LPR. Thus, when PBU are used to control the ULM in transverse plane during prone HMR, it is recommended to place PBU under SLPR to effectively increase the HMR before start of LPR.

This study has several limitations. First, we did not measure the activation of muscles such as the abdominal, back extensor and gluteal muscles. If it is known to which muscles contribute to reduce the LPR during prone HMR, it will be help to apply the feedback technique. The second limitation is that subjects with LBP only participated without control group in this study. We did not compare the effectiveness of feedback.
techniques on lumbopelvic rotation between LBP group and healthy group. Third, we did not investigate the long-term effects of prone HMR using PBU in SLPR condition. Further study is needed to determine the long-term effects of prone HMR using PBU in SLPR condition on the LBP and ULM in randomized control trial.

Conclusions

The results of our study showed that prone HMR with PBU under the side of lumbopelvic region is more effective to control the ULM than under the center of lumbopelvic region in people with LBP. Thus, when PBU are used to control the ULM during lower limb movement, clinicians must consider which position of PBU is most effective for decreasing ULM according to the type of lower limb movement and the movement plane of lumbopelvic region.

Ethical Clearance: Ethical approval for this study was obtained from the Institutional Review Board of Joongbu University (JIRB-2017020801-01).

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Conflict of Interest: We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

References


Knowledge and Perception of Physiotherapy among Clinical Students in Various Health Care Disciplines of a Nigerian College of Medicine and Health Sciences

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Abstract

Background: The delivery of effective inter professional co-operations in health practice is essential for successful treatment outcomes. Inter professional education has been seen to be a major means of improving the knowledge of students about other health disciplines and encouraging future co-operations in health practice. The study therefore aims at investigating health sciences students’ knowledge and perceptions of physiotherapy, to enable the planning of a relevant interdisciplinary curriculum that includes all clinical students.

Method: A total of 404 undergraduate clinical students [Males = 219, Females =185] in various health programmes participated in this study. A cross-sectional design was utilized for the study. A convenience sampling technique was utilized. Copies of the questionnaire were self-administered and data collected on the same day. The questionnaire was distributed in lecture halls and students’ hostels and students were expected to respond to the sections bordering on their socio-demographics, knowledge and perception of physiotherapy. Descriptive statistics using frequencies and percentages was used to analyse data on knowledge and perception of physiotherapy.

Results: A low level of knowledge of physical modalities and treatment procedures utilized by physiotherapists was observed across the various health care disciplines. A positive perception of physiotherapy was observed. Classroom lectures was identified as the most common source of knowledge of physiotherapy.

Conclusion: A low level of knowledge of the various physiotherapy treatment procedures and modalities was observed among clinical students in the various health care disciplines. An improved interdisciplinary curriculum in the various colleges of medicine may foster the increase in knowledge of physiotherapy, hence promoting interdisciplinary health care.

Keywords: Knowledge; perception; physiotherapy; clinical students

Background

Physiotherapy involves the interaction between the physiotherapist, patients/clients, other health professionals, families, caregivers and communities in a process where movement potential is assessed and goals
are agreed upon, using knowledge and skills unique to physiotherapists. Physiotherapy practice commenced in Nigeria in the year 1946. Physiotherapy training started in Nigeria by 1966 at the University of Ibadan, and also degrees in physiotherapy are currently available in eight other Universities, including one private university in Nigeria. The services of physiotherapy are available in the tertiary and secondary health institutions in all state capitals as well as the federal capital territory and majority of other towns in the country. These physiotherapy services are also obtainable in few private clinics, and hospitals, sports commissions, schools and institutionalized care centres for individuals with physical disabilities.

The recognition and awareness of physiotherapy services is satisfactory in developed nations as the monitoring of the physiotherapists and promotion of professional development are taken care of by established physiotherapy councils, challenges on this matter were only predominant in the developing nations. The awareness of a profession very much relies on the perceptions of the public and stakeholders. In a recent review of physiotherapy awareness across the globe, low awareness among general public even in countries with very high Human Development Index (HDI) was reported. Some studies in developing countries such as Nigeria, found that majority of medical students studied had good knowledge of physiotherapy but there was low awareness regarding roles and responsibilities of the physiotherapy profession. A study observed that majority of medical, occupational and sports science students had an adequate knowledge of physiotherapy. Several studies have shown that medical practitioners seem to have insufficient knowledge and comprehension about physiotherapy practice, roles and services, and this seems to be the reason why the physiotherapy practice in Nigeria is used as a “prescription” which turn out to be wrong prescriptions by most physicians. Thus, this poor knowledge could be combated by involving students from different health professions in Inter professional education (IPE). As supported by evidence, IPE has been seen to be a major means of improving the awareness of students about other health disciplines and encouraging future co-operations in health practice.

This is the first study on the knowledge and perception of physiotherapy by the clinical students of the various health care disciplines in Nigeria. This study was therefore designed to determine the knowledge and perception of physiotherapy by the clinical students of medical radiography, medical laboratory sciences, nursing sciences, medicine & surgery, and dentistry in a Nigerian College of Medicine and Health Sciences.

Material and Method

Participants

Three hundred and sixty six male and female undergraduate students of the College of Medicine University of Nigeria, Nsukka, specifically medical radiography (119), medical laboratory sciences (70), nursing sciences (68), medicine & surgery (101), and dentistry (8) participated in this study. Sample size was based on statistical estimation from the population of the clinical (fourth year to final year) students of the various healthcare disciplines. A cross-sectional design was utilized for the study. The inclusion criteria were: being in the clinical phase (fourth year to final year) of study, having completed at least three months of clinical rotations and willingness to participate in the study. Participants were excluded if they were transfer students and hence did not start their undergraduate studies at the College of Medicine, University of Nigeria, Nsukka.

Questionnaire Design

The questionnaire was adapted from a similar work done by Odebiyi et al., where the questionnaire’s content validity was ascertained and pilot survey revealed no ambiguity with the questions or instructions in the survey. It was a 24-item open and closed ended questionnaire which was divided into three sections. Section I bordered on personal characteristics such as age, gender, department, and the students’ awareness of and personal involvement with physiotherapy students and physiotherapists. Section II bordered on students’ general knowledge and perception of the physiotherapy profession, such as qualifications, work settings and treatment provided by physiotherapists. Section III bordered on respondents’ view of their knowledge base about physiotherapy and possible strategies for improvement. The options provided for the closed ended questions on perception were strongly agree, agree, undecided, disagree, strongly disagree, don’t know and yes or no for some others. It was first sent to two physiotherapists who were experts in research design for their feedback. It was also distributed to 20 clinical students for a pilot study to ensure the questions were clear and easily understood by the participants.
**Questionnaire Administration**

Copies of the questionnaire were distributed by hand at the students’ hostels and lecture halls. The questionnaire was self-administered and collected on the same day.

**Scoring**

The data from the questionnaire were reduced to percentages and descriptions by theme. The good knowledge scores were gotten by summing up responses obtained from the knowledge section. The perception score was calculated by summing up the responses obtained from the perception section, in line with the question. If the knowledge and perception scores were ≥50 %, they were regarded as good and positive, or poor and negative if they were <50 %, depending on the question asked.

**Data Analysis**

Descriptive statistics of frequency, mean, standard deviation, frequency counts and percentages was used to summarize the data on knowledge and perception of physiotherapy. Data were analysed using the statistical package for social sciences (SPSS) version 21.0 with alpha level set at p < 0.05.

**Findings**

A total of three hundred and sixty six (366) clinical students made up of 198 (54.1%) males and 168 (45.9%) females participated in this study. The students were in the departments of medical radiography, medical laboratory sciences, nursing sciences, medicine & surgery, and dentistry. Their mean age was 24 ± 3.75 years. (See Table 1).

**TABLE 1: Socio-demographic Characteristics of Participants**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>198</td>
<td>54.1</td>
</tr>
<tr>
<td>Females</td>
<td>168</td>
<td>45.9</td>
</tr>
<tr>
<td>Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Radiography</td>
<td>119</td>
<td>29.5</td>
</tr>
<tr>
<td>Med. Lab. Sciences</td>
<td>70</td>
<td>17.3</td>
</tr>
<tr>
<td>Nursing Sciences</td>
<td>68</td>
<td>16.8</td>
</tr>
<tr>
<td>Medicine and Surgery</td>
<td>101</td>
<td>25.0</td>
</tr>
<tr>
<td>Dentistry</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>23.87</td>
<td>3.95</td>
</tr>
</tbody>
</table>

Key: S.D = Standard deviation

**Knowledge of Physiotherapy:**

Massage was the most known [Medical Radiography (70.6%), Medical Lab. Science (82.9%), Nursing sciences (82.4%), Medicine & surgery (83.2%), Dentistry (87.5%)] treatment procedure utilized by physiotherapists while very low knowledge of other treatment procedures and modalities was observed across the five health care disciplines. Students in the various health care disciplines were generally not aware that physiotherapists also employed ultrasound, drugs, suction, laser, interferential current, traction, and chest percussion among others as treatment modalities for specific conditions. (See tables 2& 3).

**TABLE 2: Participants’ Knowledge of Treatment Procedures Utilized by Physiotherapists (multiple responses allowed)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>MR</th>
<th>ML</th>
<th>NS</th>
<th>MS</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massage</td>
<td>84(70.6)</td>
<td>58(82.9)</td>
<td>56(82.4)</td>
<td>84(83.2)</td>
<td>7(87.5)</td>
</tr>
<tr>
<td>PM</td>
<td>49(41.2)</td>
<td>28(40.0)</td>
<td>37(54.4)</td>
<td>57(56.4)</td>
<td>6(75.0)</td>
</tr>
<tr>
<td>Weight training</td>
<td>83(69.7)</td>
<td>57(81.4)</td>
<td>49(72.1)</td>
<td>64(63.4)</td>
<td>7(87.5)</td>
</tr>
<tr>
<td>Post. Drainage</td>
<td>29(24.4)</td>
<td>27(38.6)</td>
<td>20(29.4)</td>
<td>21(20.8)</td>
<td>4(50.0)</td>
</tr>
<tr>
<td>Plastering</td>
<td>31(26.1)</td>
<td>18(25.7)</td>
<td>27(39.7)</td>
<td>18(17.8)</td>
<td>2(25.0)</td>
</tr>
</tbody>
</table>
**TABLE 2: Participants’ Knowledge of Treatment Procedures Utilized by Physiotherapists (multiple responses allowed)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>MR</th>
<th>ML</th>
<th>NS</th>
<th>MS</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation</td>
<td>78(65.5)</td>
<td>51(72.9)</td>
<td>41(60.3)</td>
<td>76(75.2)</td>
<td>8(100.0)</td>
</tr>
<tr>
<td>Advice</td>
<td>64(53.8)</td>
<td>43(61.4)</td>
<td>40(58.8)</td>
<td>67(66.3)</td>
<td>8(100.0)</td>
</tr>
<tr>
<td>Splintage</td>
<td>23(19.3)</td>
<td>18(25.7)</td>
<td>31(45.6)</td>
<td>31(30.7)</td>
<td>3(37.5)</td>
</tr>
<tr>
<td>Manipulation</td>
<td>41(34.5)</td>
<td>17(24.3)</td>
<td>36(52.9)</td>
<td>49(48.5)</td>
<td>3(37.5)</td>
</tr>
<tr>
<td>Suction</td>
<td>19(16.0)</td>
<td>12(17.1)</td>
<td>18(26.5)</td>
<td>9(8.9)</td>
<td>1(12.5)</td>
</tr>
<tr>
<td>Post. correction</td>
<td>47(39.5)</td>
<td>41(58.6)</td>
<td>32(47.1)</td>
<td>69(68.3)</td>
<td>5(62.5)</td>
</tr>
<tr>
<td>Gait training</td>
<td>46(38.7)</td>
<td>31(44.3)</td>
<td>36(52.9)</td>
<td>81(80.2)</td>
<td>7(87.5)</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>32(26.9)</td>
<td>20(28.6)</td>
<td>23(33.8)</td>
<td>34(33.7)</td>
<td>6(75.0)</td>
</tr>
<tr>
<td>Traction</td>
<td>27(22.7)</td>
<td>18(25.7)</td>
<td>28(41.2)</td>
<td>30(29.7)</td>
<td>5(62.5)</td>
</tr>
<tr>
<td>Chest percussion</td>
<td>31(26.1)</td>
<td>26(37.1)</td>
<td>26(37.1)</td>
<td>26(25.7)</td>
<td>5(62.5)</td>
</tr>
</tbody>
</table>

Key: MR = medical radiography, ML = medical laboratory sciences, NS = nursing sciences, MS = medicine & surgery, D = dentistry, n (%) = number of positive responses and percentage from each department, PM = passive movement, post. = postural

**TABLE 3: Participants’ Knowledge of Physical Modalities Utilized by Physiotherapists (Multiple responses allowed)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>MR</th>
<th>ML</th>
<th>NS</th>
<th>MS</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrotherapy</td>
<td>51(42.9)</td>
<td>22(31.4)</td>
<td>38(55.9)</td>
<td>35(34.7)</td>
<td>4(50.0)</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>16(13.4)</td>
<td>2(2.9)</td>
<td>19(27.9)</td>
<td>3(3.0)</td>
<td>1(12.5)</td>
</tr>
<tr>
<td>Shortwave Diathermy</td>
<td>25(21.0)</td>
<td>7(10.0)</td>
<td>22(32.4)</td>
<td>10(9.9)</td>
<td>2(25.0)</td>
</tr>
<tr>
<td>TENS</td>
<td>32(26.9)</td>
<td>26(37.1)</td>
<td>37(54.4)</td>
<td>41(40.6)</td>
<td>4(50.0)</td>
</tr>
<tr>
<td>Drugs</td>
<td>20(16.8)</td>
<td>8(11.4)</td>
<td>13(19.1)</td>
<td>13(12.9)</td>
<td>3(37.5)</td>
</tr>
<tr>
<td>Infrared</td>
<td>18(15.1)</td>
<td>7(10.0)</td>
<td>21(30.9)</td>
<td>19(18.8)</td>
<td>1(12.5)</td>
</tr>
<tr>
<td>Laser</td>
<td>19(16.0)</td>
<td>8(11.4)</td>
<td>19(27.9)</td>
<td>6(9.6)</td>
<td>1(12.5)</td>
</tr>
<tr>
<td>Interferential</td>
<td>14(11.8)</td>
<td>10(14.3)</td>
<td>16(23.5)</td>
<td>6(5.9)</td>
<td>1(12.5)</td>
</tr>
<tr>
<td>Cold packs</td>
<td>31(26.1)</td>
<td>12(17.1)</td>
<td>29(42.6)</td>
<td>51(50.5)</td>
<td>6(75.0)</td>
</tr>
</tbody>
</table>

Key: MR = medical radiography, ML = medical laboratory sciences, NS = nursing sciences, MS = medicine & surgery, D = dentistry, n (%) = number of positive responses and percentage from each department, PM = passive movement, post. = postural

The majority (59.4%) of the participants stated that a patient needs a referral from a doctor before they could be seen by a physiotherapist. 26.3% stated otherwise. Highest rate of responses (96.5%) were seen for hospital followed by rehabilitation centres (90.3%), sports clinic (79.70%) then centres for the disabled (79.46%) while the least recognised were the offices (23.8%) and factories (30%) when participants were asked the settings/environment where they thought physiotherapists may work. The majority 204 (50.5%) of the participants got their knowledge of the conditions and treatments physiotherapists deal with from lectures (see table 4). Majority (67%) of the participants also reported the need for more information about physiotherapy before they...
enter the workforce as healthcare practitioners.

Table 4: Participants’ Source of Knowledge of Physiotherapy (multiple responses allowed)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature</td>
<td>163</td>
<td>40.4</td>
</tr>
<tr>
<td>Lectures</td>
<td>204</td>
<td>50.5</td>
</tr>
<tr>
<td>Sports friends</td>
<td>88</td>
<td>21.8</td>
</tr>
<tr>
<td>Family/friend (a physiotherapist)</td>
<td>158</td>
<td>39.1</td>
</tr>
<tr>
<td>Other friends</td>
<td>134</td>
<td>33.2</td>
</tr>
<tr>
<td>Clinical experience</td>
<td>191</td>
<td>47.2</td>
</tr>
<tr>
<td>Consultation with a physiotherapist</td>
<td>86</td>
<td>21.3</td>
</tr>
<tr>
<td>Family doctor</td>
<td>42</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Key: N = Total number of responses

**Perception of Physiotherapy:**

Majority of the clinical students agreed or strongly agreed that physiotherapy is a very progressive profession (85.8%), physiotherapists are generally very professional and competent (74.7%), physiotherapy has an important role in teaching public health (76.5%), physiotherapists are involved in new and innovative research (69.6%), are readily available to doctors (49.8%), are well qualified (75.9%), are caring to their patients (68.8%), offer effective treatment (75.3%), are capable of diagnosing the condition they treat (45.1%) while 36.9% strongly disagreed or disagreed that physiotherapists are mainly interested in making money.

**Discussion**

The clinical students in the various health care disciplines at the College of Medicine, University of Nigeria, Nsukka showed a low level of knowledge of the various physiotherapy treatment modalities and procedures except massage. This report supports the results of several studies\(^8\)\(^{-10}\), \(^16\)-\(^17\) which have also stated that massage and manual techniques had higher recognition while they knew little of electrotherapeutic modalities and other treatment modalities used by physiotherapists. This may be as a result of poor inter-professional education and interaction. In-line with the findings of this present study, studies\(^8\), \(^16\) reported that all respondents were aware of different settings physiotherapists may work with majority indicating hospitals and rehabilitation centres while other settings like offices and factories were least recognized. The low affirmative responses to the office and factory settings may be due to the fact that their clinical exposure are usually within the confines of a hospital setting. Similar to the findings of Odebiyi et al.\(^8\), classroom lecture was identified as the most common source of knowledge of physiotherapy. This finding was contradicted by the results of a study\(^16\) which reported that the students’ knowledge of physiotherapy came from a family member, a friend or books. This discrepancy may be as a result of the difference in the study setting.

Similar to the findings of some studies\(^8\), \(^16\), the respondents have a positive perception of physiotherapy, as majority agreed or strongly agreed that physiotherapists are generally very professional, competent, are caring to their patients and have roles in public health. A high number of clinical students indicated the need for more information about physiotherapy before they qualified as healthcare professionals. The findings is in-line with that of Odebiyi et al.\(^8\) where a high proportion of students were also interested in gaining more information about physiotherapy before qualifying as professionals. Short clinical rotations in physiotherapy as part of the undergraduate training for all clinical students, seminars and workshops, interdepartmental interactions among the students were suggested as preferred means of receiving more information through their undergraduate course about the physiotherapy profession. However, these related studies\(^8\), \(^9\), \(^16\) used for making comparisons with the results of this present study only assessed perception of physiotherapy by students of medicine and surgery and thus it is recommended that further studies be carried out to determine the perception of physiotherapy by the clinical students of all the healthcare professions in various countries because this will also help in raising awareness of the roles of the physiotherapy profession.
Conclusion

This paper addresses an issue of concern for effective health care and health educations in general, when it comes to knowledge required for inter professional practice. The study revealed the need for the improvement of the interdisciplinary curriculum of students in the various health care disciplines. This could be achieved through incorporating compulsory short clinical rotations in physiotherapy as part of the undergraduate training and widening the clinical exposure for all clinical students in an effort to foster interdisciplinary interactions.

Conflict of Interest: No conflict of interest.

Source of Funding: None

Ethical Clearance: Ethical approval was sought and obtained from the University of Nigeria Health Research and Ethics committee on certificate number-NHREC/05/01/2008B-FWA00002458-1RB00002323. The participant’s verbal and signed informed consent were obtained prior to the study, after the aim and objectives of the study were clearly explained to them.

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Some Effective Ways to Prevent Common Influenzas

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Abstract

Vietnam is a country that has a quite diverse climate with many different seasons. At the end of the year, flu epidemic becomes quite popular, people that are attacked by bacteria can be children or adults. In order for prevention rather than healing, in addition to relying on medical intervention, some small tips and simple methods have an extremely effective, great value. During February of 2019, the paper was completed on the basis of 25 respondents living in Ho Chi Minh City thanks to the method of investigation method of Hancock (1998). The paper is also based on some journals and shows that preventing flu is what a teacher need to do. Huynh Tan Hoi

Key-words: Flu, Prevention, Solutions, Virus

Introduction

The common cold is a viral infection of the respiratory tract, including the nasal organs, sinuses, throat, bronchial bar and lungs. Nasal congestion and runny nose are often the first signs of the flu. For normal people who have a good immune system, the flu only lasts for 7-10 days, but if they have bacterial infections or those with weak immune systems, the disease will last longer and the condition it will be heavier. Seasonal weather, temperature as well as humidity change frequently and erratically, this is also the cause of high risk of colds. So, which method to get rid of that is what a lot of people concern about. Therefore, keeping healthy and preventing this disease is very important, especially when it gets cold.

Antibiotics are often used by doctors for these patients to prevent and eliminate the harmful effects of bacteria on the body, thereby supporting the immune system against the harmful effects of the virus. As a result, using the right antibiotic will help treat the disease more effectively and make time to recover faster. However, antibiotics will harm our body if we overuse without consulting our doctor. Antibiotics are not harmless drugs but can cause unwanted side effects affecting human health even death. Therefore, we only use antibiotics when there is evidence of infection and is prescribed by a doctor. We do not use antibiotics for common colds caused by viral infections. In particular, pregnant women also have to limit the use of antibiotics to avoid birth defects, which no mother wants.

Another important thing that the medical world is facing today is the emergence of more resistant viruses, or resistance to antibiotics. This is the most tragic situation for any patient who suffers from causes of antibiotic abuse and improper use of antibiotics today. So, the best way for us to be in every way is to prevent serious illnesses in order to avoid the use of antibiotics, which are both harmful and expensive. Prevention is better than cure, especially at the time of the transition to the cold season, we are even more likely to get the flu than usual.

Method

The paper was completed with the support of completing surveys from 25 respondents including 20 university students and 5 teachers who are teaching for some schools in Ho Chi Minh City, Vietnam. The questionnaire consists of three main questions designed in the form of multiple-choice questions to help respondents complete in a convenient way and the data will be accessed much easier. Some popular interactive
interfaces such as Zalo, Line, Viber or Gmail were used for convenience in terms of time and distance. In addition, two direct interview questions were also mentioned to analyze the causes of related sicknesses and the effective solutions in the period of February of 2019.

**Results**

The first question is to determine how often a person suffers in daily life (Fig.1): “Do you often get one of the common diseases?” Up to 16 respondents selected the option “Very often” (64%), 4 chose “Often” (16%), 3 (12%) chose “Not often” and 2 (8%) chose “Never”. This shows the patients’ points of view while they are using this modern methods, and some of them (40%) still didn’t recognize this as a good choice.

![Fig 1. The frequency of getting illness](image)

The second question is for the purpose of determining the common diseases that a patient suffers, including symptoms of a flu (Fig.2): “What disease do you often have?”

![Fig 2. The type of common illnesses](image)

Most respondents selected the option “Headache” (44%) or “Flu” (36%), and the remaining chose “Stomachache” or other illnesses. This means that the number of people suffer from cold is not less and this disease becomes a concern again.

![Fig 3. The treatment method a patient usually chose](image)

For the last question, respondents were asked to choose which method to treat the disease. Although these are only minor illnesses, in order to determine the patient’s concerns for their own health, this question is quite interesting (Fig 3): “When you get sick, which treatment do you choose?”

Most patients chose to buy medicine at a pharmacy (68%) instead of going to the hospital to see a doctor. The results also show interest in the health of the patient because almost no one chooses to “Waiting until the disease recovers” and only a few choose “Using traditional method”.

The remaining of the data survey, only five people took participation in the face-to-face interview. And to make it clear, two interview questions directly with the respondents, mainly teachers, most of them are worried about the flu because it often makes them have a sore throat, cough and loss of voice: To the first question: “What disease do you often have?” Most teachers replied that they suffered from flu and they are aware that this is not a simple disease. When asked about what they will do when they have flu, most of them chose Western medicine because of the time: “What do you do when you have a cold?” They do not have much time and that is the result why they usually go to a pharmacy and buy something popular such as painkiller or cold medicine. That means, they are not patient enough although there are some better ways to treat their disease.

**Solutions**

The flu, with typical symptoms of muscle pain, fatigue, fever, chills, can make you miserable. Depending on the severity of the virus, the flu can even be fatal. When you get sick, there are very few ways to help reduce symptoms and shorten the life cycle of the virus. Therefore, the best treatment is prevention.
Flu prevention is very difficult because you have to be attentive and watchful during the cold season and the flu season. The flu is spread by influenza virus from patients who spread into the surrounding environment, strongly increasing during this time due to cold weather. In order to strengthen resistance to limit colds during seasonal weather, the following measures should be taken into account.

First, we should avoid contact with germs that cause the flu. So, what we have to do is to wash our hands very often since this is the simplest preventive measure to avoid flu. If it is available, we should wash our hands with warm water and soap regularly to remove germs. Hand sanitizers can be used in case we do not have soap and clean water. Washing our hands before and after eating, preparing food, after touching garbage, after shaking hands or touching others, after returning home from public. Also, we should wash our hands after sneezing, after touching animals, changing diapers or taking your child to the toilet.

The fastest way for viruses and germs to enter the body is through the path from hand to eye, nose, or mouth. Therefore, try to avoid touching these positions during the flu season. Viruses and other germs can hide under the nail even when you wash your hands and that is the reason why we should not bite our nails and restrict his habits.

We should limit close contact with sick people. If we have no choice, we should wear mask to prevent flu spread. Although it is very difficult to avoid full contact with sick people, we need to try to limit our exposure to reduce the risk of infection. Teacher should not touch sick students or come closer to help them during learning process. Even if the sick students have no flu and other illnesses, it’s best to avoid getting close. If another virus is infected, our immune system will weaken, making it harder for the body to fight the flu virus once we have been exposed. When going back home from work, we need to wash our face and hands often after contact with many people.

We can use disinfectant since flu viruses can attach to surfaces. That means that we need to disinfect surfaces in our home or office that can carry germs. This step is especially necessary if someone has a cold in the home or office. If working in a place with many people, disinfection of public surfaces like door handles and handrails can help reduce exposure to germs. This step is easy to do at home but it will be more difficult in school. We should also bring a sterile tissue and hand sanitizer when we go out.

We may consider getting a flu vaccine. Pregnant women, young children, and people with chronic illnesses can affect the respiratory system, especially older people are encouraged to get vaccinated against the flu since flu viruses constantly change. The seasonal flu vaccine is designed to prevent any virus that will be most active during that season. The ideal time to vaccinate is right after the vaccine is available in early to mid-autumn. Even so, late vaccinations can still help. If we do not want to be vaccinated or afraid of syringes, we can use the nasal spray flu vaccine.

Next, what we have to do to maintain a healthy lifestyle. We should sleep about 8 hours a day to maintain good health. The more rest, the better the immune system is. If we are lack of sleep, the body will produce more cytokines, and these proteins cause cold or flu symptoms. Before going to bed, soaking our feet in a hot tub with a little salt will give us a better and deeper sleep.

Stress is a symptom of physical and mental which can negatively affect the body and weaken the immune system. Then, reducing stress levels can help us stay healthy longer. By taking a few minutes each day to purify our mind, meditate or do yoga, anxiety and fear can be alleviated in a good way. Even though we are tired or get stressed, we should not smoke. Stop smoking reduces the ability to breathe, causes dehydration and weakens the immune system. Smoking also destroys the cilia in the nose. These hairs are the body’s first protective wall for invading germs. A smaller amount of cilia causes flu viruses to easily enter the body.

Walking, jogging or running at least 2 or 3 times a week is a good habit to maintain youth and health. Regular exercise has been shown to help fight infections, including flu viruses. It also produces many white blood cells which can prevent and fight disease. Physical activity not only helps to eliminate toxins from sweat but also improves circulation, enabling nutrients to be absorbed by the body more easily.

Then, doing yoga is a good method we should take. This is a great way to both exercise and calm your mind. Yoga is known to help ease the nervous system,
thereby reducing considerable stress, while also helping to lubricate joints and build up central muscle strength. When stress levels are low, the immune system will be healthier and better fight off disease. We can also choose swimming because it is rather good for joints.

Besides, we should keep our body warm to prevent sickness when it is cold. Wearing long clothes, shoes when going out is a good habit we should remember. We should choose clothes made from thin wool or cotton fabrics as they both have the ability to absorb sweat and keep the body warm. It is very important that we always pay attention to keeping our feet warm. Adding more vitamins to the body when it gets cold since our body needs more nutrition. Something like vitamin C can help us to increase resistance, helps the body fight off the attack of various types of bacteria causing the flu. Vitamin C is found in yogurt, orange, lemon, and sauerkraut. However, we should not eat them when being hungry because it will affect the stomach.

Chinese medicinal herbs is also one important choice since they are “derived from plants and usually incorporate one or more herbs as the basic drugs to treat the disease”. Chinese medicinal herbs are rather beneficial in the management of severe syndrome and for preventing influenza.

Last, we should keep our place clean and limit the source of infection. Closing our home or office all day is not entirely healthy. Uncontrolled air makes our room humid, enabling bacteria to thrive and grow. We should open windows every day for 10-15 minutes. Public and crowded places are the main source of infection.

Limitations of the Research

This paper can only be conducted as a qualitative research because of some unavoidable reasons. This study is limited in its scope since the findings of this study is only reliable in the current context of a small area in Vietnam. The findings could be better if it was conducted in many places of this country and in a longer time. One of some limitations is also the dominant group of participants in the study was a few teachers and university students. It just involved a limited number of respondents the data were not strong enough to support the research work. Based on the weaknesses of the study, the author would like to suggest the following directions for further studies of the same area. First, there should be a follow-up quantitative after the qualitative phase. That is, there should be a better questionnaire survey to explore more opinions of many people, based on which prominent factors that impact the patients’ health in order to have greater recommendations.

Conclusion

As soon as we catch a cold, whether it is a child or an elderly person, we should urgently apply the suitable solutions to eliminate flu quickly and without antibiotics. Although the virus that causes colds is not dangerous, colds make us feel uncomfortable. When we suspect that we have a cold, take immediate measures to equip the body with the ability to cope with colds best and help shorten the stage of the disease.

Conflict of Interest: People who are teaching at school may be interested in this topic. The reason is because they have to use their voice to teach every day and how to maintain good health, good voice is an extremely important thing. Besides, M.C or singers are also susceptible to colds by approaching many people, that is, it’s important to keep them in a good voice.

Source of Funding: The paper was completed with the support of my FPT University.

Ethical Clearance: I am ensuring the quality and integrity of my research. The ideas and opinions expressed in this paper are my own and my effort. By writing this, I surely I respect the confidentiality and anonymity of my research respondents since they participated in my study voluntarily.

References


Original Research Article

Correlation between Body Mass Index and Core Muscular Strength among School Children between 11 and 14 Years of Age: A Cross Sectional Study

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¹Professor, Bethany Navajeevan College of Physiotherapy, Thiruvananthapuram, ²Associate Professor, PG & Research Department of Rehabilitation Science, Holy Cross College, Tiruchirappalli

Abstract

Background: Childhood obesity is a major health challenge of our country. The children of the present generation lives a passive lifestyle that leads to childhood obesity and adverse health consequences. Core muscle strength plays a major role in the physical fitness including maintaining the stability and balance of the human body during functional activities.

Objective: The objective of the study is to find out the association between Body Mass Index and core muscular strength among the school going children between 11 and 14 years of age by measuring the plank time.

Materials and Method: 100 school children between 11 and 14 years from the schools in Thiruvananthapuram city were included in the study using simple random sampling method. Body Mass Index has been calculated for all the students. They were divided into three BMI categories. i.e., Normal weight, Overweight and Obese. Plank test was conducted on them to measure the core muscular strength.

Result: The result was analyzed using SPSS software version 16. The statistical tool used was Pearson correlation. The Pearson correlation for Body Mass Index and Plank time was -.957, P value was .000 which shows that there is a significant correlation at 0.01 level between Body Mass Index and plank time. Also, the value shows that the correlation is negative, i.e., as the Body Mass Index increases the plank time i.e., the core muscular strength decreases and vice versa.

Conclusion: The study concludes that there is a negative correlation between Body Mass Index and core muscular strength i.e., as the Body Mass Index increases the core muscular strength decreases and vice versa in children aged between 11 and 14 years old.

Key words: Core muscular strength, Childhood Obesity, Body Mass Index percentile, Plank

Introduction and Background

For the past few decades, globally the prevalence of obesity in children and adolescents has increased¹. Obesity is defined as ‘abnormal or excessive fat accumulation that presents a risk to health’. The consequence of childhood obesity is obesity in the adulthood². Also, childhood obesity results in various non communicable diseases such as cardiovascular disease, Hypertension, type 2 diabetes mellitus, dyslipidemia, arteriosclerosis in the adulthood³,⁴. Urbanization force the children to live a passive lifestyle where they are more involved in indoor activities such as using smartphone, computer games, etc. results in childhood
obesity. Body adiposity is most commonly associated with a greater risk of musculoskeletal pain and injury in the general population. Even a moderate level of increase in the body mass index (BMI) are enough to facilitate the development of musculoskeletal pain and disturbances in the normal ambulation. Obesity plays a major role in predicting the postural stability, and a high BMI is an important risk factor for geriatric falling. Obese individuals are less efficient than Non-Obese individuals in performing work related tasks and activities of daily living that requires an upright standing position and they are at greater risk for injury and falling than normal-weight individuals. Increased Body Mass Index may have a negative influence on the core muscular strength and stability. Core is a muscular ‘box’ which consist of the abdominals in the front (rectus abdominus, transversus abdominus (TA), multifidus (MF), internal oblique), paraspinals and gluteals in the back, the diaphragm at the top, and the pelvic floor on the bottom. The transversus abdominis which is the inner unit plays a significant role in the core stability, because contraction of this muscle dramatically increases intra-abdominal pressure and provides the greatest degree of Lumbo-Pelvic-Hip Complex stability during dynamic movement. Contraction of the transversus abdominis, similar to the multifidus muscle of the transversospinalis group, precedes initiation of limb movement. All the movements of the human body depend on core muscles. Core muscles stabilize the the axial skeleton together with the pelvis and rib cage and act as a stable base to facilitate the movements of the extremities. The force for the movement of the extremities come from the momentum created from the inner core muscles. If the core muscles are weak, there will be abnormal distribution of the forces that leads to the injuries of the extremities. Core muscles help the human body to maintain the balance against the gravity and the forces created by the uneven surface. Thus core muscles also play a vital role in maintaining the balance when there is a challenge for the human body to maintain the upright position. If the core muscles are having sufficient strength then the frequency of falling will be less. Core stability has been defined as “the body’s ability to control the trunk in response to internal and external disturbances, including the forces generated from distal body segments as well as from expected or unexpected perturbations” Core stability plays an important role in maintaining the posture of the lumbar spine. Core stability exercises decreases the ground reaction forces and optimize the postural adjustments whenever there is a perturbation. The Plank test has been shown to be a reliable measure of core muscular strength.

Materials and Method

100 school children between 11 and 14 years from the schools in thrivananthapuram city were included in the study using simple random sampling method. Children with musculoskeletal injury, neurological disorders, cardiorespiratory disorders, mental instability were excluded from the study. Body Mass Index has been calculated for all the children. They were divided into three BMI categories. i.e., Normal weight, Overweight and Obese. Plank test was conducted on them to measure the core muscular strength. For the Plank test, the participants were positioned in prone position on a floor mat. The trunk was supported on forearms and toes; elbows directly under the shoulders; ankles maintained at 90°; scapulae stabilized with elbows at 90°; spine in a neutral position throughout the assessment. As soon as the participant lifted the trunk off the mat, the therapist began timing with a stopwatch. The participant was instructed by the therapist to hold the test position as long as possible. If the participant was unable to maintain the test position, the participant would be given a maximum of two chances to re-establish the plank position. If the participant was unable to do so, the examiner stopped the test, and time was recorded in seconds. The result was analysed statistically.

Statistical Analysis:

The result was analyzed using SPSS software version 16. The statistical tool used was pearson correlation.

Results

Figure 1: Agewise and Gender wise distribution of Boys and Girls

![Agewise and Gender wise distribution of Boys and Girls](image)
Figure 1 shows the Age and Gender wise distribution of the subjects in different Body Mass Index categories. Under all the age groups 4 boys and 4 girls were under normal weight category, 4 boys and 4 girls were under overweight category and 5 boys and 4 girls were under obese category. Thus 16 boys and 16 girls were under normal weight category, 16 boys and 16 girls were under overweight category and 20 boys and 16 girls were under obese category. The total numbers of boys were 52 and girls were 48.

Table 1: Plank time in different BMI categories

<table>
<thead>
<tr>
<th>Body Mass Index Categories</th>
<th>Plank time (seconds)</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>normal weight</td>
<td>84.9062</td>
<td>32</td>
<td>7.55351</td>
<td>76.00</td>
<td>100.00</td>
<td>24.00</td>
</tr>
<tr>
<td>over weight</td>
<td>48.1250</td>
<td>32</td>
<td>1.69915</td>
<td>45.00</td>
<td>50.00</td>
<td>5.00</td>
</tr>
<tr>
<td>obese</td>
<td>32.9167</td>
<td>36</td>
<td>2.39494</td>
<td>28.00</td>
<td>39.00</td>
<td>11.00</td>
</tr>
<tr>
<td>Total</td>
<td>54.4200</td>
<td>100</td>
<td>22.40904</td>
<td>28.00</td>
<td>100.00</td>
<td>72.00</td>
</tr>
</tbody>
</table>

Table 1 shows the Plank time in different BMI categories. In normal weight category, the mean plank time was 84.9, standard deviation was 7.55, minimum value was 76 and the maximum value was 100. In the overweight category, the mean Plank time was 48.1, standard deviation was 1.69, minimum value was 45 and the maximum value was 50. In the obese category the mean value of Plank time was 32.9, standard deviation was 2.39, minimum value was 28 and the maximum value was 39.

Table 2 : Correlation between Body Mass Index and Plank time

<table>
<thead>
<tr>
<th>Body Mass Index</th>
<th>Body Mass Index</th>
<th>Plank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.957**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows the correlation between Body Mass Index and Plank time in school children between 11 year and 14 years old age. The Pearson correlation for Body Mass Index and Plank time was -.957, P value was .000 which shows that there is a significant correlation at 0.01 level between Body Mass Index and plank time. Also the value shows that the correlation is negative, i.e., as the Body Mass Index increases the plank time i.e., the core muscular strength decreases and vice versa.

**Discussion**

100 school children between 11 and 14 years of age from the schools in Thiruvananthapuram city were included in the study using simple random sampling method. Body Mass Index has been calculated for all the students. They were divided into three BMI categories. i.e., Normal weight, Overweight and Obese. Under all the age groups 4 boys and 4 girls were under normal weight category, 4 boys and 4 girls were under overweight category and 5 boys and 4 girls were under obese
category. In normal weight category, the mean plank time was 84.9, standard deviation was 7.55, minimum value was 76 and the maximum value was 100. In the overweight category, the mean Plank time was 48.1, standard deviation was 1.69, minimum value was 45 and the maximum value was 50. In the obese category the mean value of Plank time was 32.9, standard deviation was 2.39, minimum value was 28 and the maximum value was 39. Ervin et al. studied the relationship of core, upper and lower body strength with body mass status in children and adolescents. They reported that increasing body mass negatively impacted on front bridge times in children and adolescent boys and girls 14. The result of the present study supports the study conducted by Ervin et al. The Pearson correlation for Body Mass Index and Plank time was -.957, P value was .000 which shows that there is a significant correlation at 0.01 level between Body Mass Index and plank time. Also the value shows that the correlation is negative, i.e., as the Body Mass Index increases the plank time i.e., the core muscular strength decreases and vice versa. Increased body fat mass has a negative impact on postural stability 15. Core muscles play a vital role in postural stability. King et al. conducted a study which reveals the interplay between the fat mass and the postural balance, i.e., increased fat mass put excessive stress on the core muscles which is responsible for the postural stability and balance that leads to decreased postural stability and balance 16. Adipose tissue gets deposited in the abdominal region of the obese individuals that increases the waist circumference. Studies revealed that large waist circumference is associated with poor muscle function and increases the risk of sarcopenia 17. Previous studies also revealed that the rectus abdominal muscle shows the greatest fatty infiltration, followed by the lateral abdominal muscle and erector spinae, in overweight and obese individuals 18. The studies revealed that the activation of the external oblique muscle and the rectus abdominal muscle is higher than that of other core muscles in the prone bridging position regardless of the stability of the support surface 19,20. Spinal instability is associated with reduced strength and endurance of the core musculature and altered recruitment of these muscles 21. Core strength and stability is essential for the transfer of energy from the trunk to the extremities during many sports and activities 22. The body must integrate the sensory, motor-processing, biomechanical strategies coupled with learned responses and the ability to anticipate change for the maintenance of core stability23. Pre-Programmed core muscles activation enable the body to control the trunk in response to the perturbations by producing anticipatory postural adjustments 24,25.

Conclusion

The result of the study shows that there is a significant negative correlation between the Body Mass Index and the core muscular strength in school children aged between 11 years and 14 years. Thus there is a greater need for core muscular strengthening programme for obese school children.

Ethical Clearance: Ethical clearance has been obtained from the Institutional Ethical Committee of Bethany Navajeevan College of Physiotherapy

Source of Funding: Self

Conflict of Interest: Nil

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Reliability of a Novel Test for Teres Major Muscle Length

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Abstract

This study compared the inter- and intra-rater reliability of two methods for measuring the length of the teres major. The length of the teres major was measured using the active shoulder flexion test, with and without external rotation, and the teres major length test. Each examiner used both methods in a single session. Intra- and inter-rater reliability were assessed using the intra-class correlation coefficient (ICC3,1). The independent t-test was used to compare the teres major lengths of the groups. The intra-rater reliability of the active shoulder flexion test and teres major length test was excellent (ICC3,1 = 0.84 and 0.96, respectively), as was the inter-rater reliability (ICC3,1 = 0.83 and 0.91, respectively). There was a significant difference in teres major length between the normal and shortened groups (150.30° and 134.86°, respectively; p<0.05). Our results suggest that the active shoulder flexion test and teres major length test can be reliably applied to determine the length of the teres major.

Keywords: Shoulder dysfunction; Muscle length test; Teres major; Reliability

Introduction

The teres major (TM) is a shoulder muscle that originates from the posterior aspect of the inferolateral corner of the scapula and inserts into the medial aspect of the intertubercular groove of the humerus (Grosclaude et al. 2012)¹. It is innervated by the lower subscapular nerve and supplied by the circumflex scapular artery. The main functions of the TM are extension, adduction, and internal rotation at the glenohumeral joint (Broome et al. 1971; Beck, 1989)²³. The TM is called the “lat’s little helper” because of its synergistic effect with the latissimus dorsi (Biel, 2005)⁴. When the TM is located in the quadrilateral space, it can cause teres syndrome, resulting in paresthesias and pain in the lateral aspect of the scapula and arm (Kendall et al. 2005; Cirpar, 2006)⁵⁶.

Trigger points due to TM shortness can be found in the posterior deltoid, long head of the biceps brachii, and dorsal aspect of the forearm; pain is rarely referred to the elbow (Travell et al. 1998)⁷. The TM acts as an internal rotator with the pectoralis major and latissimus dorsi. Frequent, dominant internal rotation, such as when sawing, playing badminton or hockey, or water skiing, can lead to TM shortness (Grosclaude et al. 2012; Maldjian et al. 2000; Sahrmann, 2002; Takase, 2008; Leland et al. 2009)¹⁰¹¹¹². Research has reported that shortening of the TM must be measured precisely when shoulder flexion is limited and the path of the instantaneous center of rotation is not maintained in the middle of the glenoid fossa (Sahrmann, 2002)⁸. Various techniques have been reported for measuring the length of the TM.

First, the range of motion (ROM) of the TM at the glenohumeral joint can be measured in a supine position with hip and knee flexion to flatten the back (Kendall et al. 2005; Palmer et al. 1998; Kesh 2014; Peter et al. 2006)⁵¹²¹³¹⁴. However, this technique does not just measure the length of the TM; the latissimus dorsi is...
Another technique that can selectively measure the length of the TM measures increased or decreased shoulder flexion while the glenohumeral joint is internally rotated with scapular fixation after the shoulder is fully flexed in a supine position (Sahrmann, 2002). Although this technique can selectively measure the length of the TM, it is not precise. The previous study introduced a different technique that can measure muscle tension with external rotation of the glenohumeral joint after the shoulder is fully flexed with fixation of the scapular lateral border in a supine position. However, this technique cannot precisely measure the shortness of the TM, and its reliability and validity have not been reported.

Clinically, there is no best test for precisely measuring the length of the TM. Therefore, this study investigated a novel method for the precise, selective measurement of the length of the TM. We hypothesized that the intra- and inter-rater reliability of the novel method would be greater than that of conventional methods used to measure the length of the TM.

Method

Participants

This study enrolled 38 healthy students. The inclusion criteria were: 1) no musculoskeletal or neural impairment, 2) no history of surgery or pain in the shoulder or elbow, and 3) no limitation on active shoulder exercise. Table 1 summarizes the general characteristics of the subjects. The experimental protocols were explained in detail to all of the subjects, and provided an informed written consent. This study was formally approved by the Institutional Review Board process.

Experimental procedure

The active shoulder flexion with/without external rotation test (ASFT) and teres major length test (TMLT) were performed by two physical therapists with 3 years of clinical experience each, while a research assistant took pictures and recorded the data.

The examiners were trained in the experimental methods before the main study began. The subjects were asked to wear a suitable top to enable exact measurements. First, examiner 1 measured the subjects using both test methods. Then, examiner 2 measured the same subjects using the same methods. Finally, examiner 1 repeated the measurements. A 3-minute rest was allowed between each test, and the two tests were performed in random order. The examiners were blinded to the results of the other examiner.

Active shoulder flexion with/without external rotation test

The ASFT with/without external rotation was recently developed to classify subjects into shortened and normal groups according to the length of the TM. The test was performed in a standing position. The subject was asked to flex the shoulder with internal (palm-down) and external (palm-up) rotation of the glenohumeral joint while the examiner fixed the subject’s scapula by holding the acromion and inferior angle of the scapula to inhibit scapular motion. The subject was asked to perform active shoulder flexion without elbow flexion or shoulder abduction during the test. The examiner ensured that each subject’s shoulder posture was maintained during the test. The subject was asked to initiate shoulder flexion on the signal “go”. Then, the subject was asked to stop shoulder flexion on the signal “stop” when the examiner felt the end of resistance around the subject’s scapula.

In this position, the research assistant took a photograph using a camera 1 m from the shoulder at the height of the subject’s shoulder. The angle between the longitudinal axis of the humerus and vertical line in the pictures was analyzed using ImageJ software (National Institutes of Health, Bethesda, MD, USA) (Clarkson 2005) (Fig. 1). Each test was repeated twice.

The difference between shoulder flexion with internal and external rotation of the glenohumeral joint was >10° in the shortened group and ≤10° in the normal group.

Teres major length test

The TMLT was performed in a supine position on a therapy table. Before the examination, 0.5-cm-diameter markers were placed on the lateral epicondyle of the humerus and central axis of shoulder rotation to measure the angle of shoulder flexion precisely using image analysis.

Photographs were taken and an image analysis was performed to measure the angle of shoulder flexion while the examiner passively moved the subject’s arm
in external rotation and elbow flexion. The subject’s arm was held parallel to the midline of the body. During the TMLT, the examiner fixed the subject’s scapula with his hand in the midaxillary line.

While performing this test, the examiner said “stop” on feeling the end of resistance during shoulder flexion. The research assistant took a photograph of this position using a camera at 1 m from the shoulder at the height of the subject’s shoulder.

The angle between the lateral epicondyle of the humerus and the line extending through the central axis of shoulder rotation was analyzed using ImageJ (Fig. 2).

### Statistical analysis

The difference in shoulder flexion between internal and external rotation of the glenohumeral joint was greater than 10° in the shortened group and less than 10° in the normal group.

The intraclass correlation coefficient (ICC$_{3,1}$) was used to evaluate the intra- and inter-rater reliability in the ASFT with/without external rotation and TMLT. The independent $t$-test was used to compare the measurements obtained from the TMLT in the two groups. SPSS ver. 21.0 (IBM Corp., Armonk, NY, USA) was used for the statistical analysis. The level of statistical significance was set at $\alpha = 0.05$.

### Results

The shortened group included 44 shoulders and the normal group included 32 shoulders. The ICC$_{3,1}$ for the intra-rater reliability of the ASFT and TMLT was 0.84 and 0.96, respectively, while the respective values for the inter-rater reliability were 0.83 and 0.91 (Table 2).

Table 3 shows the mean and standard deviation of the TMLT in the normal (150.30°) and shorted (134.86°) groups. The difference was significant ($p<0.05$).
Table 1. The characteristics of the study subjects

<table>
<thead>
<tr>
<th></th>
<th>Mean±standard deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>22.0±1.9</td>
<td>20–26</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>166.2±8.5</td>
<td>150–186</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>62.1±12.4</td>
<td>40–90</td>
</tr>
</tbody>
</table>

Table 2. The intra- inter rater reliability of the ASFT and TMLT

<table>
<thead>
<tr>
<th></th>
<th>ICC&lt;sub&gt;3,1&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intra-rater reliability</td>
</tr>
<tr>
<td>ASFT</td>
<td>0.84</td>
</tr>
<tr>
<td>TMLT</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Abbreviations: ICC<sub>3,1</sub>, intraclass correlation coefficient; ASFT, active shoulder flexion test with/without external rotation; TMLT, teres major length test.

Discussion

This study investigated the inter- and intra-rater reliability of the ASFT and TMLT for evaluating TM length and compared the reliability of both tests between normal and shortened groups. The ICC<sub>3,1</sub> values for the intra-rater reliability of the ASFT and TMLT were 0.84 and 0.96, respectively, while those for inter-rater reliability were 0.83 and 0.91, respectively.

These intra- and inter-rater reliability values indicate that the ASFT and TMLT were very reliable for measuring the length of the TM. The TMLT was more reliable than the ASFT. The difference in reliability resulted from technical differences in fixing the scapula during the test. The TMLT was performed in a supine position, while the ASFT was performed in a standing position, which made it more difficult to fix the scapula in normal alignment.

There was a significant ($p<0.05$) difference between the normal (150.30±7.15) and shortened (134.86±6.18) groups measured with the ASFT, a newly designed method to distinguish the length of the TM as normal or shortened. The TM originates from the posterior aspect of the inferolateral corner of the scapula and inserts in the medial aspect of the intertubercular groove of the humerus (Grosclaude, et al. 2012). It functions as an extensor, adductor, and internal rotator of the glenohumeral joint. Therefore, when the scapula is fixed, shoulder flexion is limited with external rotation of the glenohumeral joint because the TM is placed in a lengthened position with external rotation. With shortening of the TM, the difference between shoulder flexion with internal and external rotation of the glenohumeral joint with scapular fixation increased.

Previous studies reported a measurement error of approximately 2–10° between the inter- and intra-rater measurements (Horger, 1990; Armstrong et al. 1998). Therefore, a cutoff 10° difference in the angle during shoulder flexion was used to define the shortened and normal groups. There was a significant difference in the shoulder flexion angle measured with the TMLT between the normal and shortened groups distinguished by the ASFT. This means that the ASFT can be used as a screening test to identify shortness of the TM in a clinical setting. The ICC<sub>3,1</sub> for the intra- and inter-rater reliability of the TMLT was high in this study, at 0.96 and 0.91, respectively.

The TMLT that we used was a modification of the conventional TMLT in which the glenohumeral and elbow joints are not fully controlled (Kendall et al. 2005; Sahrmann, 2002). Therefore, pronation and supination of the forearm might occur to compensate for internal and external rotation of the glenohumeral joint, reducing the measurement precision. In addition, the lack of fixation of the scapula might bias the measured length of the TM. Our modified technique controls for this. The examiner fixed the inferior angle of the scapula during the test so that the start position was initiated with normal alignment of the scapula to control scapular upward rotation. In addition, the subject’s shoulder was flexed passively to maintain glenohumeral joint external rotation and the elbow was flexed to inhibit glenohumeral joint internal rotation and elbow extension.

These elements may contribute to the greater reliability of the TMLT. In the normal group, the angle of shoulder flexion averaged 150° by the TMLT. Although the normal ROM of shoulder flexion is 180°, fixation of the scapula to control the glenohumeral and
elbow joints will decrease the ROM measured with the TMLT. The ASFT was performed in a standing position with scapular fixation. The examiner fixed the inferior angle of the scapula and acromioclavicular joint to inhibit shoulder adduction and abduction. The examiner monitored the subject to avoid shoulder elevation and elbow flexion as compensation for full extension of the elbow.

The angle of shoulder flexion was measured along a line extended through the center of rotation at the lateral epicondyle of the humerus (Norkin and White 1995). However, we measured the angle between the longitudinal axis of the humerus and the vertical because the position of the lateral epicondyle of the humerus changed when internal and external rotation were performed during elbow extension.

This study has several limitations. First, the study subjects were young university students. Therefore, it is difficult to generalize our results to patients. Second, the subjects had no limitation of shoulder movement and no pain during the test. Therefore, the results of the tests used might differ in subjects with limited shoulder movement or pain. Further study is required to investigate different groups to standardize the length measurement of the TM. This study investigated the inter- and intra-rater reliability of the ASFT and TMLT for evaluating TM length and compared the reliability of the tests between normal and shortened TM groups. Our results suggest that the ASFT and TMLT can be reliably applied to determine the length of the TM. We recommend that the ASFT and TMLT be used clinically to measure the length of the TM.

Funding Statement: No funding

Ethical Statement: All of the subjects provided informed consent. This study was approved by the Institutional Review Board of Joongbu University (JIRB-2017051901-01-170612).

Conflict of Interest: None.

Author Agreement: Approved.

References


Prevalence of Flat Feet among School Children

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Objective: To find out the Prevalence of flat feet in 11 to 16 years old school children in Karachi population.

Methodology: A cross-sectional study was conducted with a sample of 116 children of age 11-16 years old students of school located in Karachi by convenient sampling technique. Diagnosis of flat feet was made by obtaining ink foot print in standing posture and by calculating Plantar Arch Index (PI).

Results: A total of 116 students were evaluated out of which 74(63.8%) were male and 42(36.2%) were female. Prevalence of flat feet in the population of 11-16 years old school children was 42.24%, among which 23.3% were having bilateral flat feet and 19% were having unilateral flat feet.

Conclusion: The plantar arch index (PI) is much easier to obtain from footprints and there is no significant difference in relation to gender or age. According to the PI analysis, no significant difference was seen between sides with mean plantar indexes are 0.77 for right side and 0.72 for left side.

Keywords: Normal feet, flat feet, school children and Plantar arch index.

Introduction

Any deviation from the normal planti-grade foot is a deformed foot. Which include high arch (Pes Cavus) foot and Flat (Pes Planus) foot.¹ Pes Cavus is a condition in which medial longitudinal arch is higher than the lateral one, the medial side of the foot tends to assume the shape of high arch.¹ Pes Planus is a condition in which the arch of the instep (Medial longitudinal arch) is flattened so that the entire sole rests upon the ground.¹

Some epidemiologic studies show that being Flat foot is a normal in few years of life. In children of 2 years or younger, Morley describes a 97% prevalence of Flat foot and this prevalence drastically decreases with age so that only 4% of patients was left with Flat feet by the age of 102. This supports the certainty that most pediatric Flat foot resolves spontaneously throughout the first decade of development.² Foot wears also have an influential role in the Flat feet, in Europe and America Flat feet is one of the most common reason for the attendance of children in orthopedics clinic but in India children are seldom affected.³ According to Pita Fernandez, Prevalence of Flat foot in the population of 40 or older was 26.62%, age and female gender were specifically associated with Prevalence of Flat foot.⁴

The purpose of the study was to evaluate the Prevalence of Flat feet among school children of age 10 to 15 years, including a sample of 116 students in Karachi population by calculating the distribution of Flat feet in relation to age and gender.

Flat foot is a very common problem in children and if not diagnosed or treated early will leads to disturb whole biomechanics of body. Currently there is lack of awareness about the prevalence of Flat feet in Pakistan, the reason to choose this topic is to spread knowledge about Flat feet in the country. Early identification leads to early intervention so that it can prevent further destruction.

Materials and Method

It was a non-experimental cross-sectional study to evaluate the proportion of participants suffering from a condition named as flat foot (pes planus). A sample of 116 school children was selected from School located in Karachi. A non-probability convenient sampling technique was used for the selection of students.

Inclusion Criteria: Children belong to 10-15 years of age, Both sexes; either male or female, School children.
**Exclusion Criteria:** Children <10 or >15 years of age, Fracture over foot region, Children suffered with boils, burns, Any associated congenital abnormalities.

**Instrument/tool:** The tool used to analyze data was Plantar Arch index (PI). Staheli LT developed Plantar arch index⁵ that’s why it is also known Staheli’s arch index (SAI). It was used as a diagnostic tool for a condition called flat foot.⁵ Foot print gaining kit with Ink pad ink was used and analysis of foot prints was done through measuring the plantar arch index. A comparative study of plantar arch index calculated from ink and electronic foot prints generally shows significant results in the favor of ink foot prints.⁶

Queen et.al stated that the most consistent foot print measurement was the foot print index, followed by the Staheli index.⁷ Foot print analysis is the most valid method for diagnosing flatfoot considering it as a gold standard concluded by Fernandez et.al. Many author suggest that Chippaux- Smirak index, Staheli index, and the Clarke’s angle, as a reliable tool.⁸

**Procedure:** After getting permission from school, parental consent was obtained and we started to examine children. Data collection was done by getting demographics information and foot prints. Every individual was made to sit and foot was gotten contact with the foot impression gaining kit without any loss of image each individual foot impression was pressed on white sheets in standing posture.

**Calculation of plantar arch index:**

A line is drawn perpendicular to the medial forefoot edge and at heel region. By calculating the mean point of this line, a perpendicular line is drawn crossing the footprint. The same procedure is repeated at the heel tangency. Measurements are obtained by dividing width of the central region of the foot (A) with the width of the heel region (B) in millimeters. The plantar arch index will be (PAI = A/B).

![Figure:1 Measurement of Plantar Arch Index](image)

Basically, this index is comparing the width of the heel to the width of the middle of the foot in standing. A lower index value means a higher arch.

**Evaluation of plantar arch index:**

Plantar arch index of each individual was made to compare with Normative Reference Values of PAI according to their age which is as follows: ¹⁰

<table>
<thead>
<tr>
<th>Age</th>
<th>Normative Reference Values Of PAI ¹⁰</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.24---0.81</td>
</tr>
<tr>
<td>11</td>
<td>0.34---0.9</td>
</tr>
<tr>
<td>12</td>
<td>0.39---1</td>
</tr>
<tr>
<td>13</td>
<td>0.35---0.83</td>
</tr>
<tr>
<td>14</td>
<td>0.43---0.79</td>
</tr>
</tbody>
</table>

**Data analysis**

Data was analyzed using SPSS version 16 (SPSS Inc., Chicago, USA). Descriptive statistics including Mean and Standard deviation was analyzed, for purpose of comparing the means, parametric tests, Student’s t test and paired t-Test and ANOVA were. The adopted significance level in all test was 5% ($α$ =0.05).

**Results**

A total of 116 students were evaluated out of which 74 (63.8%) were males and 42 (36.2%) were females.

Children were further divided according to their ages into 6 subgroups. Each subgroup corresponds to children of 11, 12, 13, 14, 15 and 16 years.

The Prevalence of flat feet in a population of 11-16 years old school children was 42.24%, among which 23.3% were having bilateral flat feet and 19% were having unilateral flat feet in figure 2, shows Percentage of normal foot, unilateral and bilateral flat foot.

Out of 116 students 67 (57.8%) were having normal feet, females who suffered from flat feet were 18(15.5%) and male were 31(26.7%). Gender wise distribution of flat foot is shown in figure 3

There were no Significant differences were noted between different age groups for both sides shown in table 1 and 2.
There were no significant differences were reported between genders for both sides as described in table 3 and 4.

Plantar index mean values, standard deviation, number of feet studied (N), comparing both sides in the population sample (table 5). Following the PI analysis, no significant difference was seen between sides, with mean plantar indexes of 0.77 for right side and 0.72 for left side.

Table: 2- Plantar index mean values for left feet according to age in the sample

<table>
<thead>
<tr>
<th>Statistics</th>
<th>1L</th>
<th>12L</th>
<th>13L</th>
<th>14L</th>
<th>15L</th>
<th>16L</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>116</td>
<td>116</td>
<td>116</td>
<td>116</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>Mean</td>
<td>3103</td>
<td>.1724</td>
<td>.4136</td>
<td>.4826</td>
<td>.5776</td>
<td>.2566</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.85885</td>
<td>.86328</td>
<td>.85538</td>
<td>.98111</td>
<td>1.02625</td>
<td>72377</td>
</tr>
</tbody>
</table>

Table: 3 Plantar index mean values for right feet according to gender in the sample

Statistics

<table>
<thead>
<tr>
<th>Statistics</th>
<th>male right</th>
<th>female right</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>74</td>
<td>42</td>
</tr>
<tr>
<td>Missing</td>
<td>42</td>
<td>74</td>
</tr>
<tr>
<td>Mean</td>
<td>.7983</td>
<td>.7221</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.28454</td>
<td>.34708</td>
</tr>
</tbody>
</table>

Table: 4 Plantar index mean values for left feet according to gender in the sample

Statistics

<table>
<thead>
<tr>
<th>Statistics</th>
<th>male left</th>
<th>female left</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>74</td>
<td>42</td>
</tr>
<tr>
<td>Missing</td>
<td>42</td>
<td>74</td>
</tr>
<tr>
<td>Mean</td>
<td>.7457</td>
<td>.7105</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.31748</td>
<td>.36925</td>
</tr>
</tbody>
</table>

Table: 5 Plantar index mean values, comparing both sides in the sample

Statistics

<table>
<thead>
<tr>
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<th>left foot</th>
</tr>
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<tr>
<td>N</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>Missing</td>
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<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>.7704</td>
<td>.7277</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.30963</td>
<td>.32465</td>
</tr>
<tr>
<td>Minimum</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>1.68</td>
<td>1.79</td>
</tr>
</tbody>
</table>

Discussion

To determine the prevalence of flat foot in different age groups and gender in different countries. Many studies have been conducted. The development of medial longitudinal foot arch is comparatively higher between 2 and 6 years of age, when child starts weight bearing and becomes structurally matured around 12 or 13 years of age. According to Pfeiffer et al.
of pathological Flat feet was 44% within a population of 3-6-year-old children11. Pranti et.al concluded that prevalence of flat feet was 16 % in 14 to 20 years old12. While the present study shows a variation in the prevalence of flat foot i.e. 42.2% in 11-16 years old. These differences could be explained by the fact that authors used different age groups. Considering these results it can be said that prevalence of flat foot decrease with the increase of age.

The Turkish study of Yucesan et.al reported that flat foot was most widespread congenital abnormality in Turkish school students hence the prevalence was 22.8%13 but we had studied only children regarded as clinically normal.

We had made our diagnosis by obtaining ink foot print. There are some authors who had advocated its use: Daniel14, Roudriguez15, Forriol16 et.al, Chang17 and Fernandez8 among others. Consequently, simple ink prints technique is cost effective and easier way of diagnosing flat feet in contrast with radiography. It is less demanding and easier to apply. It does not include any radiation as well as widely used method in diagnosing flat feet clinically. A comparative study of plantar arch index, calculated from ink and electronic foot prints generally show significant results in the favor of ink foot prints, that’s why we have also used ink prints.

Whereas diagnosis could also be made by obtaining by the personal history18, body mass index (BMI)19 scanning of feet by using a laser surface scanner, and rear foot angle measurement11. Flat foot evaluation can also be made on combination of signs, specifically with great toe extension test indicated by Rose et.al20.

Considering the percentage prevalence for sexual dimorphism according to Kachoosangy et.al the prevalence was greater in female (75.2%) then male 72.6% but this difference is not much significant21. Prevalence percentage of flat feet in total population of 228 students in India demonstrate the higher prevalence among male than female which is in accordance with the results of our current study.

We haven’t looked for Footwear related history of children, though footwear also has influential role in the development of medial longitudinal arch (MLA). Children who wore shoes have higher prevalence of flat foot than those who did not23. These observations are contrary to the statement of Kelsey24 that there is no evidence that type of footwear influence the occurrence of flat foot.

According to Bhoir et.al, Flat foot prevalence was 11.25% in a population of 18 to 25 years old physiotherapy students and all subjects were affected with bilateral Flat foot25, while this have some close resemblance with the result of our study i.e. bilateral flat feet (23%) which is more than unilateral flat feet (19%).

Our plantar arch indexes do not show any difference regarding sides, both sides are affected equally while some studies show significant difference between right or left side plantar arch indexes26. The reason is somewhere in the foot print capturing method; they took child footprint in 30° flexed knee position while we had taken it in the extended knee position as done by Daniel et.al14.

**Conclusion**

The present study shows that prevalence of flat feet in the school children among 11-16 years of age is comparatively high and is more common in male than female child and bilateral involvement is more than unilateral involvement. According to the PI analysis, no significant difference was seen between sides with mean plantar indexes are 0.77 for right side and 0.72 for left side.

**Competing Interest:** The authors declare that they have no competing interest.

**Funding:** The study was completely self-funded by author.

**Ethical approval** was also taken from Institutional Review Board JPMC and parental consent was also obtained before starting data collection.

**References**

3. Echarri JJ, Forriol F. The development in footprint morphology in 1851 Congolese children from urban and rural areas, and the relationship between


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