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To Find Out the Prevalence and Various Risk Factors for Falls in Older Adults (60-75 Years) Community NCR Delhi

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ABSTRACT

Aims: To find out the prevalence and various risk factors for falls among older adults (60-75 years).

Objective: To sensitize O.T intervention program among older adults by providing health education booklet.

Material and Method: It is a cross-sectional community based study in which 100 people (aged 60-75 years) were interviewed, out of 100, 54 were women and 46 were men.100 people, fulfilling the inclusion criteria and they were asked to given a written consent for the participation in the study. General evaluation of older adults was carried out. They were assessed by face to face interview using Johns Hopkins fall risk assessment tool (JHFRAT).Scale was in English so each question was explained by the researcher in Hindi.

Result: The finding of present study shows that in total 100 subjects of older adults (male and female both) 60-75 years, the prevalence of fall is 27.69%, and the risk of fall is found (56/100) 56% older people has moderate fall risk, (12/100) 12% has high fall risk and (32/100) 32% has low fall risk.

Conclusion: This study concluded that the history of falls, poor vision, use of multiple medications, chronic disease, use of walking aids, vertigo and balance problems were associated with falls among the older adults. So there is a need to develop occupational therapy health education awareness program to prevent these problems and risk of falls.

Keywords: *Quality of life, Occupational therapy, Traumatic brain injury*

INTRODUCTION

India as the second most population's country in the world which has seen a sharp increase in the population of the older adults.

Every year nearly one third of accidental falls occur in those aged more than 60 years with 10% of these falls resulting in serious injury.

Falling in older adults can lead to hospitalization, disability and premature death. It can also reduce the level of independence, high level of anxiety and poorer quality of life.

In INDIA the prevalence of falls has been estimated as 14%to 53%.[1]

There are several intrinsic or extrinsic factors which is considered responsible for falls among older adults and reduced their QOL, affect their activity of daily living, gait and balance deficit and cognitive impairment.[3]

O.T practitioner can provide the home and environmental modifications, exercises, and practical support to enable people to overcome any barriers that prevent them from doing an activities.

This helps to increase people's independent to be able perform their activity of daily living and maintain their dignity and satisfaction in all aspects of life.

O.T interventions and treatment plans for fall prevention include positive risk-taking in activity, maximizing functional performance, improving self-

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confidence and social engagement. Environmental advice and modification to reduce home hazards, education and practice in safe moving and handling, with provision of equipment as required, are also appropriate. All interventions should promote independence and personal safety.[5]

METHODOLOGY

- TYPE OF STUDY-CROSS SECTIONAL STUDY COMMUNITY BASED DELHI NCR
- TOOL USED-JHFRAT(Johns Hopkins FALL RISK ASSESSMENT TOOL)
- SAMPLE SIZE-100
- SOURCE OF DATA COLLECTION-COMMUNITY BASED DELHI NCR

VARIABLES

- Independent Variables: Occupational therapy based booklet
- Dependent Variables: Prevalence and risk factors for fall

Inclusion Criteria

- Older adults (Male and Female Both)
- Age group (60-75 years)

Exclusion Criteria

- Less than 60
- Record of trauma unrelated to falls
- History of any psychiatric disorder
- History of any major cardiovascular disease

Outcome Measures

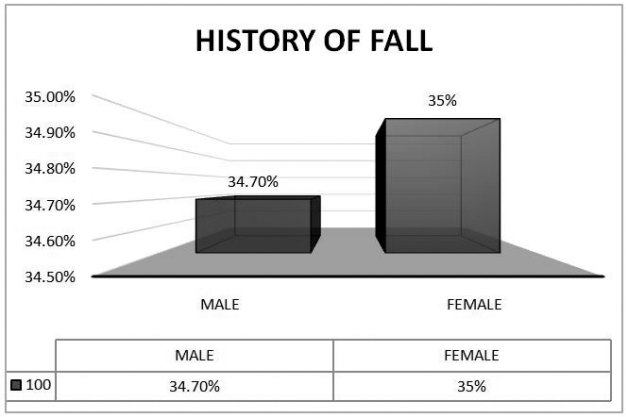
- JHFRAT (FALL RISK ASSESSMENT TOOL)-
- General Evaluation Performa

PROCEDURE

This study was a community based study. By using quota sampling method 100 aged 60-75 years who have risk for falls were interviewed, out of 100, 54 women and 46 men took part in this study.

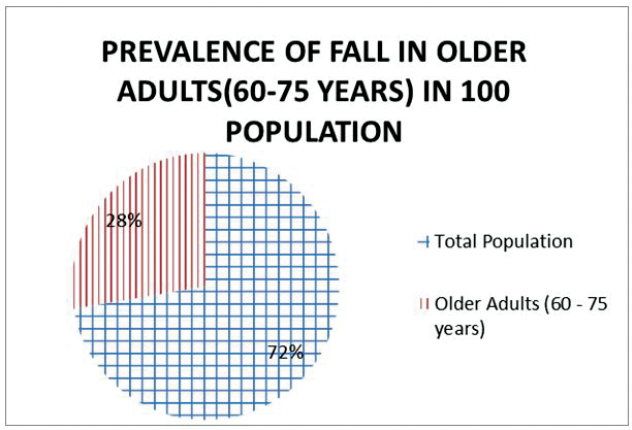
The language I choose is English and I also make people to understand the questions in Hindi so that the questioned must not be ignored or answered incorrectly. Considering the previous literature available, I excluded the older adults who were diagnosed with any major trauma not related to fall, cardiovascular or psychiatric conditions, any infections or tumor. After selecting the older adults for the sampling, the interviewer conducted door to door survey. Before proceeding to the inclusion-exclusion criteria and were willing to participate in the study they were then asked to provide their demographical details any present or past fall history, current illness, medical history, surgical history musculoskeletal history and information for body mass index (height, weight). After explaining the need and purpose of the study a duly signed written consent was obtained from each person. The scale were administered to all of them.

RESULTS



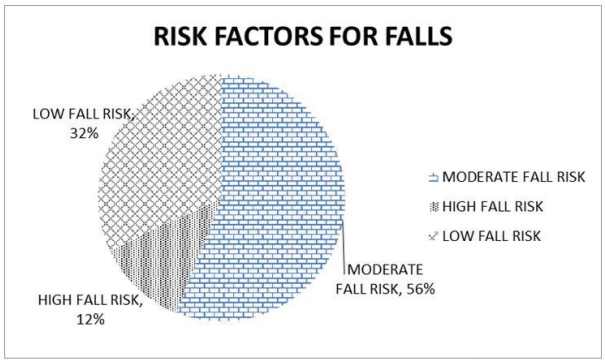
GRAPH 1

Interpretation: It shows the percentage of history of fall in male and female both, in 100 population in which there is 54 women and 46 men and fall history is 19 fall out of 54 (35%) in women, and 16 fall out of 46 (34.7%) in men.



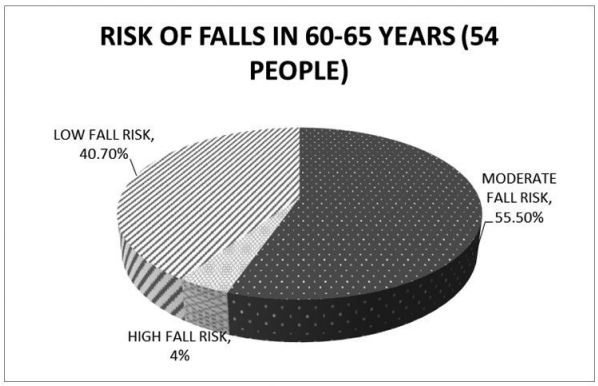
PIE CHART 1

Interpretation: It shows the prevalence of falls among older adults (60-75 years).The prevalence of falls is 27.69%,it means in every 8 person there is one fall exist.



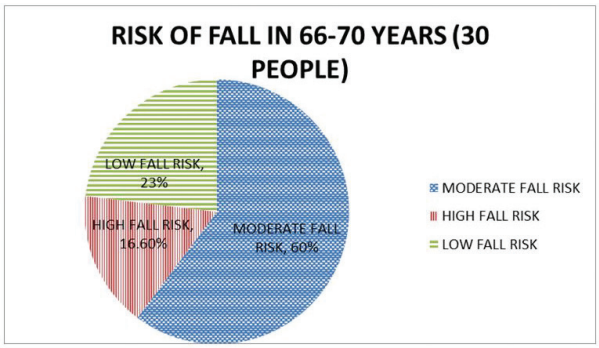
PIE CHART 2

Interpretation: It shows the risk factors for falls among older adults (60-75 years) in 100 population. In which there is 56% (56/100) people on moderate fall risk,12% (12/100)on high fall risk, and 32% (32/100) on low fall risk.



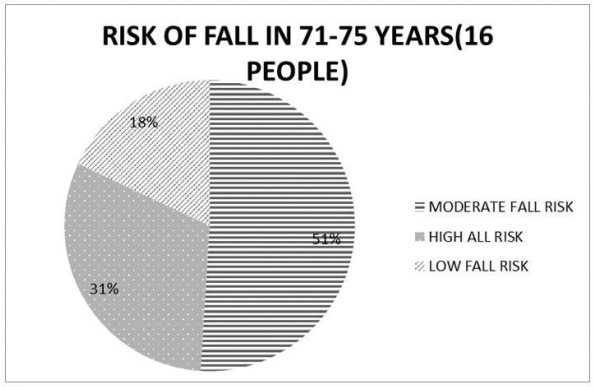
PIE CHART 3

Interpretation: It shows risk of falls in the age group 60-65 in which there is 54 people out of 100, indicate that 55.5%(30/54) people has on moderate fall risk, 40.7%(22/54) on low fall risk and 4%(2/54) on high fall risk.



PIE CHART 4

Interpretation: It shows risk of falls in the age group 66-70 years in which there is 30 people,60%(18/30) people on moderate fall risk,23% (7/30) on low fall risk and 16.6%(5/30) on high fall risk



PIE CHART 5

Interpretaton: It shows the risk of falls in the age group 71-75 years in which there is 16 people put of 100,51% (8/16) people on moderate fall risk, 31%(5/16) on high fall risk,18% (3/16) on low fall risk

DISCUSSION

Literature on geriatrics professional suggest the evident prevalence of risk factors for falls among elderly people in the age of 60-95 years (**PRADNYA DHARGAVE, September 2016)** explained that in India, the prevalence of falls has been estimated as 14-53%.

My study is on: To find out the prevalence and various risk factors for falls among older adults (60-75 years) community NCR Delhi. A total of 100 older men and women were assessed from JHFRAT. The findings of present study show that the prevalence of falls in older adults is 27.69%, which means in every 8 person there is one fall exists.

FAISAL YOUSUF ALMEGBEL et al. (2018) reported that approximately 28% to 35% of people aged 65 and over fall each year. The consequent injuries of falls are considered major public health problems. Falls account for more than half of injury-related hospitalizations among elderly people. The major underlying causes of falls lead to hip fractures, TBI, and upper limb injuries. In addition, unintentional falls are the fifth leading cause of death in elderly people.

In 100 population there is 54 women and 46 men who participated in this study in which the history of

fall is present in women is 35% (19/54) and in men is 34.7% (16/46).This result is show that more women had a history of falling than men. Many other studies found similar results. According to WORLD HEALTH ORGANISATION report, about one-fifth of fall related to death in 2004 occurred in India.

This study is also found out the various risk factors for falls among older adults which is categorized in high, moderate and low fall risk according to JHFRAT Scale. According to **RAGHUPATHY SENDHILKUMAR et al. (2016)** the risk factors considered responsible for elderly people. Important factors are weakness, arthritis, history of falls, impaired activities of daily living, gait deficit, depression, balance deficit, cognitive impairment, use of assistive devices, visual deficit, medication (certain psychiatric drugs, antiarrhythmic drugs)

In total 100 subjects of older adults (male and female both) 60-75 years the moderate fall risk is found (56/100) 56%, high fall risk is found (12/100) 12% and low fall risk is found (32/100) 32%.

There is three group divided of age, first 60-65 years-they have 54 people out of 100 in which (30/54) 55.5% people on moderate fall risk, (22/54) 40% people on low fall risk and (2/54) 3.7% people on high fall risk.

Second 66-70 years-they have 30 people in this group out of 100 in which (18/30) 60% people on moderate fall risk, (7/30) 23% people on low fall risk, (5/30) 16.6% people on high fall risk.

Third 71-75 years-they have 16 people out of 100 in which (8/16) 50% people on moderate fall risk, (3/16) 18% people on low fall risk and (5/16) 31% people on high fall risk.

This study shows that the large number of people is on moderate fall risk.

This study can be used for future research and planning of effective strategies to prevent falls among older adults.

CONCLUSION

This study concluded that the history of falls, poor vision, use of multiple medications, chronic disease, use of walking aids, vertigo and balance problems were associated with falls among the older adults population living in community Delhi NCR.

The risk of such falls increases with age and has a strong relationship with the health status of these elderly individuals. There is, therefore a need to develop occupational therapy health education awareness program to prevent these problems and risk of falls.

I am also grateful to my family and friends who are the ultimate source of strength and their love and sacrifice over the years who have opened countless opportunities for me.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: O.T prevention program for falls

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Exploring Barriers to the Use of Assistive Technology for PWDS in India

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ABSTRACT

Assistive Technology (AT) can have significant beneficial effects for people with disabilities (PwDs) but there are also many barriers to their use. These barriers need to be analyzed in order to improve their overall quality of life. Accessible India Campaign under the Department of Empowerment of Persons with Disabilities (DEPwD), Ministry of Social Justice and Empowerment, aims at achieving universal accessibility for persons with disabilities and to create an enabling and barrier-free environment for them. While assistive technologies such as advanced wheelchairs may help PwDs become employed or return to work, many non-technological barriers cause that promise to go unfulfilled. In this reference the present study has been done to identify various barriers to the use of AT among the PwDs in India by conducting a survey in different parts of the country. India has over 70 million plus people in the disabled category and the use of AT is of great importance for them. This study aims to explore various barriers to implementing assistive technology for PwDs in Indiato help them to live an independent and productive life.

Keywords: *Disability; Accessibility; Assistive Technology; Assistive Devices; Quality of Life; Socio-Psychological Attributes.*

INTRODUCTION

Accessibility is a measure of the extent to which a product or service can be used by a person with a disability as effectively as it can be used by a person without that disability.

Over a billion of the world's population has some form of disability. They are the world's largest minority. This figure is on a constant increase due to increase in the population as well as the medical advances that have decreased mortality due to old age. At the same time PwDs are experiencing a lack of access to technologies due to visual, hearing, mental, and/or other impairments that make it difficult to operate various devices. Other groups facing accessibility issues are illiterate and elderly populations.

Studies show that at least one billion people from all over the world belong to the older aged category who may acquire certain disabilities due to age related conditions. They generally prefer to continue living in their own homes rather than move into residential age care institutions. AT in the home environment and/or bodily worn systems that monitor people's movement might contribute to an increased sense of safety and security at home. However, their use can raise ethical anxieties as little is known about how older persons perceive assistive and monitoring technologies.

Another major category includes children with multiple disabilities who can efficiently improve access and participation in their school and home environments by the use of AT. Effective educational outcomes from AT use are dependent upon a coordinated assessment and implementation process. Making resources and information accessible to persons with disabilities is of great importance in this scenario as more and more people will start requiring accessibility.

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There is evidence that AT can have significant beneficial effects for children with multiple disabilities.[1,2] There is also a strong indication, however, that AT is currently implemented within educational environments in a less than optimal manner.[3,4]

India is home to 2.7 crore people living with one or the other kind of disability. Unlike the developed world, India's disabled are made further sociallyvulnerable by lack of quality education, lack of women's safety, and attitudinal barriers as they continue to grapple with the challenges of access, acceptance, and inclusion.

Until a few decades ago, it was almost unimaginable for the disabled to lead independent lives. The advent of technology and internet has, however, opened new doors. A print-impaired person can now listen to audio books and learn. The Ministry of Social Justice and Empowerment has recently announced Sugamaya Pustakalaya, an online library where books are made available in different accessible formats for people with visual impairment and other print disabilities.

In developing countries such as India, the road to accessibility is a long, winding one. Although in recent times assistive devices have been extensively prescribed, there are few evaluations of the barriers to their utilization. The purpose of this paper is to identify the potential barriers faced by the people with disabilities in using the AT by conducting survey and by reviewing the available literature.

REVIEW OF LITERATURE

Many researchers have worked on the uses and benefits of AT for the people of all ages with multiple disabilities but a little literature is available on the barriers faced by PwDs in India in using it. Although developments in AT are present to enhance the quality of life of the people with multiple disabilities, many instructors feel intimidated and unsuccessful in this endeavor because of barriers they face in implementing technology they lack knowledge about.

Children with multiple disabilities often face barriers to accessing and participating in self-care, play, leisure and education.[5] AT has been employed as one strategy, particularly in educational settings, to enable these children to participate more fully in various activities.[1,3,6,7]

Studies of AT utilization have suggested infrequent use of prescribed devices in home, vocational and community settings,[3,8] poor rates of use by teachers and other professionals who work with children with multiple disabilities,[9] and concerns regarding the way in which AT programmes are being implemented at school and at home.[1,4,10] Reasons given for abandonment of devices have been expressed in broad terms, such as the device being 'unsuitable' for the child.[11]

Multiple studies that have followed AT usage longitudinally by children with severe and multiple disabilities suggest that it is difficult to identify any one factor that limits effective AT application. Rather, it is likely that problems arise from an interaction of factors associated with the people, services, systems and processes that currently guide AT practice.[1,3,10-13]

AT provides numerous benefits for PwDs. It can be used to overcome the social, infrastructure and other barriers experienced by disabled people that prevent their full and equal participation in all aspects of society.[14] Similarly, it has been pointed out that AT allows people to continue in their normal roles and meet their expectations of life despite their physical impairment and disability.[15]

Occupational therapists have a critical role in the assessment and implementation of AT needs, particularly in determining ways for the child to interface effectively with the technology.[16,17,18,19,20,21] However, in an examination of occupational therapy training programmes in the early 1990s, minimal course content related to AT was identified, suggesting that occupational therapy graduates may be ill-prepared to fulfill their roles in technology teams.[16,17] Further research confirmed that school-based occupational therapists found to use AT with only a small percentage of their caseload. A principal reason cited for low rates of use was insufficient expertise to allow investigation and application of different devices.[19]

One of the main barriers in accessing AT in less resourced settings is the lack of funds. Limited financial resources, lack of leadership and governance in many countries have a major impact on availability and accessibility of AT.[22,23] In addition, service delivery including referral, assessment, funding, ordering, product preparation, fitting, adjusting, user training, follow-up, maintenance and repairs, hinder the use of AT.[24]

Lack of personnel with proper training in appropriate mobility device services is also a major barrier. In many developing countries like India, production of mobility devices is done only on a small scale, or perhaps not at all, due to limited access to materials, machinery and expertise.[25]

METHODOLOGY

A survey was conducted through a questionnaire among a sample of about 100 PwDs belonging to all age from different cities of India. The questionnaire was distributed to occupational therapists working in different parts of India. With their help the PwDs were interviewed and the data were collected through electronic media. In case of children their parents/ guardians were interviewed. Both the persons who were already using assistive devices and those who were in need of assistive devices were included. Among those waiting for assistive technology, there were participants who had used it previously and been forced to discontinue because of some reasons.

The questionnaire contained 18 multiple choice questions related to the problems associated with the use of AT. For the study each participant was separately interviewed to identify the problems related to the use of AT. Interviewing participants separately provided an opportunity to them to speak freely about what restricts them to use AT. The research questions that guided this study were categorized in following sections:

- General Information
- Type of disability
- Affordability and quality of AT
- Repairing and maintenance of AT
- Psychosocial barriers
- Awareness and Policies regarding use of AT

In addition to the survey, the literature available on barriers to the use of AT in India was also reviewed as a part of study in order to identify current barriers to effective incorporation of AT among PwDs.

ANALYSIS OF SURVEY

While AT improves the quality of life of persons by facilitating activities of daily living, there are also many barriers to their use. This study aims to describe these barriers among PwDs in India.

Analysis of interviews is represented in table 1.

Table 1: Analysis of Interview

S. No.	Question Related To	Categories	Percentage
1.	Age	0–3 years old	None
		4–22 years old	45%
		23–59 years old	55%
		60 years old +	None
2.	Disability	Physical Disability	65%
		Intellectual Disability	30%
		Learning Disability	30%
		Hearing Impairment	5%
3.	Work Status	Full time	63%
		Part time	29%
		Non-working	8%
4.	Contribution of AT to improve life-style	Strongly Agree	80%
		Agree	20%
		Disagree	None
5.	Barriers faced in getting/ using right AT	Lack of funding	38%
		Lack of knowledge on what AT devices are available	5%
		Lack of skilled professionals to make good recommendation	37%
		Frustration using AT	20%
		Incompatibility with higher tech AT	10%
		Transport problems due to lack of user-friendly environment	12%
		Lack of awareness	48%
		High cost	40%
		Lack of training	30%
		Repair and maintenance	80%
6.	Perception of Family members/ Society	Normal behavior	58%
		Show Sympathy	26%
		Avoid Interaction	11%
		Treat badly	5%

RESULT AND DISCUSSION

With rising life expectancy, there is a rapid increase in the number of elderly persons worldwide. The need for elderly care in India is similar to the global scenario with some factors pertinent to India like a changing family system, a rural urban divide, gender-based beliefs and a lack of facilities that need to be addressed. Lack of awareness about new assistive devices was a major hindrance in using AT by elderly population in India.

India is a developing country and around 30% of total population lives below the poverty line. The major barriers for not making use of AT were found to include lack of funding and high cost of these devices. Most of them do not earn enough to buy these devices and depend totally on Government/ NGOs for funding. Even if they manage to get these devices the next major issue is the repairing and maintenance of the device which is again very costly and unaffordable for such people.

The prime barrier faced by people who are financially sound is the scarcity of skilled professionals. Lack of awareness about newer and quality devices amongst these professionals restricts them to recommend a compatible device. Some of the existing users got information from various other sources, such as friends and the media. Another major barrier to the effective use and implementation of AT is the lack of training facilities for the instructors. As a result, they are unable to give complete information about the use and maintenance of prescribed devices.

The socio-psychological attributes greatly hinder the adoption of AT. Sometimes the unintentional negative social behavior promotes a sense of positive discrimination; pity and sympathy for PwDs which can make them feel self-conscious resulting in hindering the adoption of AT. Curiosity and unwanted attention from others can also lead to discrimination, thus hindering its usage.

The survey gives people a chance to share their experiences and opinions about AT with researchers and policy-makers who make guidelines and regulations for these technologies. The results show that multiple barriers exist for the use of assistive devices for PwDs in India which may have a major impact on their lives and livelihoods and may reduce their quality of life. Most of the people surveyed in this study believe that the use of proper AT can reduce stress and as a result can help to improve their quality of life so that they would be able to contribute greatly towards society.

CONCLUSION

The first-time users faced economic barriers, availability barriers, awareness barriers and psychological barriers, whereas persons already using AT faced repair and maintenance barriers, accessibility barriers and psychological barriers in addition to the barriers encountered by the first-time users. To sum up, lack of awareness and unavailability of repair/ maintenance services is considered to be a major barrier for existing users. Consequently, they do not feel any significant improvement in their quality of life because of poor accessibility and difficulty in finding a place to repair assistive devices.

Thus there is a need for expansion of current technology adoption models to give them an increasingly balanced outlook. Therefore, in order to increase the use of AT, there is a great need for skilled occupational therapists who can understand the feelings and experiences of PwDs. Also the local infrastructure and accessibility facilities, heightening public awareness, ensuring funding and a continuous supply of assistive devices supported by maintenance services should be improved. Persons with physical disabilities should be helped to gain more knowledge about assistive devices, especially about the availability of more modern ones. They should be given support to modify their physical and social environments.

Ethical Clearance: Taken from Ethical Committee of Maharaj Vinayak Global University.

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40 Yard Dash Test in Young Athletes of Belagavi City-An Exploratory Study

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ABSTRACT

Background: Sprinting is an essential component in many sports and can distinguish between good and better athletes during team sports performance. The sprint test is used to discriminate players performance across different ages and levels of competition and the inter sprint trial. It is thought that this information would be of importance to strength and conditioning coaches in analyzing and planning the sprint and resistance training of field sport athletes in and around Belagavi city.

Objective: The primary objective of this study is to quantify the time taken to perform 40 yard dash in young athletes aged 18–25 years. The secondary objective is to set concrete data which will prove as a base line for any other studies which will involve designing rehabilitation and/or fitness protocol for Indian athletic population

Methodology: 132 athletes (n=132) were screened for the study. The normative data was collected for the 40 yard dash test. Age criteria was 18-25 yrs. Speed of every participant was recorded.

Result: The results of this study found that 40 yards DASH Test performance of male participants of mean age 20.31±2.21 ranged from 4.00-6.90 seconds and female participants of mean age 20.22±1.97 ranged from 4.00-6.87 seconds.

Conclusion: This study concluded that the values of 40 yard DASH Test ranged between 4.00-6.90 for both genders with male athletes showing better performance than females.

Keywords: *40 yard dash , speed, sprint, young athletes*

INTRODUCTION

Speed is an essential component in many sports that can distinguish between good and better athletes during various sports performance.[1] The sprint includes different phases including first step quickness, acceleration, maximum velocity and deceleration. First step quickness is the first 0-5m phase of sprinting which is usually included in the acceleration phase, particularly characterized by foot initiation and high propulsion force [2-3] and is of extreme importance as the performance of sprinting relies on this phase.[4-6] Acceleration is the next phase that is initiated to generate maximum velocity throughout the performance till last 5m distance prior to the finishing line which needs large muscles of lower limb to be powerful.[6] Sprint performance is essential component in many sports for a multitude of reasons from winning a race to providing an advantage during sprint duels that allow players to reach the ball before the opponent.[8] Hence, improving training methods to enhance sprint performance in athletes is of great importance which can be achieved through long-term strength training program.[7]

In many sporting activities such as tennis, squash, basketball, soccer, the athletes never attain maximum speed during sprinting. In fact, sprints most frequently

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occur over very short distances (0–10 m) from both standing and rolling starts. Consequently, the speed over the first steps and the ability to accelerate quickly would be considered of greater importance.[9,10] A total seven studies reported the reliability of over ground sprinting in youth population.[11-13] Intra- and inter day sprinting distances of 10, 20, 30 and 40 m ranged from 0.83–2.07%. Intra- and inter-day distances ranged from 0.88 and 0.98 for 10–40 m and person correlation coefficient from 0.90–0.97.[14–17]

Yetter et al., found that Heavy Back Squat(HBS) treatment produced significantly greater speeds than cycling during the 10- to 20 m interval and Heavy Front Squats(HFS) during the 30- to 40-m interval following 6 bouts of sprint interval training performed over 6 weeks period.[18] Hence, multidimensional nature of sprint running that demands different levels of muscle activation can be achieved by incorporating HBS into the warm-up procedure. This is a very important topic of research that has not been adequately investigated as sprint test has an ability to discriminate players performance across different ages and levels of competition and the inter sprint trial effect. In fact, the data obtained through sprint test can be turned into valuable information on the unique physiological demands of various sports performance. Additionally, such a test can guide coaches more effectively to design conditioning and training programs across a season and also can help them to better understand differences between players.

MATERIALS & METHODOLOGY

Materials Used:

- Consent form
- Data collection sheet

Apparatus and Equipment:

- Measuring Tape
- Cones
- Stopwatch

Methodology: Ethical clearance was obtained from the Institutional Ethical Committee of KAHER Institute of Physiotherapy, 132 young adults were recruited to the study after fulfilment of eligibility criteria. A written informed consent was obtained from all the participants before the commencement of the study. The participants were from the various institutes and sports academies in and around Belagavi city. Demographic characteristics of the participant, including their age, gender, age at start of sporting event and years of playing were noted. Athletes within the age group of 18-25 year of age both male and female who were willing to participate were included in the study. Participants were excluded if there were any musculoskeletal problems such as fracture and sprain/strain of lower limb in the past 1 year, existing neurological, respiratory or cardio vascular problems or any other condition leading to limitation in 40 yard dash test performance.

Outcome measures

40 Yard Dash Test :

Equipment Required: Measuring tape/measured track, stop watch, cone markers, unobstructed grass/track surface of 60 yards.

Procedure: Aim of this test is to determine acceleration and a reliable indicator of speed, agility and quickness. The test involves running a single maximum sprint over 40 yards, with the time recorded. A thorough warm up is given, including some practice starts and accelerations. Test is started from a comfortable stationary 3-point stance position, a position that is most familiar to athlete. The front foot must be on or behind the starting line. The starting position to be held for 3 seconds prior to starting. The subjects are allowed to across the starting line, but no rocking movements are allowed. The tester provides hints to maximize speed and encouragement to continue running hard past the finish line.

The results are obtained from two trials. Best time is recorded on the nearest 2 decimal places. The start is taken from the first movement or when the timing system is triggered, and finish when the chest crosses the finish line.[24]

STATISTICAL ANALYSIS

The statistical analysis was done by using SPSS version 21 software. Correlation between BMI, speed and number of years played with best time was analysed using Karl Pearson's correlation coefficient method. Comparison of male and females with mean best time, mean of first and second attempts speed score, mean number of years played and BMI were analysed using t test.

RESULTS

132 healthy participants were included in the study. As shown in Table.1, more number of male participants were included (n=95) as compared to female participants (n=37). The mean age was 20.28±2.14 and there was no significant difference in mean age between male and female participants.

Table 1: Distribution of male and females with mean age in the study

Gender	No	%	Mean ± SD
Male	95	71.97	20.31 ± 2.21
Female	37	28.03	20.22 ± 1.97
Total	132	100.00	20.28 ± 2.14

Table 2: Normality of best time in the study by gender

Best time	Total		Male		Female	
	Range	No	Range	No	Range	No
Excellent	4.00-5.12	16	4.00-5.04	10	5.00-5.72	6
Good	5.13-6.10	94	5.05-5.79	68	5.73-6.50	26
Poor	6.11-6.90	22	5.80-6.90	17	6.51-6.87	5
Total	4.00-6.90	132	4.00-6.90	95	4.00-6.87	37
Mean ± SD	5.62 ± 0.49		5.43 ± 0.37		6.12 ±0 .39	

Note: Excellent: <mean-SD, Good: Between mean-SD to <mean+SD and Poor: >mean+SD

Table.2 shows no significant difference in normality of best time in both male and female participants. Among 95 male and 37 female participants included in the study, 10 male and 6 female fell under excellent category, 68 male and 26 female fell under good category and 17 male and 5 female performed poorly.

In this study it is found that 40 yards DASH Test performance of male participants of mean age 20.31±2.21 ranged from 4.00-6.90 seconds and female participants of mean age 20.22±1.97 ranged from 4.00-6.87 seconds.

Table 3: Correlation between BMI, speed and number of year's played with best time by Karl Pearson's correlation coefficient method

	Correlation between best time with		
	r-value	t-value	p-value
BMI	-0.1388	-1.5986	0.1123
Speed 1st attempt	0.9243	27.6136	**0.0001***
Speed 2nd attempt	0.9287	28.5612	**0.0001***
No. years played	0.0992	1.1364	0.2579

*p<0.05

As narrated in Table.3, positive correlation was found between best time with speed at first and second attempt. BMI and Number of years played did not found to have a correlation with best time.

Table 4: Comparison of male and females with mean of first and second attempts speed scores by t test

Gender	First attempt speed	Second attempt speed
	Mean ± SD	Mean ± SD
Male	5.48 ± 0.39	5.50 ± 0.41
Female	6.14 ± 0.43	6.28 ± 0.54
Total	5.67 ± 0.50	5.72 ± 0.57
t-value	-8.5033	-8.8897
p-value	**0.0001***	**0.0001***

*p<0.05

As shown in Table.4, a comparison of male and female with mean of first and second attempts speed scores found to have a significant difference.

DISCUSSION

The primary objective of this study was to quantify the time taken by the athlete to perform 40 yard dash test. The secondary objective was to set concrete data which would prove as a base line for any other studies that would involve designing a rehabilitation and/or fitness protocol for Indian athletic population. Percentage of male participant included were 71.97 as compared to 28.03 of female participants. Out of the total population included in the study (n=132), 16 samples fell under excellent category, 98 participant showed good time and

19 samples performed poorly**.** Speed in 1st as well as 2nd attempt had positive correlation(r=0.924) and (r=0.928) with number of years played. Here comparison of male and female with mean of 1st and 2nd attempt speed scores was done and showed significant (p-value=0.0001) speed scores in both the attempts.

The study done by Nesser et. al. concluded that both 10-m sprint and 5-step jump can be used to predict 40-m sprint performance. He explained the importance of a quick start and rapid acceleration, strength of knee flexors and hip extensors to propel the body forward, and the capacity of these muscles to rapidly contract and produced the force needed to create velocity concurrent with 40-m sprint performance.[20]Another study conducted by Mike Yetter and Gavin Moir showed that heavy back squat treatment produced significantly greater speeds than cycling during the 10- to 20 m interval, although the improvements were not significantly different from the heavy front squat treatment. It is difficult to explain this improvement in terms of the mechanical similarities between the back squat movement and the sprinting movement during this phase. The improvements by heavy front squat during the 10- to 20-m interval were less than those recorded during the 30- to 40-m interval. It is possible that the improvements reflect the importance of the knee and ankle musculature during the 10- to 20-m interval of sprinting.[18]

Ronnestadand Ellefsen identified that the preconditioning exercise performed with whole body vibration at 50 Hz may enhance 40 m sprint performance.[19]Another study was conducted by Jason B. Wincheste, et al The results of this study suggest that performing a static stretching protocol following a dynamic warm up will inhibit sprint performance in collegiate athletes.[21] Abrantes,et al. concluded that professional players exhibited higher performances in sprint test that seems to be the result of a combined effect of age and level of competition. In all groups, the fatigue effects were the strongest between 5th to the 7th sprint, which may help the coaches to plan the training more effectively. Lamb K concluded that individuals between age group of 16-24 spent twice time as compare to their older counterparts.[22]

CONCLUSION

This study concluded that the values of 40 yard DASH Test ranged between 4.00-6.90 for both genders with male athletes showing better performance than females.

Limitations & scope

- Male female ratio ratio 1:3
- Type of sports and its ratio was not measured

Practical applications: The result of the present study can be used as a reference for (40 yard dash) sprint performance test as well as by fitness professionals to check prognosis after training.

Source of Funding: Self

Conflict of Interest: Nil

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Study of Attitudes, Beliefs and Customs about Menstruation In Urban and Rural Adolescent Females

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ABSTRACT

Background: Menstruation in India has been always surrounded by many myths and traditional beliefs, which can, not only lead to ignorance in females regarding the facts about menstruation but also encourage a faulty perception of the physiological process. Hence this research was undertaken to assess varied Attitudes, Beliefs and Customs about menstrual health in urban and rural adolescents through a pre-validated questionnaire.

Method: A retrospective, cross-sectional study was conducted amongst 300 adolescent girls from the rural belt of Khopoli and urban section of Mumbai, Maharashtra, with urban to rural ratio of 1:1, with the help of a pre-validated questionnaire. Data were analysed statistically by simple proportions.

Results: The study revealed that 'curse of God', 'removal of impure blood' etc were the responsible for the menstrual cycle. Uterus was considered as the body part that discharged blood. Maximum study subjects irrespective of their place of residence found it easy to discuss personal matters like those related to menstruation with their mother.

The most common beliefs in both the groups were that the menstruating girl shouldn't wear new clothes, should not touch particular objects, should not enter temples and should not attend social functions. The prevalence of these beliefs, was however, more in the rural population in comparison with the urban population.

Conclusions: Based upon the findings of research, we conclude that even though the girls living in an urban have parents with a higher education qualification as compared to the girls with a rural setup, there are various myths and beliefs surrounding menstruation in both the setups.

Keywords: *Menstrual Cycle, Adolescents, Beliefs, Customs, Attitude*

INTRODUCTION

Menstruation, as understood in a layman's language, is the monthly discharge of blood from the vagina, to prepare the body for the possibility of pregnancy. The physiology of menstruation is primarily governed by the cyclical fluctuation of hormones-ovarian oestrogen and progesterone, taking place in the body.

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Apart from being extremely important for the continuation of human race, menstruation can also serve as a health indicator of a woman's body. The hormonal changes that take place during menstruation have various effects on the different systems of the body. Oestrogens are C-18 steroids synthesized from cholesterol in the ovary is a mediator of a multitude of biological functions.[1] Several forms of oestrogen are active within the female body. The oestrogen receptors are found in hair, skin, bone, soft tissues, adrenal gland, thyroid gland — to name a few sites .[1] Therefore, the level of oestrogen fluctuation is extremely important for the normal functioning of the systems/organs with oestrogen receptors.

India is a land of cultural and social diversity along with co-existence of various religions. The social practices of Indian diaspora differ not only with religion, castes and beliefs, but also with geographical, economic and educational subdomains. The day to day activities of the people are also majorly governed by the part of the socio-cultural ecosystem that they belong to.

The various socio-cultural domains have different viewpoints regarding menstruation and the menstrual blood. Many of them pose restrictions on the menstruating women.[2] Majority of these restrictions arise from the ignorance induced stigma attached to menstruation. This stigmatization has led to formulation of various myths and practices surrounding menstruating women.

In many societies menstruation also encompasses an element of secrecy, where, although menarche may be celebrated as a developmental milestone, menstruation is regarded as something about which women should always be discreet .[3] Such is the level of discretion, that various euphemisms are used to address it public, or many a times, even privately. There is no evident reason known for menstruation to be perceived as "impure" or menstruating women to be perceived as "unclean" but one of the theories endorsed by western medicine and science is that being male is considered "normal" and therefore the male body is ideal .[3] This results in most women internalizing the idea that something is fundamentally wrong with their bodies. [3] This misinterpretation can negatively affect the symptoms experienced during menstruation and have a negative effect on the overall body image of the woman.

There is a belief that menstruation affects the performance of women, by making it difficult to concentrate, displays poor judgement, lacks physical coordination, exhibits decreased efficiency, and performs less well at school or at work.[3]

Despite lacking in scientific evidence, subscribing to such belief could lead to a restriction of women's opportunities in the workplace and as contributors to society in general, and this could be an important source of discrimination against women in society.[3]

The perception of menstruation that a young girl constructs, depends on— how she is introduced to menstruation, how people around her perceive menstruation and how aware she is about the physiology of menstruation. Hence this research proposes to study the Attitudes, Beliefs and Customs about menstruation in urban and rural Adolescent females.

METHODOLOGY

This cross-sectional study was conducted on 300 subjects in the age group of 10-19 years. Descriptive survey research design was adopted for the study.Written informed consent was taken from all study subjects. Ethics Clearance for the research was taken from the Institutional Research Committee of The D.Y. Patil University by submitting a written detailed methodology. The study subjects comprised of a convenient sample of 300 adolescent girls, equally distributed over the rural belt of Khopoli and urban section of Mumbai, Maharashtra, with urban to rural ratio of 1:1.

As per the Review of Literature, a detailed questionnaire was drafted and it was validated by 2 experts. A pilot study was conducted and appropriate modifications were made as per the suggestions from the results of the pilot study.

DATA ANALYSIS, REPRESENTATION & RESULTS

This data was analysed using Microsoft Word and Excel and the charts and graphs were prepared with Excel. The quantitative data was expressed as Mean ± SD. and qualitative variables as proportions in the study Data representation was done by Microsoft Word and Excel.

Table 1: Socio-demographic profile of urban and rural population

	Urban	Rural
1. Age (years)	16 ± 3(years)	14 ± 1(years)
2.Age of menarche	12 ± 1 (years)	13 ± 1 (years)
3. Type of school	77%- Private, 23%-Government	53%-Government, 47%- Private
4.Proportion socio-economic status (As per the Kuppuswami scale)	12%- low 27%-middle 28%- high	23%- low 20%- middle
5.Mother's education	71%- Literate 26%- Illiterate/ Matriculate	18%- Literate 47%- Illiterate/ Matriculate
6. Father's education	73%- Literate 18%- Illiterate/ Matriculate	25%- Literate 43%- Illiterate/ Matriculate

Inference: The economic profile and educational status of the parents was better in the urban population than the rural population. The mean age for menarche in the urban population was earlier than rural population.

Table 2: Beliefs and Customs:

		Rural	Urban
1.	What is the cause of menstruation?		
	Natural process	107 girls (71%)	127 girls (85%)
	Didn't know the cause	26 girls (17%)	10 girls (7%)
	Curse of God	11 girls (7%)	7 girls (5%)
2.	What is the reason for menstruation?		
	Removal of impure blood	91 girls (61%)	70 girls (47%)
	Reproduction	28 girls (19%)	67 girls (45%)
	Don't know	34 girls (23%)	6 girls (5%)
3.	From which organ does menstrual blood come from?		
	Uterus	16 girls (11%)	88 girls (59%)
	Urinary bladder	52 girls (35%)	28 girls (19%)
	Don't know	70 girls (47%)	19 girls (13%)

TABLE 3: Various practices followed by the menstruating women

Menstruating Women	Rural	Urban
1. Shouldn't wear new clothes	72 girls (48%)	33 girls (22%)
2. Shouldn't touch particular objects	87 girls (58%)	46 girls (31%)
3. Shouldn't enter temples	124 girls (83%)	88 girls (59%)
4. Shouldn't attend social functions	69 girls (46%)	25 girls (17%)

Inference: It shows the various myths/practices surrounding menstruation. The most common practices (rural >urban))are that the menstruating girl shouldn't wear new clothes, shouldn't touch particular objects, shouldn't enter temples and shouldn't attend social functions.

Table 4: Ease of Communication on matters related to menstruation

	Rural		Urban	
	Difficult	Easy	Difficult	Easy
Teacher	**86%**	**11%**	**66%**	35%
Mother	10%	90%	5%	91%
Father	92%	4%	75%	19%
Sister	19%	76%	7%	83%
Close Friend	23%	62%	11%	85%

Inference: 90% girls from the rural population and 91% urban girls could easily discuss menstruation with their mothers. 11% girls from the rural population could discuss it with their teachers in comparison to 35% urban girls. Only 4% girls from the rural population could communicate freely with their fathers in comparison to 19% urban girls.

DISCUSSION

The Attitudes, Beliefs and Customs about menstruation in urban and rural Adolescent females were studied in this research through a survey based study.

This study throws light on various factors that could influence the perception of menstruation in a young

girl's life, which could in turn influence her transition to womanhood and also have an influence on the variety of symptoms that she experiences, related to menstruation, during the course of time.

It was found that the girls residing in urban areas got their menarche sooner than the girls residing in the rural areas, which is dependent on the interaction between genetic and environmental factors and corroborates with previous evidence in literature [4-6].

The educational status of the parents residing in the urban areas was better as compared to those residing in the rural areas. However, the educational status of the parent was not always indicative of the level of awareness about matters relating to menstruation.

Level of preparedness: It was observed that 12% of girls from the urban population and 16% from the rural population were not prepared for the menstrual cycle and had no prior knowledge about it. This lack of preparedness could come as a shock to the young girls as she could think of the menstrual blood to be pathological and could perceive menstruation as a disease in itself. It can also lead to the lack of openness about the problems faced by the girls regarding their monthly cycle, which could be a potential health hazard.

Etiology of menstruation: 5% of the girls from the urban population and 7% of the girls from the rural population thought that menstruation is caused due to curse of God. This could be because of the scriptures of various religions shedding light on the cause of menstruation [2]. It can further perpetuate the myth of menstrual blood being 'impure'. This can also be the cause of formulation of various myths in the society about menstruation [2,3].

61% rural girls and 47% urban girls believe the reason for the monthly discharge of the blood from a woman's body is the removal of 'impure blood'. This is alarming scenario considering 16% rural population and 12% urban population wasn't prepared for menstruation. This could mean that the source from which the girls got their knowledge about menstruation was not completely reliable.

As observed from the study, mothers were the primary source of knowledge about menstruation. Therefore, for the majority of the girls, their mothers are the link that could help them perceive menstruation as either a curse or a boon— a boon that is involved in the creation of life and is therefore extremely important in the continuation of the human race and maintenance of a normal healthy body in females.

Behaviour during menstruation: 44% rural girls and 25% urban girls kept menstruation a secret and 44% rural girls and 19% urban girls were embarrassed by it. The cause of the secrecy and embarrassment could be because of them viewing menstrual blood as impure and thereby feeling that they themselves as a whole, are impure. 13% rural girls and 12% urban girls also felt that the people's behaviour around them changed negatively when they were menstruating. This could further promote their belief that menstruation something to be ashamed of rather of thinking of it to be physiological. This could lead to them being reluctant in performing certain activities, specifically during that time of month, which could have a negative impact on their self-confidence, self-esteem and growth over the years.

Systemic symptoms experienced before and during menstruation: The most common symptoms experienced by the girls during their menses included stomach pain, low back pain, breast tenderness, abdominal bloating, mood disturbance, nausea [11]. Premenstrual syndrome is significantly associated with increase of BMI, sedentary life style, exposure to passive smoking, positive family history of PMS, excessive coffee drinking, and frequent consumption of fast food [10] which are more suggestive of an urban lifestyle, corroborating with our finding, that the urban girls had greater prevalence of the pre-menstrual symptoms as compared to rural girls.

Absenteeism from school: 39% urban girls and 9% rural girls missed school because of intolerable stomach pain and back pain. 27% urban girls and 22% rural girls missed their school because of weakness in their body.

Common myths: The most common myths observed in both the sections were that the menstruating girl shouldn't wear new clothes, touch particular objects, enter temples, and attend social functions. These myths were more prevalent in the rural areas than in the urban areas.

Nevertheless a relatively high prevalence of these myths in urban areas prove that the low socio-economic status or higher illiteracy rates can't be solely account for the existence of such myths.

Lack of support system: 92% rural and 75% urban girls found it difficult to discuss personal matters like those related to menstruation with their teachers and fathers.

Despite having primary sex education as a part of their curriculum, many girls were uncomfortable discussing matters related to menstruation with their teachers.

Even though 90% rural girls and 91% urban girls found it easy to discuss matters related to menstruation only with their mothers. Therefore, we postulate that a large number of girls lack the support system that they might be in need of to accept this natural phenomenon that is, clearly, looked down upon by many in the society. The penetration of mass media across the masses is much more in urban population in comparison to the rural population. The presence of relatively more numbers of educated and working mothers have helped to boost the confidence of the daughters to accept themselves as equal and important parts of the society.

Level of physical activity: During their menses, the number of girls who performed any form pf physical activity dropped to 19% for 2-3 days/week and 4% for 4-7 days/week.

The drop in this level of physical activity could be multi factorial. 25% urban girls and 13% rural girls experienced fatigue during their menses, which could be one of the factors. As mentioned earlier, 44% rural girls and 25% urban girls liked to keep menstruation a secret, and 44% rural girls and 19% urban girls were embarrassed by it. This could've led to them refraining from practicing certain activities. The girls could have also thought that they should refrain themselves from performing physical activities while menstruating as they wouldn't have known about the normal physiology about menstruation.

Changes in the physical appearance of the body: 38% rural girls and 27% urban girls had negative feelings about the changes in the shape and size of their breasts. These changes in the body are most often physiological in nature and negative feelings towards them implies that the girls were not completely aware of the importance of their menstrual cycle.

CONCLUSION

We have found in our study that menstruation is attached to a lot of stigmatisation which is carried on for generations at end is nurtured further by ignorance of common people about menstruation and its role in normal female physiology.

Our study also shows that this ignorance seen in the study population is irrespective of the educational status of the subjects. However there is a clear demarcation in knowledge about menstruation in the urban versus the rural population.

RECOMMENDATIONS

The communication gap between the parents and the daughters and the teachers and the student should be avoided as this may lead to formation of various wrong notions. The seminars related to menstruation should not only be restricted to girls, but also to the boys as they are the other half of the society; and the society as a whole, should be comfortable with the concept of menstruation as a whole.

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Effect of Constraint Induced Movement Therapy Versus Bimanual Task Training for Improvement of Motor Hand Function in Stroke Patients

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ABSTRACT

Background: Stroke is a dominant root of functional disability and altered quality of life among the people residing in the developed countries. Now days, Constraint induced movement therapy (CIMT) and Bimanual Task training (BMT) has emerged as optimal motor care for stroke population. Although, the efficacy of these two regimens were analyzed in pediatrics population, evidence stating its effectiveness in adults is lacking, which warrants further research. Hence, the purpose of this study was to compare the effect of constraint induced movement therapy to bimanual task related training for stroke patients.

Method: 30 subjects in the age group of 50-65 years, diagnosed as stroke with paresis of dominant arm (Grade 4 on Brunstorm), were randomized in two groups. 15 subjects were subjected to CIMT while the remaining 15 subjects were given bimanual task training to improve motor hand function. The outcome of interest included were Action Research Arm Test (ARAT) and Nine peg hole test (NHPT). CIMT was administered 3 hours, five times a week, for 4 weeks. BMT was provided 1 hour five times a week, for four weeks.

Results: On unpaired t-test, both the groups were found to be significant at $p<0.01$. However, there is significant change with ARAT and NHPT for CIMT than BMT AT $p<0.01$

Conclusion: Constraint induced movement therapy appears to be optimal treatment options for improving the motor hand function in subjects with stroke

Keywords: *Constraint induced movement therapy, Bimanual task training, Motor Hand Function, Action research arm test, Nine hole peg test*

INTRODUCTION

Stroke is a major cause of functional disabilities and decrease in quality of life of people living in industrialized countries. Reduced upper limb function impacts on ability to perform activities of daily living, which is likely to reduce independence and increase burden of care due to hemiparesis following the stroke.[1] Despite millions of dollars being spent annually for stroke rehabilitation, evidence that supports the efficacy of stroke motor rehabilitation is limited, making interventions that reduce the impact of hemiparesis a priority.[2]

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Many of these are traditional treatments that have focused on regaining control over reflexive movement patterns using muscle activation techniques. Recent innovations in technology have allowed non-invasive examination of brain physiology leading to new theories on recovery of movement control and new ways to measure the effects of therapeutic interventions. Rehabilitation scientists are revisiting old models of movement control, while a new understanding of human motor performance become available.[3] Rehabilitation for patients is fundamentally a process of relearning how to move to carry out their needs successfully. Research in motor control and motor learning has only recently begun to make an impact on he practice on rehabilitation. Motor learning need not be rigidly defined in order to be effectively studied.[4]

Extensive research showed that the chronic lack of use of the upper extremity induced in monkeys

by unilateral sectioning of the dorsal cervical and upper thoracic spinal nerve roots (i.e.somatosensory deafferentation) could be reversed several months to years later with a physical restraint applied to the contra lateral, unaffected arm.[5]

According to the theory of "learned non use", repeated disappointment in attempts to use the affected arm in the acute and sub acute phases can lead to negative reinforcement of the use of the affected arm. Although, motor function may gradually return as the combined result of spontaneous recovery and rehabilitation actual use often seems much less than potential use.[6] Within the past few years, however, an increasing number of stroke clinics in industrialized nations have begun to offer constraint induced movement therapy to treat chronic hemiparesis.[7]

It has been shown that CVA induced spasticity leads to significant slowing down of unimanual movements , alteration of multi joint co- ordination, decrease in smoothness and segmentation (multiple peak velocity) of reaching and grasping movements.[8] Remarkably, most of the goal directed movements in form of bimanual task training in which humans engage emerge from the brilliantly orchestrated and co-ordinated actions of both hands. This co-ordinated behavior appears effortless in most cases, suggesting that the masterful controller, the central nervous system (CNS) is constrained by a set of rules that naturally reduce this complex co-ordinated control problem.[9]

Now days, Constraint induced movement therapy (CIMT) and Bimanual Task training (BMT) has emerged as optimal motor care for stroke population. Although, the efficacy of these two regimens were analyzed in pediatrics population, evidence stating its effectiveness in adults is lacking, which warrants further research.

Hence, the purpose of this study was to compare the effect of constraint induced movement therapy to bimanual task related training for stroke patients.

METHOD

A randomized clinical trial was conducted between August 2015 and August 2016 in an outpatient clinic in MGM Institute of Physiotherapy, Aurgangabad, Maharashtra, India. Subjects were referred by their healthcare providers as well as recruited via advertisements in local newspapers and health magazines. Individuals were included if they were between age group of 50 to 65 years, diagnosed as stroke, either ischemic or hemorrhagic with paresis of an arm, and without cognitive impairment. Exclusion criteria included any psychological disorder, any neurological disorder, any recent or acute fracture of upper limb, and any recent upper limb surgery.

Following screening for inclusion, all eligible patients completed a standardized questionnaire, which included information pertaining to patient demographics, symptom presentation including duration and mechanism, history of previous episodes, treatment, and employment status. Patients were randomly allocated into two groups. 15 subjects were subjected to CIMT while the remaining 15 subjects were given bimanual task training to improve motor hand function. BMT was provided 1 hour five times a week, for four weeks, while BMT was provided 1 hour five times a week, for four weeks.

Outcome Measures: Outcome measures of Action research arm test (ARAT), and Nine Hole Peg test (NHPT) were captured at baseline, and 4 weeks. All outcome measures were assessed by an independent observer who was blinded to the patient's group assignment.

The ARAT's is a 19 item measure divided into 4 sub-tests (grasp, grip, pinch, and gross arm movement). Performance on each item is rated on a 4-point ordinal scale ranging from:

3: Performs test normally

2: Completes test, but takes abnormally long or has great difficulty

1: Performs test partially

0: Can perform no part of test

The maximum score on the ARTS is 57 points (possible range 0 to 57)

The Nine Hole Peg Test was conducted with the non affected arm first. Timing was performed with a stopwatch and recorded in seconds. The stop watch was started when the patient touches the first peg. The stop watch was stopped when the patient places the last peg in the container.

Fig. 1: Nine Hole Peg Test

Treatment: The CIMT subjects wore a mitten on the unaffected side to restrict movement and performed daily activity tasks through exclusive use of the affected side. The treatment comprised of unimanual activities forcing to use the affected arm. The intervention was delivered 4 hours a day, comprising CIMT for 3 hours, five times a week, for 4 weeks.

Functional bimanual task training was performed in a treatment room for 1 hour five times a week, for four weeks. During this process, daily activities were performed with an emphasis on using both affected and unaffected upper extremities simultaneously. The bimanual task training consisted of pouring water in a glass, fastening a button, putting on or removing a shirt, folding towels, and wiping windows.

DATA ANALYSIS

Statistical analysis including mean, standard deviation, and standard error were calculated for all measurements. Data analysis was performed with SPSS version 20.0. The mean differences with SD for outcome measures of Action research arm test (ARAT), and Nine Hole Peg test (NHPT) were calculated for time periods of baseline – 4 weeks. Student t-test was used to determine if significant differences ($p<0.05$) existed within and between groups for each outcome measure at each follow up period.

RESULTS

CIMT Group included 53.33 % of the subjects in the age group of 51-60 years while 26.66 % of the subjects were noticed in the age group of 51-60 Years for BMT group. Out of 15 subjects, there were 60 % males and 40% females in CIMT Group while 93.33 % females and 6.66 % males in Group 2 respectively.

Outcome measures for both groups displayed steady improvement from onset of treatment to 4 weeks. Within group and between group significance differences was noted for Action research arm test (ARAT), and Nine Hole Peg test (NHPT) at $p< 0.05$ as displayed in table 1, and table 2. Between-group analysis indicated that the CIMT group had significantly better outcome scores at all follow-up periods compared to those receiving BMT ($p<0.05$ for all measures).

Mean ARAT Score was significantly improved in CIMT Group (30.73 ± 1.478) as compared to BMT group (24.73 ± 1.459) at $p <0.05$, as shown in table 1 and 2. Similarly, Mean NHPT Score was significantly improved in CIMT Group (2.441 ± 0.2461) as compared to BMT group (2.015 ± 0.2329) at $p <0.05$, as shown in table 3 and 4.

Table 1: Comparison of Mean ARAT Score in CIMT and BMT group patients in Pre t/t and Post t/t

		Mean	t-value	p-value
Pre t/t	BMT	24.73 ± 1.459	2.352	0.0260
	CIMT	28.93 ± 1.030		
Post t/t	BMT	24.73 ± 1.459	2.889	0.9612
	CIMT	30.73 ± 1.478		

Table 2: Comparison of Mean difference in Pre t/t and Post t/t ARAT Score in CIMT and BMT groups

ARAT	Mean	t-value	P-value
Pre t/t vs Post t/t BMT	11.67	8.845	<0.0001
Pre t/t vs Post t/t CIMT	5.667	2.340	0.0346

Table 3: Comparison of Mean Nine Peg Hole Test in CIMT and BMT group patients in Pre t/t and Post t/t

		Mean ± SD	t-value	P-value
Pre t/t	CIMT	4.209 ± 0.4083	0.2832	0.7791
	BMT	4.375 ± 0.4206		
Post t/t	CIMT	2.441 ± 0.2461	1.255	0.2198
	BMT	2.015 ± 0.2329		

Table 4: Comparison of Mean difference in Pre t/t and Post t/t Nine Hole Peg Test in CIMT and BMT groups

Nine Hole Peg Test	Mean	t-value	P-value
Pre t/t vs Post t/t CIMT	1.768	5.116	0.0002
Pre t/t vs Post t/t BMT	2.359	9.790	<0.0001

DISCUSSION

The findings of the study are novel as till date no study has compared CIMT and BMT to improve the motor hand function in stroke patients. The results of the study demonstrated that there was significant improvement in patients who underwent CIMT than bimanual task training.

The result of this study correlates with one of the study done by George F. Wittenberg et al (2009) who revealed that CIMT is efficacious in promoting motor function of the paretic upper limb of stroke patients. [10] They quoted that CIMT as the first well defined post stroke motor rehabilitation which may identify changes in brain function and structure that accompany gains in motor function of the paretic upper limb. They found that varying patterns of change in activation within the sensorimotor network after CIMT, as documented on functional neuroimaging studies. Similarly, Wolf S L et al (2006) also noticed that CIMT produced statistically significant and clinically relevant improvements that persisted for at least a year in subjects with stroke.[11] Stephen J Page et al. (2004) revealed that modified CIMT may be efficacious method of improving function and use of the more affected arms of chronic stroke patients.[3]

We also notice significant results with Bimaual task training on upper limb recovery in subjects with stroke. Previous study done by Kjerstin Torre et al. (2011) also mentioned that bimanual co ordination is optimized around this period of recovery, indicating a possible beneficial effect of bimanual rehabilitation.[12] Sleimen-Malkoun R et al. (2011) stated that Bimanual coordination emerges as an active, task-specific assembling process where the limbs are constrained to act as a single unit by virtue of mutual coupling.[1] They debated on two main assumptions: 1) stroke-induced impairment of bimanual coordination might be anticipated/understood by comparing, in join protocols, changes in coupling strength and asymmetry of bimanual discrete movements observed in healthy people and those observed in stroke; 2) understanding/ predicting behavioral manifestations of decrease in bimanual coupling strength and/or increase in interlimb asymmetry might constitute an operational prerequisite to adapt therapy and better target training at the specific needs of each patient. They believed that these statements promote bimanual training as an efficient and adequate tool to facilitate the paretic upper-limb recovery and to restore spontaneous bimanual synergies.

In this present study, we found CIMT group performed better than the BMT group on upper limb recovery in subjects with stroke. Similar results has been noticed with the study conducted by Brunner IC et al. (2016) who mentioned that modified constraint-induced movement therapy was more effective than bimanual training in improving arm motor function.[13] Wearing a mitt seems unnecessary for most patients in the sub-acute phase post stroke when focused affected arm training is provided. Facchin conducted study to compare CIMT and BMT and concluded that grasping ability is responsive more to CIMT than BMT.[14] A study conducted to find out CIMT effectiveness, concluded that CIMT was more effective in improving grasp than the controlled group and also, grasp showing retention of the treatment effect at 6 month follow-up.

The possible explanation for superiority of CIMT over BMT can be explained in terms of neurophysiological studies of cortical activity after repetitive task practice using the paretic upper extremity. Liepert J et al. (2000) indicated that following CIMT there is a substantial increase in the amount of cerebral cortex representation of paretic hand muscles.[15] A recent report by Dong Y et al. (2006) using serial functional magnetic resonance imaging and a precision grip task showed a linear reduction in ipsilateral (contralesional) M1 (motor cortex) activation and that the mid-point M1 Laterality Index anticipated post-CIMT changes in time to perform the WMFT.[16]

Our study has several limitations. First, the investigation of essential aspects of CIMT, including the extent to which the intensive CIMT schedule of delivery can be altered and is ultimately cost-effective, requires further exploration. Second , incomplete detailed information about the anatomical location of each stroke and lack of information regarding the extent and use of medications limit our ability to assess the influence of these relevant variables on primary outcomes.

CONCLUSION

Among patients who had experienced a first stroke between 3 and 9 months prior, administration of CIMT resulted in statistically significant and clinically relevant improvements in paretic arm motor ability and use compared with participants receiving Bimanual Motor Task Training. These findings suggest that further research exploring central nervous system changes that accompany the observed motor gains and research on alternate models of CIMT delivery are warranted.

Conflict of Interest: None

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Effect of Backward Walking Training on Gait Parameters of Stroke Patients

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ABSTRACT

Background: Reduced Walking velocity and Gait asymmetry is a common sequel post stroke, which leads to increased energy cost and fall risk.Backward walking has been promoted as optimal treatment strategy to restore gait pattern. Hence, the purpose of this study was to find out the efficacy of the backward walking training to improve the temporal and spatial components of gait parameters in stroke patients.

Method: 30 subjects in the age group of 40-70 years, diagnosed as stroke with asymmetrical gait pattern, were randomized in two groups.15 subjects were allocated to Conventional walking while the remaining 15 subjects were given backward walking in addition to conventional walking to improve the temporal and spatial components of gait parameters. The outcomes of interest included were temporal and distance gait parameters. Both the groups were treated for 3 weeks.

Results: Backward walking in addition to the conventional walking exhibited significant improvement with respect to the walking velocity, stride length, gait symmetry as compared to conventional walking group at $p<0.01$,on unpaired t-test.

Conclusion: Conventional walking training with additional backward walking training is more effective in improving temporal and spatial components of gait parameters in stroke patients.

Keywords: *Conventional walking, backward walking, gait parameters, stroke*

INTRODUCTION

Stroke is the most common cause of disability among adults.Approximately 700,000 individuals each year; about 500,000 are new stroke & 200,000 are recurrent stroke.[1] The most severely affected activities are the abilities to transfer, dress and walk.[3-6] variety of focal deficits including changes in level of consciousness and impairment of sensory, motor, cognitive, perceptual & language functions are common.[7]

The incidence of stroke is about 1.25 times greater for males than females. The incidence of stroke doubles in the decade after 65 years of age. Hemorrhagic stroke account for the largest number of death with mortality rates of 37% to 38% while Ischemic stroke have a mortality rate of only 8 to 12%. Loss of consciousness at stroke onset, lesion size, persistent severe hemiplegia, multiple neurological deficits and history of previous stroke are important predictors of mortality.[7]

Altered gait pattern has been reported is one of the major issue following the stroke.[8,9]The gait of the person with hemiplegia has been described as slow and asymmetric.[10-12]The diminished velocity of hemiplegic gait has been reported with limitation in cadence, stride length, and gait cycle.[13,14]This slow walking velocity has been attributed to decreased joint movement amplitude and step length , while inability to produce selective movement in the joints of the LE and poor balance.[15,16] Attempts to increase walking velocity by hemiplegic subjects may result in safety issues and abnormal gait pattern. Hence, structured walking pattern should be established to promote optimal gait of the stroke patients.

Asymmetry is also common entity following stroke,characterized by asymmetry of timing in single

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limb support phase on affected and unaffected legs.[11,17,18] The asymmetrical gait pattern leads to increased energy cost and falls.[19-21] Learning to walk backwards correctly is advised to improve movement components required for walking forwards.[22]

Although diverse approaches are employed for gait training, backward walking outweighs than conventional walk in multiple manner.[23,24] In contrast to conventional walking, backward walking appears to create more muscle activity in proportion to effort than in forward walking.[24,25] It also demands a greater oxygen consumption, metabolic and cardiorespiratory response [26,27]It combines hip extension with knee flexion, and useful for patients with hemiplegia with synergy pattern in lower extrimity.[28]

Although research on the motions of walking has been conducted actively but research on gait cycle and feet contact is insufficient. Therefore, in order to confirm the additive effect of backward walking regimen to conventional walking, well designed randomised controlled trial was needed.

Hence, the purpose of this study was to find out the efficacy of the backward walking training to improve the temporal and spatial components of gait parameters in stroke patients.

METHOD

A randomized clinical trial was conducted between August 2016 and August 2017 in an outpatient clinic in MGM Institute of Physiotherapy, Aurangabad, Maharashtra, India. Individuals were included if they had first cerebrovascular accidents, Unilateral motor or sensory deficits, or have Lower extremity Brunnstrom motor recovery stage at 3 or 4, Ability to walk 11 m with or without a walking aid or orthosis. Exclusion criteria included any disability which disturbs gait training, orthopeadic and other gait-influencing diseases, and Transient Ischeamic Attack.

Following screening for inclusion, all eligible patients completed a baseline examination by independent observer. Patients were randomly allocated into two groups. Group 1(n=15) underwent traditional walking or conventional walking and Group 2(n=15) underwent conventional walking with additional backward walking.

All participants were seen 3 times a week for 4 weeks for a total of 12 treatment sessions.

Outcome Measures: Outcome measures of Gait parameters (temporal and spatial or distance parameters) were captured at baseline, and 4 weeks. All outcome measures were assessed by an independent observer who was blinded to the patient's group assignment.

The Temporal gait parameters included were Single limb support, Double limb support, Stride time, Step time, Cadence, Speed, etc. While the Spatial or Distance gait parameters consisted of Stride length, Step length, Step width, etc.

Treatment: Subjects in first group were instructed for conventional walk for 20 min and this training program mainly focused on gait training, strengthening, function & mobility activities. Subjects in second group instructed for additional backward walk. First, the subject asked to take a step backwards within parallel bars and therapist supports him or her with the unaffected hand as required. The therapist provides assistance to move the subject's leg in the correct pattern; preventing the subjects from moving the leg back in full extension. When the subject moves the leg back with the correct pattern, the therapist gradually reduces the amount of assistance. Secondly, as the movement components have been practiced and the subjects were taken over actively with only slight help, the therapist facilitated walking within parallel bars. Finally, the distance and speed of walking backward were progressively increased.

DATA ANALYSIS

Statistical analysis including mean, standard deviation, and standard error were calculated for all measurements. Data analysis was performed with SPSS version 20.0. The mean differences with SD for outcome measures of temporal and distance variables were calculated for time periods of baseline – 3 weeks. Student t-test was used to determine if significant differences ($p<0.05$) existed within and between groups for each outcome measure at each follow up period.

RESULTS

The mean age of the patient sample was 53.86 ± 9.92 for Group 1 while 51.73 ± 12.1 for Group 2. Out of 15 subjects, there were 53% males and 47% females in

Group 1 while 53% females and 47% males in Group 2 respectively.

Outcome measures for both groups displayed steady improvement from onset of treatment to 3 weeks.

In this study , the initial gait speeds for group 1 is 13.303±2.324 and for group 2 it is 13.294 ± 2.159 whereas after backward walking training gait speeds for group 1 is 14.850± 1.741 and for group 2 it is 15.8±1.428. The group 2 achieved a mean gait speed 15.8± 1.428 just under the 3 weeks intervention. The initial cadence for group 1 is 43.333± 6.320 and for group 2 it is 43.266±7.430 where as after backward walking training it is 48.666±4.820 for group 1 and 52.266±3.575 for group 2.

Within group and between group significance differences was noted for temporal and distance variables at $p< 0.05$ as displayed in table 1, and table 2. Between-group analysis indicated that the Additional Backward Walk group had significantly better outcome scores at all follow-up periods compared to those receiving conventional walk ($p<0.05$ for all measures). The mean cadence and speed was found to be significantly improved in Group 2 as compared to group 1 at $p<0.05$, as shown in graph 1 and 2.

Table 1: Pre-Post Treatment within group comparison of outcome measure in Group 1

Measure		Time period	P-value
		Baseline-3 Weeks (Mean ± SD)	
Temporal Variable	Single Limb Support Time	(2.26 ± 0.88) (1.86 ± 0.63)	0.01
	Double Limb Support Time	(2.6 ± 0.91) (2.06 ± 0.88)	0.01
	Stride Time	(1.93 ± 0.70) (1.46 ± 0.51)	0.04
	Step Time	(1.86 ± 0.63) (1.46 ±0.51)	0.06
	Cadence	(43.33± 6.32)(48.66 ± 4.82)	0.01
	Speed	(13.30 ± 2.32) (14.85 ± 1.74)	0.04
Distance Variable	Stride Length	(23.7 ±1.62) (23.56 ± 1.19)	0.01
	Step Length	(12.2 ± 0.77) (12.16 ± 0.83)	0.01
	Step Width	(4.06 ± 0.45) (3.93 ± 0.56)	0.04

Table 2: Pre-Post Treatment between group comparison of outcome measure in Group 1

Measure		Time period	P-value
		Baseline- 3 Weeks (Mean ± SD)	
Temporal Variable	Single Limb Support Time	(1.86 ± 0.63) (1.33 ± 0.48)	0.01
	Double Limb Support Time	(2.06 ± 0.88) (1.86 ± 0.63)	0.04
	Stride Time	(1.46 ± 0.51) (1.73 ± 0.79)	0.02
	Step Time	(1.46 ± 0.51) (1.2 ±0.41)	0.01
	Cadence	(48.66 ± 4.82) (52.26 ± 3.57)	0.02
	Speed	(14.85 ± 1.74) (15.8 ± 1.42)	0.01
Distance Variable	Stride Length	(23.56 ±1.19) (24.26 ± 1.57)	0.01
	Step Length	(12.16 ± 0.83) (12.1 ± 0.84)	0.04
	Step Width	(3.93 ± 0.56) (3.96 ± 0.48)	0.03

DISCUSSION

The findings of this study are novel as till date no evidence exists stating the efficacy of these two regimens in stroke patients. In the present study, walking related factors were compared between before and after backward walking in addition to conventional walking program. Based on this we found that backward walking training by stroke patients improved their walking ability. In particular, addition of backward walking training to

conventional walk improved the symmetry of walking more than the same training on the ground.

We also found significant differences after training in walking speed, cadence, stride length, step time, step length, proving the effectiveness of backward walking training. The result of the present study is in accordance with the findings of Yang et al. conducted backward walking training for 3 weeks (3 sessions per week, 30 min per session) in addition to walking training for stroke patients in their experimental group. Their experimental group showed significant increases in walking speed and stride length, demonstrating the effectiveness of backward walking training just as the present study did.[29] Weng et al studied the effect of treadmill backward walking training for stroke patients. The experimental and control groups received the same training for 3 weeks (5 sessions per week, 60 min per session), except that the experimental group performed treadmill backward walking training for 30 min in each 60 min training session. The 10 m WMS of the experimental group increased significantly more than that of the control group.Thus, backward walking could become a beneficial walking training method. [30]

Winter et. al.[31]mentioned that backward walking appears to be a mirror image of forward walking. They reported that in order to produce the muscle activation pattern involved in forward walking the temporal cycling of the muscle contraction in backward walking is simply reversed. Increased feedback though the sensory receptors of the soles led to weight movement and support onto non-paretic and paretic sides in a proper and precise direction, as well as improvement in lower limbs' muscle strength and motor learning ability and reduction in double limb support stance.This is a possible reason for the improve gait performance after additional backward walking training.

Dorian R K et al. stated that BWT appeared to be a feasible important addition to stroke rehabilitation, and significantly improved the forward and backward walking speed[32] One of the specific goal in gait training is the restoration of gait symmetry in order to regain a physiological gait pattern. The result of this study suggests that additional backward walking training may help to improve walking abilities in stroke patients. Backward walking appears to create more muscle activity in proportion to effort than forward walking. This suggests a greater level of energy expenditure in backward walking than in forward walking. Additionally, backward walking also demands a greater oxygen consumption, metabolic response and cardiorespiratory than forward walking.

The present study demonstrated that the patients with stroke can benefit in having their gait symmetry improved from receiving additional backward walking training. Therefore it is suggested that backward walking training should be added to the conventional walking training for improving gait pattern.

Some limitations were identified in this study. First, the range of the participant choice was narrow and small. Thus, further research is needed in subjects with a variety of ages, sex and disease. Second, this study only compared ground back walking in order to analyze general walking patterns. Additional research will provide customized therapeutic walking,and treadmill walking that can improve insufficient aspects of the subjects.

CONCLUSION

This study confirmed that Backward Walking was effective for increasing temporal and distance gait variables in subjects with stroke. In the clinical field, Backward Walking exercise will be able to be provided to those who lack these three elements after analyzing gait pattern of the subjects. Future research needs an intervention by each gait element through systematic analysis of those with inappropriate gait pattern, using advanced gait evaluation equipment.

Conflict of Interest: None

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Effectiveness of Core Stability Exercises on Swimmer's Knee in Breaststroke Swimmers–A Randomized Controlled Trial

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ABSTRACT

After swimmer's shoulder, breaststroker's knee also known as swimmer's knee, is the second leading cause of injury holding 25% of all swimming injuries. Core instability also results in lower extremity injuries. The purpose of this study is to compare the effect of core stability exercises on swimmer's knee in breaststroke swimmers. This study includes 44 breaststroke swimmers (8-18years old), 22 participants in group A and 22 participants in group B with medial aspect of knee pain. The knee pain was evaluated with Visual Analogue Scale (VAS) and Functional Index Questionnaire (FIQ) and core strength was scored using pressure biofeedback calibrated at 40mmHg. Lap time was measured using stop watch. After evaluation, group A and group B was conventional exercises and core stability exercises respectively. The results showed a significant difference in the reduction of swimmer's knee between the groups with a p-value difference of 0.0001. This emphasizes core stability exercises is better than conventional exercises to reduce swimmers knee.

Keywords: *swimmer's knee, core stability, conventional exercises, core stability exercises, VAS, FIQ, pressure biofeedback, lap time.*

INTRODUCTION

Swimming is as an ideal form of sport considering not many athletic injuries are documented. Although, it seems because of frequent excessive and small wounds in swimming result in injuries such as swimmer's shoulder and breaststroker's knee.[1] These occur because of frequent and harsh nature of training for competitive swimming.[2] The prevalence of knee pain among swimmers especially in breaststroke swimmers is second to shoulder pain.[3] An interesting fact is that 25% of all swimmers injuries are related to the knee.[4] The primary cause of swimmers knee is the breaststroke which is why it is also called as Breaststroker's knee.[4] The breaststroke is one of the oldest and most traditional strokes in swimming. During this stroke, the body remains levelled at the surface of the water and the movement is done by the legs and feet together to propel forward in water.[5] In this, leg whips out helping to increase the speed of body through water.[4] Councilman stated that the knee pain could be due to the tension that arose in the surrounding tendons and ligaments and determined that site of knee pain was related to individual technique of the whip kick[6, 7]. During kicking phase of the technique, the tension increases causing the force to be generated on the inside of the knee and this eventually leads to problems of the medial collateral ligament (MCL).[4] Problems associated with swimmer's knee are diffuse knee pain, inflamed and/or fatigued connective tissue, swelling of the knee, a sharp pain when placing the knee under stress, tenderness at the medial facet of the patella, and long term breaststroke swimmers may show clinical evidence of patella osteoarthritis.[4, 7]

According to a biomechanist, core stability is an osteoligamentous complex existing below a threshold at which buckling will occur. Therefore, core stability can be defined as the level of endurance or strength in particular muscle groups of lumbo-pelvic-hip complex[8]. Core stability is the ability of lumbo-pelvic-hip complex

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to prevent buckling of vertebral column and return it to equilibrium following perturbation.[9] Since, "core" or "lumbo-pelvic-hip complex" is composed of lumbar vertebrae, pelvis, hip joints, and active and passive structures that either produce or restrict movement of these segments.[8] Core stability is instantaneous; to maintain it, the involved anatomy must continually adopt to changing postures and loading conditions to ensure the integrity of the vertebral column and provide a stable base for movement of extremities. Both passive and active elements contribute to core stability. The contribution of passive elements results from the interaction of mechanical load on the body architecture and the compliance of soft tissue[8]. This is because active elements supports osteoligamentous lumbar spine, which becomes unstable under compressive loading of only 90 newtons[10]. Therefore, active muscular components of this system are critically important. The active muscular elements of the core contribute to the stability of the system through three mechanisms: (1) intra-abdominal pressure, (2) compressive forces (axial load) and (3) hip and trunk muscle stiffness.[8] There is direct relationship between intra-abdominal pressure and core stability and also abdominal muscle inactivity. Therefore, increase in intra-abdominal pressure decreases compressive loading on spine during exertion. And which ultimately gives global trunk and hip stiffness[11]. Control is likely to be automatic because extended latency period of voluntary reaction time. Two automatic neuromuscular control are – 1) Anticipatory postural alignment and 2) muscle reflex response.[8] Before self-imposed movements of trunk muscles, anticipatory postural adjustments works was observed in several studies.[12, 13] The anticipatory postural adjustments can affect the location of centre of gravity, which may affect balance and lower extremity joint forces during upright tasks.[14] Secondly, trunk muscle reflexes, which are mostly automatic, also stiffen trunk and this leads to perturbation which is innately tied to neuromuscular delay .because of this mechanism, individuals will have greater potential for core instability and greater risk for low back pain.[15] It has been also reported that contribution of individuals muscles to core stability is >30% of overall stability of the lumbar spine for a variety of loading conditions. Therefore, stability of lumbar spine totally depends on the activation of all trunk muscles rather than individual muscle with unique mechanical advantage. Large superficial muscles of the hip and the trunk are architecturally best suited to produce movement and increase hip and trunk stiffness to resist the three dimensional external moments that are applied to the core during functional activities.[8] The authors suggested that the relationship between knee and ankle moments totally depends on hip moment, to preserve forward component of the acceleration of the centre of masses during kick task. As a result, the authors gave a hypothesis that, a co-contraction of chief muscles of hip and trunk (core), in all planes results in intra-abdominal pressure and stiffens lumbar spine which ultimately causes low back pain. These results in pelvic cross syndrome or also called lower cross syndrome. These occur due to muscle imbalance when a muscle is in a shortened or tightened state for a long time, which gives weakening of muscles on the opposite side of the body. This is referred as the "Automatic Reflex Inhibition" by the brain. Consequently, this muscle strength imbalance leads to an exaggerated curve in the lower spine which in turn causes low back pain. Because the gluteals are weak, its function is compromised and other muscles such as the hamstrings and back muscles are recruited to assist them in performing daily activities. This leads to overuse and tightness of the hamstrings and back muscles which ultimately weaken the abdominals and further increases the curve of the lower spine. Strength, flexibity and range subsequently decrease, which contributes to degenerative changes and pain in the lower back and also causes knee pain mainly at the medial aspect[16].

METHODOLOGY

Inclusion Criteria:

1. Breaststroke swimmers with the age between 8 to 18 years
2. Knee pain occurred at least once a week and medial aspect during breaststroke kick

Outcome Measure: Visual Analogue Scale (VAS), Functional Index Questionnaire (FIQ), Strength using Pressure Biofeedback (Chattanooga 9296) and Lap Time.

PROCEDURE

Group A: Warm up for 20 minutes and start with given conventional exercises. This exercises protocol consists of 5 sets of exercises, those are x-crunch up (repeating 20 reps with progression of 10 reps each week), flutter kicks (continuing for 30-60sec with progression of 30sec every week), towel slides (repeating 10 reps with progression of 10 reps each week), superman plank (repeating 5-10 reps each side with progression of 10 reps each week)

and reverse wood chop with stretch cords (repeating for 15-25 reps each side with progression of 10 reps each week). After the exercises, cool down was followed for 10 minutes. This protocol was performed for 3 times a week for 3 consecutive weeks.

Group B: Warm up for 20 minutes and start with core stability exercises. Core stability exercises consists of knee bent bunkie with adduction and hip internal rotation (hold for 30 seconds with progression of 30 sec every week), swiss ball (performing for 30-45 sec with progression of 30 sec every week), pallof press with hip internal rotation (performing for 30 sec with progression of 30 sec every week) and ab wheel with ball squeeze and hip internal rotation (performing for 30 sec with progression of 30 sec every week). This session was followed by 10 minutes cool down. This protocol was performed for 3 times a week for 3 consecutive weeks.

STATISTICAL ANALYSIS

Statistical analysis of the present study was done using manually as well as statistical package of SPSS version 21 for statistical measures. Data from subjects demographic details i.e. age, gender, BMI, age of onset of breaststroke swimming, years of Breaststroke Swimming etc. were analysed using t-test. Comparison between both the groups with respect to the outcome measures of lap time, visual analogue scale (VAS), strength using pressure biofeedback and functional index questionnaire was done by independent t-test and pre and post intervention comparison between the four outcome measures in both the groups was done by paired t-test. Probability values less than 0.05 were considered significant and probability values less than 0.001 were considered highly significant.

RESULTS

1. Lap time

Table 1

Group	Time	Mean ± SD	Mean Diff. ± SD Diff.	% of change	Paired t	p-value
Group A	Pre-test	46.53 ± 7.79	0.28 ± 0.49	0.60	2.6788	0.0141*
	Post-test	46.25 ± 7.99				
Group B	Pre-test	50.62 ± 6.89	0.24 ± 0.26	0.48	4.4094	0.0002*
	Post-test	50.38 ± 6.81				

*p<0.05

2. Visual analogue scale (VAS)

Table 2

Group	Time	Mean ± SD	Mean Diff. ± SD Diff.	% of change	Z-value	p-value
Group A	Pre-test	4.64 ± 1.40	3.23 ± 0.81	69.61	4.1069	0.0001*
	Post-test	1.41 ± 0.96				
Group B	Pre-test	3.59 ± 1.05	2.77 ± 0.53	77.22	4.1071	0.0001*
	Post-test	0.82 ± 0.91				

*p<0.05

3. Strength using pressure biofeedback

Table 3

Group	Time	Mean ± SD	Mean Diff. ± SD Diff.	% of change	Paired t	p-value
Group A	Pre-test	83.77 ± 12.99	-7.18 ± 2.81	-8.57	-12.0076	0.0001*
	Post-test	90.95 ± 12.77				
Group B	Pre-test	82.50 ± 11.10	-6.64 ± 3.63	-8.04	-8.5692	0.0001*
	Post-test	89.14 ± 10.03				

*p<0.05

4. Functional index questionnaire

Table 4

Group	Time	Mean ± SD	Mean Diff. ± SD Diff.	% of change	Paired t	p-value
Group A	Pre-test	12.09 ± 1.27	-2.82 ± 1.14	-23.31	-11.5991	0.0001*
	Post-test	14.91 ± 1.27				
Group B	Pre-test	12.86 ± 1.39	-2.09 ± 0.92	-16.25	-10.6469	0.0001*
	Post-test	14.95 ± 1.33				

*p<0.05

DISCUSSION

It is claimed that knee pain at medial aspect in breaststroke swimmers is because of an overuse syndrome in training posses pressure on knee joint of breaststroke swimmers through pass of time and finally causes pain at medial aspect of knee. Comparing all outcome measures showed significant reduction in swimmer's knee after 3 weeks of intervention. In this study, lap time was measured before and after the study with the help of stop watch, similarly this form of measuring lap time was done to analyse lap time in the study done by Will G. Hopkins and Judith M. Anson While comparing the values within the group, a reduction in lap time was observed pre and post intervention. It was noted that group B (core stability exercises) was significantly better than group A (conventional exercises). Conventional exercises are proved to be effective in reduction of swimmer's knee and the possible reason for the same could be while swimming, core muscles (especially oblique) works out. Without its stability, risk becomes hideously inefficient, particularly while breathing. This study was done by Lesley Paterson which showed marked reduction in swimmer's knee. As clearly depicted in the results, the study shows a more marked reduction in swimmer's knee with core stability exercises as compared to conventional exercises. The possible reason for this could be that while doing exercises when the muscles gets contracted it activates actin n myosin, which ultimately strengthens the muscles which are been worked out. This core stability exercises strengthens the core ad also hip internal rotators and superior adductors (groin) so as applying less pressure on knee and thus core muscles helps to propel forward and also reduce lap time which is more effective than conventional exercises. Visual analogue scale (VAS) and functional index questionnaire (FIQ) was taken for knee pain before and after the study. The particular scoring was used in the study by Bert M. Chesworth, Elsie g. Culham, G. Elizabeth Tata and Malcolm peat wherein VAS and FIQ was scored for patellofemoral pain syndrome. There was a reduction in VAS and FIQ scoring in both the groups post intervention, but no reduction was observed in VAS and FIQ while comparing the values between both the groups. Thus concluding the effect of conventional exercises and core stability exercises relived pain and improved daily activities of living. Core strength was measured pre and post intervention with the help of pressure biofeedback maintaining the pressure of 40mmHg. The measurement of core strength was compared pre and post intervention in each group and both the groups showed significant increase in strength of core muscles, also a comparison of the both groups pre intervention and post intervention was done and the difference between pre and post intervention was formulated, the difference calculated was observed to be highly significant in both the groups, the cause for increase in core strength could be due to effect of exercises which strengths core muscles and also because of reduction in knee pain that might have induced the changes in core strength.

In this study, a supervised conventional exercise regimen was designed and administrated to the participants of the study group A which consisted of 5 moderate intensity exercises, x-crunch up (repeating 20 reps with progression of 10 reps each week), flutter kicks (continuing for 30-60sec with progression of 30sec every week), towel slides (repeating 10 reps with progression of 10 reps each week), superman plank (repeating 5-10 reps each side with progression of 10 reps each week) and reverse wood chop with stretch cords (repeating for 15-25 reps each side with progression of 10 reps each week). And to group B, a supervised 4 novel core

stability exercise regimen was administrated which consisted of, knee bent bunkie with adduction and hip internal rotation (hold for 30 seconds with progression of 30 sec every week), swiss ball (performing for 30-45 sec with progression of 30 sec every week), pallof press with hip internal rotation (performing for 30 sec with progression of 30 sec every week) and ab wheel with ball squeeze and hip internal rotation (performing for 30 sec with progression of 30 sec every week). The results showed exemplary reduction in swimmer's knee in both the groups. The similar study was done by Paterson on swimmers to improve strength and efficiency of core muscles by giving sets of 5 conventional exercises and found that these exercises can be useful for all sports so as to have strong core strength and stability. In the same way, a study was done by Dr. G. John Mullen to see the effect of 4 novel breaststroke core training exercises on breaststroke swimmers. The results found to be effective if done continuously for at least 3 weeks and more.

According to the above stated discussion, no study has been conducted wherein a comparison has been made between the effectiveness of conventional exercises v/s core stability exercises to reduce swimmer's knee in breaststroke swimmers within the age group of 8-18 years, thus taking into the consideration the statistical analysis of the study we can aptly conclude that both core stability exercises and conventional exercises reduces swimmer's knee but, core stability exercises more significantly reduces swimmers knee than compared to conventional exercises.

CONCLUSION

From this study we can conclude that both conventional exercises and core stability exercises significantly execute a reduction in swimmer's knee in breaststroke swimmers under the prescribed time frame, but amongst the two, core stability exercises show a more significant reduction in swimmer's knee than conventional exercises. Hence core stability exercises for swimmer's knee can be used to effectively reduce swimmer's knee.

Conflict of Interests: None

Source of Funding: KAHER institute of physiotherapy, Belagavi

Ethical Clearance: Research and ethics committe, KAHER institute of physiotherapy, Belagavi

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Quality of Life in Young Adult Females with PCOS

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ABSTRACT

Background: Polycystic ovarian syndrome (PCOS) is a condition in which woman has an imbalance of female sex hormones. This may lead to changes in the menstrual cycle, cyst in the ovary, failure to conceive and other health problems. PCOS seems to run in families, too, so if someone in the family has it, they might be more likely to develop it. The Poly Cystic Ovaries Syndrome is considered to be most prevalent of all endocrine disorders which women face. Health-Related Quality of Life (HRQoL) is a multi-dimensional, dynamic concept that encompasses physical, psychological and social aspects that are associated with a particular disease or its treatment.[2]This study intended to find out the Quality of life in young adults suffering from PCOS.

Methodology: 30 Diagnosed young adult females with Polycystic Ovarian Syndrome aged 25-35 years were taken for the study. All the participants filled up the self administered PCOSQ. PCOS Questionnaire has 26 items divided into 5 domains: emotions (8 items), body hair (5 items), weight (5 items), infertility (4 items), and menstrual problems (4 items).

Results: The mean score for each item was, Emotions (8 items) was 11.56 S.D. 2.31, Body Hair 7.9 SD 2.5, Weight 10 SD 3.25, Infertility 10.3 SD 1.84, Menstrual Problems 10.3 SD 1.8.

Discussion: The results of the present study clearly show that all the domains of PCOSQ are affected. Successful treatment of PCOS that would reduce the burden of the symptoms and associated psychosocial stress should also have an important impact on woman's HRQL. Therefore, the assessment of HRQL could add vital information to the evaluation of treatment effectiveness in clinical trials in PCOS. In conclusion, this research has highlighted the poor health-related QoL and high levels of psychological distress found in a woman with PCOS. Finally, the psychological health of women with PCOS should be reviewed regularly.

Keywords: *Polycystic Ovarian Syndrome (PCOS), Health Related Quality of Life (HRQL), Infertility, Hirsutism*

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a condition in which woman has an imbalance of female sex hormones. This may lead to changes in the menstrual cycle, cyst in the ovary, failure to conceive and other health problems. It is a common health problem among teenagers and young women. It affects 5% to 10% of women in their reproductive years. These problems cause infertility. Research has suggested that PCOS may be related to increased insulin production.[1]

PCOS seems to run in families, too, so if someone in the family has it, they might be more likely to develop it. Although there is no cure for PCOS, there are several ways to treat and manage the condition. If a girl is overweight, Weight loss can be very effective in lessening many of the health conditions associated with PCOS. [1] Sometimes weight loss alone can restore hormone level to normal, causes many of the symptoms to disappear or become less severe. Healthy food habits and exercise helps to combat the weight gain. India has witnessed about 30% rise in PCOS cases in the last couple of years. Lack of knowledge and lifestyle changes are considered to be the major factor leading to this phenomenon. There is a need to increase awareness among women so as to avoid major cases of fertility problems in the future. In more than 40% of cases, PCOS is associated with obesity, as well as impaired glucose tolerance, type II diabetes, and the metabolic syndrome. While the pathophysiology of PCOS remains unclear, insulin resistance has been implicated as a major causative factor.[1]

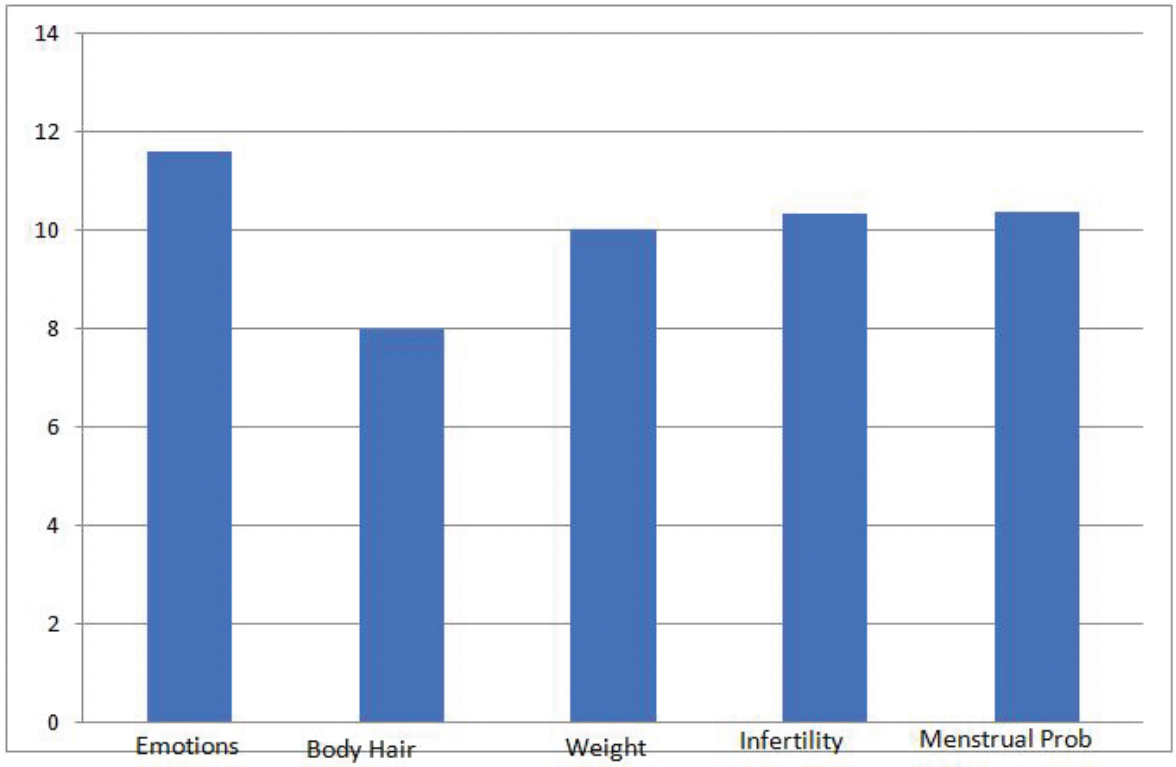
The Poly Cystic Ovaries Syndrome is considered to be most prevalent of all endocrine disorders which women face. The symptoms typically associated with PCOS—amenorrhoea, oligomenorrhoea, hirsutism, obesity, subfertility, anovulation and acne—can lead to a significant reduction in quality of life. For example, hirsutism has been shown to cause marked psychological stress and infertility issues can cause tensions within the family, altered self-perception, and problems at work. Despite this, a recent systematic review revealed that limited research had been carried out to assess the impact that the symptoms and associated treatments for PCOS have upon the quality of life of women with the condition. Health-Related Quality of Life (HRQoL) is a multi-dimensional, dynamic concept that encompasses physical, psychological and social aspects that are associated with a particular disease or its treatment.[2]This study intended to find out the Quality of life in young adults suffering from PCOS.

METHODOLOGY

30 Diagnosed young adult females with diagnosed Polycystic Ovarian Syndrome aged 25-35 years were recruited from south Delhi in the study to find out the quality of life. Females with diagnosis of depression, language or cognitive difficulties preventing reliable completion of the questionnaire, a chronic or acute illness unrelated to PCOS that could potentially affect the participant's quality of life, Patients who were pregnant or were having a medical or mental health crisis were also excluded from participation[2]. All the participants filled up the self administered PCOSQ. PCOS Questionnaire has 26 items divided into 5 domains: emotions (8 items), body hair (5 items), weight (5 items), infertility (4 items), and menstrual problems (4 items). Each question is associated with a 7-point scale in which 7 represents optimal function and 1 represents the poorest Function. Each item was weighted equally and presents the results as the mean score per item for each of the domains. Thus, the results from a domain with 4 items and from a domain with 7 items were both expressed as a score from 1 to 7[2].

RESULTS

The mean score for each item was, Emotions (8 items) was 11.56 S.D. 2.31, Body Hair 7.9 SD 2.5, Weight 10 SD 3.25, Infertility 10.3 SD 1.84, Menstrual Problems 10.3 SD 1.8.



DISCUSSION

The results of the present study clearly show that all the domains of PCOSQ are affected. Successful treatment of PCOS that would reduce the burden of the symptoms and associated psychosocial stress should also have an important impact on woman's HRQL. Therefore, the assessment of HRQL could add vital information to the evaluation of treatment effectiveness in clinical trials in PCOS. The PCOS HRQL questionnaire represents a new measure for women with PCOS and includes five domains: emotional, body hair, infertility, weight, and menstrual problems. Investigators can use the PCOSQ in either self-administered or interviewer-administered formats. The mean scale scores on the PCOSQ reflect the negative impact PCOS can have upon the quality of life of women with the condition. The weight seems to be the biggest challenge in PCOS patients.

PCOS is clearly associated with depression and reduced QoL. This has important implications for the treatment and management of PCOS. Treatment of depression, although important in its own right, will have a positive effect on the medical management of PCOS. For example, depression reduces motivation yet good motivation is the key to compliance with medication and the dietary management of PCOS. In conclusion, this research has highlighted the poor health-related QoL and high levels of psychological distress found in a woman with PCOS. Finally, the psychological health of women with PCOS should be reviewed regularly.

CONCLUSION

The study shows that PCOS affects the Quality of life and an early intervention should be started in view of well being of the patient.

Conflict of Interest: NIL

Source of Funding: Self

Ethical Clearance: The study was approved by the Institutional Ethics Committee.

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A Study to Compare Efficacy of Hold-Relax and Agonist Contraction of Proprioceptive Neuromuscular Facilitation Technique on Hamstring Muscle Flexibility in Healthy Female–An Interventional Study

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ABSTRACT

Background: There are mainly 2 types of stretching technique: active and passive techniques.[1] PNF uses the concept of muscle relaxation being fundamental to elongation of muscle tissue. There are three stretching techniques included in PNF: Hold-Relax (HR), Agonist Contraction (AC), Hold-Relax with Agonist Contraction (HR-AC). The purpose of this study to compare efficacy of Hold-Relax and Agonist Contraction of PNF technique on hamstring muscle flexibility in healthy females.

Objective: To compare the effect of Hold-Relax (HR) with Agonist Contraction (AC) of PNF technique on hamstrings muscle's flexibility in healthy female individuals.

Method: Study design is an interventional study and sample population taken was normal healthy female individuals from college area with sample size of 30. Simple random sampling method (lottery method) was used. 30 subjects having hamstrings muscle tightness which is examined by measurement of Active Knee Extension angle and Perceived level of hamstring muscle score scale. Subjects received following treatments: group A was taken Hold and Relax stretching with 30 seconds hold for 3 times per set and 1 set per day. Group B was taken agonist contraction stretching with 30 seconds hold for 3 times per set and 1 set per day. In both technique therapy was given for 5days/week, 1set/day and 3 times for each set. 5 sessions were given.

Outcome Measures: 1. Active Knee Extension angle

2. Perceived level of hamstring tightness score scale

Results: Results showed improvement in hamstring muscle flexibility in group A ($t = -7.94$, $p- <0.05$) and group B ($t= -4.75$, $p<0.05$) but more significant improvement seen in subjects of group A ($p- <0.05$).

Conclusion: Result of present study showed that Hold & Relax technique is more effective in increasing flexibility of hamstring muscle compared to Agonist Contraction technique.

Keywords: *Hamstring flexibility, PNF, Hold and Relax, Agonist Contraction*

INTRODUCTION

In the literature, the terms "flexibility" and "muscle length" are often used synonymously when referring to the ability of muscles to be lengthened to their end range. Flexibility refers to the total range of motion of a joint or group of joints. The structural characteristics of the joints and the mechanical properties of the connective tissues of the muscle tendon structures largely affect the extent of movement around a given joint. The specificity of movement that a person performs in regular physical activities and stretching methods often define the development and improvement of the body's range of motion. Muscles undergo adaptive shortening when maintained in a shortened position for a long time. Clinically it has been proposed that a muscle which does not undergo periodic lengthening will develop a decreased resting length and extensibility. A series of

studies have been done in the field of methods to improve muscle flexibility which have shown contradicting results. Stretching is defined as "therapeutic maneuver used to increase extensibity of soft tissue, thereby improving flexibility by elongating structures that have adaptively shortened."[1] There are mainly two types of stretching technique: active and passive techniques.[1] A proper stretching program is key to improve flexibility. There are many studies on effectiveness of passive versus active stretching. Many researchers prove that active stretching is more beneficial in short span than passive stretching.[2] There are limited studies on effectiveness of active stretching technique.

A shortened muscle may create imbalance in joints and faulty postural alignment that may lead to injury and joint dysfunction. A lack of flexibility in the hamstrings is thought to spike the risk of hamstring injury.[2] Indeed, research has suggested that athletes who have a history of hamstring injury have significantly less hamstring flexibility compared to uninjured fellow athletes and are also very prone to the recurrence of hamstring injury. Thus there has been considerable interest that upgrade hamstring in athletes. The stiff and short hamstring muscle tendon unit may be a risk factor for low back pain and the development of patellar tendinopathy. As documented in several studies, incidence rates of hamstring strains range between 7.1% and 30% with relatively high recurrence rates between 18% and 34 %.[3] A tight hamstring causes increased patellofemoral compressive force, which may eventually lead to patellofemoral syndrome.[4]

Stretching is used as part of physical fitness and rehabilitation programs because it is thought to positively influence performance and injury prevention. Numerous studies have been conducted to investigate the effectiveness of stretching.[2] Regardless of the type of program; the goal of stretching is often to change the physical characteristics of connective tissue. Connective tissue is a viscoelastic structure capable of plastic and elastic changes. The viscous property of connective tissue allows it to go through a permanent change in structure. Elastic properties refer to the connective tissues ability to regain its original length. When an applied stretch to a connective tissue is removed, the elastic components recover their original length and the viscous components remain deformed. The amount of elastic and viscous deformation can vary considerably, depending on the amount of applied force and tissue temperature. Theoretically, stretching protocols produce deformational changes that lengthen the connective tissue and increase joint ROM.

PNF uses the concept of muscle relaxation being fundamental to elongation of muscle tissue. In theory it is performed in a way that uses the proprioceptive abilities of the GTO (Golgi Tendon Organ) and muscle spindle to relax or inhibit the muscle in order to gain a more effective stretch. It does by using autogenic inhibition and reciprocal inhibition. When muscle is stretched and the subject voluntarily performs an isometric contraction, it is thought that the Golgi tendon organ reflexively is stimulated inhibiting or relaxing the muscle and thereby allowing the muscle to elongate. There are three stretching techniques included in PNF: Hold-Relax (HR), Agonist Contraction (AC), Hold-Relax with Agonist Contraction (HR-AC). Some studies have shown that Proprioceptive Neuromuscular Facilitation (PNF) and Contract-Relax (CR) stretches may be most effective. But there are very limited studies that conclude which stretching technique is more effective in improving hamstrings muscle flexibility so this study is an effort to find out either HR is more effective or AC in healthy female individuals.

In Hold-Relax procedure, the range limiting muscle is first lengthened to the point of limitation or to extent that is comfortable for the subject. The subject then performs isometric contraction for 5 to 10 seconds followed by voluntary relaxation of the tight muscle. The limb is then passively moved into the new range as range limiting muscle is elongated and held for 20 seconds. This can be repeated for 3-4 times.[1]

In AC stretching technique subject isometrically contracts muscle that is opposite to range limiting muscle (antagonist-quadriceps) and then hold end range position at least for several seconds. The movement of the limb is independently controlled by the subject and is deliberate and slow, not ballistic.[1] The AC technique is effective when significant muscle guarding restricts muscle lengthening and joint movement and less effective in reducing chronic contractures. This technique is also useful when a patient cannot generate a strong, pain free contraction of range limiting muscle, which must be done during the HR procedure. But AC is less effective if subject has close to normal flexibility.

MATERIAL AND METHOD

Subjects: This study was approved by the Institutional review board and ethical Committee. The background of this two group comparative study was explained to the subjects in their language and the subjects who were willing to participate were included into the study following an informed written consent. The sample was limited to the female sex due to the subjects' availability of this gender. The subjects who full filled the inclusion criteria were.

Inclusion Criteria

1. Healthy females between 18 and 40 years
2. Active Knee Extension ROM is less than 160 degrees

Exclusion Criteria: Subjects excluded were those with history of:

1. Higher cortical lesions
2. Trauma
3. Paralysis
4. Presence of adhesions and scar tissue
5. Spasticity
6. Hamstring repair or surgery, tendon transfers
7. Any recent hip or knee injury
8. Knee deformities–e.g. genu varum, genu valgum, genu recurvatum
9. Hyper mobile joints
10. Uncooperative subjects

Materials to be used

1. Assessment form
2. Consent form
3. Goniometer
4. Plinth
5. Pelvis stabilizing belt
6. Pen
7. Paper
8. Marker
9. Data collecting sheet

PROCEDURE

The study was done at the Physiotherapy Department, for a period of one week. The sample size was calculated to be 15 in each group. The subjects were randomly allotted to one of the groups using lottery method. Subjects of each group received the following treatments: Group A - 30 seconds of HR stretching for hamstrings muscle for 3 times per set for 5 days in a week, Group B - 30 seconds of AC stretching for 3 times per set for 5 days in a week for hamstrings muscle.

Outcome Measures: Flexibility of Hamstrings muscle in the form of Perceived level of hamstrings tightness score scale and Active Knee Extension (AKE) angle with hip flexed to 90 degrees in supine was recorded using goniometer before and after the treatment protocol.

1. **Active Knee Extension Angle:** Goniometric hamstring length via the knee angle was measured in the supine position. All subjects had their lumbar lordosis supported with a lumbar roll. The distal tip of the lateral malleolus was marked. Therapist 1 placed the hip into flexion until the femur was perpendicular to the exam table. Therapist 2 then placed a goniometric lever over the femur and the other lever toward the marked lateral malleolus. Therapist 1 then extended the knee until firm end feel was achieved; the knee angle was then recorded. The ankle was relaxed during the final knee angle measurements. (Fig. 1)

Figure 1: Measurement of Active Knee Extension angle

2. **Percieved Level of Hamstring Tightness Score Scale:**

   0 = no perceived level of tightness

   1 = occasionally feel hamstring are tight

2 = frequently feel hamstring are tight

3 = constantly feel hamstring are tight.

Stretching Protocol: Stretching maneuvers and verbal commands were previously standardized with the researchers being involved in the study protocol. The participants were instructed on the maneuver before the procedure. Position of subject was supine with knee extension with hip flexion. Subjects of group A underwent HR stretching and the stretching was performed by having the participant in supine position and left thigh stabilized by the researcher with the aid of a towel. The researcher passively flexed the participant's right hip to 90 degrees and then extended knee up to his/her pain threshold and position in which discomfort in the hamstrings was reported was marked as the starting position, at this starting point, subject was asked to perform isometric contraction of hamstring muscle and hold for 5-10sec. It was followed by voluntary relaxation of hamstrings muscle. The limb was then passively moved in new range as range limiting muscle was elongated.(Fig. 2)

Figure 2: Procedure of HR technique

Figure 3: Procedure of AC technique

Subject of group B underwent AC stretching and in this subject was asked to concentrically contracts muscle opposite to range limiting muscle e.g. quadriceps and then hold end range position at least for 10 seconds. In this study subject was asked to keep knee into slight flexion position then extend knee at end range so there was reciprocal inhibition of hamstring muscle and relaxation of hamstring muscle was occurred. After that move the limb actively by subject up to new length of hamstring muscle. (Fig. 3)

FINDINGS

Various studies have been conducted in the past to assess the effects of various interventions on improving hamstrings flexibility. However limited studies have been performed which evaluated that which stretching technique is more effective to improve hamstrings muscle flexibility. The finding of this study is Hold and Relax was found to be more effective in improving the length of hamstrings muscle among healthy young female subjects when compared to Agonist Contraction stretching technique.

RESULT

Post data were collected. For statistical analysis t-test was applied for comparison of within group and between group differences using SPSS 14.

Table 1: Mean value of knee angle in both group A & B and t value of same

Groups	Pre (mean ± SD)	Post (Mean ± SD)	t-value	p-value	Significant
Group-A	45.60 ± 4.30	32.80 ± 4.52	7.94	0.36	Yes
Group-B	41.87 ± 3.85	35.73 ± 3.19	4.75	0.49	Yes

Table 2: Mean difference of knee angle between group A & B

Groups	Mean ± SD	t-value	p-value	Significant
Group-A	12.80 ± 3.28	5.647	0.475	Yes
Group-B	6.46 ± 2.85			

Table 3: Mean value of scale & t value of same within group A&B

Groups	Pre (mean ± SD)	Post (mean ± SD)	t-value	P-value	Significant
Group A	2.60 ± 0.51	1.20 ± 0.67	6.42	0.293	Yes
Group B	2.53 ± 0.52	1.53 ± 0.13	5.31	0.10	Yes

Table 4: Mean difference of A & B group,t value of between group A&B

Groups	Mean ± SD	t-value	P-value	Significant
A(HR)	1.4 ± 0.50	2.45	0.29	Yes
B(AC)	1 ± 0.38			

There is also significant improvement in flexibility by using AC technique but not significant as HR results.

CONCLUSION

Result of present study showed that Hold & Relax technique is more effective in increasing flexibility of hamstring muscle compared to Agonist Contraction technique.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: Has been taken

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To Compare the Effect of Home Based Program and Supervised Occupational Therapy Program in Adhesive Capsulitis Patients with Diabetes Mellitus

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ABSTRACT

Background: Adhesive Capsulitis is most common in patients with Diabetes Mellitus. It limits the daily activities of the patient by causing pain around their shoulder and reducing range of motion (ROM) of their joints. Therapeutic exercises are given in institution as well as at home as home program. But there are patients who are unable to attend clinic regularly due to low economic condition, lack of time, jobs and household chores. The purpose of this study is to assess the efficacy of supervised Occupational Therapy programme and home programme in patients of Adhesive Capsulitis with Diabetes Mellitus.

Methodology: 35 subjects were taken and assessed at the beginning and re-evaluated at the end of 4 week rehabilitation program, using the following:

Shoulder pain and disability index (SPADI)

Universal Goniometer for range of motion of shoulder

Occupational therapy evaluation performa

Result: Though patients of both the groups showed no significant difference in mean value of any of the variables which means both supervised OT as well as home based OT are equally effective in bringing the improvement in adhesive capsulitis patients in terms of pain and ROM but the mean disability score of subjects of supervised OT group (12.32) was found to be better than those doing exercises at home (18.90) which means to have more improvement in shoulder disability, supervised OT is better than the home program.

Conclusion: The findings of the study suggests that home based occupational therapy program is as effective as supervised occupational therapy program in institute for adhesive capsulitis patients with diabetes mellitus, but to have better improvement in shoulder disability supervised OT is better than home based exercise program.

Keywords: *Adhesive Capsulitis, Diabetes Mellitus, Supervised OT program, Home Based OT program*

INTRODUCTION

Among the general musculoskeletal conditions, Adhesive Capsulitis is one of the most common conditions to affect the general population. Adhesive capsulitis is reported to affect 2-5% of the general population,[2] increasing to 19% with type 2 Diabetes and thyroid diseases.[3] The condition is most commonly reported between the ages of 40 and 65 years.[4] It occurs as the area around shoulder joint thickens and contracts. It sometimes also occur due to prolonged immobilisation of shoulder joint.

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Adhesive capsulitis limits the daily activities of the patient by causing pain around their shoulder and reducing range of motion (ROM) of their joints.[5] Adhesive Capsulitis especially decreases the abduction, internal rotation and external rotation of the shoulder and the patient in the initial phase complains of limitation in their activities and pain in the shoulder joints (Hamdan et al. 2003). Based on the etiology Adhesive capsulitis can be classified as primary and secondary. Primary Adhesive Capsulitis is an idiopathic condition where the exact underlying cause is unknown.[6]Adhesive Capsulitis associated with a known underlying disorder is considered to be secondary.[7] The freezing phase is marked by a gradual onset of diffuse shoulder pain lasting from 2-9 months. The stiffening phase is characterised by progressive loss range of motion that may last up to 1 year. The final, thawing phase constitutes a period of gradual motion improvement. Once in this phase, the patient may require up to 9 months to regain a functional ROM. [8] [9] [10] [11]

Proprioceptive Neuromuscular Facilitation (PNF) stretch is one of the various interventions used by occupational therapist to treat conditions of shoulder complex. PNF stretch is a technique commonly used in clinical environments to enhance both active and passive range of motion with the ultimate goal being to optimize motor performance and rehabilitation.[14]

Rehabilitation program can be given under supervision of therapist in the center as well as home program. But there are patients who are unable to attend clinic regularly due to low economic condition, lack of time, jobs and household chores. This study is being conducted to assess the efficacy of institution based as well as home program for patients of Adhesive Capsulitis with Diabetes Mellitus.

MATERIAL AND METHOD

Study Design: A comparative Experimental Research Design

Subjects: A convenience sample of 35 patients were taken. Males and females of Adhesive Capsulitis with Diabetes Mellitus, with age group 40-60 were included. Those with history of any life threatening disease or history of any musculoskeletal injury, traumatic injury or shoulder pain due to fracture or any other pathology in past 6 months were excluded.

Procedure: Necessary permission was taken from head of rehabilitation department for data collection. Subjects were informed about the nature of the study and consent form was taken. 35 patients of Adhesive Capsulitis with Diabetes Mellitus were taken after the fulfilment of exclusion and inclusion criteria. They were divided into two groups, institution based supervised occupational therapy program and home based exercise program, randomly. There were 16 patients in supervised occupational therapy group and 19 in home based occupational therapy group. Each patient was assessed on OT evaluation performa, universal goniometry and Shoulder Pain and Disability Index (SPADI). Patients in Institution based supervised occupational therapy group came to the department 5 days a week 45 minutes each session for 4 continuous weeks.

Patients getting home based exercise programme were called for follow up at the end of two weeks and all the activities were graded. They were given home exercise program pamphlet with exercises, dosage and precautions explained in it. All 35 patients were re-evaluated at the end of 4 week rehabilitation program on the same scales to see the difference in the dependent variables.

OUTCOME MEASURES/SCALES

Shoulder Pain and Disability Index (SPADI): It is a self- administered questionnaire consisting of items grouped into pain and disability subscales. Rating is on visual analogue scale and the mean of the two subscales are combined to produce a total score ranging from 0 (best) to 100 (worst). The SPADI was designed to measure the impact of shoulder pathology in terms of pain and disability for both current status and change over time. SPADI can be used as an outcome measure in Adhesive Capsulitis patients.[8]

Universal Goniometer for Range of Motion of Shoulder

It is the instrument most commonly used to measure joint position and motion in the clinical

Setting. Typically the design includes a body and two thin extensions called arms - a

Stationary arm and a moving arm. In this study a full circle goniometer has been Used.

Occupational Therapy Evaluation Performa

DATA ANALYSIS

Master chart was prepared on the excel sheet taking the pre and post values of the different variables of SPADI and ROM for both the groups. Paired t-test was used to compare the pre-test and post-test values of shoulder pain, shoulder disability and shoulder range of motion as measured on SPADI and Universal Goniometer respectively through SPSS software 17.0. Mean of age and gender of all 35 patients was taken. Mean, standard deviation and t-value for all the variables of SPADI (pain, disability and total SPADI score) and ROM (flexion, abduction, external rotation and internal rotation) was taken for both the groups.

FINDINGS

Data was analyzed using paired t-test for both the groups and the t-value for pain score, disability score, total SPADI score, flexion, abduction, external rotation and internal rotation of shoulder were respectively as shown in TABLE-1, TABLE-2, TABLE-3, TABLE-4, TABLE-5, TABLE-6 and TABLE-7 respectively.

Table 1: Comparison of pre and post pain score between group 1 and group 2

Pain	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	60.88	12.87	61.26	14.746	.082^{NS}
Post	21.00	11.825	21.79	8.297	.231^{NS}

NS = Non-significant

Table 2: comparison of pre and post of disability score between group 1 and group 2

Disability	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	46.92	10.065	42.85	15.653	.895^{NS}
Post	12.32	9.240	18.90	9.989	2.008*

NS= non-significant; *significant at .05 level

Table 3: comparison of pre and post of total SPADI score between group 1 and group 2

Total SPADI	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	52.72	10.489	50.34	14.126	.557^{NS}
Post	17.52	8.330	20.07	8.730	.882^{NS}

NS = Non-significant

Table 4: comparison of pre and post of flexion between group 1 and group 2

Flexion	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	134.06	27.339	113.42	33.419	1.950^{NS}
Post	165.00	16.330	157.37	18.810	1.269^{NS}

NS = Non-significant

Table 5: comparison of pre and post of abduction between group 1 and group 2

Abduction	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	93.75	37.925	95.79	27.349	.184^{NS}
Post	134.06	35.927	131.84	28.685	.203^{NS}

NS= Non-significant

Table 6: comparison of pre and post of external rotation between group 1 and group 2

External rotation	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	38.75	23.274	39.21	21.296	.061^{NS}
Post	62.19	26.011	63.68	23.502	.179^{NS}

NS= Non-significant

Table 7: comparison of pre and post of internal rotation between group 1 and group 2

Internal rotation	Group 1 (N = 16)		Group 2 (N = 19)		t-value
	Mean	Standard deviation	Mean	Standard deviation	
Pre	53.44	12.612	48.68	14.705	1.016^{NS}
Post	69.69	4.644	66.32	6.840	1.672^{NS}

NS= Non-significant

Inference: The t-value of pre pain(.082) and post pain(.231), pre total SPADI score (.557) and post total SPADI score (.882), pre flexion (1.950) and post flexion (1.269), pre abduction(.184) and post abduction (.203), pre external rotation(.061) and post external rotation(.179), pre internal rotation(1.016) and post internal rotation(.1672) suggests results to be non-significant for both groups, which means home based OT program is as effective as supervised OT program for patients of adhesive capsulitis with diabetes mellitus. But t-value of pre disability(.895) and post disability(2.008) suggests result to be significant $p<.05$ for group 1, which means supervised OT program had better effect on shoulder disability of adhesive capsulitis with diabetes mellitus.

DISCUSSION

The purpose of this study was to assess the efficacy of occupational therapy intervention in both home based program as well as supervised occupational therapy program in patients of Adhesive Capsulitis with Diabetes Mellitus. Total 35 subjects were taken and were divided into two groups randomly. They were given supervised occupational therapy program in institute and home based occupational therapy program respectively. Occupational therapy evaluation performa and shoulder Goniometry was done on the subjects. Shoulder pain and disability index (SPADI) was filled by them and scoring was done accordingly as it was suggested by Einar Kristian Tveita et al in 2008 that SPADI can be used as an outcome measure in patients with adhesive capsulitis.[8] From the 35 subjects 24 were female and 11 were males. In group 1, there were 3 males and 13 females whereas in group 2, there were 8 males and 11 females. Age group of the subjects was 40-60 years with the mean age 49.937 for group 1 and 49 for group 2.

The rehabilitation programme consisted active ROM, active assistive ROM, active stretching and strengthening exercises of shoulder joint as well as precautions for the care of affected shoulder. Sarah Russell also conducted a blinded, randomized, controlled trial in 2013 assessing conservative management strategies for frozen shoulder.[18]The treatment for supervised OT group was given for 45 minutes per session for 5 sessions a week. Home based OT group was also asked

to do the exercises for 5 days a week, once in a day. The rehabilitation program was run for 4 weeks for both the groups as it was concluded by Jurgel J et al in 2005 that a 4 week rehabilitation program improved shoulder active range of motion in patients with frozen shoulder.[21]

The result of the present study suggests that home based exercise program is as effective as supervised occupational therapy program given in institute for adhesive capsulitis patients with diabetes mellitus. Result is supported by the study of Rupali Sen et al in 2014 who did a comparative study on home-based exercise program Vs. institution based occupational therapy in improving hand skills in post collies' fracture and concluded that both home exercise program and institution based occupational therapy are equally important for reducing pain and stiffness and also for increasing pain free ROM, muscle strength and hand skills in colles' fractures.[17] Though patients of both the groups showed no significant difference in mean value of any of the variables which means both supervised OT as well as home based OT are equally effective in bringing the improvement in adhesive capsulitis patients in terms of pain and ROM but the mean disability score of subjects of supervised OT group (12.32) was found to be better than those doing exercises at home (18.90) which means to have more improvement in shoulder disability, supervised OT is better than the home program. This difference is supported by Sarah Russell et al who, in 2013, found that hospital based exercise class can produce a rapid recovery from frozen shoulder and is more effective than a home exercise program.[18]

CONCLUSION

The findings of the study suggests that there is no significant difference in the mean value of pain and ROM of shoulder between two groups but the mean disability score of subjects of supervised OT group (12.32) was found to be better than those doing exercises at home (18.90). Thus it is concluded that home based occupational therapy program is as effective as supervised occupational therapy program in institute for adhesive capsulitis patients with diabetes mellitus, but to have better improvement in shoulder disability supervised OT is better than home based exercise program. Thus the patients who cannot afford the regular hospital charges or live in remote areas with poor availability of rehabilitation services or due to any other significant reason cannot come to the institute, can be given home based exercise program, with proper follow ups, for improvement in the symptoms.

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

Funding Sources: Self

Ethical Clearance: Necessary permission was obtained to conduct the study. Verbal and Written consent were obtained from all patients who were selected for the study.

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Frequency of Foot Pain and its Association with Footwear among Young Female DPT Students

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ABSTRACT

Introduction: Foot pain is one of the presenting musculoskeletal condition usually encounter by Physical therapists. It is also found that fashion trends led the choices of footwear especially among females and there's vast range of versatility in female footwear.

Objective: This study was conducted to determine the frequency of foot pain and its association with foot wear in young female DPT students.

Method: The cross-sectional survey design was used. A self-administered questionnaire was distributed among 333 female students aged 18 to 25 years. Data forms was divided and distributed between all five years of DPT in IPMR and Ojha campus of Dow University of Health Science.

Results: More than half (56.6%) of the participants reported foot pain in past three months using NIS (numeric intensity scale). 53.7% of the participants thought that this pain was associated with footwear. Among footwear choices jogger's and canvases was the first choice followed by pumps & pointed toe box as second choice, 52.3% and 30.9% respectively. Statistically, there were found no association between foot pain and foot wear.

Conclusion: The results of the study has shown that more than half of the participant experienced foot pain disregarding the fact of jogger's and canvases was the top most choice of participants. Therefore, there's needing to create awareness regarding footwear choices that accommodates the foot biomechanically and ergonomically in correct position.

Keywords: *Foot pain, foot wear, Hallux valgus.*

INTRODUCTION

Foot pain is one of the common musculoskeletal conditions that is being treated by physical therapist [1]. In a recent APMA (American Podiatric Medical Association) survey 51% of adults reported that they have restricted activities of daily livings due to foot pain, still they have little knowledge about podiatrist and they would rather seek primary care physician (PCP)[2].

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It is highly prevalent, as one in three people aged above 65 years experienced foot pain. [3][4][5][6]. Factor may be responsible for producing foot pain like increased age, gender, ill-fitted footwear, obesity and chronic degenerative diseases[2]. A study held in Northwest Adelaide, Australia indicated that one in five people over age 18years have reported foot pain with higher prevalence in females [7]. In Asian population, 50 percent of young urban working women reported recurrent nontraumatic foot pain and 68.4% believed that the pain is associated with the footwear they wore at work [3].

The popular summertime Flip-flops tends to cause heel pain and conditions like overuse injuries of muscle (tibialis anterior) and toes that have been identified by podiatrists [13]. Furthermore, walking with flip-flops resulted in shorter stride, decreased stance time, and

smaller ground reaction force (GRF) impulse, and larger ankle contact angle in comparison with running shoes among both gender [8].

It has also been evident that wearing high heels and shoes with pointed toe box to be associated with the development of corns, lesser toe deformity and hallux valgus (bunion) [10].

The shoe toe box (shape and volume) is also significant in terms of producing ill-effects on foot's health like high heels. Decreased volume of toe box causes cramping of the toes that have been linked to produce foot deformities, joint pathologies and forefoot lesions [11]. Development of metatarsalgia, callus formation and a higher risk of ulceration under metatarsal heads have also been shown to be related with increased forefoot plantar pressure [9]. A significant association of 43 percent has been found between the shoes with narrow toe box and hallux valgus (bunion formation) [9].

Occurrence of foot pain associated with the type of footwear has been observed in epidemiological data that suggests that people show ignorant behaviour towards footwear because they prefer to choose fashion trends over comfort and ease but later in life they eventually end up with developing deformity or pathologic conditions such as hallux valgus, pes planus, plantar fasciitis, calcaneal spur etc.

So, the purpose of this study was to determine the frequency of foot pain and its association with footwear among young female DPT students of Dow University of Health Sciences.

METHOD AND MATERIALS

Research Design: A cross-sectional (self-administered) questionnaire survey design.

Study Settings: The study settings included IPMR (DUHS) and Ojha campus (DUHS).

Exclusion Criteria

- Any congenital deformity
- Any foot pathological or degenerative condition, fracture or sprain resulting in traumatic foot pain.
- Male students.

Inclusion Criteria:

- young female DPT students aged 18- 25years.

Duration of Study:

- The duration of the study was 3 months after approval of synopsis.

Sampling Technique:

- Nonprobability purposive sampling technique.

Sample Size:

- A sample size of 333 was calculated through Open Epi version 3.0 with a frequency of 68.4% (participants with foot pain attributed the pain to footwear), confidence limits of 5%, data effect of 1% and confidence level 95%.

METHODOLOGY

Demographics

- Included age, year of study, height, weight, and BMI.

Subjects

- Female DPT students aged between 18-25 years.

Tools

- The tool used for the assessment of pain intensity was numeric intensity pain scale (NIS), which represented the intensity of their pain. where 0=no pain, 5 = moderate pain and 10=unbearable pain.
- The scale of NIH (National Institute of Health) BMI calculator was used with categories defined as underweight < 18.5, normal weight 18.5-24.9, overweight 25-29.9 and obese > 30 or more.

Questionnaire

- The questionnaire was divided into 2 parts. The first part covered questions regarding footwear and second part contained questions regarding pain.
- Participants were asked to specify the type of footwear that they usually wear to university.
- They were also asked about the duration for which they continuously wore the shoe in a day. Other question included subject's opinion on whether they think that footwear affects their body image/appearance.

- The second part of the questionnaire covered questions regarding foot pain. Participants were asked if they had experienced foot pain in the past 3 months.
- The participants were asked about the location of pain which was divided into various parts of foot like the heel, medial side/arch of the foot, the sole of foot, base/ball of toes, toes of the foot, big toe or base of big toe.
- The participants were asked if they believed that their pain was associated with footwear and for the reasons they thought were behind this pain related to footwear.

STATISTICAL ANALYSIS

Data was entered and analysed using IBM-SPSS version 23.0, count and percentages were reported for the baseline information of samples on age, BMI, year of study, type of footwear, duration for which shoes were worn continuously in a day, reason for choosing that footwear, pain experienced in past three months, and other associated factors that were linked with the type of footwear. Pearson chi-square test was applied to find out the association between the variables. Bar chart and pie chart are also used to give the graphical representation of the results. A p-value less than 0.05 were considered significant.

RESULTS

333 samples participated in the study, where 52.9% aged more than twenty-one years old, 32.7% studying in fourth year and 35.4% samples were found underweight. (Table 1)

Table 1: Baseline Information of Studied Samples (n = 333)

Characteristics		n	%
Age Group	<= 21 years	157	47.1
	> 21 years	176	52.9
Year of Study	First year	59	17.9
	Second year	31	9.4
	Third year	74	22.4
	Fourth year	108	32.7
	Final year	58	17.6
BMI	Underweight	91	35.4
	Normal	144	56.0
	Overweight	19	7.4
	Obese	3	1.2

52.3% samples wear jogger's canvas and 25.5% samples reported that they wear flat sandals usually for the university, 30.9% used pumps/pointed toe box. (Table 2)

Table 2: Type of footwear usually wears to university

Footwear	n	%
Khusa	17	5.1
Kholapori	8	2.4
Heels two or more	13	3.9
Heels two or less	17	5.1
Flat sandals	85	25.5
Flip flops	7	2.1
Joggers/ canvas	174	52.3
Pumps/ pointed toe box	103	30.9

33.9% samples said they wear the shoes for more than 8-hours continuously in a day, 86.5% samples choose their type of shoes because of comfort support, 17.4% said due to fashion trends. (Table 3)

Table 3: Duration of Footwear and Reasons for choosing

Characteristics		n	%
For how many hours do you wear the shoes continuously a day?	<6hrs	35	10.5
	6hrs	78	23.4
	8hrs	107	32.1
	>8hrs	113	33.9
Reason For Choosing This Footwear	comfort & support	288	86.5
	value cost	5	1.5
	color matching	28	8.4
	brand	9	2.7
	fashion trends	58	17.4

70.3% samples thought that footwear affects their body image/appearance.

56.6% of the participants said that they experienced the foot pain in last three months where 26.6% reported the frequency of the pain as most of the day, 22.9% said once a month.

48.4% samples experienced pain in heel and 26.1% felt it in the sole of foot. (Table 4)

Table 4: Effect on body image, the experience of foot pain and location of pain

Characteristics		n	%
Do you think your footwear affects your body image/ appearance?	Yes	234	70.3
	No	56	16.8
	Don't know	43	12.9
Have you experienced foot pain in past three months?	Yes	188	56.5
	No	145	43.5
If yes, how many times have you experienced it?	Most of the day	50	26.6
	Once a day	32	17.0
	Once a week	40	21.3
	Once a month	43	22.9
	Others	23	12.2
Where do you experience the pain?	Heel	91	48.4
	Medial side arch	36	19.1
	Sole of foot	49	26.1
	Base of toes or ball of toes	22	11.7
	Toes	19	10.1
	Big toe	13	6.9
	Base of big toe	13	6.9
	Others	6	3.2

59.3% samples rated their pain as moderate pain with a score from 4-6, 14.1% of the samples suffered unbearable or severe pain. 53.7% thought this pain was associated with footwear, 41.5% said flatness of shoe is one of the reasons for this pain. 48.1% participants reported that they took rest when they experienced the pain. 19.8% sample said they do nothing, 23.5% sample said household chores and 40.1% sample said walking, jogging and exercise activities were compromised due to this pain. (table 5),

Table 5: severity of pain, its association and reason behind

		n	%
On a scale of 1-10, how severe is your pain?	No pain	1	0.6
	Mild pain (1-3)	46	26.0
	Moderate pain (4-6)	105	59.3
	Unbearable/ severe pain (7-10)	25	14.1
Do you think your pain is associated with footwear?	Yes	101	53.7
Reason behind this pain	ill-fitted shoe	8	7.5
	Tight shoe	20	18.9
	High Heel	10	9.4
	Flatness	44	41.5
	Hard Sole	23	21.7
	Pointed narrow toe box	17	16.0
	Others	9	8.5

Conted…

What do you do when you experience pain?	Rest	90	48.1
	Painkillers	15	8.0
	Icing	13	7.0
	Massage	38	20.3
	Exercise	15	8.0
	Change the footwear	29	15.5
	Nothing	37	19.8
Which activities are compromised due to your pain?	Studies	21	11.2
	Household chores	44	23.5
	Walk, jog, exercise	75	40.1
	Travelling	35	18.7
	Others	10	5.4
	None	41	26.3

6.5% samples complained of mild pain which affects their studies, 13.5% found with moderate pain and 12% samples found with severe pain, 27.9% samples of moderate pain were affected with household chores, 48% sample of severe pain complained their walk, jog and exercise activities were affected, 10.9% of mild pain samples said that it affects on traveling, however there was no significant association found between severity of pain and activities that need to be compromised by the samples . (Table 6)

Table 6: Association of Severity of Pain with activities being compromised

Compromised Activities		**Mild pain (1-3)**		**Moderate pain (4-6)**		**Unbearable/ severe pain (7-10)**		**p-value**
		n	**%**	**n**	**%**	**n**	**%**	
	yes	3	6.5	14	13.5	3	12.0	0.64
	no	43	93.5	90	86.5	22	88.0	
House hold chores	yes	9	19.6	29	27.9	5	20.0	0.60
	no	37	80.4	75	72.1	20	80.0	
walk, jog ,exercise	yes	15	32.6	43	41.3	12	48.0	0.48
	no	31	67.4	61	58.7	13	52.0	
travelling	yes	5	10.9	20	19.2	8	32.0	0.17
	no	41	89.1	84	80.8	17	68.0	
others	yes	2	4.4	6	5.8	1	4.0	0.96
	no	43	95.6	98	94.2	24	96.0	
none	yes	19	52.8	16	18.4	3	14.3	N.A
	no	17	47.2	71	81.6	18	85.7	

*p-value obtained using Pearson chi-square test

DISCUSSION

Foot pain is one of the common musculoskeletal condition that is being treated by Physical therapist [1]. To our knowledge, this study is the first survey-based study that has been conducted in Pakistan so far. Our targeted population was young female students with the mean age more than twenty-one years (52.9%). The two main aims of the study; first, to determine the frequency of foot pain among young female DPT students of Dow

university health sciences. Second, the association between the foot pain and the footwear. Other variables were also measured which includes: BMI, type of footwear, duration, reason of footwear choices, intensity of pain, location and relieving measures.

In our study, we have found that 56.6 percent of the total participants have experienced foot pain in past three months and that our results are similar with a Singaporean study in which half (50%) of the participants complained the non-traumatic foot pain at least once a month [3]. 53.7 percent of the participants in our study also felt that this pain is associated with footwear and flatness might be the most frequent cause of pain. More than half of the participants (59.3%) described their pain of moderate intensity on NIS ---(numeric intensity scale).

In previous studies, the shape of the shoe toe box is seen to be found significantly influential on foot's biomechanics and hence found to be producing foot pain and joint deformity [11], [12] as with pointed- narrow toe box [13]. In our study, it is shown that 30.9% of the participants used to wear pumps and pointed toe box which also the second most common footwear choice made by young female students.

There is found a strong link between footwear choices and the body image or appearance as 70.3 percent of the participants thought that footwear affects their overall body image. It has been shown previously that fashion trends and styles are the main components of choosing any type of footwear rather than foot's health [8]. In contrast, only 17% participant chooses the footwear of fashion trends in our study. One of the interesting findings of this study was that 86.5 percent of the participants choose their footwear because of comfort and support yet, more than half of the sample reported the foot pain which is of moderate intensity (59.3%) on most of the day (26.6%) and heel, being the most frequent location of pain to occur (48.4%).

However, there is no association found in our study between the footwear and foot pain statistically. Foot health is the area of least concern of an individual when it comes to health problems as only 2 in 10 US adults give a thought regarding foot health [1]. Therefore, the data available is limited enough to correlate the potential adverse effects of ill-fitted footwear and the corresponding foot pathologies. Further studies need to be conducted to give the vivid relation between footwear and associated problems.

CONCLUSION

It is evidently proven that diverse types of footwear impacts differently on foot's health and the prevalence of foot pain is increased comparatively from past years. It may be associated to higher variation among footwear designs and style. It is also observed that fashion trends and overall body appearance have great significance in making choices of purchasing footwear. There's a need to create awareness among general population to make appropriate footwear choices that fit in properly and accommodate biomechanically and footwear designers also need to produce shoes which are ergonomically correct.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from committee of Dow University of Health Sciences.

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Age Related Changes in Handgrip Strength among Healthy Indian Male and Female

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ABSTRACT

Purpose of study: Instrument test can provide quantitative value to which a patient's performance can be compared, but most such tests cannot be conducted efficiently in diverse setting. Hand-held Dynamometer is an exception. In the hands of a tester with adequate strength and skills.

Methodology: 300 healthy individuals between the age groups of 6- 50 years were selected and were randomly assigned to three study groups. Group 1(6-18)years ,group 2 (18-30) years andgroup 3 (30-50) years. All subjects were tested thrice and the best of three attempts was recorded. Thirty seconds time interval was maintained between each handgrip strength testing

Results: The mean difference age group in our study was (6-18).(18-30).(30-50).years. the findings of the present study indicated a gradual increment of both right and left hand grip strength from 6 to 18 years in male.

Conclusion: study generated normative values of hand grip according to gender and different age group (6-18).(18-30).(30-50).The gender differences in grip strength was statically significant with higher grip strength found in males than females

Keywords: *grip strength , hand held dynamometer*

INTRODUCTION

From early childhood it is necessary to produce enough grip force to manage independently every day tasks such as eating and playing. Grip strength is important as a measure of general health and is often estimated in screening of normal motor function. It is also regarded as one of the most reliable clinical methods for estimation of strength and is used extensively on adults [(1)]

A literature review published several years ago intimated that Dynamometrically measured grip strength may have value as a predictor of important outcomes [2]. Instrument test can provide quantitative value to which a patient's performance can be compared, but most such tests cannot be conducted efficiently in diverse setting. Hand-held Dynamometer is an exception in the hands of a tester with adequate strength and skills [(, 3]].

An estimation of grip strength is made to identify the level of development and degree of disability. It is also used for treatment planning and evaluation. One problem is, however, a lack of relevant developmental norms for the grip strength of children. There are few studies presenting data for grip strength in large groups of children and the most recent are from the 1980s, providing data from children in the USA [] and Australia [(1)]

The instrument has been found to have good reliability in healthy adults [3]It is therefore essential to obtain an estimate of the average grip strength and the variations that exist in children of different ages . Full function and adequate strength of hand are necessary for dealing with demands of daily life. Hand grip strength is used in clinical settings as an indicator of overall physical strength and health [4]. Hand strength has been identified as important factor predicting disability in musculoskeletal disease [5]It even predicts complications and general morbidity after surgical interventions , general disability and future outcomes in older age.

The jamar Dynamometer has been found to give the most accurate and acceptable measure of grip strength. Hand grip strength is positively correlated to height, weight, body mass index (BMI) and hand anthropometric measurements in healthy Indian man. [7].

Hand grip strength as measured by maximum voluntary contraction have a positive relationship with body weight height Body mass index and body surface area as investigated by various researcher in varied population of athletes, children and adolescents. A biological axiom of "Use it or lose it" applies to hand function [8].

The power of grip is the result of forceful flexion of all fingers joints with a maximal voluntary force that the subject is able to exert under normal bio kinetic conditions (Richards et al. 1996 and Bohannon 1997) [8].The relationship between handgrip strength and a number of variables included morbidity (klidjian et al. 1980),mortality (Phillips 1986),the risk of falling (Wickham et al. 1989),anthropometric traits (Ross and Rosblad 2002; Malina et al.1987;Koley et al. 2009), a range of functional ability variables (Hughes et al 1997; Hyatt et al. 1990)and nutritional status (Guo et al. 1996) have been reported [9].

Wellbeing and proper fitness of musculoskeletal system is one of the important factors to carry out daily activities, gripping and pulling strength is part of it. . The hand circumference had the strongest correlation with maximum grip strength in both males and females for right hand [10]. Hand grip strength can be quantified by measuring the amount of static force that the hand can squeeze around a Dynamometer [11]

AIM OF THE STUDY

To determine the age related differences in handgrip strength among healthy Indian male and female in the following age groups between the age group of (6-18) years , (18-30) years and (30-50) years.

HYPOTHESIS

Null Hypothesis: (N0)

There will be no significant variation seen in handgrip strength in Indian males and females

Alternate Hypothesis:- (N1)

There will be significant variation seen in handgrip strength in Indian males and females.

MATERIAL AND METHODOLOGY

Design of the Study: Survey.

Sample Setting: CAEHS Meerut

Village Meewa, Meerut

Vidyawati public school Meerut

Vishesh public school Meerut

Sample Size: 300 subject were taken with 50 male and 50 female in each age group

Sample Design: Random sampling

Tools for data collection:

1. Hand grip Dynamometer.
2. Weighing machine
3. Measuring tape.
4. Pen.
5. Writing pad.

Criteria for Sampling

Inclusion Criteria

- Subject who don't have any musculoskeletal disorder in upper limb.
- Individual who can read, write and understand follow command.
- Gender - Both male and female.
- No restricted movement of the upper limb.
- No history of fracture.

Exclusion Criteria

- Subject with cervical or upper limb musculoskeletal disorders.
- History of fracture of shoulder, arm, elbow, forearm and wrist joint.
- Restriction of movement of upper limb joints.
- Any history of inflammatory joint disease, neurological disorders or injury to upper limb extremity.
- Tightness, deformity, and contracture in upper limb.
- Any bony disease.
- Heart failure.

PROCEDURE

The research work has been approved by the research committee of college of Applied Education health science The patient is demonstrated about the survey study and informed consent form are filled by subjects..Subject will be selected according to their inclusion and exclusion criteria.

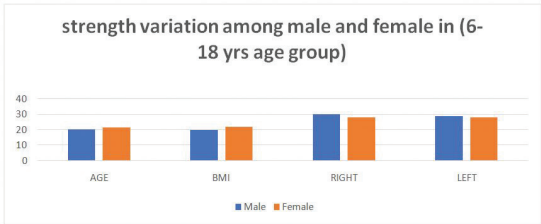
The grip strength of both right and left hands was measured using standard adjustable Digital handgrip. Dynamometer at standing position with shoulder adduction and neutrally rotated elbow in full extension.

The Dynamometer was hold freely without support, not touching the subject's trunk.

The subjects were asked to put maximum force on hand grip strength testing. The Dynamometer thrice perform both sides of the hand. The maximum value was recorded in kilograms. All subjects were tested thrice and the best of three attempts was recorded. Thirty seconds time interval was maintained between each handgrip strength testing

RESULT AND DATA ANALYSIS

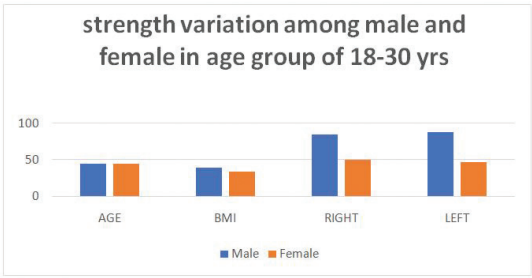
Mean variation:



Variation among male and female strength

Graph 1: It represents the handgrip strength of right hand variation is more in male rather than female and left handgrip variation is more in male. BMI is more in females than males.

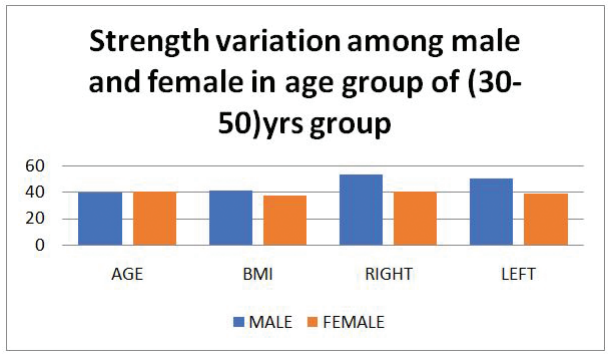
Mean variation:



Strength Variation among male and female

Graph 2: It represents the handgrip strength variation of right and left hand is more in male rather than female and BMI is more in male than females

Mean variation:



Strength Variation among male and female

Graph 3: It represents the handgrip strength variation of right and left hand is more in male rather than females.

According to the mean variation the age, body mass index and the handgrip of right and left hand are given in the table…it shows that handgrip strength of right hand is more in males of all age groups..The BMI is more in males then females age groups of (18-30) (30-50) years but BMI is more in females then males in the age group of (6-18)years.

DISCUSSION

The findings of the present study follows the some direction (graph 3) highlighting a highly significant positive correlation between all the anthrometric variables measured and right and left hand grip strength both in male and female. it is reported that as a rule, handgrip strength in (both right and left hand dominant) is stronger in male then female across all age groups (**Newman** et al. 1984; **mathiowetz** et al. 1986).Hand grip strength is a physiological variable that is affected by a number of factors including age, gender, and Body size.

The present study concluded that the mean variation among in all age groups the handgrip strength variation of left and right hand is more in male rather than females but there is difference in BMI that more in females rather than males in the age group of (18- 30) years.

The total number of subjects in our study 300. The mean difference age group in our study was (6-18). (18-30).(30-50).years. the findings of the present study

indicated a gradual increment of both right and left hand grip strength from 6 to 18 years in male (graph 1,3). It was reported earlier that physical performance had a strong association with body strength, shape, size, from and structure of the hand.

Assessment of HGS plays a cardinal in evaluating hand power and its relationships with age and with anthropometric measurements as height and weight are of great importance, so we conducted this study to correlate age, height and weight with hand grip strength and we found age to be inversely significantly correlated with hand grip strength, which might be attributed to several factors as aging causes diminished sensation, muscle fiber change in type and contour and degeneration in central nervous system, diminished proprioception or decreased muscle power and recruitment abilities.

Growth hormones and testosterone have more effect on physical body and performance of boy then girl though boys enter pubertal stage later than girls. Testosterone levels are one of the leading playing role in the variation of hand grip strength among male. It has been reported that when testosterone level is increased in man with low serum testosterone, an increase in hand grip strength is found.

The handgrip strength test is a simple and economic test that gives practical information about muscle , nerves, bone, or joints disorders. Even though there are various methods and devices for measuring hand strength, this is usually done using a Dynamometer which is economical and easy to use. Hand Dynamometer is considered to be a reliable instrument in evaluating grip strength and is used widely in rehabilitation. women working in different constructional sites have poor nutritional status due to their lower socio-economic condition but they require more physical strength i. e. handgrip strength to perform their daily work efficiently. Quite naturally poor nutritional status fails to provide adequate handgrip strength to them affecting their skills.

CONCLUSION

Descriptive statistics of height, weight ,BMI and hand grip strength of Indian males are shown in the table above in the result. According to the data we concluded that the handgrip strength of right hand of Indian males. (6-18) years,(18-30) years and (30-50) years is more than the left hand in all age groups. But mean difference increase in BMI of females rather than males in the age group of (18-30)years.

Present study generated normative values of hand grip according to gender and different age group (6-18). (18-30).(30-50).The gender differences in grip strength was statically significant with higher grip strength found in males than females. Also, it was noted that grip strength greater in dominant hand non - dominant hand. There was an inverse relationship between age and grip strength.

Handgrip strength was measured using a standard adjustable handgrip Dynamometer at standing position with shoulder adducted and neutrally rotated and elbow in full extension. The findings of the present study indicated a gradual increment of both right and left handgrip strength from (6-18)(18-30)(30-50) years in males and female.

Limitation of Study:

- Small sample size done
- Dominance of hand was not considered
- Urban and rural area are not considered

Future Scope of the Study:

- Large sample size
- Dominance of hand to be considered
- Urban and rural area are characterized

Conflict of Interest: NIL

Source of Funding: Self

Ethical Clearance: Taken From College Of Applied Education And Health Sciences

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Utilizing Complete Decongestive Therapy and Pneumatic Compression on Patients with Breast Carcinoma for Treatment of Postoperative Arm Lymphedema–A Review

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ABSTRACT

Lymphedema can be defined as an abnormal accumulation of interstitial fluid that occurs primarily as a consequence of malformation or acquired disruption of the lymphatic circulation system. Breast cancer-related lymphedema refers to a swelling of the arm caused by damage to the axillary lymph drainage routes during breast cancer treatment. Lymphedema is one of the predominant physical sequelae, and it has an impact on the physical function of the shoulder; shoulder impairment is higher in patients with lymphedema than in patients without lymphedema. The objective of this paper is to review the evidence from contemporary literature to see the effectiveness of complete decongestive therapy and pneumatic compression on patients with breast cancer-related lymphedema. The aim of this paper is to comprehensively review the literature concerning this topic and summarize existing knowledge. From present study, it can be concluded that complete decongestive therapy, including manual lymphatic drainage, compression bandaging, exercise and skincare, improves shoulder mobility and overall quality of life and helps in reduction of lymphedema volume, pain, and heaviness. The use of pneumatic compression together with complete decongestive therapy was found to be effective in increasing the range of shoulder joint motion but further studies with larger sample sizes are needed to draw more reliable conclusions regarding the effectiveness of pneumatic compression. Furthermore, this review identifies areas for further research and makes recommendations for clinical practice.

Keywords: *Lymphedema, Breast Cancer, Complete Decongestive Therapy, Pneumatic Compression, Physical Therapy.*

INTRODUCTION

More than 1.67 million women worldwide were estimated to be diagnosed with breast cancer in 2012, accounting for 25% of all diagnosed cancers in women.[5] Given that the 5-year survival rate for breast cancer is now 90%, experiencing breast cancer is ultimately about quality of life.[6]

Lymphedema remains a significant complication following breast cancer surgery when there is axillary lymph node intervention.[7] Up to 40% of the women treated for breast cancer has lymphedema. Currently, there is no cure for this chronic condition. Even more distressing is that women who treated for breast cancer are facing a life-time risk of developing lymphedema.[6] Patients who present with lymphedema may experience pain and body image issues and are at increased risk for developing cellulitis.[8] Lymphedema elicits daily stress and negative impact on breast cancer survivors' quality of life.[6] Early detection of breast cancer-related lymphedema is crucial in order to start an effective non-operative treatment program.[9]

Complete Decongestive Therapy (CDT) is a novel physiotherapeutic method which offers promising results in managing lymphedema.[10] It is accepted as the most effective therapy in lymphedema management, according to American Cancer Association, National

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Lymphedema Network and experts in this area.[11-14] CDT program consists of a combination of manual lymphatic drainage (MLD), compression bandaging/sleeve, exercise and skin care.[11,12,15-20]

Pneumatic compression pumps are used to treat acute and chronic lymphedema in order to activate extra lymph liquid in affected area. Generally, these pumps work by applying regular pressure or various-degree pressure to an extremity.[11]

REVIEW OF LITERATURE

Sezgin Ozcan, et al. (2018) did a research on 37 patients who underwent CDT-phase 1 program, including meticulous skin care, manual lymphatic drainage, remedial exercises, and compression bandages to evaluate the effects of complex decongestive therapy (CDT) on upper extremity functions, the severity of pain, and quality of life and also searched the impact of the sociodemographic and clinical characteristics on the improvement in upper extremity functions and concluded that CDT provides enhancement of upper extremity functions and quality of life and reduction in lymphedema volume, pain, and heaviness and the improvement in shoulder mobility.[21] A systematic review done by Lasinski, et al. (2012)[22] and a prospective trail done by Mondry TE, et al. (2004)[8] also concluded that CDT is effective in reducing lymphedema and success in girth reduction contributes to less pain.

In a study done by Vignes S, et al. (2007) on 537 patients with secondary arm lymphedema to evaluate long term management of breast cancer-related lymphedema after intensive decongestive physiotherapy. It was concluded that during maintenance phase after intensive decongestive physiotherapy, compliance to the use of elastic sleeve and low stretch bandage should be required to stabilize lymphedema volume.[23] Another study done by Ostby, et al. (2017) on patient perceptions of barriers to self-management of breast cancer-related lymphedema concluded that one of the main barriers identified was lack of education about lymphedema treatment and risk reduction. In addition, more than half defined support as “prescriptions” and “referrals”; therefore, it is unclear whether patients were exposed to support other than medical treatment.[24]

According to some studies assessing the efficacy of components of CDT, a randomized controlled trial done by McNeely ML, et al. (2004)[25] and a prospective study done by Johansson K, et al. (1999)[26] both suggested that compression bandaging, with or without MLD, is an effective intervention in reducing arm lymphedema volume. The findings suggest that CB on its own should be considered as a primary treatment option in reducing arm lymphedema volume. Low stretch compression bandaging is an effective treatment giving volume reduction of slight or moderate arm lymphedema in women treated for breast cancer. Manual lymph drainage adds a positive effect.

Szuba, et al. 2002 did a randomized, prospective study of a role for adjunctive intermittent pneumatic compression entitled decongestive lymphatic therapy for patients with breast carcinoma-associated lymphedema and concluded that when IPC is used adjunctively with other, established elements of DLT, it provides an enhancement of the therapeutic response.[27] Systemic reviews done by Leal NF, et al. (2009)[28] and Devoogdt N, et al. (2010)[29] showed that pneumatic compression has demonstrated efficacy when used with CDT, but once the treatment is interrupted lymphoedema volume increases.

According to study done by DiSipio T, et al. (2013) assessed the incidence of unilateral arm lymphoedema after breast cancer and explored the evidence available for lymphoedema risk factors. Their findings suggest that more than one in five women who survive breast cancer will develop arm lymphoedema. A clear need exists for improved understanding of contributing risk factors, as well as of prevention and management strategies to reduce the individual and public health burden of this disabling and distressing disorder.[30]

Butt, et al. (2017) did a randomized controlled study which was designed to evaluate the effectiveness of compression therapy and exercise in the treatment of lymphedema in 30 patients with breast cancer. And concluded that both the treatment techniques, compression bandage and compression bandage along with exercise are effective in reducing lymphedema and pain; but, clinically, compression bandage along with exercise is more effective.[31] According to a study done by Ezzo J, et al. (2015) to assess the efficacy and safety of MLD in treating BCRL included randomized controlled trials (RCTs) or quasi-RCTs of women with BCRL. Concluded that MLD is safe and may offer additional benefit to compression bandaging for swelling reduction. Compared to individuals with moderate-to-severe BCRL, those with mild-to-moderate BCRL may

be the ones who benefit from adding MLD to an intensive course of treatment with compression bandaging.[32]

In a study done by Moattari, et al. (2012) to evaluate the effect of combined decongestive therapy (CDT) and pneumatic compression pump on lymphedema indicators in patients with breast cancer related lymphedema (BCRL) concluded that CDT significantly reduced mean volume and mean circumference of the affected limb, and significantly increased shoulder joint range of motion and the use of compression pump along with CDT gives more desirable effects.[33] Whereas in a study done by Uzkeser, et al. (2013) showed that the addition of IPC to the therapy may not provide any additional benefit for upper extremity impairments.[1]

S Randheer, et al. (2011) did a prospective study and found that CDT combined with long term self-management is effective in treating post mastectomy lymphedema.[10] And in a study on effect of CDT and home program on health related QOL in post mastectomy patients done by Melam, et al. (2016), it was found that remedial exercises and home program in addition to MLD and CB resulted in improved QOL. Incorporation of remedial exercises and a home program was found to be effective in long term management of lymphedema.[34]

Some studies suggested advancements in the components of CDT, Ha, et al. (2017) concluded that the combination of MLD and PNF induces potent synergistic effects on edema volume, shoulder range of motion (ROM), pain, and depression in patients with lymphedema. In addition, an increased rate of axillary arterial blood flow in PNF-treated patients provide a potential physiological mechanism by which local arterial pulsation in the affected extremity plays a positive role in the treatment of lymphedema.[35] And according to a case study done by Do Junghwa, et al. (2017), it was concluded that the use of an additional pad and taping on a large edematous site with fibrotic changes has demonstrated a positive result in lymphedema management for a post mastectomy patient.[36]

CONCLUSION

Based on sufficient amount of evidence, it can be concluded that use of complete decongestive therapy and pneumatic compression is effective in reducing edema, pain and in enhancing upper limb functions by facilitating the lymphatic system. CDT improves overall quality of life and is effective for various degrees of lymphedema: mild, moderate, or severe; early or late onset; recent or chronic; in patients with active cancer; and in palliative care situations. The use of pneumatic compression together with CDT was found to be effective in increasing the range of shoulder joint motion, but when used individually pneumatic compression has no effect on lymphedema. Therefore, further controlled studies involving a larger number of patients over a longer period are needed to investigate the effects of pneumatic compression on functional limitations of the upper limbs. Lymphedema is one of the most important factors that elicit daily stress in breast cancer survivors since there is no cure for this condition. Lifelong adherence to prescribed treatment regimen is required to prevent progression of disease. Adherence to the prescribed management routine can be difficult because even the most customized garments or sleeves sometimes are uncomfortable, unsightly, and laborious to put on. A constellation of complex factors (*e.g.*, physical, financial, aesthetic, time) can influence survivors' adherence with management routines. To reduce the risk of lymphedema and maintain optimal lymphedema management, patient self-care is ultimately necessary to promote lymph drainage and prevent inflammation infection. Optimal self-care typically includes adherence to risk reduction behaviours, optimal weight management, use of compression garments, exercises, healthy lifestyle practices, and seeking assistance for lymphedema-related problems.

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Source of Funding: Self

Ethical Clearance: Self

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Effectiveness of Acapella, Flutter and Active Cycle of Breathing Technique on Lung Function in COPD Patients: A Comparative Study

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ABSTRACT

Background: Acapella is responsible for increasing the efficiency to remove the secretions, the Flutter helps airway clearance by vibrating the airways to loosen mucous and Active cycle of breathing technique is useful for improving lung function.

Methodology: 50 subjects of age group between 35-80 years, were screened according to GOLD criteria having MILD, MODERATE and SEVERE CRITERIA, out of which 40 patients were under inclusion criteria. 3 days protocol was given. Three groups for treatments i.e GROUP A, B and C; ACBT, FLUTTER and Acapella respectively were divided. Pre PFT was done on the 1st day and post PFT was on 3rd day. The pre and post values were compared.

Result: The comparison was done between three groups and within the groups the p-value for FEV_1 for (group A) p= 0.000, (group B) p=0.004 and (group C) p=0.002; for FVC (group A) p=0.000, (group B) p=0.005 and(group C) p=0.004 ; for FEV_1/FVC (group A) p=0.98, (group B) p=0.12 and (group C)p=0.38; for PEFR (group A) p=0.025, (group B) p=0.007 and (group C) p=0.025 and for MVC/$FEF_{25-75\%}$ (group A) p=0.02, (group B) p=0.04 and (group C) p= 0.24 and for between the group, the p-value for FEV_1 is 0.93 for the three groups, for FVC is 0.49, for FEV_1/FVC is 0.78, for PEFR is 0.71 and for MEFR or $FEF_{25-75\%}$ is 0.96. Therefore, it was not statistically significant among the group.

Conclusion: Thus, the conclusion of the study is that the ACBT, flutter and ACPELLA had a positive effect for the condition among their respective group. Between the groups, there was no treatment more effective than the other.

Keywords: *Active Cycle of Breathing Technique, FLUTTER , ACAPELLA, COPD, Lung Function.*

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) kills more than 3 million people every year, making it the 4th largest cause of death in the world [1]. COPD is associated with significant morbidity and mortality worldwide and is currently a global health priority [2]. According to crude estimates, 30 million people suffer with COPD in India, and these numbers are only going to increase in the forthcoming years [1]. Chronic obstructive pulmonary disease (COPD) is a progressive inflammatory disease of the lung characterized by chronic bronchitis, airway thickening and emphysema [3]. The progression of COPD is associated with increasing frequency and severity of exacerbations [4]. COPD is characterised by the persistence inflammation of the airways, lung parenchyma and its vasculature. Expiratory flow limitation is the pathophysiological hall mark of the COPD. Expiratory flow limitation with dynamic collapse of the small airways comprises the ability of patient to expel air during expiration, resulting in air trapping and lung hyperinflation [5].

Pathologically, COPD is characterized by diffuse inflammation of lung parenchyma and airways. The inflammatory response in emphysema typically shows evidence of the activation of innate and acquired inflammatory processes. The accumulation of these components contributes to the lung injury in these patients and serves as a self-perpetuating stimulus for further immune activation. The mobilization of inflammatory cells to the lung leads to the release of potentially

destructive mediators, including tissue proteases and cytokines, which directly contribute to tissue remodeling and destruction. These mediators include chemoattractant factors, most notably chemokines, which serve to attract additional inflammatory cells [6],[7]

Stage I: Mild FEV1/FVC < 0.70

$FEV_1 \geq 80\%$ predicted

Stage II: Moderate FEV1/FVC < 0.70

$50\% \leq FEV_1 < 80\%$ predicted

Stage III: Severe FEV1/FVC < 0.70

$30\% \leq FEV_1 < 50\%$ predicted

Stage IV: Very Severe FEV1/FVC < 0.70

$FEV_1 < 30\%$ predicted or $FEV_1 < 50\%$ predicted plus chronic respiratory failure

Dyspnea, the hallmark symptom of COPD, is the reason most patients seek medical attention and is a major cause of disability and anxiety associated with the disease. Chronic and tenacious cough often the first symptom of COPD to develop by the patient as an expected consequence of smoking and/or environmental exposures. Wheezing and chest tightness are nonspecific symptoms that may vary between days. Weight loss and anorexia are common problems in advanced COPD. Spirometry should be undertaken in all patients who may have COPD. It is needed to make a confident diagnosis of COPD and to exclude other diagnoses that may present with similar symptoms. Spirometry should measure the volume of air forcibly exhaled from the point of maximal inspiration (forced vital capacity, FVC) and the volume of air exhaled during the first second of this manoeuvre (forced expiratory volume in one second, FEV1), and the ratio of these two measurements (FEV1/FVC) should be calculated. Spirometry measurements are evaluated by comparison with reference values based on age, height, sex, and race (use appropriate reference values). The classes of medications commonly used in treating COPD are Fenoterol, Salbutamol (albuterol), Terbutaline, Ipratropium bromide, Oxitropium bromide, Tiotropium, Fenoterol/Ipratropium, Salbutamol/Ipratropium, Aminophylline, Theophylline (SR), Beclomethasone, Budesonide, Fluticasone, Triamcinolone, and Prednisone Methyl-prednisolone [8].

The active cycle of breathing technique (ACBT) and the forced expiratory technique (FET) are commonly used to promote airway clearance for individuals with chronic lung disease characterised by copious secretions[16]. Treatment methods that aim to clear secretions may decrease the frequency of infections, therefore preventing further airway damage and deterioration of lung function, and potentially reducing the rate of progression of lung disease. The FET consists of one or two forced expirations or huffs, followed by breathing control (relaxed breathing).The FET is an integral part of the ACBT, in conjunction with thoracic expansion exercises and interspersed periods of breathing control. A typical ACBT cycle therefore consists of breathing control, thoracic expansion exercises, breathing control, and the forced expiratory technique (huffing). The number and frequency of each of the components of the ACBT can be altered, but all components of the cycle must be present, and interspersed with breathing control[9].

The Acapella is a newer device that in addition to generating a positive pressure has an oscillatory component, causing airway vibrations. These vibrations may have added benefit over the PEP mask in helping to dislodge thick, sticky secretions from the airway walls. Airway oscillation may also decrease mucous viscoelasticity[14]. The Acapella, with its oscillatory function, flexibility of position for use, and the option for measuring the pressures generated has the potential to be a useful tool in CF management [10].The Acapella is a small hand held device for airway clearance. It has both resistive and vibratory features, which help loosen and clear secretions from your chest.

Fig. 1: ACAPELLA DEVICE

The Flutter is a small handheld pipe-shaped device that has a hard plastic mouthpiece at one end, a perforated plastic cover at the other, and a stainless-steel ball resting in a plastic cone on the inside. It is portable and relatively inexpensive and can be used on its own[11]..

Spirometry is a physiological test that measures how an individual inhales or exhales volumes of air as a function of time. The primary signal measured in spirometry may be volume or flow. Spirometry is invaluable as a screening test of general respiratory health in the same way that blood pressure provides important information about general cardiovascular health. Spirometry can be undertaken with many different types of equipment, and requires cooperation between the subject and the examiner, and the results obtained will depend on technical as well as personal factors [12]. Inspired and expired lung volumes measured by Spirometry are useful for detecting, characterising and quantifying the severity of lung disease. [13]. The most common parameters measured in spirometry are Vital capacity (VC), Forced vital capacity (FVC), Forced expiratory volume (FEV) at timed intervals of 0.5, 1.0 (FEV1), 2.0, and 3.0 seconds, forced expiratory flow 25–75% (FEF 25–75) and maximal voluntary ventilation (MVV),also known as Maximum breathing capacity. Other tests may be performed in certain situations.

Physiotherapy should be offered to patients with a variety of medical respiratory conditions, with the aim of breathlessness management and symptom control, mobility and function improvement or maintenance, and airway clearance and cough enhancement or support. The principal goals of pulmonary rehabilitation are to reduce symptoms, improve quality of life, and increase physical and emotional participation in everyday activities. The components of pulmonary rehabilitation vary widely from program to program but a comprehensive pulmonary rehabilitation program includes exercise training, nutrition counseling, and education. [14].

CPT comprises 5 separate elements introduced by the Cystic Fibrosis Foundation in 1997: postural drainage (PD), percussion (P), vibration (V), deep breathing, and directed cough (DC). The term CPT is often more broadly used to describe airway clearance techniques and does not have to include all the above elements [15].

As there are many evidence for comparing the physiotherapy techniques used in the cystic bronchiectasis, where the ACBT and flutter was compared but the results was both are effective, similarly there are also evidence for comparing ACBT with acapella in cystic fibrosis, where both are as effective as each. As there is no evidence for comparing the two equipments working on the forced expiratory techniques and ACBT on COPD, so the study over comparing these techniques was done.

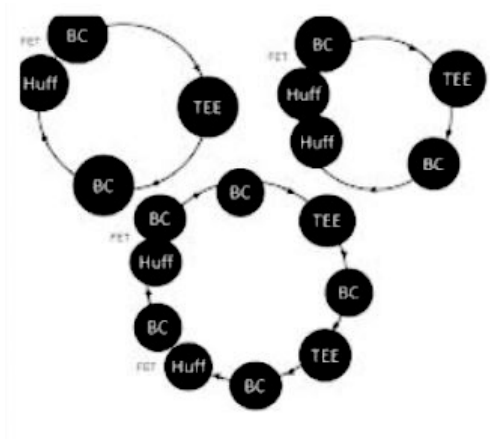

Fig. 2: Cycle of active cycle of breathing technique.

Inclusion Criteria:

1. Patients having 10-15 years of smoking history.
2. Age criteria of 35-80yrs
3. Patients fulfilling and coming under GOLD criteria of mild and moderate COPD, where post bronchodilator- FEV_1 /FVC between 30-80% (group A mild, group B moderate and group C severe). Post bronchodialotar-FEV_1/FVC should be (0.70).
4. MRC scale grade 1 and grade 2.

Exclusion Criteria:

1. Subjects having any kind of Infective pulmonary conditions.
2. Also the subjects with breathlessness with grade 4 and grade 5.
3. Patients suffering from restrictive lung disease.

METHOD

Ethical clearance was obtained. 45 subjects were screened according to the inclusion and exclusion criteria. 42 subjects were taken up and procedure was explained to them and informed consent was taken. According to fish bowl method, allocation was done, the patients were asked to choose the chit and accordingly, they were allocated their respective group and their techniques. Group A received ACBT technique, Group B received flutter and group C received ACAPELLA.

After the allocation Pre PFT was done and data were recorded. 3 days of training were given and then Post PFT was done on all the patients for reassessment.

The patients of **Group A, ACBT,** consisting of 9 patients, were positioned in a semi fowler's position and instructed to perform the three phase of ACBT i.e. breathing control, thoracic expansion and forced expiration technique. The patients were given postural drainage positions or the semi fowler's position according to the condition of the patient. The patient was made to relax the upper chest and shoulders, made to use the lower chest, diaphragm and took normal 3-4 tidal volume breaths **(breathing control) (BC)** for 5 to 10 seconds. The patient was instructed to place the hand over the abdomen for the more concentration on breathing. In **thoracic expansion phase (TEE)**, the patient was asked to breathe deeply and percussion was given by the therapist laterally over the chest. In each session 3-4 thoracic expansion exercise was given. The cycle of breathing control and thoracic expansion was repeated as shown in the **fig 2**. The same procedure was repeated for the next 2 consecutive days for the same patient. **Group B: FLUTTER** treatment where 14 patients were alloted. **GROUP C** were given ACAPELLA having 19 patients. For the FLUTTER it was placed in the patient's mouth and the patient inspired through the nose or through the mouth by breathing around the flutter mouthpiece. For the ACAPELLA, the resistance was set by the therapist for the patient according to the patient's comfort as the dial was turned clockwise to increase the resistance from low to high. The patient was made to breathe 5 regular breaths and alternate with 5 long slow deep breaths . Lastly the sputum was collected by the sputum mug and the patient is made to relax. Thus the same procedure was followed for the 3 days as the treatment session.

DATA ANALYSIS AND RESULT

The data was analysed for its statistical significance using Wilcoxon Signed Ranked test for the significance of each group and between the group and among the two groups, test applied was paired t-test. They were applied for 5 outcome measure like FEV_1, FVC, FEV_1/ FVC, PEFR and MEFR or $FEF_{25-75\%}$ there were significant difference between the pre and post values between the group and it was statistically significant. Among the groups, the values were not statistically significant.(table 1) when using ANNOVA testing.

Table 1: Showing the values of standard deviations and p value for the three groups for 5 outcome measure

	GROUP A			GROUP B			GROUP C		
	SD		P VALUE	SD		P VALUE	SD		P VALUE
	PRE	POST		PRE	POST		PRE	POST	
FEV_1	0.35	0.38	0.000	0.30	0.32	0.004	0.32	0.42	0.002
FVC	0.50	0.50	0.000	0.55	0.67	0.005	0.60	0.65	0.004
$FEV_{1/}$ FVC	10.40	10.26	0.98	9.56	10.54	0.12	8.94	7.45	0.38
PEFR	1.18	1.34	0.025	1.1.3	1.26	0.007	1.22	1.67	0.025
MEFR	0.27	0.40	0.02	0.23	0.30	0.04	0.19	0.29	0.24

DISCUSSION

Results of this study showed significant improvement in the PFT parameter for the patients using three treatments within the group. Among the group, there was no significance as three of the each treatment were as effective as each other.

There are numerous studies which concluded the improvement for **FEV_1** as decreases in the airway resistance and the air reaches the collateral due to relaxation and expansion created by ACBT, backflow created by the acapella and also by the vibrations from flutter.

For **FVC**, it has occurred due to alveolar opening which helps in improving the airway resistance by clearing the secretion. Researches have been done where the effect of the ACBT in improving the airways resistance proves that the physiology of the ACBT and also the FET helps in improving the forced vital capacity. Mikelsons C. in his article of 'The role of physiotherapy in the management of COPD' in the journal of Respirsatory Medicine concluded that The use of FET has also been demonstrated to be effective in sputum clearance in COPD, with FET and PD being more effective than cough alone[19] which improves the **FEV_1/FVC** parameters.

Nisha Shinde and Shinde KJ in their research for body positioning found out that body position plays a major role in the airway maintenance in COPD patients during forced expiration in standing, the greater recoil of lung and chest wall combined with higher pressure generated by abdominal contractions pushes the air at high speed through the narrowing airways resulting in higher **PEFR.**

The reduction of airway resistance by ACBT, vibration of the flutter and also the back flow created by acapella, among the three groups, the **MEFR or $FEF_{25-75\%}$** has been increased for the ACBT and it depicts that ACBT is the effective technique in improving the mid expiratory flow rate.

Thus between the three groups, the p value >0.05 so it clearly states that there no such significance between the group.

CONCLUSION

In this study we concluded that ACTIVE CYCLE OF BREATHING TECHNIQUE (ACBT), FLUTTER and ACAPELLA are effective among the COPD patients, to improve the lung function when compared within the group. Among the three groups, they were as effective as each of them, there was no significant difference between them.

Conflicts of Interest: Nill

Source of Funding: Self

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One Minute Sit-Up Test in Athletes of Belagavi: An Exploratory Study

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ABSTRACT

Background: One minute Sit-Up Test is a physical fitness battery commonly used to evaluate the endurance of an athlete. Performing as many repetitions of sit-up as possible in one minute duration of time reveals the endurance level of that athlete which can be used in future for planning the training program.

Objectives: To determine the standard value of one minute Sit-Up Test in the athletes of Belagavi.

Methodology: 220 athletes (n = 220) were screened for the study. The age criteria for this study was 18 to 25 years. Participants were briefed about the nature of the study. Those willing to participate were given 5 minutes of warm up before sit up procedure and after warm up they were told to perform sit up for one minute. The test were performed in three trials and the best value of the three trial were recorded.

Results: The ranges of sit up repetitions per minute in the athletes of Belagavi were from 20 to 76. The average sit up repetitions per minute for male and female athletes is 36.04 ± 6.37 and 30.82 ± 6.81 respectively.

Conclusion: The conclusion of this study revealed that the athletes of the Belagavi city have good endurance capacity as the average sit up repetitions per minute for them falls under the Good Grade category.

Keywords: *Sit–Up Test, Timed Sit – Up, Norms of Sit – Up Test, Abdominal endurance, Field Test*

INTRODUCTION

Testing and maintaining muscle endurance in the athletes is always considered as an important criteria for their sports performance.[1] In athletes, maintaining abdominal muscles endurance is of more important for core stability and back support required for long durational performance.[4,5] This is because, the ability to control the position and motion of the trunk over the pelvis results in optimum production, transfer and control of force and motion to the terminal and distal segment in integrated athletic activities hence enhancing the sports skill and performance.[1,16] However, there is always a debate about the testing measures of endurance level in an athlete.

According to the present sports fitness concept, field based tests are used instead of laboratory tests for the evaluation of the motor skills, muscular endurance and strength in athletes.[2] Generally, timed Weighted Squat (ST), Push-Up Test (PUT), Sit-Up Test (SUT), and Curl-Up Test (CUT) are used for the evaluation of the endurance level in an athlete.[3] The timed Sit-up test (SUT) is commonly performed by athletes that defines the endurance of the abdominal and hip flexor muscle and also maintains the core muscle stability.[3,12] It also helps to correlate the core muscles stability with action of distal muscles and to maintain this correlation always positive.[3] Also, SUT has greater effect in the rehabilitation of the injured athletes enhancing the time laps in order to return to sports after an injury.[4]

In One Minute SUT, performing as much number of sit-up repetitions rates the level of endurance.[6] But there are no any specific standard values of Sit-up repetitions for one minute duration. The number of repetitions

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depend upon the athletes and the type of sports they play. In practice, many athlete fitness professionals have to go for the endurance test prior to exercise routine for each athletes. This gives unequal and non-standardized value which might provide improper and unreliable fitness program for them.[6] Therefore, a baseline data is required for timed sit-up program to apply on the athletes as utterly or nationally fitness batteries.

There are various factors contributing muscular endurance in athletes, comprising muscle strength, fibre type, training, diet, environmental condition, etc. It has been found that any changes in geographical conditions influences the muscular endurance of an athlete.[10] The level of muscular endurance in athletes from different states or countries differ from each other.[10,17-19] Thus, a standard value of timed sit-up repetition in the athletes from different geographical location should be determined. There is paucity of evidences tabulating this value in Indian athletes. Hence, this study is intended to determine the standard value of one minute sit-up test in the various athletes of Belagavi. This value might be useful in future to set the abdominal endurance program, to rate the endurance level and even to train the athletes of Belagavi further to match global standards.

METHODOLOGY

Ethical Clearance was obtained from the Institutional Ethical Committee. 220 athletic subjects of Belagavi were screened. Both male and female athletes of age group 18 to 25 years of Belagavi were included in the study. Any athletes taking medicines regularly or under diet restriction regimen, having any discomfort or back pain while performing trunk flexion activity, or having any recent abdominal pain or surgery were excluded in the study. Also, the female athletes during first two days of the menstrual cycle were excluded.[1] They were briefed about the nature and procedure of the study. Only those willing to participate were recruited for the study. A Written informed consent was obtained from them. All the participants were processed through one minute sit up test.

The test procedure required the athletes to lie down on exercise mat with knees bent, feet flat on the mat and hands placed on ears. The athletes' feet were held by an assistant. The assistant had to give the command "GO" and simultaneously start the stop watch. On listening the command, the subjects had to lift their upper body and touch their knees with elbows and perform the same as many times as possible for next one minute. This procedure included three trials of SUT, each for one minute. The final score was the best of the three attempts.

OUTCOME MEASURES

One minute Sit-Up Test is a physical fitness battery commonly used to evaluate the endurance of an athlete. Performing as many repetitions of sit-up as possible in one minute duration of time reveals the endurance level of that athlete.[3,12]

Materials: An exercise mat, a stopwatch and a hand held tally counter

Scoring: The completion of one sit up was coming up to knee and going back down flat on the mat. Only correctly performed sit up were counted.

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS software 21 version. Comparison and correlation of male and females athletes in terms of maximum number of sit ups in one minute was done using t test. Level of significance was set at $p<0.05$.

RESULTS

The total 220 athletes participated in this study, out of which 108 were male athletes and rest 112 were female athletes. All the participants were competed in either college (4), district (104), state (57), national (46) or international level (9). The participant's mean ± SD years of playing was 3.83 ± 2.54 years. The years of playing of male athletes was 3.67±2.43 whereas that of female was 3.97±2.64 respectively.

The best of three sit up attempts of male was 36.04±6.37 while that of female was 30.82±6.8 respectively. *Figure 1* shows that value of the best of three sit up attempts of male was comparatively more than females. *Table 1* shows the values of the one minute sit up repetitions in the athletes of Belagavi city. The standard repetitions of overall athletes was 33.38 ± 7.08 in the ranges of 20 to 76. The duration of playing of athletes had significantly shown effect in the sit up repetitions *(Table 2, 3, 4)*.

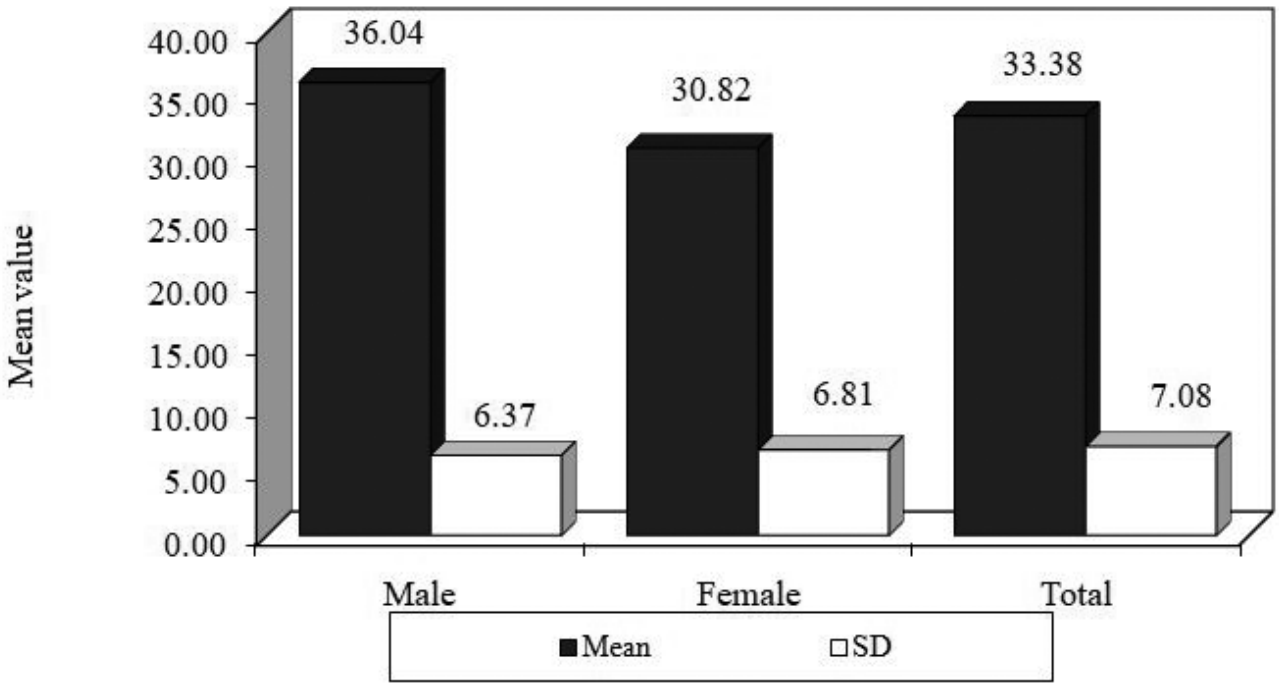

Figure 1: Comparison of male and females with mean Best of three attempts

Table 1: Normality norms of Best of three attempts scores in male, female and as a total

Best time	Total		Male		Female	
	Range	No	Range	No	Range	No
Poor	20.00-26.00	27	20.00-26.00	3	20.00-26.00	24
Good	26.01-40.00	174	26.01-40.00	90	26.01-40.00	84
Excellent	40.01-76.00	19	40.01-66.00	15	40.01-76.00	4
Total	20.00-76.00	220	20.00-66.00	108	20.00-76.00	112
Mean best time	33.38		36.04		30.82	
SD best time	7.08		6.37		6.81	

Note: Poor: <mean-SD, Good: Between mean-SD to < mean+SD and Excellent: >mean+SD

Table 2: Correlation between best of three attempts scores with Duration of playing as a whole

Variables	Correlation between best of three attempts scores with		
	r-value	t-value	p-value
Duration of playing	0.2819	3.0247	0.0031*

*p<0.05

Table 3: Correlation between best of three attempts scores with duration of playing in males

Variables	Correlation between best of three attempts scores with		
	r-value	t-value	p-value
Duration of playing	0.3423	3.7513	0.0003*

*p<0.05

Table 4: Correlation between best of three attempts scores with duration of playing in females

Variables	Correlation between best of three attempts scores with		
	r-value	t-value	p-value
Duration of playing	0.1666	1.7398	0.0848

DISCUSSION

The primary purpose of this study was to record the Sit-Up Test (SUT) for one minute in the various athletes of Belagavi City. In this study, 220 athletes from Belagavi city and of different competitive level were participated. The participants were experienced athletes having average of 3.83 ± 2.5 years of playing duration in either college level/district level/state level/national level/international level competitions.

Previous studies have already proven that sit up test is used for testing and maintaining the muscular endurance.[3] This study supports and add some norms to the study done by Sarah L. Strand et al. (2014) which stated that sit up test is the battery required to check the muscular endurance. They had concluded that sit up test along with some other test like curls up, push up and planks are used to test as well as maintain the muscular endurance of the athletes.

There are studies done for the values of sit up test in athletes other than the Indian athletes. That values are used as the global standard. According to Golding et al. (1986), the normal values of this test ranges from 25 to 49 repetitions per minute for male athletes whereas 18 to 43 repetitions per minute for female athletes respectively. They had divided into seven categories of athletes' endurance i.e. excellent, good, above average, average, below average, poor and very poor. Similarly, this study also graded the endurance level into three grades; excellent, good and poor. This study provides the values of sit ups test for the athletes Belagavi city to match them and even train them as per the global standards.

According to Kathryn M. Refshauge et al, the ability to perform the exercise using the core muscles in female athletes has comparatively less than the male athletes. This study also found that the ability to perform the sit up repetitions in one minute time duration is more in male athletes of Belagavi city in compare to female athletes. Besides this the duration of playing the sports has significantly affected the sit up repetitions. This study provides the facts that the endurance level in the athlete is more if the athlete is experienced and has the longer duration of sports exposure.

Future Scope: The result of this study might be useful in future to set the abdominal endurance program as well as to rate the endurance level of the athletes of Belagavi City. This value will even be helpful to train the athletes of Belagavi further to match the global standards. Future study must also be conducted to see if the improved core endurance influences the performance of the athletes.

Limitations: There must be large sample to generalize the value of this test.

CONCLUSION

This study provided the spectrum of the common values of the sit up test for the different males and females Indian athletes. These values might be used as a baseline data required for timed sit-up program to apply on the Indian athletes as utterly or nationally fitness batteries.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Taken

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Effectiveness of Core Stabilization Training with Pressure Biofeedback in the Management of Mechanical Low Back Pain in Subjects Between Age Group of 20-25 Years

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ABSTRACT

Background: Mechanical low back pain is an impairment of musculoskeletal system.Lifetime prevalence of low back pain is 60-85%. Frequent micro-trauma to the structures of the spine, poor control and stabilization leads to LBP and eventually causes functional limitation.

Purpose: To find whether Core Stabilization Training with Pressure Biofeedback could reduce pain and improves functional activity in patients with mechanical low back pain.

Aim: To study the effectiveness of Core Stabilization Training with Pressure Biofeedback in reducing pain and improving functional activity in subjects with mechanical low back pain between the age group of 20-25 years.

Objective: To find out the effect of core stabilization training with pressure biofeedback in reducing pain and improving functional activity in subjects with mechanical low back pain between the age group of 20-25 years.

Method: The study was conducted on 30 subjects between the age group of 20-25 years with mechanical low back pain and according to the inclusion criteria were recruited in the study. NPRS at rest and activity, Modified ODI was assessed PRE and POST treatment.

Results: P value: less than 0.05 for NPRS (pain at rest and activity)and modified ODI i.e. core stabilization training with pressure biofeedback had statistical improvement in NPRS (Pain at rest and activity) and modified ODI score.

Conclusion: Core stabilization training with pressure biofeedback is effective in reducing pain (at rest and activity) and functional disability in subjects between the age group of 20-25 years with mechanical low back pain.

Keywords: *Mechanical low back pain, Core stabilization training, Pressure biofeedback unit.*

INTRODUCTION

Low back pain is a common musculoskeletal impairment affecting 80% of population at some point in their life. It is an important clinical, social, economic and public health issue affecting population indiscriminately. It is considered to be one of the leading causes of disability contributing to more sickleaves[1]. In India incidence of LBP in general population was found to be 23.09% and has lifetime prevalence of 60-85% [2].

Mechanical low back pain can be defined as back pain caused by placing abnormal stress and strain on vertebral column and muscles typically, arises from bad habits, such as poor posture, poorly designed seating and improper bending and lifting activities. Mechanical low back pain is characterized by increase in pain with motion and decreases with rest. Chronic pain is defined as pain lasting more than 12 weeks[3]. Characteristic features of mechanical low back pain: pain often refers to the buttocks and thigh, morning stiffness, there is pain on forward flexion and aggravated by motion[4].

Core stability exercise can be defined as restoration of augmentation of the ability of the neuro-muscular system to control and protect the spine from the injury. The local muscles are said to be crucial in this mechanism.[5] Muscles related to core stability are multifidus, transverses abdominis, external/internal

oblique abdominis, paraspinalis. It has been speculated that this method of training may be useful in decreasing the risk of back pain.[6] Previous studies suggested that Core stabilization exercises showed marked improvement, while treating for long duration such as 8 weeks duration. So this study was framed with shorter duration of 2 weeks.

Hence this study was intended to find whether Core Stabilization Training with Pressure Biofeedback could reduce pain and improve functional activity using NPRS and Modified Oswestry index in patient with mechanical low back pain.

AIM

To study the effectiveness of Core Stabilization Training with Pressure Biofeedback in reducing pain and improving functional activity in subjects with mechanical low back pain between the age group of 20-25 years.

OBJECTIVE

To find out the effect of core stabilization training with pressure biofeedback in reducing pain and improving functional activity for 2 week period in subjects with mechanical low back pain between the age group of 20-25 years.

MATERIAL AND METHOD

It was an experimental study conducted on 30 patients with mechanical low back pain age between 20-25yrs was taken from NDMVP hospital. Convenient sampling with random allocation method was used in the study.

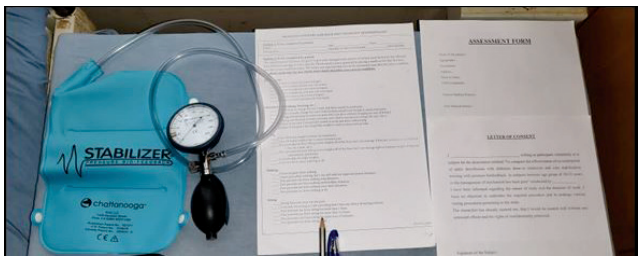

Figure 1: Materials used

Inclusion Criteria:

- Male/female patients between the age group 20-25 years having mechanical low back pain persisting for at least 6 months upto1 year.
- A current pain level ranging less than 7 on the self-reported Numeric pain rating scale (NPRS).
- Patients complaining Pain when standing or sitting for a long time or Pain when driving long distance, getting in and out of a car or lifting activities.
- Patient with minimum and moderate disability based on Modified Oswestry disability index.

Exclusion Criteria:

- Structural deformity
- Systemic inflammatory disease
- Nerve root compression
- History of spinal surgery or fractures.

PROCEDURE

Subjects clinically diagnosed with mechanical low back pain were screened according to inclusion and exclusion criteria. Ethical clearance was obtained and informed consent was taken from each subject. Subjects were briefed about the study & the intervention.30 Patients were recruited and were given core stabilization training with pressure biofeedback. The effect of intervention was measured using outcome measures comprising of NPRS (pain at rest and activity) and Modified ODI before and after 2 weeks.

1. **Curl up:** Subjects knees were bend from the supine position, knees were stabilized by the therapist. Directions were given to move head and shoulder slowly from the ground.
2. **Right Side Bridge:** Subjects were moved to right side lying and upper arm was aligned vertical on the ground and elbow flexed to 90 degrees, right elbow was on the ground and forearm rested on the floor. The participants were asked to raise the pelvis from the floor between knees and elbows; and was instructed to hold it in a straight line "plank" position.[7]

Figure 2: Right Side Bridge

1. **Birddog:** Subjects were instructed to stretch left arm and right leg in a row simultaneously from the four-foot position.

2. **Transverse abdominus activation with pressure biofeedback:**

- Participants were instructed to lie in hook lying position.
- A pressure Bio feedback cuff was placed under the first lumbar vertebra to second sacral vertebra and was inflated to 40mmhg.
- Participants were instructed to draw in his or her navel gradually (ADIM) and maintain the target pressure without any pelvic motion.
- And while performing ADIM, pressure was increased to 2mmhg from the baseline i.e. from 40-42mmhg.

Figure 3: Abdomen Drawing-in maneuver with pressure biofeedback

Intensity of each exercise: Each set: 5 sec hold, 5sec rest, 10sets.

Frequency of each exercise: 5 times a week for 2 weeks.

RESULT

Table 1: Intra-group comparison of Pain (NPRS) at rest

Parameter	Follow up	
Pain (NPRS at rest)	Pre Tx score	2.83 ± 0.80
	Post Tx score	1.48 ± 0.63
	t value	14.97
P-value (Intra-group)	Pre-Rx v/s Post Rx	0.0001 (Significant)

Values are Mean ± Standard deviation. P-values are obtained using paired t- test, after confirming the underlying normality assumption. P-value<0.05 is considered to be statistically significant.

Table 2: Intra-group comparison of Pain (NPRS) on activity

Parameter	Follow up	
Pain (NPRS at activity)	Pre Tx score	5.41 ± 0.68
	Post Tx score	3.38 ± 0.68
	t value	33.665
P-value (Intra-group)	Pre-Rx v/s Post Rx	0.0001 (Significant)

Table 3: Intra-group comparison of Functional Disability (Modified ODI)

Parameter	Follow up	
Modified ODI (%)	Pre Tx score	27.3 ± 6.57
	Post Tx score	17.24 ± 5.46
	t value	25.7806
P-value (Intra-group)	Pre-Rx v/s Post Rx	0.0001 (Significant)

RESULT

The Pain (NPRS) at rest and activity, Modified ODI Questionnaire scores improved significantly after treatment.

DISCUSSION

This study was aimed to find out the outcomes of core stabilization exercises using pressure biofeedback in reducing pain and functional disability in mechanical low back pain. This study included 30 subjects with mechanical low back pain of both genders between age group of 20-25 years. Through convenient sampling they were recruited randomly in the study and received core stabilization exercises using pressure biofeedback. Pain was measured using NPRS before intervention and after 2 weeks of intervention. Functional disability was measured using ODI before intervention and after 2 weeks of intervention.

VARIABLE 1: PAIN (NPRS) AT REST

Using paired t test for analysis mean pre treatment Pain (NPRS) at rest score ,the p value obtained was <0.05 which implies that it is statistically significant.

Thus treatment had an effect in reducing pain at rest in patient with mechanical low back pain after 2 weeks of treatment. The result found in our study is accordance with study done by Serish ali et al (2017) on effect of lumbar stabilization exercises in the management of chronic low back pain. It was 2 weeks protocol. Outcome measures used were NPRS, Modified ODI and goniometer. The study concluded that lumbar stabilization along with conventional physiotherapy are found to be more effective in chronic low back pain management in reducing pain and functional disability.[8]

One of the important factors that modulate nociceptor sensitivity is the acidity (pH) of the surrounding tissue in the lumbopelvic region. An altered pH of the local muscles of the lumbopelvic region is related to the accumulation of inflammatory soup and mechanical sensitization of the peripheral and central nocicepetor among patient with chronic low back pain. Goal of Core stabilization exercises is to increase circulation and movements of the lumbopelvic region to wash out the retained inflammatory mediators and facilitate muscle activation and thus reduces the low back pain.[9]

Reduction in pain may also be due to Core exercises enhances the endurance of central part of the trunk, reduces the tension in the ligaments and joints of the spine fix them in the neutral position reduce the pain intensity.[10]

VARIABLE 2: PAIN (NPRS) AT ACTIVITY.

Using paired t test for analysis Pain (NPRS) at activity, p value obtained was <0.05 which implies that it is statistically significant. Thus the treatment had an effect in reducing pain during activity in patient with mechanical low back pain after 2 weeks of treatment.

The result found in our study is accordance with studies done by Suresh Babu Reddy (2015) on Effect of core stabilization program and conventional exercises in the management of chronic mechanical low back pain .They performed a randomized control trial on 40 subjects between age group 30-50. Result showed that the outcome of this study had highly significant statistical changes lead us to the conclusion that "Core stabilization program is more effective in the management of chronic mechanical low back pain than conventional exercises."[11]

Reduction of pain on activity may be due to Core stability exercises produces low load isometric contraction thus producing hypoalgesic effect on contracting body part as it activates central inhibitory pain mechanism by static muscle contraction thus upsurge the secretion of beta endorphins and activates the system that regulates pain. Central inhibitory pain mechanism activates secretion of endogenous opioids and in turn reduces the pain perception.[12]

VARIABLE 3: FUNCTIONAL DISABILITY [MODIFIED OSWESTRY DISABILITY INDEX (ODI)]

Using paired t test for analysis for modified ODI score, p value obtained was <0.05 which implies that it is statistically significant The mean pre-treatment of scores of modified ODI, the p value obtained was < 0.05 which implied that it was statistically significant thus the treatment had an effect on reducing the disability and improving function in patients with mechanical low back pain after 2 weeks of treatment.

Similar study on effectiveness of core stabilization exercises on functional disability in patients with chronic low back pain results of the study were in accordance to our study showing improvements in the oswestry disability Questionnaire scores post treatment performed by Amila Kapetanovic et al. (2016).[13]

Reduced disability may be due to improved motor control caused by core stabilization training. Motor control plays a crucial role in stabilizing spinal system. Maintaining lumbar spinal stability involves three interactive systems: passive support system, which relies on ligaments and fascia of skeletal muscle; the active contraction system, in which lumbar spinal movements and stability are maintain by contracting the core muscles; and the central nervous system which place a leading role in motor control. The CNS can respond to the sensation produced in active and passive system by using the central nerves to control motor co-ordination. The CNS governs physical action and prevents interference in order to maintain spinal stability and lumbar spinal movements.[14]

Improved functional activity may be due to following mechanism it involves stabilization via intra-abdominal pressure, which reduces compressive forces in the core system. During augmented drawing in of the abdominal wall training, the deep abdominal muscles contract against the viscera, pushing the viscera

superiorly into the diaphragm and inferiorly into the pelvic floor. This results in increased abdominal pressure, which elevates the diaphragm and leads to contraction of pelvic floor musculature while concurrently assisting in intersegmental stabilization of the lumbo-pelvic system (Stanton T 2008).[15]

Another reason to improve functional activity may be due to plastic changes at the brain due to exercising specific muscle of the lower back region. In turn reprogramming the brain for optimal stabilization targeting right muscle for right task thus the subjects were more focused and attentive toward exercise by giving visual biofeedback during training session.[16]

CONCLUSION

Core stabilization training with pressure biofeedback is effective in reducing pain (at rest and activity) and functional disability in subjects between the age group of 20-25 years with mechanical low back pain.

Limitations of the Study

- No follow up was done after the said duration of study hence, long-term outcomes of the both the treatment techniques were not evaluated.
- Outcome measures were purely subjective.
- Quantitative measures were not used to compare the effect of individual exercises on isolated muscles to know which exercise gives better effect in reducing pain and disability.

Conflict of Interest: None

Ethical Clearance: Yes

Disclaimers: None

Source of Funding: Self

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To Compare the Effectiveness of Proprioceptive Circuit Exercises Versus Open Kinematics Chain Exercises on Pain and Improve Muscle Strength and Physical Function in Osteoarthritis Knee patients

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ABSTRACT

Osteoarthritis (OA) is the most common musculoskeletal condition affecting the quality of life of older adults. Aim of this experimental comparative study is to compare the effectiveness of proprioceptive circuit exercises versus open kinematics chain exercises on pain & improve muscle strength and physical function in Osteoarthritis knee patients. The data of 60 OA knee patients were collected from the Parul Sevashram Hospital, Vadodara. The patients were divided into two groups, group A was given proprioceptive circuit exercises and group B was given open kinematic chain exercises. A pretest outcome measures i.e., NPRS, MMT and WOMAC were given. Interventions were carried out for 3 weeks. The results were derived by using statistical methods with the help of statistics software Mad Calc, within group comparison "paired t test" and between group comparisons "unpaired t test" was used. There was significant differences in pretest and post values within two outcome variables of each group but there was significant differences seen when two outcome measures of each group were compared. The study showed that both groups are effective in reducing pain and improved muscle strength & physical function in knee osteoarthritis. After exercises between both groups proprioceptive circuit exercise group A was extremely statistically significant than open kinematic chain group B. So group A indicating more reducing pain and beneficial Effect on reducing pain, improved muscle strength, physical function in OA knee patients.

Keywords: *Osteoarthritis, proprioceptive circuit exercises, open kinematics chain exercises*

INTRODUCTION

Osteoarthritis (OA) is the most common musculoskeletal condition affecting the quality of life of older adults. Three major physical impairments, such as knee pain, stiffness, and decreased quadriceps strength, are highly associated with knee OA and are believed to contribute to physical disability and progression of the disease.[1] For patients with knee osteoarthritis, exercise is the most common and effective therapy for enhancing knee function and reducing pain; it is also more cost-effective than other types of medical interventions. However, its mechanism is not fully understood.[2] It has being estimated that the number of people over the age of 65 years will be doubled in the first two decades in the 21st century.[3] In the third National Health And Nutrition Examination Survey (NHANES III), approximately 37% of participants age > 60 years or older had radiographic knee OA.[4] A recent survey in India reported that the prevalence of OA in older adults more than 65 years of age was 32.6% in the rural population and 60.3% in the urban population.[5]

There are two types of osteoarthritis. Primary osteoarthritis is a chronic degenerative disease that is commonly related genetic inheritance.[6] Secondary arthritis this tends to show up earlier in life, due to an injury, kneeling or squatting for extended amounts of time, diabetes, or obesity.[6]

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Osteoarthritis is a degenerative condition primarily affecting the articular cartilage. Changes: increase in water content and depletion of the proteoglycans from the cartilage matrix; its fibrillation; cartilage abraded by contact between the opposing articular surfaces; underlying bone exposed; subchondral bone becomes hard and glossy; bone at the margins of the joint hypertrophies to form a rim of projecting spurs known as osteophyte. A similar mechanism results in the formation of subchondral cysts and sclerosis.[7] The loose flakes of cartilage incite synovial inflammation and thickening of the capsule, leading to deformity and stiffness of the joint. Often one compartment of a joint, the medial compartment is affected more than the lateral, leading to a varus deformity (genuvarum).[7] Weaknesses of the shock-absorbing and weight-bearing muscles may lead to structural damage of the articular cartilage and subchondral bone, as well as decrease joint stability, which is a risk factor for knee OA progression.[8]

The advantages of a proprioceptive circuit exercise are reduced muscle fatigue, which is generally observed during resistance exercise, and improved exercise efficiency by minimization of the recovery time between exercise sets.[2] An Open Kinematics Chain (OKC) is performed when the limb is not fixed and allowed to move freely through space. It helps in decreasing the joint compression.[9] Exercise helps in decreasing pain, improving strength and endurance, improving range of motion and connective tissue elasticity as well as exercise decreases functional limitation by improving walking speed, gait, physical activity and decreasing depression and anxiety.[3] An open kinetic chain leg extension exercises have been the traditional means of strengthening the quadriceps muscle, however several authors report that these exercises exacerbate the symptoms in many patients with patello-femoral arthritis.[10]

The strength of the knee extensor muscles was greater than that of the knee flexor muscle at baseline, and an OA related reduction in muscle strength was observed only in the knee extensor muscles, that is, in the quadriceps muscles, which is deemed as the cause of the pain and physical dysfunction of the knee joint in these patients[8]. Thus, such as knee isokinetic exercises, knee extension and flexion exercises from a sitting position, straight leg raising exercises, and knee curl exercises)[8].

AIM

To compare the effectiveness of proprioceptive circuit exercises versus open kinematics chain exercises on pain and improve muscle strength and physical function in osteoarthritis knee patients.

METHODOLOGY

This was an experimental study carried out in College of Physiotherapy, Parul Institute, Vadodara. Data of 60 indoor patient of OA Knee, age between 40 to 65 years[8], irrespective of gender, collected from Parul Sevashram Hospital, Vadodara. Study done by verbal consent of patients of unilateral of OA knee and pain for a duration of more than 3 months[8]; diagnosis with degenerative OA and had radiological stage 2 and 3 unilateral OA knee according to the Kellgren and Lawrence scale.[14] Exclusion of patients of previous and recent traumatic injury to knee, subjects with secondary OA knee, serious medical condition such as heart or pulmonary conditions, spinal problems and patients with recent knee surgery.

The testing procedure was properly explained to subjects. Two Groups A and B made. Each consist 30 OA knee patients. Group A were perform Proprioceptive Circuit Exercise Program.[2] The detail exercise program consisted of repetition of walking in place and four different types of proprioceptive circuit exercise, including wall slides, half squats, lunges, stationary bicycle. Group B were perform Open Kinematic Chain Exercises in form sitting knee extension, prone knee bending, hamstring curls, chair scoots were perform in sets of 10 repetitions; 1 set of all exercises were perform twice a day for the 1st week, and this were progress to 2 sets twice a day until the 3rd week and then 3 sets twice a day until the 5th week.

To outcome measures of the OA knee patients will be performed by following ways: (1) Pain intensity will be given by NPRS (Numerical Pain Rating Scale)[8,11], all the participants completed the NPRS by indicating the average pain level experienced before and after the intervention. (2) WOMAC index (Western Ontario and Mc. master universities osteoarthritis index)[8,12] perceived pain, knee stiffness and functional ability will be assess by WOMAC index, done initially. The individual completing the scale, rated her perceived pain, stiffness and functional ability on a 5-point Likert's scale which is scored from 0-4 i.e.:- o-none, 1-slight, 2-moderate, 3-severe, 4-extreme. (3) MMT (Manual Muscle Test)[13,] will be a convenient tool for evaluating the muscle strength and level of impairment. Muscle strength is rated from 0 to 5 according to the muscle performance against resistance.

Data analysis was conducted with Microsoft Word and Excel Medcalac version 17.9.7 have been used to generate graphs, tables etc. Paired 't' test was used for analysis NPRS, WOMAC and MMT pre-post within the Group A and Group B with calculation of values obtain as data during study. Un-paired 't ' test was used for analysis NPRS, WOMAC and MMT post intervention between Group A and Group B with calculation of values obtain as data during study.

OBSERVATIONS

Table 1: Comparison of pre and post NPRS in Group A & Group B

Group	Time	Mean	SD	Mean Difference	SD Difference	t–value	p-value
A	Pre-test	7.133	1.008	-3.166	0.746	-3.441 to -2.88	<0.0001
	Post-test	3.9667	1.129				
B	Pre-test	7.300	0.8769	-2.500	0.7311	-18.730	<0.0001
	Post-test	4.800	1.0635				

Table 2: Comparison of pre and post WOMAC in Group A & Group B

Group	Time	Mean	SD	Mean Difference	SD Difference	t – value	p - value
A	Pre-test	73.33	8.94	-20.933	5.1457	-22.85 to -19.011	<0.0001
	Post-test	52.40	10.42				
B	Pre-test	73.63	7.75	-11.4000	3.3073	-18.880	<0.0001
	Post-test	62.23	8.35				

Table 3: Comparison of pre and post MMT flexors in Group A & Group B

Group	Time	Mean	SD	Mean Difference	SD Difference	t–value	p-value
A	Pre-test	3.00	0.00	1.60	0.091	17.5879	<0.0001
	Post-test	4.60	0.50				
B	Pre-test	3.00	0.00	0.67	0.088	7.6158	<0.0001
	Post-test	3.67	0.48				

Table 4: Comparison of pre and post MMT extensors in Group A & Group B

Group	Time	Mean	SD	Mean Difference	SD Difference	t–value	p-value
A	Pre-test	3.00	0.00	1.60	0.091	17.5879	<0.0001
	Post-test	4.60	0.50				
B	Pre-test	3.00	0.00	0.70	0.085	8.226	<0.0001
	Post-test	3.70	0.47				

Table 5: Comparison of score difference in flexors and extensors after exercise between Group A & Group B

Muscle	Group	Mean	SD	Mean Difference	SD Difference	t–value	p-value
Flexors	A	1.60	0.50	0.93	0.126	7.3928	<0.0001
	B	0.67	0.48				
Extensors	A	1.60	0.50	0.90	0.125	7.2250	<0.0001
	B	0.70	0.47				

Table 6: Comparison of post NPRS, Post WOMAC, post MMT flexors and extensors in Group A & Group B

Test	NPRS		WOMAC		MMT flexors		MMT extensors	
Group	A	B	A	B	A	B	A	B
Mean	3.97	4.80	52.40	62.23	4.60	3.67	4.60	3.70

DISCUSSION

Diminished knee joint proprioception is highly correlated with the level of pain, and the interaction between proprioception and muscle strength is closely related to functional body movements. This indicates that application of proprioceptive circuit exercise improves proprioception and knee joint muscle function, thereby reducing patient pain. Strengthening knee joint muscle function likely helps reduce pain. This study showed that proprioceptive circuit exercise in patients with degenerative knee Osteoarthritis can be an effective way of strengthening knee joint muscle function and reducing pain. The results are expected to provide a useful basis for future efforts to enhance knee joint functions and improve pain control in patients with knee osteoarthritis.[2]

We got significant improvement after 3 weeks post treatment of the outcome measures of two Groups. For pre – post NPRS in Group A the two-tailed p value is < 0.0001, considered extremely significant. t = -3.441 to -2.88 with 29 degrees of freedom. For pre – post WOMAC in Group A the two-tailed p value is < 0.0001, considered extremely significant. t = 22.85 to -19.011 with 29 degrees of freedom. For pre – post MMT flexors in Group A the two-tailed p value is < 0.0001, considered extremely significant. t = 17.5879 with 29 degrees of freedom. For pre – post MMT extensors in Group A the two-tailed p value is < 0.0001, considered extremely significant. t = 17.5879 with 29 degrees of freedom.

Sung-bum J et al[2] applied proprioceptive circuit exercise to patients with degenerative knee Osteoarthritis and examined its effects on knee joint muscle function and the level of pain. In this study, 14 patients with knee osteoarthritis in two Groups, a proprioceptive circuit exercise Group (n=7) and control Group (n=7), were examined and was used to assess knee joint muscle function, and a visual analogue scale was used to measure pain level and resulted in the proprioceptive circuit exercise Group, knee joint muscle function and pain levels improved significantly, whereas in the control Group, no significant improvement was observed and concluded a proprioceptive circuit exercise may be an effective way to strengthen knee joint muscle function and reduce pain in patients with knee osteoarthritis.

For pre – post NPRS in Group B the two-tailed p value is < 0.0001, considered extremely significant t = -18.730 with 29 degrees of freedom. For pre – post WOMAC in Group B the two-tailed p value is < 0.0001, considered extremely significant. t = -18.880 with 29 degrees of freedom. For pre – post MMT flexors in Group B the two-tailed p value is < 0.0001, considered extremely significant. t = 7.3928 with 29 degrees of freedom. For pre – post MMT extensors in Group B the two-tailed p value is < 0.0001, considered extremely significant. t = 8.226 with 29 degrees of freedom. For comparison of score difference in flexors after exercise between Group A and Group B the two-tailed p value is< 0.0001, considered not significant t =7.3928 with 58 degrees of freedom. Comparison of score difference in extensors after exercise between Group A and Group B the two-tailed p value is < 0.0001, considered extremely significant. t = 7.2250 with 58 degrees of freedom.

Ganvir SD et al[1] effect of open chain exercises on muscle strength and function in elderly patients with knee Osteoarthritis. A hundred patients were randomized into two Groups. Experimental Group A performed open chain exercises in form of isometric quadriceps and straight leg exercises for 5 days a week for 5 days whereas control Group B did not perform any exercises. All the measurements were taken at baseline (week 0) and at the end of the trial at week 5. Resulted in between Group comparisons, pain intensity, and improvement in function in isometric exercises Group A at the end of 5th week were significantly greater than those of control Group B ($p<0.05$) and concluded the 5 week isometric quadriceps exercise program showed beneficial effects on quadriceps muscle strength, pain, and functional disability.

For post NPRS between Group A and Group B the two-tailed p value is equals 0.0047, considered extremely significant t = 2.9428 with 58 degrees of freedom. For post WOMAC between Group A and Group B in the two-tailed p value is equals 0.0002, considered extremely significant. t = 4.0320 with 58 degrees of freedom. For post MMT flexors between Group A and Group B the two-tailed p value is < 0.0001, considered extremely significant. t = 7.3928 with 58 degrees of freedom. For post MMT extensors between Group A and Group B the two-tailed p value is < 0.0001, considered extremely significant. t = 7.2250 with 58 degrees of freedom.

Metgud S et al[14] said to compare the effect of proprioceptive exercises in osteoarthritis and total replaced knees using the knee society score and joint position sense. Participants were divided into two groups; Group A comprised of the total knee replacement and Group B was the osteoarthritis group. Group A was given exercises along with ambulation and static and resistance cycling and training of functional activities. Group B was given exercises and seven proprioceptive exercises followed by continuous short wave diathermy cross-fire method for 15 minutes. The results show a significant difference between the two groups using VAS and JPS whereas showed no significant difference between the two groups on using the KSS and concluded that proprioceptive exercises are beneficial in improving the joint position sense in patients with osteoarthritis as well as total knee replacements.

CONCLUSION

Both groups were statistically significant and showed beneficial effect on reducing pain, improved muscle strength, physical function in OA knee patients but after exercises between both groups proprioceptive circuit exercise Group A was extremely statistically significant than open kinematic chain Group B. So Group A indicating more reducing pain and beneficial effect on reducing pain, improved muscle strength, physical function in OA knee patients. Hence alternative hypothesis is accepted.

Ethical Clearance: Taken from Ethics Committee, Parul Institute, Vadodara.

Source of Funding: Self

Conflict of Interest: Nil

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Effect of Body Awareness Therapy on Depression in Geriatric Population–A Pre Post Experimental Trial

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ABSTRACT

Objective: The main objective of this study was to evaluate the efficacy of Body awareness therapy on depression in geriatric population

Design: A Pre- Post Experimental Design.

Participants and Interventions: 30 geriatric persons who had a score of more than 5 on the Geriatric Depression scale (GDS) were enrolled in the study. They were given Body Awareness Therapy (BAT) for a period of 3 weeks 3 times a week for 40 minutes.

Main Outcome Measures: Geriatric Depression scale was used as a self rating screening tool to measure depressive symptoms in older adults at the commencement and termination of BAT.

Results: Statistical analysis was done comparing the pre and post GDS using the paired t test. There was 12.92% change in the values and the p value= .0001 which is significant ($p<0.05$).

Conclusion: Body Awareness Therapy has been shown to be effective in reducing depressive symptoms in the geriatric population.

Keywords: *Geriatrics with depression, body awareness therapy, older Persons QOL*

INTRODUCTION

India has been given the tag of an aging nation, India's health programs have shed light on the problems faced by middle aged persons, maternal and child health and disease control. Due to the rise in modern technology and health care facilities there is a rise in the geriatric population. There is the other face of the coin which needs to be explored in terms of the medical and socioeconomic status of these geriatric individuals[1]. According to the National Institute of Mental Health, Depression is persistent sad or empty mood, a feeling of hopelessness, pessimism, feelings of guilt, worthlessness, helplessness, loss of interest, decreased energy and fatigue, being slowed down while performing activities, difficulty in concentrating, remembering and making decisions[2]. It is often ignored or goes unnoticed in the elderly and has a considerable impact on physical health, social systems and overall functioning putting depression in the top most position to be the leading cause of functional impairment worldwide[3,4] . A study conducted on the point prevalence of depression in geriatric persons in India is found to be from 13% to 25%[5]. There are various pharmacological drugs available for the treatment of depression like Selective serotonin reuptake inhibitors (SSRI), Tricyclic antidepressants(TCA) and Monoamine oxidase inhibitors (MAOI) but the long term prognosis is subtle with incomplete recovery and higher rates of relapses (50%-90%) over a period of 2 -3 years. The goal of rehabilitation is not only the treatment of depression but to minimize or prevent the recurrence[3,6] .

Body awareness, is the subjective, phenomenological aspect of proprioception and interoception that enters conscious awareness, and is modifiable by mental processes including attention, interpretation, appraisal, beliefs, memories, conditioning, attitudes and affect[7]. Body Awareness Therapy (BAT) is a physiotherapeutic approach for the adjustment of pathological tension in the body and also is the ability to recognize subtle body cues. It has shown to be reduced in individuals with depression The main objective is improving the patient's ability to become aware of their bodily status

and to recapture normal balance of the body in BAT[8]. Neuroimaging studies also indicate changes in the structures of the brain involved in body awareness after BAT[9]. Evidence based treatments for depression continues to expand but the responses brought about by them are limited and the condition has a high relapse rate in the elderly[3]. Depression in this population is linked with financial problems, insecurity and loneliness as well as decreases body awareness[1]. There is a continuous need for research that predicts successful treatment outcomes in depression; an intervention that promotes a holistic change is likely to benefit these individuals[10]. BAT has been done for patients with chronic illness and depression but has not been conducted on elderly persons with depression[9]. Thus the aim of the current study was to determine effect of body awareness therapy on depression in geriatric population.

METHOD

In the region of Belgavi, Karnataka, n=67 participants from 3 old age homes were screened using Geriatric Depression Scale in 2017. The inclusion criteria was i) Above the age of 65 ii) A score of >5 on the Geriatric depression scale iii) Understand commands and iv) Ambulate with or without an assistive device. The exclusion criteria were that i) Cognitive impairment ii) Pre-existing neurological condition that alters the higher mental functions iii) Any other psychiatric condition. Once they fulfilled the inclusion and exclusion criteria n=30 older adults were included in the study. The Research Ethics committee of KLE Academy of higher education, Belgavi, India approved the study and all the participants were provided a written informed consent prior to the commencement of the study. After the completion of the initial assessment; a three week, twice a week BAT intervention was given.

Intervention and Outcome Measure: Basic Body Awareness intervention was given; the treatment session lasted for a total of 40 minutes. The initial 5 minutes was orientation and breathing exercises subsequently 10 minutes of soothing music after which a 10 minute relaxation technique in this case Jacobson's relaxation. Following this three stages of progression of BAT for three weeks were given and culminating with 5 minutes of breathing exercise[4]. The first stage included lying down exercises, stretching and contracting gradually integrated with breathing and voice, standing exercises which included coordination exercises; these exercises were integrated into normal breathing. Stage two consisted of standing exercises like isolated movements, spot marching, weight shifts, posture exercises and non verbal exercises. All these exercises were coordinated with breathing. Stage three incorporated walking exercises that aimed to be beneficial in a natural, relaxed and rhythmical gait with normal associated movements. Balance exercises and postural correction exercises were also included in this stage. Geriatric Depression Scale was used as a self rating screening tool to measure depressive symptoms in older adults, 15 items are present in the short form and the recall time is past week. It is designed as a self-administered questionnaire, though oral assistance and/or interview can be utilized. The total score is calculated by summing responses that endorse depression. The GDS was used pre and post BAT.

RESULTS

Statistical analysis was done comparing the pre and post GDS using the paired t test. There was a 12.9% change in the values and the p value = 0.0001 which is significant. Also a 3 month follow up was taken in which the p value was 0.0393 which is significant.

Table 1: Distribution of patients in the study

Variables	Min	Max	Mean	SD	SE
Age	38.00	95.00	75.17	11.43	2.09
Height	1.37	1.89	1.61	0.13	0.02
Weight	38.00	90.00	60.10	16.03	2.93
BMI	14.81	31.62	23.01	4.19	0.76

Table 2: Baseline data

Gender	No of participants	% of participants
Male	8	26.67
Female	22	73.3
Total	30	100.00

Table 3: Pre and Post GDS scores; * Significant

	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Paired t	p-value
Pretest	8.00	1.31					
Posttest 3 Weeks After BAT	6.97	1.71	1.03	0.96	12.92	5.8693	0.0001*
3 Months Follow up	7.46	0.08				1.8222	0.0393*

DISCUSSION

In the present study, the effects of BAT on depression in geriatric persons as measured by the GDS were investigated. The GDS appears to be a reliable and valid instrument with scales of adequate consistency in this study population[11]. After the intervention and a three month follow up, the comparison showed significantly statistical results which indicated that BAT may be indicated and may have a carryover effect. GDS is a subjective scale and the "YES" answer questions were the feeling of worthlessness, helplessness and their present situation. Some participants complained of memory issues and that they were easily fatigued. Yang B et al indicated that in relation to depression cognition has a negative influence[12]. This could be due to the frustration felt by the participant in relation to activities of daily living if memory is affected . The participants in the present study were in a old age home away from their families, this may have given the "YES" on the GDS where they felt that they have no purpose and find that their life is empty, while many had left their hobbies and quit doing the things that they enjoyed. Potter R et al conducted a study on the impact of the Physical Environment on depression of older residents in care homes, he concluded that the overall physical environment did not have a major role in their depressive symptoms but outdoor access and social interaction had a positive relation to depression[13].

DeJong et al conducted a study and noted that Body Awareness has been proposed to be the mechanism for BAT and it involves an attentional focus on and awareness of internal body sensations[9]. Several studies support the notion of body awareness in mindfulness training and thus takling depression which has been shown to have decreased levels of body awareness. Danielsson et al concluded that in major depression, BAT enhanced perceptual openness and challenged the numbness experienced in depression[4]. In addition, the pre and post GDS scores after BAT is significant as p=0.0001 which indicates that body awareness is increased in apparently normal geriatric persons with depression in comparison to a study done on persons who have chronic illness with depression. The limitations were that the Body Awareness component was not scored and also follow up to determine the lasting effects of BAT were not conducted.

CONCLUSION

In conclusion, the data that was collected and analyzed suggests that BAT decreases depression as measured by the GDS.

It may be worthwhile to note that the interventions that encourage an overall wellbeing and change towards body awareness will benefit this target group. The limitations of this study was that the measure of initial and change in Body Awareness was not measured also the participants were not followed up to see the long term efficacy of BAT

Conflict of Interest: The authors declare that there is no conflict of interest.

Source of Funding: Self

Ethical Clearance: KLE Academy of Higher Education ethical board, Belagavi, Karnataka

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The Immediate Effects of Mulligan Taping on Pain and Weight Distribution in Lateral Ankle Instability: A Case Study

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ABSTRACT

Introduction: Lateral Ankle Instability has been one of the common causes of impairments in the lower extremity injury resulting from repetitive ankle sprains to the lateral ankle ligament complex. This may lead to pain and disturbed proprioception resulting in positional fault of articular surfaces, poor postural control and weight distribution. Physiotherapy thus aims in reducing the pain, realignment of the articular surfaces thereby improving postural control and weight on the affected ankle joint/s. The primary purpose of this study was to assess the immediate effects of Mulligan fibular repositioning ankle taping on the NPRS and Weight Distribution in a case of Lateral Ankle Instability.

Method: A 20 year old female student, with left lateral ankle pain, had complains of chronic pain around the lateral malleolus since 2.5 months after playing basketball. The pain aggravated with squatting and forward lunges. The outcome measures were Numerical Pain Rating Scale that measured the pain intensity and percentage body weight distribution during squat as measured on Neurocom Balance Master System (version 9.1). A fibular posterolateral-superior tape as described by Mulligan was applied on an undertape and the outcome measures were again noted. Results: Pre treatment and Post treatment, pain reduced from 4/10 to 2/10 during squatting and forward lunge respectively. Also the Percentage of Body weight distributed on the left ankle improved immediately after the application of tape.

Conclusion: Fibular repositioning tape as described by Mulligan not only reduces pain but also improves the weight falling on the affected ankle joint/s.

Keywords: *Mulligan Tape, Lateral Ankle Sprain, Proprioception, Fibula repositioning tape.*

INTRODUCTION

Chronic Ankle Instability (CAI) is a common disability in the lower extremity injuries. It results from repercussions of acute ankle sprains leading to giving way sensation and self reported disability. [1] Common mechanism of injury that is postulated is extremes of plantarflexion and inversion position of ankle where the weak anterior tibio-fibular ligament (ATFL) and calcaneofibular ligament (CFL) are prone for varying degree of injury with minimal force.[2] The theories commonly postulated for the cause of CAI are: mechanical instability resulting from poor control by the ligaments and functional impairment resulting from loss of proprioception and mechanical instability which together leads to CAI. Damage to the ligaments often results in pathological laxity which leads to ankle being put in to vulnerable positions during functional activities causing subsequent injury.[3] Restriction in arthrokinematics related to repetitive ankle sprains leads to positional fault at the inferior tibiofibular joint. Individuals with CAI may have an anteriorly and inferiorly displaced distal fibula.[4] The ATFL ligament stuck in this position becomes more slack in resting position. When the rearfoot begins to supinate, the talus can go through a greater range of motion before ATFL becomes taut, leading to further laxity and sprains.[3] Since ligaments play a major role in proprioception, lateral ankle instability that results in weakening of the ligaments may lead to insufficiencies in not only

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proprioception but also postural control, neuromuscular control and functional impairments.[3, 5]

Since CAI leads to an antero-inferior positional fault of the distal fibula leading to laxity of the lateral ankle ligaments and disturbing the proprioception, methods which aim to reposition the fibula are needed to treat such conditions. One of the methods for supporting such weakened ankle joint is application of tape as proposed by Mulligan [4]. Taping is known to improve the neuromuscular proprioceptive and physiological processes, offering additional awareness of the foot position and direction of motion. Mulligan Ankle taping, in addition to these effects, may correct the antero-inferior positional fault of distal fibula, leading to a better postural control and weight distribution. There are very few studies that have documented the effects of Mulligan Taping on the weight distribution in a functional activity. Hence the need arises to assess if the Mulligan Tape plays any role in improving the weight distribution at the ankle joint.

MATERIALS AND METHOD

Case Report: Case History: The subject was a 20 year old female student who presented with the complaints of mild pain on the left side ankle. She gave a history of sudden onset of pain when playing basketball match while jumping and landing back on the ground. Intensity of pain was 7 on 10 on Numerical Pain Rating Scale (NPRS). The pain had been continuous since then at the lateral side of the ankle, which aggravated with weight bearing activity, specifically as mentioned by the subject, squatting and forward lunges. The subject continued with her normal activities, including playing basketball and did not undergo any treatment. She also gave a history of repetitive ankle sprains since then on the same side ankle giving rise to pain at the lateral side of ankle joint. Important to also mention is that the subject described inability of put complete weight on the left ankle since the injury. A period of 2.5 months had elapsed when the subject became a part of this study. During initial assessment, the pain intensity was 4 on 10 on NPRS around the lateral malleolus with squatting and forward lunge. The Range of Motion and the strength of the muscles of ankle joint were within normal limits. The only complaint was pain during squatting and forward lunge.

Outcome Measures:

1. NPRS
2. Percentage of body weight distribution during Squatting as measured on NEUROCOM BALANCE MASTER.

METHODOLOGY

A written informed consent of the subject was taken prior to the study and was explained about the procedure of assessment and management. Initial assessment consisted of examination of range of motion and manual muscle testing of the ankle joint. Pre treatment NPRS was noted. This was followed by assessing the percentage of weight distribution during squatting on the NEUROCOM BALANCE MASTER SYSTEM (VERSION 9.1).

The subject was initially shown a demo video of the procedure. Standing on the force platform, four trials were performed. The first trial consisted of subject standing relaxed on the force platform while the weight distribution was measured (0° Squat). This was followed by measuring the weight distribution at three angles of squat: 30°, 60°, and 90°. The Pre treatment outcome measures were documented.

Figure 1: Subject performing Squat On Neurocom Balance Master

The subject was then applied with the fibular repositioning tape as described by Mulligan. The subject's skin was examined for any contraindication and then an undertape was applied. With subject in supine position and ankle kept in neutral position, the tape was applied starting obliquely at the distal end

of lateral malleolus. While a pain free posterolateral-superior glide was maintained at the distal end of fibula, the tape was then wrapped diagonal and around the tendo-achilles and ended at the medial side of lower leg [4-6]. Post treatment, NPRS was noted and Weight Distribution Squat was again performed with the same procedure as mentioned above.

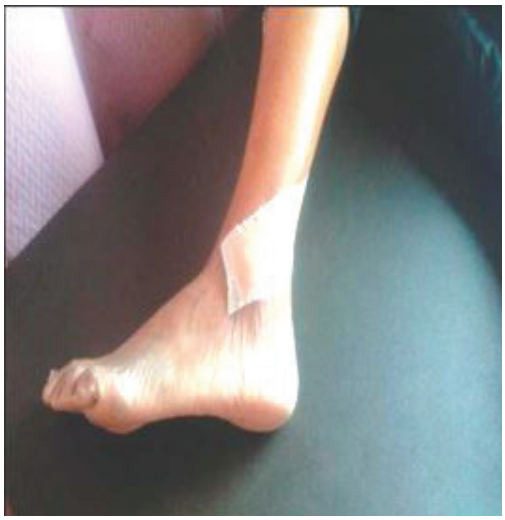


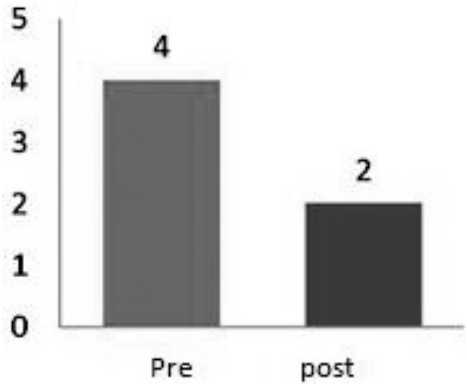
Figure 2: Fibula Repositioning Tape

RESULTS

NPRS and Weight distribution during Squat were noted immediately after the application of tape:

Table 1: NPRS measurements: Pre and Post treatment

NPRS	
PRE-TREATMENT	**POST-TREATMENT**
4	2



Graph 1: Pre and Post treatment NPR

The results showed a 50% reduction in pain intensity immediately after application of the Mulligan Tape.

Weight Distribution Squat:

Table 2a: Pre-treatment weight distribution during Squat

	% Weight Distribution	
Angle of Squat	**Left**	**Right**
0	22	78
30	48	52
60	50	50
90	49	51

Table 2b: Post-treatment weight distribution during Squat

	% Weight Distribution	
Angle of Squat	**Left**	**Right**
0	55	45
30	50	50
60	57	43
90	57	43

The results showed that, Pre-treatment weight distribution at 0° Squat was more on the right side compared to the left side. Post treatment, this changed to normal weight distribution both on right and left side after application of tape. Important to note is that, at 30, 60 and 90° squat, the percentage weight on the left side also increased to nearly 60% after application of tape. Also there was equal weight distribution seen on both the sides at all angles of squat after application of tape.

DISCUSSION

The purpose of this study was to find if Mulligan taping has any effect on improving the weight distribution during a functional activity in chronic ankle instability. Our results from this single case study showed that Mulligan taping not only reduces pain but also increases the weight distribution on affected side and nearly equals the same bilaterally.

Taping has been proven to improve the neuromuscular proprioception and hence the feedback about the joint position and weight falling on it. Mulligan taping in turn corrects the positional fault thereby improving the alignment of the articular surfaces. This in turn may improve again the weight that is bound to fall on that joint. Marjaan Someeh et al examined the influence of Mulligan

Ankle taping on functional performance in healthy athletes and athletes with chronic ankle stability. They found that Mulligan Taping significantly improved the functional performance measured through 3 tests, more in the chronic ankle instability athletes. The authors support through this study that Mulligan taping corrects the positional fault of the distal fibula that is commonly found in CAI individuals. Also, additional awareness of foot position and direction of motion by stimulation of mechanoreceptors through tape might also be one of the mechanisms of reducing pain and improving weight distribution.

Another study by the same authors examined the immediate effects of mulligan taping on postural control on athletes with and without CAI. They found that Mulligan taping improved the postural control significantly. In our study, though postural control was not measured, improved weight distribution on any weight bearing joint will in turn improve the postural control. Better proprioception, external support, correction and maintenance of fibula positional fault and better postural control and weight distribution in turn will reduce the risk of further injury. Hence more studies are further required to examine these results on a general population.

CONCLUSION

This case study has documented that Mulligan Ankle Taping reduces pain and most important improves the weight distribution immediately. Further research is needed with a large sample to document the same results for a population.

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

Source of Funding: Self

Conflict of Interest: Nil

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The Effect of Straight Leg Raise with Lumbar Stabilization Exercises in Subjects of Low Back Pain with Adverse Neural Tension between the Age Group 20-50 Years

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ABSTRACT

Low back pain is a common disorder which involves muscles, nerves, and bones of the back. About 70% to 85% of population has low back pain at some point in life. Adverse neural tension is defined as physiological or mechanical response produced when structures of the nervous system exceed their normal range of movement. Mechanically or chemically sensitized nerves show abnormal mechano sensitivity.

Purpose: purpose of the study was to find the effect of Straight Leg Raise With lumbar stabilization exercises in reducing pain, improving ROM and physical functions in low back pain subjects with adverse neural tension.

Aim: To find the effect of Straight Leg Raise with lumbar stabilization exercises in reducing pain, improving ROM, and physical functions in low back pain subjects with adverse neural tension.

Objective: To study the effect of straight leg raise with lumbar stabilization exercises in reducing pain, improving ROM, and physical functions in low back pain subjects with adverse neural tension between the age group 20-50 years.

Method: This study was conducted on 30 lower back pain patients, age 20-50 years were taken from NDMVP Hospital and research centre, physiotherapy opd . Convenience sampling method was used. ROM, Numerical pain rating scale- pain and Modified oswestry disability questionnaire- disability was assessed.

Results: P value is less than 0.05 for NPRS, ROM and modified ODI .The NPRS, PSLR and Modified ODI Questionnaire scores improved significantly by SLR with lumbar stabilization exercises after 3 weeks in subjects of low back pain with adverse neural tension.

Conclusion: SLR with lumbar stabilization exercises is effective in reducing pain improving ROM, and physical functions in low back pain subjects with adverse neural tension.

Keywords: *low back pain with adverse neural tension, SLR Stretching, lumbar stabilization exercises*

INTRODUCTION

In India incidence of low back pain (LBP) has been reported to be 23.9% and has a life time prevalence of 60-85%. There are various causes of low back pain(LBP) producing radicular and non-radicular symptoms. Low back pain (LBP) is a common disorder involving the muscles, nerves, and bones of the back. Pain can vary from a dull constant ache to a sudden sharp feeling[1]. Chronic low back pain is defined by pain persisting for more than 12 weeks[2]. Adverse neural tension is defined as physiological or mechanical response produced when structures of the nervous system increases their normal movement[3-5]. Mechanically or chemically sensitize nerves show abnormal mechanosensitivity[6].

Radiating low back pain or Lumbar radiculopathy refers to the phenomenon in which the pain produced in the lumbar region radiates or travels down in one or both lower limbs with the presence of neural dysfunction. Radiating low back pain could be attributed to various causes such as compression of one or more nerve roots caused by a direct pressure from a herniated disc, degenerative changes in the lumbar spine that cause irritation of nerve roots, or sciatica due to compression of sciatic nerve roots, facetal hypertrophy that may

compress the nerve root at the lateral foraminal exit**,** foraminal stenosis (narrowing of spinal canal through which the spinal nerve exits due to bone spurs or arthritis) – more common in elderly adults, diabetes, nerve root injuries, scar tissue from previous spinal surgery that is affecting the nerve root[7-9]**.**

Neural mobilization has a great role in management of radiculopathy and low back pain . The Straight Leg Raise (SLR) test is frequently used in the assessment of patients presenting with LBP. Improving the range of SLR has a beneficial effect in storing normal movement and decreasing the degree of impairment due to low back disease [10].

There is no formal definition of lumbar stabilization exercises , the approach is aimed at improving the neuromuscular control, strength, and endurance of the muscles that are central to maintaining the dynamic spinal and trunk stability. Group of muscles particularly the transversus abdominis and lumbar multifidius, also other paraspinal, abdominal, diaphragmatic, and pelvic muscles, lumbar stabilization exercise has been accepted as a more empiric therapeutic exercise method than any other exercise method. To improve spinal segment instability, lumbar stabilization exercises that strengthen the local muscle group located deep in the trunk around the lumbar vertebrae, which play an important role in providing dynamic stability for spinal segments, are useful for relieving functional disability of the spine. Lumbar stabilization is important for maintaining the spine and performing extremity movements and is applied to adjust the imbalance between the abdominal and trunk extensor muscles. Such imbalance causes diseases in the lumbar vertebral region of the musculoskeletal system, which must be treated to prevent low back pain[11].

Hence the rationale of the present study was to check the effectiveness straight leg raising with lumbar stabilization exercise in the treatment of low back pain with adverse neural tension.

AIM

To find the effect of Straight Leg Raise with lumbar stabilization exercises in reducing pain, improving ROM, and physical functions in low back pain subjects with adverse neural tension.

OBJECTIVE

To study the effect of straight leg raise with lumbar stabilization exercises in reducing pain, improving ROM, and physical functions in low back pain subjects with adverse neural tension between the age group 20-50 years.

MATERIAL AND METHOD

This experimental study was conducted on 30 lower back pain patients, aged between 20-50 years were taken from NDMVP Hospital and research centre, physiotherapy OPD. Convenient sampling method was used for study.

Inclusion Criteria:

1. Age group of both sexes with 20-50 years.
2. Pain referred distal to buttocks.
3. SLR testing between 45-70 degree (painfull range).
4. Mild to moderate pain (2 to 6 on NPRS).
5. Modified oswestry score greater than 10%.

Exclusion Criteria:

1. Red flags for a serious spinal condition (e.g. infection, tumors, osteoporosis, spinal fracture, etc.)
2. Pregnancy.
3. history of spinal surgery.
4. Osteoporosis.
5. straight leg raise (SLR) test of less than 45°.
6. Spondylosis, Disc herniation, Cervicogenic headache.

PROCEDURE

Subjects clinically diagnosed low back pain with adverse neural tension were screened according to inclusion and exclusion criteria. Ethical clearance was obtained and informed consent was taken from each subject. Subjects were briefed about the study & the intervention.30 Patients were recruited and were given straight leg raise stretching and lumbar stabilization exercises. The effect of intervention was measured using outcome measures comprising of NPRS, PSLR and Modified ODI before and after 3 weeks.

Straight leg raise stretching: The subject is in supine and relaxed in the center of the bed, with one pillow under the head. Therapist will stand at the affected side and raised the side which is perpendicular to the bed in straight leg raise test with one hand placed under the ankle joint and the other hand placed on the knee joints until either pain in the back or referred pain to the leg is seen.

Figure 1: Straight leg raise stretching

Then the lower limb is taken down few degrees from this symptomatic point. The therapist will mobilize the sciatic nerve by gentle oscillations alternatively toward ankle dorsiflexion and plantar flexion . This sequences is repeated several times, in which the amplitude is increased according to the patient response. The technique progressed to a point where symptoms where resistance of the movement was encountered. As the pain is relieved, the therapist increase the range of motion until reaching the maximum range of straight leg raise with pain free. The position is held for 30seconds.

Frequency: 2 times week for 3 weeks

They were instructed to perform the stabilization exercises at home twice a day on the days they did not come for their treatment sessions. Each exercises were carried forward each week.

LUMBAR STABILIZATION EXERCISES

Week 1

- Patient position: four-point kneeling position
- Patient instruction: slowly pull your navel up, hold the contraction and breath. Dosage: 10 seconds hold and 10 repetitions.
- Patient position: hook-lying

Patient instruction: draw in your lower abdomen, hold the contraction and breath. Slide your one leg along the mat to straighten the knee and return to the starting position. Do not release your abdominal contraction during the exercise. Repeat with your other leg. Dosage: 10 repetitions on each leg.

Week 2

- Patient position: hook-lying

Patient instruction: draw in your lower abdomen, hold the contraction and breath. Squeeze your buttocks together and lift your pelvis up. Do not release your abdominal contraction. Hold this position for 5-10 seconds. Dosage: 5-10 seconds hold and 10 repetitions.

- Patient position: hook-lying

Patient instruction: draw in your lower abdomen. Lift one leg up without bending the knee upto approximately 45°. Hold the position for 5-10 seconds. Lower the leg. Repeat with other leg. Dosage: 5-10 seconds hold and 10 repetitions.

Week 3

- Patient position: four-point kneeling

Patient instruction: slowly pull your navel up, hold the contraction and breath. Raise your one leg up with the knee straight followed by the opposite arm without bending the elbow. Hold this position for 5-10 seconds. Lower your arm and leg. Repeat with the other diagonal leg and arm. Dosage: 5-10 seconds hold and 10 repetitions.

- Patient position: prone

Patient instruction: slowly pull your navel up hold the contraction and breath. Slowly raise both your legs up straight without bending your knees. Hold this position for 5-10 seconds. Lower your legs. Dosage: 5-10 seconds hold and 10 repetitions.

- Patient position: prone

Patient instruction: slowly pull your navel up hold the contraction and breath. Slowly raise both your arms up straight without bending your elbows. Do not release your abdominal contraction during the exercise. Hold this position for 5-10 seconds. Lower your arms. Dosage: 5-10 seconds hold and 10 repetitions.

RESULT

Table 1: The intra-group comparison of Pain (NPRS)

PARAMETER	FOLLOW UP	
NPRS	PRE TREATMENT	5.19 ± 0.63
	POST TREATMENT	2.69 ± 0.84
T VALUE		15.69
P VALUE (INTRA GROUP)	Pretreatment v/s Post-treatment	<0.0001 (SIGNIFICANT)

Values are Mean ± Standard deviation. P-values are obtained using Paired't' test (Parametric Paired analysis), after confirming the underlying normality assumption of pre-treatment and post-treatment difference. P-value<0.05 is considered to be statistically significant.

Table 2: The intra-group comparison of Range of motion (PSLR)

PARAMETER	FOLLOW UP	
ROM	PRE TREATMENT	51.58 ± 5.01
	POST TREATMENT	65.42 ± 7.66
T VALUE		15.51
P VALUE (INTRA GROUP)	Pretreatment v/s Post-treatment	<0.0001 (SIGNIFICANT)

Table 3: Intra-group comparison of Functional Disability (Modified ODI)

PARAMETER	FOLLOW UP	GROUP A
Modified ODI	PRE TREATMENT	40.23 ± 6.46
	POST TREATMENT	21.62 ± 4.83
T VALUE		16.55
P VALUE (INTRA GROUP)	Pretreatment v/s Post-treatment	<0.0001 (SIGNIFICANT)

RESULT

The Pain (NPRS), PSLR and Modified ODI Questionnaire scores improved significantly after treatment.

DISCUSSION

The present study was carried out to see the effects of Straight Leg Raise With lumbar stabilization exercises in reducing pain, improving ROM and physical functions in low back pain subjects with adverse neural tension between the age groups of 20-50 years. This study included 30 subjects with low back pain of both genders. Through convenient sampling they were recruited in the study.

VARIABLE

Pain (NPRS), PSLR and Modified (ODI): On comparing score with paired t test, the p value obtained was <0.05 which implies that it is statistically significant .This suggest that SLR with lumbar stabilization exercises, had an effect in reducing pain improving ROM in patient with low back pain after 3 weeks of treatment. The result found in our study is accordance with study done by Neha Malik, Chitra Kataria (2012) on Comparative Effectiveness of Straight Leg Raise and Slump Stretching in Subjects with Low Back Pain with Adverse Neural Tension concluded that both techniques straight leg raise and slump stretching are equally effective in reducing pain in patients with low back pain with adverse neural tension[12] .There are many physiological benefits found with neural mobilization that reduces pain and improves ROM. In neural mobilization, there is oscillatory movement like straight leg stretching, there is elongation and shortening of the nerve which temporarily increases the intra neural pressure followed by a period of relaxation in between . This repeated pumping action enhance dispersal of local inflammatory products in and around the nerve, thus alleviating hypoxia and reducing pain.(Brown et) investigated this and found an increase in fluid dispersion in the leg has been found secondary to repeated ankle plantarflexion and dorsiflexion. (Dwornik et al 2009) said that neural mobilization gives high analgesic effects based on the finding that the resting muscle tone decreased post neural mobilization.

The result found in our study is according to Sahar M. Adel(2011) on the Efficacy of Neural Mobilization in Treatment of Low Back Dysfunctions concluded that straight leg raising (SLR) stretching may be beneficial in the management of patients with LBD. SLR stretching with lumbar spine mobilization and exercise was beneficial in improving pain, reducing short-term disability and promoting centralization of symptoms in this group of patients.

Among the abdominal muscles, the transverse abdominal abdominal, multifidus, and internal oblique

muscles help to increase the intra-abdominal pressure, thereby con-tributing to the spinal and pelvic stability [13]. Our lumbar stabilization exercise group included some lumbar dynamic exercises, which may have strengthened the lumbar extensors at the large lumbar flexion angle.

Another study concluded that exercise programs had significant effect on the patients with chronic low back pain. Back extension exercises had an additional effect in enhancing the strength of the extensor muscles and also in increasing the mobility of the lumbar spine. This provides essential support for the spine and thereby decreasing the associated pain and disability. In the presence of strong core and back muscles, the possibility for low back pain is minimal. Thus lumbar extension as well as stabilization exercises are essential to strengthen the core and reduce low back related pain and disability in patients with chronic low back pain. R. Chitra,(2014)[14]

CONCLUSION

SLR with lumbar stabilization exercises is effective in reducing pain improving ROM, and physical functions in low back pain subjects with adverse neural tension.

Limitations of the Study

1. No follow up was done after the said duration of study.
2. There is a wide variation in the age of the subjects included in the study.
3. subjects from all professions were included and may be a source of variation in results.

Conflict of Interest: None

Ethical Clearance: Yes

Source of Funding: Self

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Role of Physiotherapy in Bariatric Surgery-A Review

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ABSTRACT

Obesity is defined by excessive accumulation of body fat. Obesity is an individual to develop numerous comorbidities represents a major healthcare issues in many countries worldwide. This study is to evaluate the Role of Physiotherapy in Post Bariatric Surgery. Bariatric surgery is defined as surgery on the stomach and/or intestine to help the person with extreme weight loss. Bariatric surgery is an option for people who have a body mass index above 40 kg/m^2. Bariatric surgery is a surgery that is designed to lead to weight loss. There are actually four different types of bariatric surgical procedures that can be done to help patients achieve weight loss. These procedures will either shrink the stomach so that the patient can only eat small amounts of food at a time or will change the way that the digestive system can absorb the food the patient eats. Patients need to meet a list of criteria before they will be considered candidates for bariatric surgery . The physiotherapist supports patients to optimise fitness, mobility, and weight loss prior to surgery through motivational interviewing, collaborative goal-setting and physical activity. It has been seen that respiratory physiotherapy plays an important role in preventing complications post bariatric surgery. The role of physiotherapist in this process is essential, individual therapeutic programs help to adjust all the aspects of training to the health status of the obese patient, with respect to coexisting diseases. Exercise is very important it helps to burn calories, get rid of fat, preserve muscle tissue, protect your joints. Aerobic exercise and strength training will be included, as they both help in weight loss and weight control. Physiotherapist are trained to create safe and effective physical activities. Chest physiotherapy is a treatment that helps to remove the excess secretions from inside the lungs, re-educate breathing muscle to try to improve ventilation of the lungs. Chest physiotherapy is a group of treatments which are designed to promote mucus extraction from the patient's respiratory system. The purpose of chest physiotherapy, is to help patient breath more freely and to get more oxygen into the body. Chest physical therapy includes postural drainage, chest percussion, chest vibration, turning, deep breathing exercises, and coughing.

Keywords: *Bariatric surgery, BMI, Physiotherapy, obesity, exercises.*

INTRODUCTION

Bariatric surgery (weight loss surgery) includes a variety of procedures performed on people who have obesity. Weight loss is achieved by reducing the size of the stomach with a gastric band or through removal of a portion of the stomach (sleeve gastrectomy or biliopancreatic diversion with duodenal switch) or by resecting and re-routing the small intestine to a small stomach pouch (gastric bypass surgery) [1]

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Excessive fat accumulation around the heart may play an important role in the pathogenesis of cardiovascular diseases. Recent evidence has suggested that bariatric surgery results in relatively less decreases in epicardial fat compared with abdominal visceral fat and pericardial fat [23] . Bariatric surgery is a wonderful tool that helps patients with clinical obesity lose weight and gain their lives back [24]. Body mass index (BMI) is defined as the weight in kilograms divided by the square of the in meters (kg/m^2). It provides a useful population-level measure and obesity. BMI can be used to estimate prevalence of obesity within populations, as it is the same for sexes and for ages of adults [25] .

Exercise program after bariatric surgery provide further improvements in metabolic health, better functional capacity compared with surgery-induced

weight loss not alone, but there are many more surgeries who induced weight loss for example**,**

Gastric Sleeve: also known as 'sleeve gastrectomy', is the first step before any bariatric surgery and can also be a single standalone procedure. In this procedure, the surgeon creates a small stomach sleeve using a stapling device, and the rest of the stomach is removed [2].
Gastric Bypass: Gastric bypass is one of the most common weight loss procedures. Gastric bypass is a well-researched procedure and remains one of the best weight loss methods, surgically. It is called as 'The Roux-en Y Gastric Bypass (RYGB)' and is considered as the 'gold standard' of weight loss surgery [2].

Gastric Banding: Gastric Banding is a laparoscopic surgery where a surgeon places a band around the upper end of the stomach dividing it into two parts to create a small pouch to hold food. The band limits the amount of food the patient can eat, which makes them feel full after a small amount of food. The small opening between the sections allows the food to pass, thereby making the patient feel full [2].

Bariatric surgery is a surgery that is designed to lead to weight loss. There are actually four different types of bariatric surgical procedures that can be done to help patients achieve weight loss. These procedures will either shrink the stomach so that the patient can only eat small amounts of food at a time or will change the way that the digestive system can absorb the food the patient eats. Patients need to meet a list of criteria before they will be considered candidates for bariatric surgery [3,4].
First, the patient has to be medically documented as being severely obese or have a medical condition related to being obese and have a BMI over 35. A patient is not considered severely obese until their BMI, (body mass index) is over 40 [3].

Second, the patient needs to have tried to lose weight by other means. This usually includes healthy eating, dieting, exercising and attempting to make other lifestyle changes that would promote weight loss [3].

Third, the patient will need to attend classes to understand how his or her body will react to the surgery and how he or she will need to make drastic lifestyle changes so that the surgery will be effective [3].

Physiotherapists can work in the prevention and management of obesity [5]. The physiotherapist contributes to a multi-disciplinary team, providing education on breathing and early mobility exercises [5]. The role of physiotherapist in this process is essential, individual therapeutic programs help to adjust all the aspects of training to the health status of the obese patient, with respect to coexisting diseases. The physiotherapist supports patients to optimise fitness, mobility, and weight loss prior to surgery through motivational interviewing, collaborative goal-setting and physical activity prescription [5].

The role of physiotherapist in bariatric surgery, chest physiotherapy is a treatment that helps to remove the excess secretions from inside the lungs. It is used to assist a cough, re-educate breathing muscle to try to improve ventilation of the lungs [6].

Exercises after surgery, strength training exercises will increase the muscle tone, gives more balance and stable posture and prevent injuries such as sprain or fractures [7]. It also increases a muscle bulk. Warm-ups and stretching activities are essential preparation for a strength training. Strength, resistance and weight training are aimed at improving the strength and function of muscles [8].

Cardio: Regular cardio aerobic exercise has a lot of benefits. It gives more energy [7].

Flexibility: flexibility training is a crucial component of any fitness program. This type of training helps to enhance the range of motion of joints. Preventing Injuries. Flexibility training is important to avoid injuring. If patient feels any soreness or tightness after bariatric workout, flexibility training can help. At the time of stretching it's important to be careful. Take each stretch slowly and hold it for ten seconds–don't bounce up and down [7].

REVIEW OF LITERATURE

This study was designed to assess the role of physiotherapy in bariatric surgery.

Do Nascimento Junior P, et al. 2014 did a study on Incentive spirometry for prevention of postoperative pulmonary complications in upper abdominal surgery, found no evidence to support of the use of incentive spirometry (IS) in the prevention of pulmonary complications after upper abdominal surgery [9]. Another study done by Barbalho-Moulim et al 2011 it was

analyzed the preoperative as well as the postoperative with spirometry and maximum respiratory pressures, obtained negative results which had shown a decrease of the flow rates on both pressures [10].

Whereas, according to study done by Eli forti et al 2009, Effects of Chest Physiotherapy on the Respiratory Function of Postoperative Gastroplasty conclusion came out as Patients prevent the reduction of pulmonary function also contributes to expiratory muscle strength [11]. Another study done by Luce et al 1980, found decreases in expiratory reserve volume, functional residual capacity (FRC) and tidal volume (TV), ventilation and perfusion or even shunts, causing subsequent hypoxemia in obese patients [11,12]. Rubinstein et al 1990 found limitations in respiratory flow to between 50% and 75% of the vital capacity in obese patients [13].

Study of Pre and Postoperative Physical Activity Counselling in Bariatric Surgery, this done by Wendy C King., et al 2013. It was evidence is mounting that increasing physical activity pre- to postoperatively and higher postoperative physical activity level are associated with greater weight loss, improved body composition, and improved fitness following bariatric surgery [14].

According to a study done by Deborah Josbeno., et al 2011, Physical Activity and Physical Function in Individuals Post bariatric surgery, Physical activity participation has been shown to increase following bariatric surgery, and this increase has been associated with greater weight loss success. Weight loss induced by bariatric surgery is moderately correlated with physical activity participation is consistent. physical activity plays an essential role in weight loss maintenance after a dietary intervention [15].

According to a study done by Fu-Zong Wu et al 2016, Differential Effects of Bariatric Surgery Versus Exercise on Excessive Visceral Fat Deposits, it was evident that differential impacts of weight loss on adipose tissue of various locations after bariatric surgery or exercise program. The long-term effects of weight loss with bariatric surgery and exercise intervention on different visceral adiposity. It demonstrates that both bariatric surgery and exercise program lead to larger percentage decrease in visceral fat compared with epicardial fat volume [16].

According to this study Effects of preoperative inspiratory muscle training in obese women undergoing open bariatric surgery: respiratory muscle strength, lung volumes, and diaphragmatic excursion. Based on the results of this study, preoperative inspiratory muscles training attenuates the negative effects of open bariatric surgery in the inspiratory muscle strength [17].

While Silva et al. concluded that respiratory muscle function was invariably damaged after open abdominal surgeries, the present study showed that pulmonary function and respiratory muscle strength were maintained in patients treated with CCP and those treated with CCP+TEDS 15 and 30 days after bariatric surgery, with special emphasis on the effect of TEDS on MEP [18].

The amount of physical activity participation and the level of physical function are independently associated with weight loss in individuals 2–5 years after bariatric surgery. This study has shown that physical function is not correlated with physical activity, which may suggest that the capacity to engage in physical activity does not necessarily translate into greater levels of activity participation [19,20,21].

CONCLUSION

From this study it can be concluded that,

Bariatric surgery patients adopt an exercise routine after undergoing the procedure [22]. Develop and maintain a consistent exercise program to strengthen your heart and bones, burn calories, develop muscles, increase your metabolic rate, improve your mood and relieve stress. Exercising can also improve your blood sugar control. Exercise program after bariatric surgery provide further improvements in metabolic health, better functional capacity compared with surgery-induced weight loss. Moderate intensity exercise has been found to be effective for long-term weight control. Bariatric surgery improves insulin sensitivity and glycaemic control, which can be further enhanced when coupled with physical activity. Balance, muscular strength and endurance, flexibility and cardiorespiratory endurance are consistently improved in individual's post-bariatric surgery as a result of exercises. These improvements lead to improved functional ability for activities of daily living and increased self-reported quality of life.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Self

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Effectiveness of Neurodynamic Sciatic Nerve Tensioners Vs Sliders in Short Hamstring Syndrome

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ABSTRACT

Background: Inadequate flexibility within the posterior thigh compartment appears to be one of the more commonly accepted causes of hamstring injuries. Neurodynamics has been proposed as an alternative to stretching by targeting the neural system rather than muscle tissue. There are different methods of delivering neural mobilization, including "sliding" and "tensioning" technique.

Objective: To determine the effect and compare the effectiveness of sciatic nerve Tensioners vs Sliders in short hamstring syndrome

Methodology: Experimental design,It has three groups: Group A – Neurodynamic Tensioners (n = 35), Group B – Neurodynamic Sliders (n = 35) and Group C – Control (n = 35), age: 17 to 25 years, both genders, SRM college of physiotherapy and general public.

Outcome Measures: Passive SLR and Active Knee Extension test.

Results: There is significant difference in comparison of Post test of PSLR and AKE between groups. The F values are 46.59 and 17.34 where as $P<0.05$

Conclusion: Sliders are better than Tensioners in neural mobilization techniques among subjects with short hamstring syndrome. Being less aggressive, Sliders were comfortable and more beneficial with less pain to the patients, Hence this study recommends the use of sliders in short hamstring syndrome for betterment of the patients

Keywords: *Hamstring flexibility, Neurodynamic sciatic Tensioners, Neurodynamic sciatic Sliders, PSLR, AKE*

INTRODUCTION

Hamstring muscle group consist of four muscles, Long head of Biceps femoris, Short head of Biceps Femoris, Semitendinosus and Semimembranosus. Biceps femoris muscles occupy the lateral and semimembranosus, semitendinosus occupy the medial part of the thigh. Among these muscles except short head of biceps femoris all the other three muscles are Biarticular or twojoint muscle[1,2].

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Hamstring muscles helps in activities like walking and also helps in maintaining posture and balance.[3,4] Short hamstring syndrome is a common condition, which is caused by reduction in size of a muscle tissue length and leads to muscle strain / tear and restricted movement or dysfunction. It affects all the age groups and both in sports and occupation which requires more physical activity The risks factors suggested in the literature are poor flexibility, neural tension, muscle imbalances, fatigue and previous history of injury. In specific the poor flexibility of the hamstring muscle appears to be one of the main cause of hamstring injury[5,6].

Inadequate flexibility of hamstrings was always proposed to be the reason of frequent injury. But lot of research also contradict this concept[7,8,9]. But the nerve tension, tightness and immobility also is one of the main

causes in hamstring flexibility and hamstring injury. Nerve immobility may result in reduced muscle length. In presence of neural mechanosensitivity the protective muscle contraction occurs and it leads to hamstring tightness predisposing to subsequent strain injury[10,11,12].

The hamstring flexibility is commonly measured by Passive Straight Leg Raise (PSLR) and Active Knee Extension (AKE).Short hamstring syndrome quite commonly is treated by conventional physiotherapy treatment such as static stretching, dynamic stretching, proprioceptive neuromuscular facilitation and myofascial release techniques. These techniques concentrates at increasing the range of motion indirectly there by assuming that it is lengthening the shortened tissue length i.e. musculoskeletal level.

Nerve mobilization, evolving technique integrates both musculoskeletal and neural structures by a "flossing" of the nervous system to reduce pain and increase range of motion. It has two types: Tensioners and Sliders. The Neurodynamic Tensioners aim to mobilize a nerve by elongation of the nerve bed whereas the neurodynamic sliders aim to mobilize the combination of movements in which the elongation of the nerve bed at one joint and is simultaneously counterbalanced by a reduction in the length of the nerve bed at an adjacent joint. The Slider technique is less aggressive than tensioner technique[13].

No studies had so far compared these two techniques over its effect in short hamstring syndrome. Furthermore due to the contradictory research documentation on the effect of stretching, there arises a need to compare these neural mobilization techniques for the benefit of the patients. So the purpose of this study is to compare the effects of Neurodynamic Sciatic tensioners versus sliders in short hamstring syndrome.

METHODOLOGY

The study design was single blinded, experimental study and study type was pre and post type. Patient of both gender, in age group of 17 – 25 with Passive Straight Leg Raise and Active Knee Extension less than 80* were included in the study. Patients with recent injuries, fracture to spine, femur and tibia, neurological symptoms, spinal or lower limb deformity were excluded from the study. 75 subjects who had satisfied inclusion and exclusion criteria were randomly selected using lottery method. After obtaining the informed consent from each participant, the subjects are divided in to three groups. Prior and after the intervention PSLR and AKE will be evaluated by the other therapist who had not treated the patient.

PROCEDURE

The PSLR and AKE will be measured in the dominant leg by the two examiners and randomly divided in to three groups. The subjects in Group A received Neurodynamic tensioners, Group B received Neurodynamic sliders and the Group C received Passive mobilization of intrinsic foot joints for 10 repetitions. After the intervention again the PSLR and AKE will be measured to by the other two examiners. Here by the researchers were double blinded to the Pre and Post test of PSLR and AKE measurements.

Experimental Group:

Neurodynamic Tensioners (Group A): In this group the subjects received Neurodynamic Tensioners. The Procedure of this intervention was Patient has to be in sitting at the edge of the couch and hand held together behind back. The concurrent movement of the hip flexion, knee extension and dorsiflexion followed by cervical and thoracic forward flexion altered dynamically by concurrent movement of plantar flexion, knee flexion and hip extension followed by cervical and thoracic extension/ neutral. This movement was done for 10 repetitions in dominant leg.

Neurodynamic Sliders (Group B): In this group the subjects received Neurodynamic Sliders. The procedure of this intervention was patient has to be half lying position. The concurrent movement of hip flexion, knee flexion and dorsiflexion was altered dynamically by concurrent movement of hip extension, knee extension and plantar flexion. This movement was for 10 repetitions in their dominant leg by researcher.

Control Group (Group c)

Passive mobilization of intrinsic foot joints: In this group the subjects received Passive mobilization of intrinsic foot joints i.e. placebo technique. This technique was chosen because of no relation in anatomic and physiological changes during hamstring muscles and sciatic nerve. This movement was done for 10 repetitions in their dominant leg by researcher.

RESULTS

Table 1: Pre and Post test values of Passive Straight Leg Raise Test among Group A, B and C

Variable	Groups		Mean	St. Deviation	T Value	P Value
Passive Straight Leg Raise Test	A	Pre test	66.60	8.134	- 13.552	0.000
		Post test	76.84	6.650		
	B	Pre test	68.76	8.521	- 15.005	0.000
		Post test	83.52	5.269		
	C	Pre test	67.16	5.742	- 2.487	0.020
		Post test	67.68	5.460		

$P < 0.05$

This table shows that is significant difference between Pre and post test of Passive leg raise test among Group A and B. The group C shows no significant difference

Table 2: Pre and Post test values of Active Knee Extension test among Group A, B and C

Variable	Groups		Mean	St.Deviation	T Value	P Value
Active Knee Extension Test	A	Pre test	55.32	12.144	- 11.755	.000
		Post test	63.80	11.934		
	B	Pre test	61.20	10.836	- 15.671	.000
		Post test	74.96	9.804		
	C	Pre test	58.12	8.115	- 2.864	.009
		Post test	58.56	8.058		

$P < 0.005$

This table shows that is significant difference between Pre and post test of Passive straight leg raise test among Group A and B. The group C shows no significant difference

Table 3: Comparison of post test of Passive Straight leg raise test and Active Knee Extension test between Group A treated with Neurodynamic Sciatic Tensioners, Group B treated with Neurodynamic Sciatic Sliders and Group c treated with Passive mobilization of intrinsic foot joints.

Variables	Sum of Square	F Value	P Value
Post PSLR	5604.9	46.594	.000
POST AKE	3508	17.340	.000

P<0.05 this table shows that there is significant difference in Post test of PSLR between groups and on analysis Group B treated with Neurodynamic Sciatic Sliders found to have better outcome than the other two groups.

P<0.05 this table shows that there is significant difference in Post test of PAKE between groups and when compared was Neurodynamic Sciatic Sliders found to have better benefits over short hamstring syndrome.

DISCUSSION

This study aims to compare the effects of Neurodynamic Sciatic tensioners versus sliders in short hamstring syndrome in which no research work had been done so far.

Decreased flexibility of the hamstring is now proven not to be the sole cause of hamstring injury and it was suggested to be just one of the reason for getting hamstring strain[14,15].Magnusson proposed "sensory theory" where he proposed the idea that the increase in muscle flexibility post stretching is due to modified sensation or altered perception to stretch or pain[16].

The result of this study shows that there was a significant difference in passive knee extension test

and Active knee extension test in Group A and Group B subjects($P<0.05$) (Table 1).

This goes in hand with Dabholkar Tejashree who concluded that Neural mobilization techniques was effective in improving agility of lower extremity

Jaemyoung Park who suggested that neurodynamic sciatic nerve sliding technique improves hamstring flexibility and postural balance[17,18].

The improvement in passive knee extension can be justified by that neural mechanosensitivity is increased when the nerve gets adherent and as a consequence there occurs a protective contraction of hamstrings in short hamstring syndrome. This neural mobilisation decrease neural mechanosensitivity and thus improve the range of motion[19].Certain studies also document that neural mobilisation has autonomic effects.

The results of this study shows that there exist a statistically significant difference among three groups($p<0.05$) and on analysis Group B treated with Neurodynamic Sciatic Sliders showed a beneficial result than Group A treated with Neurodynamic Sciatic Tensioners.

This can be better explained by the fact that Sliding techniques involves the combinations of movements that result in elongation of the nerve bed at one joint, while reducing the length of the nerve bed at an adjacent joint. These have a biomechanical effect on nervous system and are less aggressive than tension technique. Here the improvement is obtained by slowly improving the distance between two ends of nerve and also the comfort of the patient in this technique is better than the other.

So this study recommends the use of sliders form of neural mobilisation technique in short hamstring syndrome for the benefit of the patient. Future studies can be done in comparing the two type of neural mobilisation in other nerves in body and long term effect can be documented.

CONCLUSION

Sliders are better than Tensioners in neural mobilization techniques among subjects with short hamstring syndrome. Being less aggressive, Sliders were comfortable and more beneficial with less pain to the patients, Hence this study recommends the use of sliders in short hamstring syndrome for betterment of the patients.

Conflicts of Interest: Nil

Source of Funding: Nil

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A Case Report on Proprioceptive Neuromuscular Facilitation on Balance and Gait in Hemiparetic Patient

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ABSTRACT

Proprioceptive Neuromuscular Facilitation (PNF) is an approach to therapeutic exercise that combines functionally based diagonal patterns of movement with techniques of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. The PNF approach gives the therapist a variety of manual resistance exercise techniques to increase muscle strength, to promote dynamic stability and controlled mobility as the foundation and in preparation for initiation of task specific skilled movements in a rehabilitation program.

This case study was intended to find out the improvements on balance and gait ability in a patient with Right Hemiparesis following Left Middle Cerebral Artery (MCA) territory stroke treated with PNF.

A case of right Hemiparesis following left middle cerebral artery lesion treated conservatively and referred for rehabilitation to our center. He had impaired weight bearing symmetry; impaired balance; impaired voluntary motor control. He was assessed with Berg Balance Scale, Fugl-Meyer Scale – lower extremity component and Functional Ambulation Category and Balance Master. He received PNF therapy for 30 days (5 days a week for 6 weeks). Following which he improved in the balance ability and independence in gait.

Keywords: *Hemiparesis, Proprioceptive Neuromuscular Facilitation, Balance, Gait*

INTRODUCTION

Stroke is a global health care problem leading to significant mortality and morbidity. Despite gains made with rehabilitation, balance and gait deficits remain at discharge [(1)]. Improvement in balance has been shown to be the most important determinant for regaining gait as measured with the Functional Ambulation Categories[(2)]. Effective interventions are needed for improving physical functioning and quality of life among survivors of stroke.

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Proprioceptive neuromuscular facilitation (PNF) is an approach to therapeutic exercise that combines functionally based diagonal patterns of movement with techniques of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. The use of PNF patterns and positions suggests a stronger sensory excitation at the cortical level leading to increased number and improved threshold of motor neurons which could result in improved range of motion, strength and balance reactions[(3)].

Case presentation: The present case is a 48 year old male is a right handed, non smoker, non alcoholic, with normal sleep and bowel & bladder pattern. He sustained a Left Middle Cerebral Artery ischemic stroke in the capsuloganglionic region resulting in hemiparesis of right side of the body with aphasia.

At the time of initial assessment he was conscious, oriented, obeying commands. He was mesomorphic. Sitting with protracted shoulder and lateral flexed trunk; lower limb abducted and externally rotated on the

right side. He had slurring of speech. Voluntary Motor Control – upper limb – 1 / 6; lower limb – 2 / 6. Babinski positive in right lower limb. Associated reactions were positive when tested in supine for Ramiste's and Limb synkinesis. Myotatic reflex (Wexler's Reflex grading) were 1+ - triceps and ankle jerk 3+ - quadriceps and biceps jerk. His postural and balance control were poor. Hand functions such as reach, grasp and release were absent. He was dependent in activities such as lying to sitting, sitting to standing, standing and walking.

His Scandinavian Stroke scale which measures the severity of stroke was 22 (severe stroke), Functional Independence Score was 41 (dependent) and Brunnstrom's stage of stroke recovery is stage 1. The initial assessment taken was Weight bearing symmetry in lower limb (assessed using Balance Master SD), Berg Balance Scale, Functional Ambulation Scale, Fugl-Meyer lower extremity component.

He was treated with Proprioceptive Neuromuscular Facilitation (PNF) intervention consisting of D1 Flexion-adduction; Extension-Abduction pattern for left lower limb which was resisted. Rhythmic initiation technique was given for the right lower limb and with improvements in voluntary motor control it was done with Combination of isotonics and Dynamic reversal. Pelvic bridging was done with combination of isotonics technique; pelvic diagonal patterns emphasizing anterior elevation and posterior depression were practiced. Chopping and lifting pattern was done is sitting. Rhythmic stabilization and stabilizing reversal for upper trunk in half standing position with the affected lower extremity in weight bearing. Bilateral reciprocal asymmetrical pattern for arm in standing was started once the strength in the upper limb and lower limb improved to promote bearing in the affected lower extremity. D1 flexion abduction pattern for right upper limb was done with endpoint approximation to facilitate and activate right gluteus medius in standing. All these activities were done for 10 repetitions with rest time as needed by the patient.

Gait training with approximation given through the hips in the stance phase to promote weight bearing in the affected lower limb for 15 minutes was done.

He attended rehabilitation for 30 session (6 days a week for 5 weeks) lasting about one and a half hour per day. Post test score was taken using the same outcome measures after 30 sessions.

DISCUSSION

The results of this study demonstrated that the PNF interventions have significant effect on balance and gait. The findings show that the working speed has a significant effect on the functional mobility in stroke patient. Improvement in lower limb motor recovery was more accelerated. This is attributed to the pelvic PNF patterns. The findings of this study correlated with findings of Wang (1994) which stated that pelvic PNF is effective in activating the Lower abdominal and trunk muscles more effectively in acute stage [4].

Berg Balance scores improved from 4 to 48, this might be attributed the trunk and abdominal muscle activation achieved with stabilizing reversal and rhythmic stabilization in half standing position. Fugl – Meyer lower limb motor component improved from 4 (reflex activity) to 24 (volitional control & improved coordination). Weight bearing symmetry in Balance Master improved from ratio of 10:90 to 48:52 with improvement in hip abductor strength. Stance phase weight bearing of the affected leg improved with hip abductor activation preventing pelvic asymmetry and compensatory lateral tilt of trunk. This was similar to the findings of Hufschmidt (1982) and Kawahira et. al., (2004) were muscle torque generation in lower limb improved with resisted PNF patterns [5, 6].

Ankle dorsiflexion though not attained full range the partial range facilitated ground clearance and improved plantar flexion momentum facilitated gait speed. The patient attained a walking speed of 0.35 m/sec which was similar to the findings of Elizabeth (2006) and Kwerkkel. G (2002) where in the gait kinematics improved with repeated PNF training for 5days a week for 3 weeks [7].

Functional Ambulation Category scale improved from 1 to 5 with patient able to walk in level surface independently. This was similar to the findings of Kumar et. al., (2012) and stated good functional outcomes in rehabilitation [8].

Table 1: Comparison of pre test and post test values

Outcome measures	Pre test	Post test
Weight bearing symmetry (in %)	10	96
Berg Balance Scale	4	42

Conted…

Functional Ambulation Category	1	5
Fugl – Meyer scale Lower Extremity component	8	24

CONCLUSION

In this present study the balance ability and independence in gait of patients improved with application of PNF. Further studies can be conducted with large samples to include PNF in treating balance and gait functions in hemiparetic patients.

Ethical Clearance: Taken from Institutional Human Ethics Committee, PSG Institute of Medical Sciences Research.

Source of Funding: Self.

Conflict of Interest: Nil.

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Correlation of Sleep Quality with Physical Activity and Memory among Young Adults

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ABSTRACT

Introduction: Poor sleep quality is common among students due to academic work burden and social norms. Physical fitness is the ability to achieve certain performance standards for physical activity, and is an outcome of habitual physical activity or exercise[1, 2.] In the process of encoding, new information inputs into neural circuits. This information is unstable and must be strengthened and transferred to long-term storage in the process of consolidation, which this project will focus on. Finally, this information is retrieved from the areas of storage. Today's fast growing industrialized world and rapid advancement in digital technology, multimedia; internet and social networking lifestyle have greatly affected the lifestyle of the people in the world population. These technologies are effecting duration and quality of sleep, because of this other parameters like their physical activity and memory are also affected. The significance of this finding is that key measures of poor sleep quality may be associated with physical activity downfall and memory issues among young adults.

Method: 100 subjects between age group 18-25 years having normal BMI were selected for the study on the basis of inclusion and exclusion criteria. After signing the informed consent the subjects administered Pittsburgh Sleep Quality Index (PSQI), Baecke Physical Activity Questionnaire (BPAQ) and Memory Functioning Questionnaire (MFQ).

Result: Analysis was done using statistical SPSS version 21. The association between sleep quality, physical activity and memory was found out by Karl Pearson correlation coefficient (r). Non-significant correlation was found between MFQ and PSQI. Non-significant correlation was found between BPAQ and PSQI

Conclusion: With the result of this study it could be established that sleep deprivation or impaired sleep quality has no effect on physical activity and memory in young adults.

Keywords: *Sleep Quality, Physical Activity, Memory, PSQI, MFQ, BPAQ, Young Adult*

INTRODUCTION

Maintaining and improving sleep quality is an important clinical issue in modern life. Poor sleep quality is common among students due to academic work burden and social norms. The main cause behind poor sleep quality includes alcohol and caffeine intake, stimulants and technology[3]. Sleep has two phases namely: non rapid eye movement (NREM) and rapid eye movement (REM). NREM consists of four stages: stages 1, 2, 3 and 4. Stages 3 and 4 are referred to collectively as slow wave sleep (SWS) as both exhibits a slow wave EEG pattern.[4] On average, one night of sleep involves four or five sleep cycles. Sleep cycles are the progression through various stages of NREM sleep and REM sleep, each lasting close to 90 minutes[5].

Physical fitness is the ability to achieve certain performance standards for physical activity, and is an outcome of habitual physical activity or exercise[1, 2].

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Higher level of physical activity decreases mortality rate by lowering the rate of cardiovascular diseases and cancer.[6-7]. Evaluating the physical fitness among young adults and late adolescence is relevant because low levels of fitness may underlie the potential for several health problems in later adulthood[8, 9].

The case for exercise and physical health is now widely accepted by medical authorities across the world[10, 11]. Sedentary living doubles the risk of morbidity and mortality from coronary heart disease and stroke[14, 15] which is comparable with the risk associated with hypertension and hyperlipidaemia and not far behind that of smoking. Low activity levels leads to obesity, diabetes and some cancer.[14]The incidence of inactivity is also high in many developed countries where technology is slowly removing exercise from lifestyles and is estimated at around 40% of the middle aged and elderly in the UK[15].The burden of inactivity is expensive and improvement can be done by activity promotions[17].

Relation between sleep and memory is growing area of research in field of neuroscience. Recent researches have shown that different stages of sleep have some beneficial effect on memory[18]. Memory is defined as ability to encode, consolidate and remember information that has been learnt. [19]It can be categorized on the basis of whether the information is received from conscious or subconscious, the former termed declarative (or explicit) memory and the latter termed non-declarative (or implicit) memory.[18, 20]

In the process of encoding, new information inputs into neural circuits. This information is unstable and must be strengthened and transferred to long-term storage in the process of consolidation, which this project will focus on. Finally, this information is retrieved from the areas of storage.[21]

A person spends more than 1/3rd of his life sleeping. Sleeping is the best way of recharging one's body. Today's fast growing industrialized world and rapid advancement in digital technology, multimedia; internet and social networking lifestyle have greatly affected the lifestyle of the people in the world population. The youth are the most affected by these advancements. It also affects their lifestyle especially their sleep timing and quality. These technologies are effecting duration and quality of sleep, because of this other parameters like their physical activity and memory are also affected. The significance of this finding is that key measures of poor sleep quality may be associated with physical activity downfall and memory issues among young adults.

MATERIAL AND METHOD

100 subjects between age group 18-25 years were selected for the study on the basis of inclusion and exclusion criteria. After selection they were made to sign informed consent.

Inclusion Criteria: Subjects both male and female with normal BMI between age-groups 18-25 years, comprehending English language were taken.

Exclusion Criteria: Subjects who will indulge in strenuous physical activity, having history of any of these following disease- Musculoskeletal disorders, Neurological disorder, Psychiatric disorder, cardiovascular disease, Trauma, Surgery were included in exclusion criteria.

Study Design: Correlational study

Outcomes Measures: Pittsburgh sleep quality index, Baecke physical activity questionnaire, Memory functioning questionnaire

Procedure: The study was conducted to find out the correlation of memory and physical activity with sleep quality. The subjects participated were screened to rule out inclusion and exclusion criteria. The subjects fulfilling both criteria were asked to sign informed consent. After signing informed consent the subjects were given the data collection form which comprises demographic details, subjective assessment, PSQI, BPAQ and MFQ

The subjects filled those details and answered the question according to their ability and perception.

The Pittsburgh Sleep Quality Index (PSQI) is used to measure quality and pattern of sleep. It shows difference in poor and good sleep by measuring seven domains namely: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, and sleep disturbances, use of sleep medication, and daytime dysfunction over the last month. Each of seven areas of sleep was rated by client himself/herself. Scoring of the answers is based on a 0 to 3 scale, whereby 3 reflect the negative extreme on the Likert Scale. A global sum of "5"or greater indicates a "poor" sleeper.

Baecke Physical Activity questionnaire includes a total of 16 questions classified into three domains: work, sports, and non-sports leisure activity. Each domain has several questions with scoring on five point scale, ranging from never to always or very often. Scoring was done according to original system in which work was the mean score in which work is the mean score for occupational questions, sports for sports-related questions and non-sports leisure for physical activities during leisure time. Each domain could receive a score from one to five points, thus allowing a total score from three (minimum) to fifteen (maximum). For the two most frequently reported sports activities, specific questions regarding the number of months per year and hours per week of participation were addressed. The original BQ was translated into Japanese using the forward and backward translation procedure. Two professional translators independently translated the original scale once.

The Memory Functioning Questionnaire (Zelinski et al., 1980), on the other hand, is narrower in scope. It consists of 92 items requiring 7-point Likert scale judgments on various aspects of everyday remembering and forgetting. Responses to the MFQ are summarized in nine a priori scale scores: General Rating of Memory, Reliance on Memory, Retrospective Functioning, Frequency of Forgetting, Frequency of Forgetting When Reading, Remembering Past Events, Seriousness of Memory Failures, Mnemonics Usage, and Effort to Remember

FINDINGS AND DISCUSSION

Analysis was performed using statistics SPSS Version 21. The association between sleep quality, physical activity and memory was found out by Karl Pearson correlation coefficient (r).Non-significant correlation was found between MFQ and PSQI. Non-significant correlation was found between BPAQ and PSQI

Table 1: Correlation values between sleep quality, memory and physical activity

		PSQI
MFQ	Pearson Correlation	-0.184
	p-value	0.066
BPAQ	Pearson Correlation	0.113
	p-value	0.262
PSS	Pearson Correlation	.265**
	p-value	0.008

Sleep with Physical Activity: The group taken into consideration can never omit doing physical activity as a whole because the college students have to go to their colleges and the office workers have to go to earn bread and butter for themselves. This was a cross sectional study, if subjects are called for a longer period for a longitudinal study, effect of sleep quality may be seen on physical activity. This effect may be for a longer duration sleep deprived subjects.

To clarify the relationship between sleep quality and physical activity in young population, this study made an attempt to explore the association between sleep quality and physical activity. These relationships imply that sleep quality will have no significant relation with physical activity.

The group in our study had a high motivation level and enjoy more. They have a more positive attitude towards life. Energy metabolism is greater. They are generally disease free. They have higher strength, endurance and flexibility.

Only few studies were there who investigated relation between physical activity and sleep [22-25]. Studies conducted on adult population show poor sleep at night along with lower levels of physical activity [25]. Physical activity predicting sleep that night was less consistent. Two studies found no relation between daily physical activity and subsequent sleep[22, 25.] There are numerous factors that may contribute to the inconsistencies in the few studies conducted to date including differences in the exercise protocols studied, such as the intensity and duration of programs, and their interactions with individual characteristics such as fitness, age, and gender[26]. Questions remain over the sleep and health benefits associated with specific levels of physical activity (light, moderate, vigorous) and at what combinations or thresholds, and differences in effects across individuals and across the lifespan. Such nuanced information is needed in order to tailor recommendations to promote optimal health.

Sleep with Memory: There is no clear explanation about which stage of sleep is most important. Different sleep stages are dependent on each other. Stage 2 of NREM sleep and REM sleep may have a role in semantic memory consolidation. Studies show that REM increases procedural memory. There is lack of evidence regarding interaction between individual sleep stages and conditioning memory.

The group taken into consideration may not have a memory problem because younger group of subjects were included. The lack of interference during sleep has been considered as a possible cause of the no effects of sleep on memory. Young adults have high amounts of slow wave sleep and sleep in general, there is no brain degeneration and their attention level is also high. The group included all college going students i.e. subjects were with lesser memory issues.

One research revealed that quality of sleep is not related to memory in an individual's life.[27]The results found in the present study do not coincide to a study conducted by Murre, Kristo, & Janssen (2014) found that sleep quality measured by the Pittsburgh Sleep Quality Questionnaire was associated with poorer autobiographical memory performance 4-6 weeks after the recorded event.

CONCLUSION

With the result of present study it could be established that sleep deprivation or impaired sleep quality has no effect on physical activity and memory in young adults.

Source of Funding: Self

Conflict of Interest: There is no conflict of interest related to this manuscript

Ethical Clearance: All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5).Informed consent was taken from the subjects prior to the study

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Abbreviations:

PSQI- Pittsburgh Sleep Quality Index

MFQ- Memory Functioning Questionnaire

BPAQ- Baecke physical activity Questionnaire

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Shuttle Run Test in Athletes of Belagavi-An Exploratory Study

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ABSTRACT

Background: 10 meters Shuttle run test is a field test which measures the agility and speed of athletes. this is a test of speed, body control and the ability to change direction.

Objective: The objective of this study was to find Common value of shuttle run test in athletes of Belagavi and to set concrete data which will prove as a base line for any other studies / training which will involve designing rehabilitation and /or fitness protocol for Belagavi athletic population

Methodology: 162 athletes (n=162) were taken for the study.10 meter shuttle run test was performed by the athletes. The time taken to complete the test was recorded.

Result: Total mean best time for males was found to be 10.99 and for females it was found to be 10.78.

Conclusion: The overall speed range for 10 meter shuttle run test in Belagavi athletes is between 9.00-12.70 Seconds. The speed range for male athletes is between 9.00-12.70 Seconds, and for female athletes it ranges between 9.00-12.50 Seconds. Mean best time for males was 10.69 Seconds

Keywords: *10 Meters Shuttle Run Test, Belagavi athletes, Field test, Speed, Agility.*

INTRODUCTION

Professional players have an advantage over Immature players in terms of body composition and shape, speed, endurance, agility, control, perception of anxiety, anticipation, and technical skill. Of all these, agility, speed and anticipation skills seem to be the strongest predictors of talent.[1] The Speed and acceleration are important qualities in outdoor sports, with running quickly over short distances for success[2,3] In Soccer players Although high-speed actions contribute only about 11% to that of total distance covered, it plays more crucial and important role in moments of the game and contribute directly to winning possession of the ball as well as scoring or to conceding of goals.[4] Agility does not have a global definition,[5] but Narasimhan et al. (2006) defined agility as the ability to efficiently change operating states in response to uncertain and changing demands placed upon it. Many Outdoor and Indoor sports involve straight sprinting, rather than straight sprinting more often repeated short sprinting with changes of direction. Attaining a high sprint velocity over a short distance is of very important for better performance in team and in field of sports.[6] Considering this sports it would seem important to provide testing and training that mimics this demand to increase specificity. The test which is most commonly used for testing speed and agility in athletes is Shuttle Run test. Sprints most frequently occur over very short distances (0–10 m) from both standing and rolling starts. Consequently, the speed over the first steps and the ability to accelerate quickly would be considered of greater importance in the field of sports[7,8] Speed and agility are important qualities in the field sports for better performance and is an important topic of research that has not been adequately investigated across a particular age group or level of competition. In fact, this data can be turned into valuable information on the unique physiological demands in athletes. Additionally, this test can effectively guide physiotherapists for

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conditioning and training programs across a season and can also help them understand the differences in fitness, between players. Hence, the present research emphasize on the need to find a common value of Shuttle run test in athletes of Belagavi.

METHOD

Ethical clearance was obtained from the Institutional Ethical Committee of KAHER Institute of Physiotherapy, 162 participants were recruited in the study after fulfillment of eligibility criteria. A written informed consent was obtained from all the participants before the commencement of the study. The participants included were from the various institutes and sports academies in and around Belagavi city. Demographic characteristics of the participant, including their age, gender, Sports and years of playing were noted. Athletes within the age group of 18-25 year of age both male and female who were willing to participate were included in the study. Participants were excluded if there were any musculoskeletal problems such as fracture, sprain/strain of lower limb in the past 6 months, existing neurological, respiratory or cardio vascular problems or any other condition leading to limitation in 10 meters shuttle run test performance.

Procedure: After finding their suitability as per the inclusion criteria participants were briefed about the nature of the study and the intervention in their vernacular language. Only those participants who are willing to participate were recruited in the study. The subjects were grouped into three strata according to age and gender. A Warm–up session for 10 min was given to all the athlete which involved 5 min jogging and 5 min dynamic exercises for all joints. All participants were given with 1 practice trial of shuttle run test for better understanding about test and they were allowed to ask questions if any doubts. After that, athlete stood in the starting position with his feet slightly apart. On the command of Go athlete was then asked to touch cone at the starting line and sprint to touch cone on end line and sprints back to starting line which are 9.14 m (30 ft) apart.[13]

The stopwatch was used to record time taken by athlete to complete the test. The test was repeated 3 time and the therapist noted down the best time taken to complete the test.

STATISTICAL ANALYSIS

The statistical analysis was done by using SPSS version 21 software. Correlation between BMI, speed and number of years played with best time was analysed using Karl Pearson's correlation coefficient method. Comparison of male and females with mean best time, mean of first and second attempts speed score, mean number of years played and BMI were analysed using t test.

RESULTS

Table 1: Distribution of male and females with mean age in the study

Gender	Number of participants	%	Mean age	SD age
Male	116	71.60	20.31	2.07
Female	46	28.40	20.28	2.10

Table number 1 Shows distribution of male and female participants in the study. Total 162 participants were included in the study 116 males (71.60%) with mean age of 20.31 with SD age 2.07 and 46 females (28.40%) with mean age of 20.28 and SD age 2.10. No significant difference was seen in male and females mean age.

Table 2: Correlation between BMI, speed and number of year's played with best time by Karl Pearson's correlation coefficient method

	Correlation between best time with		
	r-value	t-value	p-value
Age in yrs	0.2079	2.6881	**0.0079***
BMI	-0.0299	-0.3789	0.7052
No. years played	0.0377	0.4767	0.6342

*p<0.05

Table number 2 showing the positive correlation between the best time and the age of the athletes.

(p<0.05) by Karl Pearson's correlation coefficient method was used to assess the correlation.

Looking at the analysis we found no correlation between the best time and BMI same with number of years played.

Table 3: Comparison of male and females with mean BMI by t test*p<0.05

Gender	Height		Wight		BMI	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Male	5.67	0.29	64.92	6.60	22.35	1.99
Female	5.54	0.36	56.68	6.72	20.07	1.94
t-value	2.3669		7.1263		6.6214	
p-value	0.0191*		0.0001*		0.0001*	

Table 4: Patterns of best time in male and females in the study

Gender	Minimum	Maximum	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Male	9.00	12.70	10.69	0.88	0.08	10.53	10.86
Female	9.40	12.50	10.99	0.85	0.13	10.74	11.25

Table number 4 shows minimum and maximum time taken by the athletes to complete the 10 meters shuttle run test. According to the above data minimum time taken by male athletes to complete the test is 9.00 sec and the maximum taken is 12.70 sec When we see for minimum time taken by females is 9.40 sec and maximum is 12.50 sec this shows no more difference in post test data according to the gender of athletes.

Table 5: Normality of best time (in sec) in the study by gender

Best time	Total		Male		Female	
	Range	Number	Range	Number	Range	Number
Excellent	9.00-9.89	21	9.00-9.82	18	9.40-10.14	10
Good	9.90-11.65	105	9.83-11.56	43	10.15-11.83	27
Poor	11.66-12.70	36	11.57-12.70	55	11.84-12.50	9
Total	9.00-12.70	162	9.00-12.70	116	9.00-12.50	46
Mean best time	10.69		10.99		10.78	
SD best time	0.88		0.85		0.88	

Note: Excellent: <mean-SD, Good: Between mean-SD to < mean+SD and Poor: >mean+SD

Table Number 5 shows the normality of best time in seconds and number of male and female having the excellent speed in terms of minimum time taken to complete the test to poor speed. Total best time range is 9.0-9.86 which is excellent range (n= 18 males n= 10 females total n= 21), 9.90-11.65 is good(n= 43 males & 27 females total 105), 11.66- 12.70 poor(n = 55 males & 9 females total 36) Mean best time for males was found to be 10.99 and for females it was found to be 10.78.

Table 6: Comparison of male and females with mean best time by t test *p<0.05

Gender	Mean	Std. Dev.
Male	10.69	0.88
Female	10.99	0.85
Total	10.78	0.88
t-value	-1.9701	
p-value	0.0500*	

DISCUSSION

This study was conducted at belagavi on young athletes with a goal to find a common value of 10 meters shuttle run test in athletes. The secondary goal was to set a concrete data which would prove as a baseline for all the other studies that would involve designing rehabilitation or fitness protocol for belagavi athletic population. Turgut Kaplan Et.al Conducted a study on running speed and agility performance in professional and amateur soccer players, where 10 X 5 meter shuttle run test was used. The study concluded that professional soccer players running speed and agility performances were higher than amateur soccer players.[14] Another study done by germa nvicente- rodri guez Et.al to find out reliability of stopwatch for measuring time taken to complete 4 X 10 meter shuttle run test and 30 meter shuttle run test and the result of this study suggested that stopwatch is a reliable and valid instrument for recording the time taken to complete the shuttle run test.[15] In the present study also stopwatch has been used to record the best time taken to complete the 10 meters shuttle run test. In this present study total 162 participants were included with mean age of 20.31 with SD age 2.07 for males and 20.28 with SD age. In the present study three trial of 10 m shuttle run test was taken so as to avoid human error and also to record the best time of athlete and the results are consistent with the results of the old study. In

conclusion, in the present study, we found overall speed range for 10 meter shuttle run test in belagavi athletes is between 9.00-12.70 min/sec. Male athlete speed range is between 9.00-12.70 min/sec, female athletes speed range is between 9.00-12.50 min/ sec. Mean best time for males was 10.69 min/sec It is also seen that there is positive correlation between the best time taken to complete the 10 meters shuttle run test and the age of the athletes. But there was no correlation between best time taken to complete test was compared with Body Mass Index and Numbers of years of play. The total 162 participants were included in present study, in which 21 samples fell under excellent category , 105 samples fell under good category and 36 samples fell under poor category of best time to complete the test. The Common value of 10 meter shuttle run test for males excellent time, good time and poor time was within range of 9.00 – 9.82 sec, 9.83 – 11.56 sec , 11.57 – 12.70 sec respectively and for females it was 9.40 – 10.14 sec,10.15 – 11.83 sec and 11.84 – 12.50 sec respectively.

CONCLUSION

This study concluded that the common value for 10 meters shuttle run test was within range of 9.00 -12.70 sec for both male and females, were in both genders male athletes showing better performance.

Limitation: Generalizations of the sample collected is questionable as the sample collected may not be representing the total population.

Practical Applications: The result of the present study can be used as a reference for speed and agility performance test (10 m shuttle run test) & by fitness professionals for training purpose for belagavi athletes.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken

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Effectiveness of Mirror Therapy on Upper Extremity Functioning among Stroke Patients

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ABSTARCT

Background: The prevalence of stroke in the general population varies from 40 to 270 per 1000,000 in India. Approximately 12% of all strokes occur in those older than 40 years. Stroke may require a variety of rehabilitation services. One of them Mirror therapy is a simple, inexpensive and most importantly patient directed treatment that may improve hand function after stroke.

Objective: To assess the effectiveness of mirror therapy on upper extremity functioning among stroke patients at selected neuro- rehabilitation centres

Method: A quantitative research approach was used in this study. Research design was Quasi-experimental: pre-test post-test. Sample size was 50 post stroke patients who receive stroke rehabilitation at Neurorehabilitation centres. The 25 subjects were randomly divided into two groups, experimental group and control group. The experimental group has received mirror therapy with the conventional therapy for 3 days in a week for 4 weeks. Other side the control group has received only conventional therapy for 4 weeks, and 3 days in a week. The effectiveness was evaluated by Modified Brunnstrom's motor function test

Result: An average hand functioning score in pre-test was 8.2 which increased to 12.6 in post-test and 7.6 which increased to 13.4 in post-test for upper extremity functioning among experimental group, following for the control group as in pre-test an average was 8.3 which increased to 11.2 for hand and 8.1 which increased to 11.7 of upper extremity.

Conclusion: The findings of the study show that there is significant difference between the scores of experimental and control group.

Keywords: *Mirror Therapy, Upper Extremity Stroke , Neuro Rehabilitation Centre*

INTRODUCTION

As human, we move our bodies to explicit our wants, needs, emotions, thoughts, and ideas. Basically, how well we move- and how much we move- decides how well we engage with the world and make our full purpose in life. Mostly the active movement helps us in function completely, interact with the world, feel well physically and emotionally, connect and build relationship with others, and communicate and express ourselves. Also the movement helps us recover if our brain is injured or inflamed. Body movements are comparable important for smooth and effective day to day activities.[1]

Nervous system is a one of the system of our body, which perform all the sensory and motor function of body. The reason a healthy nervous system is so important is because it's what runs everything in our body. When nervous system is functioning correctly, body is able to perform all the things it needs to do. However, when the nervous system is compromised, or not working efficiently, body begins to break down.[2]

Stroke is the third biggest killer in India after heart attack and cancer and is a major public health concern.[1] Stroke occurs when there is (1) lack of blood flow to a section of brain or (2) haemorrhage into the brain that results in death of brain cells. The predominance of stroke in the population varies from 40 to 270 per 1000,000 in India. Approximately 12% of all strokes occur in those older than 40 years. It was projected that by 2015 the number of cases of stroke would be increase to 1666,372

in the country. A predicted 5.7 million people died from stroke in 2005 and it is projected that these deaths would rise to 6.5 million by 2015.[3]

Impact on daily life, 4 out of 10 stroke survivors leave hospital requiring help with daily living activities but almost a third receive no social service visits. Around a third of stroke survivors experience depression after their stroke.[4]

15 million people suffer from stroke worldwide each year. Of these, 5 million die and another 5 million are permanently DISABLED.[5]Ischemic stroke 10% in 30 days, 23% in 1 year and 52 % in 5 year. Same as Intra-cerebral haemorrhage 52% in 30 days, 62% in 1 year and 70% in 5 years. The sub-arachnoid haemorrhage was 45% in 30 days, 48% in 1 year and 52 % in 5 years. They also concluded that this prevalence of stroke may increase till 2020. Stroke patient may require a variety of rehabilitation services like physiotherapy, occupational therapy, speech therapy etc. One of them MIRROR THERAPY is an inexpensive, simple and patient directed treatment. The principle of mirror therapy is use of a mirror to create a reflective illusion of an affected limb in order to trick the brain into thinking movement has occurred without pain. [5]

METHODOLOGY

A quantitative research approach was used in this study. Research design was Quasi-experimental: pre-test post-test. Content validity was obtained by experts of medical surgical nursing and physiotherapy opinion. Tool reliability (0.8) was calculated by inter rated reliability method. The consent was taken from the subjects for participation in study. Data collection was carried out from 14/02/2018 to 15/03/2108. Sample size was 50 post stroke patients who receive stroke rehabilitation at Neurorehabilitation centres. The 25 subjects were randomly divided into two groups, experimental group and control group. The experimental group has received mirror therapy with the conventional therapy for 3 days in a week for 4 weeks. Other side the control group has received only conventional therapy for 4 weeks, and 3 days in a week. The effectiveness was evaluated by Modified Brunnstrom's motor function test before and after intervention. Data was compiled and analysis was done by using inferential and descriptive statistics.

RESULTS

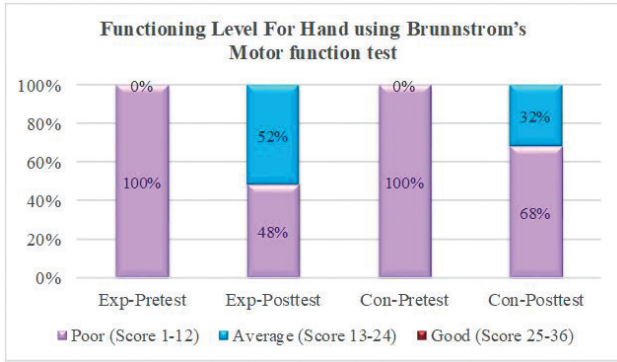

Fig. 1: Effectiveness of mirror therapy in stroke patients on the functioning of hand

In pre-test, all the experimental and control group stroke patients had poor functioning of hand. In post-test, 48% of the experimental group samples had poor functioning of hand and 52% of them had average functioning of hand. In control group, 68% of the samples had poor functioning of hand and 32% of them had average functioning of hand. This shows that the mirror therapy remarkably improved the hand functioning of stroke patients.

Table 1: Paired t-test for effectiveness of mirror therapy in stroke patients on the functioning of hand

N = 25, 25

Group	Day	Mean	SD	T	Df	p-value
Experimental	Pre-test	8.2	1.37	12.8	24	0.000
	Post-test	12.6	1.71			
Control	Pre-test	8.3	1.41	10.6	24	0.000
	Post-test	11.2	1.72			

Researcher applied paired t-test for effectiveness of mirror therapy in stroke patients on the functioning of hand. In experimental group, average hand functioning score in pre-test was 8.2 which increased to 12.6 in post-test. T-value for this test was 12.8 with 24 degrees of freedom. Corresponding p-value was of the order of 0.000, which is small (less than 0.05), the null hypothesis is rejected.

In control group, average hand functioning score in pre-test was 8.3 which increased to 11.2 in post-test. T-value for this test was 10.6 with 24 degrees of freedom. Corresponding p-value was of the order of 0.000, which is small (less than 0.05), the null hypothesis is rejected. Average for experimental group in post-test is higher as compared to that for control group. Mirror therapy is proved to be significantly effective in improving the hand functioning of stroke patients.

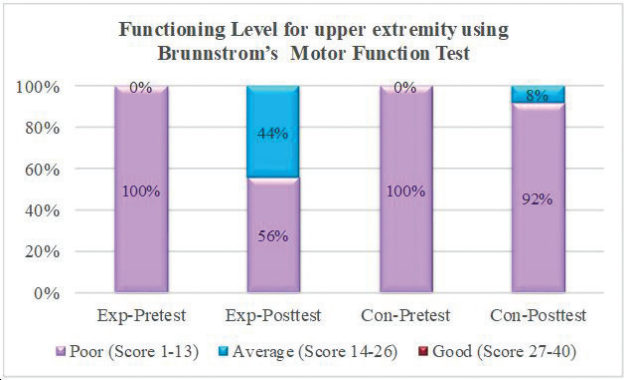

Fig. 2: Effectiveness of mirror therapy in stroke patients on the functioning of upper extremity

In pre-test, all the experimental and control group stroke patients had poor functioning of upper extremity. In post-test, 56% of the experimental group samples had poor functioning of upper extremity and 44% of them had average functioning of upper extremity. In control group, 92% of the samples had poor functioning of upper extremity and 8% of them had average functioning of upper extremity. This shows that the mirror therapy remarkably improved the upper extremity functioning of stroke patients.

Table 2: Paired t-test for effectiveness of mirror therapy in stroke patients on the functioning of upper extremity

N = 25, 25

Group	Day	Mean	SD	t	Df	p-value
Experimental	Pre-test	7.6	1.15	14.6	24	0.000
	Post-test	13.4	1.80			
Control	Pre-test	8.1	1.17	11.0	24	0.000
	Post-test	11.7	1.51			

Researcher applied paired t-test for effectiveness of mirror therapy in stroke patients on the functioning of upper extremity. In experimental group, average upper extremity functioning score in pre-test was 7.6 which increased to 13.4 in post-test. T-value for this test was 14.6 with 24 degrees of freedom. Corresponding p-value was of the order of 0.000, which is small (less than 0.05), the null hypothesis is rejected. In control group, average upper extremity functioning score in pre-test was 8.1 which increased to 11.7 in post-test. T-value for this test was 11 with 24 degrees of freedom. Corresponding p-value was of the order of 0.000, which is small (less than 0.05), the null hypothesis is rejected. Average post test score for experimental group is higher as compared to that of control group. Mirror therapy is proved to be significantly effective in improving the upper extremity functioning of stroke patients.

Table 3: Two sample t-test for comparison of experimental and control group for hand functioning

N = 25, 25

Group	Mean	SD	T	df	p-value
Experimental	4.4	2.8	4.3	48	0.000
Control	1.7	1.3			

Researcher applied two sample t-test for comparison of average change in hand functioning score of experimental and control group. Average change in hand functioning score of experimental group was 4.4 which was 1.7 for control group. T-value for this comparison was 4.3 with 48 degrees of freedom. Corresponding p-value was 0.000, which is small (less than 0.05). This indicates that the mirror therapy has significantly improved the functioning score of hand as compared to that of control group.

Table 4: Two sample t-test for comparison of experimental and control group for upper extremity functioning

N = 25, 25

Group	Mean	SD	t	df	p-value
Experimental	5.8	3.6	4.9	48	0.000
Control	2.0	1.6			

Researcher applied two sample t-test for comparison of average change in upper extremity functioning score

of experimental and control group. Average change in upper extremity functioning score of experimental group was 5.8 which was 2 for control group. T-value for this comparison was 4.9 with 48 degrees of freedom. Corresponding p-value was 0.000, which is small (less than 0.05). This indicates that the mirror therapy has significantly improved the functioning score of upper extremity as compared to that of control group.

This shows that mirror therapy was effective on upper extremity function among stroke patients.

DISCUSSION

The literature includes some studies that support the use of Mirror Therapy in post-stroke rehabilitation. However, researches involving MT have evolved over the past years, acquiring better methodological quality.

The studies found in this review assessed individuals in the post-stroke and showed similar effects concerning the effectiveness of MT on recovery of the motor function.

The above findings of the study are supported by a study conducted by, **Pournima Pawar, vijaykumar biradar** to evaluate the effectiveness of the constraint induced movement therapy (CIMT) and combined mirror therapy for patient's rehabilitation of the patients with subacute and chronic stroke patients.Twenty patients were enrolled and divided into two groups CIMT group, CIMT with Mirror therapy group. CIMT group 6 hours a day for 4 days per week for 4 weeks ,and CIMT with Mirror therapy group 30 minutes of mirror with CIMT for 4 days per week for 4 weeks . The fugl-meyer motor function assessment (FMS) and Brunnstrom Voluntary control grading were evaluated 4weeks after the treatment. The score of the Brunnstrom Voluntary control grading p value (P value 0.0001) and Fugl-meyer scale P value (0.0001), mirror therapy combined with CIMT showed more improvement than the CIMT after 4 weeks of treatment.[6]

Kil-Byung Lim, Hong-Jae Lee, Jeehyun Yoo, Hyun-Ju Yun, Hye-Jung Hwang conducted study on efficacy of mirror therapy containing tasks in post stroke patients to investigate the effect of mirror therapy on upper extremity function and activities of daily living. The samples were randomly divided into two groups that were mirror therapy group and sham therapy group, each group contains 30 samples. The mirror therapy group has undergone a mirror therapy with conventional therapy for 20 minutes per day on 5 days per 4 weeks. The Fugl Meyer assessment, Brunnstrom motor recovery stage and modified barthel index were evaluated 4 weeks after the treatment. After 4 weeks of intervention, improvements in the FMA (p=0.027) and MBI (p=0.041) were significantly greater in the mirror therapy group than the sham therapy group. The mirror therapy containing functional task was effective in terms of improving the upper extremity functions.[7]

CONCLUSION

The findings of the study show that there is significant difference between the scores of experimental and control group. The finding shows that the mirror therapy brought a significantly effect in pre-test and post-test on upper extremity functioning.

Conflict of Interest: Nil declared

Source Funding: Self

Ethical Clearance: This study is ethically approved by Symbiosis College of nursing, Symbiosis International (Deemed University)

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Effect of Hydrotherapy Based Exercises for Chronic Nonspecific Low Back Pain

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ABSTRACT

Background: Water has been highly considered for rehabilitation because it facilitates the application of established therapeutic interventions including stretching, strengthening, joint mobilization, balance, gait training and endurance training that helps in reducing back pain due to unique physical characteristics and low risks.

Objective: To compare the effect of Hydrotherapy based exercises and conventional physiotherapy in chronic nonspecific low back pain.

Materials and Method: An experimental study was conducted at physiotherapy Department of Krishna Institute of Medical Sciences. A total 30 patients were equally divided into two groups using convenient sampling with random allocation (Group A and Group B). Group A was given Conventional Therapy and Group B was given Hydrotherapy.

Results: Statistical analysis was performed using paired t-test and unpaired t-test. Intra group comparison (within group) was analysed statistically using paired t-test for VAS, ROM, MMT and MODI. This shows that there is an extremely significant difference of Group A similarly there is an extremely significant difference of Group B. But in intergroup comparison (between group) was analysed statistically using unpaired t-test. This shows that pre-intervention there was no statistically significant difference seen with P values of VAS, ROM, MMT and MODI. While on comparing post interventional values, the results between two groups using unpaired t-test revealed that there was statistically significant difference seen with P values of VAS was (P- 0.0182) but there was no statistically significant difference seen with P values of ROM, MMT, MODI.

Conclusion: From the study, it is concluded that there was significant improvement in subjects who underwent conventional therapy and hydrotherapy.

Keywords: *Nonspecific low back pain, VAS, Hydrotherapy, Physical properties of water.*

INTRODUCTION

Just like reinforced steel can bear more weight than sheet of aluminum, a strong, well-conditioned back can stand with more stress, and protect spine better, than a back that has not been conditioned through exercise. Conditioning through flexibility and strengthening back exercises not only helps to avoid the back injury, or minimize the severity of injury. It can also help to relieve the pain from many back conditions[1].

The human body has a centre of gravity, which keeps the balance between muscles and bones to maintain integrity of structures and protect them against injury[2]. In nonspecific low back pain, imbalance typically occurs

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between the functional load, which is effort required for work and in daily living activites[3]. Low back pain has a lifetime prevalence of 60-85% but it is seen in adult is 15%[3] and it may vary according to age, gender, education and occupation[4].

Chronic nonspecific low back pain is the pain where the patient cannot find any specific cause for more than 12 weeks such as infection, arthritis, fracture, spondylolisthesis etc[5]. Generally chronic nonspecific low back pain is seen because of heavy physical exertion such as weight lifting, repetitive movement and frequent static posture. Characteristic of chronic nonspecific low back pain are heavy pain, worsening with exertion and relieved with rest. In some cases the cause may be sprain or an overstretch of a ligament or muscles[6]. The endurance of trunk muscles is low in patients with low back pain as compared to individual without low back pain. The deep trunk muscles (Transverse Abdominis and Multifidus) responsible for maintaining the stability of spine. It is studied that the poor endurance of trunk muscles may caused strain on structures and hence causes low back pain[7]. In other cases the cause may be a minor problem with the disc between two vertebrae or a minor problem with a small facet joint between two vertebrae. There may be other minor problems in the structures and tissues of the lower back that result in pain.

Stretching and strengthening exercises is one of the useful mode of exercise for chronic nonspecific low back pain to decrease the pain while working out. If these exercises are done in water, the properties of water relieves pain, reduces muscle spasm, increases joint range of motion, strengthen weak muscles, improve circulation, provide resistance and improves balance and coordination[8]. Moreover, the combinations of the buoyancy, resistance properties of water allow easier joint movement and diminish disabilities than on land[9]. Although it appears that water-based exercises may be suitable exercises for individuals to improve quality of life.

Hydro means water so we can called Hydrotherapy, Aquatic therapy or Pool therapy. The heat and flotability of the water can block nociceptors by acting on thermal receptors and mechanoreceptors and exert a positive effect on spinal segments[10]. Water has many properties that give it the ability to heal.

- Water can store and carry heat and energy.
- Water cannot hurt you, even if you are sensitive to your surroundings.
- Water can help blood flow.
- Water has a soothing, calming, and relaxing effect on people.
- Exercise in water takes the weight off a painful joint while also providing resistance[11].

Hydrotherapy is one of the method that recently has found great popularity in rehabilitation[12].

Benefits of hydrotherapy are due to properties of water such as:

1. **Buoyancy:** Buoyancy reduces force of gravity and provides resistance which is used to strengthen the muscles.
2. **Hydrostatic pressure:** Hydrostatic pressure is the pressure exerted by water on immersed object. That pressure and depth allows the patients to perform exercise more easily.
3. **Viscosity:** Viscosity creates resistance to all active exercises.
4. **Surface tension:** In surface tension the use of equipment at surface increase the resistance[13].

Now a days, physiotherapy is growing with multispecialty like hydrotherapy which is used to treat disorders[14]. In chronic nonspecific low back pain there is no specific problem or disorder that can be identified as the cause of pain but water will relieve discomfort and promote physical well-being[15]. The use of Pharmacotherapy example Non-steroidal anti-inflammatory drugs and Skeletal muscle relaxant tend to have various side effects with their prolonged use. Patient with only drug therapy have high chance of recurrences and worsening of spinal function leading to early degenerative changes in spinal structures. On the other hand hydrotherapy gives an opportunity of natural way of therapy by which this chronic non specific low back pain can be effectively managed.

Aim: To find out the effectiveness of hydrotherapy based exercises for chronic nonspecific low back pain.

OBJECTIVES

- To determine the effect of hydrotherapy based exercises for chronic nonspecific low back pain.
- To compare the effect of Hydrotherapy based exercises and conventional physiotherapy in chronic nonspecific low back pain.

MATERIALS AND METHOD

It was an experimental study conducted in the KIMSDU. 30 participants were equally divided into two groups using convenient sampling with random allocation. Group A was given conventional therapy and Group B was given hydrotherapy. The patient were selected according to inclusion and exclusion criteria. Written informed consent was taken and whole study was explained to them. Detailed musculoskeletal evaluation was done to screen the subjects. Inclusion criteria were as follow: 1. Subjects clinically diagnosed as chronic nonspecific low back pain, 2. Both genders, 3. Age group – 20yrs to 45yrs, 4. Participants willing to participate in study, 5. Swimmers. Exclusion criteria were as follows: 1. Individuals with specific causes for back pain, 2. Subject with systemic illness: -Neurological disorders like ataxia, Respiratory disorders, Cardiac disorders. 3. Individuals with hydrophobia.

Group A: Treatment given was as follows:

1. Hot moist pack for 15 min.
2. Static back exercises
3. Stretching
4. Core strengthening exercises for back
5. Ergonomic advice for posture

Group B: All therapeutic exercises performed in water were given according to problem solving approaches like:

1. Stretching exercises for hip and lower back

   In Standing position: Knee to chest exercises, Leg raise

   In Prone position:-Superman position exercises

2. Strengthening exercises for abdominals, glutei, trunk, lumbar and lower limb.

   In supine position:-Swimming kicks, Hip flexion and extension, Hip abduction and adduction, Knee flexion and extension, Bridging with long dumbbell place at knees.

   In standing position:-Squatting, Lunges (forward and side), Ball squeezing between thighs, Toe raising, One leg balance, Leg circles.

Walking: Forward, Backward[16].

Post-intervention outcome measures of the subjects were calculated. Comparison of pre and post intervention values was done. The effect of conventional therapy and hydrotherapy based exercises on chronic nonspecific low back pain subjects was determined. Then, the results were compared in group A (conventional therapy) and group B (hydrotherapy) subjects of chronic nonspecific low back pain.

Table 1: Total no. of age groups included in the study

Age Groups	20-30	31-40	41-50
Group A	6	6	3
Group B	7	6	2

Between the group comparison:

1. VAS SCORE

Table 2: Comparison of VAS score between groups

	Mean ± SD	
	Pre-intervention	**Post intervention**
Group A	7.2 ± 1.47	2.66 ± 1.71
Group B	8.06 ± 1.38	1.2 ± 1.47
p value	0.1083	0.0182
t value	1.659	2.509
Inference	Not significant	Significant

MODIFIED OSWESTRY DISABILITY INDEX

Table 3: Comparison of MODI scores between groups

	Mean ± SD	
	Pre-intervention	**Post intervention**
Group A	61.33 ± 23.20	28 ± 16.22
Group B	71.06 ± 19.32	24.66 ± 12.73
p value	0.2223	0.5364
t value	1.248	0.6260
Inference	Not significant	Not significant

RESULTS

Intra group comparison (within group) was analysed statistically using paired t-test for VAS, ROM, MMT and MODI. This shows that there is an extremely significant difference of Group A similarly there is an extremely

significant difference of Group B. But in intergroup comparison (between group) was analysed statistically using unpaired t-test. This shows that pre-intervention there was no statistically significant difference seen with P values of VAS, ROM, MMT and MODI. While on comparing post interventional values, the results between two groups using unpaired t-test revealed that there was statistically significant difference seen with P values of VAS was (P- 0.0182) but there was no statistically significant difference seen with P values of ROM, MMT, MODI.

DISCUSSION

The purpose of present study was to find out the effectiveness of hydrotherapy based exercises for chronic nonspecific low back pain.

Low back pain is considered as 3rd highest problem faced by the population worldwide. Since there is change in the lifestyle due to competing professions people tend to ignore their spine health. Lack of self-care and awareness of the exercises has given a rise to this population. Thus intervention in an order to relieve the pain, improve range of motion was made as well as strengthening of the muscles and improved quality of the life are also done with exercise.

Reviewing various studies, it was analyzed that many exercise protocols like aerobic exercise, lumbar stability exercise, swiss ball exercise, only core strengthening exercises were line of treatment routinely used for chronic nonspecific low back pain.

This study was undertaken considering all the mentioned points, and the aim of this study was to find out effect of hydrotherapy in chronic nonspecific low back pain. Based on the principal of hydrotherapy, Exercise in water takes the weight off a painful joint while also providing resistance.

Benefits of conventional therapy:-It helps to control functional activities and in dynamic stabilization of joints, It moreover improves the endurance of the muscle, It activates muscle to begin to re-establish neuromuscular control.

Benefits of Hydrotherapy:-Exercise in water takes the weight off a painful joint while also providing resistance, Improved muscle strength, Greater flexibility and range of motion of the spine, Enhanced balance and coordination of muscle groups to stabilize the spine and reduces stress on the back pain, Increased tendency to maintain a neutral spine position during exercises, Efficiency of water will provide great advantage for subjects to improve quality of life and diminishes disabilities[17].

Many authors conducted studies on hydrotherapy for low back pain. So according to Dundar U, Solak O, Yigit determined the effect of aquatic exercise to treat chronic low back pain and came to a conclusion that water based exercises produce better improvement in disability and quality of life of the patients with chronic low back pain than land based exercises. Then Sjogren T, Long N, Storay I, Smith J, studied group hydrotherapy versus group land based treatment for chronic low back pain and come to conclusion that the both groups improved significantly in functional ability and in decreasing pain levels. Then Smit TE and Harrison R studied Hydrotherapy and chronic lower back pain: A pilot study. and come to conclusion that the beneficial effects from hydrotherapy may not be long lasting, suggesting the need for continuing sessions to maintain improved mobility and reduced pain levels. Then Cuesta-Vargas Al, Garcia-Roero JC studied exercise, manual therapy, and education with or without high-intensity deep water running for nonspecific chronic low back pain: a pragmatic randomized controlled trial and come to conclusion that the pain, disability, health status, muscle strength and endurance, and lumbar range of motion significantly improved in both groups. The addition of deep water running program at an individual workload of the aerobic threshold to the multimodal physical therapy program produced a significant improvement in pain in patients with nonspecific chronic low back pain, but this was not significantly different when compared with multimodal physical therapy program alone. Disability, health status, muscle strength and endurance, and lumbar range of motion significantly improved to a similar level in both interventional groups. Thermo therapy should always be used prior mobilization and MET is a form of mobilization. Hot moist packs relieve pain, relaxes muscles by vasodilation.[18]

Our study states that age groups with 20-40 are more affected as compared to 41-50 due to changing lifestyle. Intragroup comparison (within group) was analysed statistically using paired t-test for VAS, ROM, MMT and MODI scores, and intergroup comparison (between group) was analysed statistically using unpaired t-test.

Intra group comparison (within group) was analysed statistically using paired t-test for VAS, ROM, MMT and MODI. This shows that there is an extremely significant difference of Group A similarly there is an extremely significant difference of Group B. But in intergroup comparison (between group) was analysed statistically using unpaired t-test. This shows that pre-intervention there was no statistically significant difference seen with P values of VAS, ROM, MMT and MODI. While on comparing post interventional values, the results between two groups using unpaired t-test revealed that there was statistically significant difference seen with P values of VAS was (P- 0.0182) but there was no statistically significant difference seen with P values of ROM, MMT, MODI.

Clinical significance: Our study shows that conventional therapy and hydrotherapy are both effective maneuvers in chronic nonspecific low back pain. Recurrence is observed in subjects who underwent conventional therapy after some months. However, subjects who underwent hydrotherapy recovered faster as compared to conventional therapy subjects. Thus, there was significant improvement in subjects who underwent conventional therapy and hydrotherapy.

CONCLUSION

Present study concluded that both conventional therapy and hydrotherapy group showed significant relief of pain, hydrotherapy being faster in relieving pain. It showed extremely significant improvement in relieving pain, reducing functional disability statistically and clinically and thus facilitated the outcomes.

Ethics Committee Permission: Taken from Institutional Ethics Committee of Krishna Institute of Medical Science deemed to be University, Karad, Maharashtra, India

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Conflict of Interest: Nil

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An Observational Study to Predict the Risk of Stroke in Post-Menopausal Women Using Hs-CRP and Qstroke

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ABSTRACT

Background: The incidence of stroke has rapidly increased in the past decade and is expected to increase in the coming decade. The rehabilitation of stroke is laboriously elaborate and burdensome for the individual and the community, leaving residual problems. The best option for managing stroke will be prevention by early identification and prediction of those at high risk. Women in post-menopausal period have more risk of stroke and more disability as compared to men. Thus, screening of post- menopausal women is needed.

Objective: This study was intended to predict the risk of stroke in post-menopausal women.

Method: This study is a cross-sectional study where 65 women were recruited after screening for inclusion and exclusion criteria. The study participants were tested for Hs-CRP and an online software of Qstroke. Values were noted and results were analysed.

Measurement Tools: Biochemical Marker (High-sensitivity CRP), Qstroke Algorithm

Results: There was positive correlation between BMI and Hs-CRP levels (p=0.0001), and also between age and Qstroke scores (p=0.0001). No correlation was observed in Hs-CRP and Qstroke scores (p=0.5987)

Conclusion: Post-menopausal women might have an increased risk of developing stroke and the risk can be predicted well before the appearance of stroke by using Hs-CRP and Qstroke.

Keywords: *menopause, stroke, Hs-CRP, Qstroke*

INTRODUCTION

The World Health Organisation defines stroke as, "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin."[1] About 16.9 million people suffer from stroke every year.[2] The prevalence of stroke in India was estimated to be 203 per 100,000 population above 20 years of age.[3] It has been predicted that this incidence will keep rising in the upcoming years.[4] The incidence and prevalence of stroke differ with age, gender and ethnic origin.

Even though the age specific incidence of stroke is higher in men than in women, stroke affects a greater number of female population and longer life expectancy and the fact that stroke rates increase in older age groups.[5] However, National Health and Nutrition Examination Survey(NHANES) has shown a higher prevalence of stroke in women in midlife as compared to men. Women between 45 to 54 years of age had higher odds of stroke versus male counterparts of the same age.[6] Also, post stroke women were found to be more disabled in their daily activities than men.[7] The rehabilitation of stroke is laboriously elaborate and burdensome for the individual and the community, leaving residual problems. The best option for managing stroke would be prevention by early identification and prediction of those at high risk.

Menopause is defined as amenorrhea or absence of menses for 12 consecutive months. Studies have shown that premenopausal women are protected from stroke than male counterparts of the same age because of which exposure to endogenous estrogen is hypothesized to be a protector of stroke in women.[8]

High sensitive CRP (Hs-CRP) is an inflammatory bio-chemical marker and is used as an independent risk factor for occurrence of future stroke event.[9] QStroke is a newly developed and validated algorithm to predict the risk of stroke. It also provides accurate measures

of absolute stroke risk in general population or healthy individuals who are free from stroke. [10] However, there is no literature for predicting stroke risk in post-menopausal women using Hs-CRP and Qstroke.

Thus, the objective of this study was to predict the risk of stroke in post-menopausal women by using Hs-CRP and Qstroke.

METHOD

Participants: After the study was approved by Institutional Ethical Committee, the participants were screened for their inclusion and exclusion criteria. This cross-sectional study was conducted on apparently healthy post-menopausal women in Belagavi city. A house to house screening of 124 post-menopausal women was done of which 65 women who had achieved menopause through natural way were recruited in this study. Exclusion criteria of the study included hysterectomy females, or women on Hormone Replacement Therapy, women with a history of hypertension, diabetes mellitus, previous stroke or cardio vascular events, inflammatory conditions like osteo-arthritis, rheumatoid arthritis or pelvic inflammatory disease. These conditions were excluded because these females may already have higher levels of Hs-CRP and may bias the results. After the recruitment, biochemical marker serum Hs-CRP was assessed through a blood test and later the Qstroke algorithm was used to predict the percent risk of stroke in these women.

Measurement Tools:

Serum Hs-CRP: It is an inflammatory biochemical marker. Level of Hs-CRP predicts the risk of stroke event.

- Low risk: less than 1.0 mg/L
- Average risk: 1.0 to 3.0 mg/L
- High risk: above 3.0 mg/L

Q stroke: Q Stroke is software algorithm to predict the risk of stroke. It predicts the percent risk of developing stroke in next 10 years.

DATA ANALYSIS

Karl Pearson correlation coefficient method was used to assess correlation between age and BMI with Hs-CRP, and Qstroke scores. Statistical significance was defined at 5% level and analyses were carried out using IBM SPSS software, version 19.

RESULTS

Mean values of all the data parameters was calculated.

Table 1

Data	Mean Value with Standard Deviation
Age	52.5 ± 5.365
BMI	26.02 ± 3.315
Hs-CRP	3.512 ± 2.087
Q-Stroke (%)	1.275 ± 0.72

Mean age of the women undertaken for the study was found to be 52.5. The calculated mean value for the BMI scores was 26.02. The mean values of the outcome measures were also calculated. Mean value of Hs-CRP was 3.152 and that for Qstroke percent risk was 1.275.

Table 2: Association between age groups with status of risk

Age groups	Low risk	%	Moderate risk	%	High risk	%	Total	%
<=45yrs	0	0.00	2	28.57	5	71.43	7	10.77
46-50yrs	2	14.29	4	28.57	8	57.14	14	21.54
51-55yrs	2	8.00	10	40.00	13	52.00	25	38.46
>=56yrs	3	15.79	5	26.32	11	57.89	19	29.23
Total	7	10.77	21	32.31	37	56.92	65	100.00
Chi-square=2.6656, p=0.8495								

Table 2 shows association between age and the status of risk. Higher risk of stroke was associated with age groups below 45 years of age and above 56 years of age.

Table 3: Correlation between age and BMI with Hs-CRP scores and Qstroke scores by Karl Pearson's correlation coefficient method. A p value of <0.05 was considered as significant

Variables	Hs-CRP		Qstroke	
	t-value	p-value	t-value	p-value
Age in years	0.2886	0.7739	18.091	0.0001*
BMI	6.0182	0.0001*	-0.2287	0.8199

There was no correlation found between age and Hs-CRP scores (p=0.7739). However, significant positive correlation was found between BMI and Hs-CRP scores (p=0.0001)

Also, there was significant positive correlation between age and Qstroke scores (p=0.0001) however, no significant correlation was found between BMI and Qstroke scores (p=0.8199)

Table 4: Correlation between Hs-CRP scores with Q stroke (%) scores by Karl Pearson's correlation coefficient method

Variables	Correlation between Hs-CRP scores with	
	t-value	p-value
Q stroke (%) scores	-0.5289	0.5987

There was no correlation found between Hs-CRP and Qstroke values (p=0.5987)

DISCUSSION

The present cross-sectional study aimed to predict the risk of stroke in post-menopausal women wherein Hs-CRP and Qstroke outcome scales were used as stroke risk predictors.

The mean age of post-menopausal women undertaken for this study was found to be 52.5 (S.D= 5.365) as the menopausal age usually ranges between 40 to 60 years.[8]

The mean BMI was 26.02(S.D= 3.315) which indicates overweight and obesity. The probable reason for this is the increased fatness and increased levels of physical inactivity seen in midlife and menopausal period.[11] The mean Hs-CRP value was 3.512 (S.D=2.087). Values above 3.0 mg/L are considered to be high risk of stroke. Presence of other risk factors like cholesterol levels, triglyceride levels will have an influence on hs-CRP value. Also, physical inactivity increases adipose tissue. Adipose tissue secretes hs-CRP and thereby increases the level in blood.[12]

The mean Qstroke percentage was found to be 1.275(S.D=0.72) which is considerably on the lower side. Qstroke algorithm values are influenced by history of Hypertension, Diabetes and previous history of stroke events as well. As the present study was carried out on healthy population without any other history or co-morbid conditions, the Qstroke value was lower.

Association of age with status of risk was studied which shows 71% of the women under 45 years of age were at high risk, 28% were at moderate risk and 0% were at low risk i.e. women who achieved early menopause were found to be at a higher risk. Early or premature menopause occurs due to early ovarian insufficiency.[13] Due to the estrogen associated with menopause, women who attained early menopause will have reduced lifetime exposure to endogenous estrogen, thereby increasing their risk.[14]

A previous study revealed similar findings as of present study concluding that premature menopause can be an independent risk factor of stroke.[13] However, another study done by Bjarne Jacobsen et al found no correlation between age of menopause and stroke.[15]

Also, it was seen that the high risk value reduced in 46-50 and 51-55 age group whereas moderate and low risk values also changed. The reason for this might be the pattern of estrogen decline that it reduces rapidly for a year and then attains a plateau after 1 to 3 years.[16] The risk again increased in more than 56 years age group which may have aging factors associated.

56.92% of the total women undertaken in this study were found to be at high risk, 32.31% were at moderate risk and only 10.77% were at low risk. The probable reason would be sudden decline in the hormone estrogen levels in the post-menopausal period. Estrogen has beneficial effects over cardiovascular system like vasodilatation and increased cerebral flow which thus

decreases cerebral vascular tone and increases arterial compliance. Thus estrogen provides a protective shield against stroke before menopause.[6]

Positive correlation was found between BMI scores and increased hs-CRP levels. The reason for this is the underlying pathology of obesity. Additional fat tissue in the body requires more oxygen and nutrients which therefore needs blood vessels to circulate more blood to the fat tissue. This increases heart workload as it has to pump more blood through additional blood vessels. Also, obesity or increased body weight may increase heart rate and reduce body's ability to transport blood through the vessels.[17] Also, fat cells secrete several substances that have unfavourable effects on the body like increased inflammation, hardening of arteries and blood clotting.[18] As hs-CRP is an inflammatory marker, this correlation was found to be positive. No correlation was found between age and hs-CRP levels. This might be due to exclusion of all the age related inflammatory conditions which might have shown higher hs-CRP levels.

Correlation between Qstroke scores with age was found to be positive. Aging leads to structural and functional changes in the blood vessel walls, leading to increased arterial wall stiffness and decreased vascular distensibility.[19] This can cause increased heart work load and reduced cerebral blood flow. Thus, Qstroke scores will increase with increase in age and so will the stroke risk. No correlation was found between BMI and Qstroke scores. As BMI or obesity is associated with other risk factors like cholesterol and triglyceride levels, these factors are independent of age factor and can be present in any age group. This might be the probable reason of no correlation between the two variables.

Lastly, there was no correlation between the Hs-CRP and Qstroke scores. The reason for this might be that both the outcome measures predicts stroke risk taking into account different factors.

There was a study done by Dibyaratna Patgiri et al which used Hs-CRP as a novel marker for determining stroke risk which concluded that the rise in Hs-CRP levels can be identified well before the stroke event to be used as a predictor of stroke risk.[9]

A study done by Julia Hippisley-Cox et al for derivation and validation of Qstroke algorithm shows that it is a valid measure of absolute stroke risk in the general population of patients free of stroke.[10]

Therefore, both Hs-CRP and Qstroke can be used as stroke risk predictors in post-menopausal women as well because both are reliable and proved to be valid in previous studies.

Limitations: This cross-sectional study was conducted on a small sample size.

Scope: Similar studies with higher study population can be undertaken for more accurate results. Women predicted with high stroke risk can be explained about the lifestyle modifications that need to be done in order to avoid the stroke event. Also, obese women can be given exercises or an aerobic training program for reduction in obesity and further reducing the chances of getting stroke. Hs-CRP levels and Qstroke scores can be used as follow up records to compare previous reports which will be useful for the study population as feedback.

CONCLUSION

Post-menopausal women may have increased risk of stroke and this risk can be predicted using serum Hs-CRP levels or by using Qstroke algorithm.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from Institutional Ethical Committee, KAHER

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Effect of Stretching & Strengthening of Cervical Muscles on Neck Mobility of Lower Cervical Facet Syndrome-A Single System Design

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ABSTRACT

Objective: To examine the effectiveness of stretching and strengthening of cervical muscles on neck mobility of lower cervical facet syndrome.

Design: A single system design

Setting: Outpatient clinic.

Participant: A 65 years old male, surgeon by profession, with neck stiffness (C5 to C7 Facet joint Fusion) and pain on neck extension.

Intervention: Neck mobility exercises, stretching and strengthening exercises.

Main Outcome Measure: Neck Disability Index.

Results: The NDI and NRS scores remarkably indicated that strengthening and stretching of cervical muscles was helpful.

Conclusions: cervical stretching, strengthening and isometrics of neck helped a lot in relieving the patient of the symptoms and making his quality of life better.

Combination physiotherapy showed remarkable improvements as compared to only NSAIDS.

Keywords: *Neck pain, Stretching, Strengthening, neck disability index, cervical facet joint syndrome.*

INTRODUCTION

Neck pain is the most common public health problem which affects both personal health and overall wellbeing of an individual[1]. In 1933, Ghormley coined the term facet syndrome to describe a constellation of symptoms associated with degenerative changes of the lumbar spine[2].

55% of facet syndrome cases occur in cervical vertebrae, and 31% in lumbar. This includes all the structures that are a part of the facet joint such as the fibrous capsule, synovial membrane, hyaline cartilage and bone[3]. The prevalence of cervical facet joint pain may be as low as 26% or as high as 65%, depending on how aggressively it is sought[4] .Neck pain due to cervical facet joint involvement is known as cervical facet disease or Cervical Osteoarthritis or Cervical Facet Syndrome. It is a structural deterioration of one or more of vertebral facet joints in cervical segment, usually upper cervical segment. It is more common in elderly and often lead to chronic neck pain is left untreated. It can also occur due to traumatic injuries which further accelerates the degeneration process. It is also common with athletes involved in high impact repetitive motion in sports like baseball, football, golf, wrestling and gymnastics. The natural ageing process being the largest contributor for Facet syndrome.

With age the layer of cartilage covering the facet joint in the cervical vertebra begins to deteriorate, facet joint bones begin to rub against each other causing inflammation. This inflammation further triggers the development of osteophytes or bone spurs, that develop near the damaged facet joints; in an attempt to stabilise a weakened spine. These osteophytes can compress or

irritate the nerve roots or spinal cord near the facet joints. This compression would produce further symptoms like pain, tingling, numbness and muscle weakness.

Facet joint osteoarthritis (FJOA) is intimately linked to the distinct but functionally related condition of degenerative disc disease, which affects structures in the anterior aspect of the vertebral column. FJOA and degenerative disc disease are both thought to be common causes of back and neck pain, which in turn have an enormous impact on the health-care systems and economies[5]. Facet joints have been shown capable of causing pain in the neck, upper and mid back, and low back with pain referred to the head or upper extremity, chest wall, and lower extremity in normal volunteers[6,7,8].

Most often patient complaints of pain on cervical extension or rotation.

The most common symptoms are- Neck and shoulder Pain, tenderness in the neck region, headaches, difficulty in bending, twisting or bearing heavy loads, decreased flexibility & range of motion of neck, sensation of creaking and popping, stiffness , particularly more in the morning ,muscle fatigue in neck, shoulder and arm, ringing in the ears.

We undertook a single case study of neck pain & stiffness and managed him with physiotherapy measures like stretching & strengthening exercises for the neck pain.

METHOD

Participant: The subject was a 65 years old man whose chief complaint was neck pain, decreased neck flexion and overall decrease in neck ROM. He also complained of neck pain on neck extension. He is a surgeon by profession, usually spends lot of time in using the computer for academic purposes and had developed a forward head posture. He is myopic and has started developing cataract.

He complained of neck pain since past 6 months before he come to us for treatment. His pain further aggravated on computer use for more than 30 minutes. He was unable to touch his chest with his chin. On neck extension he felt pain on facet joints.

Before starting the treatment we advised him to get a plain radiograph before starting the treatment. We saw that the lower cervical vertebrae (C5,C6 & C7) are fused posteriorly at the facet joints and there is literally no movement happening at the lower cervical region on assessment.

However there are osteophytes on the anterior margins of vertebral bodies and no complaints of neural involvement like impingement and impaired sensation on examination.

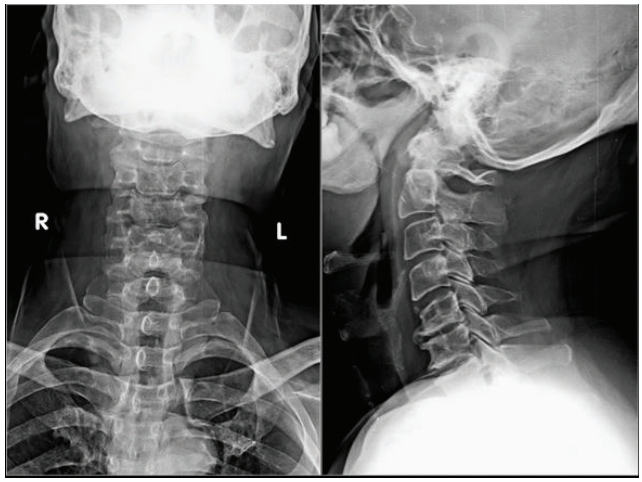

Figure 1: Radiograph of cervical vertebra

STUDY MEASURES

Neck Disability Index: The NDI is a modification of the Oswestry Low Back Pain Disability Index. It is a patient-completed, condition-specific functional status questionnaire with 10 items including pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. The NDI has sufficient support and usefulness to retain its current status as the most commonly used self-report measure for neck pain[9]. The NDI can be scored as a raw score[10] or doubled and expressed as a percent [11]. Each section is scored on a 0 to 5 rating scale, in which zero means 'No pain' and 5 means 'Worst imaginable pain'. Al the points can be summed to a total score. The test can be interpreted as a raw score, with a maximum score of 50, or as a percentage.

0 points or 0% means: no activity limitations, 50 points or 100% means complete activity limitation.

A higher score indicates more patient-rated disability. There is no statement in the original literature on how to handle missing data. To use the NDI for patient decisions, a clinically important change was calculated as 5 points, with a sensitivity of 0.78 and a specificity of 0.80[12].

Mean duration of the test: 3 to 7.8 minutes[9]

Some benchmarks can be found in literature but methodologically they were not described and their validity and reliability are questionable Vernon and Moir presented the following interpretation:[9]

0-4points (0-8%) no disability,

5-14points (10 – 28%) mild disability,

15-24points (30-48%) moderate disability,

25-34points (50- 64%) severe disability,

35-50points (70-100%) complete disability

PROCEDURE

The subject was assessed, the base line scores of Neck Disability index was noted. As pain was preventing from performing neck movements, he was advised for NSAIDS for 1 week. After which he was again assessed and his scores were recorded.

As the pain was under control, he was given Physiotherapy regimen, which was a combination therapy. The physiotherapy regimen included neck mobility exercises, self neck stretches and neck isometric strengthening exercises.

Neck Mobility exercises include: Cervical flexion, extension, side flexion and rotation of available ROM are performed. Each exercise was performed 2 times a day for 10 repetitions.

Self-neck stretches – which include cervical extensor stretching, stretching of trapezius, stretching of sternocleidomastoid muscle. Each of the exercise was performed 2 times a day for 5 repetitions.

Isometric strengthening exercise for neck- chins tucking in exercise (neck retraction exercises), isometric exercises for cervical flexors, extensors and side flexors. The hold time for these isometric exercises were for 5 seconds during each exercise. These exercises were performed 2 times a day for 10 repetitions.

He was taught the exercises in the physiotherapy department. And his Neck disability index was measured every week after post-physiotherapy treatment. The combination physiotherapy regimen was continued for 5 weeks.

DATA ANALYSIS

Results of each clinical evaluation are presented in time series design. Baseline measurements were taken at 0 week, after which NSAIDS were given for 1 week. The patient was assessed and after that combination physiotherapy was given for a total duration of 5 weeks. The NDI and NRS scores were noted after the end of each week.

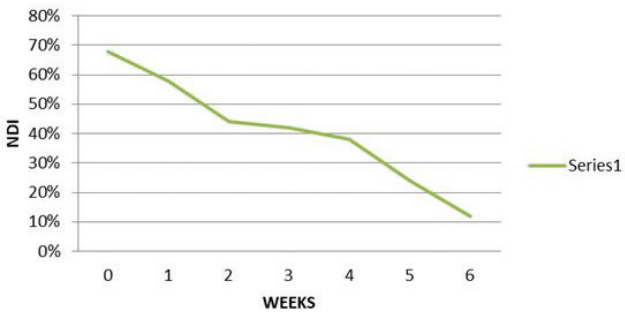

Chart-1: NDI Score pre and post intervention

RESULTS

The results of the clinical evaluation are presented in Chart 1. Each displays significant improvements. As compared to the baseline measurement when the case was presented to us, after a week of analgesics medication the improvement was 10 %.

After the pain subsided on a combination physiotherapy treatment the neck disability index scores further improved significantly by 46%. The improvement following physiotherapy treatment was significant.

DISCUSSION

It was found that neck mobility and neck disability index scores were significantly improved following combination physiotherapy after duration of 4 weeks. Neck pain is a most crippling condition which can affect our daily lives. Baseline measurements were 68%. Physiotherapy treatment could not be given as the pain was severe enough in NRS. After NSAIDs the scores came down by 10% and was 58%. Intervention was given after 1 week, as the pain subsided. At the end of each week of intervention the pain subsided gradually. Treatment continued for another 5 weeks post NSAIDS. After the end of 5 weeks of continuous physiotherapy treatment improvement was found to be by 46%.

There is lot of literature that suggests that the major protocols that can be used for neck pain should include low intensity training [13], neck mobility exercises which can be concentric exercise[14] and isometric exercises[15]. It has also been found that a regular cervical stretching program for 4 weeks can decrease neck and shoulder pain and improving quality of life in normative population with chronic moderate to severe neck pain[16].

A study by Esther Liyanage et al also showed that Neck exercises and stretching along with ergonomic intervention proved more beneficial than ergonomics alone for neck pain in computer Professionals with neck pain[17]. At the end of the session the subject's symptoms were relieved and could do his ADLs much easily.

Study Limitation: The study could have been followed up for a longer duration. Other scoring parameters can be considered. If possible the study can be conducted as an experimental study for a larger sample size.

CONCLUSIONS

It was found that with the help of analgesic as the pain subsided to a tolerable level, physiotherapy treatment was commenced. After undergoing the treatment for 4 weeks there was significant improvement in the neck disability index scores.

Ethical Clearance: Informed consent from the patient was taken.

Source of Funding: Self funding.

Conflict of Interest: Nil

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Effectiveness of Neural Tissue Mobilization in the Management of Cervicobrachial Pain in Subjects between Age Group 25-40 Years

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ABSTRACT

Background: Neck pain is a frequent and disabling complaint in general population. Roughly about two third of general population have neck pain at some point of their lives. Prevalence is high in the middle aged people. Clinically, patients with neck pain usually report aggravation of their symptoms with reading. This indicates possible compromise of the neuro musculoskeletal structures of the neck.

Purpose: To find whether neural tissue mobilization could reduce pain, improve functional activity and improve ROM in patients with cervicobrachial pain.

Aim: To study the effectiveness of neural tissue mobilization in reducing pain, improving functional activity and improve cervical ROM in subjects with cervicobrachial pain. between the age group 25-40years.

Objective: To find out the effect of neural tissue mobilization in reducing pain, improving functional activity and improve cervical ROM in subjects with cervicobrachial pain.

Method: The study was conducted on 37 subjects between 25-40 yrs with cervicobrachial pain and according to the inclusion and exclusion criteria were recruited in the study. NPRS, cervical ROM and NDI was assessed pre and post treatment.

Result: P value less than 0.05 for NPRS, cervical ROM and NDI.

Conclusion: Neural tissue mobilization is effective in reducing pain, improve cervical ROM and improve functional activity in subjects with cervicobrachial pain between the age group 25-40 years.

Keywords: *Cervicobrachial pain, Neural tissue mobilization.*

INTRODUCTION

Neck pain is a frequent and disabling complaint in general population [1]. Roughly about two third of general population have neck pain at some point of their lives[2]. Prevalence is high in the middle aged people[3]. With an increasing sedentary population, the prevalence of neck pain will continue to rise[4].

The anatomical and biomechanical nature of the cervical spine encourages mobility at the cost of stability and strength. This is the reason why cervical pain and dysfunction are more common, particularly because of poor spinal posture. Reading for extended periods with poor neck posture has been considered as a risk factor for neck pain. Clinically, patients with neck pain usually report aggravation of their symptoms with reading. This indicates possible compromise of the neuro musculoskeletal structures of the neck[5-12].

Neck pain may also radiate to the regions like shoulder, head or upper arm. Many patients also complaints of stiff neck and if neck pain involves any neural component patient will experience numbness, tingling or weakness in arm, hand and fingers, known as cervicobrachial pain syndrome often associated with neural dysfunction. Such dysfunction is caused by both the physiology and mechanics of the nerves leading to patients symptoms and limited range of motion of upper extremity and cervical ROM[13].

Cervicobrachial pain is encountered commonly in the evaluation of the neck pain that may result in significant discomfort and functional limitations and disability. It is a condition caused by the compression of the nerve root in cervical spine that commonly manifests as neck pain and it may also radiate from the neck into the distribution of

the affected nerve root. It might be unilateral or bilateral. Patients with cervicobrachial pain often report neck pain; however, they most frequently seek treatment to address their arm pain. People with neck pain combined with upper extremity symptoms experience greater levels of disability than do people with neck pain alone.When the condition becomes chronic, it is likely to become persistent problem that impacts unfavourably on an individual's physical health[14]. The most recent study for the natural history of the cervicobrachial pain reported reoccurrence rate to be as high as 32%[15]. Despite of its large impact, there are no clear guidelines for the management of cervicobrachial pain.

Neural mobilization is a set of techniques designed to restore plasticity of the nervous system, it could be defined as the ability of the nerve and its associated structures to shift in relation to each other structures[16,17]. The goal of neural mobilization is to increase the flexibility of collagen that maintains the integrity of the nerve, thus improving movement or excursion of the nerve in relation to its interface[18]. Few studies with specific inclusion criteria have utilized neural tissue mobilization and demonstrated better reductions in pain with improved functional outcomes[19]. This treatment approach focuses on passive mobilization of mechanically sensitized neural tissue structures with a primary objective of restoring appropriate neurodynamics[19-24]. Neural tissue mobilization improve neurophysiological and neuromechanical functions of the peripheral nervous system[24-28]. This technique is based on the sliding principle of neural tissue excursion which consists of an alteration of combined movements of at least two joints, in which one movement causes elongation of the nerve bed hence accelerating tension in the nerve, whereas the second movement reduces the length of the nerve bed that unloads the nerve, maintaining it in its relaxed position thus diminishing intra neural pressure. This technique aim to mobilize a nerve with a minimal increase in tension and are thought to result in a larger longitudinal excursion than techniques which simply elongate the nerve bed.[29]

Aim: To study the effectiveness of neural tissue mobilization in reducing pain, improving functional activity and improve cervical ROM in subjects with cervicobrachial pain between the age group 25-40years.

Objective: To find out the effect of neural tissue mobilization in reducing pain, improving functional activity and improve cervical ROM in subjects with cervicobrachial pain.

MATERIAL AND METHOD

It was an experimental study conducted on 37 patients with cervicobrachial pain between the age group 25-40years was taken from MVP's hospital and research centre Physiotherapy OPD. Convenient sampling method was used in the study.

Materials used were:

1. Pen
2. Consent form
3. Assessment form
4. NPRS scale
5. NDI questionnaire
6. Goniometer

Inclusion Criteria:

1. Subjects with informed consent.
2. Age group of 25-40 years.
3. Both sex
4. Neck pain radiating to upperlimb (unilateral)
5. Limited cervical ROM
6. Articular dysfunction at cervical spine
7. Positive ULTT for median nerve

Exclusion Criteria:

1. Red flags for a serious spinal condition (e.g. infection, tumors, osteoporosis, spinal fracture, etc.)
2. Diagnosed central pain syndrome
3. Surgery of cervical or thoracic spine
4. Limited shoulder ROM
5. Neurological disease
6. Cervical rib
7. PIVD of cervical region
8. Bilateral radiating
9. Brachial plexus injury

PROCEDURE

Permission from The Head of Institution and approval from Institutional Ethical Committee was obtained. Subjects which were clinically diagnosed with chronic neck pain were screened according to the inclusion and exclusion criteria and informed consent was taken. Intervention was given for twice a week for 4 weeks (8 sessions)

Baseline measurement of NPRS, Neck Disability Index (finding the level of disability in patients with cervicobrachial pain) and Cervical ROM were assessed before intervention and at the end of the last day of intervention. The patients received neural tissue mobilization technique were instructed to lie supine (flat on their back). The 'sliding' technique uses movements that lengthens the median nerve bed (elbow and wrist extension alone or combined with neck lateral flexion or rotation away from the symptomatic arm). Shoulder abduction up to 90 degrees will preload the neural tissues during manual therapy techniques and nerve gliding exercises. Depression and abduction of shoulder, elbow extension, forearm supination, wrist and fingers extension and cervical spine contralateral side flexion. INTENSITY: 20-30 slow oscillation per session[30]. FREQUENCY: twice a week for four weeks. Along with it sensory TENS of frequency 4Hz and pulse duration 0.1s was given to the subjects for 15mins after the initial treatment.

Figure 1: Neural tissue mobilization for median nerve (right side)

RESULT

Table 1: Intra group comparison of Pain (NPRS), NDI and Cervical ROM

Outcome measure	Pre Rx	Post RX	t value	P value
NPRS	6.35 ± 0.82	3.14 ± 0.92	27.46	**<**0.0001
NDI	41.00 ± 7.04	24.54 ± 7.37	25.58	**<**0.0001
Cx Flexion	58.03 ± 9.62	65.27 ± 9.93	15.24	<0.0001
Cx Extension	51.11 ± 9.71	57.68 ± 10.07	10.30	<0.0001
Cx lat flex to Right	22.46 ± 7.54	28.57 ± 7.65	10.73	<0.0001
Cx lat flex to Left	23.16 ± 5.64	29.19 ± 6.62	14.11	<0.0001
Cx Rotation Right	66.43±11.69	73.16±10.70	16.81	<0.0001
Cx rotation to Left	67.57±9.95	74.22±9.26	8.77	<0.0001

Result: The Pain (NPRS), NDI scores and Cervical ranges (Cx ROM) improved significantly after treatment.

DISCUSSION

Neural Tissue Mobilization on NPRS: Selvaratnam ,Matyas in their study said that- neural mobilization causes movement of adhered nerve and dura matter with restoration of normal mechanics of surrounding connective tissue accompanied with pain reduction[31].

Cynthia L Brown, Kerry K Gilbert in their study said that during neural mobilization various physiological changes takes place within the mechanical interface of nerve and changes the intraneural mechanics. The improvement is may be due to blood flow, axonal

transport, or temperature and re-myelination of nerve may also take place. Also, there may be fluid movement in the mechanical interface with gliding movement which reduces the probability of adhesions in the nerve, which may also reduce the pain[32].

Virali R. Raval, Vinod Babu. In their study concluded that patients in group A i.e. who received neural tissue mobilization along with traction shows better results in improving NPRS and NDI compared to patients in group B or C, the effect of neural mobilization may be because Neural tissue mobilization techniques focus on restoring the ability of the nervous system to tolerate the normal compressive, friction, and tensile forces associated with daily and sport activities, the clinical assumption is that these sliding techniques result in a larger longitudinal excursion of the nerve with a minimal increase in strain on impinged or tensed nerve. Nerve sliding elongates the nerve bed which elongates the nerve, increases the nerve tension and intraneural pressure reduces the intraneural blood flow in the oedematous neuropathies. Dynamically altering intraneural pressure may result in a 'pumping action' or 'milking effect' with beneficial effects on nerve hydration as it facilitates the removal of the intra neural oedema when correctly applied and hence brings about a reduction in symptoms[33].

Neural Tissue Mobilization on NDI: Nee RJ, Butler D. Neural mobilization gives positive impact on cervical neck disability by improving intraneural circulation, which improves axoplasmic flow, hence improving neural connective tissue viscoelasticity and reducing the sensitivity of AIGS (Abnormal impulse generating sites)[34].

Cato A Basson, Aimee Stewart, in their study said that neural tissue mobilization is effective in improving NDI the reason may be. NM is said to affect the axoplasmic flow, movement of the nerve and its connective tissue improves the circulation of the nerve by alteration of the pressure in the nervous system and dispersion of intraneural oedema. NM can also decrease the excitability of dorsal horn cells. NM is an intervention that is aimed at affecting the neural structures or surrounding tissue (interface) directly or indirectly through neural mobilization. The interface can be mobilised by mobilising the tissue surrounding the nerve, along the course of the nerve[35].

Kim DG, Chung SH, Jung HB In their study concluded that there was significant difference between the pre intervention and post intervention in NPRS, NDI, ROM and deep flexor endurance in the group who received neural tissue mobilization[36]

Neural Tissue Mobilization on Cervical ROM: Kim DG, Chung SH, Jung HB In their study concluded that there was significant difference between the pre intervention and post intervention in NPRS, NDI, ROM and deep flexor endurance in the group who received neural tissue mobilization[36].

Miriam Marks, T Schottker Koinger in their study said that ROM is improved by neural tissue mobilization to a lesser extent, this may be explained by the improved gliding and sliding of neural tissue leading to reduced interference of cervical motion[37].

Jason M- in their study said that - Neural mobilization had an immediate hypoalgesic effect on C-fiber mediate pain perception via thermal pain sensitivity testing. Furthermore, Neural mobilization techniques resulted in improvements in elbow extension ROM and decreased intensity of specific sensory descriptors during neurodynamic testing.

CONCLUSION

Neural tissue mobilization is effective in reducing pain, improve ability and cervical ROM in subjects between the age group 25-40years with cervicobrachial pain.

Limitation of Study

1. No follow up was done after said duration of study hence, long term outcome of treatment technique were not evaluated.
2. Improvement in strength were not measured.
3. Home exercise program were not taught to the patients.

Conflict of Interest: None

Ethical Clearance: Yes

Disclaimers: None

Source of Funding: Self

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Gender Specific Comparison of Activity Limitation, Participation Restriction and Community Re Integration among Stroke Patients

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ABSTRACT

Background: Stroke is the second leading cause of death globally, and the human and economic consequences are profound. Although evidence indicates that gender differences in stroke risk factors are marginal, the impact of stroke has been shown to be stronger in women.

Method: In this cross-sectional study, 60 participants 30 male and 30 female who suffered from stroke were included based on inclusion and exclusion criteria. If participants agreed to participate in the study then the written informed consent was obtained. Demographic data and research question specific data were obtained.

Result: 30 Male (Mean Age : 59.13, Mean Duration : 8.98 month) & 30 Female (Mean Age : 61.43, Mean Duration : 7.48 month) were included in the study. There is significant relation between activity limitations, participation restriction, community reintegration among male and female. There is no significant difference in activity limitation, participation restriction, and community re-integration between male and female.

Conclusion: Study findings have shown that positive correlation between activity limitation, participation restriction, and community reintegration is there in both male and female participants. Gender specific difference among activity limitation and participation restriction and community integration found no significant difference between male and female.

Keywords: *Stroke, Participation Restriction, Activity Limitation, Community reintegration, Gender*

INTRODUCTION

Traditional health indicators were morbidity and mortality but the approval of the International Classification of Functioning, Disability and Health (ICF) by the World Health Assembly has given new insight to measure health. Due to which health is now explained by bio psychosocial view considering personal and environmental factors. This model focuses on Body structure, function, Activity and Participation. This conceptual model or classification not only acknowledges the dysfunction or deviation of bodily function and structure in the form of impairments, but it also encapsulates the burden of activity limitations and participation restrictions experienced by the patients in his or her unique architectural-, social- and attitudinal environment.[1]

Stroke is the second leading cause of death globally, having profound human and economic consequences and is major cause of disease burden. As per the Global Burden of Disease Report, for high-income countries stroke is the third leading cause and for low to middle-income countries stroke is t he seventh leading cause of disease burden.[2] Physical impairments, cognitive or emotional disturbances and communication disorders resulting from stroke is likely to result in affected interpersonal relations or social isolation.[3]

Although evidence indicates that gender differences in stroke risk factors are marginal,[4] the impact of stroke

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has been shown to be stronger in women. [5] It has also been noted that women tend to fare worse than men after stroke as more women are dependent on others for self-care activities than men [6]. The fact that stroke occurs later in life among women than men put them at a greater risk of functional disability and institutionalization.[7]

Activity limitations are defined as difficulties an individual may have in performance of activities. Social Participation is defined as an individual's involvement in life situations; social participation is increasingly being recognized as an important aspect of life. Social participation is a component of human functioning that reflects the complexity of a person's roles beyond the performance of activities of daily life.[8] Community reintegration is defined as the opportunity an individual has to live in the community with the already present condition (after a state of ill-health like stroke) and be valued for his/her uniqueness and abilities, like everyone else.[9]

Stroke risk factors in male and female does not vary a lot but the fact that women are likely to be affected by stroke at later age causes more functional dependency in them. Gender based work allocation in Indian society assigns more of house hold work to be managed female which is likely to have different impact of stroke in male and female survivors. Considering the gender based variations in the roles responsibilities stroke may have different impact in social participation and reintegration.

METHOD

This is the Cross sectional study included 60 stroke patients (30 male and 30 female) selected with convenient sampling based on eligibility criteria. Participant diagnosed with first ever stroke, medically stable and discharged from Hospital (Discharge duration minimum 6 weeks) were included in the study. Participants having cognitive impairment (Hindi MMSE score < 24) were excluded from the study. These participants were explained about the study and if they agreed to participate written informed consent was obtained. Demographic data were collected like age, name, gender, occupation, duration, contact number. Data Collection was done by asking information and scoring done for Barthel index, London handicap scale, functional ambulation, community reintegration questionnaire. This evaluation took around 25 to 30 min with each participant.

Activity limitation in the study is measured on Barthel index which is used to measure activities of daily living and is having good reliability, validity and adequate responsiveness to assess activity of daily living among stroke patients [10] and is found appropriate outcome measure for stroke trials and practice.[11] It consists of 10 items feeding, bathing, grooming, bowel, bladder, transfer, mobility, toilet use, stairs .Total score is 100.The patient were graded according to the level of activity limitation. 0 indicates unable to perform the activity independently while10 indicates able to perform the activity independently.

Participation restriction in the study is measured on London Handicap Scale, which consists of 6 parameters mobility, physical activities, occupation, social integration, orientation, economic self-sufficiency .The findings were graded according to the disadvantage as no, mild, minimal, moderate, severe, very severe .The sum of all the 6 parameters plus 0.456 gives the final value. Minimum scale value is 0 which indicates total disability and Maximum scale value is 1.00 which indicates normal function. [12]

Community Integration Questionnaire is used to find community re integration in the study. This questionnaire consists of 3 component home integration, social integration, and integration of productive activities .The total score is obtained by summation of all the three components. The highest CIQ score for working participant is 29.The highest CIQ score for retired participant is 28. In this questionnaire, Total Home Integration score is 10; Social Integration score is12; Integration into Productive Activities score for working participant is 7 and for retired participant it is 6.[13]

RESULTS

Spearman Rank Order correlation was used to find association between activity limitation, participation restriction and community integration among male and female stroke patients. Mann whitney test was used to compare activity limitation, participation restriction and community integration among male and female stroke patients.

The study included 60 stroke patients matching the eligibility criteria. 30 Male (Mean Age of 59.13, Mean Stroke Duration of 8.98 month) and 30 Female (Mean Age of 61.43, Mean Stroke Duration of 7.48 month) were included in the study. Demographic details of the study participants are shown in below mentioned Table 1

Table 1: Demographic details

Gender	Numbers	Mean Age
Male	30	59.13
Female	30	61.43

Association between activity limitation, participation restriction and community integration among male and female stroke patients is shown in Table 2.

Table 2: Component Correlation

Gender	Component	r-value	p- value
MALE	BI-CIQ	0.3892	0.0335
	BI-LHS	0.3559	0.0536
	LHS-CIQ	0.3964	0.0301
FEMALE	BI-CIQ	0.4235	0.0197
	BI-LHS	0.4983	0.0051
	LHS-CIQ	0.6423	0.0001

While seeing the correlation among the different components in male stroke patients activity limitation (BI) score is significantly and positively correlated with and community integration (CIQ) score (r-value=0.3892 and p– value=0.0335) and participation restriction (LHS) score (r-value=0.3559 and p-value=0.0536) community integration (CIQ) score is significantly and positively correlated with participation restriction(LHS) score (r-value=0.3964 and p-value=0.0301). Seeing the level of correlation as shown in table 2 all the parameters are showing moderate correlation (r< 0.5) in male.

The correlation among the different components in female stroke patients significant positive correlation is found in between activity limitation and community integration (r-value=0.4235 and p– value=0.0197) and activity limitation and participation restriction (r-value=0.4983 and p-value=0.0051) and between community integration and participation restriction which is significant (r-value=0.6423 and p-value=0.0001)

Seeing the level of correlation as shown in table 2 only Social participation and community integration in female is showing strong correlation (r = 0.6423) but rest other parameters are showing moderate correlation (r< 0.5) in female stroke patients.

Table 3: Gender specific difference

Scale	Mean (male)	Mean (female)	z-value	p-value
BI	72	65.66	-1.736	0.083
CIQ	5.467	5.333	-0.666	0.5
LHS	0.701	0.75	-1.45	0.147

Activity limitation (Barthel Index) score among male was 72 + 15.29 (mean + SD) and for female was 65.66 + 15.46 (mean + SD) with non significant difference between male and female stroke patients (r- value -1.736=and p-value=0.083). Community Integration (Community Integration Questionnaire) score for male was 5.467 + 2.315 (mean + SD) and for female =5.333 + 2.139 (mean + SD) with non-significant difference between male and female stroke patients (r-value=-0.666 and p-value=0.5).

Participation restriction (London Handicap Scale) score for male was 0.7010 + 0.1310 (mean + SD) and for female was0.75 + 0.1150(mean + SD) with non-significant difference between male and female stroke patients (r-value=-1.450 and p-value =0.147)

Thus although in our study male stroke patient had less activity limitation and better community integration compared to female stroke patients, while female had less participation restriction compared to male stroke patients there is no significance difference Activity limitation, Participation restriction, Community Integration was found between male and female stroke patients

DISCUSSION

Data Analysis in the study has found positive correlation between activity limitation, participation restriction, and community reintegration in both male and female participants. This means that less activity limitation shows less participation restriction and better community reintegration. These findings are line with finding of study done by Hamzat et al which shown a significant correlation was observed between functional ability and each community reintegration and participation restriction in female stroke survivors of Ibadan.[14] In our study strong correlation between participation restriction and community integration has been found in female stroke patients but in male patient moderate correlation between participation restriction and community integration has been found. Activity limitation has shown moderate correlation with participation restriction and community integration in both male and female stroke survivors which is indicating participation restriction and community integration is likely to be affected by not only activity limitation but other factors may also be contributing to it. The other factors as found in the study done by Jenita PC et al[15] may be age, self-esteem, depression etc.

While seeing the gender specific difference among activity limitation and participation restriction and community integration found no significant difference between male and female which is not displaying any increased affection among female participants as compared to male participants this does not support the study assumption that increased stroke-related activity limitation ,participation restriction and community integration is likely to be there in female stroke survivors as compared to male stroke survivors. This can be justified by variation in findings reported as some studies findings are suggesting that after stroke women have less favorable outcome as compared to male[16,17] while other studies are there reporting no difference in post stroke outcome between male and female.[18,19]

CONCLUSION

Study findings have shown that positive correlation between activity limitation, participation restriction, and community reintegration is there in both male and female participants. This means that less activity limitation shows less participation restriction and better community reintegration. Level of correlation in the study is mostly moderate which shows that social participation and community integration is likely to be influenced by factors other than activity limitation.

While seeing the gender specific difference among activity limitation and participation restriction and community integration found no significant difference between male and female which is not displaying any increased affection among female participants as compared to male participants.

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"Mudras"-A Traditional Boon to Dentist`s Agony

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ABSTRACT

Pain is the most commonly used word when it comes to Health. There are various branches in the field of medicine which uses invasive and non invasive techniques to help a patient to get rid of this pain. The common principles of these techniques when dealing with pain removal are suppression of pain conduction or remove the source of the pain. Among alternative medicines, "Mudras" is an age old technique from the time of Vedas and Puranas, which is non invasive. This technique uses the finger tips of both the hands to rid the body of various diseases and disorders. It is easy to practice, simple yet effective. The Field of dentistry is ever expanding to meet the needs of both the patients and the dentist in terms of newer technique and newer technologies. In spite of all the possible comforts, due to long hours of practice, the doctor/dentist may succumb to pain due to wrong posture or due to use of any position for long hours. In such cases doing yoga mudra not only relieves pain but also aids in overall well being of the person. This article gives an overview of various mudras which can be done by any person with or without any ill health for their benefit.

Keywords: *Mudra, Pain, Dentist, Musculoskeletal disorders, Ergonomics.*

INTRODUCTION

Health is most important in this world. Nothing can substitute it. Pain is a universal phenomenon experienced by young & old alike. There is no one on this earth who has not experienced it. In this fast life, pain has become an integral part of our smart life. Pain may range from mild discomfort to being very severe. Sometimes the severity of pain is such that the quality of life is compromised due to pain. Invasive & non invasive techniques are available to deal with pain. Complementary & alternative medicines refer to those practices/ therapies that help patients to recover fast, but without any scientific proof.[1]

Integrated medicines are those which are used along with conventional medicines. Some of them are light therapy, magnetic therapy, homeopathy, naturopathy, chiropractic, energy medicine, pranic healing yoga, aromatherapy, hypnotherapy, massage, osteopathy, reflexology, relaxation therapies, spiritual healing and tai chi and acupuncture.[1]

Ergonomics is the study of people`s efficiency in their environment. Literatures have shown a high prevalence of musculoskeletal disorders among dentists. The sedentary nature of work together with altered posture and lack of application of ergonomic principles can result in the imbalance of specific group of muscles.[2]

Occupational health hazards due to dental practice among dental professionals are on a continuous rise resulting in a significant negative impact on the overall quality of life. Dentists tend to assume stressful body

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positions due to work place restrictions, and to obtain better access and visibility to the operating site.[2] This leads to fatigue of the practitioner, which over a long period of time cause decline in the health of the practitioner. The 'doctor' becomes the 'patient'.

In Sanskrit mudras means "seal, mark or sign", which is physical equivalent or representation of a mantra. Mudra can be perceived as a hand posture with a specific pattern of finger configurations. Complex mudras can be constructed from simple mudras with modifications.[3]

A **Mudra/Yoga mudra** is a symbolic or ritual gesture. It is seen in Hinduism, Buddhism. While some mudras involve the entire body, most are performed with the hands and fingers.[1] It is used not only as a complementary medicine, but also in various dance forms like Bharatanatyam, Kathakalli, Mohiniayyam.[1]

Yoga Mudras is a non-invasive technique which is beneficial to anyone willing to practice it. The main principle behind the 'Yoga Mudras' is that the body is comprised of 'Panchabhoota' namely, Agni, Vayu, Akasha, Prithvi, Varuna/Jala. Any disturbance or imbalance in these will lead to ill health. [4] By manipulating these 5 elements (energies) with the use of fingers, we can bring back the balance. This technique uses the tips of fingers & can be done at anytime of the day.

Each of our fingers represents the 5 elements: Thumb symbolizes fire/Agni, fore finger symbolizes air/ vayu, the middle finger for space/ akasha, ring finger for earth/prithvi and little or small finger symbolizes jala/ water [4,5,6]

Some of the disorders are due to increase / decrease in any of the elements. Of these elements, Agni is the 'Adhipathi'. It is said that agni influences the other elements. By placing any of the fingers at the base of the thumb, that particular element decreases. To increase any element, the thumb is placed at the base of the particular finger. At the end of the day, the mudras should be concluded by 'Prana mudra'. There are few mudras which need to be performed every day for at least 10 minutes to maintain vital health. Ideally both hands must be used for mudras. They are Gnana, Prithvi, Apana, Prana, Shoonya vayu, Dhyana mudras. [4]

If the right half of the body is in pain, use the fingers of the left hand and vice versa to do mudra.

METHOD OF PRACTICE

The tips of the fingers should touch each other lightly. The rest of the fingers should be comfortable, as straight as possible. Mudras can be done while standing, sleeping, walking, listening to music, jogging, reading paper, watching TV. Each mudra should be practiced for at least 15 minutes. For chronic ailments, each mudra should be done for 50 minutes followed by 15 minutes of Prana mudra. If it is not possible to do the mudras at a stretch, you can split each mudras, 3 sessions of 15 minutes each followed by 15 minutes of Prana mudra.

Prana mudra is formed by placing the tips of the thumb, ring finger and little finger together, whereas the other fingers get extended. This type of mudra increases the vitality and reduces nervousness and fatigue.[5]

The following are few mudras which can be practiced in our daily life to combat pain due to work related musculoskeletal disorders.[3-10] Not only these mudras combat pain; they also help in general well being. There are various mudras practiced in dentistry (Fig 1).

Figure 1: Mudras to combat Musculoskeletal disorder

Table 1: Mudras to combat Musculoskeletal disorder

Type of Musculoskeletal Disorder	Mudras Practiced
Backache	Merudanda mudra (both hands)
	Sahaja shanka mudra
	Vayu surabhi mudra
	Prana mudra
Pain & Aches	Shoonya vayu mudra
	Vayu surabhi mudra
	Prana mudra
Headache	Apana vayu mudra
	Samana mudra(both hands)
	Namaste mudra
	Prana mudra
Joint pains	Sandhi mudra (both hands)
	Vayu mudra
	Varuna mudra
	Prana mudra
Numbness	Shoonya mudra
	Shoonya vayu mudra
	Prana mudra

CONCLUSION

Mudras can be used by people of all walks of life. It is the belief of the authors that mudras need to be experienced by each one to know the benefits. Mudras can be used for a variety of ailments. Only a few of the mudras have been given here. For exhaustive study of mudras, books are available in all languages. Internet search reveals numerous sites of alternative (or) complementary medicines. The authors have followed these mudras and have found profound benefits with varying degrees. As with any alternative, complementary medicines, it all depends on ones faith and beliefs. Never stop other medicines when doing mudras. It is a complementary therapy. Sometimes alternative therapies are beneficial when the routine therapy does not provide sufficient relief. Only when the source of pain and discomfort is identified and removed, will the person be really benefitted by mudras.

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Prevalence of Diabetic Neuropathy in Ahmednagar City using Michigan Neuropathy Screening Instrument

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ABSTRACT

Background: Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. Diabetic peripheral neuropathy is a common complication of diabetes that can cause significant morbidity and mortality.

Aims and Objectives: The aim of the study is to determine the prevalence of Diabetic Neuropathy in Urban population of Ahmednagar City.

Material and Method: Study Design is a cross-sectional study in Ahmednagar City. Study Period is from October 2017 to March 2018. Convenient sampling was done. The patients were given a questionnaire which was to be self-administered followed by clinical examination done by the therapist.

Results: The prevalence of diabetic neuropathy among diabetics was found to be 6.25% for pure neuropathy and is 42.70% for patients with only significant clinical examination. Higher prevalence was found in patients with hypertension, hyperlipidemia, chronic diabetic patients as well as obese subjects.

Keywords: *Diabetes: Prevalence, Neuropathy, Michigan Neuropathy Screening Instrument, Ahmednagar*

INTRODUCTION

Diabetes Mellitus commonly referred to as diabetes, is a group of metabolic disorders in which there are high blood sugar levels over a prolonged period.

According to WHO, the global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Also, globally an estimated 422 million adults are living with diabetes mellitus according to the latest 2016 data from the World Health Organisation.[1].

There are various complications of diabetes mellitus which involves microvascular complications like neuropathy, retinopathy, etc and macrovascular complications which involves Atherosclerosis One of the most chronic and debilitating complications of diabetes is "Diabetic Neuropathy."[2]

According to a study in Tamil Nadu by Preeti Pawde, prevalence of neuropathy among Diabetics is 33.33%. 63% of patients with higher duration of diabetes have neuropathy. This shows that higher the duration of Diabetes, higher the chances of the patient developing neuropathy[3].

Diabetic Neuropathy is a nerve damaging disorder associated with Diabetes Mellitus. Neuropathic disorder in diabetes can impair functioning of the central, peripheral and/or autonomic nervous systems. Diabetic neuropathy affects the peripheral nerves, which causes the loss of protective sensation and impairs patient's ability to perceive incipient or even apparent ulcerations in the feet. It is considered a main risk factor for amputation, and hence a significant cause of morbidity in Diabetes Mellitus[4].

Symptoms include: Trouble with balance, numbness and tingling of extremities, dysesthesia, muscle weakness, burning or electric pain, vision changes, dizziness, etc.

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Various Scoring systems for diabetic neuropathy include:

I. **NSS:** Neuropathy Symptom Score- The NSS consists of 17 items, focusing on muscle weakness, five on sensory disturbances and four on autonomic symptoms.

II. **DNE:** Diabetic Neuropathy Examination Score is a four-item symptom score for diabetic neuropathy. The DNS score has the following items: (i) unsteadiness in walking, (ii) pain, burning or aching at legs or feet, (iii) prickling sensations in legs or feet, and (iv) numbness in legs or feet.

III. **NDS:** Neuropathy Disability Score- The instrument examines cranial nerves, muscle weakness, reflexes and sensations. The scale consists of 35 items for testing left and right side of the body; score range from 0 to 4.

IV. **NIS-LL:** Neuropathy Impairment Score in Lower Limbs: The NIS-LL is a modified version of the NDS to quantify diabetic PNP. The lower limb items of the NDS are used complemented with 2 muscle power items (toe extension and toe flexion). The NIS-LL has 14 items: 8 items evaluate muscle power (0–4 points), 2 items evaluate reflexes (0–2 points), and 4 items evaluate sensory modalities (0–2 points). All items are tested on both sides. The maximum score is 88 points.

V. **MNSI:** Michigan Neuropathy Screening Instrument: The MNSI is an instrument including two parts a questionnaire including 15 questions and a foot examination. The questionnaire inquiries 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.

VI. **CE-V:** Clinical Examination Score of Valk: It is a composite scoring system for measurement of sensory signs and reflexes in the lower limb.

VII. **TSS:** Total Symptom Score: The Total Symptom Score evaluates individual neuropathy sensory symptoms in patients with diabetic peripheral neuropathy in clinical trials, with the intent of distinguishing a response to therapy.

We used Michigan Neuropathy Screening Instrument for screening of Diabetic Neuropathy. The accuracy of MNSI scoring makes it a useful screening test for diabetic neuropathy. High specificity, likelihood ratios over 5 and a moderate to good post-test probability give a high diagnostic impact for MNSI scoring. It includes two separate assessments: a 15-item self-administered "yes or no" questionnaire and a lower extremity examination that includes inspection and assessment of vibratory sensation and ankle reflexes[5].

MATERIAL AND METHODOLOGY

Study Design: It was a population based cross-sectional study.

Sampling Method: The Convenient Sampling method was used.

Study Period: The study period extended from October 2017 to March 2018.

Sample Size: 96 samples were taken.

Study Setting: The present study was conducted among patients with type 2 DM admitted in Female & Male Ortho Ward, Female and Male Opthalmology Ward, Female and Male Medicine Ward, Male & Female Surgery Ward at Dr. Vitthalrao Vikhe Patil Memorial Hospital, Ahmednagar.Also door-to-door patients were taken with type 2 DM in Bhingar. Camps were also held at Vadgoan Gupta & Gulmohar Road, Ahmednagar. The study also included patients with Type 2 DM attending Dr. Bharat's Diabetic Clinic & Foot Care, Ahmednagar.

Written Informed Consent was taken from all participants.

A data collection sheet was designed which included the demographic data like Name, Age, Sex, Socio-economic Status, Body Mass Index, History of Hypertension/Hypercholestremia & Duration of Diagnosis.

Study Tool: The screening for DPN was conducted using the Michigan Neuropathy Screening Instrument. The MNSI is a validated tool for the screening of DPN. The MNSI includes two parts, the first part is related to patient's perception of symptoms in relation to DPN and the second part consists of a set of examinations done to detect the presence of DPN among the patients.

1. **Foot Inspection:** The feet were inspected for evidence of excessively dry skin, callous formation, fissures, frank ulceration or deformities.
2. **Vibration Sensation:** Vibration sensation was tested bilaterally using a 128 Hz tuning fork placed over the dorsum of the great toe on the bony prominence of the DIP joint. Patients, whose eyes are closed, were asked to indicate when they can no longer sense the vibration from the vibrating tuning fork.
3. **Muscle Stretch Reflexes:** For the reflex, the foot was passively positioned and the foot dorsiflexed slightly to obtain optimal stretch of the muscle. The Achilles tendon was percussed directly. Reinforcement was given if the response wasn't obtained.
4. **Monofilament Testing:** The filament was applied to the dorsum of the great toe midway between the nail fold and the DIP joint. The filament was applied perpendicularly and briefly, (<1 second) with an even pressure. The patient, whose eyes are closed, was asked to respond yes if he/she feels the filament.

Scoring for Michigan Neuropathy Screening Instrument

a. **History:** Responses were added to obtain the total score. Responses of "yes" to items 1-3, 5-6, 8-9, 11-12, 14-15 was each counted as one point. A "no" response on items 7 and 13 was counted as 1 point. Item #4 and item #10 were not included in scoring.

b. **Physical Assessment:** Vibration Sensation: Vibration was scored as 1) present if the examiner senses the vibration on his or her finger for < 10 seconds, 2) reduced if sensed for ≥ 10 or 3) absent (no vibration detection.)

Muscle Stretch Reflexes: If the reflex is obtained, it was graded as present. If the reflex was absent, the patient was asked to perform the Jendrassic maneuve, if the reflexes elicited with the Jendrassic maneuver alone were designated "present with reinforcement." If the reflex was absent, even in the face of the Jendrassic maneuver, the reflex was considered absent.

Monofilment Testing: The patient, whose eyes are closed, were asked to respond yes if he/she feels the filament. Eight correct responses out of 10 applications was considered normal: one to seven correct responses indicates reduced sensation and no correct answers translates into absent sensation.

After summing up all the components if the overall score was found to be ≥2.5, then it was considered to be positive for the presence of DPN.

RESULTS

The prevalence of diabetic neuropathy in diabetic patient in Ahmednagar City is 6.25% for patients with questionnaire score>7 & physical assessment score >2 and is 42.70% for patients with only physical assessment score >2.

A. Patients with Questionnaire score>7 & physical assessment >2.

B. Patients with only physical assessment score>2.

Table 1

Prevalence of Diabetic Neuropathy in				Total
Males n = 44		Females n = 52		96
A	B	A	B	
2.08%	23.95%	4.16%	18.75%	

The prevalence of diabetic neuropathy in Males is 2.08% (A) & 23.59%(B) whereas for females it is 4.16% (A) & 18.75%(B).

Table 2

Prevalence of Diabetic Neuropathy in				Total
Acute Subjects (<6 months) n = 11		Chronic Subjects (>6 months) n = 85		96
A	B	A	B	
0	4.16%	6.25%	38.54%	

The prevalence of diabetic neuropathy in acute subjects is 0%(A) & 4.16%(B) whereas for chronic subjects is 6.25%(A) & 38.54%(B).

Table 3

Prevalence of Diabetic Neuropathy in Hypertensive Subjects		Total
A (n = 5)	B (n = 19)	40
12.5%	47.5%	

The prevalence of diabetic neuropathy in Hypertensive subjects is 12.5% (A) & 47.5%(B).

Table 4

Prevalence of Diabetic Neuropathy in Hypercholestremia Subjects		Total
A (n = 1)	B (n = 1)	2
50%	50%	

The prevalence of diabetic neuropathy in hypercholestremia subjects is 50% (A) & 50% (B).

Table 5

Prevalence of Diabetic Neuropathy in Obese Subjects		Total
A(n = 3)	B (n = 11)	22
13.63%	50%	

The prevalence of diabetic neuropathy in obese subjects is 13.63% (A) & 50%(B).

Table 6

Prevalence of Diabetic Neuropathy In subjects with Low Socio-economic Status		Total
A (n = 0)	B (n = 5)	24
0	20.83%	

The prevalence of diabetic neuropathy in subjects with low socio-economic status is 0(A) and 20.83%(B).

DISCUSSION

The present study was conducted to determine the prevalence of diabetic neuropathy in Ahmednagar city. The present study reported the prevalence rate of diabetic neuropathy to be 6.25% with self-administered questionnaire score >7 and physical assessment score >2 using the Michigan Neuropathy Screening Instrument which correlates with the findings of a study done in Manglore[6].

The difference in prevalence rates using two methods is an important finding and it clearly demonstrates the limitations related to patient's self-perception of symptoms of DPN.

The prevalence of diabetic neuropathy was 50% more in women as compared to men with pure neuropathy which correlates with study done in Middle East.[7] whereas it was higher in men as compared to women with physical examination indicating neuropathy and the questionnaire score was less than 7. The reason for this prevalence is not clear. It might be due to less awareness of men of their symptoms regarding neuropathy or it may be due to less involvement of the male subjects in the study due to random sampling.

Also, the prevalence of diabetic neuropathy in acute subjects is nil whereas for subjects having diabetes for more than 6 months have higher prevalence of pure neuropathy as well as neuropathy with physical assessment score>2. It correlates with the study conducted in Iran as well as in South India[8,9] Also, a study conducted in Portugese concludes that Seventy-two (80%) patients had symptoms of polyneuropathy, but DPN was present only in 29 (32.2%). Calluses (37.8%) and trophic skin (74.4%) and nail (75.6%) changes were found in both feet. There was a significant positive association of DPN with age, disease duration, feet skin changes and myocardial infarction/ischemia[10].

The prevalence of pure neuropathy in hypertensive subjects is 12.5% and for neuropathy with only physical assessment score>2 was 47.5% which indicates that hypertension is a risk factor for developing neuropathy It is in conjunction with the study conducted in European countries which states that associations have been identified from this study – namely with elevated diastolic blood pressure ($p < 0.05$), the presence of severe ketoacidosis ($p < 0.001$), an increase in the levels of fasting triglyceride ($p < 0.001$), and the presence of microalbuminuria ($p < 0.01$).[11]

The prevalence of Diabetic Neuropathy in patients with hypercholestremia was found to be 50%. This result is supported by a study conducted in Pittsburg.[12] No significant data was found relating the two. But the most probable reason may be lack of exercise, excessive and unhealthy eating habits of the subjects and a higher percentage of prevalence maybe due to lack of subjects suffering from hypercholestremias well as the presence of macrovascular complications.

The prevalence of diabetic neuropathy in obese patients was found to be 13.63% in pure neuropathic patients whereas it is 50% for patients whose physical assessment score was more than 2. This is supported by a study which concludes that Duration of diabetes

(p less than 0.001), age (p less than 0.05), and ethanol use (p less than 0.05) were also associated. These data strongly suggest that body stature is a major risk factor for diabetic sensory neuropathy.[13]

The prevalence of diabetic neuropathy in low socio -economic status was found to be 20.83%. The reason for this is lack of awareness regarding diabetic neuropathy. Lack of nutrition, proper medical care and less awareness about DPN has contributed to a prevalence of 20% of diabetic neuropathy. The similar result was shown by a study conducted in Sri Lanka.[14]

The limitation of the study was since most of the study was conducted in the community it wasn't possible to administer NCV tests. Another limitation was that the prevalence of diabetic neuropathy was not separately found in diabetic patients who didn't suffer from hypertension, hypercholestremia, patients with normal BMI & with a good socio-economic status. Also the patients weren't asked about medications for DM, hypertension or hypercholestremia.

CONCLUSION

Diabetic Neuropathy is a nerve damaging disorder associated with Diabetes Mellitus. Thus, the study concluded that there is moderate prevalence of diabetic neuropathy amongst diabetic people in Ahmednagar City and more and more awareness is necessary to reduce the chances of disability. It also concluded that there is a high prevalence of diabetic neuropathy in females, people with chronic diabetes, hypertensive, suffering from hypercholestremia, obese and with a low socio-economic status. Control of the blood glucose level, modification of lifestyle, physical activity and diet play a major role in reducing the risk of diabetic neuropathy.

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Heart Rate Recovery after 6 Minute Walk Test in Normal Healthy Individuals

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ABSTRACT

Background: Heart rate recovery after graded exercise is one of the commonly used techniques that reflects the autonomic activity and predicts cardiovascular events and mortality, not only in cardiovascular system disorders, but also in various systemic disorders. Hence, this study was taken up to provide a normative data for heart rate recovery after submaximal exercise in normal healthy individuals so that patients with mild affection can be identified at much early stage.

Material and Methodology: In this cross sectional analytical study 100 patients in the age group of 40-60 years were included and divided age and gender wise in a group of 25(40-50years & 51-60years) and 50(40-60F&M) respectively. Subjects with visual ailments, any cardio vascular or respiratory disease, fractures or neurological problems which may interfere with the walking ability were excluded from the study. The ethical clearance was obtained from IEC of DVVPF's COPT for study. After ethical clearance, a written informed consent was obtained from participants, the whole procedure was explained and human activity profile questionnaire was filled by the patients.

Result: The mean of all the parameters was calculated and then the distance walked was correlated with all the parameters to determine its significance through nonparametric correlation in age wise and gender wise classification. When the means of the HRR1 were compared in the age group of **40-50F (6.24±2.818) & 51-60F (9.32±3.827)** the p value was found to be 0.0022 which was considered very significant. Also, when the distance was correlated with the HRR1 in the age group of **40-60F, the p value (0.0472)** was found to be significant.

Conclusion: It is concluded that there was a significant relationship between the distance covered and the HRR1 in the age group of 40-60 years of females.

Keywords: *6MWT, HRR, Distance, HRR1, HRR3*

INTRODUCTION

Heart rate recovery is the speed at which your heart rate returns to normal after exercise, can indicate physical cardiac condition and risk of certain diseases. [1]It is concluded that post exertion heart rate recovery is closely related to the vagal tone modulation and thus its abnormality is a simple and reliable tool to assess decrease of vagal activity.[2] According to **the New England Journal of Medicine**, people whose heart rate recovery time is long are at a higher risk of death than people with shorter recovery times regardless of physical condition or other risk factors.[1] According to **the National Emergency Medicine Association**, measuring heart rate recovery rates is one way to tell whether an exercise program is effective.[1] The failure of the heart rate to decline at 1 or 2 minutes post exercise, is associated with increased mortality.[4]Exercise training has been associated with improvement in cardiovascular capacity in older people but, whether exercise training influences HRR in older people is still unknown.

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[3] Patients suffering from various cardiovascular or respiratory conditions have a direct impact on their HRR post exercise. For instance, idiopathic pulmonary fibrosis(IPF) is a severe, progressive fibrosing interstitial lung disease.[6]The ability to better predict outcome with exercise testing in patients with heart failure(HF) and left ventricular systolic dysfunction may prove extremely valuable in determining which patients are at increased risk.[15] A stronger heart is able to push more blood through than a weaker one, so fitter people tend to have lower heart rates.[7] Hence, HRR is a significant predictor of mortality in patients with HF and patients with LVSD and maybe useful in better determining prognosis.[15] In chronic respiratory entities abnormal autonomic cardiac response could be consequence of a lower parasympathetic activation and/or increased sympathetic tone, being widely accepted that parasympathetic activations plays a protective role.[5]

Six minute walk test(6MWT) is a simple, submaximal and objective measurement of functional capacity. The time-distance walk was first introduced by Balke in 1960's as a straightforward and objective measure of functional capacity.[8] The test simply required a patient to walk as far as they could in a set period of time with the primary outcome measure being the total distanced walked in the time allotted.[8] Cooper modified it into a 12 minute walk test.[9] In 1892 Butland and colleagues compared 2, 6, and 12 minute walk test and determined that the 6 minute walk test is strongly correlated with 12 minute walk test.[10]In 1985 it was first introduced in patients with heart disease by Guyatt et al.[11] The 6MWT is often used at the beginning of the rehabilitation programs to determine a patient's exercise capacity and at the end to assess the degree of improvement.[12]As aerobic fitness improves for the person, the HRR must also improve.

The strongest indication for the 6MWT is measuring the response to medical interventions in patients with moderate to severe heart and lung disease. In some clinical situations, the 6MWT provides information that may be a better index of the patient's ability to perform daily activities than is peak oxygen uptake. However, the limitations of the test are that it does not determine peak oxygen uptake, diagnose the cause of dyspnea on exertion, or evaluate the causes or mechanisms of exercise limitation. Indications for 6MWT are as follows:

Lung transplantation[16]
Lung volume reduction surgery[17,18]
Pulmonary rehabilitation[19]
COPD[20,21]
Heart failure[22]
Cystic fibrosis[23]
Older patients[24]
Primary pulmonary hypertension[16]

Absolute contraindications for the 6MWT include the following: unstable angina during the previous month and myocardial infarction during the previous month. Whereas, relative contraindications include a resting HR of >120, a systolic BP of >180mmHg, and a diastolic BP of >100mmHg. Stable angina is not an absolute contraindication for a 6MWT, but patients with these symptoms should perform the test after using their antianginal medication. Reasons considered to cease the test include the following: 1)chest pain 2)intolerable dyspnea, 3)leg cramps, 4)staggering 5)pale or ashen appearance. Heart rate recovery after graded exercise is one of the common methods that predicts abnormality, not only in cardiovascular system disorders, but also in various systemic disorders.[13] Therefore, in this study the effect of exercise testing on HRR is being evaluated in elderly subjects to determine normative values for the heart rate recovery after 6 minute walk test in normal healthy individuals.[3]

MATERIALS & METHODOLOGY

A cross sectional analytical study was carried out at the physiotherapy OPD in Vikhe Patil Memorial Hospital, Ahmednagar district where in 100 healthy subjects were selected between the age group of 40-60 years by convenience sampling method. The study was carried out in the duration of 6 months (sept 2017-feb2018). Materials required for the study: 2 Cones, a stopwatch, a measuring tape, a chair and a fitbit wrist tracker to measure the heart rate. Subjects that were physically active and could walk independently for minimum 10 minutes and were cognitively sound to understand the given instructions were included. Subjects with visual ailments, any cardio vascular or respiratory disease, fractures or neurological problems which may interfere with walking ability and uncooperative or unwilling patients were excluded from the study. The study was

carried out after approval from the IEC of DVVPF's College of Physiotherapy, Ahmednagar. The nature and purpose of the study was explained to the subjects and a written consent was taken from them. A data collection sheet was filled by the therapist wherein details such as subject's name, age, sex, address, HRR, distance covered, human activity profile score was mentioned.

PROCEDURE

Subjects were instructed to wear comfortable clothes. All the subjects were asked to relax and not to do any strenuous task prior to the test. Subjects were explained about the test and its benefits. Precautions were taken prior to the test so that no harm was caused to the subject while the test was on. Shoes worn were appropriate and of the proper size for walking. Subjects used their usual walking aids during the test. The subject's usual medical regimen was continued. A light meal was acceptable before early morning or early afternoon tests. Subjects were told not to exercise vigorously within 2 hours as that may interfere with the results of the test. The subject sat in a chair in a relaxed position, located near the starting point, for at least 10 minutes prior to the beginning of the test. Baseline heart rate was measured. Instructions given before the test commenced were: the subject has to walk a distance of 60m. He was instructed to walk in his normal speed and not increase his pace or run at any point. He had to walk back and forth around the cones. If the subject at any point felt breathless, immediately he was given a chair to sit. But during this time the timer was kept going on. Subjects were encouraged to walk and complete the test by telling them about the remaining time and how well were they doing it. After the completion of test, a chair was given to the patient to rest and immediately HR was measured in the fitbit wrist tracker. Then after 1and 3 minutes heart rate was measured and the difference between the immediate and the heart rate after 1 minute and 3 minutes was calculated. This determined the heart rate recovery.

6 minute walk test: The 6 minute walk test (6MWT) has gained widespread use in cardiopulmonary rehabilitation programs as one measure of fitness. Most of the time the subject does not attain his maximal exercise capacity during the 6MWT; instead they adjust their own intensity of exercise and can rest or stop according to their will. However, as most of the daily activities are performed at submaximal levels of exertion, the 6 minute walk distance may better reflect the functional exercise level for daily activities.

Human Activity Profile: The human activity profile (HAP) was originally developed to measure the quality of life achieved by patients in rehabilitation programs and used as a measure of activity level in a variety of healthy and impaired populations. The activity items of the HAP are based on estimated metabolic equivalents (METs). One MET is the approximate amount of oxygen consumed by an average person at rest. The HAP comprises of 94 self-report items. Each item represents a common activity requiring a known amount of average energy expenditure (i.e. MET). Items with the lowest item numbers (e.g. Items1,2) have the lowest MET requirements, while items with the highest item numbers (e.g. Items 93,94) have the highest MET requirements. The respondent answers each item with one of three possible responses: *Still Doing This Activity; Have Stopped Doing This Activity; or Never Did This Activity*. The different variables in HAP scale are: Maximum Activity Score(MAS) is the highest oxygen-demanding activity that the respondent still performs, which interprets that it is the best estimate of respondent's highest level of energy expenditure, in comparison with peers of same age and gender. Adjusted Activity Score(AAS) is a measure of usual daily activities that means it is the best estimate of respondent's average level of energy expenditure. Activity Age is the age at which 50% of healthy adults of a given age and sex surpass a given MAS which provides an age equivalent for the respondent's activity level. Fitness classification(FC) is a translation of AAS into a general classification of the respondent's level of fitness and thus provides a general classification of fitness level in comparison with peers of same age and gender. Activity classification(AC) is a translation of the AAS into a general classification of the respondent's level of activity and thus provides a general classification of activity level in comparison with peers of same age and gender.

RESULTS

Table No. 1: Mean of all parameters-age wise

Sr. No.	Parameters	40-50F	40-50M	51-60F	51-60M	Total
1.	Distance	397.2 ± 51.43	442.8 ± 54.277	368.4 ± 31.843	402 ± 37.749	402.6 ± 51.554
2.	Resting heart rate	73.68 ± 6.568	72.08 ± 8.485	83.88 ± 3.855	73.84 ± 8.750	75.87 ± 8.494
3.	Immediately	90.44 ± 10.650	88.56 ± 11.464	104.68 ± 6.460	95.84 ± 8.764	94.88 ± 11.298
4.	After 1 min	79.92 ± 7.199	79.36 ± 9.442	93.2 ± 5.492	83.24 ± 8.131	83.93 ± 9.417
5.	HRR1	6.24 ± 2.818	7.28 ± 3.143	9.32 ± 3.827	9.4 ± 5.228	8.05 ± 4.054
6.	After 3min	74.92 ± 7.274	72.76 ± 8.368	87 ± 3.884	76.28 ± 7.877	77.74 ± 8.886
7.	HRR3	5.08 ± 2.308	6.92 ± 3.290	6.2 ± 3.227	7.12 ± 3.333	6.33 ± 3.127
8.	MAS	75.8 ± 5.292	79.16 ± 4.634	71.96 ± 1.859	76.8 ± 3.055	75.93 ± 4.680
9.	AAS	70.44 ± 8.851	76.4 ± 7.594	60.48 ± 5.796	72.36 ± 5.369	69.92 ± 9.098
10.	AA	59.22 ± 12.965	57.06 ± 11.407	68.14 ± 3.414	62.88 ± 7.619	61.825 ± 10.343
11.	FC	2.68 ± 0.5568	2.92 ± 0.4000	2.52 ± 0.5099	3 ± 0.000	2.78 ± 0.4623
12.	AC	2.32 ± 0.5568	2.52 ± 0.5859	1.96 ± 0.3512	2.28 ± 0.4583	2.27 ± 0.5291

Table No. 2: Mean of all parameters- gender wise

Sr. No.	Parameters	40-60F	40-60M	Total
1.	Distance	382.8 ± 44.769	422.4 ± 50.651	402.6 ± 51.554
2.	Resting HR	78.78 ± 7.413	72.96 ± 8.576	75.87 ± 8.494
3.	Immediately	97.56 ± 11.301	92.2 ± 10.748	94.88 ± 11.298
4.	After 1min	86.56 ± 9.228	81.3 ± 8.938	83.93 ± 9.417
5.	HRR1	7.78 ± 3.672	8.34 ± 4.401	8.05 ± 4.054
6.	After 3min	80.96 ± 8.398	74.52 ± 8.237	77.74 ± 8.886
7.	HRR3	5.64 ± 2.834	7.02 ± 3.279	6.33 ± 3.127
8.	MAS	73.88 ± 4.378	77.98 ± 4.063	75.93 ± 4.680
9.	AAS	65.46 ± 8.952	74.38 ± 6.821	69.92 ± 9.098
10.	AA	63.68 ± 10.408	59.97 ± 10.040	61.825 ± 10.343
11.	FC	2.6 ± 0.5345	2.96 ± 0.2828	2.78 ± 0.4623
12.	AC	2.14 ± 0.4953	2.4 ± 0.5345	2.27 ± 0.5291

Table No. 3: Comparison of means of HRR1 & HRR3 in age wise and gender wise

Age & gender	HRR1	Significance	HRR3	Significance
40-50F&40-50M	0.2240	Not significant	0.0265	**Significant**
51-60F&51-60M	0.9510	Not significant	0.3264	Not significant
40-60F&40-60M	0.4913	Not significant	0.0266	**Significant**
40-50F&51-60F	0.0022	**Very significant**	0.1646	Not significant
40-50M&51-60M	0.0887	Not quite significant	0.8318	Not significant

Table No. 4: Correlation of distance and HRR1 & HRR3 age wise and gender wise:

Age & gender	HRR1	r value	HRR3	r value
40-50F	p=0.9679 Not significant	-0.008475	p=0.5346 Not significant	0.1304
40-50M	p=0.5707 Not significant	0.1191	p=0.2938 Not significant	0.2186
51-60F	p=0.1898 Not significant	-0.2712	p=0.7975 Not significant	-0.05405
51-60M	p=0.5552 Not significant	0.1239	p=0.5125 Not significant	-0.1374
40-60F	p=0.0472 **Significant**	-0.2820	p=0.7060 Not significant	-0.05469
40-60M	p=0.8972 Not significant	0.01874	p=0.8927 Not significant	0.01956
TOTAL	p=0.5327 Not significant	-0.06312	p=0.4838 Not significant	0.07082

Table No. 5: Correlation of all parameters: age wise

Sr. No.	Parameters	40-50F	40-50M	51-60F	51-60M	Total
1.	Distance & resting HR	p=0.6488 (not significant)	p=0.1541 (not significant)	p=0.6714 (not significant)	p=0.0335 **(significant)**	p=0.0006 **(extremely significant)**
2.	Distance &immediately	p=0.1791 (not significant)	p=0.7071 (not significant)	p=0.6399 (not significant)	p=0.0148 **(significant)**	p=<0.0001 **(extremely significant)**
3.	Distance &1min	p=0.6054 (not significant)	p=0.1100 (not significant)	p=0.8483 (not significant)	p=0.0155 **(significant)**	p=0.0005 **(extremely significant)**
4.	Distance &HRR1	p=0.9679 (not significant)	p=0.5707 (not significant)	p=0.1898 (not significant)	p=0.5552 (not significant)	p=0.5327 (not significant)
5.	Distance &3min	p=0.4063 (not significant)	p=0.1224 (not significant)	p=0.8585 (not significant)	p=0.0152 **(significant)**	p=<0.0001 **(extremely significant)**
6.	Distance &HRR3	p=0.5346 (not significant)	p=0.2938 (not significant)	p=0.7975 (not significant)	p=0.5125 (not significant)	p=0.4838 (not significant)
7.	Distance &MAS	p=0.0342 **(significant)**	p=0.0666 (not significant)	p=0.0005 **(extremely significant)**	p=0.9166 (not significant)	p=<0.0001 **(extremely significant)**
8.	Distance &AAS	p=<0.0001 **(extremely significant)**	p=0.0057 **(very significant)**	p=0.0065 **(very significant)**	p=0.2197 (not significant)	p=<0.0001 **(extremely significant)**
9.	Distance &AA	p=0.0342 **(significant)**	p=0.0666 (not significant)	p=0.0005 **(extremely significant)**	p=0.9166 (not significant)	p=<0.0001 **(extremely significant)**
10.	Distance &FC	p=0.0015 **(very significant)**	p=0.0876 (not significant)	p=0.0133 **(significant)**	p=the slope is 0	p=<0.0001 **(extremely significant)**
11.	Distance &AC	p=0.0009 **(extremely significant)**	p=0.0010 **(extremely significant)**	p=0.0856 (not significant)	p=0.0517 (not significant)	p=<0.0001 **(extremely significant)**

Table No. 6: Correlation of all parameters: gender wise

Sr. No.	Parameters	40-60F	40-60M	Total
1.	Distance & resting HR	p=0.0636 (not significant)	p=0.7275 (not significant)	p=0.0006 **(extremely significant)**
2.	Distance & immediately	p=0.0080 **(very significant)**	p=0.0390 **(significant)**	p=<0.0001 **(extremely significant)**
3.	Distance &1min	p=0.0266 **(significant)**	p=0.3763 (not significant)	p=0.0005 **(extremely significant)**
4.	Distance & HRR1	p=0.0472 **(significant)**	p=0.8972 (not significant)	p=0.5327 (not significant)
5.	Distance &3min	p=0.0106 **(significant)**	p=0.4440 (not significant)	p=<0.0001 **(extremely significant)**
6.	Distance & HRR3	p=0.7060 (not significant)	p=0.8927 (not significant)	p=0.4838 (not significant)
7.	Distance & MAS	p=<0.0001 **(extremely significant)**	p=0.0179 **(significant)**	p=<0.0001 **(extremely significant)**
8.	Distance & AAS	p=<0.0001 **(extremely significant)**	p=<0.0001 **(extremely significant)**	p=<0.0001 **(extremely significant)**
9.	Distance & AA	p=<0.0001 **(extremely significant)**	p=0.0179 **(significant)**	p=<0.0001 **(extremely significant)**
10.	Distance & FC	p=<0.0001 **(extremely significant)**	p=0.0885 (not significant)	p=<0.0001 **(extremely significant)**
11.	Distance & AC	p=0.6338 (not significant)	p=0.1033 (not significant)	p=<0.0001 **(extremely significant)**

STATISTICAL ANALYSIS

Data was presented as mean and standard deviation. The data was calculated using the nonparametric correlation (Spearman). Statistical analysis was performed using Graphpad instat3 software.

DISCUSSION

In the last decade, many studies have been conducted to evaluate the 6MWT in healthy adults in order to provide reference values for the 6MWD. In the present study, a cross-sectional design in the age group 40-60years (40-50f:25, 40-50m:25, 51-60f:25, 51-60m:25). It was found that in **gender wise classification** the mean distance walked in the age group of **40-60 years of females** was 382.8±44.769. All the means in age and gender wise classifications of HAP parameters are mentioned in table no.1&2 respectively. The correlation values of the distance with the HAP parameters are mentioned in table no.5&6.

Further it was seen that heart rate recovery after exercise reflects changes in the autonomic tone of sympathetic withdrawal and parasympathetic reactivation. It also has certain prognostic implication. In the present study no significant relationship was found between HRR1 and distance covered by the subject and HRR3 and the distance. This is probably due to the fact that the distance covered did not stimulate the sympathetic and parasympathetic activity as the subjects were allowed to walk at their pace and did not exert too much during the activity. However, in the age group of **40-60 years of females** there was a significant(p=0.0472) correlation between HRR1 and the distance covered. This is probably explained by the fact that in females there is early stimulation of parasympathetic activity due to the factors playing the role in the menopausal state. Due to the lack of estrogen, progesterone and testosterone, parasympathetic activity gets disturbed and hence may affect its stimulation. Activity age according to human activity profile(HAP) index is an age equivalent for the respondents activity level, is found to have

significant correlation with distance in case of **females** in the age range of **40-60 years** i.e, it was extremely significant(p=<0.0001). This is probably due to the fact that physical activity of an individual is dependent on his physiological age as it needs the balance of various systems in the body. Similar pattern was observed when distance was correlated with fitness classification and activity classification. This is probably due to the fact that fitness classification and activity classification according to human activity profile index is a general classification of fitness level and activity level in comparison with peers of same age and gender.

Graphical representations:

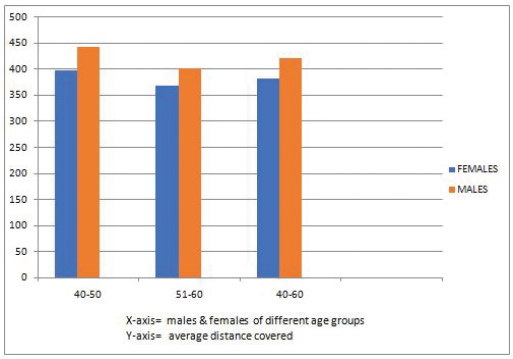

Fig. 1: Graphical representation of the average distance walked in the age and gender wise classification

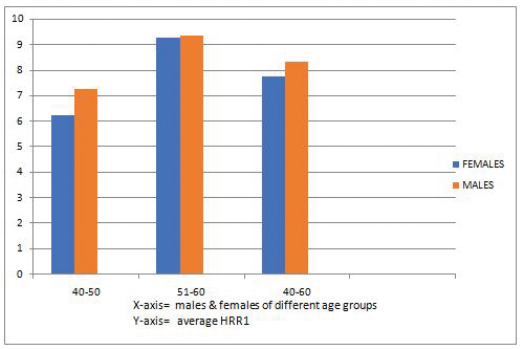

Fig. 2: Graphical representation of average HRR1 in the age and gender wise classification

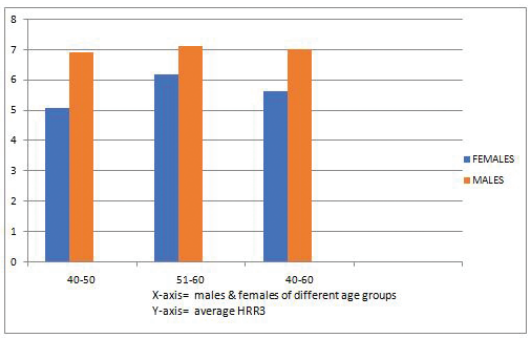

Fig. 3: Graphical representation of average HRR3 in the age and gender wise classification

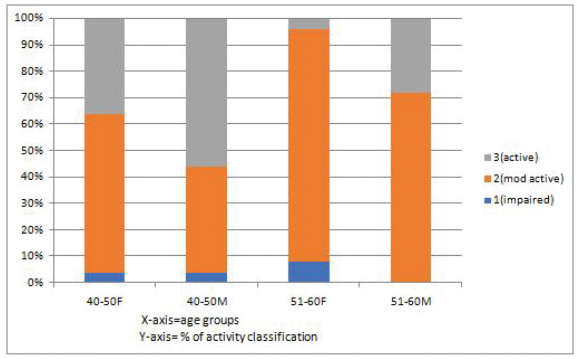

Fig. 5: Graphical representation of the average AC in age wise classification

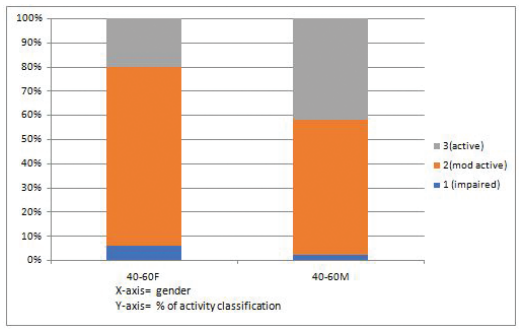

Fig. 6: Graphical representation of the average AC in the gender wise classification

CONCLUSION

The study concludes that there is no significant relationship between the HRR1 and the distance covered and between HRR3 and the distance covered except for in the age group of 40-60 years females where it was found to be significant.

Ethical Clearance: It was taken from the Institute of Ethical Committee(IEC) of DVVPF's College of Physiotherapy, Ahmednagar.

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Conflict of Interest: Nil

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