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Impact of use of Electronic Gadget with and without Internet on Physical Activity in Preschoolers of Belagavi city-An Observational Study

Deepa Metgud¹, Dhanashri P Hande², Anisha Colaco², Niharika Chungade²
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ABSTRACT

“Impact of use of electronic gadget with and without internet on physical activity in preschoolers of Belagavi city-An Observational Study”

Background: Physical activity is any bodily movement produced by skeletal muscle that requires energy expenditure. The leading risk factor for global mortality is physical inactivity. In recent years children have become less active physically. About 25 percent amongst 5 years old use internet and their number rises to 50 percent by the age of 9 to at least 75 percent by the age of 15 years to 17 years. Hence the present study uses preschoolers of Belagavi city as the study population to observe the impact of use of electronic gadgets with and without internet on physical activity.

Objective: To study the impact of use of electronic gadgets with and without internet in preschoolers on their physical activity.

Method and Measures: This study done is an observational study. After screening for inclusion and exclusion criteria, 138 children along with their primary care taker from different schools in Belagavi city were chosen. Demographic data was obtained briefly. The responses from preschool children for their physical activity by using Pre-PAQ (Home version) questionnaire were recorded.

Results: When the overall impact of use of electronic gadgets in the age group of 3-5 years was obtained, the present sample which included children without internet use was p=0.000 by using physical activity questionnaire.

Conclusion: The present study concluded that there is reduced physical activity in preschoolers using gadgets with and without internet in Belagavi city.

Keywords: Pre-PAQ, Questionnaire, Electronic gadgets, physical activity, Preschoolers

INTRODUCTION

A healthy lifestyle must consider physical activity to be an important component in young children and has proved to be effective with a healthy weight status, skeletal and bone health, psychosocial health, motor skill development, cognitive development and aspects of cardio metabolic health.¹ Physical activity is considered to be an important source of development in children. It is also considered to be an important part of day to day life. Physical education is necessary in school curriculum.²

Among young adults physical inactivity is more prevalent. About half of the adult population of industrialised nations is categorised as physically inactive according to their health benefits.³⁴⁵ Increased
level of physical inactivity in preschool children have been related to a higher risk of being overweight or obese.\(^6,7\)

Preschool and day care centres provide opportunities to improve levels of physical activity.\(^1\) Recent research has focused on the importance of physical activity in pre-school years (less than 5 years).\(^8\) It is essential to measure physical activity in preschoolers as it provides the basis for examining health benefits of physical activity among the population.\(^8\)

Physical inactivity is related to health risks behaviours such as increased consumption of unhealthy foods. Inactivity maybe commonly assessed with regards to screen time exposure (eg. Television/movie watching, computer use and playing games).\(^7,9,10,11\)

Since globalization the world has changed to electronic age with the invention of Smartphone’s, computers, video games and electronic gadgets. Use of gadgets in the fast moving world has been a global phenomenon in recent years.\(^12\)

**MATERIALS AND INSTRUMENT**

Informed Assent, Data collection sheet, Pre-school aged physical activity questionnaire, Weighing machine, Measuring tape

**Method of Collection of Data:**

- **Study design:** An observational study
- **Study type:** Descriptive study
- **Target population:** 3-5 years
- **Duration of study:** 6 months

**PROCEDURE**

After obtaining approval from the institutional ethical committee, parents of the children in the age group of 3-5 years were approached for participate in the study. The children were screened for eligibility and parents who consent for participation were enrolled into the study. The study includes the information of physical activity and electronic gadgets used by the preschoolers.

A self-administered questionnaire which consisted of questions such as The number of television sets at home? Does the child has a television set in his/her bedroom? Do you have internet connection at home? How often your child walk to get around your neighbourhood last week? Does your child eat his/her meal in front of the television? Does your child attend any organised physical activity like swimming, kinder gym, dance and sport? This questionnaire was administered to the educated parents/guardians and others were explained about the questions and how it has to be filled. The Parent/Guardian had to observe the child for a week as the questionnaire consisted the physical activity of the child during the weekdays and on weekends. Total duration taken to fill the questionnaire was 20-30 minutes. The primary investigator was available if they had any questions regarding the questionnaire.

The data was collected from various schools, day care centres, and at homes. For parents who were not educated research assistant read the questions in vernacular language and recorded their responses. Total number of schools taken were 4.

**RESULTS**

The present study titled Impact Of Use Of Electronic Gadgets With And Without Internet On Physical Activity In Preschoolers Of Belagavi City-An Observational Study. A brief information was noted for all children and responses were recorded by using Pre – PAQ Questionnaire.

**Table 1: The number of electronic gadgets available at your home**

<table>
<thead>
<tr>
<th>Particular</th>
<th>Yes</th>
<th>No</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television sets</td>
<td>124</td>
<td>14</td>
<td>89.80%</td>
</tr>
<tr>
<td>DVD or video players</td>
<td>62</td>
<td>76</td>
<td>44.90%</td>
</tr>
<tr>
<td>Electronic games</td>
<td>28</td>
<td>110</td>
<td>20.20%</td>
</tr>
<tr>
<td>Computers (laptop or desktop)</td>
<td>58</td>
<td>80</td>
<td>42.60%</td>
</tr>
<tr>
<td>Internet</td>
<td>65</td>
<td>73</td>
<td>47.00%</td>
</tr>
<tr>
<td>Pay television</td>
<td>38</td>
<td>100</td>
<td>27.50%</td>
</tr>
</tbody>
</table>

Table No.1 Explains the type of electronic gadgets that are available in their home and found that most of them had television sets that is 89%, more than the other items such as DVD or Video player, Electronic games and Computers.
Fig. 1: Distribution of Male with Respect to Age

Fig. 1. Explains about the gender, in which the study showed that male children used the electronic gadgets more than female children. Among the considered age that is 3 to 5 years, the children of 5 years of age had used electronic gadgets more.

Table 2: Local neighborhood places or facilities where the child can be physically active

<table>
<thead>
<tr>
<th>Particular</th>
<th>Yes</th>
<th>No</th>
<th>Not Sure</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open areas such as beaches, rivers, natural reserves</td>
<td>27</td>
<td>97</td>
<td>14</td>
<td>7.00%</td>
</tr>
<tr>
<td>Public park or oval</td>
<td>91</td>
<td>38</td>
<td>9</td>
<td>27.00%</td>
</tr>
<tr>
<td>Playground</td>
<td>82</td>
<td>42</td>
<td>14</td>
<td>30.00%</td>
</tr>
<tr>
<td>Public swimming pool</td>
<td>19</td>
<td>95</td>
<td>24</td>
<td>68.80%</td>
</tr>
<tr>
<td>Gym that offers programs for young children e.g. kinder-gym, play-gym etc.</td>
<td>11</td>
<td>103</td>
<td>24</td>
<td>74.60%</td>
</tr>
<tr>
<td>Club that offers activities/sports for young children e.g. soccer, dance etc.</td>
<td>12</td>
<td>99</td>
<td>27</td>
<td>71.70%</td>
</tr>
</tbody>
</table>

The p value is 0.000. Result is significant.

Table No. 2 Explains about the local neighborhood, places of facilities where the child can be physically active such as

- Beaches, rivers, natural reserves–70.2%
- Public park or oval–27%
- Play ground–30%
- Public swimming pool–68.8%
- Gym that offers program for young children–74.6%

Table 3: Child eat his/her meals in front of the television

<table>
<thead>
<tr>
<th>Particular</th>
<th>No. of observations (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 meals a day</td>
<td>11 (8)</td>
</tr>
<tr>
<td>2 meals a day</td>
<td>37 (26.8)</td>
</tr>
<tr>
<td>1 meal a day</td>
<td>53 (38.4)</td>
</tr>
<tr>
<td>Not at all or rarely</td>
<td>37 (26.8)</td>
</tr>
<tr>
<td>Total</td>
<td>138 (100)</td>
</tr>
</tbody>
</table>

Table No. 3 Explains about the number of children were having food in front of the television in which 8% of them had all meals a day in front of the TV, 26.8% of them had 2 meals a day in front of the TV, 38.4% of them had 1 meal a day in front of the TV. Out of these males were more in number.

Table 4: Correlation with gadgets and physical activity in children

<table>
<thead>
<tr>
<th></th>
<th>Q 16</th>
<th>Q 21</th>
<th>Q 22</th>
<th>Q 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.8307</td>
<td>1.64</td>
<td>3.121</td>
<td>2.258</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.68</td>
<td>0.522</td>
<td>0.540</td>
<td>0.907</td>
</tr>
<tr>
<td>Standard Error Mean</td>
<td>0.058</td>
<td>0.044</td>
<td>0.046</td>
<td>0.077</td>
</tr>
<tr>
<td>t value</td>
<td>14.139</td>
<td>7.880</td>
<td>2.263</td>
<td>9.956</td>
</tr>
<tr>
<td>P value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.009</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4.1: Child attend organized Physical Activity

<table>
<thead>
<tr>
<th></th>
<th>Swimming</th>
<th>Gym</th>
<th>Dance</th>
<th>Sport</th>
<th>Other</th>
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<tbody>
<tr>
<td>Mean</td>
<td>6.52</td>
<td>0.65</td>
<td>21.41</td>
<td>12.83</td>
<td>18.41</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>24.51</td>
<td>4.39</td>
<td>72.47</td>
<td>74.85</td>
<td>61.19</td>
</tr>
<tr>
<td>P value</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table No. 4 and 4.1 Which showed that there was lack of encouragement by the parents towards the children to play, when the weather was suitable and also the parents were not physically active in front of their child. Parents work schedule or commitments limited the time, which they had to play with their child. There was lack of open areas such as beaches, rivers, kinder-gym, club that offers sports and activities for children, swimming pool for the children. Which limited the outdoor physical activity in children. The walking distance was reduced.
in children as the local shops were within easy distance of their home. Parents stated that their child had an active nature only if they were motivated or accompanied by siblings, parents or friends. Only 29% children attended organized physical activity during the week, remaining 71% did not attend any organized physical activity.

**DISCUSSION**

The present study was intended to know the impact of use of electronic gadgets with or without internet on physical activity in preschoolers of Belagavi city. In this study screened for 138 children of age group 3-5 years, from various play schools, day care centres and home by using Pre- Physical Activity Questionnaire.

In a Randomized controlled trial on a sample of 70 children in the age group of 4-7 years and BMI above or at 75th percentile for the gender and age there was no significant change in Physical Activity but there was change in television viewing that was related to energy intake P<0.001.\(^{13}\)

In comparison to the study done by Leonard H. Epstein; Our study showed that there is a change in Physical Activity with use of television viewing but no significant change in BMI because results showed children usually consumed an average of 2 meals per day in front of television.

In an experimental study in the age group of 3-5 years, it showed that the children watched TV for more hours and ate more lunch (\(r = 0.56, P<0.05\)) and this resulted in higher energy consumption during lunch.\(^{14}\)

In comparison with the above study children mostly had electronic gadget 1 meal in front of the TV (38.40%) compared to other electronic gadgets and majority of them watched television for 1 hour daily that is 89.80%.

In this study within the age group of 3-5 years there was increased static play like sit or lay still watching TV, looking at the books or listening the stories, sitting doing puzzles or craft, digging in a sand pit. There was minimal outdoor physical activities were noticed like ran or jogged slowly, jumped, skipped or marched at an easy pace, rode a tricycle, bike or scooter at an slow speed. Hence it indicated that, children were more involved in a static play than the dynamic play.

**CONCLUSION**

The present study concluded that there is reduced physical activity in the age group of 3-5 years with and without internet use in the preschoolers of Belagavi city.

**Conflict of Interest:** None

**Source of Funding:** Self

**Informed Assent:** Obtained

**Ethical Clearance:** Obtained

**REFERENCES**

3. BAUMAN NOA. The Descriptive Epidemiology of a Sedentary Lifestyle in Adult Australians International Journal of Epidemiology. 2015 June; 21 (2).


Frequency of BMI Vs EAT-26 Score among DPT Students of DUHS, Ojha Campus

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ABSTRACT

Background: High BMI can lead to negative self-esteem and low self-evaluation, triggering risky behaviors such as uncontrollable dieting or overeating (e.g. anorexia or bulimia), being overweight leading to anxiety, depression and can affect quality of life. It is essential to investigate rates of overweight and obesity across different ethnic background.

Methodology: A cross-sectional Study was conducted among undergraduate DPT students studying in IPMR ojha campus, Dow University of Health Sciences, with the help of random sampling technique. Estimated sample size was 109. The study duration was 06 months. Data was analyzed through SPSS Version 15. Pearson Chi Square test was used to determine the degree of import between two variables. P-value was less than 0.05

Results: 22.9%(N=21) of students were found underweight, 65.1%(N=71) of students were normal, 10%(N=11) of students were found overweight and only 1.8%(N=2) of students were found obese according to their BMI. We sampled (N=109) students to evaluate whether the students having BMI≥25 have association according to semester and EAT-26 score. The samples were analyzed using chi-square test. We failed to reject our null hypothesis, X²(2) = .465, p >0.5. i.e is p=.793.

Conclusion: According to our study results, p= 0.79 which is greater than p >0.05, so there is not enough evidence to reject the H₀. There is not sufficient evidence to prove the association of BMI ≥25 and EAT-26 score among DPT students. Most of the students were not anxious regarding their eating attitudes and its effect on their BMI.

Keywords: EAT-26, Body Mass Index, obesity.

INTRODUCTION

Worldwide, disease profiles are transforming at a rapid pace catching the attention of medical professionals and policy makers alike. This is particularly true in low and middle-income countries that form the major chunk of global population. Obesity is associated with an increased risk of morbidity and mortality as well as reduced life expectancy. The last two decades of the previous century have witnessed dramatic increase in health care costs due to obesity and related issues among children and adolescents[¹].

For children and adolescents, overweight and obesity are defined using age and sex specific nomograms for body mass index (BMI). Children with BMI equal to or exceeding the age-gender-specific 95th percentile is defined obese. Those with BMI equal to or exceeding the 85th but are below 95th percentiles are defined overweight and are at risk for obesity related co-morbidities[²].

The obesity epidemic in America has been observed in all age, gender and racial groups[³]. Data from the Centers for Disease Control and Prevention. This rate is more than twice as high as the 15% rate set by the Healthy People 2010 objective for obesity prevalence.[⁴] This
The figure is also considerably higher than the Healthy People 2010 baseline figure of 23\% for the years 1988-94\[4\]

North Carolina has the 17\textsuperscript{th} highest rate of obesity in the nation among adults and the 5\textsuperscript{th} highest among teens. North Carolina also places high on a list of obesity-related co-morbidities including diabetes (9\textsuperscript{th}) and hypertension (10\textsuperscript{th})\[5\]

To be proactive in preventing obesity epidemic, to promote culturally appropriate healthy attitudes and behaviors, and to understand trends in weight control strategies in different ethnicities, it is essential to investigate rates of overweight and obesity across different ethnic backgrounds.

**Objective:** The objective of the study was to find out the association of BMI $\geq$25 versus EAT 26 score among students of DPT.

### METHODOLOGY

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

**Sample Description:** Our target population is the doctor of physical therapy students DUHS OJHA campus.

**Inclusion Criteria:**
- Age group: 18-25
- DPT student ojha campus DUHS
- Both male and female

**Exclusion Criteria:**
- Students diagnosed with systemic problem.

**Sampling Technique:** Data was collected by non-probability convenient sampling

**Study Setting:** IPMR Ojha campus DUHS

**Study Duration:** Three months

**Sample Size:** 109 (students in DPT Ojha campus DUHS)

**Data Collection/Outcome Measure:** The questionnaire included demographic information and self-report on body weight and height. The last part of the survey included questions related to eating attitudes. Research was done in IPMR (Ojha campus); they were students who agreed to participate and fulfilled the inclusion criteria.

### RESULTS

**Statistical Tool Analysis:** Descriptive statistics including mean, range, frequencies, and percentages were conducted using SPSS 15.0 statistical software. Chi-square test was performed to determine whether the rate of those with BMI $\geq$25 between gender and EAT-26 was statistically significant. For analyses $\alpha < 0.05$ was used as statistically significant difference between groups.

#### Table 01: Descriptive Statistics–Statistics

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Gender</th>
<th>Semester</th>
<th>Body Mass Index</th>
<th>Participation in Athletics</th>
<th>Eating Attitudes Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>109</td>
<td>109</td>
<td>109</td>
<td>109</td>
<td>109</td>
<td>109</td>
</tr>
<tr>
<td>N Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>22.5138</td>
<td>.9450</td>
<td>1.3853</td>
<td>.9083</td>
<td>1.3761</td>
<td>.3486</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.89871</td>
<td>.22912</td>
<td>.62225</td>
<td>.63160</td>
<td>1.69306</td>
<td>.47874</td>
</tr>
<tr>
<td>Range</td>
<td>4.00</td>
<td>1.00</td>
<td>2.00</td>
<td>3.00</td>
<td>4.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>20.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>24.00</td>
<td>1.00</td>
<td>2.00</td>
<td>3.00</td>
<td>4.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

#### Table 02: Gender Distribution–Gender

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Female</td>
<td>103</td>
<td>94.5</td>
<td>94.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Out of total sample selected, 94.5\% were females (N = 103) and 5.5\% were males (N = 6)
**Table 03: Body Mass Index−Body Mass Index**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5, underweight</td>
<td>25</td>
<td>22.9</td>
<td>22.9</td>
<td>22.9</td>
</tr>
<tr>
<td>18.5-24.9, Normal</td>
<td>71</td>
<td>65.1</td>
<td>65.1</td>
<td>88.1</td>
</tr>
<tr>
<td>25-29.9, Overweight</td>
<td>11</td>
<td>10.1</td>
<td>10.1</td>
<td>98.2</td>
</tr>
<tr>
<td>30 &amp; above, Obese</td>
<td>2</td>
<td>1.8</td>
<td>1.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

22.9 % (N = 21) of students were found underweight, 65.1% (N = 71) of students were normal, 10% (N = 11) of students were found overweight and only 1.8% (N = 2) of students were found obese according to their BMI.

**Table 04: Eating Attitudes Test−Eating Attitudes Test**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20</td>
<td>71</td>
<td>65.1</td>
<td>65.1</td>
<td>65.1</td>
</tr>
<tr>
<td>Above 20</td>
<td>38</td>
<td>34.9</td>
<td>34.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

65.1% of students have EAT score of below 20 while 34.9% of students have EAT score of above 20, in need of consultation.

**Table 05: Chi-Square Test−Chi-Square Tests**

<table>
<thead>
<tr>
<th>Body Mass Index</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig.(2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5-24.9, Normal</td>
<td>Pearson Chi Square</td>
<td>.465(c)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>.465</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>.150</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.15.

We sampled (N = 109) students to evaluate whether the students having BMI ≥ 25 have association according to BMI and EAT-26 score. The samples were analyzed using chi-square test. We failed to reject our null hypothesis, \(X^2(2) = .465, p > 0.05\). i-e p = .79

**DISCUSSION**

According to the current report, about one third (29.8%) of college students are overweight or obese (BMI ≥ 25). At the same time, the rate of overweight and obesity in the current sample is lower than reported in previous studies on college students. [6,7] This rate is also lower than the rate reported by the NCSCHS [8]. This finding may be due to several factors. Most students in this sample were Caucasian. Caucasian young and older adults have a generally lower rate of BMI ≥ 25 [9,8]. Also, rates of obesity are lower among those with a higher level of education [9,10,8]. For example, according to BRFSS 2007, the rate of BMI≥25 among North Carolinians with higher level of education was between five to eight percent lower compared to the obesity rate among people with a lower level of education.

Among adults living in North Carolina, the rate of BMI≥25 among males is close to 71% compared to 59% among female adults [8]. The higher rate of overweight and obesity among males may be partially due to the fact that male students are usually satisfied with their weight and body image (e.g., broad shoulders and large torso); they want to bulk up and increase muscle and weight gain [12]. Social pressure to be thin is higher for females than males; thus, college females are more likely to perceive themselves to be overweight and will more often attempt...
to lose weight\textsuperscript{[13,14]}. These factors may explain gender discrepancy in BMI rates, supporting previous research findings\textsuperscript{[13,21]}

Consistent with recent research\textsuperscript{[9,16]}, rates of overweight and obesity in the current study were higher among African American than Caucasian students (54.0\% vs. 24.6\%). Research findings on African American students from other studies revealed the rate of overweight and obesity around 50\%. For example, data from the 1995 National College Health Risk Behavior Survey showed a prevalence of overweight and obesity from 48.7\% in African American students\textsuperscript{[11,7]}, reported the rate of BMI $\geq$ 25 among African American students was higher than 52\%, based on data collected in 1999, which is congruent with the findings of current study.\textsuperscript{[6]} also reported the rate of overweight and obesity in African American sample to be almost 49\%.

Analysis of dieting attitudes (EAT 26) demonstrated that more than 12\% of students in this sample (higher rates recorded by females) reported to have disturbed eating attitudes. A study conducted by\textsuperscript{[7]} reported that 20 percent of the surveyed college females had an EAT-26 score (above 20) indicative of anorexic symptomatology. Although the rate based on the current study is lower than reported by\textsuperscript{[7]}, these results support the generally held belief that disturbed eating attitudes and behaviors are common among college students, especially among the female college population.

Current results also suggest that disturbed eating attitudes (dieting behavior) are not just the domain of young females. Ten percent of males in this study reported disturbed eating attitudes, which is consistent with previous research\textsuperscript{[7]}. However, in the present study no significant difference was found between the rate of disturbed eating among Caucasian and African American students. This fact invites further investigation and could be explained by the specifics of college environment and peer pressure. This pressure, perhaps explained by social reinforcement and modeling, plays a decisive role in triggering negative self-evaluation, weight control, unhealthy eating behavior, and the development of eating disorders among college females\textsuperscript{[13,7]}

It is interesting to point out that the mean BMI of females who reported excessive dieting tendencies or behavior was within the normal range (BMI=24.56), and that as many as 64\% of these females’ BMI was within the normal range (18.5 to 24.9). In comparison, 80\% of the BMIs of males who reported disturbed eating behavior were in the severely obese category with a BMI mean of 38.06. This fact supports the notion that females are more likely to diet due to a perception of being overweight, but males are more likely to diet because of their actual obese status (BMI>30)\textsuperscript{[19]}.

The findings of the current study should be interpreted in the light of some limitations. One of the limitations is the cross-sectional design of the study, which makes causal interferences difficult. All analyses were based on self-reported data. Using more precise measures of adiposity (e.g., skin fold test) can benefit future research. However, previous research with adolescents’ using self-reports demonstrated high correlations between self-reported measures and actual measurements of weight and height, and is widely used in numerous studies\textsuperscript{[20]}.

While overweight and obesity are associated with elevated risk for many chronic diseases, such as heart disease, diabetes, and some types of cancer, the rate of obesity among college students should be a concern to health care professionals because obese young adults will likely remain obese throughout their adult life. Therefore, the findings of this study call for obesity prevention/intervention, lifestyle modification, and outreach programs among college students. While more than 12\% of students in this sample reported disordered eating attitudes or behavior, unhealthy strategies to reduce weight among college population should also not be ignored. Poor eating habits and weight control strategies among college students did not meet the recommended guidelines for dietary patterns, which may have long term health implications. Weight gain and eating patterns during college years may contribute to overweight and obesity in adulthood\textsuperscript{[13]}.

Thus, for counselors and nutritionists working with students on weight management issues, it is crucial to educate college youth about healthy body attitudes, addressing the outcomes of obesity and dieting based on gender and ethnicity. This study highlights the importance of the college years as an excellent time for health promotion. Understanding weight attitudes and dieting tendencies based on gender and ethnicity may provide additional help to dietitians and counselors in the development of obesity prevention programs, including race and gender specific guidelines toward achievement of healthy body, healthy weight and improving quality of life.
CONCLUSION

According to our study results, \( p = 0.79 \) which is greater than \( p < 0.05 \), so there is not enough evidence to reject the \( H_0 \). There is not sufficient evidence to prove the association of BMI \( \geq 25 \) and EAT-26 score among DPT students. Most of the students were not anxious regarding their eating attitudes and its effect on their BMI.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Ethical Approval was sort from the institute of Jinnah Post graduate medical Centre (JPMC) review board.

REFERENCES

Prevalence of Nocturnal Enuresis in 6-15 Years School Children and its Awareness among Parents in Dharwad

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ABSTRACT

Introduction: Nocturnal enuresis (NE) is any type of bedwetting occurring in children over 5 years of age, at night, when they are asleep. The objective of our study was to discover its prevalence among school children and quantifies the awareness in parents of nocturnal enuresis in Dharwad district by considering the standard definition of International Children’s Continence Society.

Methods: After estimation of the population of students 3 schools were selected. 100 subjects between 6 to 15 years were recruited from each school. A self-administered questionnaire was translated into the local language. The questionnaire was addressed to the parents of the evaluated child in a sealed envelope. The analysis was done on completely filled questionnaires.

Results: In Dharwad (urban) the prevalence rate of 12.67% was noted in 6-15 year-old school children. The highest proportion of children with enuresis was in the 6-8 group. 2% of 12-15 year-old children were found to have NE. The awareness among parents was noted to be 35.83%.

Conclusion: Most of the parents are unaware about nocturnal enuresis though it is very common amongst school children. Follow up of these children with NE can be considered for management. This study gives insight into prevalence and warrant about early intervention in nocturnal enuresis.

Keywords: Nocturnal enuresis, 6-15 years school children, prevalence, parent’s awareness, Dharwad (urban)

INTRODUCTION

As per the International Children’s Continence Society (ICCS) nocturnal enuresis is any type of bedwetting occurring in children during sleep after the age of 5[1]. It is a widespread condition which in turn can lead to stress for the parents or caretaker [2]. In many cultures, NE is still kept as a conspiracy of silence and is often considered to be an embarrassing condition [3]. Awareness about bedwetting among individuals helps in primary prevention. Evidence is still lacking on how to transfer awareness into behavioural change and on barriers to help seeking behaviour [4].

The reported prevalence of NE varies between countries. Saudi Arabian children and adolescents are reported to have a 15% of prevalence rate, 14.9% of the children in Turkey present with NE, in U.S the reported prevalence rate of enuresis was 4.45%, and among the children of Taiwan 8% wet the bed [4,5-11]. The few published studies with Indian data give a prevalence of 4-14% in school children [12].

There is lack of parental awareness about this condition in India [12]. As per the literature searched studies are lacking and no studies could be found on awareness and education about NE as a method of

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reducing barriers to seeking treatment compared to other conditions or disabilities\cite{13,14}. Awareness of NE can be helpful in guiding the parents to understand the severity of the condition as well as leading them to an early, appropriate treatment such as behavioural therapy/Physiotherapy/Urotherapy.

Awareness and prevalence in the region of Karnataka, India is not known, thus the aim of our study was to document the prevalence based on the standard definition given by ICCS. The authors developed questions about parental awareness of NE as part of this study to determine what the effect of lack of awareness has on help seeking behaviour. A wide range of ages was sampled with the intention to discover if older children suffer much more than younger children from the stigma of bed-wetting\cite{15}.

MATERIALS AND METHOD

**Sample size:** Sample size was determined after a pilot study was undertaken on 30 school children, with 5% of precision and 95% of desired confidence level. Based on this pilot study the expected prevalence rate was considered for the factor P was 26% (Formula: $n = \frac{Z^2 \times p \times q}{d^2}$)\cite{16} resulting in a sample size estimated at 300. The children were divided into 3 groups, 6-8years, 9-11years and 12-15years. When grouping the children, 3 months were allowed for at the ends of the age groups. For example, a child with 11y 9 months or 12y 3 months was analysed in the age group of 12 years. **Study design:** Data was collected in a period of 1year in a cross-sectional study. **Subjects:** The source of data was recruited by simple random sampling design using sealed opaque envelopes from three schools in Dharwad (Urban) area. Typically developing children were selected by systematic sampling method from each class. **Inclusion criteria:** We included children of age 6-15-year-olds of either gender\cite{12,14,17} and their parents. **Exclusion criteria:** Children with developmental delay (motor, speech, cognitive etc) or variation from normal found on screening (variation in tone, range, and strength), injury to the genital area or congenital birth defects, non-willing parents and incompletely filled questionnaires were excluded from the study. **Outcome measure:** A self-administered questionnaire was formulated by thorough literature review and opinion from medical professionals (urologist, pediatricians, pediatric surgeons, psychiatrist and physiotherapists), questionnaire was validated for its face validity and translated into the local language (Kannada) by a university professor. This questionnaire had previously been found to be a reliable instrument tool\cite{18}. The questionnaire was given to the students in a sealed envelope addressed to their parents by the class teacher. The filled forms were returned by the children in the same envelope. The questionnaire includes 2 main components (night wetting and awareness includes 3 sections in both the components). The first section assesses in detail the history of the child’s enuresis. The first four questions assesses the prevalence of night time wetting.

The next questions in this section of the questionnaire describe medical/family history and behavioural wetting. As this study aims to describe only the prevalence on NW and level of awareness among parents on NE, the later sections on medical/family history, behavioral wetting, and correlated factors are not discussed in this paper.

The awareness section of the questionnaire is divided into 3 sections. The first section aims to find out the level of awareness of NE using the following questions:

1. Are you aware of nocturnal enuresis?
2. Are you aware of your child’s night time wetting?
3. Do you know if your child is wetting bed even after the age of 5 years than it is considered as atypical/ do you know that children are expected to be dry by the age of 5 years?
4. Are you aware of the fact that bed wetting also often run in families?
5. Do you know bed wetting at night may affect your child’s sleep?
6. Are you aware that bed wetting can have a deep impact on a child’s behaviour or self-esteem?

The second section explores the knowledge about therapeutic/medical intervention and the third section asks about the parental attitude towards children’s bed wetting, these two sections were not evaluated and correlated while quantifying the level of awareness.

**Data Analysis:** Descriptive analysis was used for finding the mean, percentage, standard deviation, and Chi square test applied for identifying the prevalence of night time wetting by age groups and gender distribution. Data from incompletely filled out forms was not evaluated for analysis.
FINDINGS

A total of 450 questionnaires were distributed out of which 300 questionnaires were considered and evaluated. The distribution of respondents mentioned in the (Graph1). The percentage of children with night time wetting was found to be 23% in the 6-8-year-old age group, 13% in 9-11-year-old and amongst the 12-15 age group, it was 2%. The overall prevalence of nocturnal enuresis in 6-15-year-old children was 12.67% and age group breakdown is depicted in (Table I). The overall level of awareness about NE among parents of 6-15-year-old children was found to be 35.83% (Table II). The highest response rate was ‘No’ to the awareness questions at 46.33% which means they knew what is night wetting/NE was but were unaware about its implication. ‘Don’t know’ response meant parents were unaware and uncertain about the existence of a condition called night wetting/NE. We calculated both ‘No’ and ‘don’t know’ response as unawareness.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Male</th>
<th>Female</th>
<th>Without night-time wetting</th>
<th>%</th>
<th>With night-time wetting</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-8y</td>
<td>56</td>
<td>44</td>
<td>77</td>
<td>77.00</td>
<td>13</td>
<td>23</td>
<td>23.00</td>
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<tr>
<td>9-11y</td>
<td>75</td>
<td>25</td>
<td>87</td>
<td>87.00</td>
<td>11</td>
<td>13</td>
<td>13.00</td>
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<tr>
<td>12-15y</td>
<td>60</td>
<td>40</td>
<td>98</td>
<td>98.00</td>
<td>2</td>
<td>2</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Chi-square = 19.9482 p = 0.0001*

Sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>165</td>
<td>26</td>
<td>191</td>
</tr>
<tr>
<td>Female</td>
<td>97</td>
<td>12</td>
<td>110</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>38</td>
<td>300</td>
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</table>
Table II: Awareness among parents of 6-15 years of school children and comparison of age groups with respect to awareness questions (Q.i-Q.vi)

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Age groups</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>Don’t know</th>
<th>%</th>
<th>Total</th>
</tr>
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<td>46.00</td>
<td>20</td>
<td>20.00</td>
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<td></td>
<td>9-11yrs</td>
<td>20</td>
<td>20.00</td>
<td>54</td>
<td>54.00</td>
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<tr>
<td></td>
<td>12-15yrs</td>
<td>24</td>
<td>24.00</td>
<td>44</td>
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<td>Total</td>
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<td>42</td>
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<td>41</td>
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<td>17</td>
<td>17.00</td>
<td>100</td>
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<tr>
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<td>53.00</td>
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<td>12-15yrs</td>
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<td>Total</td>
<td>95</td>
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<td>46.00</td>
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<td>41.00</td>
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<td>42.00</td>
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<td></td>
<td>Total</td>
<td>108</td>
<td>36.00</td>
<td>140</td>
<td>46.67</td>
<td>52</td>
<td>17.33</td>
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<td>51.00</td>
<td>16</td>
<td>16.00</td>
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<td>9-11yrs</td>
<td>22</td>
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<tr>
<td>Q. vi</td>
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<td>42.00</td>
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<tr>
<td></td>
<td>9-11yrs</td>
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<td>45</td>
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<td>133</td>
<td>44.33</td>
<td>49</td>
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<tr>
<td>Overall response to Awareness section</td>
<td></td>
<td>35.83%</td>
<td></td>
<td>46.33%</td>
<td></td>
<td>17.83%</td>
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</tr>
</tbody>
</table>

*p<0.05*

**DISCUSSION**

In a study from The United Kingdom prevalence of NE was quoted at 15%-20% in 5-year-olds, 7% in 7-year-olds, 5% in 10-year-olds, 2-3% in those 12 - 14 years and 1% - 2% in 15 years of age[19]. This is similar to other studies which found that the prevalence of enuresis decreases with an increase in the age of the child[20]. In the Indian population studied in this paper, nocturnal enuresis persisted in mid-teens with the prevalence gradually decreasing with age as is seen in other published studies[19]. Prevalence’s of 12.6% and 11.3%NE were found in rural India in school going children[12, 21]. In urban Mumbai in 6-10 years school children the reported prevalence was 7.61%, factors such as family stress, significant birth history and lower socioeconomic status have been found to be confounders in the NE group[14]. Our study shows a high prevalence in young children, indicating intervention needs to be started early so that the prevalence may reduce or become nil at the later ages. The study by De Sousa et al stressed on the need for parental education and awareness of nocturnal enuresis[14]. The lack of awareness about nocturnal enuresis amongst parents in our study could
be reflective of a lack of knowledge about the condition in the local society. Parents were found to be unaware of the consequences of the condition on their child. To the best of our knowledge there are no other studies that looked at parental awareness of nocturnal enuresis hence we could not correlate the level of awareness among parents with other studies. A few published studies state that there is a need to create parental awareness about this condition [12] which is reflected in our study. Parental lack of knowledge means that they are also unaware of the role physical rehabilitation plays in the management of enuresis so may not have thought to discuss it with the Physiotherapist. Furthermore since this research has quantified the level of awareness and noticed in spite of being in urban area, there was lack of awareness on NE. So parents as well as the children can be made aware by conducting camps, providing pamphlets on information on NE and also by implementing other source of mass communication and by targeting the school children and to educate parents, so they take adequate measure to treat their children and do not consider it as matter of social stigma nor consider bed wetting as a normal physiological process even after the age 5 years and take appropriate treatment for their children.

There are a few limitations to this study. These results may not be generalizable as we studied only one geographical and urban area. The socio economic status of the parents was not considered in the current study, this group may or may not be typical of other areas in India, and it is anticipated that similar areas will have a lack of understanding about NE. However, more urban/rural/educated areas may have very different results. We were unable to obtain an equal distribution of males and females in the sample. Many studies report that there is a skewed distribution of NE towards males. Further studies should be set on multi-centre studies with larger samples including the rural set ups.

CONCLUSION

Study found a prevalence rate of nocturnal enuresis of 12.67% in 6-15year old children and also the awareness of NE as a health concern among parents of these children was found to be a very low 35.83% in Dharwad. As the prevalence is noted in this population but they don’t present their children for therapies and further advice from the medical professionals. Health promotion and education can be targeted at this common condition and its management and prevalence may become nil at the later ages. As a further scope, the follow up of the 2% adolescents with NE can be considered to find out what happens to their NE in future.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: SDM College of Medical Sciences and Hospital, Dharwad

REFERENCES


Effect of Adopting Ergonomic Principles in Office Employees with Forward Head Posture

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ABSTRACT

Purpose of the study: To find the effect of adopting ergonomic principles in office employees with forward head posture

Method: 30 subjects within the age group of 20 - 50 years, diagnosed with forward head posture coming to physiotherapy department of Krishna hospital, Karad were selected for the study. Subjects were explained about the procedure of the study. Ergonomic exercises such as (self-stretching and chin tucks and postural correction) are taught to the subjects. Before the treatment protocol the subjects were assessed for pain by VAS, disability by NDI, and cervical range of motion which includes CROM, CRA and CVA. Interventions were carried out for a period of 2 weeks (3 times/day) the post treatment assessment was done for pain by VAS, disability by NDI, and cervical range of motion which includes CROM, CRA and CVA.

Results: The data statistically analysed by using paired t-test and unpaired t-test for CVA and CRA. A decrease in pain, disability and CVA and CRA noted during and post application of ergonomic principles when compared to pre application values and the results were extremely significant. A very significant difference was noted during the application of ergonomic principles when compared to pre application values in which there was no significant difference seen. The statistical analysis was done for VAS and NDI using Mann -Whitney test. During pre-treatment there was no significant difference and during the post treatment showed very significant difference.

Conclusion: From this study, it can be concluded that there was extremely significant improvement in the office employees who adopted the ergonomic principles statistically and clinically. Overall there was significant difference found in pre and post treatment.

Keywords: visual analogue scale, neck disability index, cranial vertical angle, cranial rotational angle, cervical range of motion.

INTRODUCTION

There are many postural abnormalities in office employees among which forward head posture is the most common postural abnormality seen.

Forward head posture is described as hyperextension of the upper cervical spine (c1-c2) and flexion of the lower cervical spine (c4-c7). It is mainly caused due to sitting at a desk for long time the constant use of computers has caused many office employees to develop forward head posture. The prevalence of forward head posture is reported as high as 24, 5% among office employees.
In this posture there is weakness of deep neck flexors associated with shortening of the opposing cervical extensors\(^6,7\). In forward head posture the centre of gravity of head is anterior to the vertical axis thereby increasing the load on posterior neck muscles\(^8,9,10\) which leads to isometric contraction of the neck and shoulder muscles which leads to straining of the neck muscles. Pain and fatigue are some of the common symptoms in forward head posture\(^11\).

The conventional treatment for forward head posture includes stretching of the shortened muscles (upper trapezius, sternocleidomastoid, levator scapulae pectoralis major and minor) and strengthening of the weakened muscles (deep cervical flexor) have been found effective\(^12\) which include chin tucks, shoulder blade squeezes, stretching of the neck muscles and neck isometrics\(^13\).

Ergonomics is described as science of arranging things so that the people can access them easily and safely\(^14\) studies have showed that in work places installing ergonomic programmes based on training or workplace exercises are effective in reducing work related musculoskeletal disorders\(^15\).

There is no much study done on the postural correction in office employees. Therefore the purpose of the study is to analyse the effect of adopting ergonomic principles in office employees with forward head posture.

**Participants:** 30 forward head posture subjects, 13 males and 17 females within age group of 20 - 50 years were included in the study. Simple random sampling method was used for data collection in this experimental study. Subjects with a history of head injury, balance disorders, visual deficits, recent surgery, were excluded.

**Outcome Measures:**
- Cranial vertical angle
- Cranial rotational angle
- Cervical range of motions
- Neck disability index
- Visual analogue scale

**Procedure:** Study was conducted in physiotherapy OPD of Krishna hospital and medical research centre, Karad, after approval of protocol committee and institutional ethics committee. Written informed consent was taken from the participants willing to participate. Outcome assessment was done before adopting ergonomic principles. Ergonomic principles explained to office employees were Self stretching exercises, Chin tucks, Neck isometrics, Arrangements of computer screen and keyboard, Arrangement of desks & seats to avoid further protrusion of the head leading to forward head posture. The subjects were asked to perform these exercises for 3 times each day and the treatment protocol continued for 2 weeks.

**STATISTICAL ANALYSIS**

Data was analysed using INSTAT software to verify the result obtained. Various statistical measures such as mean, standard deviation, and paired, unpaired t test for significance, Mann-Whitney test, Wilcoxon matched pair t test was utilized for this purpose. Probability values less than 0.005 were considered statistically significant and probability values less than 0.0001 were considered statistically extremely significant. Comparison of Pre and Post treatment values was analysed using paired t test and unpaired t test.

**RESULTS**

Age of the subjects in this study was between 20-50 years with mean age 31.46.

In the present study pre interventional mean CVA was 46.62 ± 2.41, whereas post-interventional mean CVA was 48.35 ± 2.54 respectively. This was done by using paired t test which showed extremely significant difference between pre and post treatment. (p = <0.0001, t = 9.514).

In the present study pre interventional mean CRA was 150.00± 7.29, whereas post-interventional mean CRA was 148.04 ± 7.28 respectively. This was done by using paired t test which showed extremely significant difference between pre and post treatment. (p = 0.0001, t = 9.775)

**Flexion:** In the present study pre-interventional mean of flexion is 32.7 ± 8.64. Whereas post interventional mean of flexion is 35.9 ± 8.44. This was done by using paired t test which showed extremely significant difference between pre and post treatment (p = <0.0001, t = 9.775)
**Extension:** In the present study pre-interventional mean of extension is 39.2 ± 7.2 whereas post intervention mean of extension is 42.6 ± 7.3 this was done by using paired t test which showed extremely significant difference between pre and post treatment (p < 0.0001, t = 4.6560)

**Right rotation:** In the present study pre-interventional mean of right rotation was 60.4 ± 6.02 whereas post interventional mean of right rotation is 62.2 ± 6.99 this was done by using paired t-test which showed very significant difference between pre & post treatment (p = 0.0074, t = 2.882)

**Left rotation:** In the present study pre – interventional mean of left rotation was 61.3 ± 6.75 whereas post interventional mean of left rotation is 63.9 ± 5.06 this was done by using paired t-test which showed extremely significant difference between pre and post treatment (p = 0.0002, t = 9.637)

**Rt lateral rotation:** In the present study pre-interventional mean of Rt lateral rotation was 40.03 ± 4.23 whereas post interventional mean of Rt lateral rotation is 42.66 ± 3.951 this was done by using paired t-test which showed extremely significant difference between pre and post treatment (p = 0.0001, t = 9.637)

**Lt lateral rotation:** In the present study pre-interventional mean of Lt lateral rotation was 40.26 ± 3.93 whereas post interventional mean of Lt lateral rotation is 42.9 ± 4.03 this was done by using paired t test which showed extremely significant difference between pre and post treatment (p = 0.000, t = 11.334)

**Neck disability index:** In the present study pre-interventional mean of NDI was 14.73 ± 3.36 whereas post-interventional mean of NDI is 12 ± 3.38 the pre - post analysis of NDI score was done using mann-whitney test. Post interventional test showed very significant difference between pre and post treatment.

**Visual analogue scale:** In the present study pre-interventional mean of VAS was 6.53 ± 1.22 whereas post-interventional mean of VAS is 4.36 ± 1.15 the pre-post analysis of VAS was done by using mann-whitney test, post interventional test showed extremely significant difference between pre and post treatment.

**DISCUSSION**

**Table 1: Age distribution**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Age</th>
</tr>
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<td>Group</td>
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**Table 2: Gender Distribution Table**

<table>
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<th>Distribution</th>
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<td>Males</td>
<td>13</td>
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<tr>
<td>Females</td>
<td>17</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
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</tbody>
</table>

**Table 3: Comparison of Pre and Post treatment CVA**

<table>
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<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>‘t’</th>
<th>‘p’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46.62 ± 2.41</td>
<td>48.35 ± 2.54</td>
<td>9.514</td>
<td>&lt;0.0001</td>
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</table>

**Table 4: Comparison of Pre and Post treatment CRA**

<table>
<thead>
<tr>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>‘t’</th>
<th>‘p’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
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</tr>
<tr>
<td>150 ± 7.29</td>
<td>148.04 ± 7.28</td>
<td>9.775</td>
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**Table 5: Comparison of Pre and Post treatment cervical range of motion**

<table>
<thead>
<tr>
<th>Action</th>
<th>Pre- treatment</th>
<th>Post-treatment</th>
<th>‘t’</th>
<th>‘p’</th>
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<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
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<td></td>
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<tr>
<td>Flexion</td>
<td>32.7 ± 8.64</td>
<td>35.9 ± 8.44</td>
<td>11.451</td>
<td>&lt;0.0001</td>
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<tr>
<td>Extension</td>
<td>39.2 ± 7.2</td>
<td>42.6 ± 7.3</td>
<td>4.656</td>
<td>&lt;0.0001</td>
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<tr>
<td>Right Rotation</td>
<td>60.4 ± 6.02</td>
<td>62.2 ± 6.99</td>
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</tr>
<tr>
<td>Left Rotation</td>
<td>61.3 ± 6.75</td>
<td>63.9 ± 5.06</td>
<td>4.320</td>
<td>0.0002</td>
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<tr>
<td>Right Lateral Flexion</td>
<td>40.03 ± 4.23</td>
<td>42.66 ± 3.951</td>
<td>9.637</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Left Lateral Flexion</td>
<td>40.26 ± 3.93</td>
<td>42.9 ± 4.03</td>
<td>11.334</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
DISCUSSION

Forward head posture is described as hyperextension of the upper cervical spine and flexion of the lower cervical spine. It is mainly caused due to sitting at a desk for long time the constant use of computers has caused many office employees to develop forward head posture.

The aim of the study was to analyse the effect of ergonomic principles in office employees with forward head posture. This study was done and the results was analysed using VAS, CROM, CRA, CVA and, neck disability index as the outcome measures.

The results was statistically analysed using paired t test for CVA, CRA, CROM which showed there was a extremely significant difference between pre and post treatment. Pre and post treatment of CVA showed an extremely significant difference (p=<0.0001, t=9.514), Pre and post treatment of CRA showed a very significant difference (p=<0.0001, t=9.775).

The results showed extremely significant improvement in office employees with forward head posture in improving cervical range of motion movements and reducing pain and neck disability.

The findings of present study showed that there was extremely significant improvement with the ergonomics principles in the office employees with forward head posture.

CONCLUSION

The current study after analysing statistically strongly emphasizes that adopting ergonomic principles with forward head posture in office employees has significant effect in reducing pain and disability and also helped in improving the cervical range of motion. We expect that adopting these ergonomics principles in office employees with forward head posture can give better results and helps in reducing postural disabilities. Thus the alternative hypothesis is proved.

Source of Funding: Krishna Institute of Medical Sciences Deemed to be University, Karad.

Conflict of Interest: NIL

Ethical Clearance: Study approved by Institutional ethical committee of Krishna Institute of Medical Sciences Deemed to be University, Karad.

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To Compare the Immediate Effects of Active Cranio Cervical Flexion Exercise Versus Passive Mobilization of Upper Cervical Spine on Pain, Range of Motion and Cranio Cervical Flexion Test in Patients with Chronic Neck Pain

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¹Associate Professor, ²B. P. Th, ³Principal and Professor, MVP’s College of Physiotherapy, Nashik

ABSTRACT

Background: Neck pain is a common musculoskeletal problem. Occasionally neck pain might be related to a severe pathology such as nerve compression, a prolapsed intervertebral disc, or a fracture. Cervical spine is surrounded by arrangement of muscles that leads to control head and neck. The deep cervical flexor muscle group is an important stabilizer of head and neck posture located on anterior and lateral surface of cervical spine. Neck pain is considered chronic if it lasts for more than 3 months. Reduced activation of deep cervical flexors muscles has been observed directly and indirectly when people with neck pain perform the cranio-cervical flexion test, used as an exercise cranio-cervical flexion succeeds in both immediate and long term pain relief.

Purpose of Study: The purpose was to compare the immediate effects of active cranio-cervical flexion exercise with passive mobilization of upper cervical spine on pain, cervical range of motion and cranio-cervical flexion test (CCFT).

Aim: To observe the immediate effects of active cranio-cervical flexion exercise with passive mobilization of upper cervical spine on pain, cervical range of motion and cranio-cervical flexion test (CCFT).

Objective: To find out the immediate effect of active cranio-cervical flexion exercise versus passive mobilization of upper cervical spine on pain, cervical range of motion and cranio-cervical flexion test (CCFT).

Method: This experimental study was conducted on 34 chronic neck patients and they were divided into 2 groups, 17 patients were included in each group. Patient aged 20-50 years were taken from NDMVP Hospital and research centre and physiotherapy clinic in an around Nasik. Random sampling method was used for study. Pain, cervical range of motion (ROM) and cranio-cervical flexion test (CCFT) was assessed.

Results: Using T-test statistically P Value was less than 0.001, so, according to result group B(passive mobilization) was more effective.

Conclusion: Both groups were effective in reducing pain, ROM and CCFT in patients with chronic neck pain. It was also seen that in group 2 i.e. passive mobilization of upper cervical spine clinically more improvement was seen as compared to the other group.

Keywords: Neck pain, Exercise, Mobilization, CCFT.

INTRODUCTION

Neck pain (NP) is a common problem in the community, affecting approximately 70% of population. In one year, 30% of adults will report Neck pain¹. The cervical vertebral column includes seven cervical vertebrae. The cervical column is divided into two
regions i.e the upper cervical or craniocervical region and the lower cervical spine. The craniocervical region includes occipital condyles and the first two vertebrae; C1 and C2 i.e atlas and axis. The lower cervical includes C3 to C7 vertebrae. Vertebrae from C3 to C6 are typical cervical vertebrae. The atlas, axis and C7 vertebrae are considered to be atypical vertebrae.

Cervical spine is an arrangement of muscles that leads to control head and neck. The deep cervical flexors (longus colli, longus capitis, rectus capitis anterior and lateralis) are stabilizers of head and neck. Cause of recurrent mechanical neck pain can be disturbance in motor control of the cervical spine which might increase the risk of micro trauma of cervical structures. It has been observed that people with neck pain performing craniocervical flexion test shows reduced activation of deep cervical flexors. Used as an exercise intervention craniocervical flexion has shown positive results in both immediate and long term pain relief and leads to improve coordination between the deep and superficial cervical flexors. Passive joint mobilization may be a useful technique to improve cervical muscle activation when painful or limited joint mobility makes the movement difficult.

Deep cervical flexor (DCF) helps in postural function by supporting and straightening the cervical lordosis. It has been found that certain muscles in the cervical spine tend to weaken in NP, the most common of these being the DCF.

The CCFT is a clinical test used to assess an individual’s ability to slowly perform and hold a precise upper cervical flexion action without flexion of the mid and lower cervical spine.

AIM

To observe the immediate effect of active craniocervical flexion exercise versus passive mobilization of upper cervical spine on pain, cervical range of motion and cranio-cervical flexion test (CCFT).

OBJECTIVES

1. To see the immediate effect of assisted active craniocervical flexion (exercise group) on pain, cervical range of motion and cranio-cervical flexion test.

2. To see the immediate effect of passive mobilization on pain, cervical range of motion and cranio-cervical flexion test.

3. To compare the immediate effect of pain, cervical range of motion and cranio-cervical flexion test.

MATERIAL AND METHOD

This experimental study was conducted on 34 chronic neck patients and were divided into 2 groups, 17 patients were included in each group. Patient aged 20-50 years were taken from NDMVP Hospital and research centre and physiotherapy clinic in an around Nasik. Random sampling method was used for study. Pain, cervical range of motion (ROM) and cranio-cervical flexion test (CCFT) was assessed.

Inclusion Criteria:

- Age 20 to 50 years.
- History of chronic non-severe neck pain more than 3 months.
- Poor performance on clinical craniocervical flexion test (unable to achieve 20-24 mmHg).
- Pain intensity more than 3 on numerical rating scale (NRS).

Exclusion Criteria:

- People with severe neck pain.
- History of fracture, trauma and surgery around cervical spine.
- Patient suffering from vertigo or dizziness.
- Patients having congenital cervical disorders i.e cervical rib, torticollis, thoracic outlet syndrome.
- Any neurological disorder i.e vertigo.

PROCEDURE

34 patients suffering from chronic neck pain meeting inclusion criteria were included in group and were randomly divided into 2 groups: Group 1 (Exercise group), Group 2 (Mobilization group). Demographic data of the patient, degrees of cervical range of motion with the help of goniometer, pain with the help of NRS and CCFT was taken and informed consent form was filled by the patients.

(A) Active craniocervical flexion (exercise group):

Patient crook lying with cervical spine in neutral position and instructed to perform repeated movements of craniocervical flexion at the rhythm of one repetition per 2 sec for one min with the help of sphygmanometer. The therapist assisted the action of craniocervical flexion.
cradling the head of the patient and guiding the correct movement. Then patient performed the movement independently. This mobilization enhance the dorsal glide of the occipital condyles with cranio-cervical flexion. Mobilization force not standardized and is given according to every patient.

(B) Passive mobilisation with cranio-cervical flexion (mobilization group): Patient positioned in crook lying and the rhythmic one repetition per 2 sec for one min was given. Mobilization with assisted cranio-cervical flexion movement was given. Grade III Maitland mobilization for cranio-cervical flexors was given. For passive mobilization, therapist placed hand dorsally at the level of the vertebral arch of C1 to stabilize it and the other hand held the occiput dorsally, then move head dorsally against the stabilized atlas in a straight line and maintain this position.

The therapist performed the outcome measures before and immediately after the treatment. NRS and Cervical range of motion (ROM) was assisted in sitting, CCFt measured.

(C) Cranio-cervical flexion test: Patient supine, fold bladder of biofeedback unit, place it beneath the arch of the neck abutting the occiput. Inflate the stabilizer about 20mmHg. Gauge hold by patient using a towel roll beneath elbow. Instruct patient to perform a chin tuck and try to move the needle to the first incremental stage (22mmHg). Test the ability of the patient to hold each level for 10 seconds and progress 2 mmHg at a time. 3-4 times for 10 second holds with motor control should be demonstrated before going to the next level (30mmHg).

RESULT SHOWING BETWEEN GROUP COMPARISON

Table I: Paired T-Test was used for within Group Comparison i.e. (Group A and Group B)

<table>
<thead>
<tr>
<th>OUTCOME MEASURES</th>
<th>GROUP A</th>
<th>GROUP B</th>
<th>T VALUE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRE TREATMENT</td>
<td>PRE TREATMENT</td>
<td></td>
<td></td>
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<td>SD</td>
<td>MEAN</td>
<td>SD</td>
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<tr>
<td>CX ROM</td>
<td>FLEXION</td>
<td>73.88</td>
<td>3.94</td>
<td>78.71</td>
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<td>EXTENSION</td>
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<td>3.50</td>
<td>63.55</td>
<td>3.94</td>
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<tr>
<td>RT LAT FLEXION</td>
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<td>3.49</td>
<td>33.59</td>
<td>5.26</td>
</tr>
<tr>
<td>LFT LAT FLEXION</td>
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<td>3.70</td>
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<tr>
<td>RTLAT ROTATION</td>
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<td>2.83</td>
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<tr>
<td>LFTLAT ROTATION</td>
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<td>3.84</td>
<td>82.59</td>
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<tr>
<td>CCFt</td>
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<td>1.22</td>
<td>21.06</td>
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<tr>
<td>VAS</td>
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<td>1.11</td>
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<td>1.32</td>
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Table II: Unpaired T-test was used for between group comparison i.e. (Group A and Group B)

<table>
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<tr>
<th>OUTCOME MEASURES</th>
<th>GROUP A POST RX</th>
<th>GROUP B POST RX</th>
<th>T-VALUE</th>
<th>P-VALUE</th>
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<td>VAS</td>
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<td>0.94</td>
<td>4.53</td>
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</table>

DISCUSSION

The purpose of the study was to determine the immediate effects of active cranio cervical flexion exercise with passive mobilization of upper cervical spine on pain, range of motion and cranio cervical flexion test (CCFT) in patients with chronic neck pain. The results confirm that both active and passive interventions lead to immediate relief of pain. The result indicated that passive mobilization was more effective as compared to active cranio cervical flexion exercise on pain, cervical range of motion and CCFT. The previous observation that active exercise resulted in immediate pain relief on VAS observed by O’Leary et al., 2007 shows the notion that specific exercises of the deep cervical muscles can induce immediate hypoalgesia to painful cervical spine structures improved motor control of the cervical spine relies on active and repetitive exercise therapy. This finding supports the recommendation of active exercise in the rehabilitation of patients with neck pain by Albright et al., 2001; Jull et al., 2008.

Oscillatory mobilization of cervical spine has also been shown previously to result in immediate pain relief in patients with neck pain. Bialosky et al., 2009; Melzack and Wall, 1996; Nijs et al., 2010; Nijs and Van Houdenhove, 2009; Schmid et al., 2008 shows that the active repeated movement in the exercise group likely produced greater sensory input into the pain modulating system compared to the passive mobilisation. Such mechanical sensory input is considered to be an important mechanism for pain relief mobilization was applied in a sustained mode and perhaps this technique has a greater effect on mobility rather than pain the mobilisation employed in this study was specific to the upper cervical region and it is unknown whether cranio-cervical flexion range of motion was enhanced by the intervention, it is unknown whether the active intervention improved range of cranio cervical movement despite no significant change in cervical range of motion. Sustained mobilization in tested in this study display a significant reduction in pain during the range of motion tests, which supports the notion of a generally greater pain relieving effect for the exercise compared to the active group. The exercise group displayed an improvement in performance of the motor task, which was reflected in a reduction of sternocleidomastoid and anterior scalene.

Some studies have reported positive effects of passive mobilisation on performance of the CCFT. For example, decreased activity of the sternocleidomastoid was observed immediately following a posteroanterior oscillatory grade III Maitland mobilisation to the articular pillar of C5-6. These changes occurred at the lower levels of the CCFT (22mmHg) by Sterling et al., 2001. In a more recent study, the same mobilisation was shown to reduce the level of sternocleidomastoid activity on the CCFT, but mainly at the highest level of the CCFT (i.e. 30 mmHg) by Jesus-Moraleida et al., 2011. Both studies used an oscillating movement for mobilisation with large amplitude, while a sustained mobilisation was used in the current study.

Oscillatory mobilisations may be superior at improving motor function due to their pain alleviating effect. The above mentioned studies did not compare the effects of the passive mobilisation to that of an active intervention. As confirmed in the current study, an active intervention produces superior gains in motor control immediately post-intervention. Since the mobilisation intervention failed to improve CCFT performance, it appears that motor control is not spontaneously improved despite the relief of pain achieved with passive mobilization.
The process of exercise-induced adaptations of the motor system depends on several factors, including neuronal by Adkins et al., 2006 and muscular changes by Coffey and Hawley, 2007. Due to short duration and the low load nature of the intervention applied in the exercise group the improved performance on CCFT post exercise likely reflects neural rather than peripheral adaptation. Performance on CCFT was better in passive mobilization group because it was an immediate effect. Motor learning effect does not occur because it is an immediate effect. Cranio cervical flexion represents the action of the longus capitis in synergy with the longus colli, which causes a reduction of the cervical lordosis. The pressure biofeedback unit, which was placed behind the neck, monitored the flattening of the cervical spine as the deep neck flexors were activated. The results of our study revealed that the highest pressure level successfully achieved during the CCFT was less on average in the subjects with chronic neck pain. The results may suggest that those patients with chronic neck pain may tend to develop an increased cervical lordotic posture associated with a forward head posture.

Conclusion: The study concluded that passive mobilization group was more effective than active cranio cervical flexion exercise group on pain relief, cervical ROM and performance on CCFT in patients with chronic neck pain.

Limitations of the Study:
1. The study had smaller sample size and duration
2. The study was not gender specific.
3. Occupation of patient was not considered for treatment.

Conflict of Interest: None

Ethical Clearance: Yes

Disclaimers: None

Source of Funding: self

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3. Enrique Lluch a, Jochen Schomacher b, Leonardo Gizzi c, Frank Petzke c, Dagmar Seegar c, Deborah Falla c,d,*Immediate effects of active cranio-cervical flexion exercise versus passive mobilisation of the upper cervical spine on pain and performance on the cranio-cervical flexion test Manual Therapy xxx (2013) 1e7


Effectiveness of Flex Bar Eccentric Exercises Versus Progressive Resistance Exercises of Wrist on Pain, Pain Free Grip Strength and Functional Activities in Sub Acute Tennis Elbow

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ABSTRACT

Objectives: to compare the efficacy of Flex bar Eccentric wrist exercises (FBE) versus Progressive resistance exercises (PRE) on pain, pain free grip strength and Functional activities in Sub acute tennis elbow.

Study Design: Comparative case control study.

Methodology: Forty subjects (both gender) age group 35-50 years with a diagnosis of sub acute Tennis Elbow were selected from department of Physiotherapy, Nootan General Hospital, Visnagar, Gujarat. These subjects were randomly assigned into two equal groups i.e. 20 subjects in each group. Group-1: Subjects were received treatment comprised of Flexbar Eccentric exercise of wrist extensors (FBE) along with Therapeutic Ultrasound. Group -2: Subjects were received progressive resistance exercises (PRE) along with Therapeutic Ultrasound. Continue the exercises once a day, 7 days a week, for about 3 weeks. Data was collected on 1st day, at the end of 1st week, and at the end of 3rd week for outcome measures of pain on VAS, Pain free grip strength (PFGS) by HHD & Patient-Rated Tennis elbow Evaluation (PRTEE) questionnaire score for Functional activities. Comparison between the two groups was done on Paired T test.

Results: Result suggest that both form of exercises are effective but at the end of 1st week and 3rd week the relief in Pain, increase in PFGS and improvement in function was more in Flexbar Eccentric Exercises group.

Conclusion: Flexbar Eccentric wrist extensors Exercises are effective in the treatment of Sub acute Tennis Elbow.

Keywords: Flex bar Eccentric Exercises, Progressive Resistance Exercises, VAS, Pain free grip strength (PFGS), Patient-Rated Tennis elbow Evaluation (PRTEE) questionnaire.

INTRODUCTION

Tennis elbow, a chronic inflammation of wrist extensors muscles (mainly extensor carpi radialias brevis) at their attachments to the humerus near the lateral condyle, Tennis elbow is caused by repeated forceful contraction of wrist extensors, primarily the extensor carpi radialis brevis (ECRB). The tensile stress created at the origin of ECRB may cause microscopic tears that lead to inflammation of the lateral epicondyle. Tennis elbow is thought to be the result of micro trauma, the overuse and inflammation at the origin of the ECRB as a result of repeated large impact forces created when the ball hits the racket in the backhand stroke. Repetitive microtoma injury can lead to mucinoid degeneration of the extensor origin and subsequent failure of the tendon. The treatment of tennis elbow is often a frustrating experience for the clinicians due to the frequent failure of obtaining a symptomatic improvement in the patient. This failure is equally apparent in both conservatively & surgically treated patients. Therefore the management of tennis elbow both at early and late stages has been suggested to be primarily a conservative approach. Physical therapy is
another important component to conservative treatment of lateral epicondylitis. Traditionally, physiotherapy was aimed at stretching and strengthening the extensors of the forearm. According to the research by Svernl and Adolffson (2001) the eccentric portion of the exercise may actually have a greater benefit than the concentric portion; however, more research is needed before a greater and clearer understanding of the role isolated eccentric exercise plays in the rehabilitation of degenerative tendon conditions is achieved. Multiple sets of 15 to 20 repetitions are recommended to promote muscular endurance. Several studies show superior results in the treatment of humeral epicondylitis using progressive resistive exercise. Study done by Timothy Tyler in 2009 found that Subjects performing the FlexBar® exercise in addition to standard PT had significantly more improvement than the group receiving only standard PT. Purpose of this study was to compare the efficacy of Flex bar Eccentric wrist exercises (FBE) versus Progressive resistance exercises (PRE) on pain, pain free grip strength and Functional activities in Sub acute tennis elbow.

MATERIAL & METHOD

Evaluation of study subjects: A sample of convenience of 40 subjects both male & female with age range from 35-50 yrs with diagnosis of Sub acute Tennis elbow by the Orthopedic Surgeon were recruited from the Nootan General Hospital, and Nootan College of Physiotherapy Visnagar, Gujarat. Subjects were randomly assigned in to two groups i.e. 20 subjects in each group.

Inclusion criteria: Patients with tennis elbow in subacute phase (more than 3 weeks old condition), given their consent to participate in this study with complain of pain over lateral epicondyle on grip strength test or Cozen’s Test and no prior history of surgical treatment for their tennis elbow were included in this study.

Exclusion criteria: Bilateral tennis elbow, lateral elbow pain due to pain originating from neck, shoulder and wrist, previous history of fracture of the arm, forearm causing limitation in upper limb function, received a corticosteroid injection in the last 12 months before inclusion, Rheumatoid arthritis. Malignancy and Neurological abnormalities.

Outcome measures: Pain on VAS: Tennis elbow pain was recorded on (VAS) which is a 10 cm horizontal line, 0 represented no pain while 10 represented extremely intense pain. VAS was given to all participants and was asked to place a vertical mark along the line where they feel pain. VAS provides a reliable method for measuring pain and is sufficiently sensitive to detect distinct differences in pain experience.

PRTEE Questionnaire: Patient-rated Tennis Elbow Evaluation (PRTEE) Questionnaire developed by Joy C. MacDermid (2010) is a 15-item questionnaire designed to measure forearm pain and disability in patients with lateral epicondylitis (also known as “tennis elbow”). The PRTEE allows patients to rate their levels of tennis elbow pain and disability from 0 to 10, and consists of 2 subscales:

1. PAIN subscale (0 = no pain, 10 = worst imaginable)
   Pain - 5 items  Best score = 0; Worst score =50
2. FUNCTION subscale (0 = no difficulty, 10 = unable to do)
   Specific activities - 6 items
   - Best Score = 0; Worst Score = 60
   Usual activities-4 items
   -Best Score = 0; Worst Score = 40
   Function Subscale - (Specific Activities + Usual Activities)/2- Best score= 0; Worst score =50
   Total Score = Pain Subscale + Function Subscale
   - Best Score = 0 Worst Score = 100
(Pain and disability contribute equally to score)

The reliability of PRTEE ranges from 0.85 to 0.94, and it is known as a very reliable evaluation method.

Pain Free Grip Strength (PFGS) by using hand held dynamometer: PFGS test is used to measure the amount of grip force that the patient generates prior to the onset of pain; when there is no pain the test result could be regarded as maximum grip strength. It is commonly performed in patients with lateral epicondylalgia (LE). Measurements of grip strength taken with the JAMAR Hydraulic Hand Dynamometer have evidence for good to excellent (r > 0.80) test–retest reproducibility (Mathiowetz Vet al 1984) and excellent (r = 0.98) interrater reliability (Peolsson A et al 2001). Patients were instructed to follow Southampton protocol for adult grip strength measurement:

1. Sit the participant comfortably in a standard chair with legs, back support and fixed arms. (2) Ask them to rest their forearms on the arms of the chair with their wrist just over the end of
the arm of the chair—wrist in a neutral position, thumb facing upwards. (3) Position the hand so that the thumb is round one side of the handle and the four fingers are around the other side. (4) The observer should support the base of the dynamometer on the palm of their hand as the subject holds the dynamometer. (5) Encourage the participant to squeeze as long and as tightly as possible or until the needle stops rising. Once the needle stops raising the participant can be instructed to stop squeezing. (6) Read grip strength in kilograms from the outside dial and record the result to the nearest 1 kg on the data entry form. (7) Do two further measurements for each hand alternating sides to give three readings in total for each side. (11) The best of the three grip strength measurements of the affected side hand is used in statistical analyses so as to encourage the subjects to get as high a score as possible.

Procedure: Written consent was taken from each patient who fulfills the inclusion criteria of the study. 40 Shortlisted patients were randomly assigned into two different groups of 20 in each group. Group-1: Subjects were received treatment comprised of eccentric strengthening exercise by using a Flexbar (FBE) along with Therapeutic Ultrasound (pulse mode). Patients were asked to hold FlexBar in involved hand in maximum wrist extension; grab other end of FlexBar with uninvolved hand. Twist FlexBar with noninvolved wrist while holding the involved wrist in extension. Bring arms in front of body with elbows in extension while maintaining twist in FlexBar by holding with noninvolved wrist in full flexion and the involved wrist in full extension. Slowly allow FlexBar to ‘untwist’ by allowing involved wrist to move into flexion (ie, eccentric contraction of the involved wrist extensors). Each eccentric wrist extensor contraction lasted approximately 4 second (i.e. slow release). A 30 second rest period was given between each set of 15 repetition and 3 sets of 15 repetitions were performed by the subjects. Intensity was increased by giving the patient a thicker flex bar.

Group 2: Subjects were received progressive eccentric and concentric resistance exercises (PRE) along with Therapeutic Ultrasound (Pulse mode). Patients were instructed to perform progressive eccentric and concentric resistance exercises (PRE) for treatment of lateral epicondylitis (This Exercise protocol was initially proposed by Dr Ernest W in 2003, an American physiatrist from Ohio State University in Columbus). Patients were instructed to Start strengthening program with a 1- or 2-lb dumbbell, Sit on a chair next to a table that has an edge or an overhang. Bend the elbow to 90º; palm should be facing the floor. Slowly lower the weight, then slowly raise it toward the ceiling. Lower and raise the weight 10 times. Take rest of few seconds then repeat the above exercise in elbow extension position also. Once 10 repetitions have become easy to do, with hardly any pain, increase the weight by 1 or 2 lb. continue the exercises once a day, 7 days a week, for about 3 weeks.

Statistical Analysis: Outcome measures of all the individuals were analyzed on day 1 before the start of therapy, at the end of 1st week and at the end of 3rd week i.e end of therapy. Comparison between the two groups was done on Paired T test. SPSS statistical software was used for data analysis.

FINDINGS/RESULTS

In this study Paired t-test was used for all the three variables, namely VAS, PFG and PRTEE questionnaire score. Intergroup Analysis of VAS Score: There was no significant difference in FBE and PRE group on VAS score (M=6.2, SD = 1.005) on 1st day t (19) = 0.000, p = 1.000. At the end of 1st week there was significant difference between FBE group (M=3.1, SD =1.021) and PRE group (M=4.5, SD =1.147) in VAS score t (19) = -4.626, p =0.000. At the end of 3rd week there was highly significant difference between FBE group (M =0.9, SD =0.788) and PRE group (M=2.45, SD =0.945) in VAS score, t (19) = -5.431, p = 0.000. Therefore the results suggest that at the end of 3rd week pain level has more decreased in the FBE group in comparison to PRE group.
At the end of third week there was highly significant difference between FBE group (M =45.85, SD =1.981) and PRE group (M=33.95, SD =8.069) in PFGRS score, t (19) = 6.305, p = 0.000. Therefore results suggest that at the end of 3rd week pain free Grip strength (PFGS) level has more increased in the FBE group in comparison to PRE group.

Fig. 2: Intergroup Analysis of PFGS test Score

Intergroup Analysis of PRTEE Score: There was no significant difference in FBE and PRE group for the PRTEE score (M=41, SD = 2.616) on 1st day t(19)=0.000 ,p = 1.000. At the end of 1st week there was significant difference between FBE group (M =23.05, SD =3.649) and PRE group (M= 31.65, SD =7.576) in PRTEE score t (19) = -4.875, p =0.000. At the end of 3rd week there was highly significant difference between FBE group (M =9.65, SD =1.631) and PRE group (M= 18.15, SD =1.221) in PRTEE score, t(19)= -6.671 , p = 0.000. Therefore results suggest that at the end of 3rd week PRTEE questionnaire score level has more decreased in the FBE group in comparison to PRE group.

Fig. 3: Intergroup Analysis of PRTEE Score

DISCUSSION

The conservative, therapy-based treatment that has been suggested to be the first-line of treatment for tennis elbow is eccentric exercise which involves lengthening the musculotendinous unit while a load is applied to it. Eccentric exercise has demonstrated encouraging results, although the literature is limited, eccentric programs are varied, and optimal dosing has not yet been defined.15,16

In our study we compare the efficacy of two types of exercises program in sub acute Tennis Elbow i.e Flex bar Eccentric exercise of wrist extensors (FBE) and Progressive resistance wrist Exercise (PRE). Based on the result of this study it is clear that both form of exercises are effective in the relief of Pain, increase in grip strength and improvement in function in patients with Tennis Elbow. Upon intergroup analysis of outcome measures at the end of 1st week and 3rd week the relief in Pain, increase in PFGRS and improvement in function was more in FBE group in comparison to PRE.

In clinical trials, a program of eccentric exercises has demonstrated superior efficacy in the treatment of LE tendinopathy, as compared to therapeutic ultrasound , bracing and multimodal rehabilitation programs consisting of: ice, therapeutic ultrasound, TENS, friction massage, and stretching; and friction massage, ultrasound, heat, ice, and stretching .17,18 Findings of these studies supports the outcome of our study.

All outcome measures for chronic lateral epicondylitis were markedly improved with the addition of an eccentric wrist extensor exercise to standard physical therapy, compared with physical therapy without the isolated eccentric exercise. This novel exercise, using an inexpensive rubber bar, provides a practical means of adding isolated eccentric training to the treatment of chronic lateral epicondylitis.10 Result of this study also supports the findings of our study.

CONCLUSION

Flexbar Eccentric wrist extensors Exercises are effective in the treatment of Sub acute Tennis Elbow. This Nobel type of Exercise program is easy to perform by the patient. It is cost effective and superior to Progressive resistance exercises because it requires no supervision. Once patient has learned it, he can perform flexbar exercises by self.

Conflict of Interest: None

Sources of Funding: Self financed

Ethical Clearance: Taken from Research Committee

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Effectiveness of Iontophoresis and Phonophoresis on Pain in Patients with Lateral Epicondylitis: A Comparative Study

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ABSTRACT

Background: Lateral epicondylitis is the most common overuse syndrome occurring in lateral side of elbow region. Pain occurs at the lateral epicondyl from where common extensor tendon originates. Individuals from mechanical profession and sports (such as Tennis) or recreational activities who are prone to repetitive stress and vigorous use of forearm muscles are tend to have lateral epicondylitis. Diagnosis can be made by history and the tests which reproduces the pain. Electrotherapeutic modalities are most commonly used for treating pain at the affected side. However, agreement on a clearly superior modality has not been substantiated in the literature. So, this study was conducted to compare the effectiveness of iontophoresis and phonophoresis on pain in patients with lateral epicondylitis.

Aims and Objectives: To study and compare the effectiveness of iontophoresis and phonophoresis on pain in patients with lateral epicondylitis.

Methodology: 32 patients with lateral epicondylitis were equally included in two groups after taking ethical approval for the present study. Along with the conventional physiotherapy, patients in Group A were given iontophoresis, while in Group B phonophoresis was given using sodium diclofenac for 6 days. Pre and post interventional outcome measures in terms of VAS score at rest & at activity, PRTEE score and Grip strength in KG force were evaluated. Data of 32 patients were analysed after the completion of the treatment.

Results: Results showed significant improvement in all the outcome measures within group (p < 0.05), while there was no statistically significant difference found for any of the outcome measures between groups (p > 0.05).

Conclusion: It can be concluded that iontophoresis and phonophoresis both are equally effective and either of them can be used in the treatment of lateral epicondylitis.

Keywords: Lateral Epicondylitis, Iontophoresis, Phonophoresis.

INTRODUCTION

Lateral epicondylitis is one of the most common overuse syndromes of the extensor tendons of the forearm¹. The term Lateral epicondylitis was first described by Runge in 1873 and then was used by Morris in 1882. It is used to describe the pattern of pain, most commonly seen at the origin of the wrist extensors from the lateral epicondyle of the humerus²; which is aggravated by gripping activities³, ⁴. Lateral epicondylitis is most commonly seen in tennis players and hence it is also known as “Tennis Elbow”. Although it can occur with other racket sports, tennis players have been reported to account for 5-8% of all the lateral epicondylitis.⁵ It also occurs in non-tennis players because of work related overuse injuries.⁶Musicians, carpenters, assembly line workers and many other subjects whose activities involve supination-pronation, overuse of wrist and finger extensors or lifting the objects with palm down, on an almost daily basis are more prone to have lateral epicondylitis.⁶ The dominant arm is commonly affected with a prevalence of 1-3% among the general population. It can occur at any age but is mostly seen in between 30 to 60 years of age. Both the sexes are equally affected; but it appears to be of longer duration and severity in females.⁷ Primary pathology of
this condition is tendinosis of the extensor carpi radialis brevis (ECRB) tendon, usually within 1-2 cm (0.5-1 in.) of its attachment to the common extensor origin at the lateral epicondyle of the humerus and thus it is referred to as extensor tendinopathy or lateral elbow tendinopathy.  

Patients with lateral epicondylitis mainly complain of pain and decreased function of the affected elbow, both of which may affect the daily activities. Up to 30% of the patients with lateral epicondylitis seen in primary care are referred to physical therapy. Mostly, electrotherapeutic modalities are used in treatment of lateral epicondylitis in physical therapy regimens. Therapeutic Ultrasound, Phonophoresis, Iontophoresis, Laser, Extracorporeal shock wave therapy etc. are commonly used electro modalities for the treatment. Exercises include stretching and strengthening of wrist extensor muscles, gripping exercise and eccentric exercise of wrist extensors. Ph phonophoresis is the movement of drug molecules through the skin under the influence of ultrasound. Iontophoresis is a drug delivery method that uses external electric current to drive water-soluble ionic drugs through the skin. Non-steroidal anti-inflammatory drugs (NSAIDs) are most commonly used in the treatment of musculoskeletal disorders. But, NSAIDs when given orally, has side effects like gastrointestinal discomfort. Whereas, transcutaneous application of these drugs, most common of which are, Sodium diclofenac, Methyl salicylate, Naproxen etc. with iontophoresis and phonophoresis are non-invasive and well tolerated methods by the patients. Iontophoresis and phonophoresis both are helpful in relieving pain in patients with lateral epicondylitis. However, agreement on a clearly superior modality or sequence of modalities has not been substantiated in the literature. So, the purpose of the study is to compare the effectiveness of iontophoresis and phonophoresis using sodium diclofenac on pain in patients with lateral epicondylitis.

MATERIALS AND METHOD

The patients coming to physiotherapy department on OPD basis were selected according to inclusion and exclusion criteria. All the patients were informed about the nature and purpose of the study. Written informed consent was taken from all the patients in their understandable language. Inclusion criteria for the present study were, Patients who were diagnosed with lateral epicondylitis by orthopedician, Unilateral involvement, Both males and females, Age- 30 to 60 years, Patients who were not taking any pain killers, Patients who were willing to participate and having Symptoms for > 2 months. Exclusion Criteria were kept as Any allergic conditions to the drug, Recent trauma or surgery to the involved limb, Any psychological condition, Altered sensations, Any other musculoskeletal disorder like cervical spondylosis, Rheumatoid arthritis, pronator syndrome, radio-humeral bursitis, radial tunnel syndrome, Metal implants in the affected extremity, Patients who had taken any local corticosteroids in last 3 months, Patients who were uncooperative and refusing for participation. Total 32 patients were selected for the study and were equally divided into two groups. Demographic data of all the patients in both the groups were taken and pre-treatment assessment was done. Patients in both the groups were given conventional physiotherapy in the form of stretching and active movements. Stretching of wrist extensors was applied with patient in supine lying, elbow in extension, forearm in pronation, wrist in flexion and in ulnar deviation, according to the patient’s tolerance. This position was held for 30 seconds and total of 6 repetitions were given with the interval of 30 seconds in between. 3 repetitions were given before the exercise and the rest were given after the exercise during single treatment session. Active movements of the wrist were started with elbow in 90° of flexion. Initially 2-3 sets of 10 repetitions and progressing to the 5 sets of 10 repetitions were given according to the patient’s tolerance. Along with the conventional physiotherapy, Group A (16 patients) was given iontophoresis of sodium diclofenac and Group B (16 patients) was given phonophoresis of sodium diclofenac. Iontophoresis was given using sodium diclofenac solution (1%) under the influence of direct galvanic current produced by the electrical stimulator. Diclofenac is negatively charged ion, so it was kept under Cathode as an active electrode to deliver the drug at the lateral epicondyle. Anode was used as an inactive electrode and was placed proximally away from the cathode. Intensity was then gradually increased until the patient felt mild prickling or tingling sensation. At the same time they were also asked to report if they felt any local pain or burning sensation. Dosage was given according to 40 mA•min. (Photograph 1). Phonophoresis was given using Volini gel (1%) with the help of ultrasound machine. Ultrasonic gel was used as the coupling medium. Phonophoresis was given with 1 MHz frequency at 1 w/cm² for 6 minutes in circular manner (Photograph 2). Treatment was given once a day for 6 days to all the patients. Outcome measures in
the form of VAS score at rest & during activity, PRTEE score and grip strength were taken from all the patients before the administration of the treatment and after the 6 days of treatment.

**FINDINGS**

Data of 32 patients (Group A-16, Male: 7, Female: 9 and Group B-16, Male: 7, Female: 9) were analysed by using statistical package for social sciences version 16 (SPSS 16) and Microsoft Excel 2010. Wilcoxon signed rank test was applied to analyse pre and post outcome measure within group, while between group analysis was done by using Mann-whitney U test for all outcome measures.

**Table 1: Comparison of baseline characteristic between groups**

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>U VALUE</th>
<th>p-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>115</td>
<td>0.621</td>
</tr>
<tr>
<td>Pre VAS rest (score)</td>
<td>125</td>
<td>0.923</td>
</tr>
<tr>
<td>Pre VAS activity(score)</td>
<td>118</td>
<td>0.706</td>
</tr>
<tr>
<td>Pre PRTEE(score)</td>
<td>95</td>
<td>0.213</td>
</tr>
<tr>
<td>Pre GRIP(KG force)</td>
<td>107</td>
<td>0.439</td>
</tr>
</tbody>
</table>

**Table 2: Within Group Comparison of Outcome measures in Group A**

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Pre (Mean ± SD)</th>
<th>Post (Mean ± SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS at Rest</td>
<td>1.61 ± 1.56</td>
<td>0</td>
<td>0.003</td>
</tr>
<tr>
<td>VAS at activity</td>
<td>6.9 ± 1.9</td>
<td>3.2 ± 1.1</td>
<td>0.001</td>
</tr>
<tr>
<td>PRTEE score</td>
<td>53.41 ± 12.45</td>
<td>22.41 ± 3.63</td>
<td>0.000</td>
</tr>
<tr>
<td>Grip strength (kg force)</td>
<td>10.83 ± 8.29</td>
<td>19.33 ± 7.16</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 3: Within Group Comparison of Outcome measures in Group B**

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Pre (Mean ± SD)</th>
<th>Post (Mean ± SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS at Rest</td>
<td>1.9 ± 2.06</td>
<td>0.22 ± 0.75</td>
<td>0.008</td>
</tr>
<tr>
<td>VAS at activity</td>
<td>7.28 ± 1.43</td>
<td>3.46 ± 2.49</td>
<td>0.001</td>
</tr>
<tr>
<td>PRTEE score</td>
<td>47.03 ± 13.20</td>
<td>22.19 ± 10.39</td>
<td>0.000</td>
</tr>
<tr>
<td>Grip strength (kg force)</td>
<td>10.79 ± 5.48</td>
<td>15.39 ± 6.99</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Table 4: Between Group Comparison of Outcome measures**

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Group A (Mean ± SD)</th>
<th>Group B (Mean ± SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference of VAS at Rest</td>
<td>1.61 ± 1.57</td>
<td>1.68 ± 1.85</td>
<td>0.892</td>
</tr>
<tr>
<td>Difference of VAS at activity</td>
<td>3.74 ± 1.88</td>
<td>3.82 ± 2.18</td>
<td>0.664</td>
</tr>
<tr>
<td>Difference of PRTEE score</td>
<td>31.00 ± 11.71</td>
<td>24.84 ± 12.05</td>
<td>0.118</td>
</tr>
<tr>
<td>Difference of Grip strength (kg force)</td>
<td>8.50 ± 7.47</td>
<td>4.61 ± 4.97</td>
<td>0.141</td>
</tr>
</tbody>
</table>
Above results showed significant improvement in VAS score at rest & at activity, PRTEE score and Grip strength within group (p < 0.05), while there was no statistically significant difference found for any of the outcome measures between groups (p > 0.05).

DISCUSSION

The purpose of the present study was to study and compare the effectiveness of iontophoresis and phonophoresis on pain in patients with lateral epicondylitis. Statistically significant improvement was found in VAS score at rest and at activity in the group treated with iontophoresis of sodium diclofenac. The proposed mechanism behind the reduction in pain might be the analgesic effect of the low intensity direct current and also the effect of analgesic properties of the sodium diclofenac drug which was delivered through the electrical current. The negative charge at cathode repelled the diclofenac ions and thus enhancing its effects. Reduction in pain symptoms can thus lead to improvement in function and grip strength. Similar findings were found in the study done by Famaey et al. who compared the effectiveness of ionisation using sodium diclofenac with that of the placebo solution in 97 patients with periarthritis of shoulder, epicondylitis or tendinitis. They found significant improvement in the patients treated with sodium diclofenac. In contrast, Martin reported that in traumatic or osteoarthritic pathology, epicondylitis was not a good indication for diclofenac ionization. However, these results were obtained in only 3 patients with epicondylitis. There was statistically significant improvement in VAS at rest and at activity in Group B after 6 days of treatment with phonophoresis of sodium diclofenac. This reduction in pain with phonophoresis may be because of increase in localized temperature within the tissue, which results in vascular dilation and thus elevation in pain threshold. In association to this, heating of the tissues through the Ultrasound waves increases the kinetic energy of the drug molecules in the cell membrane. Ultrasound has also been found to dilate the points of entry of topical drugs, such as hair follicles and the sweat glands, thereby increasing circulation to the area treated. Decrease in pain thus has better functional outcome and improvement in grip strength when treated with phonophoresis. The findings of study done by Stratford P W et al. also support the present study. The effect of phonophoresis in lateral epicondylitis was significant in their study. There was no significant difference found in any of the outcome measures between iontophoresis and phonophoresis groups. Both the iontophoresis and phonophoresis have the benefit of providing local delivery of medication without the problems related to injections or the side effects often associated with oral medications. These findings indicate that the topical application of the sodium diclofenac either by iontophoresis or by the phonophoresis should be performed clinically to avoid the systemic side effects which are produced by using it orally in treatment of lateral epicondylitis.

CONCLUSION

From the present study, it can be concluded that iontophoresis and phonophoresis are equally effective and either of them can be used in the treatment of lateral epicondylitis.

Conflict of Interest: None declared.

Source of Funding: Nil.

Ethical Clearance: Ethical committee approval was taken prior to the study.

REFERENCES


Daytime Sleepiness among Medical and Non-Medical Students and its Impact on their Academic Performance

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ABSTRACT

University students are prone to have an insufficient sleep and tend to feel sleepiness during daytime, in which may impact cognitive function, impair the psychological health and academic performance. This study aimed to compare the prevalence of daytime sleepiness between medical and non-medical students in Management & Science University (MSU) – Shah Alam campus and to investigate the relationship between daytime sleepiness among university students towards their academic performance. A cross-sectional study was carried using Epworth Sleepiness Scale (ESS) was to identify and evaluate the effect of daytime sleepiness on academic performance. A total of 152 undergraduate students ranging from the age of 19 to 27 years were participated and completed the questionnaires with a response rate of 76%. Statistical analysis was done using Pearson’s Chi-Square Test. There were 56.6% of participants showed an abnormal score of ESS (>9) in both groups. Medical students reported having a high prevalence of daytime sleepiness (52.3%) whereas non-medical students showed slightly less prevalence of daytime sleepiness (47.7%). The results obtained might be due to the medical students have exposure to the hectic and excessive academic load causing the need to study until late at night. Poor academic results were revealed among 84 (55.3%) university students. A statistically significant finding was observed between daytime sleepiness and lower academic performance (p<0.001). Analysis shows a significant relationship between daytime sleepiness and academic performance. Medical students have a higher prevalence of daytime sleepiness compared to non-medical students.

Keywords: Daytime sleepiness; Academic performance, Medical students, University students.

INTRODUCTION

Inadequate sleep is highlighted to be a public health matter that has relation to medical effects. Sleep has been found to be neglected from the priority list of most individual especially students. The study on daytime somnolence has been defined that it is a sudden, uncontrollable compulsion to fall asleep during daytime causing weak of alertness and concentration, a decrease of motivation and a high level of stress[1]. College students are highlighted as a unique population with their cultural sleep-related disorders[2]. Sleep deprivation is common among university students, which may result in the sleep disorder like excessive daytime sleepiness[3]. Students sleep late at night to do their tasks which results in inadequate sleep hygiene. Furthermore, students often use technology and substances that compromise sleep quality and quantity[3, 4]. Untreated sleep disorder may develop numerous negative consequences[4]

Circadian sleep rhythm disorder is a delayed sleep phase syndrome occurred among young adult[5]. Smoking at night to keep the person stays awake can be seen to be trending among students. This habit significantly contributes to inadequate of sleep hours and affects academic performances[6]. Reduction or alteration of sleep at night has been associated with excessive sleepiness.
and impaired academic performance. Analysis of the role of sleep showed four long-term memory systems which include procedural memory, perceptual representation system, semantic and episodic memory. It requires either non-rapid eye movement (NREM) or rapid eye movement (REM) sleep or needs both of the sleep stages to consolidate memories. Sufficient sleep is pivotal to physical health and also mental development for learning and memorization ability. Adequate sleep may initiate the function of cognitive systems for the better aspects of life and performance.

The tendency of committing errors, especially among medical students while assessing the patients may exist. To the best of our knowledge, many researchers have done the study regarding sleep disorder and daytime sleepiness, but only focusing on a particular group, for example only medical students. With this study that has been conducted, it helps to compare the degree of daytime sleepiness among medical students and non-medical students with the academic performance.

MATERIALS AND METHOD

This study is a descriptive correlation study that investigated the relationships between the two variables of daytime sleepiness and academic performance. Apart from that, it has been designed to predict the relationship between daytime sleepiness and academic performance. It indicates the outcome within a specific range of sleep disorder that correlated with the scores of academic achievements.

This cross-sectional study collected data at just one point time from May 2016 to June 2016. The study population comprised of the students enrolled in the main campus of Management & Science University (MSU), Shah Alam, Selangor, Malaysia at this time. The inclusion criteria of this study involve the current MSU male and female students, students enrolled in bachelor program, mentally stable and cooperative. The study subject must be within 19 to 27 years of age. The exclusion criteria comprise MSU staffs and outsiders, and those who refuse to cooperate.

A quota sample of surveys has been administered to 152 students in which these participants consisted of male and female students ranging from 19 to 27 years; each group comprised 76 students of medical and 76 non-medical students.

Data were collected by using the structured questionnaires that comprised of questions covering all of the study variables on socio-demographic, lifestyle, sleep pattern characteristics of medical and non-medical students and their examination results. Academic performance will be analyzed with the previous academic grade results. The first section was socio-demographic part with some of the response choices of yes or no, while other variables need to be marked based on its categories. Section 2 is the Epworth Sleepiness Scale. This questionnaire is primarily used to determine the daytime sleepiness among the respondents. It is a well-validated eight-item questionnaire.

RESULTS

There were 152 students responded and completed this survey from the total population of 200 students with a response rate of 76%. Table 1 summarizes the demographic characteristics and other study variables.

| Table 1: Frequency and percentage in demographic information |
|-----------------|--------|-----|
| Variable                    | Frequency | %   |
| Age                        | 152    | 100.0 |
| Range (19-27) Years        |        |      |
| Mean (22.6 ± 1.6)          |        |      |
| Gender                     |        |      |
| Male                       | 39     | 25.7 |
| Female                     | 113    | 74.3 |
| Major                      |        |      |
| Medical                    | 76     | 50.0 |
| Non-medical                | 76     | 50.0 |
| Have Diagnosis of Sleep Disorder |    |     |
| No                         | 135    | 88.8 |
| Yes                        | 17     | 11.2 |
| Use of Stimulant to Stay Awake |      |      |
| No                         | 108    | 71.1 |
| Yes                        | 44     | 28.9 |
| Get Enough Sleep           |        |      |
| No                         | 63     | 41.4 |
| Yes                        | 89     | 58.6 |
| Average Hours of Sleep per Night |    |      |
| Less than 5                | 68     | 44.7 |
| 6 to 7                     | 64     | 42.1 |
| More than 7                | 20     | 13.2 |
Among the 152 participants, 86 were diagnosed as daytime sleepiness representing a prevalence of 56.6%. There were 66 (43.4%) of the respondents do not have daytime sleepiness. As being derived from overall 152 respondents, both of the group, which are medical and non-medical students were being divided into same quantity, 76 students in each group by using quota sampling method.

The result showed that 31 (47.0%) medical students have no daytime sleepiness and the rest of 45 (52.3%) students are having daytime sleepiness. Whereas, there are 53.0% non-medical students counted with the absent of daytime sleepiness, and the remaining of 47.7% students came with the daytime sleepiness. According to the data obtained in Table 4.2, 66 students of both major educations do not have daytime sleepiness while 86 of students experience daytime sleepiness. Medical students were reported to have slightly higher in daytime sleepiness compared to non-medical students.

A statistically significant difference was found between high scoring of ESS and poor academic performance with regards to excessive daytime sleepiness (P<0.0001) based on Table 3.

**DISCUSSION**

Medical students sleep less than general populations. Their average nighttime sleeping hours are similar to those with insomnia (12). Also, daytime sleepiness, insomnia, and insufficient of sleep (less than seven hours per night) are associated with psychiatric disorders. In this study, daytime sleepiness was detected in 45 (52.3%) medical students compared to non-medical students with slightly less (47.7%) having daytime sleepiness.

The data of this study show a high percentage of daytime sleepiness (52.3%) among medical student responders compared with the result of the study conducted in International Medical University, Malaysia (35.5%) (13). Non-medical students have slightly less percentage of (47.7%) of daytime sleepiness. This variation could be due to the difference in the cut-off value of the Epworth Sleepiness Scale. In the current study, the standard mean value is 9; while the cut-off value in the study by Zainilawatiet al. was 11. The medical students have to be on their morning and evening educational and clinical assignments. Also, they study the medical books until late at night (14, 15).

Utilization of memory and brain causing the medical students to feel fatigue not only in physical part but also mental part, in which give implication towards the sleep-wake cycle. The syllabus learned by those non-medical students might be straightforward and light, and the...
students were not under pressure to handle the situations as those in medical students who need to face weekly test and examinations. The medical students who will be the medical staffs later, this sleeping disorder should be prevented to reduce the errors while handling the patients and during consultation or surgery\(^{(16)}\).

The association between sleep disorder of daytime sleepiness and academic performance among medical and non-medical students has not been investigated thoroughly. Most of the studies only conducted for a particular group such as in the earlier study by Johns et al\(^{(10)}\) that carried out the study among medical students. The findings earned in this study showed a significant association between academic performance and daytime sleepiness. It was supported by another study in which sleep disorder could give implication on the school result. Abdulghani reported a significant relationship between ESS scores and academic achievement \((P=0.002)\)\(^{(17)}\). The university students were likely to complain having a sleeping disorder in this study for around 56.6% of students evaluated of having daytime sleepiness.

Sleep can have a role in facilitating the learning and memory processes. Conversely, sleep deprivation and fragmentation usually impair these functions \(^{(18)}\). The previous study expressed the association between education and ESS score. Stated that higher ESS score was gained from people with both low and high level of education, compared with those people of medium education level. A few studies have displayed a significant relationship between daytime sleepiness and academic result. In this study, it was found 56.6% of all the participants suffered from daytime sleepiness. Thus, the study revealed a clear correlation between academic performance and daytime sleepiness \((P<0.001)\). In the current study, a statistically significant difference \((P=0.001)\) was found between daytime sleepiness and poor academic performance; this result is in agreement with previous study \(^{(3)}\), which concluded that 68.5% of 108 Sudanese medical students that were studied had daytime sleepiness. Sleepier students did not achieve excellencein the previous examination; therefore, the requirement to improve awareness among medical students and teaching staffs about sleep education and sleep hygiene in addition to implementing the best indicator in scheduling duty hour for the lecture. A highly statistically significant difference between the good students and the weak students was concluded with regards to the feeling of insufficient sleep \((P<0.001)\) and sleeping less than five hours per night\(^{(19)}\). This study concluded that sleep deprivation (less than five hours) became part of medical students’ exposure and is associated with poor work-related performance, mood, and medical errors.

These findings provide health educators with good sleep as an additional positive reason to promote engagement in health behaviors\(^{(20)}\). Practical applications of these data for health lecturer on university campuses can conduct. For instance, health experts could continue with the implementation of programs related to healthy habits with the correlation between sleep and academic performance benefits to document the importance and value of these programs. Also, these results should be relevant to educators, administrators, parents, and students. These understanding of the findings may contribute to another connection of health behaviors for better academic achievement. Disturbances of sleep-wake behavior can be affected by academic demands, depression during examination week, social schedule, and insufficient sleep education.

There is a great concern about the relationship between daytime sleepiness and academic achievement; therefore, screening for causes of sleep deprivation and daytime sleepiness among medical and non-medical students is highly recommended. Measures to improve living conditions, and educate about good sleep hygiene are needed.

**CONCLUSION**

A high prevalence of daytime sleepiness was reported in this study on medical students compared to non-medical students. The daytime sleepiness was measured using ESS comprising the score more than nine as abnormal. Daytime sleepiness significantly affects the academic performance among medical and non-medical students of MSU Shah Alam. Education and awareness on the importance of enough sleep hours and the quality of the sleep could aid in improving the academic achievement and along with the psychological and physical health of an individual. As the recommendation, further research on a larger scope regarding daytime sleepiness with its relations towards academic achievements in both group of students, medical and non-medical need to be carried out due to its lack of previous investigations. To conclude, this present study is conducted to be as the reference with the hope that awareness of daytime sleepiness among university students will arise.
**Conflict of Interests:** The authors have declared that no conflict of interest exists.

**Source of Funding:** Self-funding.

**Ethical Clearance:** Ethical approval was obtained from the MSU Ethical Committee.

**REFERENCES**


A Comparative Study between Kinesiotaping and Kinetic Chain Based Rehabilitation of Shoulder on Downward Rotated Scapula in Young Elite Fast Bowlers

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ABSTRACT

Objectives: To find out if kinesiotaping and kinetic chain exercise are effective in treatment of scapular dyskinesia in fast bowlers and to compare if kinesiotaping or kinetic chain exercises were effective in treatment of scapular dyskinesia.

Aim: To compare two different approaches to shoulder rehabilitation, kinetic chain exercises and kinesiotaping throughout the program in treatment of downward rotated scapula in young elite fast bowlers.

Design: Experimental study

Settings: Cricket clubs in and around Mumbai and Pune.

Method: The study included males of age group 19-25 years and playing cricket since 2 years diagnosed with downward rotated scapula using lateral scapula slide test. The subjects were divided randomly in two groups, and group A was Kinesiotaped and group B was given kinetic chain exercises and both groups continued with conventional rehabilitation for scapular dyskinesia.

Analysis and Results: Post data analysis shows the treatment given to Group B (kinetic chain based rehabilitation) was statistically more significant than group A (kinesiotaping).

Conclusion: Kinesiotaping is not as effective as kinetic chain exercises and thus might not help prevent shoulder injuries like impingement syndrome and rotator cuff injuries in the future.

Keywords: Cricket, fast bowlers, scapular dyskinesia, kinesiotaping, kinetic chain exercises

INTRODUCTION

Competitive overhead athletes frequently develop non-traumatic shoulder pain although the majority of injuries are benign and can be treated conservatively with a functional rehabilitation program. Throwing athletes, athletes involved in racquet sports such as tennis, volleyball players, fast bowlers in cricket and swimmers need full, unrestricted arm function to perform optimally in their sports. Overhead bowling involves a combination of a skillful and intricate movement while transmitting large forces through the shoulder. The bowler’s goal, unconscious as it may be, is to deliver a high-intensity force at the extreme of overhead motion. The shoulder must therefore strike a balance between mobility and stability. It must be loose enough to throw, especially with external rotation, but also have the stability to prevent injury and subluxation. This combination of flexibility and stability has led to what some authors have called the thrower’s paradox.¹⁵

This balance often is compromised by repetitive forces as the athlete challenges the physiologic limits upon the surrounding tissues. These forces can result in functional adaptations and also can create micro traumatic stresses that cumulatively may predispose the overhead athlete to pain and injury. Common shoulder injuries include impingement syndrome, rotator cuff pathology, biceps tendonitis, shoulder instability, labral tear, or acromioclavicular joint disruption, among others. The exact prevalence of the various shoulder injuries experienced by the overhead athlete in different sports is
difficult to quantify. This is due to the complexity of the joint and relative unreliability of the shoulder physical exam. It is likely that the exact injury prevalence varies between sports and experience of the athlete; however, the most common cause of shoulder injury in any overhead athlete is believed to be impingement syndrome.

Altered scapular movement or scapula dyskinesia is the alteration in the normal static or dynamic position or motion of the scapula during coupled scapulohumeral movements.

Alterations in scapular position and motion occur in 68 – 100% of patients with overhead athletes. This may occur due to muscle imbalance or weakness of a specific group of muscles. Related to Sherry’s law of reciprocal inhibition and the muscle spindle. Activation of a muscle uses stretch reflex connections to stimulate an agonist and to inhibit the antagonist to movement using an inhibitory interneuron. If a muscle, or muscle group(s) are continually recruited in an abnormal pattern (such as forward head posture), eventually the antagonist muscles will become inhibited due to receiving continued inhibitory impulses. The most commonly weak or inhibited muscles are the serratus anterior, lower and upper trapezius and rhomboid muscles. Inhibition is seen as both a decreased ability for muscles to exert torque and stabilize the scapula and also as a disorganization of normal muscle firing patterns. More commonly the serratus anterior and trapezius are affected first.

Scapular dyskinesia is a condition mostly affected in overhead athletes like fast bowlers in cricket, bowling in cricket has mainly two types of actions, front-on and side on. In the side on action the hips and the shoulder are perpendicular to the bowling crease and the front foot. While in the front on action the hips and the shoulder are parallel to the bowling crease.

The front on and side on action In bowling action put a lot of stress on the rotator cuff muscles and put a question on the glenohumeral stability due to counter rotation of the shoulder during the fast overhead motion during the delivery. Fast bowling can be considered to have three phases (1) run-up (2) front foot contact (3) back foot contact, during the back foot contact the shoulder and the scapula are in a cock-up position and ready for the release of the ball with the front foot in contact. Abnormal motions result in altered scapular movements as scapula provides muscular attachment and dynamic position of the glenohumeral joint during upper extremity movement.

Prior studies have shown altered scapula movement to be detrimental to shoulder function. Additionally improvement or correction in the abnormal scapular mechanics decrease the chances of symptoms associated with shoulder pathology.

Complex movement patterns such as overhead throwing, require a precise interaction of entire kinetic chain to become efficient. An imbalance of strength, flexibility endurance or stability anywhere within the chain may result in fatigue, abnormal arthrokinematics and subsequent compensation.

Kinetic chain shoulder rehabilitation incorporates the kinetic link biomechanical model and proximal-to-distal motor-activation patterns with proprioceptive neuromuscular facilitation and closed kinetic chain exercise techniques. This approach focuses on movement patterns rather than isolated muscle exercises. Patterns sequentially use the leg, trunk, and scapular musculature to activate weakened shoulder musculature, gain active range of motion, and increase strength. The paradigm of kinetic chain shoulder rehabilitation suggests that functional movement patterns and closed kinetic chain exercises should be incorporated throughout the rehabilitation process.

Both open and closed kinetic chain exercises stimulate receptors facilitate co-contraction of the shoulder force couples. Recruitment of the force couples may reduce the alteration in the abnormal movement of the scapula.

Kinesiotaping is a treatment method used in conjunction with other therapeutic techniques in the treatment of various musculoskeletal and neuromuscular deficits. Kinesiotaping has a long history of use by occupational therapists and physical therapists and athletic trainers and other trained health professionals to achieve improvement in the treatment of joint instabilities, weakness and pain. Thus kinesiotaping can be used as a treatment for muscle imbalance which is prevalent in altered scapular movement or scapular dyskinesia.
METHOD

Sixty subjects were diagnosed with downward rotated scapula using the lateral scapula slide test (ICC – 0.95) during this procedure the subjects were standing on a flat surface and were asked to stand upright with shoulders relaxed at the same time.

Using a marker or patches inferior angle and 18 spinous process was marked and it was measured on both sides of the spine at three different positions of the shoulder joint.

1. Shoulder neutral
2. Hands on hips (shoulder at 45°)
3. Shoulder abducted at 90° with internal rotation

Subjects were randomly divided into two groups; A and B where group was treated with kinesiotaping to serratus anterior and upper trapezius keeping in mind the weakness of the same. Group A were treated with kinetic chain exercises which contained both open and closed kinetic chain exercises.

Taping was done for 4 weeks and tapes were changed every 3 days i.e. twice a week. Taping to upper trapezius was done with a 25% stretch (I-strip) from the origin to insertion with the neck rotated to the opposite side. Taping to serratus anterior was done with a 25% stretch (I-strip) from the origin to insertion in full abduction of the shoulder.

Kinetic chain exercises were done for 6 days a week with every exercise having 15 repetitions and 2 sets each. Exercises included pushups with plus, low row, the robbery and the lawn mower.

**Pushups with a plus:** The athlete gets into the top of a standard push-up with his abs drawn in. Bending his elbows to lower his chest to nearly touch the floor. As he rises back up, he pushes his upper back up as to broaden his shoulder blades. Holding this action for a count or two to deepen the activation of the serratus anterior.

**Low row:** The athlete stands upright with the arm in abduction to 90 degrees with a fist on a solid surface. The athlete then applies pressure with the fist in the direction of arm adduction against the surface and instructed to inferiorly depress the scapula for 5 seconds.

**The Lawn mower:** The athlete begins this exercise with a flexed and rotated trunk towards the contralateral side with the hand at the level of the patella. For the next step the athlete moves his arm with his elbow flexed at 90 degrees in extension with trunk rotation as pulling a chain of a lawn mower.

The robbery exercise: The athlete begins this exercise in a standing position with the trunk flexed to approximately 45 degrees with the arms forward flexed and palms facing the thighs. The athlete is then instructed to move into a vertical orientation while extending the arms and flexing the elbows so the palms are facing up and away from the body while simultaneously squeezing both the scapula together with a forceful contraction for 5 seconds.

Common exercises in both the groups included; shoulder capsular stretches; anterior, posterior, inferior, internal rotation at 90 degrees of abduction, deltoid and supraspinatus strengthening.

FINDINGS

Pre and post analysis was done within the groups using paired t test which showed significant results.

**Table 1:** Shows pre and post analysis of group A

<table>
<thead>
<tr>
<th>Group A</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
<tr>
<td>45</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
<tr>
<td>90</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
</tbody>
</table>

**Table 2:** Shows pre and post analysis of group B

<table>
<thead>
<tr>
<th>Group A</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
<tr>
<td>45</td>
<td>0.0004</td>
<td>Significant</td>
</tr>
<tr>
<td>90</td>
<td>&lt;0.0001</td>
<td>Extremely significant</td>
</tr>
</tbody>
</table>

Post analysis of comparison was done using unpaired t test and the results showed that group B was more effective than group A in treatment of downward rotated scapula in young elite fast bowlers.

**Table 3:** Shows pre and post analysis between both the groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>A 0.110 ± 0.097 B 0.335 ± 0.304</td>
<td>Extremely significant</td>
</tr>
<tr>
<td>45</td>
<td>A 0.0350 ± 0.043 B 0.148 ± 0.202</td>
<td>Very significant</td>
</tr>
<tr>
<td>90</td>
<td>A 0.047 ± 0.050 B 0.102 ± 0.111</td>
<td>Significant</td>
</tr>
</tbody>
</table>
Group B showed increase in mean scapular distance at all three levels as compared to group A.

RESULTS

Post data analysis shows the treatment given to Group B (kinetic chain based rehabilitation) was statistically more significant than group A (kinesiotaping).

Our study found that the significance of effectiveness is different at all three levels at neutral shoulder level the effectiveness of group B was extremely significant (p-0.0003), at 45 degrees it was very significant (p - 0.0042) and at 90 degrees it was significant with p - (0.0168).

DISCUSSION

The present study was done to see the effectiveness of kinesiotaping and kinetic chain based rehabilitation on young elite fast bowlers with downward rotated scapula. In this study 60 patients were included with 30 in each group of the age group 19-25yrs.

When pre and post analysis was done within group A we found out that kinesiotaping was effective in treatment of scapular dyskinesia to an extent as it showed significant statistical improvements in fast bowlers as the proposed mechanism for kinesiotaping in group A for increased strength or for muscle activation is that taping can stimulate mechanoreceptors, which can increase motor unit firing in turn stabilizing the scapular control. (18)

When both groups were compared, we found out that kinetic chain exercises has proven to be more effective as compared to kinesiotaping, As kinetic exercises incorporates the trunk and rest of the body in rehabilitation instead of isolating the shoulder only, the segmental integration follows the proximal-to-distal movement and muscle-activation sequence consistent with biomechanical upper extremity function. While kinesiotaping does not address abnormal trunk and scapular biomechanics.

Within group B when pre and post analysis was done we found that kinetic chain exercises has shown very significant statistical improvements in the treatment of scapular dyskinesia in young elite fast bowlers. Exercises that counteract the protracted, depressed, and anterior tilted scapula through activation of the lower trapezius and serratus anterior should be at the core of the initial phases of rehabilitation. Using electromyography (EMG), Kibler et al. showed that the low row, lawnmower, robbery, and inferior glide are suitable exercises that correctly target the lower trapezius and serratus anterior. The exercises work to strengthen weakened kinetic link segments by activating the force couple of scapula, thus probably correcting scapular malposition. (3)

While kinetic chain exercises target the muscles around the scapula and activate the serratus anterior, upper trapezius, lower trapezius, kinesiotaping probably does not meet the threshold afferent stimulus to activate the mechanoreceptors to activate the muscles.

Clinically, kinetic chain rehabilitation has been effective in restoring shoulder function when other methods of shoulder rehabilitation have failed. (1)

CONCLUSION

Kinetic chain based rehabilitation is better than kinesiotaping on downward rotated scapula in young elite fast bowlers. Kinesiotaping is not as effective as kinetic chain exercises and thus might not help prevent shoulder injuries like impingement syndrome and rotator cuff injuries in the future.

Conflict of Interest: There is no conflict of interest in the conduct of the study.

Source of Funding: Self

Ethical Clearance: Ethical clearance was obtained from the ethical committee of the college.

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16. Current Concepts for Shoulder Training in the Overhead Athlete David J. Kennedy,1 Christopher J. Visco,1 and Joel Press2 1Sports and Spine Fellow, Rehabilitation Institute of Chicago, Chicago, IL; 2Medical Director, Spine & Sports Rehabilitation Center, Rehabilitation Institute of Chicago, Chicago, IL

17. Kellie Golik, MS, DPTc The Effect of Kinesiotaping on Muscle Activation or Pain in Adults with and without Patellofemoral Pain: An Evidence Based Review

Comparing the Effect of Proprioceptive Retraining Technique against Home Exercise Programme on Hand Functions in Patients with Rheumatoid Arthritis

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ABSTRACT

Introduction: Rheumatoid Arthritis (RA) is an autoimmune, inflammatory disease that causes progressive destruction in the joints with the hands and wrists being the most frequent actively involved joint. Hand involvement significantly affects daily living activities in RA with decreased mobility. Aim of the study was to compare the effect of Proprioceptive retraining (PRT) technique over home exercise (HE) program on hand functions in RA.

Method: After obtaining written informed consent, forty patients with rheumatoid arthritis for more than one year duration fulfilling the inclusion criteria were randomly assigned to two groups with 20 subjects each. One group received proprioceptive retraining and the other group received the home exercise programme for 8 weeks.

Result: Data was analyzed using SPSS version 21.0 software. The hand functions in the PRT group improved significantly as compared to the HE group. Patients under both the programs showed significant improvement of hand functions after 8 weeks of intervention.

Conclusion: The proprioceptive retraining technique is more effective than home exercise programme in improving hand functions in RA patients.

Keywords: Rheumatoid arthritis, proprioceptive retraining, Hand function, Home exercise, ADL

INTRODUCTION

Rheumatoid arthritis (RA) is chronic, systemic, inflammatory disease with unknown aetiology that causes progressive destruction in the joints with the hands and wrists being the most frequent actively involved joint². RA is an ongoing, progressive autoimmune disease that affects 1% of general population³,⁴. The incidence is 3 times more in women than in men³. The prevalence of RA is 1.16% in women and 0.44% in men increasing with age to 5% in those over 55 years ⁶. Hand involvement significantly affects daily living activities⁷ and RA results in deterioration of hand function causing pain, deformities, decreased hand strength and mobility⁸,⁹. Hand joints such as wrist, the metacarpo-phalangeal (MCP) joints, and/or the proximal inter-phalangeal (PIP) joints are affected in more than 90% of all patients ⁹. Persons with RA consider hand function to be of maximum importance for how they cope with their daily life activities ¹⁰. Loss of grip strength and function in hand is a major cause of disability in patients with RA ¹¹,¹². Such dysfunction results from pain or fear of pain, reflex inhibition, and disuse atrophy¹³–¹⁵.

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Therapists aim to maximize the hand function through treatment program and education. The three most common components of physiotherapy/occupational therapy for RA hands are exercise therapy, joint protection advice and provision of functional splinting and assistive devices. For the treatment process to be more effective there is a need for treatment approach beyond strengthening exercises to promote dynamic joint and functional stability and enhance joint protective muscle activity within functional context.

Proprioceptive training focuses on the use of somatosensory signals such as proprioceptive or tactile afferents in the absence of information from other modalities such as vision and thereby improving or restoring sensorimotor function. It is necessary that the patients keep their balance while executing multiple tasks on a daily basis. Balance training or proprioceptive training emphasizes the maintenance of balance during visual and perturbation challenges with eyes open or closed, range of motion, and maintaining stability over reduced areas of support and unstable surface. Studies have shown a function improvement after a proprioceptive training in patients with RA. The proprioceptive retraining (PRT) technique is incorporates both neurophysiological and biomechanical procedures and techniques to influence neuromusculoskeletal integrity. The intervention is divided into three phases i.e. preparatory phase, dynamic adaptability phase and dynamic environmental interaction phase implemented over a period of 8 weeks. PRT exercises such as tapping and weight bearing exercises in a neutral position should be performed first with the eyes open and then with eyes closed. After performing strengthening exercises for several months, symptoms can improve and an improvement in ligament toughness can be detected with joint translation testing.

Few studies have specifically examined the effect of hand exercises in patients with RA. So far no studies have been done comparing PRT and hand exercise on hand functions in rheumatoid arthritis. The aim of the study was to compare the efficacy of proprioceptive retraining technique over home exercise program on hand functions in RA patients.

**METHODOLOGY**

**Study patients:** This study was conducted in Rheumatology OPD of KIMS hospital at Bhubaneswar and Department of Occupational Therapy of SVNIRTAR at Olatpur during the year 2016 – 2017. Patients aged 20 to 74 years with rheumatoid arthritis for more than one year duration, fulfilling the 2010 ACR/EULAR classification criteria with functional class II and III on stable DMARDs of three months or more were included. Patients with upper extremity joint fracture or surgery in the previous six months or other type of arthritis or sensory impairment of hand were excluded. Patients who had fixed deformities including swan neck and boutonniere or wrist subluxation or had severe pain and cognitive deficits were excluded.

**Study design and interventions:** Two groups, pre-test post-test structured, experimental study design was followed. The study was approved by the Institutional Ethics Committee. After obtaining the informed consent, they were stratified by sex and randomly allocated alternatively to the following two groups.

**Group 1:** Twenty patients received proprioceptive retraining. This technique included grip exercise activity, weighted pulley activity for fingers, lifting dumbbells with hand, wrist roller activity and stretch and hold of bilateral counterpart fingers. The exercise program was performed 3 times a week for 8 weeks. Each task was repeated 10 times and the position of maximal effort was held for 3-5 seconds with a 10 seconds rest between repetitions. All activities were performed in sitting position.

**Group 2:** Twenty patients received home exercise (HE) program which included simple movements of wrist, and finger joints, thumb movement performed against resistance, touching the base of each finger, volar and dorsal flexion of wrist, pronation and supination of forearm, and tendon gliding exercises. The exercise program was performed 3 times a week for 8 weeks. Each task was repeated 10 times and the position of maximal effort was held for 3-5 seconds with a 10 seconds rest between repetitions. All activities were performed in sitting position.

**Outcome assessments:** The brief Michigan Hand outcomes Questionnaire (bMHQ) and Jebsen Hand Function Test (JHFT) were used to assess the hand function of the study participants and all the assessments were conducted by one occupational therapist. The brief version of the MHQ contains 12 items with responses on a 1 through 5 Likert scale regarding several aspects of hand function. The items include: (1) Overall, how well did your hand(s) work during the past week? (2)
How was the sensation (feeling) in your hand(s) during the past week? (3) How difficult was it for you to hold a frying pan during the last week? (4) How difficult was it for you to button a shirt or blouse during the past week? (5) In the past 4 weeks, how often were you unable to do your work because of problems with your hand(s)/wrist(s)? (6) In the past 4 weeks, how often did you take longer to do tasks in your work because of problems with your hand(s)/wrist(s)? (7) How often did the pain in your hand(s)/wrist(s) interfere with your daily activities (such as eating or bathing) in the past week? (8) Describe the pain in your hand(s)/wrist(s) in the past week? (9) I am satisfied with the look of my hand(s)? (10) In the past week, the appearance of my hand(s) interferes with my normal daily activities? (11) In the past week, how satisfied are you with the motion of your fingers? (12) In the past week, how satisfied are you with the motion of your wrist? Higher scores indicate better overall functioning and satisfaction. The brief MHQ does not distinguish between hands.

The purpose of the JHFT is to assess broad aspects of hand function commonly used in activities of daily living using standardized tasks. There are 7 items: writing, turning over 3 × 5 inch cards (simulated page turning), picking up small common objects, simulated feeding, stacking checkers, picking up large light cans, and picking up large heavy cans. Each item is timed. The longer the time required to complete the items, the more disability a person has.32,34.

Statistical analysis: The data were analyzed using SPSS version 21.0 software and values were expressed as mean, standard deviation, proportion, and 95% confidence interval. Differences in demographic variables at baseline between two patient groups were examined by unpaired t test. Within group differences between baseline and 8 week scores in each patient group was examined by paired t test whereas between group differences in change scores were examined by unpaired t test. The significance level was set at p < 0.05.

Table 1: Demographic characteristics of patients with rheumatoid arthritis participating in the study (N = 40)

<table>
<thead>
<tr>
<th>Variable value</th>
<th>Proprioceptive training group (n = 20)</th>
<th>Home exercise group (n = 20)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Mean ± SD)</td>
<td>44.85 ± 7.35</td>
<td>47.10 ± 6.98</td>
<td>0.327</td>
</tr>
<tr>
<td>Disease duration (Years)</td>
<td>3.65 ± 1.42</td>
<td>4.15 ± 1.39</td>
<td>0.268</td>
</tr>
<tr>
<td>Gender (N, %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>04 (57.1)</td>
<td>03 (42.9)</td>
<td>1.000</td>
</tr>
<tr>
<td>Female</td>
<td>16 (48.5)</td>
<td>17 (51.5)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Mean changes (95% CI) and mean differences (95% CI) in change scores for hand function between two groups of rheumatoid arthritis (N = 40)

<table>
<thead>
<tr>
<th>Test</th>
<th>Proprioceptive training</th>
<th>Home exercise</th>
<th>Mean differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>(95% CI)</td>
</tr>
<tr>
<td>MHQ*</td>
<td>20</td>
<td>17.85 (1.75)</td>
<td>20 17.55 (1.73)</td>
</tr>
<tr>
<td>Baseline (SD*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ week 8</td>
<td>20</td>
<td>-2.35(-2.66 to -2.04)†</td>
<td>20 -1.40 (-1.63 to -1.16)†</td>
</tr>
<tr>
<td>JHFT* (for dominant hand)</td>
<td>20</td>
<td>43.29 (1.37)</td>
<td>20 43.32 (1.06)</td>
</tr>
<tr>
<td>Baseline (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ week 8</td>
<td>20</td>
<td>2.97(2.78 to 3.17)†</td>
<td>20 1.78(1.63 to 1.92)†</td>
</tr>
<tr>
<td>JHFT (for non-dominant hand)</td>
<td>20</td>
<td>74.08 (1.20)</td>
<td>20 74.42 (0.89)</td>
</tr>
<tr>
<td>Baseline (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ week 8</td>
<td>20</td>
<td>2.12 (1.93 to 2.31)†</td>
<td>20 1.68 (1.51 to 1.84)†</td>
</tr>
</tbody>
</table>
RESULTS

Table 1 presents the demographic characteristics of the participating patients. Patients in both the groups were similar with respect to age, sex and disease duration. Majority of the study participants were females (33, 82.5%). Mean change in MHQ and JHFT scores for hand function of the patient groups is given in table 2. Both patient groups showed a decline in MHQ score and an increase in JHFT score at 8 weeks than the baseline value which means an improvement of hand function in both these groups. These differences were statistically significant. Furthermore, change in bMHQ as well as JHFT scores for hand function at 8 weeks was significantly higher in proprioceptive training group.

DISCUSSION

This study discusses the effect of two techniques on hand function of RA patients and comparison between their efficacies.

Comparing the baseline and 8 week mean scores of bMHQ and JHFT in the home exercise group, it was observed that overall hand functions including ADL activities and pain level improved significantly after the completion of the treatment protocol. The stretching and strengthening for rheumatoid arthritis of the hand (SARAH) randomised controlled trial evaluated the effectiveness of a hand exercise programme and demonstrated it was clinically effective and cost-effective at 12 months. Hand function had reduced over time which coincided with a reduction in hand exercises highlighting the importance of promoting long-term exercise adherence among patients with RA. Hand exercise is an effective intervention for rheumatoid arthritis patients, leading to better strength and function. We also found significant improvement of hand functions after completion of proprioceptive retraining in the PRT group compared to the baseline value. Our study demonstrated that PRT program is superior to HE program in terms of improving hand function. Participants who were under the PRT program achieved significant improvement in MHQ as well as JHFT scores as compared to those under home exercise program. This might be due to the fact that proprioceptive acuity plays an important role in neuromotor control of hand joints and its impairment significantly affects neuromusculoskeletal integrity contributing to pain, and functional disability. This indicates that proprioceptive retraining technique can be used as a better alternative over conventional home based exercise program. Batra et al. Showed in their study that PRT had better functional outcomes than conventional technique.

Our study has following limitations. First, sample size needs to be larger, second, the occupational therapist assessing the patients knew which exercise program might have influenced the measurements. We conclude, proprioceptive retraining program is more effective compared to home exercise program for improvement of hand functions in patients with RA.

Ethical Clearance: Taken from the institutional ethics committee

Source of Funding: Nil

Conflict of Interest: Nil

REFERENCES


Effect of Myofascial Release as an Adjunct Treatment to Conventional Physiotherapy in Plantar Fasciitis

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ABSTRACT

Background: Plantar fasciitis is defined as series of micro trauma to the plantar fascia due to sustained stress of weight bearing, or running results in fasciitis. Myofascial Release therapy is applied to restore the length, decrease pain, and improve function. So, the present study was conducted to find out the effect of Myofascial release in addition to conventional physiotherapy in plantar fasciitis.

Method: 40 subjects will be taken after thoroughly screening from the inclusion and exclusion criteria and informed consent will be taken from them.20 subjects will be randomly allocated to each group. Group A: Conventional physiotherapy. Group B: Myofascial release and Conventional Physiotherapy. Follow up assessment will be taken after 2 weeks. Conventional treatment: Therapeutic Ultrasound, strengthening exercises-Toe curl ups, Active ankle exercises, Tendon Achilles stretch, stretching with tennis ball.

Results: The results of Group A and Group B showed significant improvement in VAS (p < 0.0001), FFI (p < 0.0001).

Conclusion: Manual therapy in the form of myofascial release showed overall significant improvement in Pain and Functional status. Hence it can be concluded that myofascial release as an adjunct treatment to conventional is an effective treatment for plantar fasciitis.

Keywords: Myofascial release, Plantar fasciitis, Pain (VAS), Foot Function Index (FFI).

INTRODUCTION

The plantar fascia is dense, multi-layered fibrous connective tissue that originates from the medial tubercle of the calcaneus and extends towards the toes.¹ The central band of the plantar fascia is primarily affected where a hyper-cellular inflammation occurs within the fibers from the fascia, leading to degenerative changes. Overload on the foot causes micro trauma trauma to the plantar fascia due to sustained stress of weight bearing, or running results in fasciitis.² It has a common cause of heel pain which affects 10% of the general population.³ which can be acute or chronic. Plantar fasciitis is more familiar between ages 40 to 70 with no bias to gender. Factors which causes plantar fasciitis are degenerative changes, mechanical stress factors, defective shoe.⁴ The most common symptom is pain on the sole of foot at the inferior region of the heel. The pain is progressive during weight bearing, especially the first step in the morning.⁵ On examination there is tenderness over medial aspect of calcaneus, swelling of digits, decreased range of motion. Diagnosed with patient history and physical examination⁶ which includes windlass test.⁷,⁸,⁹ Various physiotherapy treatment protocols such as rest, taping, orthosis- night splint, stretching and strengthening exercises. Even electrotherapy modalities in the form of therapeutic ultrasound, phonophoresis, laser, microwave diathermy, iontophoresis, cryotherapy, contrast bath can be given.¹⁰

Therapeutic ultrasound is described as a high frequency mechanical wave which transmits energy
through vibration. In the continuous form, the wave power remains steady and in pulse mode waves are in interrupted form.\textsuperscript{11,12} As the sound vibrations create a gentle heating effect upon the body, the body responds by increasing blood flow to the site of injury. As the blood flow increases, the amount of oxygen and nutrients reaching the damage tissue also increase. Ultrasound therapy heals tissue, reduces inflammation, softens scar tissue and minimizes the pain.\textsuperscript{13} Various stretching and strengthening exercises show a decrease in pain on first steps in morning and other symptoms. Types of exercises are

Towel curl up, Active ankle exercises, Tendon Achilles stretching, Stretching with tennis ball for 10 times\textsuperscript{14}

Myofascial Release therapy is defined as the facilitation of mechanical, neural, and psycho physiological adaptive potential as interfaced via the myofascial system.\textsuperscript{15} Myofascial release technique stem from the foundation that fascia, a connective tissue found throughout the body, reorganizes itself in response to physical stress and thickness of the lines of tension.\textsuperscript{16} Myofascial release there is a change in the viscosity of the ground substance to a more fluid state which eliminates the fascia’s excessive pressure on the pain sensitive structure and restores proper length, decrease pain, and improve function.\textsuperscript{17,18} Hence this technique is proposed to act as a catalyst in the resolution of plantar fasciitis. It is a soft tissue mobilization technique given in the acute and chronic conditions which is caused by tightness and restriction in soft tissues. It is applied in a low load, long duration stretch to the myofascial complex, to restore the length, decrease pain, and improve function.\textsuperscript{19,20}

As plantar fasciitis is one of the common conditions in 10\% of general population. Plantar fasciitis is a painful disorder that involves the plantar aspect of the heel. Such as, therapeutic ultrasound and strengthening exercises are said to be effective\textsuperscript{21} However there is less evidence, which supports that manual therapy is effective in conjunction with conventional physiotherapy treatment the management of heel pain. Therefore, the present study was undertaken without the intention to find out the effectiveness of myofascial release in plantar fasciitis, in conjunction with conventional physiotherapy treatment and to compare the effectiveness of myofascial over conventional physiotherapy treatment.

\textbf{MATERIALS AND METHOD}

40 subjects were recruited after thoroughly screening from the inclusion and exclusion criteria and informed consent was taken prior to the treatment. In this study subjects were divided into groups. Randomization was done by lottery method and 20 Subjects were allotted to each group. Group A was a control group and group B was an experimental group. This was followed by pre-treatment assessment of the involved foot for tenderness temperature, swelling and windlass test, pain intensity in terms of visual analog scale and foot function index was carried out. Ethical clearance was obtained from university’s institutional review board. Inclusion criteria were between age of 45-60, both male and female, clinically diagnose with plantar fasciitis, pain more than 3 weeks. Exclusion criteria are red flags to manual therapies in and around ankle joint, previous surgery, neurological condition and corticosteroids injection in heel preceding three months. Both the groups were given regular conventional Physiotherapy treatments for 2 weeks. Group A was given conventional physiotherapy which includes therapeutic ultrasound for 8 minutes and exercises which includes towel curl ups, active ankle exercises, tendon Achilles stretching, stretching with tennis ball, and the group B was given conventional treatment and myofascial release technique by using the thumb, pressure will be held for 90 seconds given for 15 minutes per session. The post treatment improvement was noted with the outcome measures.

\textbf{STATISTICAL ANALYSIS}

Statistical analysis was done manually as well as using the statistics software INSTAT software. Wilcoxon matched pair test was the statistical test used for pre and post intervention comparison within the group. Mann-Whitney test was used for pre and post interventional comparison between the groups.

\textbf{RESULT}

1. Gender distribution

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
Sr. No. & Gender Distribution & Total \\
\hline
1. & Male & 9 \\
2. & Female & 31 \\
\hline
\end{tabular}
\end{table}
2. Age Distribution: According to the study, the age group which was more involved was of 45-49 years with sample size of 17.

**Table 2: Mean age distribution**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Age Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>45-49</td>
<td>17</td>
</tr>
<tr>
<td>2.</td>
<td>50-55</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>56-60</td>
<td>13</td>
</tr>
</tbody>
</table>

**Outcome Measures:**

1. Visual Analog Scale:

**Table 3: Comparison of pre and post visual analog scale**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>‘p’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>7.95 ± 0.8256</td>
<td>6.4 ± 0.5026</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>B</td>
<td>7.95 ± 0.8256</td>
<td>3.7 ± 0.7327</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

The graph shows comparison of mean values and standard deviation of scores of Visual Analogue Scale. The values were compared by applying Wilcoxon on matched pairs test. Pre and Post treatment values shows that there is extremely significant difference in pain. (p = 0.001)

**Table 4: Comparison of pre and post foot function index**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>67.35 ± 3.689</td>
<td>50 ± 4.645</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>B</td>
<td>67.95 ± 2.625</td>
<td>35 ± 13.955</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

The graph shows comparison of mean values and standard deviation of scores of Foot Function Index. The values were compared by applying Wilcoxon on matched pairs test. Pre and Post treatment values shows that there is extremely significant difference in Functional Disability. (p = 0.001)

**Table 5: Comparison of pre-pre and post-post visual analog scale**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>‘p’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>SEM</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>A</td>
<td>7.95±0.8256</td>
<td>0.1846</td>
<td>6.4±0.5026</td>
</tr>
<tr>
<td>B</td>
<td>7.95±0.8256</td>
<td>0.1846</td>
<td>3.7±0.7327</td>
</tr>
<tr>
<td>‘p’</td>
<td>0.9891</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

In the present study pre-interventional mean of visual analog scale was 7.95 ± 0.8256 in Group A and 7.95 ± 0.8256 in Group B respectively whereas post interventionally mean of visual analog scale was 6.4 ± 0.4894 in Group A and 3.7 ± 0.7327 in Group B respectively. Inter group analysis of visual analog scale was done by using Mann-Whitney test. Pre intervention analysis showed no significant difference between Group A and Group B (p=0.9891). Post intervention analysis showed extremely significant difference between Group A and Group B (p<0.0001)

**Table 6: Comparison of pre-pre and post-post Foot Function Index**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>‘p’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>SEM</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>A</td>
<td>67.35±3.689</td>
<td>0.8249</td>
<td>50±4.645</td>
</tr>
<tr>
<td>B</td>
<td>67.95±2.625</td>
<td>0.5870</td>
<td>35±13.955</td>
</tr>
<tr>
<td>‘p’</td>
<td>0.5136</td>
<td>0.0004</td>
<td></td>
</tr>
</tbody>
</table>

In the present study pre-interventional mean of visual analog scale was 7.95±0.8256 in Group A and 7.95±0.8256 in Group B respectively whereas post interventionally mean of visual analog scale was 6.4 ± 0.4894 in Group A and 3.7± 0.7327 in Group B respectively. Inter group analysis of visual analog scale was done by using Mann-Whitney test. Pre intervention analysis showed no significant difference between Group A and Group B (p=0.9891). Post intervention analysis showed extremely significant difference between Group A and Group B (p<0.0001)
DISCUSSION

Plantar fasciitis involves an overstretching of the plantar fascia causing an inflammatory reaction, usually near the fascia’s calcaneal attachment. It is most common condition which affects 10% of general population and which can be treated by a wide variety of physiotherapy methods. The aim of the study was to find the effect of myofascial release as an adjunct treatment to conventional in plantar fasciitis.

40 participants with the age group of 45 to 60 years were included in the study. Subjects were divided in two groups, Group A was given conventional physiotherapy treatment and Group B was given myofascial release in addition to conventional physiotherapy treatment. Pain and Functional disability were measured and documented by Visual analog scale and Foot function index.

The pre and post interventional values of Visual analog scale and Foot function index for within the Group A were statistically analyzed using Wilcoxon matched test and the results showed statistically difference in Visual analog scale (p<0.0001) and Foot function index(<0.0001).Thus the treatment given in Group A was effective in reducing pain and functional disability.

According to the study performed by Hana Hronkova, Ultrasound is the Electrotherapy modality used in treating pain in plantar fasciitis. Ultrasound heats these tissues and the tissues absorb the energy, resulting in an increase in tissue temperature and metabolism, tissue softening, and an increase in circulation. Ultrasound enhances to increase chemical activity in tissues, increase cell membrane permeability, deform molecular structures, and alter diffusion and protein synthesis rates, all potentially affecting the speed of tissue repair. Thus ultrasound in plantar fasciitis has showed significant reduction in pain in ultrasound group.

In contrast a study done by Crawford F, et al in 1996 therapeutic ultrasound was given to patients with heel pain and found no evidence to support the effectiveness of Ultrasound.

Ultrasound was used as it’s preferred for soft tissue repair as affirmed it is capable of reaching to deeper layer. When the ultrasound is given to the damage tissue, the tissue absorbs the energy, due to this energy the tissue is gently heated, the body responds by increasing blood flow to the site of the injury. As the blood flow increases, the amount of oxygen and nutrients reaching the damaged tissue also increases. This speeds healing by body’s natural process. As a result, ultrasound therapy heals tissue, reduces inflammation, softens scar tissue and minimizes pain.

As conventional treatment also includes of stretching and strengthening exercises for plantar fasciitis.

Boyd HS et al (1992)in his study found that strengthening exercises for intrinsic foot muscles were cited as one of the most helpful treatment in heel pain. Strong intrinsic muscles thereby help in supporting the arches of the foot.

The pre and post interventional values of Visual analog scale and Foot function index for within the Group B were statistically analyzed using Wilcoxon matched test and the results showed statistically difference in Visual analog scale (p<0.0001) and Foot function index(<0.0001).Thus the treatment given in Group B was effective in reducing pain and functional disability.

Paloni John in a study review of Myofascial release as an effective manual therapy technique, supports the usage of Myofascial release technique for the treatment of Myofascial pain. According to the literature, applying an appropriate myofascial technique can be a very effective therapy for myofascial pain. Results have shown a decrease in pain, and increase in range of motion for joint acted by the affected muscle.

Myofascial release is given in cases of Injuries, stress, and poor postures which causes restriction to fascia. Gentle and sustained stretching of myofascial release is given to free adhesions and soften and lengthen the fascia. By freeing up fascia that may be impending blood vessels or nerves, myofascial release helps in improving circulation and nervous system transmission. This technique has been widely used in physical therapy treatments in the chronic conditions causing tightness and restriction in soft tissues. By Myofascial release there is a change in the viscosity of the ground substance to a more fluid state which eliminates the fascia’s excessive pressure on the pain sensitive structure, restores proper alignment and improves the circulation.

Comparison of pre pre interventional values of Visual analog scale and Foot function index between the Group A and Group B were statistically analyzed using
Mann-whitney test and the results showed no significant difference in Visual analog scale (p<0.9891) and Foot function index (p<0.5136).

Comparison of post post interventional values of Visual analog scale and Foot function index between the Group A and Group B were statistically analyzed using Mann-Whitney test and the results showed extremely significant difference in Visual analog scale (p<0.0001) and Foot function index (p<0.0004). Thus the treatment given in Group B was more effective than Group A in reducing pain and functional disability.

Suman Kuhar conducted the study on myofascial release technique an effective treatment for plantar fasciitis concluded that conservative management approach like physiotherapy in the treatment of plantar fasciitis, is beneficial. The subjects treated with myofascial release techniques showed an additional benefit in terms of reduction of pain on Visual analog Scale and functional ability in terms of Foot function index. Hence, it can be concluded that myofascial release technique is an effective therapeutic option in the treatment of plantar fasciitis.

With the two techniques used in the study the role of conventional treatment were to stretch the tightened structures like the plantar fascia and Tendo Achilles tendon to break the vicious cycle which aggravates the condition, and also to maintain and restore the proper biomechanics, and maintain the integrity of muscles and related tissues. After this study researcher suggest to use myofascial release as an adjunct treatment for Plantar Fasciitis patients as it is being found to be more effective. Therefore myofascial release is a good adjunct for treatment of Plantar Fasciitis.

CONCLUSION

Based on the statistical analysis and result this concluded that Manual therapy in the form of myofascial release showed overall significant improvement in Pain and Functional status. Hence it can be concluded that myofascial release as an adjunct treatment to conventional is an effective treatment for plantar fasciitis.

Hence the alternative hypothesis was accepted.

Source of Funding: The source of funding for study is self.

Conflict of Interest: There is no conflict of interest.

Ethical Clearance: Ethical clearance was taken from institutional ethical committee of KIMSDU.

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13. From brunnstrom, S: movement therapy is hemiplegia. Haper and row, new york.


A Comparative Study between Maitland Mobilisation with Postural Correction, Postural Correction with Strengthening Exercises and Maitland Mobilisation with Strengthening Exercises in Patients with Non Specific CLBP

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1Assistant Professor, Noida International University, Greater Noida; 2Consultant Physiotherapist, Fortis Hospital, Faridabad; 3HOD Physiotherapy, PIPRAMS,Greater Noida

ABSTRACT

Background: Chronic Low Back Pain (CLBP)-in which pain is localised to lumbar spine or referred to the leg. It is commonly presented in general practice, much CLBP is resistant to diagnosis and it has been estimated that up to 80% of such case may present no identifiable pathology.

Objective: To establish a compatible result oriented protocol in the treatment of patients with non specific CLBP and to relieve pain in shortest possible time and its reoccurrence.

Methodology: 30 subjects were included in the study both male and females. Patients were divided into three groups randomly, while every group having 10 subjects each

Results: Mobilisation technique with strengthening exercises is effective for management of non specific CLBP.

Conclusion: The study concluded that treatment of patients with chronic low back pain using Maitland mobilization and strengthening exercise program was found to be more effective.

Keywords: CLBP, LBP, Mobilisation, Strengthening Exercises, WT, HT, BMI, OT, PAS

INTRODUCTION

Chronic low back pain (CLBP)- in which pain is localized to lumbar spine or referred to the leg. It is commonly presented in general practice, much CLBP is resistant to diagnosis and it has been estimated that up to 80% of such cases may present no identifiable pathology. Degenerative disease of lumbar spine is a common cause of low back pain and lower extremity pain.

In western countries chronic LBP constitutes a major health care problem. Moreover it challenges the social insurance systems. In Germany, for example, chronic LBP is one of the most important reasons for early retirement.

It is thought that CLBP emerges from acute pain of muscle and connective tissue, which persists approximately 30% of acute cases and becomes chronic. Besides somatic factors, psychological and social factors play an important role in chronification; therefore CLBP often is referred to as “unspecific". Approximately 70% of people experience Low back pain (LBP) during their lifetime (Frymoyer, 1988). In most cases the origin of LBP symptoms remains unknown and the condition is described LBP of unknown origin or nonspecific LBP (NSLBP). Between 10-50% with LBP are referred to physiotherapist.

It has been suggested in order to produce the best outcome for patients with NSLBP. The therapist should deliver SMT to the most symptomatic spinal level (Maitland et al, 2001). Therefore it is recommended that...
therapist performed passive accessory motion testing to identify the most symptomatic level and then apply manual treatment to this level. Applying treatment to this level is thought to produce better result then when treatment is applied to an adjacent or more remote spinal level.

Posture is the mechanical relationship of the parts of the body to each other. The Posture Committee of the American Orthopaedic Association (1946) defines good posture as ‘that state of muscular and skeletal balance, which protects the supporting structures of the body against injury and progressive deformity irrespective of the attitude in which these structures are working and resting.

LITERATURE REVIEW

Farrell and Twomey (1982) compared passive mobilization and manipulation of the lumbar spine and a regimen of microwave, isometric abdominal exercises and ergonomic instruction. They claimed the duration of low back pain symptoms was significantly shorter for subjects receiving mobilization and manipulation. Jason et al (1981) compared two groups of patients having placebo or mobilization and manipulation.

Mary T. Moffroid, described that decreased endurance has been noted as a predictor of first time occurrence of LBP, and also as a finding in persons with CLBP compared to those with sound backs. Training has been shown to improve measured endurance characteristics of the trunk muscles, but diverse intervention programs over several months duration appear to be the most successful in improving physical performance.

Adit et al, showed that various lumbar mobilization techniques have similar immediate effects on pain and range of movement in subjects with NSLBP. It appears however that, mobilization treatment applied to lower lumbar spinal level is associated with a greater immediate analgesic effect than mobilization applied to upper levels.

Sean Hanrahan et al, stated that the effects of grade 1 and grade 2 joint mobilization on a group of collegiate athletic with relative minor mechanical lumbar injuries and found that mobilization techniques resulted in immediate and 24hours increased in the ability of the para-spinal musculature to produce force, a 24 hour decreased in pain as measured by the sensory sub scale of Mc Gill pain questionnaire, and a decrease in pain during lumbar extension as measured by VAS when compared with subjects in the control group.

MATERIALS AND METHODOLOGY

The study was carried out at Physiotherapy Center of Senior Citizen’s Welfare Council of Sarita Vihar.

Subjects: Patient aged between 40 – 60 yrs with Lumbar Spondylosis with pain (symptoms for at least 3 months) were recruited in the study. Both males and females were included in the study.

Group 1: Maitland mobilization and Postural Correction exercises

Group 2: Postural Correction and Strengthening exercises.

Group 3: Maitland mobilization and Strengthening exercises.

MATERIALS

Evaluation proforma (IV), Manniche et al Scale for functional outcome measure.(Annexure III)

Stopwatch

Plinth or suitable furniture

Marker

Measuring Tape

Belt

Plumb line

Inclusion Criteria: Individual between the age group of 40-60 yrs suffering from non specific chronic low back pain.

Exclusion Criteria: Diagnosed Hypertensive Patients

Prolapse intervertebral disc

Peripheral neuropathy

Infection of a spine

Fracture of lumbar spine
Surgery of lumbar spine  
Congenital deformity  
Spondylolisthesis  
Ankylosing Spondylosis  
Carcinoma  

**Research Design:** Comparative Study  
**Setting of Study:** Physiotherapy Center of Senior Citizen’s Welfare Council of Sarita Vihar  
**Duration of Study:** 4 weeks.  
**Sample Size:** Total no. of patients included in the study was 30 with each group containing 10 patients each.  
**Randomization:** Subjects were randomly allocated to all three interventions.  

**PROCEDURE**  

The patients that satisfied the selection criteria were selected for the study.

A patient in the age group of 40-60 yrs both male and female were randomly selected for the study. The patients who were randomly selected were further divided into three groups of 10 patients each to attain a uniform criteria where in exclusion criteria was strictly adhered. The treatment protocol was given for 5 sessions per week. Total duration of the treatment lasted for 4 weeks. The patient was thoroughly assessed each week, prior to the treatment session using Manniche et al Functional Outcome Measures.

---

**INTERVENTION**

**MOBILISATION**

Postero–anterior central vertebral pressure to the Lumbar Spinous

**STRENGTHENING EXERCISES:**

**POSTURAL CORRECTION**

Neutral spine forward bending

Prone Pelvis Press

Decompression Exercise (re Alignment)

Standing (Off the Wall)

Plumb Line Method:

**DATA ANALYSIS**

Analysis of the data was performed using statistical analysis systems (SPSS) version 10. Chi square test was performed to find out whether there was any significant difference between male and female ratio. The result shows no significant difference between male and female ratio indicating that the sex ratio was uniformly distributed over three groups. One way ANOVA was done to check whether mean values are significant or not in all the groups and within the groups.

Tukey post hoc test was applied to analyze further which pair of out come shows difference within the groups and all the groups. If P value > 0.05 – not statistically significant If P value < 0.05 – statistically significant.

---

**RESULTS**

**Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th></th>
<th></th>
<th>P . I.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>S.D</td>
<td>M</td>
<td>S.D</td>
</tr>
<tr>
<td><strong>B &amp; L</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1</td>
<td>19.10</td>
<td>6.66</td>
<td>14.60</td>
<td>5.60</td>
</tr>
<tr>
<td></td>
<td>22.90</td>
<td>4.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WKI</td>
<td>14.80</td>
<td>4.26</td>
<td>13.10</td>
<td>5.95</td>
</tr>
<tr>
<td></td>
<td>20.20</td>
<td>5.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WKII</td>
<td>11.60</td>
<td>3.10</td>
<td>7.40</td>
<td>3.78</td>
</tr>
<tr>
<td></td>
<td>16.30</td>
<td>3.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WKIII</td>
<td>8.20</td>
<td>3.71</td>
<td>6.40</td>
<td>3.31</td>
</tr>
<tr>
<td></td>
<td>14.60</td>
<td>4.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WKIV</td>
<td>5.90</td>
<td>2.64</td>
<td>4.50</td>
<td>2.92</td>
</tr>
<tr>
<td></td>
<td>11.80</td>
<td>4.18</td>
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</table>
Group II

<table>
<thead>
<tr>
<th></th>
<th>B &amp; L</th>
<th>D.I</th>
<th>P. I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>S.D</td>
<td>M</td>
</tr>
<tr>
<td>Day I</td>
<td>19.40</td>
<td>8.32</td>
<td>15.30</td>
</tr>
<tr>
<td>WKI</td>
<td>19.00</td>
<td>5.27</td>
<td>14.80</td>
</tr>
<tr>
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<td>15.60</td>
<td>5.83</td>
<td>12.00</td>
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<tr>
<td>WKIII</td>
<td>11.20</td>
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<td>8.90</td>
<td>4.77</td>
<td>6.20</td>
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</table>

Group III

<table>
<thead>
<tr>
<th></th>
<th>B &amp; L</th>
<th>D.I</th>
<th>P. I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>S.D</td>
<td>M</td>
</tr>
<tr>
<td>Day I</td>
<td>18.40</td>
<td>6.13</td>
<td>11.70</td>
</tr>
<tr>
<td>WKI</td>
<td>14.10</td>
<td>3.57</td>
<td>10.10</td>
</tr>
<tr>
<td>WKII</td>
<td>10.30</td>
<td>2.41</td>
<td>7.30</td>
</tr>
<tr>
<td>WKIII</td>
<td>7.00</td>
<td>1.83</td>
<td>5.00</td>
</tr>
<tr>
<td>WKIV</td>
<td>5.40</td>
<td>1.43</td>
<td>3.80</td>
</tr>
</tbody>
</table>

The above table shows the values of mean & S.D for the following parameters of the three groups for the various days of treatment Day I, Week I, Week II, Week III & Week IV

B & L- Back & Leg pain
D. I-Disability Index
P. I.-Physical Impairment

ANOVA VALUES

Table 2: POST–HOC TEST FOR 1ST WEEK ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>Variable</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>B&amp;L</td>
<td>G1–G2</td>
<td>.104 (N.S)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.934 (N.S)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.50 (S)</td>
</tr>
<tr>
<td>D. I.</td>
<td>G1–G2</td>
<td>.752 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.398 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.122 (N.S.)</td>
</tr>
<tr>
<td>P. I.</td>
<td>G1–G2</td>
<td>.089 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.756 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.019 (S)</td>
</tr>
</tbody>
</table>

Parameters (B&L) shows statistical significant difference in group three, as well as P.I. shows statistical significant difference in G2-G3. In all other parameters, in all three groups there is no statistical significant difference.

B&L–Back and Leg Pain
D. I.–Disability Index
P. I.–Physical Impairment

Table 3: POST–HOC TEST FOR 4TH WEEK ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>Variable</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>B&amp;L</td>
<td>G1–G2</td>
<td>.117 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.937 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.059 (N.S.)</td>
</tr>
<tr>
<td>D. I.</td>
<td>G1–G2</td>
<td>.476 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.602 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.099 (N.S.)</td>
</tr>
<tr>
<td>P. I.</td>
<td>G1–G2</td>
<td>.327 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G1–G3</td>
<td>.821 (N.S.)</td>
</tr>
<tr>
<td></td>
<td>G2–G3</td>
<td>.118 (N.S.)</td>
</tr>
</tbody>
</table>

The above table shows that there is no statistical significant difference (P<0.05) for all parameters (B&L, D.I. & P.I.) in all three groups.
RESULT AND DISCUSSION

Maitland mobilisation with strengthening exercises showed greater significant amount of recovery at the end of 2 weeks than the group II (Strengthening exercises with Postural Correction) and group I (Maitland with Postural Correction). This could be due to the fact that spinal mobilisation reduces pain by moving soft tissue containing neurotransmitters such as substance p & histamine. In addition the oscillation produced by spinal mobilization also seems to increase the threshold which stimulates the nociceptors.

The analysis of the data show that group I (m + p) patients also showed significant amount of recovery but, took a longer time to show the desired results. This could be due to the fact that correction of posture involves the programming of nervous systems writing reflexes and innate organizing energy requiring use of our head and body weighting system. The results also showed that postural correction and strengthening exercises doesn’t prove to be an efficient means of management in chronic low back pain which may be due to the fact that these methods primarily doesn’t seem to reduce pain efficiently.

Similarly the same data was analyzed to evaluate the patients disability index and physical impairment. The level showed that the patients who were treated using group III (m + s) got improved in their disability levels by the end of 2nd week. There was no significant reduction seen in the disability levels of patients who were treated using (m + p) group I and (s + p) group II during the same period. The results also showed that there was no significant improvement in the physical impairment levels for all the 3 groups of patients. The above finding could be due to the fact that the back muscles took longer time to get improved in their endurance level.

The limitation of the study is that the number of patients in each group was too small, this might be the reason why no statistically significant improvement was seen in all groups. Further study should include applying all the three treatment protocols (Maitland mobilization + postural correction + strengthening exercises) for all the patients and determining the effects upon them.

CONCLUSION

The study concluded that treatment of patients with chronic low back pain using Maitland mobilization and strengthening exercise program was found to be more effective. The study also concluded that no significant improvement in physical impairment was recorded.

Conflicts of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not Required

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Development of an Assessment and Rehabilitation Device for Shoulder Dysfunction

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¹Depatment of Neurology Physiotherapy, ²Physiotherapy Intern, KAHER Institute of Physiotherapy, Belgavi, Karnataka, India

ABSTRACT

An innovative shoulder ROM measurement device was designed to make measurement of shoulder ROM more easy and reliable. The aim of the study was to report on the comprehensive validity and reliability testing of the new device. The validity of the device compared to the goniometer was found to be strong. Correlation for flexion was 0.64, extension was 0.78 and for abduction was 0.73. Cronbach’s α for intra rater reliability for flexion was ≥0.5, for extension it was ≥0.72 and for abduction it was ≥-0.83. The inter rater reliability for flexion was ≥0.5, for extension it was ≥0.63 and for abduction it was ≥0.30. According to the statistical analysis, the new shoulder device is a valid and reliable device for measuring shoulder ROM.

Keywords: Reliability, Shoulder device, Shoulder ROM, Validity.

INTRODUCTION

The shoulder joint is the most mobile and unstable joint in the human body, it compromises its stability for the sake of mobility.¹ Proper functioning of the shoulder is required for performing activities of daily living (ADL). Shoulder dysfunction hampers the quality of life substantially.² It is extremely necessary for the assessors to have valid and reliable measurement devices to assess shoulder range of motion (ROM). Different mediums used for assessing shoulder ROM are goniometer, linear measures, visual observation and inclinometer.³ Proper shoulder ROM assessment is of great importance in diagnosing the shoulder dysfunction.⁴ Goniometer is the most widely used device for assessing ROM due to its portability and cost effectiveness.⁵ But goniometer has a few setbacks, it requires the therapist to stabilize and mobilize the limb simultaneously leading to blunders.³ The extent to which the goniometer measurements are reliable and valid also depend upon the knowledge required to use the goniometer.⁵ The inclinometer is another commonly used device for assessing shoulder ROM. One of the reasons why the inclinometer is not used as widely as the goniometer is its cost and need for familiarization with it.⁶ Visual estimation also shows reliability as good as goniometer but it requires tremendous experience in assessing ROM.⁴ Various physiotherapy techniques are used for treating shoulder dysfunction.⁵ The devices commonly used to treat shoulder dysfunction are shoulder wheel, finger ladder and shoulder pulley.⁶

NEW SHOULDER DEVICE

Description of the device: The instrument made is a C shaped metal rail like structure. The C shaped structure is curved according to the normal ROM of the shoulder joint to allow full range of motion in all movements. This C shaped structure is mounted on a movable stand (photograph 4) so it has the added advantage of being portable. A semicircle of 5 feet diameter was chosen as it is suitable for the average Indian height. A pipe measuring 40 mm (1.5 inch) was selected and was rolled on a mechanical pipe rolling machine to attain the semi-circular shape. The centre of the pipe was slit making a 10 mm slot for the probe to slide. As the pipe was slit to house the slide, it lost some dimensional stability and another thinner pipe of 10mm was bent and welded to provide stability. A spring wader slider was installed which can be moved in any position as the spring will hold it in place defying gravity. We are be able to move

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the C shaped structure in different positions so that the instrument can be used in different positions such as standing, supine and lying. The plate has a box like structure that allows the subject to hold on to it and move it around. Sensors is installed in the C shaped structure to get accurate measurement and these measurements are displayed. A plate measuring 10 inches was mounted on the sliding unit and the electronic probe was housed in a acyclic box with a knob to rotate the plate in any desired direction. The sliding mechanism was connected to the sensor which could read the angle of the vertical movement of the arm. It reads from 0 to 200. This contraption is mounted on a firm base with 4 legs to provide a stable base during operation of the system. Also the height of the stand is adjustable. Finally for aesthetic looks and long life of the surface coat, the system was sent for powder coating.

<table>
<thead>
<tr>
<th>Design characteristic</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>C shaped arc</td>
<td>Allows normal ROM of the shoulder</td>
</tr>
<tr>
<td>Adjustable height</td>
<td>Convenient for subjects of all heights</td>
</tr>
<tr>
<td>Adjustments available to shift the arc in different planes</td>
<td>Allows patients who are wheel chair bound and bed ridden to use the device</td>
</tr>
<tr>
<td>Ability to diagonal adjust the arc</td>
<td>Allows movements in functional planes</td>
</tr>
<tr>
<td>Sensitive sensors installed</td>
<td>To measure exact values</td>
</tr>
<tr>
<td>Screen showing digital readout of ROM</td>
<td>For easy interpretation of the values.</td>
</tr>
<tr>
<td>C shaped arc mounted on the stand</td>
<td>Allows the device to be portable.</td>
</tr>
</tbody>
</table>

**METHOD**

Ethical clearance was obtained from the Institutional Ethical Committee. All subjects were screened based on the inclusion and exclusion criteria. The purpose of the study was explained to the participants. By convenience sampling, subjects were included and a written informed consent was obtained from all them. 15 normal individuals above the age of 19 years and within the age of 35 years were recruited for this study. This group constituted of 7 males and 8 females. The height of these individual ranged from 152cms to 174cms. The average height of Indian women is 152.6cms and of an Indian male is 164.9cms. The shoulder ROM values recorded were flexion, extension and abduction. Other values such as internal rotation and external rotation also can be recorded using the instrument but were not recorded due to certain limitations such as instability of the plate, and time constraints. Two assessors recorded the values on two different days at the same time. Three different mediums used for recording the values were the universal goniometer, goniometer app and the shoulder device. Three values of each ROM were recorded on each instrument and the mean values were calculated and analyzed.

Values were recorded on the shoulder device. For flexion the subject was asked to hold the plate and move it upwards facing towards the device. For extension the subject was asked to stand in front of the tool, hold the handle and move it up and down. For abduction-adduction movement: the subject were asked to stand beside the tool, hold the handle and move it up and away from the body and bring it down and towards the body. Flexion, extension and abduction values were taken on the goniometer and the goniometer app. These values were then given for statistical analysis.

**RESULT**

Statistical analysis for the present study was done using Statistical Package of Social Sciences (SPSS) version 23 so as to verify the results obtained. Standard Cronbachs α test was used for reliability and validity was done using correlation matrix analysis.

**Validity:** Validity is moderate when the correlation is more than 0.4 and strong when more than 0.6.

**New device verses goniometer for assessor 1 day 1**

<table>
<thead>
<tr>
<th>Particular</th>
<th>Pair</th>
<th>Mean</th>
<th>SD</th>
<th>Correlation</th>
<th>p-value</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessor 1 &amp; day 1 for new instrument and Goniometer</td>
<td>Flexion Flexion</td>
<td>179.6233</td>
<td>.50228</td>
<td>0.617</td>
<td>0.014*</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>Extension Extension</td>
<td>59.2460</td>
<td>.85982</td>
<td>0.626</td>
<td>0.012*</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>Abduction Abduction</td>
<td>179.5793</td>
<td>.56968</td>
<td>0.849</td>
<td>0.000*</td>
<td>Strong</td>
</tr>
</tbody>
</table>
Validity of the new device on day 2 (Table 2): The statistical analysis produced correlation of 0.64 and p value 0.010 for flexion, correlation of 0.76 and p value 0.001 for extension and correlation of 0.73 and p value 0.002 for abduction which signifies strong validity.

Table 2: Validity of new instrument and Goniometer on day 2

<table>
<thead>
<tr>
<th>Particular Pair</th>
<th>Mean</th>
<th>SD</th>
<th>Correlation</th>
<th>p-value</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessor 1 &amp; day 1 for new instrument and Goniometer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexion Flexion</td>
<td>179.5567</td>
<td>.59952</td>
<td>0.642</td>
<td>0.010*</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>179.6680</td>
<td>.45496</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension Extension</td>
<td>59.2673</td>
<td>.92853</td>
<td>0.758</td>
<td>0.001*</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>59.2227</td>
<td>.81517</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abduction Abduction</td>
<td>179.7347</td>
<td>.22567</td>
<td>0.732</td>
<td>0.002*</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td>179.5793</td>
<td>.42791</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reliability: Cronbach’s alpha above 0.6 is considered good and a higher cronbachs alpha based on standardized items than Cronbachs alpha shows a higher reliability of the instrument.

Intra rater reliability:

Intra rater reliability for flexion (assessor 1) (Table 3): Cronbach’s alpha was 0.96 for day one and day two and Cronbach’s Alpha based on standardized items was 0.96. This shows excellent intra rater reliability. Significance was 0.000 which is statistically significant.

Intra rater reliability–Assessor 1

Shoulder tool assessor 1 on day 1 and day 2 for flexion

Table 3: Intra rater reliability for flexion (assessor 1)

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha Based on Standardized Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.957</td>
<td>0.965</td>
</tr>
</tbody>
</table>

Intra rater reliability for extention (assessor 1) (Table 4): Cronbach’s alpha was 0.84 for extension for day one and day two and Cronbach’s Alpha based on standardized items was 0.84. This shows excellent intra rater reliability of the instrument. Significance was 0.001.

Shoulder tool assessor 1 on day 1 and day 2 for Extension

Table 4: Intra rater reliability for extension (assessor 1)

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha Based on Standardized Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.842</td>
<td>0.844</td>
</tr>
</tbody>
</table>

Intra rater reliability for abduction (assessor 1) (table 5): Cronbach’s Alpha for day one and day two was 0.45 and for Cronbach’s Alpha based on standardized items was 0.6. This shows good intra rater reliability of the instrument. Significance was 0.138.

Shoulder tool assessor 1 on day 1 and day 2 for abduction

Table 5: Intra rater reliability for abduction (assessor 1)

<table>
<thead>
<tr>
<th>Cronbach’s Alpha</th>
<th>Cronbach’s Alpha Based on Standardized Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.449</td>
<td>0.595</td>
</tr>
</tbody>
</table>

Intra rater reliability for flexion (assessor 2): Cronbach’s alpha was 0.49 and Cronbach’s Alpha based on standardized items was 0.49 for flexion by assessor 1. Intra rater reliability for extension of the assessor 2 for day one and day two for this shows good intra rater reliability of the instrument. Significance was found to be 0.111

Intra rater reliability for extension (assessor 2): Cronbach’s alpha was 0.72 and according to Cronbachs alpha based on standardized items was 0.73 for extension by assessor 2,which shows good reliability .The intra reliability test for assessor 2 according to significance was found to 0.012 which is statistically significant.

Intra rater reliability for abduction (assessor 2): Cronbach’s alpha was -0.84 and according to Cronbachs alpha based on standardized items was 0.86. Significance was 0.866 which is significant.

These results reveal that the instrument has good reliability compared to the goniometer and the standard
values and can be used inter changeably with the goniometer while measuring ROM.

**Inter rater reliability of the new device**

**Inter rater reliability for flexion of day 1:** Cronbach’s alpha was 0.57 and Cronbach’s Alpha based on standardized items was 0.61 for flexion. Inter rater reliability for flexion is good. Significance was 0.064.

**Inter rater reliability for extension on day 1:** Cronbach’s alpha was 0.63 and Cronbach’s Alpha based on standardized items was 0.64 for extension. Inter rater reliability for flexion is good. Significance was 0.035

**Inter rater reliability for abduction on day 1:** Cronbach’s alpha was 0.30 and Cronbach’s Alpha based on standardized items was 0.32 for abduction. Inter rater reliability for abduction is less than satisfactory. Significance was 0.256.

**Inter rater reliability for flexion on day 2:** Cronbach’s alpha was 0.60 and Cronbach’s Alpha based on standardized items was 0.71 for flexion. Inter rater reliability for flexion is good. Significance is 0.047.

**Inter rater reliability for extension on day 2:** Cronbach’s alpha was 0.97 and Cronbach’s Alpha based on standardized items was 0.97 for extension. Inter rater reliability was excellent. Significance was 0.000 which is statistically significant.

**Inter rater reliability for abduction on day 2:** Cronbach’s alpha was 0.55 and Cronbach’s Alpha based on standardized items was 0.57 for abduction. Inter rater reliability is less than satisfactory. Significance was 0.075.

**DISCUSSION**

The universal goniometer is gold standard for assessing shoulder ROM. But it has a few shortcomings i.e. it requires skills, experience and pre set knowledge of the patient and therapist position, the placement of the goniometer etc. As it is interpreted by the assessor it is prone to subjective bias. During the measurement of the ROM the therapist is required to move the moveable arm along with the limb, at times it is difficult for the therapist to stabilize and mobilize the limb simultaneously. Various equipments present which help restore ROM of shoulder are shoulder wheel, finger ladder and shoulder pulley.[6] But they have few shortcomings. Shoulder wheel allows only circumduction which is combination of flexion and extension. Finger ladder allows only flexion. Shoulder pulley allows abduction, adduction and flexion. Thus they provide limited scope of rehabilitating the shoulder ROM. So for the rehabilitation of the shoulder , a single equipment cannot be used all of them must be used in combination. Thus the medical personnel aiming to treat shoulder dysfunction must invest in all these instrument, which can be a burden financially and spatially as they are large. Another setback of these equipment is that they are mounted on the wall making them non portable. New device has sensors which record values and display them on a screen unlike the goniometer. There may be no chance of error by the observer. It can be read easily by anyone. No skill or training is required. Many orthopedics and other medical professionals who are required to measure ROM ,3 can take advantage of this device to measure the ROM. As they are not familiar with the goniometer the shoulder device is a convenient option which saves time and reduces the hassle of stabilizing or moving the limb. The advantage of this instrument is that it can be adjusted and rotated according to the patient’s height and position. The arc can be moved in various directions, values can be recorded in standing, sitting and supine positions so patient who are bed ridden or on wheel chair can be assessed using this instrument. By addition of resistance to the moveable plate, strengthening of the shoulder musculature can be done along with restoring ROM. Visual feedback seen on a display is proven to provide therapeutic benefits by altering physical processes which increase the precision during function activities by engaging the patients attention.7 the device made has an arc which is along the normal anatomical movements of the shoulder joint. No instrument present allows all isolated movements of the shoulder. The shoulder device present in this study allows all the ROM of the shoulder joint i.e. flexion, extension, abduction, adduction, internal rotation and external rotation. This ability of being able to perform isolated movements will help focusing on the exact problem of the patient and help in treating it. Whereas the other equipments present provide a generalized solution for all the problems. Most of the instruments present now work in the three plane sagittal, coronal and transverse only. But the movements we perform in our ADL do not take place in these isolated planes. Most of the movements performed in the ADL are diagonal pattern of movements. The devices used in present day help restore the normal
anatomical movements of the shoulder joint but do not allow the functional movements of the joint which are of more importance to the subjects, as when they return to their daily lives after rehabilitation they will be required to perform these movements. The moveable arc allows the patient to perform movement in function planes with are usually restricted and of greater importance to the patient. Unlike the other instruments with are mounted on the wall the device can be moved around and the added advantage is that both the arc and the stand are detachable.

CONCLUSION

The validity obtained for the device was found to be strong which can further improve if problems such as limited number of observations, instability of the plate and lack of familiarity to the instrument are tackled. Based on the results obtained we can conclude that the instrument has good reliability compared to the goniometer.

Conflict of Interest: None

Source of Funding: Self

Informed Consent: Obtained

Ethical Clearance: Obtained

REFERENCES


To Compare Effect of Neuro Facilitatory Techniques with Neuromuscular Electrical Stimulation Versus Neuro Facilitatory Technique alone on Upper Extremity Function in Subjects with Acute Cerebro Vascular Accident

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¹MPT, ²Associate Professor, ³Prof & HOD, Department of Physiotherapy, Pad. Dr. D. Y. Patil University, Nerul- Navi Mumbai

ABSTRACT

The aim of the study was to evaluate and compare effect of Neuro Facilitatory Techniques with Neuromuscular electrical stimulation Versus Neuro Facilitatory techniques alone on upper extremity function in subject with Acute CVA. An experimental study for a period of one year was carried on 30 individual (15 experimental & 15 control group) with an inclusion criteria of Subjects within 4 weeks after CVA with either gender in age group of 35-75years. Subjects with medical co-morbidity, visual defects & contraindicated to electrical stimulation was excluded. The results revealed Neuromuscular Electrical Stimulation along with Neuro facilitatory technique enhances the upper extremity motor recovery in acute stroke survivors resulting in clinically meaningful motor function. Subjects in the experimental group performed better on Brunnstrom-Fugl-Meyer test than those in the control group. These results emphasize the potential beneficial effect of therapeutic interventions for hemi paretic upper extremity.

Keywords: Cerebrovascular accident(CVA), Neuromuscular Electrical stimulation(NMES), Fugl-Meyer assessment of physical performance(FMA), Brunnstrom-Fugl-Meyer(BFM).

INTRODUCTION

A stroke is referred to as a CVA.¹ The WHO clinically defines CVA as the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin’.² The syndromes that lead to stroke compromise two broad categories: Ischemic and Hemorrhagic stroke.

Types of stroke are Transient Ischemic Attack, Ischemic Stroke, Embolic Stroke where the sources of emboli are Cardiac emboli, Vascular emboli, Paradoxical emboli, Thrombotic stroke, Lacunar syndrome and the Vascular. Syndromes are

1. Anterior cerebral artery syndrome
2. Middle cerebral artery syndrome
3. Internal carotid artery syndrome
4. Posterior cerebral artery syndrome

Patients with (MCA stroke syndrome) may have some basic physical findings, as:

1. Loss of consciousness
2. Hemiparesis and hemiplegic
3. Visual deficits
4. Autonomic dysfunction
5. Neglect

In acute Stroke the upper limb pattern of long term return of motor function is usually more proximal, with distal functioning in the fingers being the last to return. Most subjects achieved full active movement within the first month and all of them recovered function by the third month.³ A recent study reported that statistically significant improvement in arm function is seen only in the first 3 months following the onset of stroke.⁴ In the early post stroke phase, the hemiplegic arms are often paralyzed and flaccid. In the Chronic phase flaccidity is replaced by the development of spasticity, hyper reflexia
and mass patterns of movement termed as synergy. To reduce the complication in chronic stroke; physiotherapy should be started early in acute stroke.(10)

Quick icing may stimulate activity in the muscles when applied before an active movement is attempted. Tapping the therapist sweep firmly and briskly over the muscle group, given to increase the tone and the muscle activity. Weight bearing activities given to activate the muscles which stabilizes the joint and activity is stimulated reflexly through compression of joints. Passive movement is given for maintenance of full pain free range of movement without traumatizing the joint and the structures which surround it.(1)

The effects of a short-term electrical stimulation in conjunction with neurodevelopment exercises on sensory and functional recovery of hemiparetic upper limb in acute stroke patients. The results of this study indicated that additional stimulation of the hand and fingers leads to an improved sensorimotor outcome immediately after the intervention.(14)

Neuro Muscular Electrical stimulation – NMES also helps to regain motor control and tone in the acute phase of stroke. According to a study done on 46 subjects where symmetric biphasic pulses with the pulse width of 300microsecond and frequency of 25 to 50 Hz, was given to extensor digitorum communis and extensor carpi radialis for 1 hour a day for 15 sessions. The study concluded that NMES enhances upper limb motor recovery in acute stroke survivors. (15)

A study was conducted on Fugl-Meyer Assessment of Physical performance (FMA). This instrument has a good construct validity and high reliability for determining motor function and balance. A quantifiable outcome data allow this instrument to be accurately used for the research purposes (a gold standard) and document over a time.(1)

METHODOLOGY

An ethical committee approval was taken to starting with the intervention.

Study Subject: Acute stroke patients

Source of data collection: IPD/OPD patients from Department of Physiotherapy D.Y Patil Medical hospital And Research Center, Life line Hospital (bhivandi).

Sample size: 30 patients, 15 patients in each group.

Study Design: A Experimental study

Duration of study: 1 year

The Inclusion criteria were as follows:
- Subjects Diagnosed with CVA
- Subjects within 4 weeks after CVA.
- Either gender.
- CVA occurring in subjects between 35-75 years

The Exclusion criteria were as follows:
- Subjects with medical co-morbidity.
- Un co-operative subjects.
- Subjects who are contraindicated to electrical stimulation.
- Subjects with previous history of CVA
- Subjects with fixed deformities in wrist and hand on affected side.
- Subjects with visual defects

Materials used:
- Assessment sheet.
- Upper extremity component of Fugl-Meyer Assessment of Physical performance scale.
- Equipment: Biotech NMES with accessories
- Cryotherapy Unit.
- Equipments used for acute rehabilitation of stroke.
The Training Procedure were as follows: All the subjects with acute CVA who met with the inclusion criteria were selected. Subjects participate in the study were explained about the study and intervention. Consent form was filled. The participants were distributed into 2 groups.

- **(Experimental group):** 15 subjects in this group received tailor made neuro facilitatory technique (NFT) and NMES
- **(Control Group):** 15 subjects received tailor made neuro facilitatory technique (NFT). Techniques like passive movements, quick icing, tapping, weight bearing activities etc.

**(Experimental group):** 15 subjects in this group had received the NMES, symmetric biphasic wave electrical stimulation for 15 sessions for 1 hour to Wrist and finger extensors with a pair of carbon electrodes. One carbon electrode placed proximally over the forearm on the common extensor origin and other was placed distally on the forearm. Neuromuscular Electrical stimulation with pulse width of 300 micro second and frequency of 50 Hz with the amplitude set at the minimum level required to produce full joint extension. With the rest period of 10 seconds ramp up and ramp down of 2 seconds each was given.

Neuromuscular facilitatory technique like passive movements, quick icing, tapping, weight bearing activities.

Passive movement, with proper support and gentle grip limb is moved to its anatomical range and even ask patient to incite or imagine the movement performed.

Icing technique is given on the dorsum of the forearm in upward direction with ice cubes. Quick icing is given in the form of a quick wipe with an ice cube. It is applied to the skin in 3 wipes after each wipe ask patient incite the required action.

Tapping provoke muscle and tendon reflexes and to stimulate muscle. Tapping is given to the dorsum of the forearm’ the therapist supports the subjects arm with one hand and with other hand a firm and brisk tapping was given over the extensor group of muscles of forearm from its origin above the elbow to the fingertips. The tapping movement is performed with the therapist fingers in extension.

Weight bearing activities is performed on patient in high sitting, patient made to weight bear on the affected arm with elbow and wrist into extension, the therapist is sitting on the affected side and brings the subjects weight over the affected upper limb towards the therapist. The therapist’s hand in the axilla facilitates lengthening of affected side; other hand of the therapist is over the side flexors of the opposite side to facilitate their shortening on the unaffected side when the therapist draws the subject towards him and ask patient to put his efforts too.

**(Control group):** 15 subjects in this group had received only Neuromuscular facilitatory

Technique like passive movements, quick icing, tapping, weight bearing Activities as above treatment is given to both groups for 5 days a week for 4 weeks in Experimental and control group.

**DATA ANALYSIS AND RESULTS**

**Graph 1:** Comparison of experimental and control groups with respect to post test scores on Fugl Meyer upper extremity of acute CVA Subjects

The statistical analysis was done by using non-parametric (Mann Whitney test) U-value 59.500, p-value 0.02.

<table>
<thead>
<tr>
<th>Post test</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Value</td>
<td>42.46</td>
<td>35.06</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>9.28</td>
<td>5.31</td>
</tr>
<tr>
<td>Lower 95% CI</td>
<td>37.327</td>
<td>32.125</td>
</tr>
<tr>
<td>Upper 95% CI</td>
<td>47.606</td>
<td>38.008</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Study sample of 30 subjects were included in our study. They were randomly allocated in two groups and 15 subjects in each group.

Experimental (NMES + NFT) and Control group (NFT), both the study groups received NFT which include icing, passive movement, Tapping, Weight bearing.

Most activates of nervous system are initiated by sensory experience exciting sensory receptor, whether visual receptor in the eyes, auditory receptor in ears,
tactical receptor on the surface of the body or other kind of receptors. This sensory experience can either cause immediate reaction from the brain, or memory of the experience can be stored in the brain for few minutes, weeks or years and determine bodily reaction at some future date.

The somatic portion of the sensory system, which transmits sensory information from the receptors of the entire body surface and from deep structure. This information enters from CNS through peripheral nerves and conducted immediately to multiple sensory areas in spinal cord at all level, reticular substance of medulla, pons, mesencephalon of brain, cerebellum thalamus area of cerebral cortex.

The skeletal muscle can be controlled from many level of CNS system including 1)spinal cord, 2)reticular substance of medulla, pons, mesencephalon,3) basal ganglia 4)cerebellar 5)motor cortex.

Nerve fibers carry signals need to be transmitted to and from CNS. In the general classification, the fibers are divided into type A and C and type A fiber subdivided into alpha, beta, gamma, delta.

Neuro facilitatory techniques:

Icing: Icing helps in stimulating the Golgi tendon organ which is situated at the insertion of musculotendon junction. The body of the organ is made up of strands of collagen that are connected at one end to the muscle fibers and at the other merge into the tendon proper. Each tendon organ is innervated by a single afferent type Ia sensory motor fibers that branches and terminates as spiral endings around the collagen strands. The Ia afferent axon is a large diameter, myelinated axon. The Ia sensory feedback generates spinal reflexes and supraspinal responses which control muscle contraction. Ia afferents synapses with interneurons within the spinal cord that also project to the brain cerebellum and cerebral cortex through lateral and anterior spinothalamic tract which will further activate pyramidal tract to control movement.

Passive movement: When passive movement are perform muscle spindle stretch reflex get activated, which follow same mechanism as mentioned in icing to achieve motor control. It also helps in restoring the ROM and prevents atrophy of muscle.

Tapping: The tapping movement is performed with the therapist fingers in extension. Here ventral or anterior spinothalamic are activated through cutaneous stimulation which further pyramidal tract to control movement.\(^\text{(15)}\)

Weight bearing: Here spino-olivery and spino-vestibular tract were proproception information is carried to the brain, through olivo-spinal tract to achieve the motor control.\(^\text{(15)}\)

All the above facilitatory techniques travel from peripheral nervous system to CNS through the afferent pathway. Through visual feedback somatosensory will stimulate the motor cortex, by repetitive stimulus which will activate the pyramidal tract and help in motor response.\(^\text{(16\textendash}17\text{)}\)

Neuromuscular Electrical Stimulation (NMES): Clinical applications of neuromuscular electrical stimulation (NMES) in stroke rehabilitation provide both therapeutic and functional benefits. Therapeutic applications include upper and lower limb motor relearning. Electrical stimulation of the peripheral nerve or motor points is associated with concomitant physiologic changes in the brain including activation of primary sensory and motor areas and the supplementary motor area, reduction of intracortical inhibition.\(^\text{(16\textendash}17\text{)}\)

The strength of the muscle contraction is controlled by the pulse frequency, amplitude and duration of the current pulses.\(^\text{(17)}\)

The addition of NMES to the treatment program for this patients increase the ease of recruitment on two levels:

1. Direct excitation onto alpha motor neuron through peripheral stimulation of 1a myotatic sensory system
2. Ascending afferent information which will be integrated to conscious and sub-conscious level of the CNS and which may result in central modulation of alpha motor neuron.\(^\text{(17)}\)

According to our study the analyses of the Fugl Meyer gain Scores with the mann-whitnney u-test revealed significantly greater motor improvement for Neuro Muscular Electrical Stimulation (NMES) group at 4 weeks after treatment compared to the control group which received Neuro facilitatory technique alone. Which suggests that enhances upper extremity improvement in experimental group who received NMES with neuro facilitatory technique compared to control group who received neuro facilitatory techniques only.
This present study is in correlation with the study done by Jonna Powell et al who showed Neuromuscular electrical stimulation may have direct effect leading to increased muscle strength and improved motor control, resulting in reduced upper limb disability.\(^{(16)}\)

As such NMES is an extremely power full tool to enhance voluntary control, therefore NMES can be incorporated into almost any traditional facilitation technique to further enhance a patient motor control. \(^{(17)}\) Hence from all the above studies and physiology we can conclude from our study that NMES will be more beneficial along with NFT in acute stroke subjects for the early upper limb motor recovery.

The present study shows that neuromuscular electrical stimulation along with neuro-facilitatory techniques, patients achieved significant enhancement in their upper extremity motor recovery since experimental group receives (NMES +NFT) There is an additional sensory bombardment to the sensory cortex which may be further leading to early upper extremity motor control recovery than the control group.\(^{(17)}\)

**CONCLUSION**

Neuromuscular Electrical Stimulation along with Neuro facilitatory technique enhances the upper extremity motor recovery in acute stroke survivors resulting in clinically meaningful motor function. Subjects in the experimental group performed better on Brunnstrom-Fugl-Meyer test than those in the control group.

**Acknowledgment:** NIL

**Source of Funding:** SELF

**Conflict of Interest:** NIL

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Prevalence of Hypertension and Diabetes among People With Poor Abdominal Strength between the Age Group of 45-55 Years

Jay Gupta1, Nanda Bodalia2, Satish Pimpale3, Priyanka Honkalas4

1Associate Professor; 2Intern, DPO’s NETT College of Physiotherapy, Thane; 3Assistant Professor, Lokmanyaa Medical College of Physiotherapy, Kharghar; 4Assistant Professor, DPO’s NETT College of Physiotherapy, Thane

ABSTRACT

Introduction: The role of abdominals apart from its many anatomical functions is not well understood yet. This study result of abdominal weakness to be associated with hypertension and diabetes remains an eye-opener concept in the current health status.

Aims: To find out prevalence of hypertension and diabetes with poor abdominal strength.

Objectives: To find out prevalence of hypertension and diabetes with poor abdominal strength between the age 45-55 years.

Procedure: Prior starting the study, a written consent form was signed and taken from subjects in language best understood by them. The participants will be explained about abdominal strength testing and then the test will be performed. One-time assessment was made of their body mass index, west hip ratio and abdominal strength.

Conclusion: The conclusion of this study shows that 71% of the total population recruited in the study suffered abdominal weakness.

Keywords: Hypertension, diabetes, abdominal strength.

INTRODUCTION

The muscular system is an organ system consisting of skeletal, smooth and cardiac muscle. It permits movement of the body, maintains posture and circulates blood throughout the body. 1,8

The four main abdominal muscles transverse abdominis, external oblique muscle, internal oblique muscle and rectus abdominis.2,3

Based on various journal reports and research articles it states that the core muscles tone is important in maintaining the physiological functions of the muscles.4,7

The abdominal muscle’s resting length and contractile function is affected in obesity. According to a survey conducted in United states of America and Singapore in the year 2001; obesity is one of the predisposing factors for diabetes and hypertension.8,6

It is reported that the quality of life is highly affected due to diabetes and hypertension; in South East Asia the statistics accounts up to 46% whereas in India the statistics is 46%.5,3

It is also found that various other factors like age, gestational history, history of laprotomy and urban lifestyle influences the strength of abdominal muscles.7,2

NEED OF STUDY

There is dearth in literature identifying the prevalence of diabetes and hypertension among people with poor abdominal strength between the age group of 45-55 years.

AIMS AND OBJECTIVES

Aims: To find out prevalence of hypertension and diabetes with poor abdominal strength.
**Objectives:** To find out prevalence of hypertension and diabetes with poor abdominal strength between the age 45-55 years.

**MATERIALS AND METHODOLOGY**

**Study Design**
- Type of study: Prevalence
- Duration of study: 6 Months
- Location: Community center

**Sample Design**
- Sample size: 100
- Sample population: 45-55 Years
- Sample selection: Convenient

**Materials**
- Body mass calculator
- Measuring tape
- Pen
- Notepad

**SELECTION CRITERIA**

**Inclusion Criteria**
- Subject willing to participate.
- Both male and female.
- Age group 45-55 years.
- Occurrence of diabetes or hypertension > 5 years.

**Exclusion Criteria**
- Recent laparotomy surgery.
- Athlete congenital abnormalities of pelvis.
- Low back pain.
- Occurrence of diabetes or hypertension < 5 years.

**PROCEDURE**

In the present study participants were selected accordingly to the inclusion criteria. Prior permission was obtained from the people regarding the project and then further data collection was done.

Prior starting the study, a written consent form was signed and taken from subjects in language best understood by them. The participants will be explained about abdominal strength testing and then the test will be performed.

Onetime assessment was made of their body mass index, west hip ratio and abdominal strength.

The height and the weight of the individual are recorded BMI were calculated as weight (in kg) divided by height (in meter) squared (kg/m²). Waist hip ratio was calculated after the measurement were taken in standing position with feet together, arms kept freely by the side with minimal clothing. The waist circumference was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, hip circumference was measured around the widest portion of the buttocks with the tape parallel to the floor.

Abdominal strength was measured by manual muscle testing. Subject in supine with legs extended and asked to perform a trunk curl slowly completing spine flexion thereby, the ROM that can be performed by abdominal muscle.

**TABLES AND RESULTS**

The above pie chart shows that majority (71%) of recruited population shows poor abdominal weakness.

71% of the subjects had poor abdominal strength and 29% had good grade abdominal strength.

The above graph shows the abdominal strength in men/women.

**DISCUSSION**

The role of abdominals apart from its many anatomical functions is not well understood yet. This study result of abdominal weakness to be associated with hypertension and diabetes remains an eye-opener concept in the current health status.1,2

The possible reason for such a result may be due to impaired viscerosomatic reflexes and abdominal-wall dystony and factors leading to diabetes, hypertension and abdominal weakness remains inter link.3,6

Though this study perspective of checking whether there can be any relationship between abdominal muscle strength, hypertension and diabetes has shown positive results.4
Hence prevention practices and education about good life style can reduce the probability of hypertension and diabetes as well as strengthening of core muscle.2,8

CONCLUSION

The conclusion of this study shows that 71% of the total population recruited in the study suffered abdominal weakness.

Ethical Clearance: Taken from college committee

Source of Funding: Self

Conflict of Interest: Nil

LIMITATIONS

- Participants recruited in the study had tight working hours which may have affected the result.

SUGGESTIONS

- More specific studies on particular group involving more concrete testing procedures will be fruitful for future research.
- Frequent check up of abdominal strength.

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Comparative Study between the Effects of Muscle Energy Technique and Ischaemic Compression on Patients with Chronic Shoulder Pain

Jay Gupta¹, Satish Pimpale², Mahima Gupta³
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ABSTRACT

Introduction: MET is commonly utilized method for achieving tonus release in a muscle before stretching. The approach involves the introduction of an isometric contraction to the affected muscles producing post isometric relaxation.

Aim: To compare between the effects of ischaemic compression and MET on chronic shoulder pain.

Objectives: To find out effects of ischaemic compression on pain and range of motion for chronic shoulder pain & if MET on pain and range of motion for chronic shoulder pain. To compare between the effects of ischaemic compression and MET on pain and range of motion for chronic shoulder pain.

Procedure: The study was conducted on 60 patients with two groups of 30 each. Group A was intervened with IC whereas Group B was intervened with MET. Outcome measures included pain intensity by VAS and range of motion by goniometer which was measured prior to treatment (pre-Rx) and at the end of 6 sessions of treatment.

Conclusion: In clinical practice for improving ROM, MET is more effective over the effects of ischaemic compression. Thus for increasing range of internal rotation MET should be used while, effects of ischaemic compression were more dominant in reducing the pain on VAS over MET.

Keywords: VAS, MET, ROM, SHOULDER PAIN.

INTRODUCTION

A trigger points which are defined as hyperirritable spots within taut bands of skeletal muscles fibers¹. They exhibit a local twitch response (muscle fasciculation) or jump sign (whole body movement in response of digital pressure). The spots are painful on compression and can produce motor dysfunction and autonomic phenomena².

Trigger points form in the muscles fibers, close to the motor end plate (neuromuscular junction). Excess acetylcholine is released at the synapse, usually associated with overuse or strain, leading to release of calcium³. Resulting ischaemia creates an oxygen deficit energy crisis without available ATP, calcium ions, which keeps the gates open for Ach to keep flowing, cannot be removed ⁴. A chemically sustained contracture (without motor potential) is different from a contraction (voluntary with motor potential) and a spasm. (involuntary with motor potentials). Actin myosin filaments shorten in the area of the motor end plate⁵.

Ischaemic compression (IC) is defined as trigger point pressure release and described as follows.

Application of slowly increasing non painful pressure over a trigger point until a barrier of tissue resistance is encountered. Contact is thus maintained until the tissue barrier is released and a pressure is increased to reach a new barrier point and a tension point.

MET is commonly utilized method for achieving tonus release in a muscle before stretching. The approach
involves the introduction of an isometric contraction to the affected muscles producing post isometric relaxation through influence of golgi tendon organs (autogenic inhibition) it may also be applied to the antagonists muscle groups producing reciprocal inhibition in the offending agonist muscle

Fyer and Fossum have hypothesized that the sequence of muscle and joint mechanoreceptor activation evoke firing of local somatic efferents. This in turn leads to sympathetic excitation and activation of preaqueductal gray matter which plays a role in descending modulation of pain. Owing to stimulation of mechanoreceptors simultaneous gating of nociceptive impulses in the dorsal horn of the spinal cord thus the purpose of the study is to examine the effectiveness of IC versus MET in the treatment of chronic shoulder pain.

NEED OF STUDY

It is important to determine which treatment is more effective in clinical practice. Many studies are available on effects of ischemic compression and MET on shoulder but very less data is available comparing ischemic compression and MET. Hence this study is done to compare the effects between ischemic compression and MET.

AIMS AND OBJECTIVES

Aim: To compare between the effects of ischemic compression and MET on chronic shoulder pain.

OBJECTIVES

- To find out effects of ischemic compression on pain and range of motion for chronic shoulder pain.
- To find out effects if MET on pain and range of motion for chronic shoulder pain.
- To compare between the effects of ischemic compression and MET on pain and range of motion for chronic shoulder pain.

HYPOTHESIS

Null Hypothesis: There will be no significant difference in the effects of ischemic compression and MET on chronic shoulder pain.

Research Hypothesis: There will be significant difference in the effects of ischemic compression and MET on chronic shoulder pain.

MATERIAL AND METHODOLOGY

Study Design: Experimental study.

Source of Data: Metropolitan city.

Sample Technique: Simple random sampling.

Sample Size: 60

Tools Used:
- Visual analogue scale.
- Goniometer.

OUTCOME MEASURES:
- ROM using goniometer.
- VAS.

Inclusion Criteria:
- Age group 45-55 yrs of age with a palpable tender spot.
- Reproduction of subjects pain upon palpation.
- Jump sign characterized by patient withdrawal.
- Patient having tender points positive for internal rotators.

Exclusion Criteria:
- Generalised inflammatory disease.
- Neurological deficit.
- Congenital anomalies.
- Shoulder sprain.
- History of recent injury or open wound or surgery.

PROCEDURE

A Demographic Data form and a content form were taken from the subjects before the tests were done.

Based on inclusion and exclusion criteria, subjects were included in the study convenient sampling with random allocation to the two groups.

Each group of 30 subjects.

Group A: MET

Group B: IC
**Group A:** All subjects in group A were asked to fill VAS and ROM before starting the treatment and the treatment sessions of 6 sittings were given.

Subjects were made to lie down in supine position with 90 deg of shoulder abduction and 90 deg of elbow flexion therapist stabilizes the affected shoulder with one hand while other hand moves the hand in external rotation and till the end rage later providing resistance to internal rotation by placing hand to the ventral aspect of the forearm below the wrist joint and the subject is asked to perform active internal rotation.

**Group B:** All subjects in group A were asked to fill VAS and ROM before starting the treatment and the treatment sessions of 6 sittings were given. The therapist placed her hand on the trigger point till the nail bed blenching took place and the pressure was further increased up to subjects tolerance. Subjects were instructed to raise hand when they could not bear pain any more, pressure was held for 30 seconds and was slowly released.

VAS and ROM is taken post treatment after completion of 6 sessions.

**TABLES AND RESULTS**

**Table 1: Comparision of Pre and Post Values of Vas of Group A**

<table>
<thead>
<tr>
<th>VAS</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>POST</td>
<td>5</td>
<td>SIGNIFICANT</td>
</tr>
</tbody>
</table>

Paired t test: p = 0.001

**Result:** The above table shows muscle energy technique is significantly effective in reducing pain.

**Table 2: Comparision of Pre and Post Values of Rom of Group A**

<table>
<thead>
<tr>
<th>ROM</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>POST</td>
<td>68</td>
<td>SIGNIFICANT</td>
</tr>
</tbody>
</table>

Paired t test: p = 0.001

**Result:** The above table shows there is a significant effectiveness of MET in increasing ROM in group A.

**Table 3: Comparision of Pre and Post Values of Vas in Group B**

<table>
<thead>
<tr>
<th>VAS</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>POST</td>
<td>4</td>
<td>SIGNIFICANT</td>
</tr>
</tbody>
</table>

Paired t test: p = 0.001

**Result:** The table shows there is a significant difference in pre and post VAS in group B.

**Table 4: Comparision of Pre and Post Values of Rom in Group B**

<table>
<thead>
<tr>
<th>ROM</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>POST</td>
<td>66</td>
<td>SIGNIFICANT</td>
</tr>
</tbody>
</table>

Paired t test: p = 0.001

**Result:** The table shows ischaemic compression is significantly effective in increasing the range of motion.

**Table 5: Comparision of Pain on Vas of Group A and Group B**

<table>
<thead>
<tr>
<th>VAS</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP A</td>
<td>9</td>
<td>significant</td>
</tr>
<tr>
<td>GROUP B</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Unpaired t test: p = 0.001

**Result:** The above table shows that IC is significantly more effective in reducing pain than ischaemic compression.

**Table 6: Comparison of Values of Rom of Group A And Group B**

<table>
<thead>
<tr>
<th>ROM</th>
<th>MEAN</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP A</td>
<td>55</td>
<td>SIGNIFICANT</td>
</tr>
<tr>
<td>GROUP B</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

Unpaired t test: p = 0.001

**Result:** The above table shows that MET is significantly more effective in increasing range of motion than ischaemic compression.

**DISCUSSION**

The incidence of myofascial pain syndrome is reported as high as 85% at certain American pain clinics.
Many studies suggest various treatments available for MTrPs. Noninvasive methods include spray (freeze) and stretch, physical therapy (posture correction and body mechanics), IC, massage, MET, strain counter strain (SCS), electrical modalities such as laser, ultrasound therapy, TENS, electrical muscle stimulation, and invasive methods like acupuncture, trigger point injections (dry or wet needling). There is no general acceptance of one standard treatment.

The study was conducted on 60 patients with two groups of 30 each. Group A was intervened with IC whereas Group B was intervened with MET. Outcome measures included pain intensity by VAS and range of motion by goniometer which was measured prior to treatment (pre-Rx) and at the end of 6 sessions of treatment.

In our study we compared the effects between Ischemic compression and Muscle Energy Technique, data was collected then statistical analysis was done.

Table 1 shows that muscle energy technique given to group A was significantly effective in reducing pain on VAS.

Table 2 shows that muscle energy technique applied to group A was significantly effective in improving ROM in chronic shoulder pain cases.

Table 3 shows that effect of IC on group B was significantly effective in reducing pain on VAS.

Table 4 shows that effect of IC on group B was significantly effective in improving ROM in chronic shoulder pain cases.

Table 5 and Table 6 shows the comparative study between both the techniques-MET and IC. It reveals that the technique of IC was more effective in reducing pain whereas MET proved to be more effective in improving ROM.

Ischemic pressure may be applied to the trigger points. Pressure on the trigger point stops blood from flowing into the affected area making it ischemic (deprived of oxygen). The person feels comfortable pain as if pressure is being released. After 8 to 20 seconds, the pressure is released and the circulation of blood, oxygen, and nutrients to the area increases. In addition, it is important to apply MET technique to the surrounding muscles which helps keep the shoulder functioning correctly and speeds up the rehabilitation process.

**Clinical Implication:** In clinical practice for improving ROM, MET is more effective over the effects of ischaemic compression. Thus for increasing range of internal rotation MET should be used while, effects of ischaemic compression were more dominant in reducing the pain on VAS over MET thus in clinical practice for reduction of pain and pain relief ischaemic compressions should be used.

**LIMITATIONS AND SUGGESTIONS**

**Limitations**
- Sample size was limited.
- No long term follow up of the patients.
- Trigger point examination was done subjectively.

**Recommendations**
- Further study should be done on larger sample group.
- Longer follow up should be done.

**Ethical Clearance:** Taken from College Committee

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


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Effect of Motor Imagery in Improving Trunk Control among Hemiparetic Patients

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ABSTRACT

Background: Stroke is one of the major causes for physical and functional disability in adult population globally. Effective limb function depends on better postural control in sitting and standing posture. A common problem with hemiplegia is the inability of the upper trunk to move independently of the lower trunk (dissociate). Motor imagery has shown improvement in the motor and functional performance of upper and lower limbs when administered along with the conventional therapy in sub-acute stroke patients.

Methodology: 40 sub-acute stroke patients are selected for the study and screened through inclusion and exclusion criteria. Then the patients will be divided into two groups by simple random sampling method. Group A given with conventional exercises and Group B Patients are given with motor imagery. The duration of the study were 90 minute per day, 6 days a week and for 6 weeks. Patients are evaluated by trunk control test, trunk impairment scale and Barthel Index pre-test and post-test for both groups.

Results: The comparison with trunk impairment scale the mean value of post treatment Trunk impairment scale of group A and Group B are 16.55 and 19.7 respectively. The t-value was 5.28. These values suggest there is significant difference. The comparison with FIM scores the mean value of post treatment FIM SCALE of group A and Group B are 89.7 and 103.6 respectively. The t-value were 4.98. These values suggest there is significant improvement in activities of daily living in motor imagery practice group (group B) than conventional exercise group (group A).

Conclusion: the study concluded that there is significant improvement in giving Trunk motor imagery techniques than conventional exercises in improving trunk balance in stroke

Keywords: CVA, Trunk impairment, trunk impairment scale, FIM score, Trunk motor imagery.

INTRODUCTION

Stroke is one of the leading causes of death and disability in India. The estimated adjusted prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/100,000 in urban areas. The incidence rate is 119-145/100,000 based on the recent population based studies. There is also a wide variation in case fatality rates with the highest being 42% in Kolkata

Effective limb function depends on better postural control in sitting and standing posture. Trunk muscles not only help in maintaining an erect trunk/posture but also allow effective weight shifts during dynamic postures. A common problem with hemiplegia is the inability of the upper trunk to move independently of the lower trunk (dissociate).

Impaired trunk control post stroke many patients with stroke tend to demonstrate insufficient trunk control, affecting their functional ability in many activities, e.g. turning in bed, sitting up/lying down, rising from sitting to standing, standing and walking. Impaired anticipatory activity of the superficial lateral trunk muscles (latissimus dorsi, rectus abdominis and external oblique) on the paretic side has been found to influence the ability to perform daily activities. Patients have demonstrated altered trunk position sense after
stroke (Ryterso and mislocalisation of tactile stimuli to the trunk in the presence of neglect. Several studies have demonstrated decreased trunk muscle, and muscle strength has been found to be positively correlated with balance as measured with Berg’s Balance Scale. Increased activation of the erector spinae muscle on the paretic side has also been described; Altered recruitment patterns for head and trunk rotation in sitting has been reported whereby patients with stroke move the head and trunk simultaneously instead of in a cranial-caudal pattern. Deficit in segmental rotation between the thorax and pelvis was found to be associated with poorer postural control.5

Stroke patients with impaired proprioception cannot maintain balance and stable postures and have difficulties in performing motor control when their vision is blocked. Trunk control of stroke patients is an important indicator in predicting their post-stroke activities of daily living, gait, and balance. Eventually, the lack of postural control can degrade the quality of life7

Motor imagery has shown improvement in the motor and functional performance of upper and lower limbs when administered along with the conventional therapy in sub-acute stroke patients. Imagery is a clinically feasible intervention. Measurement of the effects of imagery is possible using the instruments hereindescribed. Imagery, in association with therapy, appears to be a noninvasive, efficacious complement to traditional therapy.8

Motor imagery involves visual and kinesthetic (sensorimotor) representations and also activates the motor system Trunk motor imagery practice is a clinically important early rehabilitation strategy along with the routine trunk rehabilitation in improving trunk performance, which in turn improves functional balance and daily activity in subjects with acute stroke.9

Imagery helps in activating the mirror neuron system located in the primary cortex. Both observation and execution of an observed movement in turn enhances the corticospinal facilitation and cortical reorganization. The motor imagery training group showed significantly larger differences in all results compared to the control group. This suggests that improvement in trunk proprioception and the activation of trunk muscles through motor imagery training can prevent falls that may have occurred and play an important role in activities of daily living and balance.10

**NEED FOR STUDY**

Stroke is one of the major causes for physical and functional disability in adult population globally. Trunk impairment is the most neglected part in stroke rehabilitation Motor imagery is considered to be one of the latest rehabilitation strategies to treat post stroke disabilities. Motor imagery technique are rarely used as a treatment approach in India. So it is very important to conduct in sub acute stroke patients

**METHODOLOGY**

40 sub-acute stroke patients are selected for the study and screened through inclusion and exclusion criteria. Then the patients will be divided into two groups by simple random sampling method. The inclusion criteria were sub-acute stroke patients, age between 30 to 70 years, single episode of stroke and both male and female are included in the study. The exclusion criteria were trunk impairment score above 20 at baseline, uncooperative patients, history of multiple strokes. The participants were explained about the study and written consent taken before the tests. The study was passed through ethical committee of our institute.

The patients were divided into two groups, group A and group B. group A given with conventional exercises such as Bridging, Upper, lower trunk rotation in supine, Unilateral bridging with single arm or leg raises and Upper and lower trunk flexion with rotation in supine position. In sitting position the Forward reach outs, Lateral trunk flexion and Pelvic lifts. The progression were Forward reach outs in multiple directions, increased lateral flexion arc of movement and Pelvic shuffling.

Group B Patients are given with motor imagery between the exercises and they are asked to repeat the same exercise. The exercise were Bridging, Upper, lower trunk rotation in supine, Unilateral bridging with single arm or leg raises and Upper and lower trunk flexion with rotation in supine position. In sitting position the Forward reach outs, Lateral trunk flexion and Pelvic lifts. The progressions were Forward reach outs in multiple directions, increased lateral flexion arc of movement and Pelvic shuffling. The duration of the study were 90 minute per day, 6 days a week and for 6 weeks. Patients are evaluated by trunk control test, trunk impairment scale and Barthel Index pre -test and post -test for both groups.
**STASTICAL ANALYSIS**

**Table 1: Trunk Impairment Scale Comarision of Group A & Group B**

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>t-Test</th>
<th>p-Value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>16.55</td>
<td>1.96</td>
<td>5.28</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Group B</td>
<td>19.7</td>
<td>1.81</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Functional Independent Measures (Fim) Comarision of Group A & Group B**

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>SD</th>
<th>t-Test</th>
<th>p-Value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>89.7</td>
<td>8.4</td>
<td>4.98</td>
<td>&lt;0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Group B</td>
<td>103.6</td>
<td>9.22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RESULT**

The table-I results shows that there were significant difference between group A and Group B mean value of post treatment Trunk impairment scale of group A and Group B are 16.55 and 19.7 respectively. The t-value were 5.28. These values suggest there is significant difference in giving motor imagery practice than conventional exercise in improving trunk balance in sub-acute stroke patients.

The table II results shows that there were significant differences between group A and Group B. mean value of post treatment FIM SCALE of group A and Group B are 89.7 and 103.6 respectively. The t-value were 4.98. These values suggest there is significant improvement in activities of daily living in motor imagery practice group (group B) than conventional exercise group (group A).

**DISCUSSION**

The improvements in trunk control may be due to the fact that the trunk exercises mainly consisted of selective trunk movements which helped in strengthening of trunk muscles and also increased awareness of trunk position and anticipatory postural adjustments. It also helped in achieving good trunk control. Improvements in balance and gait occurred because both the trunk rehabilitation program and balance training consist of the use of lower limb muscles which account in change of balance and gait.

Dong-Sik Oh (2017) observed that many stroke rehabilitation methods have been developed over the last decade. Among them, imagery training is a neural rehabilitation method that has brought about the improvement of motor skills in interventions for stroke patients. Imagery training can also be effective if it is used together, with conventional physical therapy, for the functional rehabilitation of the upper and lower limbs, as well as for the recovery of daily activities. Motor imagery training can be said to be a rehearsal of physical movements and is an act of expressing movement internally without externally expressing movement behaviors. When undergoing imagery training, the same region of the brain that is activated when actual movements are made is greatly activated and muscle strength and speed are improved.

Exercise methods using imagery training have been shown to be effective for the functional rehabilitation of stroke patients through systematic reviews. The most difficult part in motor imagery training is determining how much the subject can reproduce movements through imagination. Motor imagery has shown improvement in the motor and functional performance of upper and lower limbs when administered along with the conventional therapy in sub-acute stroke patients.

**CONCLUSION**

40 hemi paretic patient in sub-acute stage undergone treatment with trunk motor imagery and conventional exercise in improving trunk control. The results suggest there were significant difference between the two groups. The statistical analysis suggest that there is significant improvement in giving Trunk Motor Imagery.

So this study concluded that there is significant improvement in giving trunk motor imagery than conventional exercises in improving trunk balance in sub-acute stroke patients.

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

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

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14. Dong-Sik Oh, MSc, PT The effect of motor imagery training for trunk movements on trunk muscle control and proprioception in stroke patients. Journal of physical therapy science


Effect of Hoffman’s Exercises on Flat or Inverted Nipples in Immediate Postpartum Mothers–A Randomized Control Trial

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ABSTRACT

The aim of our study is to evaluate the effect of Hoffman’s exercises on flat/inverted nipples in immediate postpartum mothers. 34 immediate post-partum women with inverted or flat nipples were involved. The experimental group was given hot moist packs, manual breast massage, Hoffman’s exercises and an appropriate breastfeeding position, while the control group did not receive Hoffman’s exercises. The treatment was given for 4 consecutive days. LATCH: A Breastfeeding Charting System and Documentation Tool and BSES: Breastfeeding Self Efficacy Scale documented as outcome measures on day 1 pre intervention and day 4 post intervention. The scores from pre and post LATCH and BSES of both groups followed normal distribution as per Kolmogorov-Smirnov small test. The experimental group showed significant improvement in LATCH and BSES scores and were statistically highly significant. Hence, Present study concludes Hoffman’s exercise showed significant effect on flat or inverted nipples in immediate postpartum mothers.

Keywords: Inverted or flat nipples; Hot moist pack; Manual breast massage; Hoffman’s exercises; Immediate Postpartum mothers.

INTRODUCTION

Approximately 10% of women who wish to breastfeed have inverted or non-protractile nipples.¹ A chronically inverted nipple is often a common finding in breast development. It may be a result of retraction of the underlying connective tissue of the nipple.² An inverted nipple is a condition where the nipple, instead of pointing outward, is retracted into the breast. This is caused by fibrous bands connecting the nipple to the underlying breast tissue. In many cases these bands will loosen due to the hormonal changes of pregnancy and the nipples will become everted. In some cases, the nipple will be temporarily protruded if stimulated, but in others, the inversion remains regardless of stimulus.³

When the fault lies in the anatomy, the breasts have short lactiferous ducts which tether the nipple hence preventing it from projecting.⁴

Breastfeeding with inverted nipples highlights the difficulties faced by a mother due to poor nipple protractility.¹ An appropriate latch is of utmost importance for adequate breastfeeding. Babies feeding onto breasts with inverted nipples have difficulty in establishing a deep grasp, leading to unsuccessful sucking. If the baby fails to feed, there is accumulation of milk in breasts making them prone to develop engorgement, which will further worsen the condition. This interferes with the mother’s psychological well-being and her ability to breastfeed.⁵ The second most common reason for early cessation of breastfeeding is painful nipple or latch problems arising from inverted or retracted nipples. Early cessation deprives the baby of the necessary nutrients it would acquire from the mother’s milk. This may lead to malnourishment as well as poor immunity in the child.⁶ Another important aspect of breastfeeding is correct positioning or handling of the baby during breastfeeding. Mothers with inverted nipples may require more support in handling their child.
during breastfeeding as an incorrect position will hinder a good latch.\(^7\)

Various non-surgical devices are used to treat inverted nipples which cause discomfort to the mother in the form of nipple cracking, bleeding, soreness, etc.\(^8\) the use of exercise is a safe measure ensuring that the mother will not face these problems. In this study, the aim was to educate the mother about self-usable measures to treat the condition and its complication. Along with Hoffman’s exercises, hot moist pack and kneading will act as a supportive measure as hot moist pack gives a sense of comfort and softens the areola which will provide grounds for the nipple to be stretched effectively as it is to be done in Hoffman’s exercises while, kneading will help prevent or treat engorgement as massage encourages drainage of fluid towards the axilla and helps in reducing swelling, softens breasts and aids in resolution of milk stasis, and directs the accumulated milk towards the nipple.\(^9\)

**METHOD**

Ethical Clearance was obtained from the Institutional Ethical Committee. Immediate post-partum women were screened and assessed for inverted or flat nipples using the “Pinch” test, based on the procedure as described by Waller.\(^1,8\) 34 participants were recruited in the study as per inclusion and exclusion criteria. **Inclusion Criteria** were women within the age group 18-30 years, immediate post-partum women, full term delivery, women with inverted or flat nipples and their willingness to participate in the study. **Exclusion Criteria** were antenatal women, engorgement without inverted nipples, cracked nipples, nipple disease, breast cancer and heat intolerance. After finding their suitability as per the above mentioned criteria, subjects were requested to participate in the study. Participants were briefed about the nature of the study and the intervention. Only those willing to participate were recruited for the study. Demographic data and a written informed consent was obtained from every participant. The recruited participants were made to answer a breast feeding self-efficacy questionnaire\(^10\) and the therapist assessed the level of nipple inversion using the LATCH scale.\(^11\)

The recruited participants were randomized into two groups using the envelop method. There were two envelopes one denoting Group A i.e. experimental group and the other denoting group B i.e. control group. The recruited participants were asked to pick one from the two envelopes. Based on the selection by the subject they were assigned to the group selected by them. One group received the intervention under study (Hoffman’s exercises) and conventional physiotherapy (Hot moist pack, manual massage (kneading), education regarding breastfeeding positions) while the other group was given conventional physiotherapy only.

Participant was made to sit comfortably. Hot moist pack was applied to the mother’s breast for 10 minutes. The temperature of hot moist pack ranged between 43 – 46 degrees Celsius. The hot pack was administered twice daily for four consecutive days.\(^12\) This was followed by Manual Massage in which kneading was done by using fingertips in repetitive up and down motion starting from the areola which was given for approximately 15 minutes,\(^9\) followed by Hoffman’s exercises in which the thumb and the forefingers were placed close to the inverted nipple, then pressed into the breast tissue firmly and gradually, the fingers were pushed away from the areola. The procedure was repeated 5 times in the horizontal plane and then 5 times in vertical plane. The exercise was completed by an attempt to ease the nipple out further by traction at the nipple base. The exercise was done 5 times a day for a period of 4 days.\(^8,13\) The mother was advised to adopt the most suitable breastfeeding position i.e. the cradle position. The mother was made to sit comfortably. She was made to hold the baby in such a way that the baby’s chest faced the mother’s chest, and its head was placed into the crook of the mother’s arm. The baby’s body was placed in correct alignment in a way that it had a vertical orientation and the mother directed the nipple towards the baby’s mouth with the use of one finger.\(^7,14\)

On the fourth day, the participants were again made to fill in the breastfeeding self-efficacy questionnaire and the LATCH score was assessed

**RESULTS**

**Demographic Profile**

**Age distribution:** Age of the participants in the study was between 18–30 years. The mean age of participants in Group A was 23.53 ± 3.002 and the mean age of participants in Group B was 22.65 ± 2.572. (Refer table 1)
Table 1

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>17</td>
<td>20</td>
<td>30</td>
<td>23.53</td>
<td>3.002</td>
</tr>
<tr>
<td>Group B</td>
<td>17</td>
<td>19</td>
<td>29</td>
<td>22.65</td>
<td>2.572</td>
</tr>
</tbody>
</table>

**Type of Delivery:** Out of the 17 participants in Group A 64.7% (11 participants) had undergone LSCS and 35.3% (6 participants) had undergone FTVD. In Group B, 70.6% (12 participants) had undergone LSCS while 29.4% (5 participants) had undergone FTVD. This suggests that majority of the participants had undergone LSCS.

**OUTCOME MEASURES**

**Comparison of Group A [Experimental] and Group B [Control] with respect to LATCH Score by summary independent samples t test:** A comparison of Group A and Group B was done with respect to the latch score by independent samples t test. In Group A the mean values of pre intervention is 3.70±1.31 and post intervention was 8.35±0.99 and in group B it was 3.00±1.11 and 6.05±1.19 respectively. The p values were compared between the two groups. The p value of the pre score was 0.103 which was statistically insignificant while that of the post score, p is <0.001 which was highly significant. The difference in the mean of pre and post score of group A was 4.64±1.27 and group B was 3.05±0.89 and its p value being <0.001 which was highly significant. (Refer table 2)

Table 2

<table>
<thead>
<tr>
<th>Time point</th>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Score</td>
<td>Group A</td>
<td>3.70</td>
<td>1.31</td>
<td>0.416</td>
<td>1.681</td>
<td>0.103</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>3.00</td>
<td>1.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Score</td>
<td>Group A</td>
<td>8.35</td>
<td>0.99</td>
<td>0.375</td>
<td>6.126</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>6.05</td>
<td>1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>Group A</td>
<td>4.64</td>
<td>1.27</td>
<td>0.376</td>
<td>4.227</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>3.05</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 5% level
All values in absolute form [ignored negative sign for statistical convenience]

Group A showed more significant improvement than group B based on higher mean value in all categories. Since post score and difference score was less than 5% level (0.000<0.05) it was statistically significant and fulfilled the desired outcome as per our experiment.

**Comparison of Group A [Experimental] and Group B [Control] with respect to Breastfeeding self-efficacy scale by summary independent samples t test:** A comparison of Group A and Group B was done with respect to the breastfeeding self-efficacy scale by independent samples t test. In Group A the mean values of pre intervention is 73±10.52 and post intervention was 117.17±10.22 and in group B it was 81.41±9.22 and 96.94±8.59 respectively. The p values are compared between the two groups. The p value of the pre score is 0.019 which was statistically insignificant while that of the post score, p is <0.001 which was highly significant. The difference in the mean of pre and post score of group A was 43.70±10.21 and group B was 15.252±6.61 and its p value being <0.001 which was highly significant. (Refer table 3)

Table 3

<table>
<thead>
<tr>
<th>Time point</th>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Score</td>
<td>Group A</td>
<td>73.00</td>
<td>10.52</td>
<td>3.393</td>
<td>2.479</td>
<td>0.019*</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>81.41</td>
<td>9.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Score</td>
<td>Group A</td>
<td>117.17</td>
<td>10.22</td>
<td>3.238</td>
<td>6.248</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>96.94</td>
<td>8.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>Group A</td>
<td>43.70</td>
<td>10.21</td>
<td>2.950</td>
<td>9.553</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>15.52</td>
<td>6.61</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 5% level
All values in absolute form [ignored negative sign for statistical convenience]
Group A showed more significant improvement than group B based on higher mean value in all categories. Since post score and difference score is less than 5% level (0.000<0.05) it is statistically significant and fulfilled the desired outcome as per our experiment.

**DISCUSSION**

In the present study, demographic data of the subjects taken was homogenous in both the groups. The age of the mothers with inverted or flat nipples who wished to breastfeed ranged from 18-30 years. Similar to this study, another study was done which had 4 groups in which the maternal age also ranged between 18-30.

Hence, both the studies showed that the condition is seen mostly in mothers of the lower age group.

In the present study, all of the included subjects were primiparous and immediate postpartum (n=34). The study intervened postnatally, because there was a risk of getting premature uterine contractions which may occur due to stimulation or manipulation of nipples before the 3rd trimester of gestation as it leads to secretion of oxytocin which is known to induce uterine contractions. Contradictory to this study, there was another study done which included nulliparous females between 25-35 completed weeks of gestation. Since the mothers were intervened before 3rd trimester, they were at a risk of premature uterine contractions.

In the present study we first used hot moist packs which showed significant reduction in breast tenderness as heat works by improving vascular tone and providing an anti-inflammatory action. It aids oxytocin uptake and softens the areola prior to attachment. It also promotes comfort and let down. Supporting this study, different studies were done by R. Nanthini et al and Smriti Arora et al, which compared the use of cold cabbage leaves and hot packs. Both these studies found that hot packs were more effective in treating breast engorgement.

After the application hot moist packs, manual massage was given which showed significant results as massage encourages drainage of fluid towards the axilla and helps in reducing swelling, softens breasts and aids in resolution of milk stasis. Another study by Storr GB supported the use of breast massage to prevent nipple tenderness and breast engorgement by massaging one breast which helped in softening the breasts and furthermore helping the baby was to latch better onto the mother’s breast. The breast which was massaged showed decreased tenderness and engorgement as the rhythmic movements used in massage helped in dissolving the plugs which caused breast hardening and directing the swollen lymph towards the axillae.

The current study we found that there was significant improvement in successful breastfeeding as Hoffman’s exercises help to break adhesions and promote nipple protrusion. This was made easier by manual massage which was given prior to Hoffman’s exercises as it softens the areola and surrounding tissue. Furthermore, when the baby sucks on to the breast it stimulates the nipple protrusion. On the contrary, a study by J. M. Alexander, M. Grant et.al which had given Hoffman’s exercise and breast shells failed to identify any benefit of recommending Hoffman’s exercises but recognized that Hoffman’s exercises showed that there was a moderate but clinically important increase in successful breastfeeding.

In the current study we intervened using Hoffman’s exercises and caused no nipple discomfort or irritation to the participants post treatment. Hoffman’s exercises are patient friendly, easy to practice even by the participant as well as are cost-effective. On the other hand various devices were used in correcting inverted nipples. Julie Bouchet-Horwitz used supple cups wherein, 10 of the 12 participants of the study were successfully able to breastfeed their babies. Although, the devices were useful in nipple protraction they caused nipple soreness, discomfort and skin problems. The devices retained moisture and caused irritation which promoted bacterial growth.

In the present study, we taught the mother cradle hold position during breastfeeding and it was noticed that when the mother used this position, the baby was able to latch better and at the same time the mother was comfortable. Supporting the same, Wambach K. et al suggested that the cradle hold is the commonly used position as it includes correct alignment of the baby’s body with its head in such a way that it has a vertical orientation. The baby’s chin is buried in the breast, his nose touching the breast. On the contrary, Renee A. Milligan et al compared various breastfeeding positions to evaluate which one of them was efficient in minimizing fatigue and concludes that a supported side lying position best served the purpose.
CONCLUSION

The present randomized controlled trial concluded that Hoffman’s exercises are effective in correcting flat or inverted nipples in immediate postpartum mothers and improving their breastfeeding self-efficacy when given along with hot moist, breast massage and an appropriate breastfeeding position as one compliments the other.

Conflict of Interest: None

Source of Funding: Self

Informed Consent: Obtained

Ethical Clearance: Obtained

REFERENCES


Impact of Circuit Training Exercises on Land Versus in Water in Overweight Females-A Randomized Clinical Trial

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¹Associate Professor, ²Physiotherapist Intern, Department of Sports Physiotherapy, KAHER Institute of Physiotherapy, Karnataka, India

ABSTRACT

Background: Circuit training exercises are proved to be effective in weight reduction. Very less literature is available comparing the effect of circuit training exercises on land and in water using same intensity on overweight individuals.

Objective: The purpose of the study was to compare the effects of circuit training exercises on overweight individuals on land and in water.

Design: Randomized clinical trial

Methods: The present randomized clinical trial was conducted among 28 overweight females between the age group of 18-25 years and they were randomly allocated into 2 groups namely Group A: [Aquatic circuit training] and Group B: [Land circuit training]. Pre-interventional outcome measurements were taken in the form of Body Mass Index (BMI), Waist to Hip ratio and skin fold measurements.

Results: Statistical analysis for the present study was done using the website social science statistics. BMI and skin fold measurement were found to be statistically significant and waist to hip ratio was clinically significant in overweight females performing circuit training exercises in water when compared to individuals performing circuit training exercises on land.

Conclusion: The present study demonstrates that aquatic circuit training exercise program proved to be more effective in weight reduction in overweight females.

Keywords: Pre obese, obesity, weight loss, circuit based exercise, aquatic therapy.

INTRODUCTION

According to WHO, “Overweight and obesity are defined as abnormal or excessive fat accumulation that presents risk to health. A person with a BMI of 30 are generally considered as obese. A person with a BMI equal to or more than 25 is considered overweight”¹.

BMI is classified as Underweight, Normal, Overweight, Pre-obese and Obese and the ranges are < 18.5, 18.5-24.9, ≥ 25, 25.0-29.9 and ≥ 30.0 respectively. Obese is further classified into class 1 obese, class 2 obese, class 3 obese and the ranges are 30.0 – 34.9, 35.0 – 39.9 and ≥40 respectively.²

Obesity and overweight leads to elevation of cholesterol levels, elevation of BP, impairment of carbohydrate tolerance and it also predisposes to premature atherosclerosis. The ratio of obesity and overweight in male: female is 1:5. The main features of overweight and obesity are exertional dyspnoea, angina, sluggishness, arthralgia of knee and hip.³

Aquatic exercise is the treatment given in pools or tanks. This facilitates the application of various therapeutic interventions, including stretching, strengthening, joint mobilization, balance and gait training, and endurance.⁴

DOI Number: 10.5958/0973-5674.2018.00064.3
Aquatic exercises increase the physical health of overweight individuals without risk of injuries. It is also gaining popularity in individuals who are overweight and obese as it provides high level of intensity with minimal strain on joints.

Indications for aquatic interventions are impairments and functional limitations like decreased range of motion, pain with movement or functional activity on land, balance, proprioception or co-ordination deficit, decreased strength, cardiovascular compromise etc.

Shallow water exercises are the exercises which are done in waist, chest or shoulder deep water. It improves abdominal, upper limb and lower limb lipid profile.

Aquatic exercises have proved to be helpful in weight reduction and they are easier to be performed as they do not put stress on weight bearing joints which further prevents the wear and tear of the joints. Thus, there is an increasing need to know better about the effects of aquatic exercises on weight reduction. As there are less number of studies on aquatic exercises for overweight and even lesser number of studies on comparison between circuit based aquatic exercises and land exercises for overweight in India, this calls for our research study.

MATERIALS AND EQUIPMENTS

Informed consent, Data collection sheet, dumbbells, theraband, Foam dumbbells, Pool noodle, Weighing machine, Calliper, measuring tape.

METHOD

This study was conducted at physiotherapy sports rehabilitation centre, KLES Dr. Prabhakar Kore hospital and MRC, and Suvarna JNMC swimming pool, Belagavi during the study period from November 2017 to January 2018. Ethical clearance was obtained from the Institutional Ethical Committee. The participants were initially screened for the study based on inclusion and exclusion criteria. Females aged between 18 to 25 years with BMI 25 to 29.99(kg/m$^2$) were included. Exclusion criteria comprised of any participants with fear of water, open wounds, allergic to chlorine, any neurological disorders or cardiac dysfunctions, severe peripheral disease and any other contraindications for aquatic therapy. Total 28 participants were recruited in the study. Participants were randomly divided into group A (Aquatic based circuit training) and group B (Land based circuit training). All the participants were explained about the study and a written informed consent was obtained. Baseline measurements i.e. Body Mass Index, waist to hip ratio, skin fold measurements were taken pre and post intervention. The intervention was given for 2 weeks, 6 sessions per week.

The Intervention for the two groups was done for Group A such that these participants received series of circuit based aquatic exercises and group B participants received series of circuit based land exercises.

Each group received a session of 1 hour which included warm up for 5 mins (spot jogging), primary exercises for the upper body, lower body & abdominals for 50 mins followed by 5 mins cool down for 2 weeks, 6 sessions per week.


Outcome measures like Body Mass Index (BMI) kg/m$^2$ was used where normal value of BMI is 18.50 – 24.99 kg/metre square. BMI was calculated by using the formula:

$$\text{WEIGHT in kilograms/Height in metre}^2$$

while another outcome measures were taken as Waist to hip ratio (WHR) where normal value for healthy female is 0.6-0.8 and for healthy male is 0.8-0.9. The waist circumference was measured at the midpoint between the lower margin of the last palpable rib and the top of iliac crest with the subject standing and hip circumference was measured at the level of greatest gluteal protuberance. The ratio of waist to hip was calculated as circumference of waist/circumference of hip$^3$ and skin fold measurement (mm) for the abdomen was done using a Skin fold calliper, the right or left side of the abdomen is measured. Measurement for the abdomen thickness was done at the suprailiac spot, the Skin fold calliper is placed at a
2.5-inch gap on either side of the spot marked, fingers was placed at the 2.5-inch gap measured, the skin will be pinched and fat away from the underlying muscle will be measured with the Vernier caliper.9

FINDINGS

RESULTS

Table 1: Pre And Post Intervention Value of BMI In Group A And Group B:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Pre</th>
<th>Mean Post</th>
<th>Mean Difference</th>
<th>Standard Deviation</th>
<th>T Value</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic</td>
<td>26.93</td>
<td>25.88</td>
<td>1.12</td>
<td>7.39</td>
<td>5.5138</td>
<td>0.0473</td>
</tr>
<tr>
<td>Land</td>
<td>27.72</td>
<td>27.29</td>
<td>0.43</td>
<td>1.96</td>
<td>4.1526</td>
<td>0.1772</td>
</tr>
</tbody>
</table>

Table 2: Pre and Post Intervention Value of Waist To Hip Ratio in Group A and Group B:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Pre</th>
<th>Mean Post</th>
<th>Mean Difference</th>
<th>Standard Deviation</th>
<th>t Value</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic</td>
<td>0.89</td>
<td>0.87</td>
<td>0.02</td>
<td>0</td>
<td>6.3235</td>
<td>0.4570</td>
</tr>
<tr>
<td>Land</td>
<td>0.85</td>
<td>0.84</td>
<td>0.01</td>
<td>0</td>
<td>4.1633</td>
<td>0.4783</td>
</tr>
</tbody>
</table>

Table 3: Pre and Post Intervention Value of Skin fold measurements in Group A and Group B

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Mean Pre</th>
<th>Mean Post</th>
<th>Mean Difference</th>
<th>Standard Deviation</th>
<th>t Value</th>
<th>p Value</th>
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Out of fourteen participants in each group, the mean with SD of pre interventional BMI (table 1.1) in group A and group B was 26.93 ± 7.39(kg/m²) and 27.72 ± 1.96(kg/m²) respectively and mean with SD of post interventional BMI was 25.88 ± 7.39 (kg/m²) and 27.29 ± 1.96 (kg/m²) respectively. The mean with SD of pre interventional waist to hip ratio (table 1.2) in group A and group B was 0.89 ± 0.02 and 0.85 ± 0.01 respectively and the mean with SD of post interventional value was 0.87 ± 0.02 and 0.84 ± 0.01 respectively. The mean difference of skin fold thickness (table 1.3) for biceps, triceps, abdomen and thigh in group A are 2.29, 2.71, 2.21 and 2.57 respectively and for group B are 1.07, 0.79, 1 and 0.71 respectively.

Intergroup Comparison: Intergroup comparison of the pre-intervention and post intervention outcome measures between the group A and B was done in terms of BMI, waist to hip ratio and skin fold measurements. BMI and skin fold measurement were found to be statistically significant and waist to hip ratio was clinically significant in group A with p value ≤ 0.05 post intervention. This suggested that participants performing circuit training exercises in aquatic group proved to be more effective than land group.
DISCUSSION

The present study was conducted to compare the effects of circuit training exercises on land and in water in overweight females. The study involved 28 overweight females, fourteen participants in aquatic and fourteen in land group. Six sessions were held per week for two weeks.

The present study showed significant reduction in outcome when intragroup comparison was done on the basis of pre and post interventional readings of BMI, waist to hip and skin fold measurements. To the best of knowledge this is the first time an experimental study has been performed to compare the effects of circuit training exercises on land and in water on overweight females.

The age group selected for this study was 18 to 25 years of age, as this age group is vulnerable to weight gain due to critical life course points and dramatic lifestyle changes as stated by Poobalan et al (2009).7

The present study is in agreement with the previous literature which showed that circuit type water based exercise can elicit significant improvements in cardio respiratory fitness, strength and abdominal obesity.6 Similarly, a study demonstrated that circuit based land exercise has an effect on reduction in anthropometric parameters in obese older women.

CONCLUSION

The present study demonstrates that aquatic circuit training exercise program proved to be more effective in weight reduction in overweight females.

Conflict of Interest: None

Source of Funding: Self

REFERENCES

Effect of Swissball Exercise Versus Plinth Exercises in Improving Trunk Control among Hemiparetic Patients- A Comparative Study

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ABSTRACT

Background: Stroke is a global health problem. Along with hemiplegic limb muscles, trunk muscles are also impaired multidirectional in stroke patients. Trunk control is important for functional outcome and also an early predictor for activities of daily living after stroke. Treatment focusing on this aspect in stroke patients is needed.

Materials and Method: A total of 40 stroke patients in the age group of 40 to 60 years who satisfied the selection criteria were selected by convenience sampling and randomly assigned into two groups. Group A received trunk exercises on Swiss ball and Group B received trunk exercises on bed for 12 days [6 sessions per week for 2 weeks (45 minutes/session)]. Outcomes were measured with Trunk Impairment Scale score and Motor Assessment Scale score.

Results: All participants in group A and group B showed significant improvement in TIS scores, the mean value of post treatment Trunk impairment scale of group A and Group B are 18.2 and 11.9 respectively. The t-value were 9.07 n p<0.0001 These values suggest there is significant difference in giving balance training with ball in improving trunk balance. In MAS scores group A and group B showed significant improvement with a mean difference results shows that there were significant differences between group A and Group B. mean value of post treatment Motor assessment scale of group A and Group B are 43.45 and 32.25 respectively. The t-value were 4.18 n p<0.0002. These values suggest there is significant difference in giving balance training with ball in improving trunk balance.

Conclusion: The study concluded that there is significant improvement in giving Swiss ball exercise than plinth exercises in improving trunk balance in stroke.

Keywords: Swiss Ball, Hemi Paretic, Trunk Control, Trunk Exercises, Functional Outcome, Trunk Impairment, Bed Exercises.

INTRODUCTION

Stroke is defined as, neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours. Developing countries have the highest stroke mortality rates in the world, comprising over two third of stroke death worldwide. India has a large population of more than 900 million people with a relatively low life expectancy of about 61 years and a young population 33.8% are less than 15 years, 59.1% between 15 and 59 years and only 7.1% are 60 years and above. Both the lower life expectancy and younger population will naturally influence the incidence and prevalence rate of stroke. The number of well defined population based studies on incidence of stroke in India is limited. One study conducted at Vellore, south India, showed a annual
incidence rate of 13/100,000 population (15.2/100,000 in males and 10.8/100,000 in females)\(^9,10,11\). The trunk being the central key point of the body proximal trunk control is a pre-requisite for distal limb movement control balance and functional activity. Trunk control it is the ability of the trunk muscles to allow the body to remain upright adjusant weight shifting and performed selective movement of the trunk so as to maintain the center of mass within base of support during static and dynamic postural adjustment. Training the patient in awareness of trunk position could improve sitting weight symmetry in sub-acute stroke\(^4\).

The trunk being the central key point of the body proximal trunk control is very essential for distal limb movement control, balance and functional activities. A cross sectional study has shown that trunk control is related to measures of balance, gait and functional ability in patients with stroke. A prospective study demonstrated trunk control as an early predictor of comprehensive ADL function in stroke patients. Selective trunk muscle exercise regime has improved trunk control, balance and gait in chronic stroke patients\(^4\).

A randomized controlled trial by Verheyden et al demonstrated that additional trunk exercises performed on plinth along with regular rehabilitation had a beneficial effect in improving selective performance of trunk lateral flexion in sub-acute stroke patients. A study have shown that trunk muscle activity was greater when trunk exercises are performed on a Swiss ball in comparison to similar exercises performed on stable surface in healthy adults\(^5\).

Task specific trunk exercises performed on Swiss ball provided significant improvement in dynamic sitting balance and trunk coordination in stroke patients. In a previous study, trunk exercises performed using the Swiss ball have showed an significant improvement in trunk control and functional balance when compared with similar exercises performed on plinth. The potential activation of trunk muscles is greater when trunk exercises are performed on a Swiss ball because it is an unstable surface which provides an postural perturbation to which the trunk muscles has to respond in order to maintain the desired posture\(^6,7,8\).

There are evidences to show that trunk exercises performed on bed had beneficial effects on trunk control among stroke patients. There are also evidence to support that trunk exercises performed on Swiss ball also improved trunk control in stroke patients, but there are very few studies that compared the effects of trunk exercises performed on bed and Swiss ball.

Hence the need of this study is to compare the effect of trunk exercises performed on bed versus Swiss ball and to find out which of these two shows the most beneficial effect in improving trunk control among hemi paretic patients.

**Need for the study:** There are evidences to show that trunk exercises performed on bed had beneficial effects on trunk control among stroke patients. There are also evidence to support that trunk exercises performed on Swiss ball also improved trunk control in stroke patients, but there are very few studies that compared the effects of trunk exercises performed on bed and Swiss ball.

Hence the need of this study is to compare the effect of trunk exercises performed on bed versus Swiss ball and to find out which of these two shows the most beneficial effect in improving trunk control among hemi paretic patients.

**METHODOLOGY**

60 Hemiparetic patients were selected for the study and screened through inclusion and exclusion criteria. The subjects were briefed about the study and consent taken. They are divided into two groups by random sampling method. Group A patients were given with Swiss ball exercise and Group B patients are given with plinth exercises. Materials used in the study were Swiss ball and plinth. The inclusion criteria were single time stroke patients, acute ischemic stroke patients, age group between 40 to 60 years and Both male & female. The exclusion criteria were Un-cooperative patients, Obese patient (BMI <30), Neurological disease affecting balance other the stroke such as a cerebellar disease, Parkinson’s disease, vestibular lesion, and musculoskeletal disease such as low back pain, arthritis, degenerative disease of the lower limb affecting motor performance. The study passed through ethical committee.

**PROCEDURE**

**Group A: Exercises on Swiss ball**

In supine lying the exercises were Pelvic bridging, unilateral bridging and trunk rotation. In sitting the exercises were static sitting balance, Trunk flexion extension Trunk lateral flexion and Trunk rotation.
**Group B: Exercises in plinth**

In Supine lying the exercises were pelvic bridging, unilateral bridging and Trunk rotation. In sitting the exercises were trunk flexion extension, Trunk lateral flexion, Lower trunk lateral flexion and forward reach and Lateral reach.

**STATISTICAL ANALYSIS**

<table>
<thead>
<tr>
<th>Table 1: Trunk Impairment Scale Comparison of Group A and B</th>
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<tbody>
<tr>
<td><strong>Group</strong></td>
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<td>-----------</td>
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<tr>
<td>Group A</td>
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<td>Group B</td>
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<table>
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<tr>
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<tr>
<td>-----------</td>
</tr>
<tr>
<td>Group A</td>
</tr>
<tr>
<td>Group B</td>
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</table>

**RESULTS**

The table-I results shows that there were significant difference between group A and Group B mean value of post treatment Trunk impairment scale of group A and Group B are 18.2 and 11.9 respectively. The t-value were 9.07 n p<0.0001. These values suggest there is significant difference in giving balance training with ball in improving trunk balance.

The table-II results shows that there were significant differences between group A and Group B. mean values of post treatment Motor assessment scale of group A and Group B are 43.45 and 32.25 respectively. The t-value were 4.18 n p<0.0002. These values suggest there is significant difference in giving balance training with ball in improving trunk balance.

**DISCUSSION**

The trunk being the central key point of the body, proximal trunk control is a prerequisite for distal limb movement control, balance and functional activities. Trunk control is the ability of the trunk muscles to allow the body to remain upright, adjust weight shift, and performs selective movements of the trunk so as to maintain the center of mass within the base of support during static and dynamic postural adjustments. A study on electromyography analysis observed that the anticipatory postural adjustment of trunk muscles activity is impaired in patients with stroke. A cross sectional study by Verheyden et al. demonstrated that trunk control is related to measures of balance, gait and functional ability in patients with stroke. Trunk control has also been identified as an important early predictor of functional outcome after stroke.

Trunk control and stability, coordination of movement patterns, and balance all involve complex pyramidal and extra pyramidal systems that are frequently disrupted by stroke. Patients with stroke usually present with difficulty in maintaining balance, disorders of posture, head and trunk malalignment, and asymmetry of weight distribution at all stages after stroke.

Selective trunk muscle exercises in supine position include the use of lower limb muscles also, which could account for change in BBS results. Experts in the field of neurological rehabilitation have addressed the trunk as the central key point of the body, and the control of movement proceeds from proximal to distal...
body regions. Motor control literature suggests that if an improved level of proximal trunk control gains were attained, a better distal limb control might be anticipated during balance and functional mobility.

The possible reason for better trunk control improvement in the Swiss ball group may be as the movement of the Swiss ball under the patients provided a postural perturbation to which the trunk muscles respond reactively in order to maintain the desired postural stability. The study results had shown that trunk exercises performed on a Swiss ball resulted in a greater improvement in trunk lateral flexion and trunk rotation than plinth exercises.

**CONCLUSION**

40 hemiparetic patient in sub acute stage undergone treatment with Swiss ball exercises and plinth exercises in improving trunk control. The results suggest there were significant difference between the two groups. The statistical analysis suggest that the there is significant improvement in giving Swiss ball exercise.

So this study concluded that there is significant improvement in giving Swiss ball exercise than plinth exercises in improving trunk balance in stroke.

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

**Source of Funding:** Nil

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

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Effectiveness of MWM, Neurodynamics and Conventional Therapy Versus Neurodynamics and Conventional Therapy in Unilateral Cervical Radiculopathy: A Randomized Control Trial

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¹MPT (Musculoskeletal Sciences), College of Physiotherapy, ²MPT (Musculoskeletal Sciences), Faculty of Physiotherapy, ³Professor and HOD, Department of Orthopaedics, Nizam’s Institute of Medical Sciences, Hyderabad, Telangana

ABSTRACT

Objective: The purpose of this trial was to study and compare effectiveness of Mobilization With Movement (MWM), Neurodynamics (NDS) and conventional therapy (CT) versus NDS and CT in individuals with cervical radiculopathy.

Background: Cervical radiculopathy (CR) is a common condition in recent days in which nerve root compression causes radicular symptoms in upper limbs. Recent evidence showing conservative treatment is more effective than surgical options.

Methods: The study design is Randomized controlled trial. This study included 90 patients with CR who were assigned randomly to a control group (CT only), experimental group I (CT+NDS) and experimental group II (CT+NDS+MWM). The subjects were treated for a period of 4 weeks. Pain was assessed by Numerical pain rating scale (NPRS), physical function was assessed by Neck Disability Index (NDI) and cervical rotation was assessed by goniometer on baseline, 2nd week and 4th week in all three groups.

Results: The results were analyzed by Kruskal Wallis test for NPRS and ANOVA for NDI and cervical rotation. All three groups showed significant improvement in pain (p<0.05), NDI (p<0.05) and cervical rotation (p<0.05). Comparison of three groups was done with Two Way ANOVA test.

Conclusion: Experimental group II (CT+NDS+MWM) and experimental group I (CT+NDS) were more effective when compared with control group in reducing pain and disability. Experimental group II (CT+NDS+MWM) subjects showed significant improvement in cervical rotations when compared with other two groups.

Keywords: Cervical Radiculopathy, Neurodynamics, MWM, Cervical rotation.

INTRODUCTION

Cervical radiculopathy is a common dysfunction of neck involving the nerve root of the cervical spine. Radhakrishnan K and Litchy et al in their study stated that the annual incidence of cervical radiculopathy is approximately 83 per 100,000 and increased prevalence in the 5th decade of life. However in recent times the number of cases of CR has increased due to sedentary lifestyles and usage of cell phones. CR is more common between the ages of 40 – 70 years.

The most common cause of cervical radiculopathy (in 70–75% of cases) is foraminal encroachment of the spinal nerve due to combination of factors, including decreased disc height and degenerative changes of the uncocvertebral joints anteriorly and zygoapophyseal joints posteriorly.

Treatment for CR has been the subject of debate among clinicians and researchers, with recent evidence
demonstrating conservative treatment to be more effective than surgical options. (Costello) Conservative treatment for CR typically includes therapeutic exercise (ROM, strengthening), manual therapy (muscle energy techniques, non-thrust mobilization, manipulation), modalities (cryotherapy, traction), massage therapy, medication, and cervical collar².

Miller et al, in a systematic review concluded that, for neck pain, a combination of cervicothoracic mobilizations and exercises is the most effective rehabilitation approach to reduce pain and disability⁹.

Treatment strategies should address both neural as well as articular causes for CR.

Neurodynamics concept hypothesizes that neural mobilization techniques can have a positive impact on symptoms of radiculopathy by improving intra neural circulation, axoplasmic flow, neural connective tissue viscoelasticity and by reducing sensitivity of abnormal impulse generating site.¹¹

There are many approaches to mobilize the cervical spine like Maitland, Mulligan and Mc Kenzie and few studies have been done to assess their effectiveness in CR.. Mulligan concept is the mobilization of the spine whilst the spine is in a weight bearing position and directing the mobilization parallel to the spinal facet planes (Mulligan 1999). The concept has its foundation built on Kaltenborn’s (1989) principles of restoring the accessory component of physiological joint movement. Passive oscillatory mobilizations called ‘NAGs’ (natural apophyseal glides) and sustained mobilizations with active movement ‘SNAGs’ (sustained natural apophyseal glides) and ‘MWM’ (mobilization with movements) are the mainstay of this concept’s spinal treatment (Mulligan 1999)⁷.

**METHODOLOGY**

Subjects presenting to the outpatient Department of Physiotherapy with a clinical diagnosis of cervical radiculopathy were enrolled into the study.

**Inclusion criteria**
- Males and females in the age group of 20–50 years.
- Unilateral cervical radiculopathy.
- 3 out of 4 tests of clinical prediction rule positive: spurling test, distraction test, neurodynamics tests, ipsilateral cervical rotation <60°. (wainner’s cluster)
- Subjects who are willing to participate in the study.

**Exclusion criteria**
- History of previous cervical or thoracic spine surgery.
- Bilateral upper-extremity symptoms,
- Patients with Vertigo.
- Patients with sensory and motor deficits.
- Signs or symptoms of upper motor neuron disease.
- Medical “red flags” (eg, tumor, fracture, rheumatoid arthritis, osteoporosis, prolonged steroid use).
- Current use of steroidal medication prescribed for radiculopathy symptoms.
- Patients who are not willing to participate in the study.

After completing the baseline assessments by an Independent assessor, the samples are allocated into three different groups by simple random sampling (chit method). Allotment was concealed. Principal investigator blinded to randomization and allocation. All patients provided informed consent prior to their enrollment in the study.

**Treatment groups and protocol:** Subjects in the control group (CG) received conventional treatment (CT) which includes neck ROM exercises, neck isometrics, shoulder girdle exercises and TENS. TENS is given for 15 min duration. 6 times a week, exercises are performed with 10 repetitions twice a day. Subjects in the experimental group I (EGI) received neurodynamics (NDS) along with conventional treatment (CT). Neurodynamics testing⁷⁵
was done and depending on the affected nerve neural mobilization was given. The treatment will consist of 6 times/week for 4 weeks. The patient is positioned in neurodynamic test position according to the involved nerve and required sliding or gliding techniques will be used if symptoms improved progressed to tensioners. 3 sets with 15 oscillatory movements per set are given. Subjects in the experimental group II (EGII) received Mulligan MWM with NDS and CT. For mulligan MWM with neurodynamics subjects are made to sit and therapist stands behind the subject. MWM lateral glide is given to the affected segment of cervical spine and ask the patient or colleague to do Neurodynamic gliders and progressing to tensioners. These movements are repeated for 15 oscillations for 3 sets, 6 times in a week for 4 weeks.

OUTCOME MEASURES

Primary outcome measure is Neck disability index (NDI). Secondary outcome measures are Numerical pain rating scale (NPRS) and Cervical Range of Motion (rotations). Patients completed all outcome measures at baseline and at 2-week and 4-week follow-up periods. A higher NDI score indicates a greater patient’s perceived disability. The reliability (intra class correlation coefficient [ICC]: 0.73 to 0.98), construct validity, and responsiveness to change have all been demonstrated in various populations. For patients with cervical radiculopathy, the minimal detectable change is 10 points, and the clinically important difference is 7 points. Pain was quantitatively measured by NPRS. Here the subjects were shown a 10 centimeter line where one end is marked ‘0’ and other end is marked ‘10’. They were explained that ‘0’ represents no pain and ‘10’ represents the maximum pain and they were instructed to mark their level of pain over that 10 centimeter scale. The MCID for the NPRS has been reported to be 2 points. The patient is seated. Cervical rotation is measured with a standard goniometer with fulcrum on the vertex of the skull, immovable arm is parallel to ground and movable arm is parallel to tip of nose.

DATA ANALYSIS

Kruskal Wallis test for VAS and ANOVA Test for NDI and cervical rotation was used to calculate for the significance of the difference with in the three groups. Two way ANOVA test was used to calculate for the inter group comparison among the three groups. To find out the average baseline score in the above mentioned parameters in all the groups, the means were calculated on 0th day and these values were considered as baseline values. The same parameters are studied on 2nd week and 4th week. Averages were recorded in terms of means of each parameter and variations from the means (SD) and standard error (SE) were also calculated.

RESULTS

90 subjects were enrolled into the study out of 88 participated and remaining 12 are dropouts. No side effects were observed in any of the subjects during the treatment and follow-up periods. The means of all parameters before and after treatment are shown in Table 1. There were no significant differences between means of three groups in terms of VAS, NDI and Cervical
rotations scores at baseline and at the fourth week VAS, NDI and Cervical rotations values of experimental groups were significantly improved which are shown in Table 1. Table 2, 3 and 4 are Two-way ANOVA test which shows comparison between the groups for VAS, NDI and cervical rotations respectively. There is no significant difference between all three groups at baseline where the p value is >0.05, There is a significant difference between control and experimental groups at 1st and 4th week where the p value is <0.05. There is less significant difference between two experimental groups for all parameter except in cervical rotation where p value is < 0.05 in EGII.

Table 1: Mean values of control and experimental groups

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<td>SD</td>
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<td>SD</td>
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Table 2: Two way ANOVA for VAS

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<td>CG ECGII</td>
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<tr>
<td>EGI EGII</td>
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<td>.252</td>
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Table 3: Two way ANOVA for NDI

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<tr>
<td>EGI EGII</td>
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<td>.308</td>
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Table 4: Two way ANOVA for ROTATIONS

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<tr>
<td>EGI EGII</td>
<td>-2.125</td>
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<td>.126</td>
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DISCUSSION

This study describes to compare the effectiveness of Neurodynamics with MWM as an adjunct to conventional treatment vs Neurodynamics alone as an adjunct to conventional treatment in unilateral cervical radiculopathy. Physical impairments are limited ROM, decreased functional ability and pain are improved at the end of 4 weeks of study. Improvements were observed in the VAS, NDI and in cervical rotations. As groups were selected according to criteria described in methodology and there is no interaction between patient’s selection and three groups were selected independently and randomly 22 subjects in each group after dropouts. All the three groups were assessed for pain (VAS), functional ability (NDI) and cervical rotations (with goniometer). All the parameters were measured at baseline (0th week), 2nd week and 4th week following completion of the intervention.
Mean pain scores of CG, EGI and EGII when compared after four weeks of treatment. The results have shown the improvement of pain intensity over the four-week period in three groups. The findings of this study are similar to those of Persson et al determined a diagnosis of CR with diagnostic imaging and used the VAS as an outcome measure. The study revealed that no significant differences existed between the outcome measures of all three groups. This suggests that physical therapy, which includes manual therapy and exercise, is at least as effective as surgery.

NDI shows significant improvement in both experimental groups when compared with control group. Between Experimental group 1 and Experimental group 2 there is no statistical significant difference and its p value is at 0.308. The findings of this study are similar to those of Ragoneuse, Cleland et al and Young et al in their study used NDI as measuring tool all three studies demonstrated statistically significant improvements in NDI scores. Ragoneuse reported all three groups demonstrated statistically significant improvements in function, with the therapeutic exercise/manual therapy combination group showing the greatest results compared to the other two groups. Cleland et al and Young et al corroborated these results with their studies. As the pain reduces disability also reduces.

Cervical rotations show significant difference between EGI and EGII. The findings of this study are similar to those of Ragoneuse, found that all three treatment groups (manual therapy only, therapeutic exercise only, and a combination group) measured cervical rotation range of motion and reported statistically significant improvement in cervical rotation in all three treatment groups. The current study shows significant difference of Cervical rotations of both experimental groups but found that the combination Group (MWM with Neurodynamics) had the lowest P value when compare with Neurodynamics alone group, The significance in Experimental group II might be due to combine effect of MWM with Neurodynamics which mobilize the facet joint and improves cervical range of motion.

Lacunas of the study are limited sample size, results are applicable to subjects belonging to age group 20-50 years only, short duration study (4 weeks), only outcome measures of pain, ROM, and disability were evaluated and the study population was limited to those who were able to attend the physiotherapy clinic.

CONCLUSION

NDS with MWM as an adjunct to conventional treatment and NDS as an adjunct to conventional treatment are more effective when compared with just conventional treatment in reducing pain and disability in subjects with unilateral cervical radiculopathy. Using MWM along with NDS and conventional exercises helped to significantly improve cervical rotations. However, further studies are needed using large sample size and long term follow up.

Ethical Clearance: Taken from Nizam’s Institute Of Medical Sciences committee, Hyderabad, Telangana.

Source of Funding: Self.

Conflict of Interest: Nil.

REFERENCES


Pattern of Neck Pain Seen in Physiotherapy Clinics in Kano Metropolis: A Five Years Retrospective Study

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ABSTRACT

Background: Neck pain is a common problem in our society and, is a major management challenges to physiotherapy. The purpose of the present study was to investigate the prevalence of neck pain and the socio-demographic distribution of neck pain seen in physiotherapy clinics in Kano.

Methods: A retrospective study of patients diagnosed with neck pain. The case folders of 268 patients with neck pain out of 7652 patients seen in two physiotherapy clinics in Kano from 2008-2012 were reviewed. Using self-designed proforma. Data obtained were analyzed using descriptive statistics.

Results: The patients’ ages ranged between 16-86 years with a mean age of 44.85±13.72 years. Males were more affected 131(59.5%) with neck pain compared to females 89(40.5%). The most commonly exposed categories to neck pain in terms of occupation were civil servants 100(45.5%). Neck pain constituted 2.9% of all the referrals to the selected physiotherapy clinics. The social behavior of the participants revealed that 193(87.7%) do not take kolanut, smoke or consume alcohol. Cervical spondylosis was the most common cause of neck pain 186(84.5%).

Conclusion: The prevalence of neck pain was relatively low in physiotherapy clinics within Kano Metropolis, with cervical spondylosis as the most common cause of neck pain in this environment. Further study should be conducted to ascertain other causes and risk factors of neck pain in Kano metropolis.

Keywords: Neck pain, Prevalence, Pattern, Kano, Physiotherapy

INTRODUCTION

Neck pain is the sensation of discomfort in the neck area, which can result from disorders of any of the structures in the neck, including the cervical vertebrae, intervertebral discs, nerves, muscles, blood vessels, esophagus, larynx, trachea, lymphatic organs and thyroid gland, or parathyroid glands. It is sometimes referred to as cervical pain1.

Neck pain appears to be a common ailment all over the world, especially in Western countries. It is a public health problem associated with significant disability.2,3 The lifetime prevalence has been reported to be between 14.2% and 70%. The one-year prevalence of neck pain among adults ranges from 12.1% to 71.5% while the point prevalence is reported to be between 12% and 34%.3

The lifetime, one-year and point prevalence of neck pain in the rural community in Northwestern Nigeria were 67.9%, 65.9% and 17.0% respectively.4 However, lower prevalence has also been reported. For example in Sweden, a lifetime prevalence of 26% was reported, and in Finland, only 17% had had neck pain during the past year4. Thus, great variation exists regarding the prevalence of neck pain.

Differences in study population and genetic dispositions of participants accounted for these wide
range in NP prevalence. Neck pain is common among women than men. It is also common among people living in urban areas than rural areas. Neck pain is a common symptom in clinical settings and it places a significant and unduly heavy load on physiotherapy care facilities.

The complaint of neck pain is second only to low back pain in terms of common musculoskeletal problems in society today. Neck pain affects about 330 million people globally as of 2010 (4.9% of the population) and it is more common in women (5.7%) than men (3.9%).

Approximately 44% of patients experiencing neck pain will go on to develop chronic symptoms and many will continue to exhibit moderate disability at long-term follow-up. A study by Bovim reported that 30% of patients with neck pain will develop chronic symptoms, with neck pain of greater than 6 months’ duration affecting 14% of all individuals who experience an episode of neck pain. Additionally, a survey demonstrated that 37% of individuals who experience neck pain will report persistent problems (pain and disability) for at least 12 months. Five percent of the adult population with neck pain will be disabled by the pain, representing a serious health concern.

The economic burden due to disorders of the neck is high, and includes costs of treatment, lost wages, and compensation expenditures. Neck pain is second only to low back pain in annual workers’ compensation costs in the United States. In Sweden, neck and shoulder problems account for 18% of all disability payments. Most of the studies on prevalence of neck pain were population based studies and were carried out in developed nations. Very few were carried out in north-west and south-west Nigeria. However hospital based studies will give clear information on the extent of the prevalence of neck pain, health seeking behaviors and the exact number of patients with neck pain who seek Physiotherapy care. To the best of my knowledge, no hospital based study on prevalence of neck pain was carried out in Northern part of Nigeria where still people are not familiar with Physiotherapy services. Therefore, the aims of this study was determined the prevalence and pattern of neck pain seen in physiotherapy department of selected tertiary hospitals, in Kano metropolis.

**METHOD**

Ethical approval was obtained from medical advisory committees of Aminu Kano teaching hospital, Kano (AKTH/MAC/SUB/12A/1160) and National Orthopaedic hospital, Dala (NOHD/RET/ETHIC/60) prior to the commencement of this study. The ethical approval evidences were presented to the Head of Physiotherapy department of these institutions, from where an introductory letter was collected and submitted to the record units of the hospitals where the research was conducted.

The case folders of patients with neck pain referred to Physiotherapy Departments between 2008- 2012 in Aminu Kano Teaching Hospital (AKTH) and National Orthopaedic Hospital, Dala (NOHD) were used for this study. A total number of 7652 case folders were found in both hospitals from the year 2008-2012, out of which 268 were diagnosed as cases of neck pain. 48 were excluded from the study due to the deficiency of one or more of the socio-demographic variables being not recorded, while 220 folders were used in this retrospective study. Profoma form was used to collect data on sociodemographic characteristics (cases of neck pain, age, gender, occupation, etiology and social behavior) of the patients.

**DATA ANALYSIS**

The results were presented using descriptive statistics of mean and standard deviation; frequency distribution, percentages and tables. Statistical packaged for social sciences (SPSS) version 18 was used for the analysis.

**RESULTS**

Prevalence of neck pain and Socio-demographic characteristics of the participants: The prevalence of neck pain seen in physiotherapy departments was found to be 2.9%. The patients’ ages ranged between 16-86 years with a mean age of 44.85 ± 13.72 years. The most commonly affected age group was 31- 44, constituting 80 (36.4%) of the cases while the males 131(59.5%) were most affected compared to females which constituted 89(40.5%) of the cases. The most commonly exposed categories to neck pain in terms of occupation were civil servants 100(45.5%), while the less commonly exposed group were farmers 4(1.8%), as shown in the table below.
Table 1: Socio-demographic characteristics of the participants (n = 220)

<table>
<thead>
<tr>
<th>Variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean ± SD</td>
<td>44.85 ± 13.72</td>
<td></td>
</tr>
<tr>
<td>Age range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-30</td>
<td>37</td>
<td>16.8</td>
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<tr>
<td>31-44</td>
<td>80</td>
<td>36.4</td>
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<tr>
<td>45-58</td>
<td>61</td>
<td>27.7</td>
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<tr>
<td>59-72</td>
<td>36</td>
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<tr>
<td>73-86</td>
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<td>2.7</td>
</tr>
<tr>
<td>Total</td>
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</table>

<table>
<thead>
<tr>
<th>Gender</th>
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<tbody>
<tr>
<td>Male</td>
<td>131</td>
<td>59.5</td>
</tr>
<tr>
<td>Female</td>
<td>89</td>
<td>40.5</td>
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<td>Total</td>
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<table>
<thead>
<tr>
<th>Occupation</th>
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<tr>
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<tr>
<td>Housewife</td>
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<td>19.1</td>
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<tr>
<td>Business</td>
<td>45</td>
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</tr>
<tr>
<td>Civil servant</td>
<td>100</td>
<td>45.5</td>
</tr>
<tr>
<td>Tailor</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Farmer</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>2.3</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social behavior</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolanut</td>
<td>17</td>
<td>7.7</td>
</tr>
<tr>
<td>Smoking</td>
<td>7</td>
<td>3.2</td>
</tr>
<tr>
<td>Alcohol</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Nil</td>
<td>193</td>
<td>87.7</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Aetiological distribution of neck pain

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical strain</td>
<td>8</td>
<td>3.6</td>
</tr>
<tr>
<td>Cervical spondylisis</td>
<td>186</td>
<td>84.5</td>
</tr>
<tr>
<td>Trauma</td>
<td>17</td>
<td>7.7</td>
</tr>
<tr>
<td>Ankylosis</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>2.3</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100</td>
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</tbody>
</table>

KEY: No = frequency
% = percentage

Table 3: Yearly distribution of neck pain

<table>
<thead>
<tr>
<th>Year</th>
<th>No.</th>
<th>%</th>
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<tr>
<td>2008</td>
<td>47</td>
<td>21.4</td>
</tr>
<tr>
<td>2009</td>
<td>57</td>
<td>25.9</td>
</tr>
<tr>
<td>2010</td>
<td>30</td>
<td>13.6</td>
</tr>
<tr>
<td>2011</td>
<td>30</td>
<td>13.6</td>
</tr>
<tr>
<td>2012</td>
<td>56</td>
<td>25.5</td>
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<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

KEY: No = frequency
% = percentage

**DISCUSSION**

This study described the prevalence and patterns of neck pain seen in physiotherapy departments in Kano, over a period of five years. It has shown that the prevalence of neck pain seen in physiotherapy departments was found to be 2.9%. However, this is relatively lower compared with previous hospital based studies that reported 5.5% in South-West of Nigeria and 15% in the United Kingdom. This could be due to most neck pain patients do not go to the hospitals in this environment and therefore the referral to physiotherapy clinics for neck pain was limited.

From the present study it was found that increasing age was a predisposing factor to neck pain, as the peak age ranged from 31-44 years, constituting 36.4% of the neck pain patients and over 80% aged 30 years and
above. This was in consistent with the study by Skillgate et al\textsuperscript{19} that neck pain peaks at the age range of 30-59 years.

From the result of this study, neck pain affects males than females in the ratio of 5:4. This concurs with the study carried out among dentists and dental auxiliaries in South-western Nigeria by Abiodun et al\textsuperscript{16} that reported the prevalence was higher (83.2\%) in male than (80.6\%) in female. This study reported a higher prevalence of neck pain among civil servants (45\%), which was in consistence with previous study by Ayanniyi et al.\textsuperscript{17} However, neck pain is associated with occupations that involve abnormal posture, forceful and/or repetitive tasks, and poor work place support among others\textsuperscript{20}.

The prevalence of smoking (3.18\%) and kolanut (7.73\%) was found to be low. The low prevalence could be due to social stigma on smokers in this environment. Smoking increases the risk of MSD because nicotine restricts blood circulation\textsuperscript{21} and kolanut also contains nicotine. Previous study reported that neck and shoulder pain were found to be related to smoking only in female subjects\textsuperscript{22}, though other studies have found males to be just as prone to problems\textsuperscript{23}. However, there was preliminary evidence that gender, occupation, headaches, emotional problems, smoking were related to the occurrence of neck pain\textsuperscript{11}.

The causes of neck pain from the result of this study were found to be cervical spondylosis (84.5\%), cervical strain (3.6\%), ankylosis (1.8\%) and others (2.3\%). Donald\textsuperscript{24} reported that common conditions thought to cause neck pain are degenerative disc disease, with or without disc herniation, and degenerative arthritis of the zygopophyseal joints. Douglass and Bope\textsuperscript{25} reported that much less common causes include cervical myelopathy caused by spinal cord compression, infection, neoplasms, rheumatic causes (ankylosing spondylitis, spondyloarthopathies, rheumatoid arthritis, and diffuse idiopathic skeletal hyperostosis), torticollis, cervical dystonia, and major trauma, including fractures, dislocations, and cord injuries.

The yearly distribution of neck pain occurrence fluctuates from 2008-2012, whereby in 2009 the highest number of patients 57(25.9\%) were seen and recorded, this slightly decreased in 2012 to 56(25.5\%), then 2008 with 47(21.4\%), and 2010 & 2011 30 (13.6\%) having the least percentage of occurrence of neck pain.

CONCLUSION

The study concluded that cervical Spondylosis is the most common cause of neck pain and the prevalence of neck pain was relatively low in the selected physiotherapy clinics.

Conflict of Interest: The authors declared that no conflict of interest.

Source of Funding: The research was self funded

Ethical Clearance: Ethical approval was sought and obtained from Aminu Kano teaching hospital, and National Orthopaedics hospital Dala, Kano, Nigeria.

REFERENCES


The Effect of Exercises in Primary Dysmenorrhea among Young Females of Adesh University

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1Physiotherapist, Fortis Hospital, Ludhiana, 2Assistant Professor, AIMSR, Muktsar, 3Physiotherapist, Adesh University, Bathinda

ABSTRACT

Introduction: Dysmenorrhea is defined as pain associated with menstruation of sufficient magnitude so as to affect day-to-day activities. Dysmenorrhea can be classified as Primary dysmenorrhea and Secondary dysmenorrhea.

Method and Material: Sample of 60 unmarried healthy reproductive females aged between 18-25 years of Adesh University, who suffered from primary dysmenorrhea, were enrolled by randomized sampling method. Consent was taken for volunteer participation. Participants were then divided randomly in two groups (group A and group B) each group consisting of 30 subjects. Group A underwent exercise regime and thermotherapy during menstruation and group B underwent thermotherapy during menstruation. Post treatment, pain was assessed by using Visual Analog Scale.

Result: The results revealed that exercise regime significantly relieved menstrual pain and subjects could easily perform daily activities, without getting absent from their workplace.

Conclusion: It was concluded that combination of exercises along with the thermotherapy is effective in reducing pain and relieving the discomforts of Primary Dysmenorrhea as compared to thermotherapy and performing exercises separately.

Keywords: Exercises, Primary Dysmenorrhea

INTRODUCTION

Dysmenorrhea is defined as pain associated with menstruation of sufficient magnitude so as to affect day-to-day activities. According to ‘Dawood’, dysmenorrhea is the common gynaecological complaint that can affect 50% of women with 10% of these women suffering severely enough to render them incapacitate for one to three days of each menstrual cycle. Dysmenorrhea can be classified as Primary dysmenorrhea and Secondary dysmenorrhea. Primary dysmenorrhea defined as painful menses in women with normal pelvis anatomy, usually beginning during adolescence. The prevalence of primary dysmenorrhea in the general population, ranges from 47% to 80% depending on the age group studied. 75% to 85% of women report that symptoms are mild. In primary dysmenorrhea, there is abnormal and increased prostanoid and possibly eicosanoid secretion, which in turn induces abnormal uterine contractions. PGF2α stimulates myometrical contractions, ischemia and sensitization of nerve endings. The contractions reduce uterine flow, leading to uterine hypoxia thereby causing pain. The increased vasopressin release during menstruation in women results in persistence of pain. Psychosomatic factors like tension and anxiety during adolescence; lower pain threshold often attribute as an aggravating factor in pain perception. Pain may start within 6 months of onset of menarche. Pain experienced may be fluctuating with spasmodic menstrual cramps, sometimes referred to as “labour-like” pain that begin only a few hours before or with the onset of menstrual flow. Usually pain is more intense on the first or second day of the menstrual flow, or more precisely the first 24-36 hours, consistent with the time of maximal prostaglandin release into the menstrual fluid. The pains are suprapubic in location with radiation into the inner aspect of the thighs. On the contrary, Secondary
dysmenorrhoea is menstrual pain associated with underlying pathology\(^5\). Emotional and behavioural problem may exacerbate menstrual cycle problems and dysmenorrhoea. It is a common cause of sickness, absenteeism from both classes and work by female student’s community.\(^6\)

Physical exercise has been suggested as a non-medical approach for managing the symptoms of dysmenorrhoea. It has been found useful to affect menstruation in many ways. Billig’s exercise is one of the big plus for adolescents, to relieve menstrual discomforts\(^7\) It is an exercise, which stretches the connective tissue around the pelvis, hip flexors, and muscles of the abdomen\(^8\).

It is believed that women who exercise have a reduced incidence of dysmenorrhea\(^9\). Most of the adolescents feel that exercise is one of the effective methods for treating dysmenorrhoea. When a woman with dysmenorrhoea, has a contracted ligamentous bands in the abdomen, while exercising subsequently developed a series of stretching in the abdomen and pelvic muscles, which claimed a high rate of symptom relief.

It has been proven to be safe by the World Health Organization (WHO) and the US National Institute of Health (NIH), among other reputed research institutions that in the past two decades, the relation between physical activity and menstruation disorders, including inducing primary dysmenorrhoea, has significantly been studied. Several studies have shown that the reduction of dysmenorrhoea in women who regularly exercise may be due to effects of hormonal changes on uterine epithelial tissues or an increase in endorphin level\(^10\). Exercise is known to cause the release of endorphin hormones in brain that raise the pain threshold and is shown to improve mood of exercising subjects\(^9\).

Physiotherapy has a diversity of therapeutic resources aiming at decreasing or eliminating pain in practical and economic way, promoting better quality of life by means of some analgesic modalities such as therapeutic exercises, electrotherapy and therapeutic massage. Thermotherapy is another recurrent treatment for this disorder. Thermotherapy works by increasing the blood flow supplying protein, nutrients and oxygen at the site of injury. Increased blood flow facilitates tissue healing by increasing metabolism. This increase in metabolism aids the healing process by increasing both catabolic and anabolic reaction needed to degrade and remove metabolic by-products.

Reviewed studies showed that satisfactory results of physiotherapy intervention, however the problem for researchers is due to subjective nature of dysmenorrhoea. Symptoms which are experienced by women and heterogeneity of exercises regime. Some had tried to quantify exercise in terms of high intensity and low intensity exercises, due to which exercises varies in quality, intensity and duration to relation to menses\(^11\). So, it is clear that the need of further research in this area, is to develop qualitative, randomized and controlled studies with regard to physiotherapeutic manoeuvres.

### METHOD AND MATERIAL

**Research Design:** Interventional approach

**Research Setting:** Adesh University, Bathinda.

**Sample Size:** Consist of 60 healthy reproductive females, who suffer from primary dysmenorrhoea. Subjects were divided into two groups: Intervention group (30) and control group (30).

**Inclusion Criteria:** Healthy reproductive unmarried females between age group 18-25 years, regular menses with complaint of primary dysmenorrhoea, students who are willing to participate in this study.

**Exclusion Criteria:** Inter-menstrual bleeding, diagnosed cases of Urinary tract Infection, Irregular menstrual cycle.

**Tool:** Self-administered Menstrual Distress Questionnaire (MDQ), Visual Analog Scale (VAS).

**Intervention:** Subjects of interventional group (Group A) underwent exercise regime and thermotherapy during menstruation whereas subjects of controlled group (Group B) underwent only thermotherapy during menstruation. Group A performed exercises for three days in a week for 8 weeks. They were asked to perform following exercise for a duration of 20 minutes: Lied faced up with legs and knee bent, performed abdominal breathing for 10 minutes, Stand holding back of chair, lift one heel off the floor, then the other repeat 20 times, Stand holding back of the chair then does 5 deep knee bends, While lying on back, lift and bring knee to touch chin, 10 times.
RESULT

Table 1: Inter group Comparison of baseline, first post intervention and second post intervention of mean score of VAS of both groups

<table>
<thead>
<tr>
<th></th>
<th>GROUP A</th>
<th>GROUP B</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN SD</td>
<td>MEAN SD</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>7.37 1.19</td>
<td>7.60 1.41</td>
</tr>
<tr>
<td>After 1 month</td>
<td>6.30 1.44</td>
<td>7.50 1.00</td>
</tr>
<tr>
<td>After 2 month</td>
<td>5.57 1.50</td>
<td>6.60 1.25</td>
</tr>
</tbody>
</table>

Table 2: Shows the mean improvement in post intervention MDQ score

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>After 1st intervention</td>
<td>6.45</td>
<td>6.66</td>
</tr>
<tr>
<td>After 2nd intervention</td>
<td>5.50</td>
<td>6.41</td>
</tr>
<tr>
<td>Mean Improvement</td>
<td>0.95</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Table 3: Shows the mean improvement in post intervention VAS score

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
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</thead>
<tbody>
<tr>
<td>After 1st intervention</td>
<td>6.30</td>
<td>7.50</td>
</tr>
<tr>
<td>After 2nd intervention</td>
<td>5.57</td>
<td>6.60</td>
</tr>
<tr>
<td>Mean Improvement</td>
<td>0.73</td>
<td>0.9</td>
</tr>
</tbody>
</table>

DISCUSSION

The present study deals with “Effect of exercise on Primary dysmenorrhoea”. Primary dysmenorrhoea is defined as pain associated with menstruation of sufficient magnitude so as to effect day-to-day activities. Various factors which contribute to primary dysmenorrhoea are increased levels of PG, which results in uterine contraction and ischemia[9]. Primary dysmenorrhoea pain may be associated with headache, fatigue, nervousness, nausea, vomiting, mood swings and in severe cases, syncope[12].

In this study, 60 female subjects were selected randomly; pain and premenstrual symptoms were assessed by using VAS and Self Administered Menstrual Distress Questionnaire. Subjects were divided into two groups (group A and group B). Group A participated in exercise regime while Group B was control group. Both groups received thermotherapy during menstruation. This present study indicated that along with thermotherapy, exercises had a positive impact on the most of primary dysmenorrhoea symptoms (reduced pain and menstrual distress). In this study, there was a significant improvement in MDQ and VAS scores after intervention. In the experimental group, the subjects who underwent exercise protocol for two months showed marked improvement in MDQ and VAS, with the mean improvement of Group A MDQ (0.95) and VAS( 0.73). Topically applied heat had proved subjective relief of pain in primary dysmenorrhoea. It was also found that there was mean improvement in VAS (0.9) and MDQ (0.25) in Group B (control Group) after application of thermotherapy. However this improvement was less significant as a compared to Group A (experimental group) in the study.

A similar study was done by Aditi Chaudhari et al, to estimate the prevalence of primary dysmenorrhoea among school girls and to compare the impact of exercise and hot water bottle on occurrence and severity of primary dysmenorrhoea among the study population by using MDQ and VAS pain scores[13]. At the end, result showed that in both groups a clear shift from moderate and severe goals towards mild grade. The mean VAS score decreased from 5.79 to 2.96 (p <0.0001) and from 5.16 to 2.06 (p< 0.0001) at three months in both the groups. Also MDQ decreased from 14.53 to 7.89 (p< 0.0001) and from 14.92 to 8.16 (p< 0.001) at three months in group A and B respectively.

As thermotherapy works by increasing the blood from therapy supplying proteins, nutrients and oxygen at the site of injury. Increase blood flow facilitate by increasing in metabolism. This increased in metabolism aids by healing the process by increasing catabolic and anabolic treatment needed to degrade and remove metabolic by products. The reduction in pain in the control group of the study who received thermotherapy could be consistent with physiological basis[14].

For almost half a century, exercises has been thought that relief or even cured primary dysmenorrhoea and in last 15-20 years, researchers for link between physical activity and menstrual disorders has significantly reduced.

Golub et al studied effect of Golub exercise on the frequency of premenstrual difficulties and dysmenorrhoea in junior high school girls over a 3 yrs period. At the
end of study, 39% of exercise group suffered from dysmenorrhea compared with 61% of the control group. This difference was statistically significant at the p< 0.05 level[13]. However, the investigator does not differentiate between primary and secondary dysmenorrhea. Prior to enrolment, the subjects were also informed that special exercise was effective in preventing and relieving menstrual discomfort and it was important to perform exercises daily. Exercises are recommended in primary dysmenorrhea with supporting literature since more than 15-20 years[16].

Izzo and Labriolo showed that dysmenorrhea was less prevented in Athletes who had begun their sport activities prior to menarche, and that there was improvement in symptoms after imitation of exercise and athletes participating in more intense sports activities had less severe menstrual symptoms[17].

The result of current study showed that intensity of dysmenorrhea decreased with decreasing duration and amount of menstruation and intensity pain. The findings in association with intensity of primary dysmenorrhea obtained from MDQ and VAS for assessing total pain and its prevention, revealed that intensity of pain was reduced in experimental after completing training protocol (with mean improvement of 0.95 in group A in MDQ score and 0.73 in group A in VAS score) as compared to control group B MDQ and 0.9 in VAS score). Other studies such as Abbaspour et al[9], Shahyad and Sheikh hussain[18] and Izzo and Labriola[17] supported these results.

Improvement in all the outcome variable in the present study after using thermotherapy almost corroborates with a recently published study by Akin et al, where the results indicated that odds of receiving complete relief while on heat treatment were 4 times greater than relieving pain with unheated/ Placebo effect. Heat may have a different relaxing effect on uterus, thus relieving pain[19].

At the end, with attention of positive effect of exercise on dysmenorrhea, the results of present study suggested that performing regular physical activity reduced primary dysmenorrhea symptoms.

According to result of this study, performing 8 weeks of selected exercise reduced pain intensity and pain duration. At the end, we recommend regular exercise as a helpful manner for age group as doing exercise in every place do not need any cost.

CONCLUSION

Within the limitation of the study, it can be concluded that combination of exercises along with the hot pack is effective in reducing pain and relieving the discomforts of Primary Dysmenorrhea as compared to hot pack and doing exercises alone, aiding in pain free menses.

Ethical Clearance: Ethical Committee, Adesh University, Bathinda.

Source of Funding: Self

Conflict of Interest: None

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To Find the Relationship between the Physical Activity and the Academic Grades of the School Going Children

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ABSTRACT

Background: Education is very important in everyone’s life. In India education is judged by the grades that a student achieves. Education depends on various factors such as mental health, physical health, socioeconomic factors and environment. This study aimed to find the relationship between the physical activity and the academic scores of the school going children aged between 10-14 years. As different physical activities tend to improve various health factors such as concentration and fitness.

Methods: This is a type of co-relational study in which 511 students participated who were fulfilling the inclusion criteria of age between 10-14 years and going to a public school following the CBSE criterion of CCE to evaluate and grade the student’s performance. The amount of physical activity was collected using the PAQ-C questionnaire along with the academic grades of the students in the previous session. And the PAQ-C outcome score was then correlated with the academic grades of the students.

Results: The correlation between the grades and the questions of the PAQ-C questionnaire came out to be +0.042, +0.079, +0.158, +0.099, +0.11, +0.190, +0.082, +0.131, +0.012 which states that the children should do more physical activity during various time of the day to achieve better results.

Conclusion: The study stated that there is a significant positive relationship between the physical activity and the academic grades of the school going children.

Keywords: Physical Activity, Mental and Physical Health, Academics, Academic grades, CCE

INTRODUCTION

Education is a very important part of everyone’s life to achieve success in life. Education has a very important aspect of learning. A person may learn better if he/she is physically and mentally fit.

Physical activity by WHO is defined as any bodily movement produced by skeletal muscles that requires energy expenditure.[¹]

Health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity (WHO definition).[²]

The academics of a student may be calculated through the student’s grades. Indian system has moved from summative to a continuous evaluating system, CCE (continuous comprehensive evaluation) which has been introduced by the CBSE.[³]

Factors such as quality of life, social and environmental factors, such as socioeconomic status or household characteristics play a key role in academic performance either directly or indirectly by influencing student health status,[⁴] [⁵]

Student’s attention is greater in active students rather than in a sedentary student. Increasing the physical activity in children is disease preventive strategy.[⁶] Insufficient physical activity is a risk factor for higher body mass index for adolescents.[⁷] [⁸]

Recommended physical activity for children stated that children should participate in more than 60 minutes daily from moderate to vigorous levels.[⁹] [⁷]

Adequate physical activity levels are necessary for the development and functioning of many physical, physiological and psychomotor processes in children.
Physical activity will have a positive effect on the academics. Physical activity improves concentration in classes. Physical activity has a positive influence on memory and classroom behavior. Physical activity improves self esteem, self concept, depressive symptoms and anxiety stress. There is a significant positive relationship between the physical activity and cognitive functioning in children.

So it might be said that regular physical activity improves health, concentration, physical health, mental health, cognition. And it has a significant effect on academic skills and scores.

Aim: To find the relationship between the physical activity and the academic grades of the school going children.

Research Design: Survey method

METHODOLOGY

Type of Study: Co-relational study.

Number and Source of subjects: A total number of 900 students were approached from different schools of Delhi out of which 600 students were present on the day of the study and out of them 511 were fulfilling the inclusion criterion.

Inclusion Criteria:

1. Gender : male and female
2. School going children age 10-14years
3. Type of school : Private
4. Study board : Central Board of Secondary Education (Delhi)

Exclusion Criteria: Any diagnosed case of musculoskeletal, neurological, dermatological, disorder.

INSTRUMENTATION

Physical Activity Questionnaire For Children (PAQ-C): PAQ-C i.e physical activity questionnaire for children The PAQ-C is a well defined questionnaire used to measure the physical activity of children aged 10-14 years in the last seven days. It consists of 9 different questions in which the first question asks about the name of the activities that the child plays and scale it on the point of 1-5. The questions 2-8 measures the activity in different time periods of the day and the amount of activity describing on a 5 point scale and the 9 question tells about different days of the week and the activity done by the subject in those days.

The result is obtained differently for all the questions.

1. Item 1 (Spare time activity) - Take the mean of all activities (“no” activity being a 1, “7 times or more” being a 5) on the activity checklist to form a composite score for item 1.

2. Items 2 to 8 (PE, recess, lunch, right after school, evening, weekends, and describes you best) - The answers for each item start from the lowest activity response and progress to the highest activity response - Simply use the reported value that is checked off for each item (the lowest activity response being a 1 and the highest activity response being a 5).

3. Item 9 - Take the mean of all days of the week (“none” being a 1, “very often” being a 5) to form a composite score for item 9.

Outcome Measures: PAQ-C outcome score.

PROCEDURE

A random sample of 900 students were approached from different schools of Delhi out of which 600 students were present on the day of the study and out of them 511 were fulfilling the inclusion criterion.

The aim of the study was thoroughly explained to the subjects. After clearing their doubts, a written consent was taken. The questionnaire PAQ-C was distributed to the subjects which contain the grades achieved by the students in last exam session and 9 questions that enclosed the information about the activities performed during last 7 days of the students during different hours of school and after school.

Each and every question of questionnaire was thoroughly explained to the students with the “the things to remember” while filling the questionnaire. The pre-set time of 20 minutes was given to complete the questions. Scoring of the questionnaire was done. Score of 1 was assign to No activity and score of 5 was assign to Most Often activities the students performed during last 7 days.
Data Analysis: The data analysis was done using SPSS software version 20.0.

RESULTS

The correlation between the grades and the first question came out to be +0.042. The correlation between the grades and question 2 came out to be 0.079. There is a positive correlation between the question 3 of the questionnaire and the academic grades of the student and the value is +0.158. The correlation between the question 4 of the questionnaire and the academic grades of the student came out to be 0.099. There is a positive correlation of 0.11 between the question 5 of the questionnaire and the grades of the students. There is a positive correlation of 0.190 between the question 6 and the grades of the student. The correlation between the grades and the question 7 of the questionnaire came out to be +0.082. The correlation between the grades and the question 8 of the questionnaire came out to be +0.131. The correlation between the grades and the question 9 of the questionnaire came out to be +0.012.

DISCUSSION

A significant relationship has been found between the physical activity and the academic scores of the student thereby, accepting the experimental hypothesis.

The academic scores were according to CCE pattern and the activity levels were obtained using the PAQ-C questionnaire. As there is increase in physical activity, there is improvement in physical and mental health of an individual leading to improvement in the academic score. As various mental health factors affects the academic skills of the student.

It is also recognized that there is influence of socioeconomic factors and the home background on how well students perform academically. [4][6]

Study done by McAuley suggested that a positive relationship exists between self-esteem and physical activity of children and improved self esteem results in better classroom behavior and a craving to learn which improves concentration and results in better academic scores. [13][15]
There is no such study available suggesting any negative effect of physical activity though few have suggested that over and strenuous activity can lead to depression as well as spasm and strain in muscles so it is suggested that we should encourage adolescents to give equal priority to both physical activity as well as academic excellence for better future.

CONCLUSION

There is a significant positive relationship between the physical activity and the academic grades of the students.

Source of Funding: Self funded

Ethical Clearance: A consent form was duly filled by the candidate.

Conflict of Interest: Nil

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