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The title of the paper should provide a concise statement of the contents of the paper. A good title is very important and will attract readers and facilitate retrieval by online searches, thereby helping to maximize citations. The title should include topical keywords and allude to the interesting conclusions of the paper. A title that emphasizes the main conclusions, or poses a question, has more impact than one that just describes the nature of the study.

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Provide a context or background for the study (i.e., the nature of the problem and its significance). State the specific purpose or research objective of, or hypothesis tested by, the study or observation; the research objective is often more sharply focused when stated as a question. Both the main and secondary objectives should be made clear, and any pre-specified subgroup analyses should be described. Give only strictly pertinent references and do not include data or conclusions from the work being reported.

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The Methods section should include only information that was available at the time the or plan of the protocol. All information gathered during the conduct of study should be included in the result section.
Study Design, Inclusion / Exclusion Criteria, Data collection procedure, Statistical analysis.

RESULTS
Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first.

Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. When data are summarized in the results section, give numeric results not only as derivatives (for example, percentages) but also as the absolute numbers from which the derivatives were calculated, and specify the statistical methods used to analyze them. Table font should be 10 and caption should be below table and figure.

Data should not be duplicated in both figures and tables. The maximum limit of tables and figures should not exceed more than 4. Mention the findings of the study in paragraph, while mentioning figure and table number in text in sequential order.

TABLE

Table should not be copy pasted or in picture form

DISCUSSION

Discuss your findings by comparing your results with other literature

REFERENCES

References should not be less than 20.
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Example: Cook NR, Rosner BA, Hankinson SE, Colditz GA. Mammographic screening and risk factors for breast cancer. American Journal of Epidemiology. 2009 Dec;170(11):1422-32. doi: 10.1093/aje/kwp304.

If there are more than six authors, write *et al*. after the first six names.

CONCLUSION(S)

Conclusion should elucidate how the results communicate to the theory presented as the basis of the study and provide a concise explanation of the allegation of the findings.

ACKNOWLEDGEMENT

Provide the list of individuals who contributed in the work and grant details where applicable

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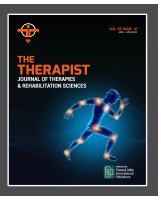

Physical Therapy Strategies for Osteogenesis Imperfecta

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Osteogenesis Imperfecta (OI) is known to affect about 1/15,000–20,000 individuals in the world [1]. OI is rare congenital disorder characterised by bone fragility. Mutation in collagen related genes results in deficiency of collagen, which forms the bone matrix. This can result in fractures, deformities of the spine, and effects on other organs. A child's perception of pain can be influenced by a variety of circumstances, including repetitive fractures, bone deformities, muscle atrophy, mobility issues, and psychological concerns. Based on clinical characteristics and the course of the disease, OI subtypes are categorised; types I, II, III, and IV. OI Type I is considered the mildest form of the condition, with normal growth patterns and a low incidence of fractures during the perinatal period. Type II OI is more severe and causes death during the prenatal period. In contrast, OI Type III is a more serious presentation of the disorder. People with type III OI have significant bone deformities, and have fractures often even after birth. The most clinically heterogeneous type of OI is Type IV, with members displaying mild to severe symptoms. OI is diagnosed by using ultrasonography, radiography, bone densitometry, and serum electrolytes(calcium and phosphorous). Bone and skin biopsy also helps in diagnosis by studying collagen tissue. Individual differences in treatment response and outcome are due to genetic complexity in each kind of OI. Medicinal treatment(bisphosphonates) is the most common approach used to manage pain but these treatments' primary drawbacks include their comparatively low efficacy, their lack of benefits, the emergence of treatment resistance in certain individuals, or their cytotoxic adverse effects. The multidisciplinary approach to manage OI involves occupational therapy, physical therapy, orthotics and by other health care professionals including orthopaedic surgeon, dieticians, and speech therapists. Ongoing studies have provide new avenues for the management of OI, including medical, rehabilitation, and surgical treatments. Physical therapy maximise mobility and independence while lowering the risk of fracture and bone loss. The physiotherapists play a crucial role by providing counselling to the parents of OI infants based on disease severity and help the children with OI reach adult independence and maintain optimal musculoskeletal health. Parents are advised to handle and position the baby safely, with the ultimate goal of enabling the child to gain mobility on their own, whether that means utilising a wheelchair in the future or walking aids. Observational studies have shown evidence that supervised exercise regimes can enhance physical capacity and muscle strength.

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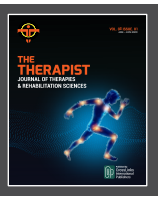

Original Article

Determining the Frequency of Non-Obstructive Coronary Artery Disease in Elective Angiography Cases

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ABSTRACT

Cardiovascular disease particularly ischemic heart disease has emerged as a leading cause of death. Atherosclerosis in epicardium results in CAD without the restriction of coronary circulation but the other processes that may disrupt the myocardial supply and demand in patients exhibiting angina symptoms or indications may be suspected of having non-obstructive CAD. **Objective:** To find out the prevalence of non-obstructive CAD in patients enrolled for elective angiography. **Methods:** A cross-sectional descriptive analysis was done in the Cardiology department in King Edward Medical University and Mayo Hospital, Lahore. The duration of study was for six months from 01-08-2022 to 01-02-2023. After approval from hospital ethical committee, 150 patients were enrolled in the study with informed written consent. Demographics including Name, age, BMI, confounding factors like (diabetes, hypertension, smoking and family history) and address were noted. All selected patients underwent coronary angiography via right femoral artery approach by a consultant cardiologist. Non-obstructive coronary artery disease was assessed as per operational definition. All the information was noted on pre-designed proforma (attached). **Results:** A total of 150 patients were selected for the study. It showed that out of 150 patients, 2.7% (n=4) fall in age group of 18-40 years and 97.3 % (n=146) were in age group of 41-60 years, average age was 51.94±5.26 years and the BMI was 27.96±6.44 kg/m2. There were 62.7 % (n=94) male and 37.3 % (n=56) females. Frequency of diabetes mellitus was 34.7 % (n=52), hypertension was 24.7 % (n=37), smokers 16.7 % (n=25), family history was 12.7 % (n=19) and frequency of non-obstructive CAD was 27.3 % (n=41). **Conclusions:** It is to be concluded that a considerable percentage of patients enrolled for elective coronary angiography had non-obstructive CAD.

INTRODUCTION

CAD is mainly recognized by an inadequate supply of blood and oxygen to myocardium. It is caused by blockage of the coronary arteries and due to an imbalance between supply and demand for oxygen. The most important feature is the formation of plaques in coronary artery that hinders the blood flow [1]. The atherosclerotic plaque that causes non-obstructive (CAD) is not expected to impede blood flow or cause angina symptoms. Despite the fact that these lesions are rather common—they show up in 10% to 25% of individuals having coronary angiography—the medical literature has labeled their existence as "insignificant" or "no significant CAD [2]. "Non-obstructive CAD is easily ignored and left untreated due to its prolonged asymptomatic period and hence increases the risk of abrupt clinical coronary events that resemble those of obstructive CAD [3]. Initially, it was believed that non-obstructive CAD was a benign illness, but it is recently discovered that patients with non-obstructive CAD have greater risk of cardiovascular related disease and death [4]. The 2013 guidelines for Stable Coronary Artery Disease (ESC-SCAD) from the European Society of Cardiology suggested non-obstructive CAD as a distinct kind of CAD [5]. It is discovered that approximately 40% of all individuals who undergo angiography are known to have

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non-obstructive coronary CAD or normal coronary arteries. This is a group that, despite its great incidence, is rarely given a clear diagnosis, is commonly mislabeled and managed inappropriately, and, for the most part, still exhibits symptoms [6]. According to a research by Iqbal et al., 25.8% of individuals undergoing elective angiography had non-obstructive CAD [7]. In Pakistan, cardiovascular related diseases are becoming one of the main reason of mortality [8]. The increasing death rate has encouraged the opening of cardiac catheterization laboratories across the nation, in both the public and private sectors. Cardiac catheterization is used as a golden standard for the diagnosis of CAD but the concern is that it is being overused in individuals with stable CAD [9].

This study was focused to find out the prevalence of non-obstructive CAD in patients who undergo coronary angiography without the prior diagnosis of heart disease and also to assess the clinically important symptoms, risk factors and the outcomes of noninvasive testing in patients having both non-obstructive and obstructive CAD.

METHODS

A cross sectional analysis was conducted in the Department of Cardiology in King Edward Medical University and Mayo Hospital, Lahore. The duration of study was for six months from 01-08-2022 to 01-02-2023. Non-probability consecutive sampling was used to select participants. Study enrolled 150 patients by using WHO sample size calculator with 8% margin of error, 95% confidence level and taking expected prevalence of non-obstructive CAD as 25.8%. Individuals of all genders, aged 18 to 60 years and without the history of cardiovascular disease, were admitted for coronary angiography. Patients with a history of myocardial infarction, previous percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG) surgery, or the need for emergency or urgent cardiac catheterization were excluded from the study. After approval from hospital ethical committee (ref no. CPSP/REU/CRD-2020-066-2407, dated 30-07-2022), 150 patients were enrolled in the study, presenting in department of Cardiology, KEMU/ Mayo Hospital, Lahore with informed written consent. Demographics including Name, age, BMI, confounding factors like (diabetes, hypertension, smoking and family history) and address were noted. All selected patients underwent coronary angiography via right femoral artery approach by a consultant cardiologist. Non-obstructive CAD was assessed as per operational definition. All the information was noted on pre-designed proforma (attached). All the data were analyzed by using SPSS version 28.0. Numerical variables like age and BMI were calculated as mean + S.D. Frequency and percentage were calculated for qualitative variables like age group, gender, hypertension, diabetes mellitus, family history, smoking and non-obstructive coronary artery disease. Data for age, BMI, gender, diabetes mellitus, hypertension, smoking, family history were stratified. After the stratification, chi-square test was used to determine p value(less than 0.05 as significant).

RESULTS

Total 150 patients were selected on the basis of inclusion criteria to find out the frequency of non-obstructive CAD in patients who undergo for elective angiography. Distribution of demographics showed that out of 150 patients, 2.7 %(n=4) were in age group of 18-40 years and 97.3 %(n=146) were in age group of 41-60 years, average age was calculated as 51.94±5.26 years and 62.7 %(n=94) were male and 37.3 %(n=56) were females. Frequency of diabetes mellitus was 34.7 %(n=52). Frequency of hypertension was 24.7 %(n=37). Frequency of smoking was 16.7 %(n=25). Frequency of family history was 12.7 %(n=19). Distribution of BMI was 27.96±6.44 kg/m2. Frequency of non-obstructive CAD was 27.3 %(n=41)(Table 1).

Table 1: Distribution of demographics (N= 150)

Variables		Frequency(%)
Age Group	18-40 years	4 (2.7)
	41-60 years	146 (97.3)
Gender	Male	94 (62.7)
	Female	56 (37.3)
Diabetes Mellitus	Yes	52 (34.7)
	No	98 (65.3)
Hypertension	Yes	37 (24.7)
	No	113 (75.3)
Smoking	Yes	25 (16.7)
	No	125 (83.3)
Family History	Yes	19 (12.7)
	No	131 (87.3)
Non-obstructive coronary artery disease	Yes	41 (27.3)
	No	109 (72.7)
BMI (Mean± SD)		27.96±6.44 kg/m2

The data for age, gender, diabetes mellitus, hypertension, smoking, family history was stratified by using chi-square test (Table 2). Family history had a significant difference(p=0.000) gender (p=0.187), hypertension (p=0.678), Body mass index (p=0.415), diabetes mellitus (p=0.565), age group (p=0.301), and smoking status (p=0.221) had non-significant differences.

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Table 2: Stratification for non-obstructive coronary artery disease with respect to age group (N= 150)

Variables	Non-obstructive coronary artery disease Frequency (%)			p-value
	Yes	No	Total	
Age group				
18-40 years	2 (50.0)	2 (50.0)	4 (100.0)	0.301
41-60 years	39 (26.7)	107 (73.3)	146 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
Gender				
Male	22 (23.4)	72 (76.6)	94 (100.0)	0.187
Female	19 (33.9)	37 (66.1)	56 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
Diabetes Mellitus				
Yes	16 (30.8)	36 (69.2)	52 (100.0)	0.565
No	25 (25.5)	73 (74.5)	98 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
Hypertension				
Yes	9 (24.3)	28 (75.7)	37 (100.0)	0.678
No	32 (28.3)	81 (71.7)	113 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
Smoking				
Yes	4 (16.0)	21 (84.0)	25 (100.0)	0.221
No	37 (29.6)	88 (70.4)	125 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
Family History				
Yes	16 (30.8)	6 (31.6)	19 (100.0)	0.000
No	25 (25.5)	103 (78.6)	131 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	
BMI Group				
17-25kg/m^2	9 (21.4)	33 (78.6)	42 (100.0)	0.415
>25kg/m^2	32 (29.6)	76 (70.4)	108 (100.0)	
Total	41 (27.3)	109 (72.7)	150 (100.0)	

DISCUSSION

The atherosclerotic plaque that causes non-obstructive CAD is not expected to impede blood flow or cause angina symptoms. Despite the fact that these lesions are rather common—they show up in 10% to 25% of individuals having coronary angiography [2, 10]. Cardiac catheterization is being considered by several cardiologists as the golden standard for diagnosing CAD [9]. The degree of epicardial illness mostly influences consensus guidelines for the diagnosis and treatment of stable ischemic heart disease. Therefore, treating consultants usually have challenges when dealing with patients who have non-obstructive CAD and exhibit symptoms of ischemia. Vasospastic angina (VSA) and microvascular angina (MVA) are difficult to diagnose during coronary angiography and are rarely found. Coronary vascular function is determined directly or either by using pharmaceutical agent. The incidence of non-obstructive CAD has been the subject of several earlier investigations, yet the findings are inconsistent. The frequency of non-obstructive CAD among patients who undergo elective coronary angiography is determined in the current study. Age distribution of the patients was done, it showed that out of 150 patients, 2.7 %(n=4) were in age group of 18-40 years and 97.3 %(n=146) were in age group of 41-60 years, average age was 51.94±5.26 years and BMI was 27.96±6.44 kg/m2. There were 62.7 %(n=94) male and 37.3 %(n=56) females. Frequency of diabetes mellitus was 34.7 %(n=52), hypertension was 24.7 %(n=37), smokers 16.7 %(n=25), family history was 12.7% (n=19) and frequency of non-obstructive CAD was 27.3 %(n=41). The mean age was reported as 55.4±13.2 years in a study conducted by Fazal et al., [11] and 51.78±13.26 years in another study by Ilyas et al [12]. In this study, the average height was 162.5±14.6 cm, the average weight was 65.4±10.4 kg, and the average body mass index calculated was 27.8±6.3 kg/m2. These findings were comparable to those of Larsen et al., who reported a BMI of 27.2±5.1 kg/m2 [13], while Petroni et al.'s study revealed a lower number with a BMI of 23.4 kg/m2 [14]. According to Ilyas et al., there were 45 (45%) females and 55 (55%) males [12]. 16 (76%) of the patients had hypertension, according to Xue-chao et al. A recent study found that 34.7% of participants (n=52) had diabetes mellitus [15]. A study reported 125 (82.8%) patients had a negative family history of non-obstructive CAD, compared to 26 (17.2%) patients who had a positive family history. 16.7% of participants in the current study were smokers 16.7% (n = 25). 297 (64.7%) smokers were recorded in the study by Jahic et al [11, 16], whereas 28 (50%) smokers were reported in the study by Larsen et al [13]. Iqbal et al., reported 95 (25.8%) of patients having non-obstructive CAD [7]. Ouellette et al., had shown 125(13.5%) patients with non-obstructive CAD [17]. A recent study that stratified confounders and effect modifiers with regard to non-obstructive CAD found that family history had a significant difference (p=0.000), but gender (p=0.187), hypertension (p=0.678), Body mass index(p=0.415), diabetes mellitus(p=0.565), age group(p=0.301), and smoking status(p=0.221) had non-significant differences. In addition to having more severe symptoms of chronic chest pain and a higher death rate, women are more likely to develop non-obstructive CAD than men [18, 19]. According to the Women's Ischemia Syndrome Evaluation cohort research, non-obstructive CAD and chest pain both makes the female more vulnerable to death, also shown that in spite of atypical symptoms and non-obstructive illness, female gender can be a risk factor [20].Furthermore, information released by the Women's Health Initiative revealed that women are twice as likely as men to get a non-fatal MI if they experience non-specific chest discomfort [21]. The possible contributing factors may be the women have worse mental health and physical state, a lower degree of interstitial fibrosis, and a lower frequency of

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plaque rupture than men [22]. Obstructive CAD is mainly responsible in producing myocardial ischemia and related anginal symptoms, so it has historically been the main focus in the management of CAD [23, 3]. The rationale for this investigation was provided by the realization that ruptured plaque, rather than occlusive plaque, is the cause of most MIs. Additionally, the majority of ruptured plaques result from non-obstructive CAD, indicating that non-obstructive CAD is linked to a significant risk for MI and all-cause mortality [24, 25].

CONCLUSIONS

The frequency of non-obstructive CAD in patients who undergo for elective angiography was determined in the current study. We discovered that 27.3% of people (n=41) had non-obstructive CAD. We can conclude that a significant proportion of individuals admitted for elective coronary angiography had non-obstructive CAD.

Authors Contribution

Conceptualization: HMRJ
Methodology: AT
Formal analysis: MAS
Writing-review and editing: TAB, WA, AS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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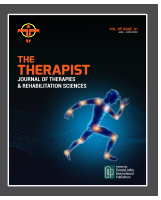

Original Article

Comparing the Effectiveness of Specific Lumbar Mobilization and Core Stability Exercises in Mechanical Low Back Pain in Decreasing Pain and Disability: A Randomized Control Trial

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ABSTRACT

Low back pain (LBP) is a global neuro - muscular problem developing significant disability of thoracic, lumbar or sacroiliac joint at any age. **Objective:** To analysis comparative effectiveness of specific lumbar mobilizations and core stability exercises in mechanical low back pain in reducing pain, ROM and disability. **Methods:** A patient blinded randomized trial was executed in the department of Physical therapy of Mayo Hospital, Lahore including 45 LBP patients randomly distributed into three groups. Each group received Conventional physical therapy in which Group A was control group, Group B received specific lumbar mobilizations while Group C received core stability exercises. NPRS, RMDQ and MODI were used for assessing pain and disability. SPSS version 24.0 was used for analyzing within and between group analysis through Paired T-test and Independent T- test with p-value <0.05. **Results:** The results showed conventional therapy, specific lumbar mobilization and core stability exercises are effective in improving pain, ROM and functional status. However; Core stability exercises was more effective with p-values for NPRS (p=0.049), MODI (p=0.038), RMDQ (p=0.003) and for Ranges (R-side flexion; 0.008, L-side flexion; 0.033, R-side rotation; 0.00, L-side rotation; 0.00) as compared to lumbar mobilization. Additionally; there was no substantial difference was found between three groups for flexion and extension. **Conclusions:** Core stability exercises are statistically and clinically more effective than conventional therapy and specific lumbar mobilizations in improving ROM, decreasing pain and functional status.

INTRODUCTION

Chronic low back pain (LBP), the most communal musculoskeletal condition with a pervasiveness of up to 84% in the grown-up population and world's chief cause of debility and a major welfare and economic issue and lasts for at least 12 weeks [1]. LBP affects human beings somewhere of their lives and its progression is too much and with time it becomes difficult to change [2]. LBP may be mechanical or non-mechanical in nature and causes more global disability than any other condition [3]. Degenerative disc diseases and spondylolysis with or without listhesis causes low back pain in athletes [4] while sacral hiatus (either highly placed apex or deficient posterior wall) is one of the major causes of mechanical low back pain in the Middle Ages [5]. Modic changes occur in persons with low backbone pain associated with disc degeneration and displacement and severity of disease. Weakness in gluteus medius and tenderness in glutei,

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greater trochanter and paraspinals is accompanying with lingering low back pain [6]. Incidence of acute sequel is due to infectious disease and short-term injuries and a small fraction of individuals experience no sequel to disease. The prevalence of chronic low back pain is common in health care professionals especially in France with 15-45% [7] and the in US; 13.1% point prevalent among 20–69 years old as 1 out of every 5 individual had LBP [8]. The continuing low backbone pain prevalence is 4.2 percent in individuals between 24-39 years old and 19.6 percent in those aged between 20-59 years and prevalence in old Brazilian population is 25.4 percent and in Brazilian population point prevalence is 37.1 percent, 76% prevalent in 1-year and 85.5% prevalent through life [9]. Male and female workers including nurses had high incidence of developing LBP due to their working hours. However; ethnicity reduced its prevalence as it is more common in White and Asian people while with lower incidence in Spanish people [10, 11]. Global prevalence of low backbone pain in adult general population has point prevalence of about 12%, with one month prevalence 23%, one year prevalence 38% and a lifetime prevalence of approximately 40% and prevalence increases with increasing age and maximum in the Russian Federation (56%) and deepest in China (22%) [12, 13]. Prevalence rates of low back pain increase with older age and affected by risk factors like genetic, gender and ethnicity, age, lack of exercise, heavy weight lifting, improper lifting, psychological factors and smoking [14]. There are a number of treatment preferences i.e., heat, massage, cold pack, mobilization and exercise therapy, and core stability exercises. Lumbar mobilization is the technique to mobilize spinal vertebral joints of lumbar region. The specific lumbar mobilization includes central antero-posterior-CPA, and unilateral antero-posterior-UPA glides applied on specific vertebras practice in prone lying position. These lumbar mobilizations are also active in chronic soreness and develop function in non-specific low backbone pain [15]. Core stability exercise are the re-establishment or of the capability of the neuromuscular machine to regulate and guard the spine from injury [16]. Core muscles include Local muscles cross one or two joints named multifidus, transversus abdominis (TrA), inter-transversarii and inter-spinalis, posterior fibers of psoas major [17] and global muscles cross several joints with pelvic and thorax attachments named rectus abdominis, external oblique and internal oblique, thoracic portion of longissimus and iliocostalis, quadratus lumborum lateral fibers, psoas anterior and latissimus dorsi lateral fibers [18]. Ahmad *et al.*, (2020) reported that combination of cores stability along with mobilization is an alternative therapy in reducing pain, improving RMDI scoring among chronic low back pain patients [19]. Additionally; Ibrahim *et al.*, (2023) reported that Maitland or specific mobilization is more beneficial in improving proprioceptive sensation along with VAS and ODI scoring functional level among chronic LBP patients [20].

The study was designed with an aim of determine the comparative effect of core stability exercises and specific lumbar mobilizations on pain and functional disability in subjects with power-driven low backbone pain.

METHODS

The single-blinded randomized control trial was performed after receiving Ethical permission from Ethical Review board of JIPS with the Reference number JIPS/ACD/23-141 on 10. March 2023. The study was conducted in the department of Physical Therapy of the Mayo hospital Lahore from March 2023 to August 2023 for 6 months. The sample size of 45 was calculated by using G power program by the research center of King Edward Medical University and recruited from the Outdoor male and female department of Hospital [21]. The inclusion criteria was the participants of both gender having 20-60 years of age was suffering from the mechanical low back pain were enrolled in the study [21]. Additionally; patients suffering from acute low back pain, history of any systemic disease, vertebral fracture, malignancy, and pregnancy are excluded from current study [22]. The patients were completely aware of the purpose of the study and each participants signed a proper written consent. Each participants were assessed according to the baseline assessment criteria. The baseline assessment involves the proper history taking procedure, physical examination of the lumbar spine (Inspection, palpation and movements) and the special tests including straight leg raising, slump test, passive lumber extension test, Quadrant test, Ober's test, rectus femoris test, 90-90 degree SLR and Thomas test [23]. After the assessment; Non-probability convenient sampling technique was used for the sample collection and through lottery method randomly allocation of patients were done into three groups received conservative physical therapy. Group A as a control group managed with conventional treatment protocol including hot pack, core strengthening (back isometrics, pelvic tilting and William flexion), whereas Group —B received combination of conservative and Specific Lumbar Mobilizations and Group — C received combination of conservative and Core Stability Exercises. Group A patients had to take the treatment session of 30 minutes in which hot pack was applied for 10 minutes. After this, William's flexion of 3 sets for 5 minutes, the patient performed back isometrics 3 sets for 10 minutes and pelvic bridging 3 sets for 5 minutes [24]. Group B was managed with Specific lumbar mobilization and conventional treatment. Firstly; hot pack was applied for 10 minutes in

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prone lying position. Additionally; the patient was lying in prone position in which a postero-anterior glides were applied by therapist from T12 to S1 using Maitland's technique in grade III. The whole session was completed with 3-4 sets of gliding for 10 minutes. After mobilization; patient performed William flexion, back isometrics and pelvic bridging with 3 sets for 5 minutes [25]. In Group C, patients were managed with conventional treatment with core stabilization. Firstly; hot pack was applied for 10 minutes in prone lying position. Additionally; the core stability exercises program includes static exercises were Plank, Side plank, Bridge and Super-man position. The dynamic exercises including Side lying with abduction, Oblique crunch, Straight leg raising (SLR) and Lying wind screen. These all activities were performed with 10 repetitions for 5-10 seconds [26]. The patients than performed William flexion, back isometrics and pelvic bridging with 3 sets for 5 minutes [24]. Outcome variables including pain, lumbar ranges and functional status was assessed through Numeric pain rating scale (NPRS), Modified Oswestry Disability Index (MODI) and Rolland and Morris disability questionnaire (RMDQ) and Goniometer. NPRS 11 point self-describing scale quantify intensity of pain from 0 (zero pain) - 10(severe pain). Having ICC =0.991 make it reliable tool for LBP pain assessment [27, 28]. MODI having 6 subdivision describing disability from 0 -5 [28] while RMDQ is self-reported 24 questionnaire, by replying YES or No assessing disability level among CLBP. MODI with 0.871 ICC value and having >3.5points of RMDQ are reliable and valid tool for evaluating functional status among LBP patients [29]. SPSS Statistical Power version 26.0 was used for statistical analysis. The analysis of demographic data were described through frequency (%). The within and across the group analysis of the pain, ranges and disability level were analyzed by using Paired sample t-test and One-Way ANOVA.

RESULTS

The results of the current study were described through tables. The baselines demographic variables of each group was defined in Table 1. Having no significant difference in demographic variables; the mean age of patients were 39.93±7.95, 37.53±9.48 and 40.87± 9.357 in Group A, B and C respectively. In the Table I; the gender distribution among groups was 3 (20%) male and 12 (80%) female, in groups B 6 (40%) male and 9 (60%) female and group C 6 (40%) male and 9 (60%) female. Furthermore; the socioeconomic status in group A were 6.7% upper class, 60% middle class and 33.3% lower class, in group B were 53.3% middle class and 46.7% belong to lower class and in group C 80% middle class and 20% belong to lower class. Table I described the behavior of pain as in group A was 13.3% had localized, 80% radiating and 6.7% have referred pain, in group B 20% had localized, and 80% radiating pain and in group C 26.7% had localized, and 73.3% had radiating pain. The occupation in-group A 13.3% had sedentary, 73.4% housewife and 13.3% had other job. However in Group B and C had 26.7% sedentary, 46.7% housewife, 13.3% laborers and 13.3% had other job and 40% sedentary, 46.7% housewife and 13.3% had other job respectively were described in Table 1.

Table 1: Demographic variables of patients

Variables		Results		
		Group A	Group B	Group C
		39.93±7.95	37.53±9.48	40.87± 9.357
Gender	Male	3 (20%)	6 (40%)	6 (40%)
	Female	12 (80%)	9 (60%)	9 (60%)
Socioeconomic Status	Upper Class	1 (6.7%)	0 (0%)	0 (0%)
	Middle Class	9 (60%)	8 (53.3%)	12 (80%)
	Lower Class	5 (33.3%)	7 (46.7%)	3 (20%)
Pain behavior	Localized	2 (13.3%)	3 (20%)	4 (26.7%)
	Radiating	12 (80%)	12 (80%)	11 (73.3%)
	Referred	(6.7%)	0 (0%)	0 (0%)
Occupation	Sedentary	2 (13.3%)	4 (26.7%)	6 (40%)
	Housewife	11 (73.4%)	7 (46.7%)	7(46.7%)
	Laborer	0 (0%)	2 (13.3%)	0 (0%)
	Other	2 (13.3%)	2 (13.3%)	2 (13.3%)

Table 2 reported significant reduction in pain intensity having post treatment NPRS scoring comparison in group A, B and C was 5.4 ±1.89, 5.15±1.5 and 3.93±1.65 respectively showing that core stability exercises are more effective in reducing pain in patients with power-driven low backbone pain with p-value = 0.049. Table 2 showed significant improvement in MODI and RMDQ post-treatment scoring among all groups but Post treatment comparison of mean MODI in group A, B and C was 24.20±5.59, 19.33 ±5.14 and 19.55±6.20 p- value= 0.038. Similarly; mean RMDQ in groups was 14.80±3.17, 13.27 ±3.82 and 10.53±2.56 with a p-value = 0.003 showing that core stability drills are more operative in reducing infirmity in patients of power-driven low back pain.

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Table 2: Pre and Post-treatment analysis of NPRS MODI and RMDQ of groups

Outcome Measure	Group A			Group B			Group C		
	Pre	Post	p	Pre	Post	p	Pre	Post	p
NPRS	6.63± 1.75	5.4 ±1.89	0.00*	6.9± 1.52	5.15±1.51	0.00*	6.53± 1.54	3.93±1.64	0.00*
MODI	25.4± 5.8	24.2±5.59	0.00*	21.26± 5.28	19.33±5.13	0.00*	23.33± 6.27	19.55 ±6.20	0.00*
RMDQ	16.7± 3.26	14.80±3.16	0.00*	16.13± 3.83	13.26±3.82	0.00*	14.67± 2.49	10.53±2.56	0.00*

Table 3 shows that Active rotation and side flexion improved in all groups as compared to the flexion and extension of lower back. On the comparison, mean flexion in group A, B and C was 37.33±7.67, 32.93±10.96 and 35.13±9.06 with p-value 0.441. The mean post-treatment extension was 18.4±6.55, 17.7±6.22 and 21.2±5.19 respectively with p-value 0.258. The result showed that both Core stability and Specific lumbar mobilization produced no significant difference in improving flexion and extension among on the low backbone pain. However, the post-treatment mean right side flexion in-group A, B and C was 12.33±3.08, 13.0±3.38 and 16.06±3.49 with a p-value 0.008. The mean left side flexion in groups was 12.06±3.84, 12.8±3.67 and 15.40±2.99 with a p-value 0.033. The mean right and left side rotation in group A was 11.67±3.56, while in group B and C was 10.28±3.10 and 15.867±2.50 respectively while 11.28±3.39, 9.80±2.42 and 15.733±2.34 with p-value 0.000. The results confirmed that p-value <0.05 indicating that core stability exercises are more effective in improving side flexions and rotation.

Table 3: Post-treatment Ranges of all groups

Ranges	Group A	Group B	Group C	p-value
Flexion	37.33±7.67	32.93±10.96	35.13±9.06	0.441
Extension	18.4±6.55	17.7±6.22	21.2±5.19	0.258
Right side flexion	12.33±3.08	13.0±3.38	16.06±3.49	0.008*
Left side flexion	12.06±3.84	12.8±3.67	15.40±2.99	0.033*
Right Rotation	11.67±3.56	10.28±3.10	15.867±2.50	0.000*
Left Rotation	11.28±3.39	9.80±2.42	15.733±2.34	0.000*

DISCUSSION

The study was designed with the purpose of determining the effectiveness of core stability and specific lumbar mobilization in the mechanical low back pain for decreasing pain and disability. The results of the study showed that core stability was statistically significant in managing pain, disability and ranges among low back pain patients with p-value < 0.05. However; among patients; there was no significant difference was observed in flexion and extension ranges among patients. Javaherain *et al.*, reported that Maitland PA mobilization is highly effective in improving pain and ranges especially rotation, lateral flexion and extension ranges of low back patients than flexion ranges [30]. The current study result showed significant improvement in extension range with 17.7±6.22. However; Qaseem *et al.*, reported that core stability exercises are highly significant in improving ranges flexion and extension of low back patients as it enhances the muscular strength of the deep core muscles. The muscles that were targeted in these exercises were local and global dynamic muscles [24]. The current study result showed the improvement in flexion and extension range with 35.13±9.06 and 21.2±5.19 respectively. However; on comparison; mobilization and core stabilization did not show any significant difference in improving flexion and extension ranges with p-value > 0.05. Islam *et al.*, reported that core stabilization is highly effective in reducing the pain intensity as core stabilization focus on managing the activation of global muscles with increasing the control of deep spinal muscle [31]. The current study showed significant reduction in pain intensity with p-value <0.05. Similarly; Ali *et al.*, reported that Maitland mobilization is effective in improving pain intensity among LBP patients especially grade I and II as it decrease the stimulation of nocireceptors [21]. This supported current study results as pain reduction in Maitland group was significantly lower as compared to core stabilization due to the application of grade III. Similarly; Frizziero *et al.*, concluded that core stability exercises play an important role in enhancing spinal muscle thickness and activation. This activation helps in improving the pain and ranges that ultimately improve the functional status of patients and reduce disability [32]. This support current study results as MODI and RMDQ scores was significantly improved in core stability patients with p-value <0.05. Additionally; Outeda *et al.*, supported that Maitland mobilization played a significant role in improving pain and disability level in combination or alone application. However; this further depend on the grade of mobilization application [33]. This support current study result as MODI and RMDQ showed significant improvement while pain intensity did not show significantly improvement. Specific mobilization and core stabilization played significant improvement in pain and

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disability among mechanical low back pain. However; core stabilization is statistically significant in improving pain, disability and ranges of low back pain patients as compared to Specific lumbar mobilization. Limitations of this study were that this was a single centered study, as all the patients were taken from one hospital. The other limitations were shorter time duration, limited sample size was for this study was limited too. The main limitation was all patients met the inclusion criteria, but some patients were mainly inactive or drop out while others were principally standing or sitting during their waged hours and all these factors were ignored in this study. Primarily; a future research would be should be conducted with larger sample size for longer treatment session period for better understanding of effects. Other recommendations were evaluation of data by another blinded person, Formation of subgroups to further modify pain and follow up for extra one year to check sustainability of progress and to warrant devotion of patient to exercise.

CONCLUSIONS

The study concluded that core stability exercises are more effective than Specific Lumbar mobilizations and conventional treatment in reducing pain, improving range of motion especially right and left side flexion and right and left side rotation and functional status in LBP patients. However, lumbar mobilization and core stability exercises equally effective in flexion and extension.

Authors Contribution

Conceptualization: RH, AK
Methodology: SS
Formal analysis: SR, AZ
Writing-review and editing: MJ, LNK, AK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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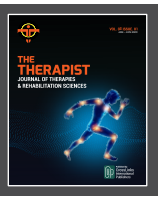

Original Article

Awareness About Glaucoma and Associated Factors Among Glaucoma Patients Visiting Munawar Memorial Hospital Chakwal

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ABSTRACT

Glaucoma is a significant public health problem worldwide blindness after cataract is attributed to this ophthalmic disease. The resultant blindness is mostly irreversible. Its earlier detection is imperative to prevent blindness. **Objective:** To ascertain the awareness about glaucoma and associated factors among glaucoma patients in association with family history. **Methods:** A cross-sectional descriptive hospital base study was done among 21 glaucoma patients at Munawar Memorial Hospital Chakwal from October – December 2021. The patients were enrolled through consecutive sampling. Data were gathered from the patients through self-structured questionnaire pertaining to demographics, family history, association of glaucoma with blindness, reversibility of resultant blindness, treatment in addition to prevention and cure of blindness. Data were analysed by SPSS version 25.0. Apart from descriptive statistics, Fisher's exact test was also applied to measure the association of family history of glaucoma with other factors. $p<0.05$ was taken as significant. **Results:** Of the 21glaucoma patients, most (63%) were males and 11 patients had positive family history. Overall, 25% patients knew about the disease. Mean age of the respondents was 50.52 ± 22.5 years. Almost 72.2% of the patients with positive family history were aware about the prevention of blindness resulting from glaucoma ($p<0.05$). on the other hand, 81.8% of the patients with negative family knew about cure. 81.8% of the patients knew the purpose of treatment ($p<0.05$). **Conclusions:** There was scarcity of knowledge about glaucoma among patients. Despite the positive family history, knowledge of glaucoma patients about their disease was deficient.

INTRODUCTION

Glaucoma is a complex of optic neuropathies that is identified with degeneration of retinal nerve fibres and ganglion cells [1]. Due to raised intraocular pressure and resultant damage to optic nerve and ganglion cells; there is irreversible blindness that drastically affects the quality of life of the patients [2, 3]. However, its progression is arrested by 30-50% reduction of intraocular pressure. Its commonest form is primary open angle glaucoma that is greatly linked with old age, positive family history and high myopia [4]. Glaucoma is about 3-5% prevalent globally among people aged 40 years or above and is anticipated to prevail among 112 million people worldwide by 2040. Tham et al., in his systematic review and meta-analysis revealed that primary angle closure glaucoma is predominant among Asian inhabitants while primary open angle glaucoma is more prevalent among African male urban dwellers [5]. Japanese on the other hand have been detected with higher incidence of normal tension glaucoma [6]. By 2010, blindness among one out of 15 persons was attributed to glaucoma while visual impairment among one out of 45 patients was linked with glaucoma [7]. Glaucoma is mostly diagnosed at progressive stage with considerable visual impairment knowing sufficiently about the risk factors of glaucoma and its clinical manifestations would enable the patients to pursue consultation for their problem quite earlier [8].

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Various over-the-counter and prescribed drugs are known to cause rise of intraocular pressure and hence people taking such medications are prone to develop glaucoma [9]. A study by Dada et al., stressed on the significance of investigating the accompanying factors that prelude to disease severity among glaucoma patients [10]. Moreover, systemic hypertension and glaucoma have also been reported as co-incidental attributes among cases [11]. A couple of studies have also linked glaucoma with certain endocrinological disorders like acromegaly and Addison's disease [12]. Another study by Fujita et al., brought the limelight the association of some life style habits with glaucoma like obesity, skipping breakfast, exercise and alcohol intake [13]. Glaucoma has substantially been reported among elders of Pakistan and the burden of ensuing visual problems are speculated to reach their zenith during 2025 [14]. Having adequate knowledge about glaucoma and its contributing factors is imperative in order to get rid of untoward results. Due to fear of debilitating healthcare outcomes, it is necessary to assess the awareness about glaucoma among general public.

The current study is therefore aimed to rule out the knowledge about glaucoma and its accompanying factors among adult glaucoma cases. This study would really aid our policy makers in planning appropriately for disseminating the essential information pertaining to risk factors and management of glaucoma among laypeople with an intention to diminish the imminent incidence of this disease in the country.

METHODS

A cross-sectional descriptive study was done among 21 adult glaucoma patients who visited Eye OPD of Munawar Memorial Hospital Chakwal from October – December 2021. Ethical approval for this study was sought from Institutional Ethical Review Board (IERB) of Munawar Memorial Hospital & College of Optometry (Ref# MMH/IRB/010/2021) on 10th October 2021. This study is based on thesis that was composed in partial fulfilment of BSc (Hons) Optometry & Orthoptics requirement. Prevalence of glaucoma in Asia was determined to be 58.3% [15]. In accordance with this prevalence, the sample size of 115 was calculated with WHO sample size calculator using 95% confidence level of 1.96 (z) and 9% margin of error(d). The formula used for calculation was n = z2×p(1-p)/d2. However, due to COVID-19 pandemic data could be gathered only from 21 patients. Only diagnosed glaucoma cases were enrolled in the study through non-probability consecutive sampling. The data were collected from the patients by using self-structured questionnaire regarding their demographics, family history, association of glaucoma with blindness, reversibility of resultant blindness in addition to prevention and cure of blindness. Moreover, patients were also inquired about the treatment of glaucoma and its purpose. Data were analysed by means of SPSS version 25.0 and Microsoft Excel 2016. Descriptive statistics were applied. Fisher's exact test was applied to determine the association of family history of glaucoma with many associated attributes. P<0.05 was considered significant.

RESULTS

Of the total 21 glaucoma patients enrolled in our study, 13(63%) and 8 (37%) were females and males respectively. Mean age of our study subjects was 50.52 ± 22.5 years. 11 patients had positive family history of glaucoma and 7 of them were 51-70 years old as depicted below in figure 1.

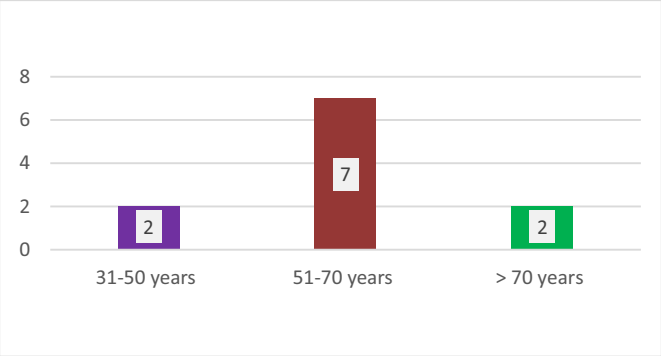

Figure 1: Family history of glaucoma patients

Awareness of the glaucoma patients about different attributes of glaucoma is revealed below in figure 2.

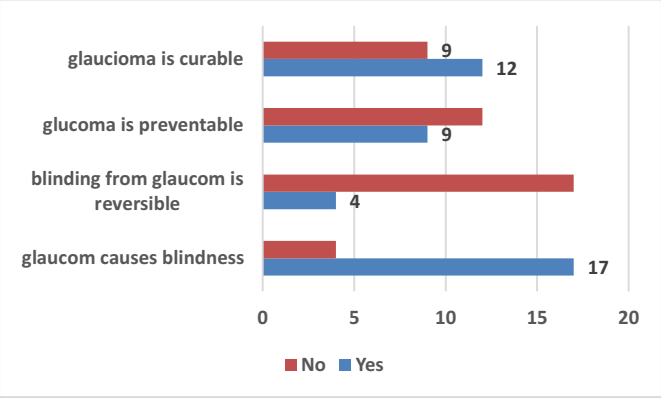

Figure 2: Awareness of glaucoma cases about various attributes

According to 57.2% and 42.7% patients, treatment of glaucoma was meant to restore / improve the vision of cases and to delay the disease progression respectively. Most (57.1%) knew about the use of eye drops for treating glaucoma, while only 23.8% were aware of the surgical management of glaucoma. However, 19.1% did not know about treatment of glaucoma. Association of knowledge about different attributes of glaucoma with family history is illustrated below in table 1.

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Table 1: Association of knowledge about various factors of glaucoma with family history of glaucoma cases

Questions	Glaucoma patients	Glaucoma subjects with positive family history	p – value
Can glaucoma cause blindness?	Yes – 17 (81%)	Yes – 10 (90.9%)	>0.10
	No – 4 (19%)	No – 1 (9.1%)	
Is blindness due to glaucoma reversible?	Yes – 4 (19%)	Yes – 2 (18.2%)	>0.10
	No – 17 (81%)	No – 9 (81.8%)	
Is blindness from glaucoma preventable?	Yes – 9 (42.9%)	Yes – 8 (72.2%)	*<0.05 (statistically significant association of knowledge about prevention of glaucoma-linked blindness with positive family history)
	No – 12 (57.1%)	No – 3 (27.3%)	
Is glaucoma curable?	Yes – 12 (57.1%)	Yes – 2 (18.2%)	*<0.05 (statistically significant association of knowledge about cure of glaucoma with negative family history)
	No – 9 (42.9%)	No – 9 (81.8%)	
What treatment do you know?	Eye drops – 12 (57.1%)	Eye drops – 8 (72.7%)	>0.10
	Surgery – 5 (23.8%)	Surgery – 1 (9.1%)	
	Didn't know- 4 (19.1%)	Didn't know - 2 (18.2%)	
Do you know the purpose of treatment?	Restore or improve vision – 12 (57.2%)	Restore or improve vision – 9 (81.8%)	*<0.05 (significant association of knowledge about purpose of glaucoma treatment with positive family history)
	Delay progression – 9 (42.8%)	Delay progression – 2 (18.2%)	

*Statistically significant difference

DISCUSSION

Mean age of glaucoma patients in our study was 50.52 ±22.5 years. Of the 21 cases, 11(52.4%) had positive family history. A comprehensive epidemiological review of glaucoma by Allison K et al., revealed that persons above 60 years of age with positive family history and high myopia, diabetics, hypertensives and with any ocular injury were more prone to develop glaucoma [16]. Approximately 2.2 billion people globally are suffering from near or distant visual impairment and about 1 billion of them have preventable problem. Out of these 1 billion cases, almost 7.7 million patients have been recognized with glaucoma [17]. There is possibility of having juvenile cases of glaucoma that are reported among less than 40 years old people [18]. Mean age of newly diagnosed glaucoma cases in African region was determined to be 59.9 ± 17.1 years. Moreover, family history was positive among 26.1% patients [19]. Although positive family history of a patients is a valuable clue; yet many glaucoma patients due to negative family history were not thoroughly explored for their presenting complaints and other allied factors [20]. So, just paying attention to positive family history for reaching accurate diagnosis is mistaken, other aspects of history, detailed clinical examination and investigations should undoubtedly be given due consideration also before chalking out the management plan. The glaucoma patients with positive family history in current study were more aware about the prevention of this disease (p<0.05). A similar study among patients attending eye clinic illustrated significant association of positive family history and any experience of working in medical field with adequacy of knowledge about glaucoma [21]. Another study by Celebi et al., concluded that glaucoma patients with higher level of education were more well-versed about their disease [22]. Although family history is considered one of the key risk factors associated with glaucoma; yet, genetic testing was gained recognition as an essential diagnostic test for ascertaining high risk individuals [18]. According to a study carried out among Indian urban population, there was deficient knowledge about glaucoma that highlighted the need for health education among them for timely prevention instead of planning for rehabilitation on confrontation with grave consequences [23]. Health seeking behaviour of Pakistani population is quite dissatisfactory. Therefore, despite at increased risk elders of our country is unacquainted about glaucoma [24]. The current study showed significant association (p < 0.05) of negative family history of glaucoma cases with knowledge about cure for their disease (Table 1). Where first degree relatives of glaucoma cases have 22% risk of suffering from glaucoma during their life, there is 2.3% risk of glaucoma among those with negative family history [25]. Apart from family history and education, Body Mass Index (BMI) has also been noted as a renowned risk factor for developing glaucoma [26]. Further studies with consideration of other risk factors will enable us to have holistic analysis of the determinants of glaucoma in our nation. Of the 11 glaucoma patients with positive family history in present study, about 9 (81.8%) rightly confessed that glaucoma treatment is intended to restore the vision. There was statistically significant association (p < 0.05) of the positive family history of glaucoma with satisfactory knowledge among study subjects about purpose of the

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treatment. A study by McNaught et al., among Tasmanian inhabitants unveiled the fact that 27% of the glaucoma patients were unaware about their positive family history [27]. Only 3 of the 11 glaucoma cases in our study with positive family history knew about eye surgery for glaucoma. The visitors of a public hospital of Syria interviewed during 2022 were also found to have deficient knowledge about glaucoma and this aspect was considered as one of the reasons for progression of this disease [28]. Knowledge about glaucoma among people of Nigeria was also inadequate [29]. Even healthcare workers of a Nigerian tertiary care facility also had minimal knowledge about glaucoma that should be updated for dissemination of information about this ailment among general population [30]. Knowing the risk factors for glaucoma would enable the primary healthcare workforce to detect at risk patients and refer them to ophthalmologists for timely diagnosis and prompt management [31]. Health related Quality of Life (QoL) of glaucoma patients can substantially be improved by discussing and pondering both patient and management related risk factors and resultant outcomes by the ophthalmologist [32]. Awareness about glaucoma would not only enable the public to pursue the relevant healthcare services in time but also reduce the burden of the associated ocular and visual disabilities [33]. Of the total 21 glaucoma patients in present study, most (81%) knew about irreversibility of blindness as a result of glaucoma. Although timely management of glaucoma is linked with better prognosis; yet it is a debilitating disorder that markedly deteriorates the well-being of the patients. An Ethiopian study elucidated that majority (46%) of the patients visiting ophthalmology department of a teaching hospital had advanced glaucoma [34]. This data is illustrative of either delay in seeking healthcare by the patients or lack of timely diagnosis by healthcare professionals. However, both of these aspects for avoidance of grave health outcomes should promptly be deliberated and addressed to provoke strategic planning for better healthcare of the masses. High risk screening for glaucoma was also found a beneficial step towards curbing this havoc [35]. Health sector should provide sufficient budget for efficacious implementation of screening program against glaucoma in the community. This initiative would not only reduce the burden on our healthcare facilities but would also considerably protect the public from this crippling disease.

CONCLUSIONS

The glaucoma patients had inadequate knowledge about their disease and very few were aware about surgical management. Despite the positive family history, knowledge of glaucoma patients about their disease was deficient. Apart from social media, healthcare professionals should also play their role in dissemination of information pertaining to outcomes, prevention and management of glaucoma.

Authors Contribution

Conceptualization: IK
Methodology: HA, RS, IK
Formal analysis: HA, RS, SH
Writing-review and editing: HA, RS, IK, SH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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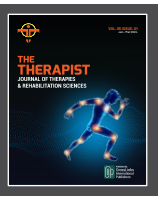

Original Article

Attributes of Menstruation among Young Physical Therapy Female Students of Karachi

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ABSTRACT

The average age of menarche is between 9 to 14 years of age. Menarche is considered a normal milestone of every female's life. This period is supposed like a special period of every girl's life because in this stage girl is converted to the woman's age. Menarche is the indicator sign of a female that is ready to take part in reproduction activity. **Objective:** To determine the attributes of menstruation among young physical therapy female students of Karachi. **Methods:** This cross-sectional study was done among 385 young physical therapy female students in Karachi-Pakistan to reveal the age, duration, symptoms, and length of the menstruation cycle. The duration of the study was between June to November 2023. A non-probability purposive sampling technique was used. The validated questionnaire was used from a previous study done in 2016. Data were analyzed through SPSS version 23.0 software. **Results:** A total number of 385 young females was included in this study. The mean age of menarche revealed 187 (48.57%) found between 11 to 13 years. The regularity of menses was found in 299 (77.66%)participants. The average days of menstruation flow were about 6 to 8 days in 218 (56.62%) of research participants. The average length of the menstrual cycle was 21 to 35 days in 221 (57.40%) while the most common symptom found in research participants was lower abdominal pain in 187 (48.57%). **Conclusions:** There were significant differences between the characteristics of every young female related to the pattern, duration, age, regularity, and cycle length of the menstrual cycle.

INTRODUCTION

In females, the beginning of menstrual bleeding first time in their life is known as Menarche. Menarche does not give any sign before starting and it is mainly painfree [1]. Girls face this menarche problem at different ages. The average age of menarche is between 9 to 14 years of age [2]. Menarche can be altered by various factors like hereditary, social status, physical activity, status of health, and dietary habits. It gives an initiation of puberty level in females and now they can be fertile and take part in reproduction, in some cases, females can not be fertile then it indicates some pathology in their body or any hormonal disturbances that can cause infertility in females [3]. Many physiologic, behavioral, mental, emotional, and hormonal changes can be seen in the body of females at the level of menarche. Most of the females are depressed due to facing many problems related to their menstrual cycle like painful menses, and irregular menses. It can give stress to the females [4]. Females who are facing late menarche issues

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also experience depression to the female and also their family members it is most important to identify the exact date of the menstruation period because it is necessary to know the fertilization period of the female [5]. The length or duration of the menstruation cycle may vary for every individual female. The mean age of the ovulation cycle ie in between 21 to 35 days [6]. Eventually, the flow of menses is at least 2 to 7 days, but most females face this bleeding problem for at least 3 to 5 days. It is more common in females in the puberty stage they initially disturb their cycle pattern [7]. It can be normal in 1 to 2 years of the start of the menarche stage and it is regularly the same in the whole life of the female when they reach their menopausal stage or females decrease their normal functions of the ovaries [8]. The major problem of adult females is disorders of the menstrual cycle which include low bleeding issues (hypomenorrhea), painful or abdominal cramps (dysmenorrhea), irregular or infrequent bleeding (oligomenorrhea), and abnormal functions of the uterus. Around the world, the prevalence ratio of menstrual disorders may vary from 5 percent to 35.6 percent [9]. Menarche is considered a normal milestone of every female's life. This period is supposed like a special period of every girl's life because in this stage girl is converted to the woman's age. Menarche is the indicator sign of a female that is ready to take part in reproduction activity [10]. Many factors can contribute to the age of menarche which includes heredity issues, body posture, body mass, size of the family, and societal conditions [11]. Females face many signs and symptoms during their cycle including headache, lower abdominal pain, pain in lower limbs, mood swings, lower back pain, pimples on their faces, and sometimes they suffer from fever [12]. The rate of mortality rate is increased in those persons who are facing human immune viruses, diseases transferred through sexual interaction [13]. Around the world, the problem of menarche age faced by every female due to the high body mass index of females, insulin resistance, and profile level is also increasing cardiac issues, like high blood pressure, heart diseases, and diabetes [14]. However, females who reach menarche before the age of 12 years have a higher chance of developing cancer of the breast as compared to those who get their 1st menstruation at the age of 15 or more. On the other side later age of menarche can cause other health issues in females like bone weakness, anxiety, females with depression signs, and also face social issues [15]. In Pakistan, there is a lack of knowledge regarding the normal and impaired functions of menses [16]. Most female students of physiotherapists have a lack of knowledge regarding their menstrual issues [17]. Complain of painful menstruation are common in university students because students are busy with their medical tasks, lectures, and sports activities and they are not taking care of their health which can create issues like stress, eating problems can lead to pyrexia, vomiting, loose motions and person feels like fainting [18]. Nowadays it is important to provide awareness and knowledge regarding the regular cycle of menses to adult females because a lack of knowledge creates many problems in the life of females because they face many issues regarding their impaired functions of hormones, and decreased rate of fertility and all these problems can impact the individual life of female and give a bad impression to other family members before and after her marriage [19]. It is mainly important that every female get knowledge and ask about their problems with their mother or as well as a doctor as compared to feeling shy or embarrassed regarding their menstruation issues [20]. Most mothers can play a vital role in their daughters' lives it is the responsibility of every mother to tell their child about the menarche age, regarding their symptoms, issues, complaints, the flow of bleeding, and regular pattern of menstrual cycle so, they can manage their issues on time and resolve them [21].

The aim of our study was to determine the attributes of menstruation among young physical therapy female students of Karachi.

METHODS

This cross-sectional study was done to determine the age, duration, symptoms, and length of the menstruation cycle among the female physical therapy students of Karachi-Pakistan. The duration of the study was between June to November 2023. The collection of data was done after receiving ethical approval from the research committee of AORC (Advanced Orthopaedic and Reconstructive Clinic) with a reference no: BASAR/No.074845/physio, dated: 25 May 2023. The sample size of the study was 385 selected through a non-probability purposive sampling technique. Confidentiality of the data of the participants was maintained. the validated questionnaire was used from a previous study done in 2016. The questionnaire was divided into two parts in the first part questions related to demographic information were included while in the second part questions related to age, duration, length, and symptoms of menstruation were included. The inclusion criteria of the study were female physical therapy students who undergo menarche, aged between 16 to 28 years from Karachi. Females who had a history of pelvic inflammatory disease, endometriosis, and any gynecological pathology using special drugs, or painkillers, and females who were not willing to participate in the study due to domestic or ethical issues were excluded from the study. The data were analyzed through the Statistical Package of Social Sciences (SPSS) version-23.0 Through which we evaluate the frequencies and percentages of depending variables

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including: Menarche age, Flow duration, Cycle duration, Symptoms as well as conditions in research participants of seven districts of Karachi.

RESULTS

There were 385 young physical therapy female students selected from the seven districts of Karachi. The age group range of research participants at menarche from 9 to 11 years was 27 (7.01%), 11 to 13 was 187 (48.57%), 13 to 14 was 83 (21.55%), 14 to 15 was 69 (17.92%), and 15 to 16 was 19 (4.93%). The mean menarcheal age was 12 ± 1.05 as shown in table 1.

Table 1: Mean Menarche Age

Menarche Age	Frequency [N (%)]
9-11	27 (7.01)
11-13	187 (48.57)
13-14	83 (21.55)
14-15	69 (17.92)
15-16	19 (4.93)

Their length of menstrual cycle ranged from less than and equal to 20 days was 98 (25.45%), 21 to 35 days was 221 (57.40%), and greater than 35 days was 66 (17.14%). The duration of menstruation flow in research participants was more than 56.62% in 218 participants lasting for 6 to 8 days, while 105 (27.27%) lasted 3 to 5 days, and 62 (16.10%) had menses lasting more than 8. The flow duration, cycle duration and prevalence of symptoms related to the menstrual cycle is shown in table 2.

Table 2: Characteristics of Menstraution

Menarche Age	Frequency [N (%)]
Flow Duration	
3-5	105 (27.27)
6-8	218 (56.62)
Greater than 8	62 (16.10)
Cycle Duration	
Less or equal than 20 days	98 (25.45)
21-35 days	221 (57.40)
Greater than 35 days	66 (17.14)
Symptoms	
Low back pain	51 (13.24)
Lower abdominal pain	187 (48.57)
Tenderness of breast	19 (4.93)
Fear	93 (24.15)
Depression	21 (5.45)
Nausea, vomiting, & pain in head	14 (3.63)

The frequency of research participants is extracted from seven districts of Karachi of which 96 (24.93%) were from the central district, 21 (5.86%) from the east, 15 (3.89%) from Kemari, 67 (17.40%) from Malir, 33 (8.57%) from Korangi, 22 (5.71%) from the west, and 131 (34.02%) from the south district as shown in figure 1.

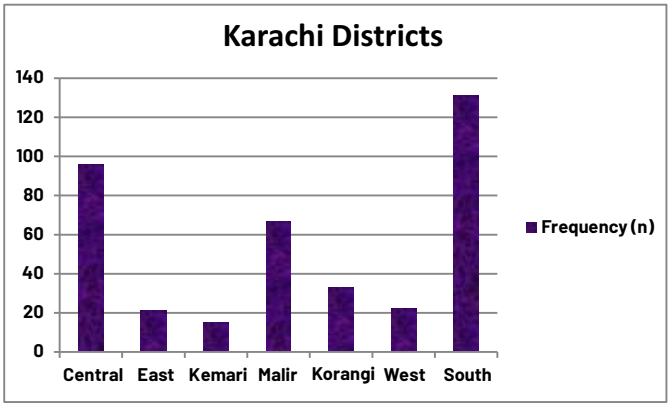

Figure 1: Frequency of Participants from Districts of Karachi

The conditions of the menstruation cycle are found in three categories out of 385 participants who said about the condition of dysmenorrhea 251 (65.19%) said yes, 134 (34.80%) participants said no, questions regarding the premenstrual symptoms 196 (50.90%) replied yes, 189 (49.09%) replied no, and while asking the questions regarding the regularity of menstrual cycle 299 (77.66%) answered yes, and 86 (22.33%) answered no as shown in figure 2.

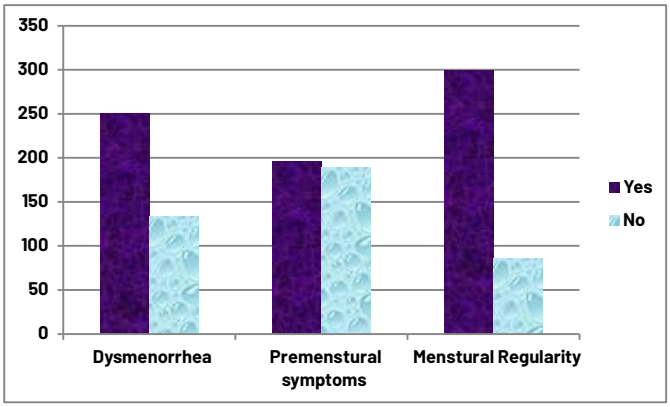

Figure 2: Conditions of Menstraution Cycle

DISCUSSION

The production of hormones and the changes in the structure of the ovary and uterus of the reproductive system of a female with the initiation of the puberty stage is known as the menstrual cycle [22]. In this duration the time starting from day one of the female periods to the day before the female's next period is included. In females menstrual cycle is the crucial factor of life which shows the different aspects of society like: dietary, geographic, and socio-economic [23]. A study reported in the early 2 years after the beginning of the cycle shows common factors

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among all females because of the anovulation state [24]. As compared to this our study, 385 females whose ages range from 16 to 28 years were selected from the female physical therapy students general population of Karachi, the average age of the menstruation cycle was observed to be 12 ± 1.05 among the research participants. In comparission to this various researches showed different means of menarcheal ages. The research was done in Ethiopia, reported the average age of the menstrual cycle was reported between the ages of 13.6 ± 1.5 years [25]. Another study done in Addis Ababa reported the mean age of menstruation as: 13.72±1.31 years [26]. Further studies done in Nigeria compared the rural versus urban population and the results showed 13.19 ± 1.32 years from urban and 14.22 years from rural population [27]. The study done in Sudan reported 13.85 years while a study done in Mozambique reported: 13.9 ± 1.29 years [28, 29]. In our study, it is observed that females have very little knowledge regarding the different aspects of menstruation, Some consider it as sparse while others who had heavy bleeding thought that it causes anemia after the end of a cycle. The duration of menstrual flow was found 6 to 8 days in 218 (56.62%) participants. The length of the menstruation cycle in our research was found to be 21 to 35 days in 221 (57.40%) research participants, Menstrual Irregularity was found in 86 (22.33%) participants. Premenstrual symptoms were found in 196 (50.90%) participants. As compared to the study conducted on university students in Karachi showed the prevalence of dysmenorrhea in 50 to 95 percent and the premenstrual symptoms were found in 75 to 85 percent of the population. The lack of attendance is found to be 51 percent in students during the menstrual period [30]. However in our study, the prevalence of dysmenorrhea was found in 251 (65.19%) of the research participants which is similar to the study done in Gondar town Ethiopia 64.7 percent. The youth females are required to be educated regarding the menstrual cycle, the perception of girls towards menses should change and provide them awareness related to the menstrual symptoms and its aspects [31]. In a present study about 77.66% of research, participants had regular menstrual cycles while some reported irregular cycles after 6 months of menarche. The reason behind the irregularity of the cycle was the poor growth in the follicular phase of the cycle and may be due to the defective generation of follicles which is due to ovulation deficiency. Another research reported that 36.6 percent of females complained of back pain, or abdominal pain while 8.9 percent had nausea, 25.5 percent had anxiety and symptoms of depression, 12.2 percent tenderness of the breast, 12.4 percent had a headache, and 2.8 percent had complaints of vomiting during the cycle [32]. The education of mensuration can change the perception of youth regarding menses. In this mothers play a vital role in enhancing the knowledge of a girl after first menarche and this needs the girls to be confident during their cycle without the feeling of embarrassment. It also reduces the morbidity rate caused by hygiene issues, and also symptoms that occur during the menstrual period.

CONCLUSIONS

Our study concluded the majority of young females have a regular menstruation cycle and lower abdominal pain is most common in the research participants. It is the need of the community to increase awareness regarding the attributes of the menstruation cycle among young females to prevent morbidity-related menstruation like premenstrual symptoms, heavy bleeding, and irregular periods.

Authors Contribution

Conceptualization: SAH, SH
Methodology: MRM, KZ, OA
Formal analysis: TS
Writing-review and editing: SAH, SH, MRM, KZ, AA, SRB
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest

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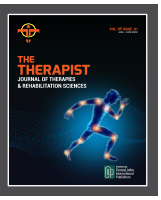

Original Article

Assessment of Fall Risk and its Association with Frailty among Elderly

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Frailty, Elderly Care, Fall Risk, Functional Mobility, Berg Balance Scale, Sit to Stand Test Graph, Functional Reach Test Graph

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ABSTRACT

Falls are a major public health concern about 10% of falls result in serious injuries like traumatic brain injury. Falls can cause poor quality of life and financial costs for both individuals and society. Early detection of who are at high risk of falling makes it easier to provide rehabilitation therapy in the future. **Objectives:** To assess functional mobility, fall risk and its association with frailty among elderly. **Methods:** This cross-sectional study design comprised 90 male / female elderly patients ages 65 to 75. Subjects with limb amputation history, cognitive impairment and ICU status were excluded. Data were gathered from DHQ Kasur andAriz Memorial Hospital. Non-probability convenience sampling was applied. Ethical approval was obtained from institute before conducting research study ran July 2022 to December 2022.Evaluation tools included Berg Balance Scale, Elderly Mobility Scale, Functional Reach Test, and FRAIL Scale. SPSS version 25.0 used to analyze data. Frequencies, percentages, cross tabulations, bar charts, and pie charts were used to display the categorical variables. **Results:** Frailty and fall risk are significantly correlated, with a p-value of less than < 0.001. Mobility and Frailty had significant relationship (p< 0.001). There was significant association between Frailty and balance dysfunction with (p<0.001). There was significant association between Frailty and fall risk with (p<0.001). **Conclusions:** Results suggested that frail elderly were at higher risk of fall and their functional mobility is more compromised as compared to non-frail.

INTRODUCTION

Frailty is defined as a clinically recognizable state of increased vulnerability, resulting from aging-associated decline in reserve and function across multiple physiologic systems such that the ability to cope with everyday or acute stressors is compromised [1]. Frailty a fairly common biological syndrome in the elderly is identified by decreased reserves in multiple organ systems. It may be initiated by disease, lack of activity, inadequate nutritional intake or physiologic changes of aging. Frailty develops slowly in a stepwise process, manifested as loss of skeletal muscle mass(sarcopenia)[2, 3]. Abnormal neuroendocrine systems and poor energy regulation [4]. Multiple factors are epidemiologically identified with frailty include old age ,female, low socioeconomic status, comorbidities or disability [5]. Falling is one of the most prevalent and hazardous ailments that affect the elderly [6, 7]. Sarcopenia plays a major role in the development of frailty. Age-related changes in alpha motor neurons, type I muscle fibers, muscular muscle atrophy or inadequate levels of vitamin D have all been linked to sarcopenia and the

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subsequent emergence of frailty [5]. It is associated with an elevated likelihood of falls, less autonomy in the elderly and institutionalization with unfavorable health consequences [8, 9]. Clinical indicators of frailty include decreased body mass index, osteoporosis, sarcopenia, inactivity , impaired balance or altered nutritional status. As a result frailty maintains a high risk of restricted daily activities, cardiovascular disease, carcinomas, falls, impaired balance, and a higher probability of hospitalization and fatality [5, 8, 10]. Every year, between 20 and 30 percent of people who are sixty years of age or older may experience a fall. The community's senior residents may experience 0.7 falls year, ranging from 0.2 to 1.6 [11]. According to previous investigations, one of the primary impacts of frailty is falling. In older persons, frailty and pre-frailty constitute significant predictors of falls, with pre-frail people having a 1.36 higher likelihood of falling.Based on existing knowledge, frailty has been linked to older people' motor function and fall risk. Clinicians who handle older individuals are aware of this decline [11]. Older adults are more likely to experience frailty syndrome and fall at a higher probability [12].

The primary goal of the current study was to bridge the knowledge gap in the literature by evaluating fall risk, mobility and the relationship between these factors and frailty in the elderly.

METHODS

A cross-sectional study was carried out using non-probability convenience sampling. The sample size was calculated using the Fisher's formula shown below.

$$n = \frac{Z^2 p(1 - p)}{d^2}$$

where

p = expected prevalence or proportion

n= sample size

d= precision(if the precision is 7% then d=0.07)

z= z statistic for a level of significance 95% is equal to 0.95

Prevalence was 12.7% with the level of significance 0.07 the sample size was 86. Both frail and non-frail patients in the outpatient department of physical therapy, as well as patients admitted to the medical ward between the ages of 65 and 75 were included. Data were collected after ethical approval from Ariz Memorial Hospital and DHQ Hospital Kasur with reference number IRB/2023/085, dated February 21, 2023. Study ran from July 2022 to December 2022. Patients with the history of limb amputation, cognitive impairment, patients on wheel chair and in ICU were excluded. Subjects signed consent form before starting the test protocols. The Berg Balance Scale, Elderly Mobility Scale, Functional Reach Test, and FRAIL Scale were all the assessment tools utilized. There were five simple inquiries on the FRAIL scale .People were categorized as robust (0 points), pre-frail (1 to 2 points), or frail (3 points) based on their score, which spanned from 0 to 5. Participants were asked if they felt tired most of the time or weight decrease between previous six months of 5% or more [13]. Functional Reach Test was designed to determine dynamic balance in a single, easy exercise. The reach distance, which is typically measured in inches, was assessed to establish the score difference between the start and finish positions. The mean of the final two trials was recorded when three trials were completed.10" or 25 cm or more Minimal fall risk: 6"/15cm to 10"/25cm. Fall risk was two times higher than average; 6"/15cm or less Fall risk was four times higher than usual;hesitant to make contact Fall risk was eight times higher than average [14]. 5-Times Sit to Stand Test was used to evaluate an older adult's functional lower extremity resilience, transitional motions, balance, and risk of falling. With their arms crossed over their chest and their back resting against a chair, the patient was first sitting. For the patient's safety, the therapist stood by them and provided the necessary protection. Patient were instructed as follows: "When I say 'Go,' get up and sit down as fast as you can five times in a succession. Every time you perform a rep, strive to stand up straight and avoid touching the backrest when you sit" [15]. Health practitioners, such as physical therapists, utilize the elderly mobility scale (EMS), a validated examination, to evaluate the degree of mobility in elderly people. To assess if physical treatment or an exercise regimen had improved the mobility of elderly patients who were fragile, EMS was employed [16]. A patient's ability (or incapacity) to balance securely during a series of specified activities is assessed objectively using the Berg Balance Scale. It took around 20 minutes to finish the list of 14 items, each of which had a five-point ordinal scale with 0 representing the lowest degree of function and 4 representing the maximum level. It excluded the evaluation of gait [17]. Quantitative variables were presented using mean, standard deviation, range,chi square and histograms in the analysis of the data was conducted with SPSS version 25.

RESULTS

Out of total 90 participants, 44 were female and 46 were male. According to frail scale, out of 90 participants, 45 were non-frail and 45 were frail .To assess fall risk and functional mobility berg balance scale, elderly mobility scale, 5 time sit to stand test or functional reach test were applied on both frail and non-frail elderly. Out of 90 participants, 45 were at high fall risk 5 were at medium fall risk and 40 were at low fall risk. According to elderly mobility scale, out of 90 participants, 46 were dependent, 3 were at borderline, 41 were independent.There was a significant association between frailty and fall risk with p-value < 0.001. There was significant association between

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Frailty and mobility with p-value < 0.001.There was significant association between Frailty and balance dysfunction with p-value < 0.001. There was significant association between Frailty and fall risk with p value < 0.001. As shown in table 1, out of 90 participants, 45(50%) were non-frail elders and 45(50%)were frail elders.

Table 1: Frail and Non- frail Elders

Frailty	Frequency (%)
Non- frail Elders	45 (50)
Frail elders	45 (50)
Total	90 (100)

According to Berg Balance Scale Analysis, out of 90 participants, 45 (50%) were at high risk of fall, 5 (5.56%) were are at moderate risk of fall and 40 (44.44%) were at low risk of fall shown in figure 1.

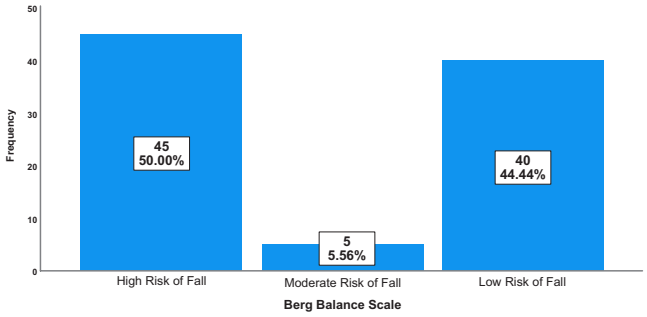

Figure 1: Berg Balance Scale Graph

Elderly Mobility Scale (EMS) showed that out of 90 participants 46 (51.1%) were dependent, 3 (3.3%) were at borderline and 41 (45.6%) were independent shown in table 2).

Table 2: Elderly Mobility Scale (EMS)

EMS	Frequency (%)
Dependent	46 (51.1)
Borderline	3 (3.3)
Independent	41 (45.6)
Total	90 (100)

The results of 5-times sit to stand test showed that out of 90 participants, 40 (44.44%) were normal and 50 (55.56%) were with balance dysfunction shown in figure 2.

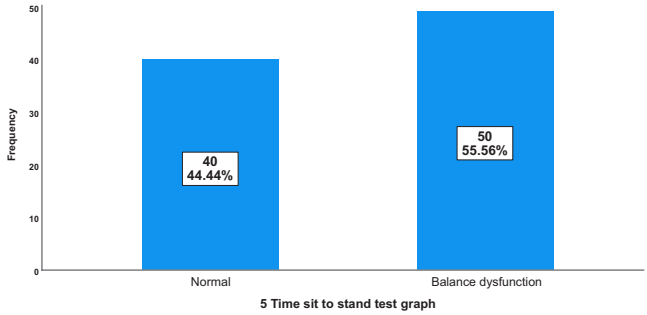

Figure 2: 5-Times Sit to Stand Test Graph

According to the findings of functional reach test, out of 90 participants, 45(50%) were at high fall risk, 2(22.2%) were at moderate fall risk, and 43(47.78%) were at low fall risk shown in figure 3.

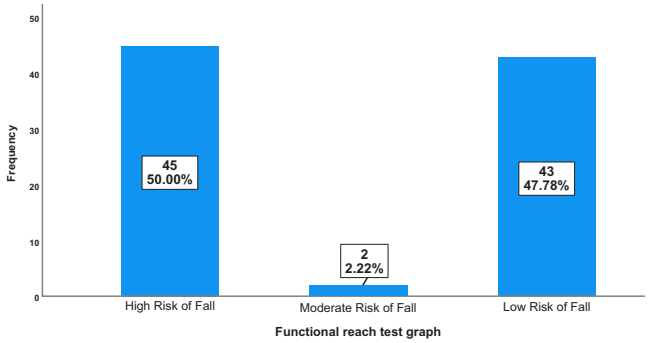

Figure 3: Functional Reach Test Graph

Association between Frailty and Berg Balance Scale using chi square showed Pearson chi-square value (90.000) and Likelihood Ratio (124.766).There was significant association between frailty and fall risk with (p-value < 0.001) shown in table 3.

Table 3: Association between Frailty* Berg Balance Scale (Cross tabulation)using Chi Square Test.

Frailty		Berg Balance scale graph			Total
		High Risk of Fall	Moderate Risk of Fall	Low Risk of Fall	
Non-Frail elders	**Count**	0	5	40	45
	% within Frailty	0.0%	11.1%	88.9%	100.0 %
Frail elders	**Count**	45	0	0	45
	% within Frailty	100.0%	0.0%	0.0%	100.0 %
Total	**Count**	45	5	40	90
	% within Frailty	50.0%	5.6%	44.4%	100.0 %
Chi Square Test					
Value					**p-value**
Pearson Chi-Square		90.000[a]			<.001 ***
Likelihood Ratio		124.766			<.001***

Association between Frailty and elderly mobility scale using chi square showed Pearson chi-square value (86.087) and Likelihood Ratio (115.131). There was a significant association between frailty and fall risk with (p-value < 0.0010) shown in table 4.

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Table 4: Association between Frailty* Elderly Mobility Scale (Cross tabulation) using Chi Square Test

Frailty		Elderly Mobility Scale			Total
		Dependent	Borderline	Independent	
Non-Frail elders	Count	1	3	41	45
	% within Frailty	2.2%	6.7%	91.1%	100.0 %
Frail elders	Count	45	0	0	45
	% within Frailty	100.0%	0.0%	0.0%	100.0 %
Total	Count	46	3	41	90
	% within Frailty	51.1%	3.3%	45.6%	100.0 %

Chi Square Test		
Value		p-value
Pearson Chi-Square	86.087	<.001 ***
Likelihood Ratio	115.131	<.001***

Association between Frailty and 5-times sit to stand test using chi square showed Pearson chi-square value (72.0000) and Likelihood Ratio (92.258).There was a significant association between frailty and fall risk with (p-value < 0.001) shown in table 5.

Table 5: Association between Frailty * 5-Times Sit to Stand Test (Cross tabulation) using Chi Square Test

Frailty		5-Time sit to stand test graph		Total
		Normal	Balance dysfunction	
Non-Frail elders	Count	40	5	45
	% within Frailty	88.9%	11.1%	100.0 %
Frail elders	Count	0	45	45
	% within Frailty	0.0%	100.0%	100.0 %
Total	Count	40	50	90
	% within Frailty	44.4%	55.6%	100.0 %

Chi Square Test		
Value		p-value
Pearson Chi-Square	72.000	<.001 ***
Likelihood Ratio	92.258	<.001***

Association between Frailty and functional reach test using chi square showed Pearson chi-square value (90.0000) and Likelihood Ratio (124.766).There was significant association between frailty and fall risk with p-value (< 0.001) shown in table 6.

Table 6: Association between Frailty* Functional Reach Test (Cross tabulation) using Chi Square Test.

Frailty		Functional reach test			Total
		High Risk of Fall	Moderate Risk of Fall	Low Risk of Fall	
Non-Frail elders	Count	0	2	43	45
	% within Frailty	0.0%	4.4%	95.6%	100.0 %
Frail elders	Count	45	0	0	45
	% within Frailty	100.0%	0.0%	0.0%	100.0 %
Total	Count	45	2	43	90
	% within Frailty	50.0%	2.2%	47.8%	100.0 %

Chi Square Test		
Value		p-value
Pearson Chi-Square	90.000	<.001 ***
Likelihood Ratio	124.766	<.001***

DISCUSSION

The current research revealed that, in comparison to elderly individuals who are not frail, frail elderly individuals have a higher risk of falling and have decreased functional mobility.The fall frequency in the United States for individuals 65 years of age and older fluctuated between 28.2-36.3% [18]. Because of aging-related biological changes and an increase in life expectancy, there has been a significant rise in the frequency of falls. This WHO statement is supported by the research's findings, which show that, among the 19 studies reviewed, a prospective longitudinal study involving 315 senior individuals from 11 towns across three counties in Sweden had the greatest prevalence of falls. 93% of the participants fell, and 58.8% of them were fragile, according to the data, which were consistent with recent study [3, 11]. Falls are considered indicators of functional decline and markers of frailty [19]. Conversely, it was noted that the frequency of falls varied between 8.2% and 93.0% [3, 20]. According to Kashikar and Nagarkar, 26% of Indians are frail (pre-frail: 63.6%; non-frail: 10.4%) [21]. Although Ali *et al.*, discovered frailty in 55.4% of Pakistani elder adult (Intermediate fragile – 44.6%), these results were consistent with recent studies [22]. Frailty was prevalent in 46.2% of males and 46.1% of women in Nepal and 15.2% of pre-frail people in 48.5% of Sri Lanka [23, 24]. Premature death is more likely to occur in frail elderly persons [25]. All SF-36 subgroups with the lowest scores were those of a study by Azeynel *et al.*, on frail patients. According to the Hendrich II Fall Risk Model, 337 (80.2%) patients were classified as high-risk, while 83 (19.8%) patients were classified as low-risk. In the fragile category, the proportion of patients with low quality of life and a significant fall risk peaked at 96%. Among senior hospital patients, frailty is a significant geriatric syndrome. Frailty is frequently accompanied with low quality of life and an increased risk of falling [26]. A prospective cohort research nested inside a RCT was carried out to investigate the relationships between frailty and future falls with short-term incidents in older adults living in the community. For a period of 24 weeks, 248 community-dwelling individuals over 65 who had never experienced more than three falls and were assigned to the usual care arm of an exercise intervention study were prospectively followed for falls. 46 of the 248 individuals were deemed fragile, and 57 of them fell at least once while being monitored. Fallers were categorized as frail (19/57, 33.3%) compared to non-fallers (27/191, 14.1%), and fallers had a

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higher mean FI (0.21) compared to non-fallers (0.14). These outcomes aligned with recent research demonstrating a substantial correlation (p 0.001) between fall risk and frailty [27]. According to a study done in 2021 by Petermann-Rocha *et al.*, frailty was present in 92.1% of patients with sarcopenia or cachexia and had the greatest prevalence (45%). People with frailty alone and frailty plus sarcopenia showed higher all-cause death rates compared to those without any conditions; these findings were consistent with current study [28].The result of this research is that there is a significant relationship between the functional quality and the frailty phenotype in terms of both appendicular skeletal muscle mass. Frailty should thus be considered in routine geriatric examinations.

CONCLUSIONS

The result suggested that frail elderly were at greater risk of fall and their functional mobility is more compromised as compared to non-frail elderly. Frailty and fall risk are significantly correlated there is significant association between Frailty and balance dysfunction .By recognizing the synergistic impact of frailty on fall risk healthcare professionals can implement proactive measures to enhance the well-being and quality of life for the elderly ultimately promoting healthy aging and independence.

Authors Contribution

Conceptualization: AN, AK
Methodology: AN, FA
Formal analysis: HR, AA
Writing-review and editing: AN, MA, MS, MHR, HABA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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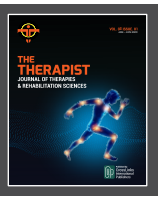

Original Article

Vital Signs Monitoring in Outpatients Physical Therapy in Various Cities of Pakistan

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ABSTRACT

Every time a new patient or client visits, their vital signs should be taken, according to the American Physical Therapy Association (APTA). Taking vital indicators such as blood pressure, heart rate, breathing rate, and body temperature is part of a physical therapist's professional decision-making process. **Objective:** To determine the frequency of vital signs monitoring in outpatients physical therapy practice. **Methods:** A descriptive cross-sectional study was conducted in physical therapy departments of different clinical settings. Data were collected through 12 items survey questionnaire from physical therapist, which was then analyzed by SPSS version 2022.The frequency of monitoring of vital signs by physical therapist was measured by using frequency tables. Association was seen with the help of chi-square test. **Results:** In this survey study, 12 items and 300 respondents were included to find out the frequency of physical therapist who monitor vital signs in their daily practice. The results suggested that 56.7% respondents monitor vital signs, 27.3% respondents monitor vitals only when there is an indicted or diagnosed cardiovascular condition and 16.0% respondent do not monitor vital signs. There is a significant relation that vital signs are neglected due to time constraints in daily practice with p-value less than 0.05. **Conclusions:** This study demonstrated that vital signs are being monitored by most of the physical therapist. Further studies need to conducted and better stratify risk factors for different conditions to better determine when exercise and activity may be at risk.

INTRODUCTION

The first series of clinical examinations consists of evaluating the patient's vital signs. Vital signs indicate to the physician how much a patient has departed from the norm, which is why they are used to rank patients in urgent/prompt care or emergency departments [1]. Healthcare practitioners must understand how to appropriately interpret these sets of measures and be aware of the numerous physiological and pathological processes that influence them [2]. The degree of abnormalities in a patient's vital signs can also serve as a reliable predictor of the patient's long-term health, frequency of ER visits, risk of readmission to the hospital, and utilization of medical resources [3]. Physical therapists must make the decision to take vital signs as part of their multifaceted clinical decision-making process [4]. It can consider factors such as the personal traits of the physical therapists, the type of choice, and the circumstances surrounding the decision [5]. Vital signs should be included in a comprehensive risk assessment rather than being limited to their use as a screening tool for clinical deterioration [6]. Vital signs are a useful tool for evaluating a patient's overall cardiopulmonary function [7]. Evaluating whether a patient's condition permits physical activity or whether their cardiopulmonary condition

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necessitates a change in their course of treatment, which may involve referring them to a different medical specialist [8]. Vital indicators such as temperature, respiratory rate (RR), blood pressure (BP), and pulse rate (PR) are often assessed in physical therapy settings and can be specifically applied when needed [9]. As one of the minimal competences for physical therapists, the American Physical Therapy Association (APTA) states that taking a patient's or client's vital signs should be done each time they visit [10]. Nevertheless, current studies reveal that routine evaluation is not a common practice in physical therapy, with less than half of therapists conducting vital sign checks for the majority of patient sessions [5]. Physical therapists are licensed medical professionals who work in a range of settings, including outpatient rehabilitation facilities, hospitals, schools, nursing homes, and support organizations, according to the American Physical Therapy Association's "Guide to Practice" [11, 12]. In addition to helping patients move more smoothly, they also listen to their complaints and try to lessen their suffering (American Physical Therapy Association (APTA), 2015 [13]. Physical therapists have additional autonomy because patients may not need a referral to start physical therapy [8]. The most fundamental, reasonably priced, and probably most important information obtained about a patient in a clinical context is their vital signs [13]. Additionally, they are a crucial component of various "track and trigger systems" and early warning scores, which are already common practices in many nations for the identification of clinical deterioration [14, 15].

In accordance with the guidelines outlined by the American Physical Therapy Association (APTA) in 2014, it is strongly recommended that vital signs be screened prior to initiating physical therapy. Given the significance of these guidelines, it is imperative for physical therapists to diligently monitor vital signs, particularly in outpatient physical therapy departments. The purpose of this study was to find out whether physical therapists really monitor vital signs or vital signs are not given due significance by them.

METHODS

Descriptive cross sectional study was conducted after obtaining the approval from Institutional Review Board of Women Institute of Rehabilitation Sciences, Abbottabad (reference no.1834 , date of issuance 13-02-23). Raosoft software was used to calculate sample size. Population was assumed to be 20 thousand with 95% of confidence interval. Study setting was Women Institute of Rehabilitation Science, Abbottabad. Convenience Sampling Technique used as sampling technique with sample size of 377 in total. Study duration was 6 months, in inclusion criteria clinical Physiotherapist both male and female were included in the study. On contrary, Physiotherapist working online academic side, unemployed and home care physiotherapists were excluded. The institutional review board approved the research proposal that was presented during the data gathering process. Data were gathered from specific physiotherapists who met the study's eligibility requirements. Prior to gathering data, each physiotherapist was informed about the project and given their consent. Each participant received a self-administered questionnaire, which they completed on their own. The information was gathered via Google Forms and from the following sources: Combined Military Hospital, Jinnah International Hospital Abbottabad, DHQ Abbottabad, DHQ Haripur, Basil Clinic Haripur, Chaudhary Medical Center Haripur, Frontier Medical Institute Abbottabad, Elaj Private Limited, Ibn-Sina Hospital, Saddique Physiotherapy Center, Allama Iqbal Hospital, IDC, Abbottabad, Pak Irish Rehabilitation Center, Aqsa physiotherapy center Haripur, Helping Hand Institute of Rehabilitation Sciences Mansehra, Alghazi folij center Haripur, and Ibn-Sina Hospital. Data were analyzed through SPSS version 2022. The collected data were coded manually organized and categorized into percentages and then frequency tables were made. The descriptive statistical approaches were used to find out the frequency variables. Chi square was used to find out the association.

RESULTS

Total 300 physiotherapist were included in this study out of which 159(53.0%) were females and 141(47.0%) were males, which shows the majority of participants were females shown in table 1.

Table 1: Gender distribution

Gender	Frequency (%)
Female	159 (53.0)
Male	141 (47.0)
Total	300 (100.0)

Table 2 shows that 219 (73.0%) the physiotherapist in our survey were DPT graduates, and 81 (27.0%) were MSPT* masters in physical therapy, indicating that the majority of physiotherapists were DPT graduates.

Table 2: Qualification of physical therapist

Qualification	Frequency (%)
Graduation (DPT)	219 (73.0)
Masters (MS)	81 (27.0)
Total	300 (100.0)

Table 3 tells about the most appropriate definition of vital signs according to physical therapists. Out of 300 PTs, 50(16.7%) PTs were of the view that it is "signs and

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symptoms of a disease", 13(4.3%) PTs are of the view that it is "a part of human composition" and 237(79.0%) PTs were of the view that it is "an indication of basic body function."

Table 3: Most appropriate definition of vital signs

Vital Signs	Frequency (%)
Signs and symptoms of disease	50 (16.7)
A part of human composition	13 (4.3)
An indication of basic body function	237 (79.0)
Total	300 (100.0)

Table 4 shows that 170 (56.7%) PTs take vital signs in their daily practice. 48 (16.0%) do not take vital signs and 82 (27.3%) monitor vital signs sometimes.

Table 4: Frequency of taking vital signs

Variables	Frequency (%)
Yes	170 (56.7)
No	48 (16.0)
Sometime	82 (27.3)
Total	300 (100.0)

Table 5 shows that most frequently measured vital signs, 84 (28.0%)blood pressure being the most monitored vital sign, followed by temperature 19 (6.3%), pulse 15 (5.0%) and respiratory rate 8 (2.7%). Whereas most of the PTs stated that they measure all the below mentioned vital signs equally.

Table 5: Measurement of vital signs in practice

Variables	Frequency (%)
Physiotherapist who don't take vital signs	45 (15.0)
Temperature	19 (6.3)
Pulse	15 (5.0)
Respiratory rate	8 (2.7)
Blood pressure	84 (28.0)1
All of the above	29 (43.0)
Total	300 (100.0)

Table 6 shows that 59 (19.7%) PTs thought that it is time consuming to perform vital signs ,95 (31.7%) thought that it is not time consuming to perform vital signs and 101(33.7%) thought that sometimes it is time consuming to perform vital signs.

Table 6: Performing vital signs is time consuming

Variables	Frequency (%)
Physiotherapist who don't take vital signs	45 (15.0)
Yes	59 (19.7)
No	95 (31.7)
Sometimes	101 (33.7)
Total	300 (100.0)

Table 7 shows that 171 (57.0%) can relate vital signs to presenting disease 20 (6.7%) cannot relate, 64 (21.3%) can sometimes relate vital signs to presenting disease.

Table 7: Physiotherapists able to relate vital signs to presenting disease

Variables	Frequency (%)
Physiotherapist who don't take vital signs	45 (15.0)
Yes	171 (57.0)
No	20 (6.7)
Sometimes	64 (21.3)
Total	300 (100.0)

Table 8 shows that 34 (11.3%) thought that vital signs monitoring is neglected due to time constraints, 45 (15.0%) thought that vital signs are not neglected due time constraints, 176 (58.7) thought that vital signs monitoring is neglected sometimes due to the time constrains.

Table 8: Vital signs monitoring is neglected due to time constraint

Variables	Frequency (%)
Physiotherapist who don't take vital signs	45 (15.0)
Yes	34 (11.3)
No	45 (15.0)
Sometimes	176 (58.7)
Total	300 (100.0)

A significant relation was observed using Chi-Square Test that vital signs are neglected due to time constraints in daily practice with p value less than 0.05.

DISCUSSION

It is concluded from the study's results that not all patient scenarios include taking vital signs. Vital signs give information about a patient's health and what their expected course of treatment should be. Patients who have direct access do not need a referral to see a physical therapist. This autonomy calls for more data to inform the clinical judgment of physical therapists when it comes to vital sign assessment. Because of the high rate of undetected cardiovascular disorders and the effect exercise has on the cardiovascular system, physical therapists need to be aware of the significant risks associated with obtaining vital signs in order to make safe and optimal practice decisions. According to a 2011 research study by Graham and Clark, a physical therapist's job is to first monitor the patient's vital signs in order to establish a baseline report that can be used to measure and compare readings before and after exercise [16]. To ascertain whether the patient is reacting adequately and is suitable for exercise, baseline measurements should be taken. Therefore, the purpose of this study was to ascertain how frequently physical therapists in their separate hospital settings monitor vital signs during outpatient practices. Allen and Mulderick also conducted a survey in US assessing factors that influence vital signs assessment, sixty one physical therapist completed the survey. The result showed that 41% of respondent assessed

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a pulse, 36% obtained blood pressure, 64% obtained respiratory rate. While in this study 300 physical therapist completed the 12 item survey. The result showed that 5.0% of respondent assessed a pulse, 28% obtained blood pressure, 2.7% obtained respiratory rate and 6.3% obtained body temperature [17]. Vital signs can provide information that elucidates the immediate condition of patient in clinic. A pilot study by Peters examined the frequency of vital signs assessment by outpatient physical therapist in Florida. The majority of respondents indicated measuring vital signs 0-20% of the time during initial evaluation and regularly scheduled visits in the prior 6 months, only 24.4% of respondents reported that routine assessment of the heart rate and blood pressure during initial evaluation. The number of respondents that performed routine assessment during regular visits was even at least 13.4% for heart rate and 6.7% for blood pressure assessment [18]. While in this study out of 300 participants 56.7% respondents assessing vital signs, 16.0% respondent never obtained vital signs and 27.3 obtained sometimes or when it is indicated. A study conducted by Smith et al., suggested that Vital signs were documented on only 29 occasions over 134 therapy sessions. No correlation was found between comorbidities and VS assessment [19]. Whereas this study suggests that 56.7% respondents are assessing vital signs and shows significant relation that vital signs are neglected due to time constraints in daily practice with p value less than 0.05. Another study conducted by Millar et al., suggested that of the 74 patient sessions, 15 were initial visits, 54 were follow-up, and 5 were discharge sessions. Although 26% (n=19) of the patients had hypertension as a comorbidity, initial HR and BP were only taken in 2 sessions, and only once taken after exercise while this study suggests blood pressure being the most monitored vital sign and accounts for a total of 28.0% [20]. In this survey study questionnaire and 300 respondents were included to find out the frequency of physical therapist who are assessing vital signs are not, whether they are taking only one or two vitals or they thought that it is time consuming to assess vital signs in outpatient physical therapy practice. The 56.7% respondents are assessing vital signs, 27.3% respondents are assessing vital only when indicted or diagnosed cardiovascular condition and 16.0% respondent are refused to assess vital signs. 43.0% obtained all the vital signs, 6.3% obtained temperature, 5.0% Obtained pulse, 2.7% obtained respiratory rate and 28.0% obtained blood pressure only. When we asked respondents how frequently you monitor vital signs in your OPD 52.0% respondents asses only 1 time , 21.0% are assessing 2 time before and after session, 12.0% are assessing 3 times before ,during and after session. 26.0% respondents obtained respiratory rate for 15 seconds, 32.7% respondents obtained for 30 seconds and 26.3% respondents obtained for 1 minute. 27.0% usually obtained pulse rate for 15 seconds , 34.3% obtained pulse rate for 30 seconds and 23.7% obtained pulse rate for 1 minute. At the end of the survey items we asked the respondents that is it neglected due to time constraints then 11.3% respondents said that it is always time constraints due to which vitals are neglected, 15.0% obtained that it is not time constraints and58.7% obtained that sometimes it is time constraints due to which monitoring vital signs is neglected in outpatient physical therapy practice. The implication of this study highlight the need for early reorganization as well as continues monitoring and paid attention to vital signs monitoring in outpatient physical therapy practice.

CONCLUSIONS

Based on the findings of this study, it is determined that vital signs monitoring is present in large portion of physical therapist practice, but it is also suggested that vital signs are not performed by some physical therapist in their daily practice. The high frequency of monitoring vital signs warrants frequent monitoring of vital sings by physical therapist. One of the limitation of this study is that it was difficult to meet all the Physical therapist needed for our study findings .In order to do so, a larger facilities needs to be selected. Furthermore, the study was limited to close ended answers, physical therapist detailed impressions were unable to record study. A more precise estimate of the prevalence of vital sign monitoring in outpatient physical therapy practice would come from additional experimental and controlled research. Future studies are also required to investigate if routinely monitoring vital signs leads to a reduction in adverse medical events and the identification or diagnosis of disease patterns. Our results may be useful to researchers as they offer a foundational understanding of physical therapy practice.

Authors Contribution

Conceptualization: IJ
Methodology: MK, BK, QA
Formal analysis: WA
Writing-review and editing: FB, AJ, AA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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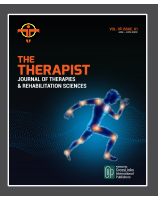

Original Article

Occupational Risk Factor for Carpel Tunnel Syndrome Related to Computer Usage: A Descriptive Cross-Sectional Study

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ABSTRACT

Carpal tunnel syndrome (CTS) is triggered by compression of the median nerve as it travels through the wrist's carpal tunnel. CTS is also more likely to occur if you work in certain occupations such as Related with clerical and administrative work on Computer. **Objective:** To identify the frequency and pattern of CTS among clerical and administrative workers using computer. **Methods:** A descriptive cross-sectional study was started from October 2021 to January 2022 between 20-50 years of age at five Private colleges in Lahore city. The participants fulfilling the inclusion criterion were using computer for more than 6 hours a day, having co-operative attitude, weren't taking any analgesics and had no associated co-morbidities. After informed consent 200 participants were enrolled using convenient sampling method. Sample size was calculated by taking average from previous research publications. A designed questionnaire was given among the participants to obtain information about demographics and Phalen's test for CTS. Data were entered and analyzed in SPSS version 21.0. **Results:** The Results shows that 5 participants have Positive CTS in 20-30, 10 in 31-40, 14 in 41-50 age group. Positive CTS was considered positive via Phalen's Test. Males have higher frequency of CTS as 21 Males and 8 Females with Positive Phalen's test. **Conclusions:** CTS is related with an occupational factor in terms of computer usage. It is common in males because of excess workload and job duties.

INTRODUCTION

Carpal tunnel syndrome (CTS) is triggered by compression of the median nerve as it travels through the wrist's carpal tunnel. Sensory and frequently motor symptoms and indications in the peripheral distribution of the median nerve characterize illness. CTS is also more likely to occur if you work in certain occupations such as Related with clerical and administrative work on Computer [1]. Compression of the median nerve at the wrist causes this common condition that compromises hand function [2]. The carpal tunnel is produced by the several bones in the wrist as well as the transverse carpal ligament, which serves as the roof of the carpal tunnel. The carpal tunnel contains the median nerve and nine tendons [3]. CTS is caused by inflammation and development of the median nerve and inflammation in tendons in because of expansion and thickness of the transverse carpal ligament. The presence of a mass lesion can be a tumor or cysts within the carpal tunnel. It can be a combination of many other factors and pathologies [4]. Whatever the exact cause, pressure on the median nerve and dysfunction are the end results [5]. Research studies have associated computer professionals to overall population of various occupational

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categories did not account occupational risk factors in their estimates [6, 7]. Thus, office workers who use computers infrequently or not at all are a more acceptable comparison group than the overall population or multiple occupational groupings [8]. According to the findings of this meta-analysis, excessive computer use can be an occupational risk factor for CTS [9]. There is a need for more prospective research among office workers with reliably measured keyboard and mouse use, as well as CTS symptoms or indicators confirmed by a nerve conduction study [10]. The carpal tunnel can be constricted and irritated by a wrist fracture, as well as the swelling and inflammation caused by rheumatoid arthritis [11]. CTS is a condition that can be caused by a variety of factors. A combination of risk factors is most likely to blame for the illness's start [12]. CTS prevalence in the general US population is assessed to be 3.72 percent, reflecting a larger pool of afflicted people than previously thought [13]. The carpus has a concave bony structure on its flexor face, which is covered by the flexor retinaculum [14]. The bony carpus forms the carpal tunnel's floor and walls, with the stiff flexor retinaculum functioning as its roof. The flexor retinaculum is connected to the scaphoid tubercle, trapezium ridge, and ulnar side of the hamate and pisiform hooks by the transverse carpal ligament [15, 16]. Certain occupational groups have higher prevalence rates of CTS [17]. The provocative test known as Phalen's Maneuver is utilized in the identification of carpal tunnel syndrome. This is sometimes referred to a flexion test for wrist [18]. The Phalen's test is a stimulating test that can be used to diagnose Carpel Tunnel Syndrome. When the median nerve is crushed or constricted at the wrist, this happens [19]. The discomfort is usually at its worst at night. The patient rests her contracted elbows on a table, enabling her wrists to reach their full range of motion. The patient is instructed to press the dorsal surfaces of her hands together for half a minute. The median nerve will be compressed amongst the transverse carpal ligament and the forward edge of the distal end of the radius in this posture which is increasing the pressure in the carpal tunnel [20]. Computer work contact was linked to an increase of Carpal tunnel syndrome. Ergonomic considerations are critical in ensuring proper hand positioning while working on a computer.

This study explained the Occupational factor in occurrence of Carpel Tunnel syndrome. It will also help the computer users to get awareness as primordial prevention and early symptomatic management in patients for early cure.

METHODS

It is a descriptive cross sectional study conducted from October 2021 to January 2022 among computer users (of clerical staff) aged between 20-50 years at five Private colleges in Lahore city .The participants fulfilling the inclusion criterion i.e. (using computer for more than 6 hours a day, having co-operative attitude, weren't taking any analgesics and had no associated co-morbidities) were enrolled whereas participants having non-co-operative attitude, using computer for less than 6 hours a day, were taking regular analgesics and having other comorbidities for example recent fracture or surgery, pregnancy and infectious diseases were excluded. 200 participants were enrolled in the study via simple convenient sampling method. The sample size was calculated using formula of adjusted sample size:

N=(S)/[1+(S–1)/Population]

where, S = sample size for infinite population, Z = Z score, P = population proportion (Assumed as 50% or 0.5) with 95% confidence interval.

A written permission was obtained from Concerned Departments and ethical considerations were considered. A specially designed questionnaire was given among the participants to obtain demographic data and information regarding Phalen's test of CTS. Data were entered and analyzed in SPSS version 21.0 and Descriptive statistics were applied for frequencies and percentages.

RESULTS

The study was conducted to evaluate the frequency of CTS among computer users of operating computer for more than 6 hours a day, having co-operative attitude, were not taking any analgesics and had no associated co-morbidities. A total of 200 participants were included and considered for Phalen's Test which is a stimulating test that can be used to diagnose CTS once the median nerve is crushed or constricted at the wrist. The patients were instructed to press the dorsal surfaces of their hands together for 30-60 seconds. The frequency and percentages were calculated showing participants positive with Phalen's Test.

Demographic data such as age was distributed in three groups 20-30, 31-40, 41-50 as mentioned in table 1.

Table 1: Frequency Distribution regarding Age Groups

Age (years)	Frequency (%)	Valid Percent	Cumulative Percent
20-30	92 (46.0)	46.0	46.0
31-40	63 (31.5)	31.5	77.5
41-50	45 (22.5)	22.5	100.0
Total	200 (100.0)	100.0	-

The age has a significant role in CTS as the age increases it increased with age and showing CTS-positive via Phalen's Test mentioned in table 2 and for those who had negative, Phalen's Test was resulted as negative.

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Table 2: Cross Tabulation of Age with CTS

Age Groups of Computer Users	Carpel Tunnel Syndrome		Total	p-value
	Positive with Carpel Tunnel Syndrome N (%)	Negative with Carpel Tunnel Syndrome N (%)		
20-30	5 (3.5)	91 (45.5)	96 (48)	0.000
31-40	10 (5)	52 (26)	62 (31)	
41-50	14 (7)	28 (14)	42 (21)	
Total	29 (14.5)	171 (85.5)	200 (100)	

Out of 200, 80 were females and remaining 120 were male and among both populations, males had higher frequency of CTS as mentioned in Table 3.

Table 3: Cross Tabulation of Gender with CTS

Gender	Carpel Tunnel Syndrome		Total	p-value
	Positive with Carpel Tunnel Syndrome N (%)	Negative with Carpel Tunnel Syndrome N (%)		
Female	8 (4)	72 (36)	80 (40)	0.140
Male	21 (10.5)	99 (49.5)	120 (60)	
Total	29 (14.5)	171 (85.5)	200 (10)	

DISCUSSION

CTS is a common complaint among computer users, and it is triggered by severe pressure on the median nerve during repeated wrist movements and a persistent stress-inducing wrist posture, such as the extended wrist position. The international discussion over the link between CTS and occupational tasks are still ongoing. Occupational Safety and Health Administration (OSHA) guidelines and regulations on cumulative trauma disorders had been enacted. Repetitive tasks, force, posture, and vibration have all been identified as occupational risk factors. The National Institute for Occupational Safety and Health (NIOSH) directed a review of available scientific data and found that occupation responsibilities involving highly repetitive manual items or specific wrist postures were linked to incidents of CTS, but interconnection could not be established [21]. Increased work load, lack of rest intervals, lack of postural awareness, and adoption to unhealthy and sedentary lifestyles have all been linked to job-related neuromuscular illnesses in the previous two decades. Computer typists have a job that demands only repetitive use of wrist joint along with constant sitting posture that in addition to CTS results in low back ache, cervical muscles spasm and work induced headache. The fine wrist movements requiring high precision are reportedly known as the sole source of overuse syndrome i.e., CTS. In a Study by Shiri *et al.*, published a meta-analysis in 2015 has described the use of computer in CTS [9]. The goal of his meta-analysis was to see if computer use causes CTS. Computer/typewriter usage was inversely linked with Carpel Tunnel Syndrome in a meta-analysis of six studies. In this study computer workers with other people belonging different occupations were compared. This Meta-Analysis had similar Results with the current study in which 29 Participants had Positive Phalen's test showing positive CTS out of 200 participants doing Computer Related work. Another study by Lee *et al.*, published in 2019 explains that CTS remains a complaint that affects people of all ages and genders. His Study Results are related with the current study showing that Males are more prone to Develop CTS because of more occupational exposure and work load [8]. A Recent study by Feng *et al.*, published in 2021 A cross-sectional surveys of 969 respondents considered from 17 to 49 years from 30 offices was undertaken in a Chinese metropolitan city [13]. Clinically proven CTS patients were evaluated based on symptomatic responders' histories, skin sensory testing, Phalen's test and Tinel Sign. CTS was shown to be prevalent in 9.6% of people in his study. Wrist and hand symptoms were shown to be prevalent in 22 and 15% of people, respectively. Young office workers in China have a high frequency of work-related clinically validated CTS symptoms and increases with age, which is similar to the current study. Working in discomfort on a regular basis is linked to clinically verified CTS. Wrist and hand discomfort are linked to prolonged computer use and no breaks at work.

CONCLUSIONS

It is concluded that CTS is more prevalent among computer users in maximum age groups. CTS are related with an occupational factor in terms of computer usage. It is common in males because of excess workload and job duties. Wrist and hand discomfort are linked to prolonged work on computer having no breaks. There are no confirmed ways for preventing carpal tunnel syndrome; nevertheless, frequent breaks can help reduce tension on your hands. Gentle stretching and bending hands and wrists periodically and maintaining good posture could be beneficial.

Authors Contribution

Conceptualization: TAF
Methodology: AB, NF
Formal analysis: NJ, MJ
Writing-review and editing: TAF

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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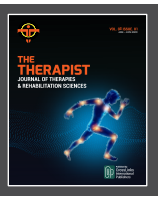

Original Article

Comparative Effects of Core Neuromuscular Training versus Conservative Physical Therapy to Reduce Pain and Improve Functional Performance in Patients with Patellofemoral Pain Syndrome

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ABSTRACT

Running, stair climbing, jumping and squatting represent a few of the activities that can cause patellofemoral pain syndrome. Patellofemoral pain syndrome (PFPS) is one of the most typical causes of anterior knee discomfort in teenagers and persons below Sixty. **Objective:** To contrast the results of conservative physical treatment plus core neuromuscular training and conservative physical therapy alone. **Methods:** It was a quasi-experimental study in which patients suffering from patellofemoral pain syndrome were selected on the basis of convenience sampling from Government hospitals of Faisalabad after meeting the inclusion and exclusion criteria. Twenty patients with patellofemoral pain syndrome were divided into Group A and Group B at random. Participants of Group A performed neuromuscular core training plus conservative physical therapy exercise program for 4 weeks while participants of group B performed conservative physical therapy exercise alone for 4 weeks. Data were analyzed by SPSS version 27.0. **Results:** Following therapy, the pain level was substantially reduced in both of the groups ($P < 0.05$) with Intervention group showing better results. Similarly, there was improvement in scores of Kujala questionnaire in both groups after treatment ($P< 0.05$) but the results of Intervention group were comparatively better. **Conclusions:** There is significant effect of core neuromuscular training plus conservative physical therapy as compared to conservative physical therapy alone.

INTRODUCTION

Pain either behind or around the patella that is exacerbated by at least one action that produces stress on the patella when the knee bends and bearing load is referred to as PFPS [1]. Pain results from a minimum of two of the following behaviors: ascending or descending stairs, running, leaping, maintaining a seated position, squatting, or prolonged kneeling [2, 3]. It occurs more frequently in women and has a yearly incidence of about 23% in adults, rising to 29% in teenagers [4]. Diffuse discomfort, frequently along the knee's medial surface, and pain coming from the anterior portion of the patella are typical symptoms [5, 6]. The primary causes of patellofemoral pain syndrome are numerous and may be related to bio-mechanical or neurophysiological alterations [7, 8]. Individual factors include muscle imbalances, weak quadriceps, and significantly greater hip abductor muscular endurance in contrast to another thigh musculature [9, 10]. While treating patellofemoral pain syndrome, most patients respond well to conservative treatment [11]. For the most common causes of anterior knee discomfort, non-operative care aimed at the underlying cause is the first line of treatment. Surgery should only be carried out when all other options have failed [12, 13]. In case of surgical treatment, the tibial tubercle

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osteotomy (TTO) is a flexible procedure for managing patellofemoral arthritis [14]. In case of patellofemoral pain syndrome patients, a common minimally invasive treatment for musculotendinous diseases is percutaneous electrolysis [15]. Exercises for the core might help PFPS patients with their function and pain [16, 17]. Clara et al., reported that both therapies were successful in treating PFPS patients' discomfort and enhancing their functional outcomes. However, the core strengthening group considerably outscored the knee strengthening group in terms of improvement in knee function [18].

The objective of study was comparing the outcomes of conservative physical treatment and core neuromuscular training in patellofemoral pain syndrome patients.

METHODS

It was a quasi-experimental study in which participants were selected using convenient sampling technique. Sample size was 20 and it was collected using OpenEpi tool. Participants were recruited using lottery method. The duration of the study was 6 months; it commenced from 1st March 2023 and concluded on 31st August 2023.This study was carried out in Government Hospitals of Faisalabad: District Head Quarter (DHQ), Allied Hospital Faisalabad and National Hospital Faisalabad. Subjects were included on the basis of following inclusion criteria: Aged 18-40 years, both male and female, included subject must feel pain after 2 functional activities at least e.g. step up or step down and after 2 month of running, squatting, jumping or kneeling., positive patellar grind test and before any intervention the subject must score 50 to 80 on Kujala Questionnaire and participants with any disease related to ligament, tendon or meniscus, patellar dislocation or subluxation or any surgical history of spine or lower back without referred pains and other congenital illnesses like DM, RA etc. were excluded from the study. Visual Analogue Scale (VAS) and Kujala Questionnaire were the outcome measurement collection tools used in the study. Participants were randomly divided into two groups: Group A - the intervention group - received conservative physical therapy including Hamstring, ITB and gastrocnemius stretching; Quadriceps setting; SLR; Forward step-up and lateral step up exercises plus core neuromuscular training such as bridging while holding a small ball between knees; Side lying hip abduction (clam exercise); lateral SLR; curl-up while holding a small ball between bent knees and straight knees; isometric hip abduction in standing position. Group B - the control group - received only conservative physical therapy exercises mentioned above. Shapiro Wilk test indicated that data were normally distributed. Independent sample t test was used for between group analysis of Visual Analogue Scale (VAS) and Kujala scale while paired sample t test was used for within group analysis of Visual analogue Scale and Kujala scale. Data were analyzed by SPSS version 27.0.

RESULTS

Table 1 shows frequency distribution of gender wherein 7(35%) were male and 13(65%) were female and age of the participants those who participated in study.

Table 1: Frequency distribution of gender and age

Variables		Frequency (%)
Gender	Female	7 (35)
	Male	13 (65)
	Total	20 (100)
Age	21-30	12 (60)
	31-40	8 (40)
	Total	20 (100)

Table 2 shows that Independent sample t test was applied for between groups comparison. There were non-significant differences (p=0.605) between groups in Visual analogue scale at baseline with mean ±SD of intervention group (7.400 ±1.349) and control group (7.100 ±1.197). After treatment mean ±SD of intervention group (4.300 ±1.636) and control group (5.700± 1.059) with t value (-2.271) and significant p value (.036). Intervention group reduce more pain than control group.

Table 2: Between group difference of Visual analogue Scale at baseline and after treatment.

Outcome Measure	Treatment Groups				p-value	t-value
	Intervention Group		Control Group			
	N	Mean ± SD	N	Mean ± SD		
Visual analogue Scale at baseline	10	7.400 ±1.349	10	7.100 ± 1.197	.526	.605
Visual analogue Scale after Treatment	10	4.300 ±1.636	10	5.700 ±1.059	-2.271	.036

Table 3 shows that Independent sample t test was applied for between groups comparison. There were non-significant differences (p=0.978) between groups in Kujala scale at baseline with mean ±SD of intervention group (68.600 ±8.884) and control group (68.500 ±6.687). After treatment mean ±SD of intervention group (79.400 ±6.345) and control group (73.000± 6.182) with t value (2.284) and significant p value (.035). Intervention show more improvement than control group.

Table 3: Between group difference of Kujala Scale at baseline and after treatment

Outcome Measure	Treatment Groups				p-value	t-value
	Intervention Group		Control Group			
	N	Mean ± SD	N	Mean ± SD		
Kujala Scale at baseline	10	68.600±8.884	10	68.500±6.687	.028	.978
Kujala Scale after Treatment	10	79.400±6.345	10	73.000±6.182	2.284	.035

Table 4 shows within group difference in which Paired sample t test was applied. Intervention Group shows paired

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difference of visual analogue scale is (3.100) with significant p value (<.001) and paired difference of control group (1.400) with significant p value (<.001).

Table 4: Within group difference of Visual Analogue Scale Paired sample t test used at baseline and after post interventions.

Outcome Measure	Treatment Groups			
	Intervention Group		Control Group	
	N	Mean ± SD	N	Mean ± SD
Visual analogue Scale at baseline	10	7.100±1.197	10	7.400±1.349
Visual analogue Scale after Treatment	10	5.700±1.059	10	4.300±1.636
Paired Differences	-	1.400±.516	-	3.100±1.286
p-value	-	<.001	-	<.001

Within group difference paired sample t test was applied. Intervention Group show paired difference of Kujala scale is (-10.800) with significant p value (<.001) and paired difference of control group (-4.500) with significant p value (<.001).

Table 5: Within group difference of Kujala Scale Paired sample t test used at baseline and after post interventions

Outcome Measure	Treatment Groups			
	Intervention Group		Control Group	
	N	Mean ± SD	N	Mean ± SD
Kujala Scale at baseline	10	68.600±8.884	10	68.500±6.687
Kujala Scale after Treatment	10	79.400±6.345	10	73.000±6.182
Paired Differences	-	-10.800±4.131	-	-4.500±.849
p-value	-	<.001	-	<.001

DISCUSSION

The main goal of the current study was to compare the effectiveness of core neuromuscular training in reducing pain and enhancing functional abilities in patients with patellofemoral pain syndrome when combined with conservative physical therapy versus when conservative physical therapy was used alone. According to our study's findings, patellofemoral pain syndrome patients in the intervention group displayed an increase in functional performance and a discernible difference in pain intensity. Since PFPS patients have a unique pattern of recruitment of musculature, core neuromuscular training must have rectified the incorrect muscle recruitment in order to provide stability to proximal region, enabling the immediate realization of this improvement. A randomized control trial was carried out in 2019 by Moteallah *et al.,* to investigate the consequences of core neuromuscular training in women with patellofemoral pain syndrome. In their trial, after therapy the pain score was noticeably lower with p value equal to 0.001 and p value of Kujala score after treatment was less than 0.05 in both treatment and control group with treatment group showing better results. While in our study the p value was less than 0.05 in both VAS and Kujala scoring after treatment with significant effects in intervention group [16]. We did a study to see if core neuromuscular training could help with patellofemoral pain syndrome. Both guys and girls were part of the study, but mostly girls (65%) and fewer boys (35%). Our findings matched up with other research that says girls tend to get this type of pain more than boys. A study was conducted in 2016 by Chevidikunnan *et al.,* using core musculature strengthening for reducing pain and improving balance in females suffering from patellofemoral pain syndrome. In their study, after treatment the value of SD of VAS in control and treatment group was 3.26 and 4.17 respectively having less than 0.05 p value. In our study, the SD values of VAS in the control and intervention group were 1.059 and 1.636 respectively with p value of 0.036 [19]. A study was conducted by Foroughi and colleagues to look for core postural control in patellofemoral pain syndrome patients. In their study, the NRS and Kujala questionnaire showed the value of p less than 0.001 in both control and intervention group after treatment with intervention group showing better results [20]. In our study, VAS showed that the value of p was 0.036 after treatment and in case of Kujala questionnaire the value of p was 0.035 with more significant results in intervention group. In 2021 a study conducted by Tazesh and colleagues to assess the impact of core stability training in individuals with patellofemoral pain syndrome. In that study. the standard deviation of VAS at baseline was 41.6(20.7) and 46.6(17.5) for control and intervention group respectively and SD value after treatment for control and intervention group was 27.4(16.4) and 19.4(13.4). The value of standard deviation of Kujala questionnaire at baseline was 70.4(11.8) and 68.6(11.3) and SD value after treatment was 79.8(10.4) and 84.3(8.6) for control and intervention group respectively. While our study showed that in case of VAS, SD values at baseline were 1.197 and 1.349 and after treatment values were 1.059 and 1.636 for control and treatment group respectively. Similarly, for AKPS, the values of SD at baseline and after treatment were 6.687 and 6.182 for control group. For treatment group, SD value at baseline was shown to be 8.884 and after treatment it decreased to 6.345 [21]. The study encountered some limitations. Firstly, the sample size was relatively small, which may have impacted the generalizability of the findings. To enhance the validity of our results, future research with larger sample sizes and similar study designs is warranted. Secondly, our analysis was constrained by the lack of assessment of knee and core proprioception, as well as the strength of muscles in the lower limbs and trunk. This limitation may have influenced the comprehensiveness of our findings. Lastly, comorbidities were not discussed in our study, which could

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have implications for the interpretation of results. Future studies should allocate adequate time for implementing interventions to ensure accurate results.

CONCLUSIONS

The study concluded that both treatments effectively reduced pain and improved functional performance. However, combining core neuromuscular training with conservative physical therapy yielded significantly better results. Similarly, both interventions showed benefits in improving functional performance, with the core neuromuscular training group demonstrating superior outcomes.

Authors Contribution

Conceptualization: AK
Methodology: NJ
Formal analysis: NF
Writing-review and editing: AK, NJ, NF

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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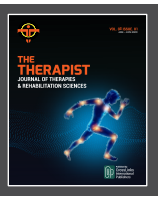

Original Article

Effectiveness of PNF Pattern in Regular Physical Therapy Sessions on Functional Mobility in Frozen Shoulder

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ABSTRACT

Frozen shoulder, or adhesive capsulitis, is a musculoskeletal condition that presents with symptoms such as discomfort, nocturnal pain, and limited range of motion. Abduction and external rotation are significantly reduced. **Objective:** To investigate the effectiveness of combining proprioceptive neuromuscular facilitation (PNF) patterns into routine physical therapy sessions for patients with frozen shoulder. **Methods:** A six-week quasi-experimental study was conducted on a total of 30 participants, divided into group A (n=15) and group B (n = 15), selected from the outpatient department (OPD). Pain, disability, and range of motion were evaluated as outcome measures. The group A received proprioceptive neuromuscular facilitation (PNF) patterns in addition to their usual physical therapy sessions, and group B only received conventional physical therapy sessions. Disabilities of the Arm, Shoulder and Hand (DASH), VAS (Visual Analog Scale) and goniometer were used to assess pain, disability and range of motion (ROM). Data were analyzed using SPSS version 23.0. **Results:** Both groups showed a significant reduction in DASH and VAS scores and an increase in ROMs, as group A showed a better result in terms of DASH score and abduction range ($p<0.05$). **Conclusions:** Both the experimental and control groups had statistically significant outcomes. The PNF pattern and Codman exercises both have a positive impact on rehabilitation. However, PNF is more advanced because it involves a combination of movements that are also useful in daily activities. Additionally, PNF helps develop memory for correct patterned movements. On the other hand, Codman exercises are only effective for retaining and improving shoulder ranges.

INTRODUCTION

Frozen shoulder, or adhesive capsulitis, is a musculoskeletal condition characterized by pain, stiffness, and restricted range of motion in the shoulder joint [1]. It predominantly affects individuals aged 40 to 60, with higher incidence among women and those with comorbidities like diabetes or thyroid disorders [2]. The condition progresses through four stages: painful, freezing, frozen, and thawing. The painful stage lasts up to three months, marked by increasing shoulder pain, especially at night, and limited motion [3]. This painful stage transitions into the freezing stage, which lasts for 3 to 9 months. The frozen stage symptoms persist for duration of 9–14 months where stiffness becomes pronounced due to capsule volume reduction. The thawing

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stage, lasting 15 to 24 months, sees gradual improvement in range of motion with little discomfort as the capsule restores [4]. There are two types: primary, with unknown cause, and secondary, triggered by events like trauma or surgery [5]. Pathologically, primary frozen shoulder involves inflammation, fibrosis [6], and capsular contracture [7]. Elevated levels of cyclooxygenases, interleukins, and TNF-α are observed in affected tissues, with pain associated primarily with mild to moderate severity, though some experience severe pain [8]. Neuronal components and increased vascularity are linked to the condition, yet understanding of pain mechanisms remains limited [9]. Proprioceptive Neuromuscular Facilitation (PNF) techniques, pioneered by Dr. Kabat and Margaret Knott, are therapeutic exercises designed to improve neuromuscular function through proprioceptive feedback and movement patterns [10]. Initially developed for conditions like multiple sclerosis and poliomyelitis, PNF has shown effectiveness in treating various neurological, traumatic, and orthopedic disorders [11]. By incorporating spiral and diagonal movement patterns in three planes [12], PNF utilizes stretch and resistance to strengthen muscles and enhance functional movements [13]. In frozen shoulder, which hinders daily activities and impacts psychological well-being, PNF offers potential benefits in reducing pain, improving range of motion, and enhancing functional impairment.

Despite physical therapy being a common initial intervention, the additional benefits of integrating PNF techniques remain uncertain. Therefore, this study aimed to explore the effects of combining PNF with standard physical therapy in treating frozen shoulder, with the goal of improving treatment outcomes and facilitating return to daily tasks.

METHODS

A quasi-experimental study was conducted in both the public and private sectors over duration of 6 weeks, from November 2023 until December 2023. Purposive sampling was employed with a sample size of 30 individuals, divided into two groups: experimental (Group A, n = 15) and control (Group B, n = 15). For this quasi-experimental study, the sample size calculation was conducted using Rasoft software, ensuring that the study had sufficient statistical power to detect meaningful effects. The study focused on variables including pain, disability, and shoulder range of motion (ROMs), with an alpha value of 0.05 and a confidence interval of 95%. The study population comprised regular outpatient department (OPD) patients meeting the inclusion criteria: male and female individuals aged 45 to 60, diagnosed with adhesive capsulitis, and experiencing limited ROMs of 50%. Exclusion criteria encompassed acute trauma, fractures, bony deformity, glenohumeral joint pathology, acromioclavicular joint pathology, and rotator cuff disorder. SPSS version 23.0 was used to analyze the data. The Disability of the Arm, Shoulder, and Hand (DASH) questionnaire, the Visual Analogue Scale (VAS) for pain assessment, and a goniometer were utilised to measure disability index, pain levels, and range of motion (ROMs), respectively. Shapiro Wilk test was used to analyze the distribution of data: the p- value was kept at >0.05 which indicated that data were normally distributed and parametric test (independent sample t-test for between groups and paired sample t test for within groups) was applied. In this study, control group received treatment regimen comprised transcutaneous electrical nerve stimulation (TENS), application of a heating pad, ultrasonic therapy, Codman exercises, and range of motion (ROM) exercises. We administered this comprehensive treatment approach to the control group under investigation. We used TENS therapy and heating pad for stimulation and to facilitate muscle relaxation and vasodilation to the targeted areas, aiming to relieve pain and promote muscle relaxation. Ultrasonic therapy with high-frequency sound waves aided tissue healing and reduced inflammation. Codman and Range of motion exercises focusing on specific shoulder movements, improve joint mobility and strength. The study used a structured protocol, with each control group participating in 40-minute sessions five days a week. While in experiment group we utilized PNF patterns along with ultrasonic and heating pad. The therapist used proprioceptive neuromuscular facilitation (PNF) techniques, specifically using the hold-relax method followed by the D2 pattern of flexion-extension movements. Participants underwent active-to-passive movements up to their end range of motion, followed by resistance training comprising 15 repetitions and 3 sets. The researchers administered this regimen five days per week for duration of six weeks.

RESULTS

Figure 1 shows the age distribution of the patients N=30 with mean of 52.43 and standard deviation 4.46.

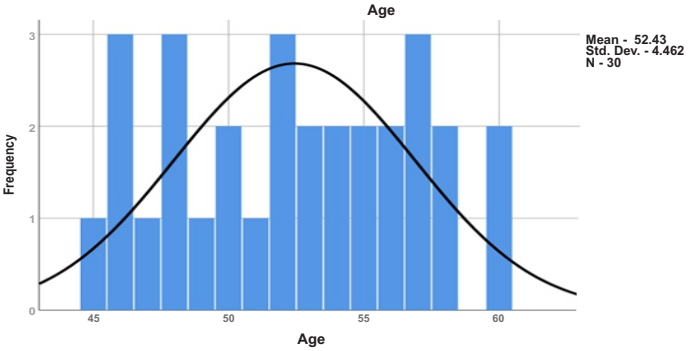

Figure 1: Age Distribution of Patients

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Figure 2 shows frequency distribution of gender in which 20(66.67%)females and 10(33.33%)males were included.

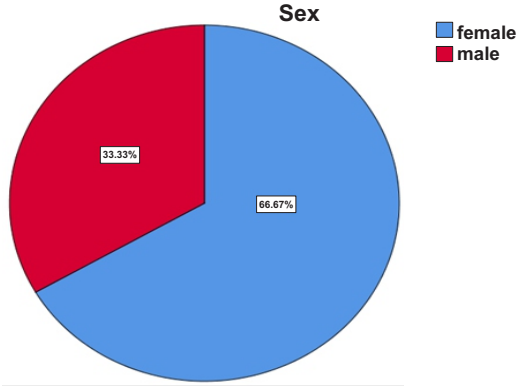

Figure 2: Gender Distribution

For within group difference, paired sample t-test was used. Table 1 shows the experimental group (group A) within group paired analysis and Table 2 shows control group paired analysis. For Group A, the DASH scores showed a paired difference of 32.46 with a standard deviation difference of 6.772, yielding a significant p-value of 0.000. Similarly, VAS scores exhibited a paired difference of 1.53, a standard deviation difference of 0.105, and a significant p-value of 0.001. In terms of shoulder mobility, external rotation had a paired difference of 5.20, a standard deviation difference of 0.704, and a significant p-value of 0.003. Abduction showed a substantial paired difference of 43.00, a standard deviation difference of 5.238, and a highly significant p-value of 0.000. Internal rotation demonstrated a paired difference of 7.20, a standard deviation difference of 2.956, and a significant p-value of 0.003. Flexion had a paired difference of 39.73, a standard deviation difference of 1.173, and a significant p-value of 0.000. For Group B, the DASH scores displayed a paired difference of 13.27, with a standard deviation difference of -8.706, resulting in a significant p-value of 0.007. VAS scores exhibited a paired difference of 1.00, a standard deviation difference of 0.662, and a significant p-value of 0.010. Shoulder mobility, external rotation had a paired difference of 3.13, a standard deviation difference of 4.892, and a significant p-value of 0.003. Abduction showed a paired difference of 15.26, a standard deviation difference of 14.979, and a significant p-value of 0.002. Internal rotation demonstrated a paired difference of 4.86, a standard deviation difference of 3.361, and a significant p-value of 0.004. Flexion had a paired difference of 50.74, a standard deviation difference of 12.203, and a highly significant p-value of 0.000.

Table 1: Paired T-Test within Groups Analysis

Groups	Variables	Time of Measurements		p-value
		Pre-Treatment	Post-Treatment	
		Mean ± SD	Mean ± SD	
Group A	DASH	67.93 ± 6.105	35.47 ± 12.877	0.000
	VAS	4.33 ± 1.302	2.80 ± 1.407	0.001
	External Rotation	11.87 ± 1.710	17.07 ± 2.414	0.003
	Abduction	100.00 ± 10.154	143.00 ± 15.392	0.000
	Internal Rotation	28.40 ± 2.610	35.60 ± 5.566	0.003
	Flexion	118.07 ± 4.978	157.80 ± 6.151	0.000
Group A	DASH	70.87 ± 4.511	57.60 ± 13.217	0.007
	VAS	4.13 ± 1.759	3.13 ± 1.971	0.010
	External Rotation	12.27 ± 1.552	15.40 ± 5.444	0.003
	Abduction	100.67 ± 13.229	115.93 ± 28.208	0.002
	Internal Rotation	29.67 ± 5.779	34.53 ± 9.140	0.004
	Flexion	115.73 ± 7.968	166.47 ± 20.171	0.000

Table 2 and 3 showed between group comparison before and after treatment. Independent sample t-test shows there is no statically significant difference before treatment between experimental and control groups. A statically significant difference was observed only in DASH disability index of arm, shoulder and hand, and shoulder abduction($p<0.05$).

Table 2: Between Group Analysis at Baseline (Independent t-test)

Groups		Mean ± SD	N	T	p-value
Group A	DASH at Baseline	67.93 ± 4.511	15	-1.497	.146
Group B	DASH at Baseline	70.87 ± 6.105	15		
Group A	VAS at Baseline	4.33 ± 1.759	15	.354	.726
Group B	VAS at Baseline	4.13 ± 1.302	15		
Group A	External Rotation at Baseline	11.87 ± 1.552	15	-.671	.508
Group B	External Rotation at Baseline	12.27 ± 1.710	15		
Group A	Abduction at Baseline	100.00 ± 13.229	15	-.155	.878
Group B	Abduction at Baseline	100.67 ± 10.154	15		
Group A	Internal Rotation at Baseline	28.40 ± 5.779	15	-.774	.446
Group B	Internal Rotation at Baseline	29.67 ± 2.610	15		
Group A	Flexion at Baseline	118.07 ± 7.968	15	.962	.344
Group B	Flexion at Baseline	115.73 ± 4.978	15		

Table 3: Between Group Analysis after Treatment (Independent t-test)

Groups		Mean ± SD	N	T	p-value
Group A	DASH After Treatment	35.47 ± 13.217	15	-4.645	.000
Group B	DASH After Treatment	57.60 ± 12.877	15		
Group A	VAS After Treatment	2.80 ± 1.971	15	-.533	.598
Group B	VAS After Treatment	3.13 ± 1.407	15		
Group A	External Rotation After Treatment	17.07 ± 5.444	15	1.084	.292
Group B	External Rotation After Treatment	15.40 ± 2.414	15		
Group A	Abduction After Treatment	143.00 ± 28.208	15	3.262	.004
Group B	Abduction After Treatment	115.93 ± 15.392	15		
Group A	Internal Rotation After Treatment	35.60 ± 9.140	15	.386	.703
Group B	Internal Rotation After Treatment	34.53 ± 5.566	15		

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Group A	Flexion After Treatment	157.80 ± 20.171	15	-1.592	.130
Group B	Flexion After Treatment	166.47 ± 6.151	15		

DISCUSSION

The findings of this study suggest that incorporating proprioceptive neuromuscular facilitation (PNF) patterns into regular physical therapy sessions significantly impacts functional mobility in individuals with frozen shoulder [14]. The results revealed significant improvements in various outcome measures, including Disability of Arm, Shoulder, and Hand (DASH) scores, Visual Analog Scale (VAS) scores for pain, and shoulder mobility parameters such as external rotation, abduction, internal rotation, and flexion. Both groups showed a noticeable reduction in the disability index (DASH score), indicating a significant improvement in their functional ability for routine tasks [15]. Moreover, recent research has shown the efficacy of proprioceptive neuromuscular facilitation (PNF) approaches in improving joint mobility and flexibility [16]. The findings of a comparative study provide valuable evidence supporting the use of proprioceptive neuromuscular facilitation (PNF) stretching as an effective intervention for improving range of motion, reducing shoulder pain, and enhancing functional outcomes in patients with adhesive capsulitis [17]. A single case study; on 46-year female who diagnosed with adhesive capsulitis, revealed the combined effectiveness of PNF with deep breathing exercises. After 11 sessions result showed VAS improvement from 6 to 2 and the post-exercise shoulder flexion and abduction improved from 100 degree to 160 degree, internal rotation from 25 degree to 55 degree, and external rotation from 40 degree to 60 degree [18]. A prior study has provided evidence supporting the effectiveness of proprioceptive neuromuscular facilitation (PNF) approaches in managing chronic back pain [19]. The between-groups analysis demonstrated that the experimental group demonstrated significant improvement in DASH score and abduction range, which corresponds to the findings of a study conducted to examine the impact of proprioceptive neuromuscular facilitation (PNF) exercise on the range of motion (ROM), pain, and functional activity of patients who received total knee arthroplasty (TKA). The exercise resulted in significant changes in VAS and TUG scores within and between the experimental and control groups ($p<0.01$)[20]. However, it is important to acknowledge a few restrictions of the study, which include the relatively small sample size and the lack of long-term monitoring to assess the long-term effects of the improvements observed. Further research including a larger sample size and extended periods of observation is required to gain a better understanding of the continuous efficacy of PNF pattern therapy in the treatment of frozen shoulder.

CONCLUSIONS

The study found that the combination of proprioceptive neuromuscular facilitation patterns, Codman exercises, and electrotherapy resulted in statistically significant benefits. Both the PNF pattern and Codman exercises have a beneficial effect on rehabilitation. However, PNF is considered to be better due to its use of the combination of movements that have common uses for routine activities. In addition, PNF helps in the improvement of memory for correct patterned movements. However, Codman exercises are mainly effective for retaining and improving shoulder mobility.

Authors Contribution

Conceptualization: JA
Methodology: MF
Formal analysis: MA
Writing-review and editing: SG, SURB, HS, TAS, HABA, SA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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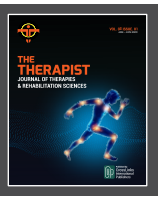

Original Article

Comparative Effectiveness of Muscle Energy Technique (MET) With or Without Proprioceptive Neuromuscular Facilitation (PNF) Pattern in Lumbosacral Dysfunction

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ABSTRACT

Lumbosacral dysfunction is a condition affecting the lumbar and sacral regions of the spine, causing back pain, limited range of motion, sensory deficits, and motor impairments. It can be caused by degenerative changes, traumatic injuries, congenital anomalies, or abnormal biomechanics. **Objective:** The objective of this study was to compare the effects Muscle Energy Technique (MET) alone and with combination of PNF in treating lumbosacral syndrome. **Methods:** The study was a quasi-experimental design over the duration of 8 weeks. Purposive sampling was employed with a sample size of 40 patients, divided equally into Group A (N= 20) who received MET combined with PNF and Group B (N= 20) that only received MET. We used Oswestry Disability Index (ODI), Numeric Pain Rate Scale (NPRS) and goniometer to assess disability, pain, and range of motion (ROM). We analyzed the data using IBM SPSS version 23.0. **Results:** Outcome measures including pain intensity, functional disability, and range of motion, were assessed at baseline and post-intervention (8 weeks). The group A showed significant improvements in all outcome measures compared to the group B at post-intervention assessments ($p < 0.05$), pain intensity decreased by 60-80%. Functional disability scores were reduced by 60-75% in the group A, while the group B showed only 40% significant change. Moreover, the group A exhibited a substantial increase in lumbosacral range of motion compared to the group B. **Conclusions:** The study reveals that both MET alone and MET combined with PNF effectively improve pain, functional disability, and lumbar range of motion in lumbosacral dysfunction patients.

INTRODUCTION

Lower back pain affects 80% of people at least once in their life with a significant percentage developing chronic conditions [1]. It significantly impacts daily tasks, work productivity, and quality of life making it a global disability cause [2]. LBP 4 are multifaceted, including pathological disorders, age, gender, genetics, sedentary behavior, obesity, smoking, and psychosocial factors like stress and depression [3]. Facet joint syndrome, a common cause of chronic low back pain can cause discomfort, limited mobility, and a lower quality of life due to its heterogeneity and lack of precise biomarkers [4]. Lumbosacral dysfunction is a condition affecting the lumbar and sacral regions of the spine causing back pain, limited range of motion, sensory deficits, and motor impairments [5, 6]. It

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can be caused by degenerative changes, traumatic injuries, congenital anomalies, or abnormal biomechanics. Diagnostic evaluation involves a comprehensive assessment, clinical history, and physical examination [7]. In some cases, facetogenic pain may resemble radiculopathy due to compressed spinal discs or nerves, leading to micro instability and synovial facet cysts [8]. PNF techniques were developed focusing on rhythmical stabilization (RS) and a combination of isotonic (COI) exercises for female patients [9]. However, there is limited evidence for their combined use with other therapeutic approaches. A clinical trial showed that MET supervised motor control and resistance exercises significantly improved ODI scores in 19 patients with acute low back pain [10]. The rationale of this study was to compare the effects of MET with combination of PNF in treating lumbosacral facet syndrome.

The aim is to determine the most effective treatment approach, either a combination of PNF and MET or MET alone, that potentially improving symptoms.

METHODS

The study utilized a quasi-experimental design over the duration of 8 weeks from January 2023 till March 2023, and took place in both public and private sectors. Purposive sampling was employed with a sample size of 40 patients, divided equally into Group A (N= 20) and Group B (N= 20). For this quasi-experimental study, the sample size calculation was conducted using Raosoft software, ensuring that the study had sufficient statistical power to detect meaningful effects. The study population comprised regular outpatient department (OPD) patients meeting the inclusion criteria: male and female individuals aged between 25 and 50, diagnosed with lumbosacral dysfunction, limited ROMs of > 40%, NPRS score > 4 and ODI score >20. Exclusion criteria encompassed acute trauma, fractures, bony deformity, spine surgery, metabolic disorder like osteoporosis, and osteomyelitis. The study focused on variables including pain, disability, and lumber range of motion (ROMs), with an alpha value of 0.05 and a confidence interval of 95%. Experimental group received combination therapy of PNF techniques and Muscle Energy Technique. The intervention was structured into four sequential steps with a total period of 15 minutes. The initial step, Step 1, focused on preparing participants for subsequent interventions through PNF hold-relax techniques, aiming to induce relaxation and enhance blood flow in the affected lumbar area. Moving to Step 2, the focus shifted to addressing muscle stiffness frequently associated with lumbosacral facet syndrome, utilizing pulsed MET to enhance tissue flexibility and alleviate discomfort by targeting muscle tension reduction. Step 3 aimed at enhancing participants' range of motion through PNF contract-relax techniques, combining controlled contractions with passive stretches to improve joint flexibility and mitigate the limitations posed by the syndrome. The final step, Step 4, aimed at simultaneous strength and range of motion improvement, employing rapid and slow isotonic eccentric stretches. Participants engaged in 5 repetitions of each stretch type, effectively promoting muscle strength development and further augmenting joint mobility. Overall, this comprehensive four-step intervention seeks to address various aspects of lumbosacral facet syndrome, ultimately aiming to improve participants' functional mobility and participation and to reduce pain. Control group received only Muscle Energy Technique intervention. MET involves the use of isometric contractions to enhance joint mobility and restore balance to musculature around the joint. Patient placed in a comfortable position on a treatment table and is ensured relaxation and communication with the patient to maintain their comfort throughout the procedure. The practitioner uses one hand to feel the specific parts of the lower spine (L4–L5). The patient is sitting down and is gently moved into a slightly bent and tilted position, which puts the problem area at the point where it doesn't want to move further. At this moment, the patient is told to try to straighten up again. This action uses the muscles that are preventing the spine from moving as it should. At the same time, the practitioner applies a little resistance to prevent any actual movement. This effort to move without actually moving is held for about 3 to 5 seconds (as suggested by Stiles), using only about 20% of the patient's strength. This effort is coordinated with breathing. Once this isometric contraction is done and the patient stops trying to move, the problematic point should have shifted a bit, allowing for a bit more bending and tilting without effort. The process is repeated a few times until the maximum possible movement is achieved without discomfort. So, in simpler terms, the practitioner gently guides the patient's spine to a tricky point, and then the patient tries to move as if pushing against a gentle resistance, holding it briefly. When they stop, the difficult point usually becomes a bit easier to move, and this is repeated until the movement improves as much as possible. The data analysis was performed using SPSS version 23.0. A paired t-test was used to assess within-group comparisons from baseline to the post-treatment session for VAS, ODI, and lumbar ROM. An independent sample t-test was used to see the mean difference between the two groups for all the outcome measures at baseline, immediately after the first treatment session, and then after the final treatment session.

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RESULTS

Figure 1 shows frequency distribution of gender 28 (70%) male and 12(30%)female included in the study.

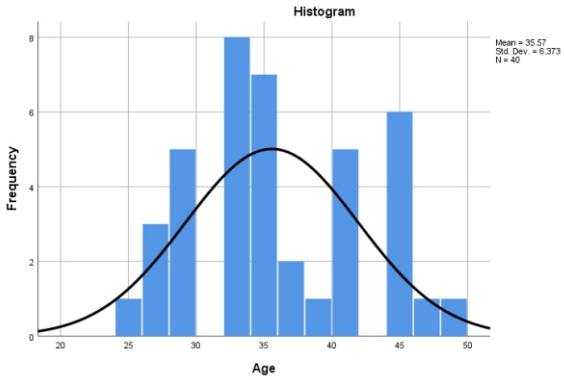

Figure 1: Gender distribution.

Figure 2 the age distribution of the patients N=40 with mean of 35.57 and standard deviation 6.37

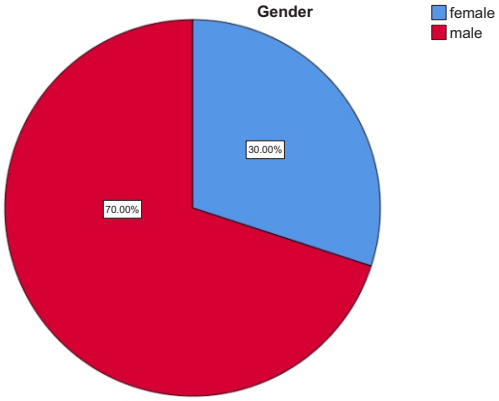

Figure 2: Age distribution of patients

For Group A, the NPRS scores showed a paired difference of 3.100 with a standard deviation difference of 1.03, yielding a significant p-value of < 0.001. For ODI the paired difference was 1.30 ± 0.510 with significant p-value <0.001, for Lumbar flexion it was 4.75 (SD = 1.631), for Right side flexion it was 3.50 (SD = 1.361), for Left side flexion it was 2.45 (SD = 2.637), and for Extension it was 2.95 (SD = 1.667) with significant two tailed p-values of <0.001. For Group B, the mean of paired differences for NPRS was 2.750 (SD = 1.050) and for Left side flexion it was 1.75 (SD = 1.959) with p < 0.001. Paired difference of ODI, Lumbar flexion, Right side flexion, and for Extension were 0.35 (SD = 0.657), 1.90 (SD = 1.694), 1.60 (SD = 1.791), 1.35 (SD = 1.465) and with significant two tailed values were 0.015, 0.006, 0.004 and 0.004 respectively (Table 1).

Table 1: Paired sample t-test within group comparison.

Variables	Group A			Group B		
	Pre-Treatment (Mean ± SD)	Post-Treatment (Mean ± SD)	p – value	Pre-Treatment (Mean ± SD)	Post-Treatment (Mean ± SD)	p – value
NPRS	5.850 ± 1.0399	2.750 ± 0.638	<.001	5.950 ± 1.050	3.20 ± 0.6615	<.001
ODI	3.55 ± 0.510	2.25 ± 1.07	<.001	3.3 ± 0.657	2.95 ± 0.605	0.015
Lumber Flexion	36.65 ± 1.631	41.4 ± 1.875	0.001	37.85 ± 1.694	39.75 ± 2.845	.006
Right Side Flexion	16.2 ± 1.361	19.70 ± 2.43	.0001	16.55 ± 1.791	18.15 ± 2.109	.004
Left Side Flexion	16.7 ± 2.637	19.150 ± 2.277	<.001	16.95 ± 1.959	18.7 ± 2.202	<.001
Extension	9.6 ± 1.667	12.55 ± 1.7	<.001	9.6 ± 1.465	10.95 ± 2.012	.004

Table 2 illustrated the comparison between groups by using independent sample t-test. Table 2 shows there is no statically significant difference between both groups at baseline.

Table 2: Independent sample t-test for dependent variables at baseline

Outcome Measure at Baseline	Treatment Groups		Independent t test	
	Group A (Mean ± SD)	Group B (Mean ± SD)	t – value	p – value
NPRS	5.85 ± 1.040	5.95 ± 1.05	0.303	0.764
ODI	3.55 ± 0.510	3.3 ± 0.657	1.344	0.373
Lumber flexion	36.65 ± 1.631	37.85 ± 1.694	2.282	0.28
Right side flexion	16.2 ± 1.361	16.55 ± 1.791	0.696	0.491
Left side flexion	16.7 ± 2.638	16.95 ± 1.959	0.340	0.736
Extension	9.6 ± 1.667	9.6 ± 1.465	0.00	1.00

P: probability SD: standard deviation

In table 3, ODI index, lumber flexion and extension some degree of significance as p-value<0.05 at post treatment sessions

Table 3: Independent sample t-test for dependent variables after treatment.

Outcome Measure after treatment	Treatment Groups		Independent t test	
	Group A (Mean ± SD)	Group B (Mean ± SD)	t – value	p – value
NPRS	2.75 ± 0.639	3.2 ± 0.616	.269	0.29
ODI	2.25 ± 1.070	2.95 ± 0.605	2.547	0.002
Lumber flexion	41.4 ± 1.875	39.75 ± 2.845	2.166	0.037
Right side flexion	19.70 ± 2.43	18.15 ± 2.11	2.154	0.38
Left side flexion	19.15 ± 2.277	18.7 ± 2.203	.635	.527
Extension	12.55 ± 1.701	10.95 ± 2.012	2.716	0.010

P: probability SD: standard deviation

DISCUSSION

The present study investigated the efficacy of two treatment modalities in managing lumbosacral dysfunction. The findings suggest that both interventions, MET alone and MET combined with PNF, demonstrate significant improvements in various outcome measures compared to baseline, with some differences noted between the two groups post-treatment. In Group A, revealed the significant reductions in NPRS and ODI scores

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indicate a reduction in pain levels and functional disability, respectively, following MET intervention. Moreover, improvements in lumbar range of motion parameters suggest enhanced flexibility and mobility in the lumbosacral region, which are crucial for overall spinal health and function. Although Group B exhibited similar significant improvements, there was a slightly lower mean paired difference compared to Group A. A research has been conducted in which PNF Integrated Pattern (PIP) cross-training is used in the study [11]. The within group comparison using independent sample t-tests revealed no statistically significant differences between Group A and Group B at baseline, indicating that both groups were comparable before the intervention. However, we observed significant differences in ODI index, lumbar flexion, and extension at post-treatment sessions, suggesting that the effectiveness of the two interventions may vary in certain outcome measures. These findings corroborate the established benefits of MET in mobilizing restricted joints, improving muscle function, and alleviating pain, thus enhancing overall patient well-being [12]. A study on 44 chronic low back pain patients found proprioceptive neuromuscular facilitation training reduced pain intensity and improved functional disability [13]. An RCT study involving 30 patients aged 20-40 with chronic low back pain found that muscle energy technique (MET), (PNF) and static stretching significantly improved hamstring flexibility. The results showed that these techniques significantly decreased pain and increased the range of motion in the hamstring, making them an effective therapeutic maneuver for chronic lower back patients [14]. Another RCT was conducted to compare the effectiveness of MET versus PNF in reducing pain and improving strength and function in participants with low back pain (LBP) found significant improvement in pain, disability, and performance. The study divided participants into three groups: MET, PNF, and control. Results showed MET were more effective than PNF and control in treating LBP participants [15]. A study involving 30 chronic nonspecific low back pain patients found that MET, supervised exercises, hot pack, and TENS significantly improved the Oswestry Disability Index score, decreasing disability and improving function [16]. The systematic review of twelve trials involving 410 participants found that PNF Exercise effectively relieved pain, and improved waist function but did not significantly improve dynamic balance in chronic low back pain patients [17]. A study evaluated the effect of Proprioceptive neuromuscular facilitation (PNF) stretching combined with resistance training on non-athlete male students. Results showed significant improvements in strength, muscle volume, and flexibility in both groups after 8 weeks [18]. Some studies from literature give indications that there are same effects of MET when compared with other techniques and with PNF as well. A study compared the immediate effects of MET and lumber stabilizing exercises (LSE) on 21 patients with chronic low back pain with suspected facet joint origin. The study found no significant difference in pain, lumbar movements, or disabilities scores between 21 patients with chronic low back pain, suggesting that a single session of MET and LSE may not be enough [19]. A randomized clinical trial evaluated the effect of MET with or without strain counter-strain (SCS) on acute lower back pain (LBP) in 50 patients. Results showed significant improvement in pain, ROM, and disability after the second session, but no significant difference was found between groups. The immediate effect was only on pain intensity after the first session [20]. However, several limitations should be considered. Firstly, the sample size of the study may have limited statistical power to detect small differences between groups. Furthermore, the study design, while providing valuable insights, does not enable drawing causal inferences regarding the effectiveness of the interventions. Future research employing larger sample sizes and rigorous study designs, such as randomized controlled trials, is warranted to further elucidate the comparative effectiveness of MET with and without PNF in lumbosacral dysfunction.

CONCLUSIONS

In conclusion, the findings of this study suggest that both MET alone and MET combined with PNF are effective interventions for improving pain, functional disability, and lumbar range of motion in individuals with lumbosacral dysfunction. However, the addition of PNF to MET may not confer additional benefits in terms of improving lumbar flexibility. Practitioners should consider these findings when designing treatment plans for individuals with lumbosacral dysfunction, considering the specific needs and preferences of the patient.

Authors Contribution

Conceptualization: TU, AK
Methodology: RK, TA, AM
Formal analysis: SWR, AA
Writing-review and editing: SH, AH

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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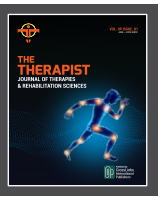

Original Article

Consequences of Stress on the Workability of Physical Therapists

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ABSTRACT

Assertive stressors are legitimate within all occupations. Elements similar to varying employee slots, underprivileged administration, increasing payables, lack of scheduled employee development, insufficient figures of workers, moreover disputes in the office might be frequent job-related irritants. Work efficiency is based on the equilibrium between job requirements and individual resources. **Objective:** To evaluate the consequences of stress on the ability of physical therapists to work. **Methods:** A cross-sectional study was conducted in which data were collected from 100 Physical therapists by using a non-probability convenient sampling technique from multiple hospitals in Karachi. The duration of the study was 6 months from January 2023 to June 2023. Data were evaluated by two validated questionnaires: The Work Ability Index Questionnaire (WAI) and the Perceived Stress Scale (PSS). Statistical analysis was done through SPSS version 23.0. **Results:** Our study results show there is a weak relationship between stress with the different systems of the body in most of the research participants but it physically affects the performance of work in 27 % of participants with symptoms while 4% were unable to complete their task due to stress. Among the participants, 42% were taking leave due to sickness and work burden. **Conclusions:** There is a significant effect of stress on the workability of a physical therapist.

INTRODUCTION

Stress is defined as the character of our psyche that includes both the human brain and the body plus the synergy between them; it differs from man to man and not only emulates the considerable life affairs but also the clashes and it influences the routine life [1]. Hormones linked with the constant stress load look after the body momentarily and urge transformation (allostasis), although during the remote future, affecting strain about constant nervous tension originates modulation into the mind plus embodiment which be capable of bulging to illness (allostatic damage along with overwork) [2]. Brain ambits are elastic and are altered via stress to shift the equity among nervousness, temperament, remembrance, as well as governing [3]. The brain is the chief structure concerning nervous tension as well as alteration. The societal and physical surrounding has strong upshot taking place in the corpse in addition to the brain via neuroendocrine, autonomic, and immune systems [4]. Job tensions have turned into an extremely universal as well as costly crisis inside the institute because Stress is not uniformly assigned, nonetheless, with gender, age, and practice type acknowledged being important associates [5]. In contemporary society, roles in hospitals are growing even more sophisticated with ongoing improvement in curative abilities within an association, sufferers regularly anticipating inside as well as outside of the hospital,

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moreover, claim meant for the finest desirable utility [6]. Working stress is capable of influencing the well-being of individuals along with the company and also affects their effectiveness. Work proficiency is an all-around idea not merely correlates with physical condition nevertheless and with capability, morals, functioning habitat as well and societal relationships [7]. Job capacity is not only resolute via statistical attributes like senility, learning degree, the socio-economic rank, nevertheless is well pretentious using ecological elements in addition to living fashion [8]. The employment facility perception is a vigorous technique to facilitate alterations to a great extent all through a person's operational years. Anytime an internal or external dispute is detected as awful, devious, or alarming, a bunch of processes are roused that execute an arranged reaction to that specific dispute [9]. Stress is always present in our contemporary, action-based, and exacting community. In common, stress is familiar to brain study and memory actions [10]. Stress observed amid or pre-erudition is considered in the direction of improving reminiscence creation, where nervous tension extensive ahead knowledge is considered on the way to quench novel conceal headed for guard reminiscences composed within the demanding circumstances as of obstruction [11]. Stress assists various infirmities universally which results in producing a a serious economic load. Stressful disputes can be sharp or of a constant nature (being in distress or a shattered family) [12]. It may happen only once or may occur repetitively, which can be expected. Stress can be uncertain and ungovernable, harsh, and happening on and off concerning background, e.g. about education skills [13]. The anatomical strain feedback can break into two dissimilar instance areas in the company an instant reaction and a slow reaction. The initial fraction afore strain reaction be reasoned as the "alarm reaction" and "fight-fright-or-flight" reaction, which engage the fast energizing of the autonomic nervous system (ANS) which grounds the secretions like epinephrine as well as norepinephrine from the adrenal medulla [14]. Those chemical substances rapidly raise the fundamental speed of metabolism, and blood pressure along pulmonary functions, in addition to raising blood supply towards major important imperative structures which are important meant for "fight-or-flight" reaction, like the heart along with skeletal brute force [15]. The level of occupational capacity within the functioning people knows how to predict mutually future ceaseless incapability in addition to episodes of illness abscond [16]. Consequently, massive assortments of research have approached ultimate job capability within the vocational community using primarily corporeal burden next to employment. The relation between vocational capacity, and physical and mental strength was explained by various studies [17]. Work efficiency is based on the equilibrium between job requirements and individual resources. Heath and functional ability form a base for workability with professional knowledge and capability, worth, stance, and encouragement.[18].

The aim of our study was to highlight factors that caused stress and affect the performance of a physical therapists. It will help to minimize the factors that are the reason of stress at workplace and improve the performance of a worker at workplace.

METHODS

This study was a cross-sectional survey conducted from January 2023 to June 2023. The sample size of the study was 100. The sample size was calculated through Raosoftware.com at a 90% confidence interval. After receiving ethical approval from the competent authority of Jinnah Postgraduate Medical Center. Research participants were recruited through a non-probability convenient sampling technique and the sample population was physical therapists from different hospitals in Karachi (Patel Hospital, National Institute of Cardiovascular Disease, National Medical entre, Liaquat National Hospital, ACELP Institute of Child Development, Jinnah Postgraduate Medical Center, Sindh Institute of Physical Medicine and Rehabilitation, and Dow Ojha Campus). The inclusion criteria were physical therapists having a minimum of 1 year of clinical experience and also currently in practice, both male and female physical therapists were included. The exclusion criteria were physical therapists working in academic and administrative settings, and who were not willing to participate in our study. Data were collected through two validated questionnaires. The first tool was the Work Ability Index Questionnaire (WAI)-a measurement tool used to assess the ability of a person at work. in which the major parameters included are: the ability to do work, job description, acute conditions diagnosed by a doctor, inability to do work due to pathological conditions, leaves due to sickness in past tenure, and mental disability. The scoring of (WAI) ranging from 2 to 49. 2 to 27 lies in poor category, 28 to 36 medium, 37 to 43 good and 44 to 49 very good. The second tool which were used in this study was Perceived Stress Scale (PSS) is a self-reporting measuring tool to evaluate the working conditions of a physical therapists and their level of stress. It is type of five points Likert scale ranging from 0 (never) to 5 (very often). Data were collected from the 100 physical therapists of different hospitals and clinics in Karachi. Data were analyzed by SPSS version 23.0. in which frequency and percentages of research participants were evaluated.

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RESULTS

In our study, a total population of 100 physical therapists was included among which 38% were male and 62% were female 67% of respondents were between 21 and 30 years of age, 23% responded between the age of 31-40 years and 10% lie between 41-50 years of age. Work experience was categorized into four groups 64% of physical therapists had work experience of less than five years, 21 percent had 6 to 10 years, 12 percent had 11 to 15 years only 3 percent had more than 15 years of experience. The two evaluating methods were used in our study which is a questionnaire was named Work ability index (WAI) questionnaire, and the scale was used for stress was perceived stress (PSS) scale.

According the findings of WAI, the current workability of physical therapists was recorded in which 15% of therapists reported moderate workability, 84% reported high workability and only 1% of therapists reported low workability as shown in table 1.

Table 1: Current Workability Compared with Lifetime

Workability	Frequency (%)	Valid Percent	Cumulative Percent
4-6 Moderate Workability	15 (15.0)	15.0	15.0
7-10 High Workability	84 (84.0)	84.0	99.0
1-3 Low Workability	1 (1.0)	1.0	100.0
Total	100 (100.0)	100.0	

In comparison to the job demands workability of physical therapists was categorized into 3 classes among which 13% lie in the moderate class, 32% of physical therapists reported rather a good workability and 55% had a very good ability to work in association with the demand of the job as shown in table 2.

Table 2: Workability of the Demand for Job

Workability	Frequency (%)	Valid Percent	Cumulative Percent
Moderate	13 (13.0)	13.0	13.0
Rather Good	32 (32.0)	32.0	45.0
Very Good	55 (55.0)	55.0	100.0
Total	100 (100.0)	100.0	

The percentage of workability of physical therapists in demand for jobs and the physical demand for job was categorized into moderate, good, and very good, and the results are shown in figure 1 and figure 2.

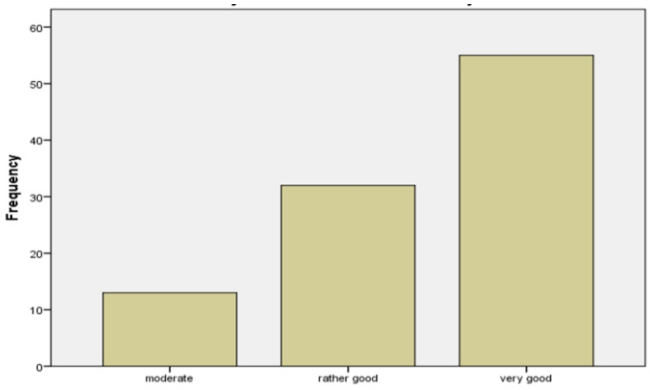

Figure 1: Workability in Relation to Demand of Job

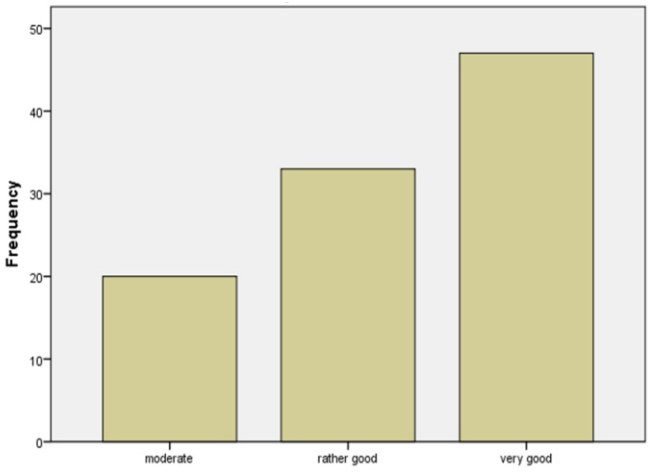

Figure 2: Correlation of Work with Physical Demand of Job

The percentage of workability concerning the mental demand of a job was categorized into very poor, poor, moderate, good, and very good (Figure 3).

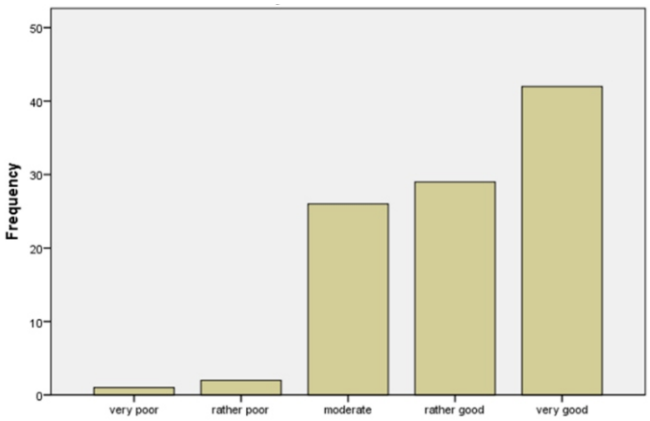

Figure 3: Correlation of Work with Mental Demand of Job

After asking the question related to feelings of stress in the last month the physical therapist answered in five categories never, rarely, sometimes, fairly often, and very often as shown in figure 4.

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In the systemic review section, 84% of therapists did not have any back pain as the result of any injury from an accident, 14% reported injury in their own opinion while 2% of therapists had injury diagnosed by a physician In musculoskeletal diseases 67% participants reported with no disease in the upper back or cervical spine in contrast 24% have cervical pain in their own opinion and 9% were diagnosed by physicians Inquiring about lower back pain 87% of therapists reported no disease while 10% had pain in their own opinion and 3% were diagnosed by a physician. While investigating respiratory tract infections 87% reported no disease,5% had their own opinion and 8% of cases were diagnosed) .75% of therapists don't have any mental disorders depression anxiety, or insomnia, 20% reported yes but that was their own opinion while 5% were diagnosed cases. While investigation of obesity revealed that 86% replied no, 11% had obesity in their own opinion and 3% were diagnosed cases. Investigation about anemia revealed that 88% had no disease, 10% were diagnosed by a physician and only 2% of cases had their own opinion. Among 100 participants 49% of therapists had no hindrance in their work 20% were able to carry out their job but some symptoms were experienced,27% of therapists sometimes slow down their job speed or alter their technique and 4% of therapists must often slow down their speed. Among 100 participants 42% took sick leave none at all in the past 12 months, 43% of therapists took at most 9 days and 15% of therapists took 10-24 days of sick leave in the past year 66% of therapists reported relatively certain prognosis in their workability while 25% were not certain about it and 9% reported unlikely no prognosis.

A Perceived Stress Scale (PSS) was administered among participants, the results found to be 12 (12.0%) participants replied they never feel stress, 17 (17.0%) participants said almost, 32 (32.0%) participants replied sometimes, 27 (27.0%) replied to fairly often, and12 (12.0%) responded very often feel stress that revealed among the total of 100 physical therapists as shown in figure 5.

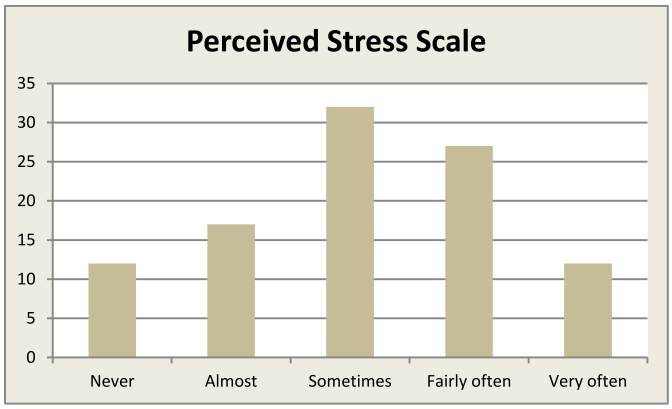

Figure 5: Cumulative Score of PSS

DISCUSSION

Stress is defined as the character of our psyche that includes both the human brain and the body plus the synergy between them [19]. Our study showed that increased stress was independently associated with the lower workability of physical therapist as compared to this a study revealed an association between occupational efficacy, & backache. Soreness and workability together are interrelated to one another [20]. As the results of our study implicit that pain and work-related stress both affect the job attitude of physical therapists. It is also revealed that initially in earlier years workability had been reported high but gradually the ability was reduced to some extent due to musculoskeletal pain and stress factors whether it is personal or related to work. Furthermore, a study reported that incorrect posture and body mechanics result in decreased workability [21]. That is true but stress is also a major factor that affects workability in comparison to this. From our study it is observed that due to high levels of stress physical therapists often or sometimes change their pace or working methods. A study reported, Managerial discrimination may become the factor to enhances the stress level that ultimately results in decreased workability and psychosocial factors may be the prompt indicator of illness leave or absenteeism [22]. But in our study, there was not a very large impact but about 42% of good current mental workability 26% of therapists reported moderate level that shows that they have psychological hindrances in their work that may be personal or work-related. Additionally, a systemic review showed that musculoskeletal problems were experienced as 33% cervical pain, 13% lower back pain, and 4% other musculoskeletal problems 13% had respiratory infections,25% mental problems,14% obesity, and 12% experienced anemia in this high instance were reported about the mental problems and musculoskeletal pains. Some studies revealed that as age advances the work capacity decreases in addition the feeling of inferior rank staff mainly accounts for the increased stress levels of laborers that ultimately result in decreased work capacity [23, 24]. Those results of researches are also supported in our study that as the work experience advances of the physical therapists they reported the changes in their work pace and methods with the figure of 51% of therapists change their pace. Another study revealed that lack of support at the workplace, and poor communication lead to burnout that results in absenteeism and increased depression [25]. But in our study, results implied that 58% of therapists took sick leave that is due to increased stress levels and body problems related to their work. A study conducted among Australian veterinarians found a Strong relationship between too many patients per day, few

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holidays extended working hours with no breaks that decreases the workability of veterinarians [26]. Similarly, in our study that mental resources had a great impact on the work efficiency of physical therapists increased workload enhances the stress level that ultimately decreases the workability either there may be any impairment related to physical problems are present or not the therapist most often loses their ability due to increased level of stress. The PSS (Perceived Stress Scale) is a validated tool used for the evaluation and self-reporting of stressful situations of own lives [27]. The investigation about the perceived level of stress of our study observed that most of the participants replied with the option of sometimes indicating that with the increased work demands the stress of the therapists increases that have an impact on the productivity of physical therapists. So, there is a need to develop those types of strategies that help therapists reduce their stress levels to enhance the workability that is beneficial for the therapists themselves and for the country's economy and development as well so future studies must focus on the development of purposeful strategies because impact is already described in the study so there is no need to develop such strategies and to reduce the levels of stress in physical therapists.

CONCLUSIONS

In our study, there is a direct impact of mental condition on the physical ability of a physical therapists. Therefore, it is concluded that productivity of a physical therapists decreases as the level of stress increased at workplace that is a measuring factor needed by the healthcare professional during the clinical practice.

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Authors Contribution

Conceptualization: MH
Methodology: SB, PL, KFR
Formal analysis: SM
Writing-review and editing: MH, NSB, SB, KFR, SRB

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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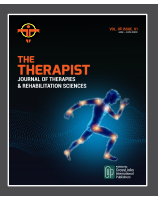

Original Article

Prevalence of Hamstring Tightness Among Healthcare Workers

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ABSTRACT

Hamstring tightness is the incapability of the muscle to move more than 160 degrees of extension of the knee while 90 degrees is flexion of the hip is called tightness of the hamstring. Mostly seen that the higher ratio of hamstring tightness occurs in the right lower limb. **Objective:** To determine the prevalence of hamstring tightness among healthcare workers. **Methods:** It was a cross-sectional study conducted on hamstring tightness among healthcare workers in Karachi from July 2023 to Jan 2024. The sample size of the study was 643 healthcare workers. The convenient sampling techniques was used. For the evaluation: SLR(Straight leg raise) and AKE(Active knee extension) were used. The data were analyzed through the SPSS version 23.0. **Results:** A total number of 643 healthcare professionals of both genders were recruited from hospitals in Karachi. There were 197(30.63%) physical therapists who were found to be the tightness of the hamstring muscle. The ranges of body mass index among healthcare workers are higher in the underweight BMI category. The severity of hamstring muscle tightness in males was observed higher between 31 to 45 degrees in the right lower limb as compared to the left. The severity of hamstring muscle tightness in females was observed higher between 31 to 45 degrees in the right lower limb as compared to the left. **Conclusions:** The prevalence of hamstring was found in all healthcare workers of research but the highest percentage was found in physical therapists as compared to other professions.

INTRODUCTION

The inability of an individual muscle or group of muscles to perform the task in the full range of motion of the specific joint that is involved in the activity is known as muscle tightness. It can cause pain in the muscles and also decrease the flexibility of the muscles [1]. The hamstring muscle is considered a large group of muscles because it covers the posterior side of the thigh and consists of three muscles which are semitendinosus, semimembranosus, and biceps femoris [2]. These muscles cross the 2 joints, the knee and gluteus region as they arise from the tuberosity of the ischial and ends in the posterior region of the knee. The major role of the hamstring muscle is to maintain the flexibility of the body and work as a flexor of the knee and extensors of the hip joint [3]. Hamstring tightness is the incapability of the muscle to move more than 160 degrees of extension of the knee while 90 degrees is flexion of the hip is called tightness of the hamstring [4]. The main causes of tightness include sitting for a

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prolonged period, standing in a constant position, lack of stretching before doing any physical activity, strain of the muscle, and hamstring shortness [5]. It shows the many musculoskeletal disorders like lower back aches, pain in the patellofemoral region, injury of the muscle, and inflammation of the plantar fascia. However, the pain ratio increases time by time increasing the tightness of the hamstring muscle [6]. People working in those departments who are working constantly in a sitting position for about 6 to 8 hours are more prone to the tightness of the hamstring which decreases flexibility and the prevalence of loss of flexibility of hamstring muscle in office workers was 85.7%, due to the loss of flexibility of the muscle causes the injuries of the hamstring muscle. Mostly seen that the higher ratio of hamstring tightness occurs in the right lower limb [7]. There are some special tests used to measure the flexibility and range of the hamstring muscle which include the active knee extension test and passively performed straight leg raise test. In young people, the movement of the hamstring muscle is poor it can cause lower back pain issues [8]. When a person sits in a constant position for a longer period it can cause trigger points in the hamstring muscle which causes tightness of muscle, exerts a high pressure on the lower lumbar spine, and also exerts mechanical stress on the spine [9] While a person maintains a kyphotic posture for a longer time it exerts more pressure on the spine and causes muscle tightness. Many factors can affect the elasticity of hamstring muscle like age of the person, gender basis, activity of their routine, and it's body mass index. The group of hamstring muscles can linked with dysfunction of movement at the spine, pelvis, and lower extremities because it causes lower back ache and gait pattern disturbances [10]. Healthcare workers can treat individuals as consultants, nurses, physical therapists, staff, technicians, and medical waste handlers. Many musculoskeletal problems occur while they are serving human beings and do not take care of their health. Mostly upper extremities, lower back aches, pain in knees, and lower extremities are affected the most [11]. There are many different symptoms related to the musculoskeletal systems faced by healthcare professionals such as muscle stiffness and reduced muscle strength, flexibility, stability, and many more. Symptoms mainly affect more than seven times in the healthcare workers because they can perform duties to grasp the patient, bad posture, patient positioning, feeding the patient, and transferring the patient to bed, and chairs for their specific reasons [12].Strains and tightness of muscles can be treated conservatively through rest, cryotherapy at least 3 to 4 times a day, gentle exercises, properly stretching techniques, and then back to normal life again if it is not treated on time it can cause a major injury of the muscle, tendon, ligaments of the joint [13]. Flexibility is the major component of fitness.

The aim of our study was to evaluate the muscle tightness of the hamstring which can affect the performance of a person and enable him/her unable to function properly. The study aims to evaluate the prevalence of hamstring muscle tightness among healthcare professionals in Karachi.

METHODS

It was a cross-sectional study conducted on hamstring tightness among healthcare workers in Karachi from July 2023 to January 2024. The sample size of the study was 643 according to the healthcare workers. The sampling techniques used in this study were convenient. The inclusion criteria of the study included both genders, healthcare workers like consultants, physical therapists, pharmacists, nurses, dieticians, technicians, and other staff members who are currently working in hospital setups of Karachi, and ages between 20 to more than 59 years. Those participants were excluded in our study who were not willing to participate in the study, and who suffered from any injury or deformity of the spine and the lower limb. In this study, we used two special tests named Straight leg raise and Active knee extension which were used to identify the hamstring muscle tightness and flexibility of the hamstring muscles in male and female healthcare workers of the study. Active knee extension is measured by the performance of knee flexion from the knee in an extended position during this test every knee of the limb was measured thrice. To perform the active knee extension test, participants were required to supine lying on the couch with an extension of both lower limbs. By the use of a vertical bar apparatus, the alignment of the anterior superior iliac spine of both limbs was done. During the measurement the limb which was not measured stabilized on the couch by the thigh area. The therapist told the research participant to flexion of the hip joint towards the horizontal bar to maintain the thigh and horizontal bar contact. Now the subjects were advised to relax their feet extend the legs maximally and foot hold the position for five seconds. For checking the flexion and extension range of motion of the knee joint, the standard instrument was used named as Goniometer, which was placed around the femur and fibula bone of the lower limb. The data were analyzed through the SPSS version 23.0 software in which we calculated the frequencies and percentages.

RESULTS

A total number of 643 healthcare professionals were recruited from different hospitals in Karachi from which 98(15.24%) were general physicians, 197 (30.63%) were physical therapists, 160 (24.88%) were nurses, 67 (10.41%) were pharmacists, 43 (6.68%) nutritionists, 37 (5.75%) was

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technicians and 41 (6.37%) was staff. The ranges of body mass index among healthcare workers were higher in the underweight BMI category at 289 (44.94%) whereas lower in the obese BMI category at 48 (7.46%) and other demographics as shown in table 1.

Table 1: Demographics of Research Participants

Factors	n (%)
Healthcare Professionals	
General Physicians	98 (15.24%)
Physical Therapists	197 (30.63%)
Nurses	160 (24.88%)
Pharmacists	67 (10.41%)
Nutritionists	43 (6.68%)
Technicians	37 (5.75%)
Staff	41 (6.37%)
Age	
20-29	236 (36.70%)
30-39	147 (22.86%)
40-49	97 (15.08%)
50-59	89 (13.84%)
>59	74 (11.50%)
Gender	
Male	327 (50.85%)
Female	316 (49.14%)
Body Mass Index (BMI)	
Underweight (<18.5)	289 (44.94%)
Normal (18.5-24.9)	217 (33.74%)
Overweight (25.0-29.9)	89 (13.84%)
Obese (≥30)	48 (7.46%)

The prevalence of hamstring tightness was found in 382 (59.40%) and absent in 261 (40.59%) among healthcare workers in Karachi as shown in figure 1.

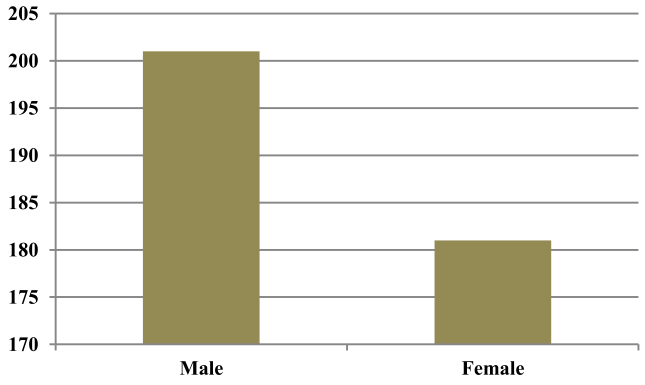

Figure 1: Prevalence of Hamstring Tightness Among Healthcare Professionals

The prevalence of hamstring tightness was found 201 (52.61%) in males healthcare professionals while 181 (47.38%) in females as shown in figure 2.

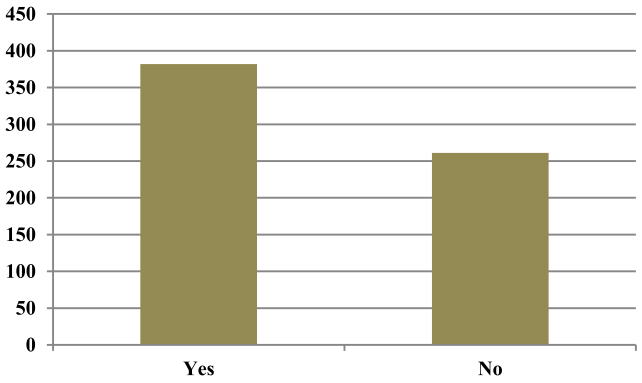

Figure 2: Prevalence of Hamstring Tightness in Both Genders

Tightness of hamstring muscle severity among males was found more in the right lower limb 172 as compared to the left lower limb 134 between 31 to 45 degrees. In the right lower limb 98 (48.75%) of the research participants had hamstring tightness in 172 males while in the left lower limb, hamstring tightness was found in 134 males from which 72 (53.73%) of participants had higher tightness in between 31 to 45 degrees. Furthermore, tightness of hamstring muscle severity among females was found more in the right lower limb 159 as compared to the left lower limb 97 between 31 to 45 degrees. In the right lower limb 67 (42.13%) of the research participants had hamstring tightness in 159 females while in the left lower limb hamstring tightness was found in 36 (37.11%) of participants out of 67 females have higher tightness between 31 to 45 degrees as shown in figure 3.

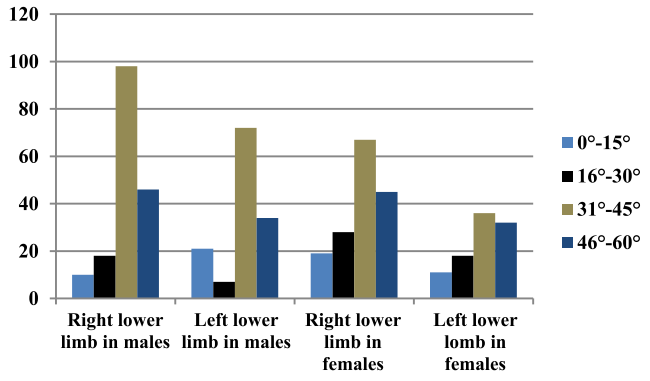

Figure 3: Severity of Hamstring Tightness in Both Limbs

DISCUSSION

The hamstring muscle group is prone to develop tightness around the the region of backside of the thigh may be due to trauma, prolonged sitting, and biomechanically imbalanced posture [14]. People of every occupation have different levels of work due to their job description but

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commonly healthcare professionals have the same type of posture issues related to their specific profession which makes them prone to developing musculoskeletal injuries [15]. The objective of our study is to find out the frequency of hamstring muscle tightness among all healthcare professionals. In our study, we add multiple healthcare professionals from different departments to compare their rates of prevalence of hamstring muscle tightness. The results of our study showed a higher prevalence of hamstring muscle tightness was found in physical therapists i.e., 30.63% while in technicians the least prevalence is found i.e: 5.75% the difference in the results shows their job description variation which causes the injury. In comparison to this, a study reported that the prevalence of hamstring muscle tightness is found more in athlete males who are engaged in contact sports activities as compared to other sports and they also reported that there was no association of hamstring tightness with the height of body as well as the resting time between the sports, therefore, the athletes who engaged in contact sports should take preventive measures to avoid the hamstring muscle tightness [16]. A study conducted in Nigeria reported that the average age of hamstring tightness was between 29 to 45 years [17]. Another crossectional study whose authors used the active knee extension test revealed the prevalence rate of hamstring tightness was higher in between the age group of 18 to 25 years and they also reported the research participants of younger age was 82% and more common in females as compared to males [18], while in our study the commonest age of the research participants who had hamstring tightness is found in between 20 to 29 years among 36.70% of research participants. Concerning the gender a comparative study about the correlation of prevalence of hamstring tightness between the length of right and left hamstring muscle in both genders was conducted on college students and they concluded hamstring tightness was found in all research participants and there was a significant correlation between the hamstring muscle of right and left lower limbs of both genders: the male participants had more tightness in left limb while in females right limb was affected in higher amount additionally nonsignificant results were found when they compared the length of hamstring muscles in both right and left sides [19]. Furthermore, in our study, the majority of healthcare professionals fall in the underweight category of BMI while the lowest number of research participants was found in the obese category of BMI as compared to A study done in Malaysia, which concluded that the BMI of the obese category was found more in nurses as compared to the doctors [20]. The study revealed that the severity of hamstring muscle tightness was found to be higher in 68% of subjects during the movement between the angle of 30° to 45° and reading reported after the implementation of the active knee extension test [14]. however in our study, tightness of hamstring muscle severity in males was observed higher between 31 to 45 degrees in the right lower limb as compared to left lower limb while in females the tightness of hamstring muscle severity was observed higher between 31 to 45 degrees in the right lower limb as compared to the left lower limb. Our study showed, that almost all research participants with different occupations had tightness of the hamstring muscle with slight changes in the degrees and other factors.

CONCLUSIONS

The prevalence of hamstring was found in all healthcare workers of research but the highest percentage was found in physical therapists as compared to other professions. The younger age healthcare workers from 20 to 29 years are more affected. There was a significant relation between hamstring tightness the BMI level and our study observed a higher rate of males being affected as compared to females. Therefore, awareness of stretching exercises should be increased among healthcare workers to prevent hamstring tightness and physical therapists should do some stretching exercises themselves to prevent musculoskeletal issues and future injuries.

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Authors Contribution

Conceptualization: KJ
Methodology: SH, KZ
Formal analysis: OA
Writing-review and editing: KJ, SR, SRR, SH, FZ, SA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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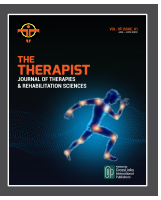

Original Article

Occurrence of Coccydynia in Healthcare Professionals of Karachi; Pain and Straight Leg Raise Test Perspective

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ABSTRACT

Coccydynia is a condition in which pain is experienced around the tailbone or coccyx region. The sitting position triggers the pain in the coccyx region especially when while patient comes from sitting to a standing position. The prevalence of coccydynia is unknown in the general population but it is more common in females than males. **Objective:** To determine the occurrence of coccydynia in healthcare professionals of Karachi. **Methods:** A cross-sectional study was conducted among healthcare professionals in Karachi from August 2023 to Feb 2024. The sample size of the study was 543 healthcare professionals. The sampling techniques which was used in this study were convenient. For the collection of data, a self-administered questionnaire was used while for the evaluation of data, two tests Visual Analog Score (VAS) and Straight Leg Raise(SLR) were used. The data were analyzed through the SPSS version 23.0 software in which we calculated the frequencies and percentages. **Results:** The study was done on 543 healthcare professionals between the ages of 20 to more than 59 years old who were recruited from different hospitals in Karachi. Pain intensity which was evaluated by the visual analog scale observed 223 (41.06 %) of participants found to lie in the moderate pain category while confirmation of coccydynia was done by the application of SLR and was found to be positive in 426 (78.85%) of healthcare professional's. **Conclusions:** The occurrence of coccydynia was found in the majority of the healthcare professionals of Karachi while the complaints of pain were found in the moderate category.

INTRODUCTION

Coccydynia is the pain of the tailbone at the base of the spine (coccyx) bone. It may be a sharp pain or sometimes feels like dull pain around the coccyx bone [1]. It is more common in females as compared to males. When sitting in a constant position for a long period causes inflammation of the coccyx bone and sometimes it injures the joints of the coccyx called coccygeal joints the reason for the injury of bone is that it gives compressive pressure on tailbone muscles and their tissues which surround the coccyx bone [2]. It is a very irritating condition for the patients who suffer from this pain. Sometimes patients feel pain in the region of the lower sacrum and sometimes they feel pain in the lower back or not. When they are sitting on a hard surface for a longer period it shows the signs and symptoms of this disease are sharp pinching or dull aching pain in the tailbone or lower region of the sacrum [3]. Most of the time the pain becomes worse and increases the intensity of symptoms in females when they have a period of menstruation, due to performing activities that exert pressure on the muscle of levator ani muscle during sexual intercourse, bending in a forward position, floor sitting, a person can sit down or standing up position, and also when

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passing the stool [4]. It is still unclear the mechanism of pathophysiological which is considered as a coccydynia. Most cases of coccydynia are related to spinal or rectal surgery, injections of epidural, or accidental events like fall on the tailbone, or when they are given birth to a child [5]. After any traumatic injury, it might lead to the hypermobility of the coccyx joint and cause inflammatory effects on the sacrococcygeal joint [6]. It also produces microtrauma through faulty body posture or position of the body like bike riders who are riding their bike for a constant period, or those who are sitting in a wheelchair for a prolonged period it may cause a sprain in the coccyx bone pr region of the coccyx [7]. The prevalence of this condition coccydynia is unknown in the general population but in a study, it is reported that the ratio coccydynia is present with lower back ache with range from 1 to 2.7 percent [8]. In obese persons, the incidence rate of coccydynia is higher than in normal persons. The other studies showed the risk factors of coccydynia like age, traumatic complaints, body mass index, tumors, joint position, and clinical presentations [9]. In a lean person, the coccyx usually rotates in a sitting position as the body mass index increases in the person the rotation of the pelvis is reduced in a sitting position and the angle of incidence is high. Coccydynia can be diagnosed by using the two tests straight leg raise (SLR) and per rectal measurement [10]. The SLR is most commonly used to find out the pathology of the intervertebral disc or irritates nerve roots. When the person performs the straight leg raise the intensity of pain is increased [11]. Coccydynia mostly shows symptoms like pain or swelling in the coccyx, numbness sensation, leg weakness, and bladder problems [12]. Without treatment, the coccydynia resolves the issue within a week. If the pain does not resolve on its own then taking a conservative treatment to subside the symptoms of coccydynia and about 90 percent of it is managed conservatively [13]. It can be treated by taking painkiller medicine, a doughnut-shaped pillow for sitting, physical therapy sessions, and sometimes taking the injections of steroids [14]. Most of the patients who suffer from the condition of coccydynia usually take physical therapy sessions in which a physical therapist gives cryotherapy, trans electrical nerve stimulation on the coccyx, therapeutic ultrasound, and suggests some exercises that help them to relieve the pain in the coccyx region. While taking the steroidal injections it suggests that take two injections in a consecutive month [15].

The study aims to determine the prevalence of pain and straight leg raise tests in healthcare professionals with the occurrence of coccydynia.

METHODS

A cross-sectional survey is conducted on the occurrence of coccydynia among healthcare professionals working in hospitals in seven districts of Karachi from August 2023 to February 2024. The sample size of the study was 543 healthcare professionals and was calculated through Raosoft.com. The non-probability convenience sampling was used in this study. The inclusion criteria of the study were age group between 20 years to more than 59 years, the presence of pain and tenderness during palpation in the coccyx area of research participants for more than 2 months, The participants excluded in our study who were not willing to participate in the study, who were done with partial or complete coccygectomy, abnormalities of coccyx region were excluded from this study. For data collection, a self-administered questionnaire comprised of demographics, and subjective and objective assessments of research participants was used. For evaluation of coccydynia SLR and Pain VAS were used. Data were analyzed by SPSS version 23.0 software in which frequencies and percentages were calculated.

RESULTS

The study includes 543 healthcare professionals between the ages of 20 to more than 59 years old who were recruited from different hospitals in Karachi. When we asked about the exposure of pain felt in a sitting position around the coccyx region the participants reported about 311(57.27%), in standing, the participants felt pain about 129(3.75%), and in a supine lying position, the research participants felt pain about 103(18.96%). When we asked a question about feeling the tenderness over the coccyx bone about 361 (66.48%) participants responded yes they had felt the tenderness. In this study, we recruited 543 healthcare professionals of which 57 (10.49%) were physicians, 117 (21.54%) were physical therapists, 104 (19.15%) were nurses, 63 (11.60%) were pharmacists, 54 (9.94%) nutritionists, 96 (17.67%)supporting staff, and 52 (9.57%) were technicians as shown in Table 1

Table 1: Demographics of Healthcare Professionals

Demographics	N (%)
Age	
20-29	103 (18.96)
30-39	201 (37.01)
40-49	121 (22.28)
50-59	73 (13.44)
>59	45 (8.28)
Gender	
Male	246 (45.30)
Female	297 (54.69)
Experience of Pain	
Sitting	311 (57.27)
Standing	12 (23.75)
Lying	103 (18.96)
Tenderness over Tail Bone	
Yes	361 (66.48)

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No	182 (33.51)
Healthcare Professionals	
Physicians	57 (10.49)
Physical Therapists	117 (21.54)
Nurses	104 (19.15)
Pharmacists	63 (11.60)
Nutritionists	54 (9.94)
Supporting Staff	96 (17.67)
Technicians	52 (9.57)

When we measured the intensity of pain we used the visual analog scale 223 (41.06 %) of participants were found to lie in the moderate pain category of VAS (visual analog scale) and after the application of SLR (straight leg raise test) 426 (78.85%) of a healthcare professional's had a positive test as shown in table 2.

Table 2: Findings of SLR Test and VAS Scale

Categories	N (%)
Visual Analogue Scale (VAS)	
No Pain	11 (2.02)
Mild Pain (1-3)	125 (23.02)
Moderate Pain (4-6)	223 (41.06)
Severe Pain (7-9)	106 (19.52)
Worst Pain (10)	78 (14.36)
Straight Leg Raise Test	
Positive	426 (78.45)
Negative	117 (21.54)

We recruited healthcare professionals from seven districts of hospitals in Karachi of which 74(13.62%) were from East, 134 (24.67%) were from Central, 58 (10.68%) were from Kemari, 63(11.60%) were from Malir, 91 (16.75%) were from Korangi, 68 (12.52%) were from South, and 55 (10.12%) were from west as shown in figure 1.

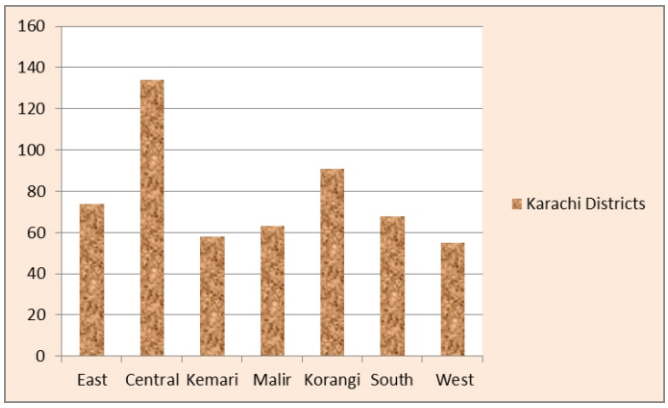

Figure 1: Healthcare Professionals from VII Districts of Karachi

When we asked a question about the previous history of coccyx injury 291 (53.59%) responded yes. When asked a question related to the radiating pain to the lumber region 206 (37.93%) replied yes. While asked a question about the worsening of pain 394 (72.55%) replied yes. When asked a question about the pain increases while leaning backward in a sitting position said 304 (55.98%) yes as shown in Figure 2.

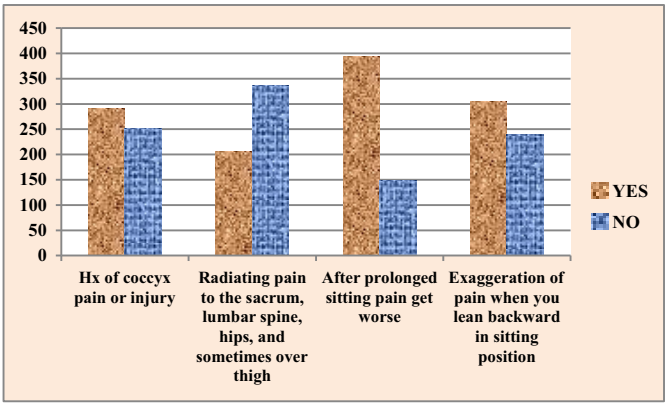

Figure 1: Pain-Related Factors among Health Professionals

DISCUSSION

The coccyx or tailbone is located at the bottom of the human's spine which is formed by the fusion of 3 to 5 vertebral bones. The main purpose of the coccyx is to maintain the posture, support the weight of the body, and help in sitting position. Coccydynia is referred to as the pain in the tailbone or coccyx region [16]. Postural maintenance is a vital aspect of every occupation but commonly healthcare professionals are susceptible to having musculoskeletal issues related to their specific professions [17]. In our study, the main objective is the finding of the occurrence of coccydynia among healthcare professionals in Karachi. The study revealed obesity and female gender are the major factors that are most susceptible to Coccydynia [18]. As compared to the previous study, our research found that 30 to 39 years is the common age of healthcare professionals who are selected in our study and the most common gender is female which showed a majority of females are susceptible to have coccydynia due to their job description. Furthermore, a study reported that the sitting position is the most aggravating posture for patients with coccydynia [19]. Similarly, in our study 311(57.27%), research participants experienced pain in sitting positions as compared to other positions. Another study reported that changing position from sitting to standing causes severe pain in the coccyx region [20] While in our study, 361 (66.48%) research participants have complained of pain in the bone of the tail or coccyx. A study revealed, that a history of trauma, prolonged sitting during driving, cycling, or traveling, bad posture, and obesity can cause strain on the coccyx region which causes tenderness and pain [21]. In our study, VAS (visual analog scale) showed about 223 (41.06%) of research participants were in the moderate pain category and the VAS score of their research participants in the pre-

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treatment session was lay in the severe category, but after the application of shock wave therapy, the pain severity of their subjects was reduced upto mild to moderate pain categories [22]. In our study, 426 (78.45%) of research participants found positivity in SLR (straight leg raise test) which is commonly used for the diagnosis of coccydynia. Whereas, a study concluded SLR test can be a reliable test for the evaluation of coccydynia because it is not influenced by the change in age, BMI (body mass index), low back pain, urinary incontinence, and fatigue [23].

CONCLUSIONS

Our study concluded with two major findings. Firstly, the occurrence of Coccydynia was observed in the majority of research participants but the highest percentage of coccydynia was found in physical therapists as compared to other healthcare professionals. Secondly, the age group from 30 to 39 years was more affected. Therefore, Awareness of stretching exercises and posture maintenance should be increased to prevent healthcare professionals from coccydynia.

Authors Contribution

Conceptualization: KJ
Methodology: OA, ML
Formal analysis: KZ
Writing-review and editing: ML, RB, AA, YI

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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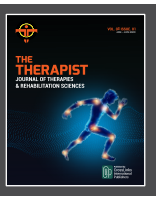

Original Article

Assessment of Facial Function in Patients with Facial Palsy Using Patient-Based and Clinician-Based Tools

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ABSTRACT

Facial palsy is a serious disorder that impairs both function and appearance resulting from facial muscle weakness. It impairs the quality of life of affected patients. There are questionnaires for general health and disease-specific assessments of quality of life accessible. **Objective:** To assess the facial function in patients with facial palsy using patient-based and clinician-based tools. **Methods:** A cross-sectional study was conducted among patient diagnosed with facial palsy. The study sample size 79 of both genders calculated via Epitools software and using convenient sampling technique. A pre-tested structured valid and reliable tool was used for the assessment of disability and facial function via Facial Clinimetric Evaluation used as patient-based tool and House-Brackmann Scoring Scale used as clinical based tool. SPSS version 25.0 was used to analyze data. **Results:** The mean age of the participants was 27.53 years. 59.5% were males whereas, 40.5% were females. So, a higher prevalence of males was seen. 58.2% were recorded at grade IV (moderately severe), 31.6% were at grade III (moderate level) and 10.1% were at grade V (severe) level. There was statistically significant association between House-Brackmann scores and facial clinimetric evaluation scores ($p<0.001$) that was indicating that there was an association between disability and patient's perception towards facial palsy. **Conclusions:** Facial Clinimetric Evaluation scale used as patient-based tool provide subjective experience and functional limitation experienced by facial palsy patient while House-Brackmann Scoring Scale used as clinical based tool provides objective evaluation of facial function of facial palsy patient.

INTRODUCTION

Patients with facial malformation, including facial paralysis, might encounter negative consequences due to these impairments and disabilities. These limitations direct affect their functionality [1]. Facial paralysis-related disability has evident limitations, like difficulty in mastication and speech articulation. Although its impact on abstraction aspects such as social contact and (QOL) quality of life are less well known [2]. Facial paralysis is a occurring and devastating after effects of brain damage and stroke [3]. Facial palsy can cause notable alterations in facial function and appearance. Those affected often report psychosocial difficulties including social withdrawal, anxiety, poor body image, and low mood [4]. Bell's palsy is an acute condition, typically occurring unilateral, facial musculature weakness or paralysis, associate with peripheral facial nerve damage without unknown etiology [5]. Other symptoms include experiencing pain behind or around the ear occasionally extending into the occipital or cervical area. Impaired ability to tolerance typical noise levels and disrupted taste buds on the same side. Facial palsy results from an upper motor neuron lesion, which can be caused by a stroke in the area of middle cerebral artery or lesions taking up along the pathway. Lesions to Upper motor neuron cause paralysis of the opposite side of lower part of the face leaving the upper part of the face unharmed. Other signs like Dysphasia, hemiparesis, and sensory impairments are dependent upon neighboring neural pathways and regions [6]. Facial paralysis often as a result of damage to the 7th cranial nerve. The condition varies from flaccid paralysis to post-

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paralytic facial hyperactivity [7]. Facial palsy symptoms include Brow ptosis, incomplete eye Closure, external nasal valve collapse, articulation and speech issues, inability to communicate emotions, aesthetic deficiencies, and synkinesis (involuntary movement during voluntary movement). Leading psychosocial consequences, lowering the quality of life of the patients [8]. Facial palsy may result from trauma, specifically basal skull trauma affecting the temporal bone. The facial nerve, traversing this bony channel, can be compressed due to head impact or subsequent swelling, leading to the palsy [9]. Congenital factors encompass genetic syndromes, birth trauma, and isolated developmental issues like facial muscle hypoplasia. This genetic hyperplasia can lead to unilateral or bilateral neonatal paralysis, attributed to intrapartum injuries or developmental disorders [10]. Lyme disease can uncommonly lead to facial palsy as the bacteria responsible for the disease can harm the nervous system, including the facial nerve. This damage can result in a weakened muscle or facial paralysis on one side in those affected [11]. Facial paralysis and bell's palsy differ mainly due to their origin and impact. Facial palsy arises with a clear cause, resulting in permanent (for years to life) nerve damage necessitating surgery. In contrast, Bell's palsy is often unexplained and temporary typically resolving within 3 months without surgical intervention [12]. Risk factors of Facial Palsy mainly stem from brain tumors. The Postoperative percentages for tumors in the deep, superficial, and lower lobes were 37.9%, 15.0%, and 14.6%, respectively, with a notably elevated occurrence in deep lobe cases [13]. The left side is primarily impacted, and the most frequent form of facial nerve paralysis is upper motor neuron lesion, accounting for 80.3% of cases [14]. Limited research exists on this topic due to the rarity of recurring facial paralysis in children. With low occurrence rates for both prevalence and incidence [15]. While the World Health Organization's disability definition focuses on individuals' earlier studies highlighting society's impact on personal health indicate that social viewpoints and their consequences must be factored into assessing outcomes for patients affected by facial paralysis [16]. Research indicates that abnormalities of the face, include facial paralysis, have clear psychosocial impact. Considering how the face and quality of life (QOL) are affected on communication, individuals with facial paralysis-induced disability might encounter amplified social consequences [17]. The evaluation of peripheral facial palsy's impact on facial function involves diverse approaches: physician-assigned grades, automated measurements, and patient self-evaluation via surveys. Despite advancements in computerized tools, the disease's effect on quality of life remains a crucial aspect of assessment, integral from initial consultation to post-treatment [18]. Patient self-assessment via surveys offers insight into how diseases affect quality of life Currently, there are limited disease-specific questionnaires available, with only a handful being utilized in routine clinical practice [19]. While there may be disagreements over the use of physical therapy in treating facial paralysis, various methods such as exercises, electrical stimulation, massage, heat therapy, and biofeedback techniques appear valuable. Each approach possesses distinct merits and suitable applications. Additionally, specific patients enduring recent facial injuries or prolonged paralysis might find rehabilitative surgical techniques advantageous [20].

The purpose of this investigation was to assess the facial function in people with history of facial palsy or in individuals that are currently facing this condition and patients' perception toward facial palsy by utilizing the instruments using Facial Clinometric Scale (for patient perception) and House-Brackmann Scoring System (for clinical evaluation) by patient history and clinician notes.

METHODS

A cross-sectional study using a Non-Probability Convenient sampling technique for facial palsy patients. The sample size calculated using Epitools software. Statistical conditions were 99% confidence interval. The sample size of 79 individuals of both genders. Data were collected through Questionnaire including Facial Clinimetric Scale (for patient perception) and House-Brackmann Scoring System (for clinical evaluation), of facial function. Data were collected from Physiotherapy Departments of Services and Jinnah Hospitals and other private clinics of Physiotherapy department in Lahore. The study encompassed unilateral and bilateral facial palsy cases, involving participants aged 18-35 years. Exclusion criteria involved the presence of comorbidities or Bell's palsy. After taking informed written consent from patients. SPSS version 25.00 was used to analyze data. Percentages and Frequencies were reported for categorical variables and mean ± SD were reported for non-normal continuous data. Chi-square test was used to assess the association between variables. Tests were applied according to normative and non- normative data. The prevalence was reported as having 95% confidence interval using binomial exact distribution. The significance level was set at $P<0.05$.

RESULTS

The descriptive statistics of house-Brackmann scale score are given in figure 1. The maximum score was 6 and minimum was 2. The mean score was 3.77 with a standard deviation of 1.154.

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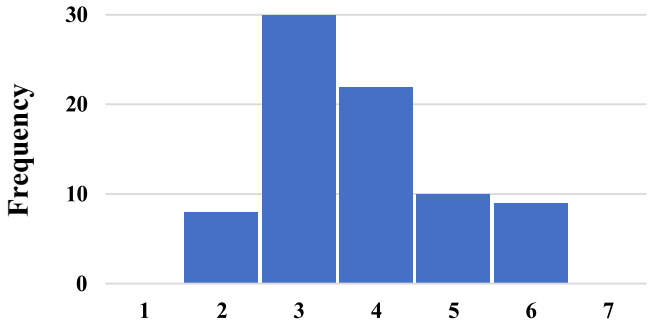

Figure 1: Descriptive Statistics-House-Brackmann Facial Nerve Score

The descriptive statistics of Facial Clinometric Evaluation Score are given in figure 2. The maximum score was 56 and minimum was 23. The mean score was 36.27 with a standard deviation of 8.05

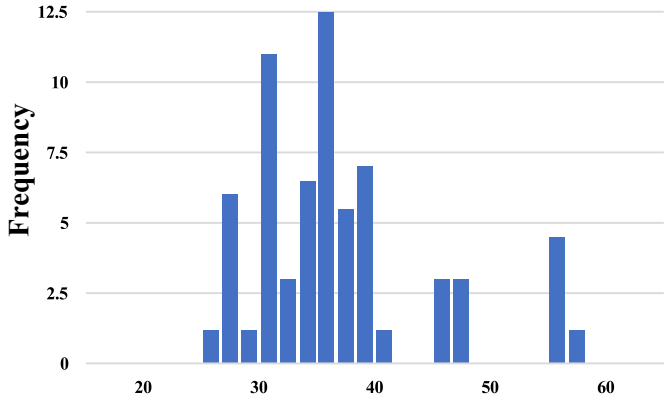

Figure 2: Descriptive Statistics of Facial Clinometric Evaluation Scores(FaCE)

The results of House-Brackmann facial nerve grading system are shown in figure 3. 31.6% were at grade III (moderate level). 58.2% were recorded at grade IV (moderately severe), and 10.1% were at grade V (severe) level.

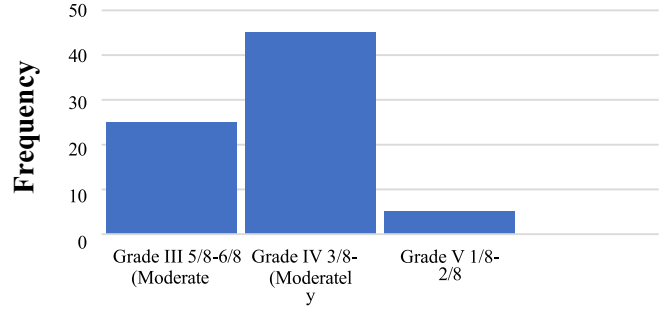

Figure 3: House-Brackmann Facial Nerve Grading System

The association between the two scales used in the study is shown in table 1 as House-Brackmann Scale Scores * faCE Scale Total Score Correlation. A p-value of less than 0.001 was obtained showing a statistically significant relationship between the two variables.

Table 1: House-Brackmann Scale Scores * faCE Scale Total Score Correlation (N=79)

House-Brackmann Scores (out of 8)	Facial Clinimetric Evaluation Scores	
	Moderate (40-60)	Moderately Severe (20-40)
2.00	1	7
3.00	4	26
4.00	6	16
5.00	5	5
6.00	6	3

p-value <0.001

DISCUSSION

Face palsy is a debilitating disorder that causes facial muscular weakness, poor oral function, psychological discomfort, and difficulty in communication, which impair the quality of life of affected patients. For evaluating quality of life, there are both general health and disease-specific questionnaires available. In patients with facial paralysis, Giones et al., examined the relationships between patient- and observer-perceived impairment and quality of life. She concluded compared to patients who were paralyzed, observers were more likely to judge their quality of life poorer due to impairment [2]. The aim of this investigation was to evaluate the facial function in individuals suffering from facial palsy using patient based & clinician based tools.in current study 79 facial palsy patients was enrolled via non-probability convenient technique was used. The mean age of the participants was 27.53 the maximum age was 35 and the minimum age was 18. In this study fifty nine percent were males whereas, forty percent were females. So, a higher prevalence of males was seen. Fifty eight percent were recorded at grade IV (moderately severe), thirty-one-point six percent were at grade III (moderate level) and ten-point one percent were at grade V (severe) level. A p-vale of less than 0.001 was obtained showing a statistically significant relationship between House-Brackmann scores and facial clinimetric evaluation scores. Majority of the population fall in moderate level of severity. In contrast to disability, which is subjective and may be influenced by individual viewpoints and values, facial impairment is a concept that is better suited for objective interpretation. This distinction may assist to explain our findings that observers imposed a higher quality of life penalty due to disability and severity than the patients who were paralysed did. Bruins et al., interpreted variation in the Facial Disability Index (FDI), Facial Clinimetric Evaluation (FaCE) scale, and Synkinesis Assessment Questionnaire (SAQ) quality-of-life scores among patients with facial palsy. He discovered that SAQ, FaCE, and FDI are useful for research purposes [21]. According to the response shift theory, patients gradually modify their expectations and value systems to account for their handicap. For instance, person who lost their capacity to utilise their legs would

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come to value walking less and less over time. By doing this, a patient's values grow more in line with their capabilities, which lessens the impact of their impairment on how they view QOL themselves [22]. Similar results have also been found in facial deformity research. In our sample, the patient may not have felt more impaired despite having what is thought to be a more severe impairment because of the accommodation effect. In fact, our research revealed a correlation between a patient's lower disability rating and a better quality of life (QOL) when the observer rated the paralysis as more severe. Observer-based analysis of facial function was compared patient based to facial palsy-specific gradings (FaCE and FDI), and general health-related quality of life questionnaires (SF-36) by Eva. His conclusion was that the evaluation of patients with facial palsy requires the use of validated instruments relevant to the disorder [13]. When comparing to current study there was significant association between House-Brackmann scores and facial clinimetric evaluation scores ($p<0.001$) that was indicating that there was association between disability and patients' perception towards facial palsy.

CONCLUSIONS

Facial Clinimetric Evaluation used as patient based too provide subjective experience and functional limitation experienced by facial palsy patient while house Brackmann scoring scale used as a clinical based tool provides objective evaluation of fascial function. Spectators' perceptions of a patient's post-facial paralysis normality and severity had a significant impact on the observer's assessment of the patient's level of disability. An objective severity level influenced the patient's impression of their disability, implying that the patient is going through extra procedures.

Authors Contribution

Conceptualization: AL, SM
Methodology: AL, SM
Formal analysis: AL, SM
Writing, review and editing: AL

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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