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S#	TABLE OF CONTENT	Page #
	Research Article	
1.	Motivational Factors Associated With Sports Participation Among Athletes	320
2.	Frequency Of Kinesiophobia In Pregnancy Related Low Back Pain	326
3.	Perceived Stress And Psychological Adjustment Among Fathers And Mothers Of Physically Handicapped Girls	329
4.	Effects Of Ultrasound Therapy Versus Transverse Friction Massage Along With Eccentric Exercise Program On Chronic Achilles Tendinopathy	333
5.	The Comparison Of Easy Onset And Pantomiming Treatment On Blocking In Stammering	338
6.	Gender Based Differences Of Burnout Among Clinical And Academic Physical Therapists	342
7.	Effect Of Modified Epley's & Semont's Maneuvers With Or Without Beta-Histine On Benign Paroxysmal Positional Vertigo: A Randomized Control Trail	346
8.	Effect Of Mirror Therapy Versus Repetitive Facilitation Exercise On Upper Limb Function In Post Stroke Patient	351
9.	Effects Of Neuromuscular Training On Single Limb Stability In Young Female Athletes	357
10.	Effectiveness Of Lateral Wedge Insole On Knee Osteoarthritis Outcomes In Pakistani Population	361
11.	Effects Of Moderate Physical Activity On Glycemic Control In Type-2 Diabetes Mellitus	367
12.	Effects Of Electromyographic Biofeedback On The Performance Of Vastus Medialis Oblique Muscle In Knee Osteoarthritis: A Randomized Controlled Trial	372
13.	Level Of Patients' Satisfaction From Physical Therapy Services In Outpatient Department Of Tertiary Care Hospitals In Peshawar: A Cross-Sectional Survey	377
14.	Professional Preferences Of Speech Pathologist For The Assessment And Management Of Dysphagia After Stroke	382
15.	Efficacy Of Digital Manipulation Of Thyroid Cartilage, Fluency Shaping Therapy And Combination Of Both In Treatment Of Stuttering Severity: A Randomized Clinical Trial	389

EDITORIAL TEAM

RESEARCH ARTICLE

MOTIVATIONAL FACTORS FOR SPORTS PARTICIPATION AMONG PAKISTANI ATHLETES

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ABSTRACT

Background: Successful athletes are motivated for future-oriented for more achievements. Apprehensive athletes are not as successful as highly motivated athletes. The sport participation is influenced by many factors those contribute in success of athletes. **Objective:** To explore the motivational factors for sports participation among Pakistani athletes. **Methodology:** The cross-sectional survey was conducted on both male and female athletes (n=400) between the age of 14 to 40 years, played at the national and international levels at least from one year. The study was conducted at the Pakistan sports board (PSB) from July-December 2018. The non-probability convenience sampling was used in this study. The sports participation scale-6 was used to explore the motivational factors. The data was presented as n(%). **Results:** the mean age of the participants were 24±5.45 years The results showed that the mean scores of six categories of Sports Motivational Scale (SMS) was 134.69±13.431, which showed that majority of athletes were highly motivated. The result of the study also showed that all subdomain of sports motivation scale positively correlated to total score ($p<0.001$), while a motivation was negatively associated $r=-0.701$, $p<0.001$) with total score of sports motivation scale. Although most of the athletes were normal in term of depression, anxiety, and stress. But depression is negatively correlated ($r=-0.09$, $p=0.04$) with sports motivation. **Conclusion:** This study concluded that most athletes are motivated because hard training improves their performance and other motivational factors are also associated like pleasure, internal satisfaction, and excitement. The least motivational factor was achieving social or material benefits of being an athlete.

Keywords: Athlete, motivation, participation, stress.

INTRODUCTION

An athlete is a person in sports who has a natural or acquired ability for physical activities or sports, particularly to be performed in a spirited nature. Successful athletes are motivated for future oriented for more achievements. Apprehensive athletes are not as successful as highly motivated athletes[11]. An athlete training includes muscle strengthening for competition in sports. Motivation is the reason for people's desires, actions, and needs. There are two types of motivation in sports extrinsic and intrinsic. The positive motivation gets experts reward and negative motivation gets experts punishment. The motivational prevalence demonstrated that alcohol effects on athletic performance delayed recovery of muscle, increased risk for injury and including increased dehydration[2]. Motives related to athlete appearance, competition intensity and excitement, fun and enhanced competence are the key factors for a competition. [3].

A research concluded that increasing participation in physical activity can create differences in motivations [4]. Results of the research showed that the Motivation must require the systematic involvement of academic, athletic support staff to make clear to athletes and faculty that not affects athletic performance[5]. The motivational structure of the athletes from the different groups and their coaches seems incongruent and this incompatibility might induce athletes' lower and high motivation [6]. College athletes appear to have similar motivation to flow states, regardless of gender and sports type[7].

The motivational effect on athlete's performance is undeniable. The self-determined motivation enhances performance of athletes [8]. Boys and girls 8 to 18 years of age at a summer sports school resulted have fun; improve skills, to be challenged, learn new skills and to be physically fit [9]. In advance countries a lot of research material is available, and they are also doing more research on it. Based on these materials they train their athletes and get the high performance and victory stands and, from the bottom level i.e., club, a motivational psychologist attached with teams. But no research available in Pakistan to take benefit from it and make the training programmers of current athlete's even psychologist is not attached at our national and

international level athletes or teams to enhance their performance. It is dire need to do research on motivational factors to get optimal level of performance of athletes to get to know that actual factors are associated with their motivation and to work on them which can result in the optimal level of performance of athletes. The motivation improves confidence, focus, composure, intensity and believes on performance among athletes[6].

There are many factors that contributed to sports participation but, as per author's knowledge, motivation in sports participation was not studied on Pakistani athletes. So, the objective of study was to explore the motivational factors for sports participation among Pakistani athletes.

METHODOLOGY

The cross-sectional survey was conducted at Pakistan sports board (PSB) from July-December 2018 on n=400 male and female national and international level athletes at least from one year. The data was collected through non-probability convenience sampling after the approval from Director Pakistan Sports Board. The coaches, management and support staffs of athletes and Pakistan sports board (PSB) and individuals with any pathology were excluded from the study.

The outcome tools include general demographic questionnaire included age, gender, height, weight, and BMI. The 24 item sports motivational scale related to factors of six types of motivations displayed by athletes in their performances. There are six sub factors include a motivation, external regulation, identified regulation, introjected regulation, integrated regulation, intrinsic motivation. As the understanding of the questionnaire was difficult for athletes, the research asked the athlete the questionnaire in Urdu. The participants were asked to grade their motivational factors on the Likert scale with 7 points in it. 1= doesn't correspond at all, 2 and 3 = corresponds a little, 4 = corresponds moderately, 5 = corresponds a lot and 6 and 7 = corresponds exactly. The total score was 168. The two items from sub factor a motivation had negative scoring.

The individual item of Sports motivation scale was presented as frequency and percentages, while correlation of mean score of subscales, depression, anxiety, and stress with total score was calculated through Pearson correlation. The data was analyzed by using SPSS 21.

RESULTS

In the current study n=380 were male and n=20 females with the mean age 24 ± 5.45 years. The mean height was 5.74 ± 0.45, weight was 71.64 ± 13.05 kg and BMI were 16 ± 0.83 kg/m^2. A total of n=144 athletes were players of Athletics, n=30 subjects were volleyball player= 99 were hand ball player and n=127 were boxing player. The results of the study showed that regarding Internal Motivation factor, a total of 348(87%) were corresponds exactly for the excitement they feel when they are really involved in the activity n=328(82%) to feel a lot of personal satisfaction while mastering certain difficult training techniques n=303(75.8%) and n=321(80.3%) were correspond exactly to the pleasure of discovering new performance strategies. (Table 1)

In external Regulation factor, a total of n=178(48.5%) were corresponds exactly to Because it allows them to be well regarded by people that they know, n=321(80.3%) to the prestige of being athlete, n=324(81%) to the material and/or social benefits of being an athlete and n=326(81.5%) were correspond exactly to show others how good they are at their sports. (Table 1)

The responses to Integrated Regulation factor, n=205(51.3%) were corresponds exactly to because it's part of the way in which they have chosen to live my life, n=305(73.5%), n=341(85.3%) and n=222(55.5%) were correspond exactly to because participation in their sport is an integral part of their life. (Table 1)

While Identified Regulation factor, a total of n=306(76.3%) were corresponds exactly to the statement Because it is a good way to learn lots of things which could be useful to them in other areas of my life, n=345(86.3%) for Because it is one of the best ways, they have chosen to develop other aspects of their life, n=358(88%) for Because it is one of the best ways to maintain good relationships with their friends and n=235(58.8%) were correspond exactly to Because training hard will improve their performance. (Table 1)

While regarding the Identified Regulation factor, a total of n=306(76.3%) were corresponds exactly to the statement that it is a good way to learn lots of things which could be useful to them in other areas

of their, n= 345(86.3%) for Because it is one of the best ways, they have chosen to develop other aspects of their life, n=n=352(88%) for Because it is one of the best ways to maintain good relationships with their friends and n=235(58.8%) for Because training hard will improve their performance. (Table 1)

The responses of athletes regarding Interjected Regulation factor corresponded exactly to the statements; n=175(43.8%) for it is absolutely necessary to do sports if one wants to be in shape, n=273(68.3%) for Because they must do sports to feel good about themselves, n=318(79.5%) for Because they would feel bad if they were not taking time to do it, n=340(85%) for Because they must do sports regularly. (Table 1)

In a motivation factor, A total of n=327(81.8%) regarding they do not know anymore; have the impression of being incapable of succeeding in this sport, n=264(66%) don't know if they want to continue to invest their time and effort as much in their sport anymore, n=358(89.5%) was not clear to them anymore; they don't really think their place is in sport and n=362(90.5%) were correspond exactly to that they don't seem to be enjoying their sport as much as they previously did. The detail frequency distribution of subscales with their individual items can be seen in table 1

Table 1: Frequency distribution of Sports Motivation Scale (n=400)

Factors	Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds exactly
Internal Motivation					
For the excitement I feel when I am really involved in the activity	5 (1.3%)	0 (0%)	9 (2.3%)	33 (8.3%)	348 (87%)
Because I feel a lot of personal satisfaction while mastering certain difficult training techniques	13 (3.3%)	10 (2.5%)	0 (0%)	29 (1.3%)	328 (82%)
For the satisfaction I experience while I am perfecting my abilities	5 (1.3%)	0 (0%)	37 (9.3%)	55 (13.8%)	303 (75.8%)
For the pleasure of discovering new performance strategies	15 (3.8%)	0 (0%)	18 (4.5%)	46 (11.5%)	321 (80.3%)
External Regulation					
Because it allows me to be well regarded by people that I know.	174 (43.5%)	5 (1.3%)	10 (2.5%)	17 (4.32%)	174 (48.5%)
For the prestige of being athlete	1 (0.3%)	0 (0%)	18 (4.5%)	60 (15%)	321 (80.3%)
For the material and/or social benefits of being an athlete	0 (0%)	0 (0%)	19 (4.8%)	57 (14.3%)	324 (81%)
To show others how good I am at my sport	0 (0%)	0 (0%)	14 (3.5%)	60 (15%)	326 (81.5%)
Integrated Regulation					
Because it's part of the way in which I've chosen to live my life.	119 (29%)	0 (0%)	34 (8.5%)	42 (10.5%)	205 (51.3%)
Because it is an extension of me	26 (6.5%)	10 (2.5%)	20 (5%)	39 (9.8%)	3.5 (73.5%)
Because participation in my sport is consistent with my deepest principles	10 (2.5%)	11 (2.8%)	15 (3.8%)	23 (5.8%)	341 (85.3%)
Because participation in my sport is an integral part of my life	110 (27.5%)	13 (3.3%)	23 (5.8%)	32 (8%)	222 (55.5%)
Identified Regulation					
Because it is a good way to learn lots of things which could be useful to me in other areas of my life	0 (0%)	10 (2.5%)	10.5 (2.5%)	75 (18.8%)	305 (76.3%)
Because it is one of the best ways, I have chosen to develop other aspects of my life	0 (0%)	10 (2.5%)	15 (3.8%)	30 (7.5%)	345 (86.3%)
Because it is one of the best ways to maintain good relationships with my friends	5 (1.5%)	0 (0%)	13 (3.3%)	21 (5.3%)	352 (88%)
Because training hard will improve my performance	15 (3.5%)	14 (3.8%)	64 (16%)	72 (18%)	235 (58.8%)
Introjected Regulation					
Because it is absolutely necessary to do sports if one wants to be in shape	190 (47.5%)	0 (0%)	10 (2.5%)	25 (6.3%)	175 (43.8%)
Because I must do sports to feel good about myself	0 (0%)	13 (3.3%)	45 (11.3%)	69 (17.3%)	273 (68.3%)
Because I would feel bad if I was not taking time to do it	0 (0%)	6 (1.5%)	20 (5%)	56 (14%)	318 (17.9%)
Because I must do sports regularly	0 (0%)	36 (9%)	5 (1.3%)	19 (4.8%)	340 (85%)
Amotivation					
I don't know anymore; I have the impression of being incapable of succeeding in this sport	22 (5.5%)	15 (3.8%)	5 (1.3%)	31 (7.8%)	327 (81.8%)
I don't know if I want to continue to invest my time and effort as much in my sport anymore	54 (13.5%)	59 (14.8%)	13 (3.3%)	10 (2.5%)	264 (66%)
It is not clear to me anymore; I don't really think my place is in sport	0 (0%)	6 (1.5%)	4 (1%)	32 (8%)	358 (89.5%)
I don't seem to be enjoying my sport as much as I previously did	5 (1.3%)	5 (1.3%)	15 (3.8%)	13 (3.3%)	362 (90.5%)

The results showed that the mean scores showed that most of the athletes were normal in term of depression {n=309 (77.3%)}, anxiety {n=258 (64.5%)} and stress {n= 249 (62.3%)}, but depression is negatively correlated (r=-0.09, p=0.04) with sports motivation (table 2)

Table 2: Correlation between subscale and total score of sport motivation scale (n=400)

		Total score of Sports Motivational Scale-6 (134.69±13.431)	
	Mean±SD	Pearson Correlation (r)	p-value
Depression	1.57±1.21	-0.09	0.04*
Anxiety	2.01±1.55	-0.02	0.63
Stress	1.87±1.27-	0.009	0.85

Significance Level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The objective of the study was to explore the motivational factors for sports participation among Pakistani athletes. According to results, the major motivating factor for most of the athletes in this study was the excitement, they feel when they participate in sports and when they accomplish something, it motivates them more. Another motivating factor that was proved to drive the athletes to participate in sports was satisfaction while perfecting their skills and learning new and difficult techniques, factors of intrinsic motivation as well as to improve their performance. Some athletes were motivated because they wanted to prove themselves best and show others, how well they are at games. They wanted to be recognized by public and well regarded by people around them, while few of them participate for the prestige of being athlete. They were motivated to participate just because they wanted to be in international team. Hence, their performance was driven by external regulation. Majority of the athletes were motivated because they decided to choose playing because it was the specialty, they excelled it. They do so, because it is the selected way of life and is consistent with deepest principles, factors of integrated regulation. They struggle to achieve monetary recompenses, gold medals and rewards as they do for internal satisfaction.

According to the Mallet & Hanrahan (2004) elite athletes competing at the international levels, not only show external motivation, more specifically, identified regulation, but also intrinsic motivation. Some displayed introjected regulation, as they participate in sports because of their desire to stay physically fit and in shape. In their study, the integrated regulation and the intrinsic motivation was articulated, somehow. The study concluded that, due to presence of factors of external regulation, extrinsic type motivation, their intrinsic motivation is not lowered. In fact, it influences the motivation to improve performance. [10]

Similarly, in current study majority of the athletes corresponded exactly or corresponded a lot to all the factors of integrated regulation. Majority of the participants corresponded that they participate in sports for the excitement they feel while doing athletic activity. All the participants corresponded that the satisfaction of fine-tuning of their skills, learning of new and difficult skills and desire of improvement in performance is also a major motivating factor. Almost all the athletes were motivated to participate just to show others their best performance. Majority, not all the participants of current study play to be recognized by people and peers. Few athletes i.e., less than half, participate to get the honour of being called an athlete or for the social or material benefits. Majority of participants were motivated because participation is sports become an integral part of their life. On the contrary, in current study, only few participants were displaying motivation for the external constrains and rewards.

Forzoni and Karageorghis (2001) states that the high levels of intrinsic motivational factors are reported to be present elite soccer players.[11] Similarly in current study, athletes are highly motivated due to intrinsic factors. In a study conducted by Reeve and Deci (1996), it was concluded that, athletes participate in sports activity for the pleasure and satisfaction of learning new performance skills and strategies and mastering them via difficult training to be competent enough[12]. In another study, factor of participation in sports for the purpose to learn new thing irrelevant to sports but useful in other aspects of life was lacking in elite athletes.[13] Similarly in current study, factors of intrinsic motivation and integrated regulation were major motivating factors.

A study conducted by Reinboth M (2006) on Perceived motivational climate, need satisfaction and indices of well-being in team sports: A longitudinal perspective. They assessed perceptions of the motivational climate; the need for autonomy, competence, and relatedness; subjective vitality and physical symptoms. Result showed that an increase in perceptions of a task-involving climate positively predicted an increased satisfaction of the needs for autonomy, competence, and relatedness. In turn, changes in the satisfaction of the needs for autonomy and relatedness emerged as significant predictors of changes in subjective vitality. [14] Similarly, in current study, all the athletes corresponded that they participate in sports because they feel a lot of satisfaction while doing so and only few participate for the material benefit. On the contrary to the results of previous one, they both can coexist somehow because in another study by Mallet & Hanrahan (2004) this concept was nullified by saying that the factor of external regulation doesn't decrease or limit the intrinsic motivation, but it can be an additive to overall motivation for giving best performance[10].

The Leslie Podlog in 2015 conducted a study on need satisfaction, motivation, and engagement among high-performance youth athletes. They concluded that intrinsic motivation and identified regulation partially mediated the relationship between competence and engagement. These Findings support SDT contentions highlighting the importance of self-determined forms of motivation in mediating need satisfaction and engagement[15]. While in current study, conducted on professional athletes, among them more than half participates for being physically fit.

A study was conducted by Van Heerden CH (2014) on the relationship between motivation type and the sport participation in South African teams. This study concluded that, the participation of athletes is mainly driven by the factor to prove them best and show others how well they are at sports, instead of their love and passion towards game. Thus, external regulation plays major role in athletes' participation as compared to intrinsic motivation[16]. Similarly in current study the factor of external regulation, reason of participation to show their best and prove themselves dominated all types of motivation with 100% agreement. Contrarily, the factors of intrinsic motivation play major role in participation of athletes in current study.

A study was conducted by Leigh McGraw et al.in USA (2012) to determine the influence of mental skill on motivation and psychosocial characteristics. They recruited the participants immediately after regular training activities and were assessed on DASS-21. They concluded that participants who were intrinsically motivated were more psychosocially healthier and with strong mental skill profile as compared to others which is like the current study, showing the strong correlation between DASS-21 and motivational[17].

A similar study was conducted in 2007 by Katrien Wijndaele et al. to find association between leisure time physical activity and stress. They concluded that sports participation and other types of leisure time physical activity was significantly lower in stressed participants which also depicts strong association between stress and sport motivation like the current study[18].

Although sample was appropriate but there is vast variation in age of the athletes that may affect the motivation level. There was multiple demographic factor that may be included in the study including education level, marital and financial status that may affect the result of study.

CONCLUSION

The mostly athletes are highly motivated because hard training will improve their performance and other motivational factors are also associated like pleasure, internal satisfaction, and excitement. The least common motivational factors were achieving social or material benefits of being an athlete. The depression may also affect the motivation level for sports participation.

Some demographic related Pakistani athletes must be included in the future study to obtain a clear picture of factor associated with Sports motivation.

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RESEARCH ARTICLE

FREQUENCY OF KINESIOPHOBIA IN PREGNANCY RELATED LOW BACK PAIN

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ABSTRACT

Background: For a small but significant group, pregnancy-related lumbopelvic pain may become persistent. While multiple factors may lead to post-partum disabilities' such as kinesiphobia sleep disturbance, body perception or mindfulness. **Objective:** To explore the frequency of kinesiophobia in pregnancy related low back pain. **Methodology:** The Cross sectional study was conducted on n=97 pregnant women in 3rd trimester presenting to gynaecology outpatient department of Ghurki Trust and Teaching hospital from August 2016 to January 2017 were included in the study through non probability convenient sampling technique. All women were experiencing low back pain in their third trimester of pregnancy. Numeric Pain Rating Scale (NPRS) was used to determine pain whereas; the kinesiophobia was assessed by using Tampa scale of kinesiophobia (TSK). The mean ± standard deviation, frequency and percentages were used for description of result. SPSS Ver. 20 was used for data analysis. **Results:** The mean age of n=97 pregnant women having low back pain was 29.45±5.87 years Results showed that, n=18(18.6%) patients represented high level of kinesiophobia while n=52 (53.6%) and n=27 (27.8%) had moderate and low levels of kinesiophobia respectively. The result also showed strong positive correlation between pain and level of kinesiophobia (r_s=*0.708, p<0.001*). **Conclusion**: The study concluded that all women those having low back pain in 3rd trimester also has kinesiophobia. The level of LBP highly contributes in kinesiophobia.

Keywords: Kinesiophobia, lumbo pelvic pain, pregnant women, postpartum depression.

INTRODUCTION

Women's body undergoes enormous changes during pregnancy that includes weight gain, metabolic changes and increased production of various hormones. The most commonly observed postural changes include increased curvature of lumbar spine. It has been noted that lumbar curvature increases significantly during 3rd trimester of pregnancy and is accompanied by greatest symptom of low back pain related to pregnancy[1]. The prevalence of pregnancy related low back pain is 50.9%[2]. Exact cause behind occurrence and progression of lumbar pain during pregnancy is not clear. There is an ambiguity in whether physical inactivity is the cause of pain in lower back or low back pain has a negative impact on activity of pregnant women[3].

Kinesiophobia, a fear of physical movement and activity, has a strong positive correlation with acute low back pain. The patients with high kinesiophobia have reduced activities of daily living and greater level of pain[4]. The Kinesiophobia if not dealt with timely can result in decrease in the physical activity and disability hence affecting the quality of life[5]. Physical health status of a person with kinesiophobia deteriorates because lack of activity causes deconditioning of musculoskeletal system of the body[6]. Kinesiophobia also causes depression because of dependency on others for completion of activities of daily living [7].

There is paucity in literature about the prevalence of kinesiophobia in Pakistani pregnant women having low back pain. In Pakistan majority of gynaecologists or clinicians advised to restrict the movement in pregnancy especially in 3rd trimester to avoid low back pain. Which further induce the fear of movement that causes even postnatal physical as well as psychological issue related to quality of life. The awareness about the magnitude of study may help in planning the appropriate strategies to avoid negative effect on quality of life among the study population. So the aim of study was to explore the frequency of Kinesio-phobia in pregnant women having low back pain.

METHODOLOGY

A cross sectional study was conducted on n=97 pregnant women presenting to gynaecology OPD of Ghurki Trust Teaching and Surgimed Hospital from August 2016 to February 2017 after getting the permission from Institutional/Ethical review Board (IRB/ERB in letter no (ERC/LCPT 025). The Pregnant women who were in their third trimester of pregnancy with history of back pain were recruited in the study, whereas women with high-risk pregnancy including gestational diabetes and hypertension as well as non-mechanical low back

pain were excluded. The Written informed consent was obtained from all participants after explaining the purpose and significance of the study. The pain intensity was measured using Numeric Pain Rating Scale (NPRS)[8, 9]. The Kinesiophobia was assessed by original version of 17 items Tampa Scale for Kinesiophobia (TSK) With Cronbach α=0.80 in acute low back pain[10]. The TSK scores range from 17-68 with score ranging from 17 to 33 as low kinesiophobia, 34-50 as moderate and 51-68 was considered as high level of kinesiophobia. The data was analyzed on Statistical Package of Social Sciences (SPSS) Version 21.0. The data was presented in the form of mean±Std, Spearman's rank correlation coefficient between LBP and kinesiophobia was also measured and the level of significance was at $p<0.05$).

RESULTS

The mean age of n=97 pregnant women having low back pain was 29.45±5.87 years. The mean score of the kinesiophobia was 25.14±3.43, which showed that the n=18 (18.6%) patients represented high level of kinesiophobia while n=52 (53.6%) and n= 27 (27.8%) had moderate and low levels of kinesiophobia respectively. The detail frequency distribution of kinesiophobia according pain category can be seen (Figure 1). The result also showed strong positive correlation between pain intensity and kinesiophobia (r_s=0.708, $p<0.001$)

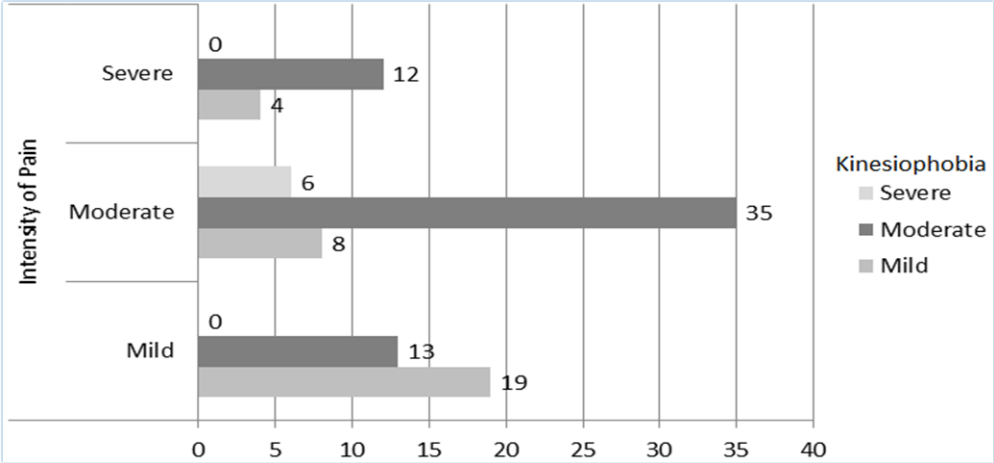

Figure 1: Frequency distribution of kinesiophobia according pain category

DISCUSSION

The study objective was to explore the frequency of kinesiophobia in pregnant females experiencing low back pain mainly in the third trimester of pregnancy. The result showed that all pregnant female having LBP showed some level of kinesiophobia and have positive correlation between the intensity of pain and kinesiophobia.

Vlaeyen JW et al have suggested that pregnancy-related LBP was associated not only with physical factors but also with psychological factors such as stress, catastrophizing, and fear-avoidance beliefs that result from fear of pain, (re)injury, and movement[11]. In another study investigating the relation between PGP (included in LPP) and fear of movement, the latter was significantly higher in pregnant women with PGP than in healthy pregnant women. According to the results of study most of the females with pregnancy related low back pain experience moderate level of kinesiophobia. The previous study conducted by Beales compare post-partum female who experience no pain with post-partum female experiencing persistent lumbo-pelvic pain concluded that females who experienced lumbo-pelvic pain that can cause the moderate level of disability showed greater levels of kinesiophobia. The above mention study coincided with this study as there was relation between the moderate level of kinesiophobia and pregnancy related low back pain[12].

Level of kinesiophobia is associated with pregnancy related low back pain and the pain intensity while it contradicted with the previous cross sectional study where increased kinesiophobia was found in pregnancy-related low back pain subjects with moderate disability, irregular sleep and decrease body perception. The results support the consideration of these factors in the assessment

and management of pregnancy-related lumbo-pelvic pain.

Furthermore, the recent study concluded that moderate level of kinesiophobia is more common in the 7th month of pregnancy especially in the patient who experience pelvic low back pain. The findings of current study contradict with the study by Annile in 2011 where she concluded that there is minor level of kinesiophobia in patient with postpartum period as well[13].

Another observational cross-sectional study coincided with results of my study that was directed in 2011 by Rogério Sarmento Antunes where 193 participants with low back pain were included. In the study the depression was evaluated by Beck Depression Inventory, fear of movement by Tampa Scale and pain severity by McGill Questionnaire. The participants with depression showed unsatisfactory scores in relation to fear of movement, pain and quality of life[14]. Considering this finding not withstanding reports that women in the perinatal stage are more intellectually fragile than in different stages of their lives, fear of movement may be more grounded in pregnant women[15,16].

The first limitation of this study was that all data was self-reported, furthermore sample size and setting which compromised the generalizability of the result is small with limited clinical settings so the study be conducted in multicenter setting with large sample size.

CONCLUSION

This study found that Majority of the females with pregnancy related low back pain experience moderate level of kinesiophobia mainly in their last trimester of pregnancy during 7th month. There is a strong positive correlation between pain and level of kinesiophobia further studies should be conducted on participants with all trimesters in pregnancy as well as in multicentre clinical settings on lager sample size.

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RESEARCH ARTICLE

PERCEIVED STRESS AND PSYCHOLOGICAL ADJUSTMENT AMONG FATHERS AND MOTHERS OF PHYSICALLY HANDICAPPED GIRLS

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ABSTRACT

Background: Physical disability of a female child by birth or by some injury in a family is very challenging for the parents and siblings. Present study is an attempt to explore the role of Perceived Stress and Psychological adjustment among parents of Physically Handicap girls. **Objective:** to explore the relationship between stress and psychological adjustment among parents of physically handicapped girls. **Methodology:** The sample consisted of n=40 parents of physically handicapped female children from the Nishtar hospital Multan. Snowball sampling technique was used for data collection. The parents of female physically disable children were included in the study. Perceived Stress Scale (PSS) (Cohen et al. 1988)) and Psychological Adjustment Scale were used to measure study variables. **Results:** There was a negative association between perceived stress and psychological adjustment (r=-0.77, p=0.01) among parents of handicapped girls. Results further suggested through t-test scores that fathers of handicapped girls were high on psychological adjustment as compared to mothers (p=0.01) and mothers were more under stress as compared to fathers (p=0.02). **Conclusion:** The Fathers and mothers of physically disabled female children are different in term of coping the level of stress as well as the fathers show more psychological adjustment as compare to mothers.

Keywords: Disability, psychological Adjustment, Stress.

INTRODUCTION

A female child with a physical disability by birth or by some injury in a family may present enormous challenges for the parents and siblings. The birth of physically handicapped children especially female child is quite challenging. The special needs along with the expenditures to be met and the day-to-day problems may lead the parent toward extreme disturbance psychologically as well as physically.[1] The disability because of some injury or disease, later on, became the source of psychological distress for the entire family also[2].

Parents of severe physical handicap children especially with a female child may confront various challenges which may tend to tremendous psychological pressure. Moreover, the developmental process of such girls is usually weak and slow, because of physical deficiencies and the inability to learn adaptive skills[3]. In South Asia and especially in Pakistan, most physically handicapped individuals have usually been cared for by their families. Therefore, their parents are more vulnerable to physical and emotional distress consequently their personal domestic life also fluctuates due to the birth of a disabled child in the family and this change can be even more severe when a child with special needs is born[4, 5]. A review of literature suggests that the parents of disabled children often had symptoms of stress and depression[4]. Literatures also suggest that there are significant differences in stress-related issues between parents of children with developmental disabilities as both suffer from parental stress, family social support, or family functioning. However, parents of female children with disabilities experience extremely higher levels of stress in different fields of life. Paternal and maternal stress was mostly linked with aspects of family functioning as perceived by themselves and their spouses[6, 7].

The present study is an attempt to highlight levels of stress among father and mothers due to the challenging role of parenting because of their physically disabled female child. In Pakistani society this problem is very stressful for the family that they have disable daughter. In this connection, the current study may provide the basis for parents and family counselling for parents of disabled female children as well as treatment of handicapped girls. This can improve father and mother psychological wellbeing in the society. So, the objective of this study was to explore the relationship between stress and psychological adjustment among parents of physically handicapped girls.

METHODOLOGY

The correlational study was conducted at Nishtar Hospital Multan on n=40 fathers and mothers of physically handicapped female children. The ethical approval was obtained from the ERB of Islamic international University (ERB# FSS-0781). The Parents age range was 21-42 years. The sampling technique was snowball sampling technique, from Nishtar Hospital Multan. The age of father and mother ranged from 21-42 years, whereas the age of female disabled children ranged from 4 to 12 years. The Perceived Stress Scale (PSS) Psychological Adjustment Scale (PAS) were used to assess stress and psychological adjustment among parents of physically disabled female children respectively. Pearson product moment correlation was used to find association between PSS (Cronbach's α=0.81) and PAS (Cronbach's α=0.82) and to determine the difference between father and mother and stress and psychological adjustment independent t-test was used. SPSS Ver 23 was used for data analysis while keeping the significance level p<0.05.

RESULTS

A total n=40 parents with age range 21 to 42 years with mean age of 32± 9. The children age ranges from 4 to 12 years with mean age of 7.5±3.5. The perceived stress level and psychological adjustment was negatively associated with each other (r=-0.77, p=0.01). While comparing the mother and father significant difference was observed regarding PSS (p=0.01, Cohen's d= 0.99) and PAS (p=0.02, Cohen's d= 1.42) with large effect size. (Figure 1)

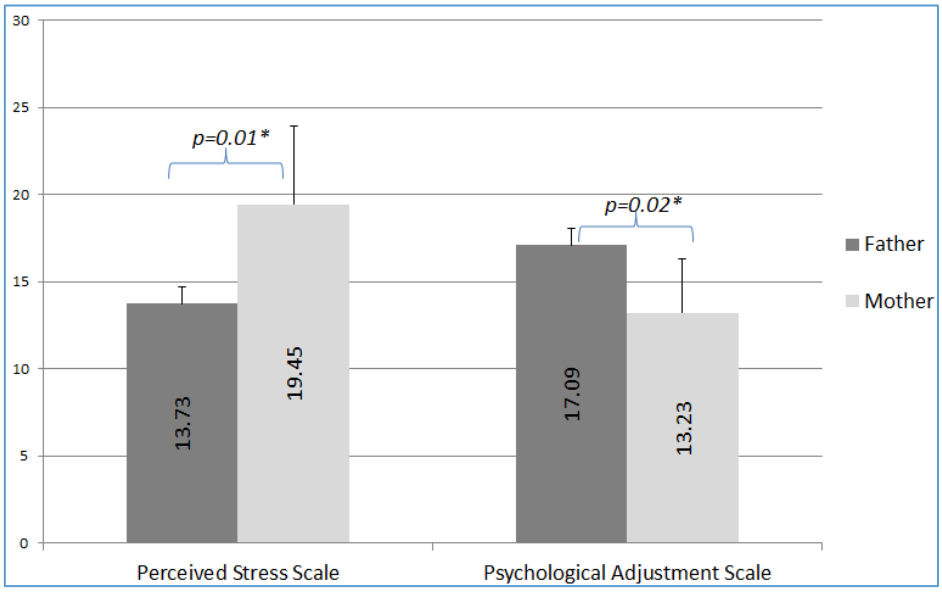

Figure 1: Comparison between Father and Mother (PSS & PBS)

DISCUSSION

The objective of the present study was to assess the perceived stress and psychological adjustment among fathers and mothers of physically handicapped girls. The current study indicated that increased level of psychological stress reduces the capability of psychological adjust among parents of physically disabled children. The Father showed more capability to psychologically adjust as compared to mothers regarding their disable child. It was revealed that as the perceived stress level increased the psychological adjustment of the parents' of physically handicapped lowers down.

Both parents of physically handicapped girls having stress due to long lasting issues of their female child's physical disability. Parents of physically handicapped children bear various kinds of pressures in their day-to-day life[8,9]. It is a challenging and tiresome job to nurture these children and in the case of physically handicapped female children, these problems may multiply many folds due to their unique demands[10]. Fathers and mothers start experiencing stress with the arrival of handicapped new-borns in their family that may become severe as time passes by. During the developmental phase, the expenditures may

also increase due to increased medical, educational, and rehabilitative needs of these children, which may serve as an additional source of stress for parents[5, 11].

The outcomes of this study suggest a negative association between stress and psychological adjustment among parents of physically handicapped female children. The present finding is supported by a study revealed that due to developmentally disabled children, parents are not only exposed to tiredness and stress but also impaired physical functioning affect their social and psychological adjustment as well[9]. Likewise, parents having mentally handicapped children undergo anxiety, stress, and strain that influence their psychological adjustment. They barely feel adjusted in life after such a lifetime incidence. Consequently, the quality of life of such parents may also get impacted[12]. Another hypothesis of this study was about gender differences on stress and psychological adjustment scores experienced by the parents of physically handicapped female children. These finding were supported by literature that revealed both parents (fathers and mothers) had heightened stress levels, however; their perception of stress was different due to differences in their responsibilities and daily life activities. Usually, mothers are overwhelmed by their daily living activities while fathers go through financial and social burden[13,14].

It is imperative for being parents of such special children to become more empowered and educated as well as learn to provide unconditional love to their special daughters and need to modify the notion of perfection and disability. Moreover, there is a need to acknowledge the great holy responsibility of rearing a daughter. Children reflect a wide range of behaviours, competencies, and manners that they learned from their parents[15].

Although the results are significant but the single center study with sample size was small, limit the generalizability of the study.

CONCLUSION

The Fathers and mothers of physically disabled female children are different in term of coping the level of stress as well as the fathers show more psychological adjustment as compared to mothers. Findings of this study might be beneficial in rehabilitation, counselling, and therapeutic services. The future study is being recommended with large sample size and multiple centres to generalize the results. Although this study directs the professionals to train self -management Skills that would prepare fathers and mothers for the new roles associated with parenting of special children and train them with effective coping skills that help in dealing with difficult situations. It is recommended that some factors that may predict the stress level and psychological adjustment must be included in future studies i.e education of parents, family system, socioeconomic status etc.

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RESEARCH ARTICLE

EFFECTS OF ULTRASOUND THERAPY VERSUS TRANSVERSE FRICTION MASSAGE ALONG WITH ECCENTRIC EXERCISE PROGRAM ON CHRONIC ACHILLES TENDINOPATHY

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ABSTRACT

Background: Achilles tendinopathy is highly prevalent and caused by intrinsic or extrinsic factors. The multiple minor traumas can lead to achilles tendinopathy. Physical therapy treatment includes soft tissue mobilization and exercises. Objective: To compare ultrasound and transverse friction massage in chronic Achilles tendinopathy. Methodology: The study was a randomized control trial from 1st March 2019 to 15th August 2019. The non-probability convenient sampling technique was used to include n=76 patients having pain and activity limitation of Achilles tendon and randomly allocated into groups A and B by lottery method. The outcome measuring tools were numeric pain rating scale (NPRS) for pain, the Victorian Institute of Sports Assessment- Achilles questionnaire (VISA-A) for severity and goniometry for ROM. The Group A was treated with transverse friction massage and the group B was treated with ultrasound therapy. Both groups also performed eccentric exercises. The assessment was done at the baseline on the 1st session, at end of the 9th and 18th session. The data was analysed by SPSS 23 using independent t-test and repeated measures ANOVA. Results: The results of RM-ANOVA with pairwise comparison showed that both groups improve significantly ($p<0.05$) throughout the treatment duration with large effect size for all variables. While comparing the groups with independent t-test, TFM group showed more improvement in all variables as compared to UST group ($p<0.05$) after 3rd week as well as after 6th week of intervention. Conclusion: The Transverse friction massage (TFM) was more effective than ultrasound therapy (UST) when combined with eccentric exercises in improving pain severity of tendinopathy and ROM of ankle.

Keywords: Achilles tendon, eccentric exercises, pain stretching, myofascial release, ultrasonic therapy, tendinopathy.

INTRODUCTION

Achilles tendinopathy (AT) is an intra-tendinous inflammatory process and degeneration of the tendon[1]. The AT most commonly occurs due to dysfunction or prolonged standing in a sportsperson or person having a physical activity like running, jogging etc[2, 3]. The AT can be caused by intrinsic factors like microtrauma or it can be caused by extrinsic factors like external impact. There is a positive association between obesity, age, hypertension and use of steroids with AT[4, 5]. In the general population, the incidence of AT was 1.85/1000 patients and 2.35 in the adult population[6].In elite athletes, the middle distance runner had higher prevalence (83%) of Achilles tendinopathy than other athletes[7]. In the Dutch population for AT the prevalence rate was 2.35/1000 and the incidence rate was 2016/1000[8]. The treatment options include medicine, invasive procedure, conservative treatment and physiotherapy. The purpose of all treatments is re-vascularization, fibrotic adhesion removal and cell stimulation to start inflammation[9,10,11,12]. The ultrasound is a commonly used modality for tendinosis[10]. It Improves microcirculation, migration and synthesis of collagen fibers to the achilles tendon[11, 12]. A study compared ultrasound (US) with friction massage and both techniques were effective in tendinitis[13]. Eccentric exercises improve range of motion, functional activity, decrease pain and also effect on the rapid recovery of Achilles tendinosis[14, 15].In a study when soft tissue treatment was added with eccentric exercises there was the better effect on function and pain in achilles tendinosis.[16] Transverse friction massage (TFM) is one of the Cyrix approaches, the direction of massage must be transverse from direction of fibers of affected structure. It improves pain and mobility by breaking the adhesion and releasing the scar in muscle and tendon[17,18,19].

The Ultrasound, transverse friction massage and eccentric exercises had effects on achilles tendinopathy but there was no comparison of ultrasound with transverse friction massage when eccentric exercises are baseline treatment. This study aimed to compare transverse friction massage

and ultrasound therapy incorporated with eccentric exercises in the treatment of Achilles tendinopathy.

METHODOLOGY

A randomized control trial was conducted at City Hospital Jalal Pur Jattan, Gujrat. The duration of the study was from 1st March 2019 to 15th August 2019. The study was started after approval from research and ethical committee (RCR&AHS/REC/MS-OMPT/022). The non-probability convenient sampling technique was used for sample collection and patients were randomly allocated in groups by lottery method. A total of n=76 patients were included in the study who were 18 to 65 years of age, had pain on achilles tendon palpation, the VISA-A scale score of >20 and <80 points and had activity limited due to symptoms for the last 6 months. The exclusion criteria were patients having AT surgery previously, intra-articular injection for the past 6 months, having rheumatoid arthritis; and primary and secondary osteoarthritis.

The Group A was treated with transverse friction massage (TFM) along with eccentric exercises (EE) and the group B was treated with ultrasound therapy (UST) along with eccentric exercises (EE). A total of n=73 patients from n=76 samples were included in the data analysis, as the one patient dropped out from the TFM group (n=36) and two patients from the UST group (n=37). (Figure 1)

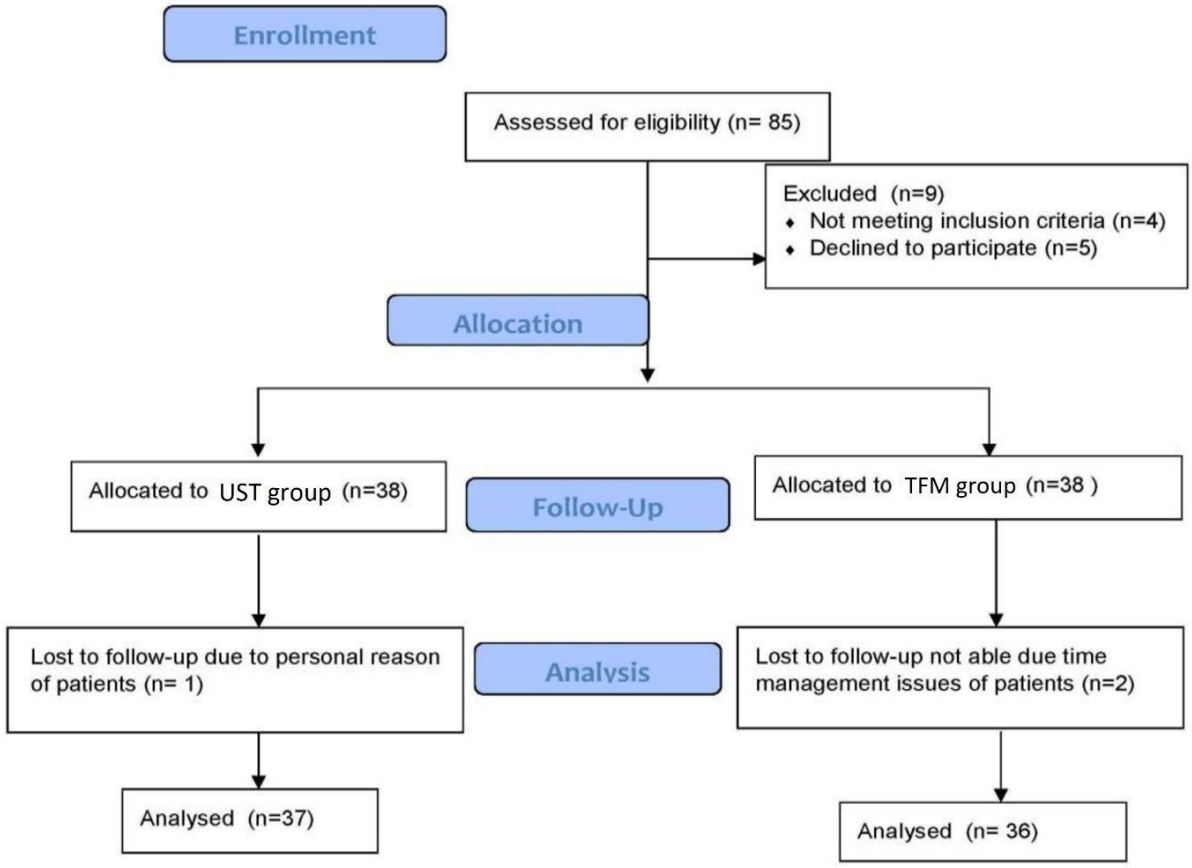

Figure 1: Consort diagram

The Eccentric exercises of plantar flexion were performed while standing on the step with 6 sets of 15 repetitions. The gastrocnemius and soleus were targeted by 3 sets of plantarflexion while knee in extension and 3 sets while knee in slight flexion.

The Ultrasound settings were pulse 20% duty cycle 8ms interval/2ms emission, 2ms burst of 1.0 MHz sinewaves repeating at 100Hz, 0.5 w/cm² of intensity. Transverse friction massage was performed by thumb for 3 min over 3cm-5cm area. The duration of treatment was 6 weeks with 3 sessions per week The assessment was done at the baseline on the 1st session, at end of the 9th and 18th session. The Numeric pain rating scale (NPRS), a valid and reliable scale (ICC=0.63)[21]. To measure the severity of Achilles tendinopathy, self-administered, The Victorian institute of sports assessment–achilles

questionnaire (r=0.90-0.93) was used [22]. The universal goniometry was used for planter flexion, dorsiflexion, inversion and eversion. The demographic data was presented as mean±Sd and n(%) for age and gender respectively. As the assumptions of the parametric test were met so RMANOVA with Bonferroni correction was applied for with-in group changes and to compare the group independent t-test was applied. The partial eta squared (ηp^2) and Cohen's d was also calculated to determine the effect size for RMANOVA and independent t-test respectively. The level of significance was set at $p<0.05$ and SPSS ver 23 was used for data analysis.

RESULTS

The mean age of the participants in the group A was 42.67±5.50 years and in the group B was 42.52±5.29 years. A total of n=28 males and n=9 females were in the group A and the remaining n=25 male and n=11 females were in the group B.

Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated ($p<0.05$), and therefore, a Greenhouse-Geisser correction was used. It showed that both groups improve significantly ($p<0.05$) throughout the treatment duration with large effect size for all variables. (Table 1)

Table 1: With-in group changes pain, severity, and foot ROM

		Group A(TFM)					Group B (UST)				
		Mean	SD	p-value	F(df)	ηp^2	Mean	SD	p-value	F(df)	ηp^2
NPRS	Zero week	8.56	0.50	<0.001^{***a}	982.54(1.34,48.58)	0.96	8.38		<0.001^{***a}	596.72(1.692,59.23)	0.94
	3rd week	5.1	0.75	<0.001^{***b}			6.5	0.64	<0.001^{***b}		
	6th week	1.8	1.01	<0.001^{***c}			4.02	0.77	<0.001^{***c}		
VISA-A	Zero week	27.62	4.70	<0.001^{***a}	1639.35(1.931,69.51)	0.97	27.97		<0.001^{***a}	1506.07(1.91,67.54)	0.97
	3rd week	59.56	3.76	<0.001^{***b}			49.4	2.75	<0.001^{***b}		
	6th week	84.81	4.52	<0.001^{***c}			72.47	3.23	<0.001^{***c}		
Planter Flexion	Zero week	12.54	2.08	<0.001^{***a}	1461.11(1.663,59.85)	0.97	12.44		<0.001^{***a}	1336.35(1.747,61.15)	0.96
	3rd week	22.78	2.89	<0.001^{***b}			18.08	2.52	<0.001^{***b}		
	6th week	31.59	2.94	<0.001^{***c}			23.83	2.19	<0.001^{***c}		
Dorsi Flexion	Zero week	5.27	1.50	<0.001^{***a}	1642.99(1.785,64.24)	0.97	5.41		<0.001^{***a}	543.34(1.648,57.67)	0.93
	3rd week	10.62	1.68	<0.001^{***b}			8.50	1.71	<0.001^{***b}		
	6th week	16.62	1.68	<0.001^{***c}			12.50	1.99	<0.001^{***c}		
Inversion	Zero week	8.40	1.89	<0.001^{***a}	1022.68(1.996,71.84)	0.96	8.33		<0.001^{***a}	868.664(1.58,55.51)	0.96
	3rd week	15.21	2.79	<0.001^{***b}			11.86	1.70	<0.001^{***b}		
	6th week	23.48	2.30	<0.001^{***c}			17.86	1.86	<0.001^{***c}		
Eversion	Zero week	5.40	1.48	<0.001^{***a}	927.647(1.479,53.24)	0.96	5.30		<0.001^{***a}	374.231(1.38,48.37)	0.91
	3rd week	11.00	1.43	<0.001^{***b}			8.72	1.76	<0.001^{***b}		
	6th week	17.08	1.65	<0.001^{***c}			13.22	2.05	<0.001^{***c}		

[a]0 week vs. 3rd week, [b]3rd week vs. 6th week, [c]0 week vs 6th week

Level of significance: p<0.05 p<0.01**, p<0.001****

While comparing the groups with independent t-test, TFM group showed more improvement in all variables as compared to UST group ($p<0.05$) after 3rd week as well as after 6th week of intervention with large effect size. (Table 2)

Table 2: Between group comparison (TFM & UST)

		Group A(TFM)		Group B (UST)		MD	p-value	Cohen's d
		Mean	SD	Mean	SD			
NPRS	Zero week	8.56	0.50	8.38	0.49	0.18	0.129	0.18
	3rd week	5.1	0.75	6.5	0.64	-1.4	<0.001***	0.75
	6th week	1.8	1.01	4.02	0.77	-2.22	<0.001***	0.81
VISA-A	Zero week	27.62	4.70	27.97	4.30	-0.35	0.761	0.04
	3rd week	59.56	3.76	49.4	2.75	10.16	<0.001***	0.84
	6th week	84.81	4.52	72.47	3.23	12.34	<0.001***	0.82
Planter flexion	Zero week	12.54	2.08	12.44	2.07	0.1	0.885	0.02
	3rd week	22.78	2.89	18.08	2.52	4.7	<0.001***	0.66
	6th week	31.59	2.94	23.83	2.19	7.76	<0.001***	0.84
Dorsi flexion	Zero week	5.27	1.50	5.41	1.22	-0.14	0.722	0.04
	3rd week	10.62	1.68	8.50	1.71	2.12	<0.001***	0.53
	6th week	16.62	1.68	12.50	1.99	4.12	<0.001***	0.87
Inversion	Zero week	8.40	1.89	8.33	1.75	0.07	0.871	0.02
	3rd week	15.21	2.79	11.86	1.70	3.35	<0.001***	0.57
	6th week	23.48	2.30	17.86	1.86	5.62	<0.001***	0.81
eversion	Zero week	5.40	1.48	5.30	1.47	0.1	0.808	0.03
	3rd week	11.00	1.43	8.72	1.76	2.28	<0.001***	0.58

Level of significance: p<0.05 p<0.01**, p<0.001****

DISCUSSION

The objective of this study was to compare ultrasound with transverse friction massage in Achilles tendinopathy. Eccentric exercises of planter flexors were common treatment for both groups. NPRS, VISA-A and goniometer were used for pain, functional outcome and range of motion at the ankle joint. There was a significant decrease in pain within and between groups. There was also significant increase in functional status (VISA-A) and range of motion at ankle joint.

A meta-analysis was conducted in 2019 to compare the VISA-A score of eccentric exercises and ultrasound in Achilles tendinopathy. In that meta-analysis, a study compared two groups, group A was treated with deep friction massage (DFM), ultrasound and in group B eccentric exercises were added with deep friction massage, ultrasound. The mean difference of VISA-A for group B was 35±3.00 and for group, A was 22±10.00. In current study, the mean difference of VISA-A for transverse friction massage group was 57.19±0.18 and for the ultrasound group was 44.5±0.96. In the previous study the treatment plan was of 12 weeks with 1week interval. In current study treatment was of 6 weeks but was continuous. That 1 week pause of treatment in previous study can affect the outcomes. Another study in this meta-analysis also uses DFM and ultrasound for AT and there was no significant improvement in VISA-A but in current study, there was a significant improvement in VISA-A score for both groups. In That meta-analysis, deep friction massage showed better improvement in VISA-A as compared with traditional physical therapy. In the current study, ultrasound was compared with transverse friction massage; and eccentric exercises were common in both groups. By comparing the current study with this meta-analysis it can be concluded if eccentric exercise is added with transverse friction massage or ultrasound there will be more significant positive effects on Achilles tendinopathy[23,24].

A study in 2011 compared ultrasound with deep friction massage in tendinitis. It was an RCT of 10 days treatment. The baseline treatment was Codman's exercises. The current study showed better improvement in pain as compared to previous study. because in this study eccentric exercises were common treatment and in previous study, Codman's exercises were common treatment. For ROM, the results in previous and current study both showed significant improvement (p=0.001)[25].

A study analyzed the effect of transverse friction massage on tendinitis. That trial was of 3 weeks with 2 sessions per week. Outcome measuring tools were VAS and VISA-A. They included eccentric exercises with transverse friction massage. In current study the result of NPRS and VISA-A were more significantly better than previous study because the duration of treatment and quantity of sessions in current study were greater in quantity [26].

In current study the BMI, presence of diabetes and information regarding foot wear of participants was not considered, which may affect the progress of the condition even with intervention.

CONCLUSION

The transverse friction massage (TFM) was more effective than ultrasound therapy (UST) when combined with eccentric exercises in improving pain severity of tendinopathy and ROM of ankle.

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RESEARCH ARTICLE

THE COMPARISON OF EASY ONSET AND PANTOMIMING TREATMENT ON BLOCKING IN STAMMERING

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ABSTRACT

Background: Stammering is a speech fluency disorder categorized by repetitions, prolongations and blocks that interrupt the normal flow and forward movement of speech. The Fluency shaping techniques including Easy Onset and Pantomiming treatment are commonly used techniques for the management of stuttering. **Objective:** To compare the effectiveness of Pantomiming and easy onset method for the treatment of blocks in stammering in school aged children. **Material & Method:** A randomized control trial (NCT04813588) was conducted in hospitals of Rawalpindi and Islamabad. The Convenient sampling technique was used for data collection from National Institute of Rehabilitation Medicine (NIRM). The sample size was n=16, randomly divided in Easy onset (n=8) and Pantomiming (n=8) through lottery method. The schools going children and adolescent between 6-18 years of both genders with mild to moderate stammering with blocking symptoms were included. The severity of stuttering was assessed with real time analysis of speech fluency. The data was analysed at the baseline and after three months of intervention. The non-parametric tests were applied for within and between group analyses. **Results:** The mean age of the participants was 10.38±5.290 years. A total n=11 were males and n=5 were females. When compared both groups, there was no significant difference between Easy onset and Pantomiming technique {MR=9 vs MR=8, U=28, p=0.535} in the management of stuttering after three months of intervention. **Conclusion:** The easy onset and pantomiming techniques are equally effective in improving the blocking in stuttering.

Keywords: Blocks, easy onset, fluency shaping, pantomiming, speech therapy, stammering, stuttering.

INTRODUCTION

The speech is a complex process which involves the integrity and incorporation of various neurocognitive, neuro motor, neuromuscular and musculo-skeletal activities[1]. Stammering is a speech disorder categorized by repetitions, prolongations and blocks that interrupt the normal flow and forward movement of speech[2]. Stammering is regarded as by overt behaviors such as unintentional blocks and pauses in speech; repetitions; prolongation and covert, concealed or unobservable behaviors. This inability to control is a core and essential feature of stammering explained by many people who stutter [3]. Untimely the termination of sound and air is called blocks in stammering and frequently allied with discontinuing of the movement of the tongue, lips and/or vocal folds. The muscle tension and exertion is also related to blocking symptoms frequently [4] . In a study occurrence of linguistic and speech complications among children and its association with Demographic variables in Karachi Pakistan showed that 4.5% Fluency problems were observed[5].

The stammering has adverse effects on speech production itself as well as increased anxiety levels and avoidance of speech situations that may impact the general quality of life as the stutter grows [6]. it is essential to measure and calculate the severity of stuttering before, during and after any therapy [7].

The variety of techniques is used to treat the stuttering with direct and some are indirect techniques including digital manipulation and fluency shaping technique[8]. The adults who stutter can learn to acquire the control and increase their speech fluency and speed by transforming their speaking rate and frequency. The current speech and language therapy skills can contribute to this practice by checking speaking speed and giving feedback to the person who stutter[9]. The Fluency shaping techniques are used to impart a new speech style that is without stammering. There is much diverse fluency shaping techniques most of them include slower rate of speech, easy onset of sounds, Prolongation, pantomiming, relaxed and deep breathing etc. The main emphasis of Fluency shaping techniques is on speech production[8, 10]. The therapists' help parents identify and increase factors that prompt fluency and reduce aspects that disturb fluency at home[11]. In prolongation is one of the most used speech reformation

managements for making fluency in PWS. In this technique PWS are taught their disfluent expressions by a new speech form[8]. In easy onset technique Utterer is trained to exhale slightly before the start of phonation and reach conversational loudness and volume progressively, this will help the PWS to release the block easily [9,12].

Al though the frequency shaping therapy showed some significant results than some other techniques like digital manipulation thyroid cartilage[8]. As there are different types of independent fluency shaping, but comparison was made to determine the better option for stuttering. So, the study objective was to compare the effectiveness of Pantomiming and easy onset method for the treatment of blocks in stammering in school aged children.

METHODOLOGY

A randomized control Trial (NCT04813588) was conducted on n=16 school aged children and adolescents with stammering at National Institute of Rehabilitation medicine Islamabad (from February 2021 till August 2021). The study duration was 6 months after the approval of research and ethical committee of Riphah International University (Ref# Riphah/RCRS/REC 00879). A convenient sampling technique was used for data collection. A randomization was done through lottery to allot the subjects to both groups and equally divided into Easy onset (n=8) and Pantomiming (n=8) group. (Figure 1)

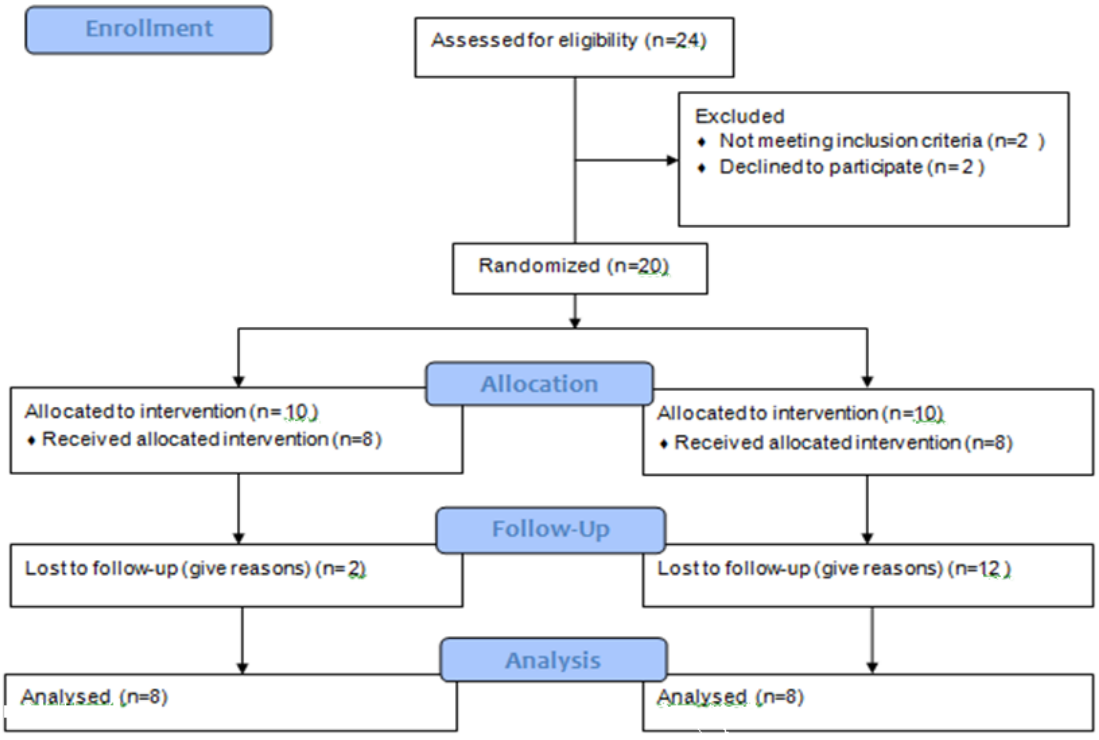

Figure 1: Consort diagram

The Real Time Analysis of Speech Fluency was used to assess the severity of stuttering. The assessment data was gathered from play base activities questions about daily routine. The procedure involves observing a speech sample and counting fluent and disfluent words (in this study speech sample was videotaped). The Step 1 clients' speech was observed for a few minutes to become familiar with the general speaking style and pattern of disfluencies in the speech. Step 2 was to begin coding speech with a dot (.) or dash (-) for fluent words and an (x) or coding symbol for disfluent words and gather the sample of 300 syllables. Calculator was used to find the severity of stuttering; total stutter was divided by the total number of syllables. So, the Percentage of syllables stutter was calculated. According to the tool 3-8 % syllable stuttered, is considered as mild stuttering

and 8-15% syllable stutter will be consider as moderate stutters.

In *Easy onset treatment (Group A)* technique the utterer was trained to start out with a quite sigh. It produced a "hhh" sound without the sound has turned on. He was also trained to slowly produce "h" sound before the vowel and vowel was stretched out at this stage and then utterer was trained to produce a range of vowel with easy onset e.g. ay,ah,ee.

In *Pantomiming treatment (Group B),* In this technique utterer was trained to articulate without phonation. Both groups received 30 minutes session, three times a week for three months. The data was analysed at the baseline and at the end three months intervention.

The descriptive statistics was used to present the data, including mean±Sd, n(%). As the assumptions of parametric test were not met, for with-in group analysis Wilcoxon signed rank test and for comparison Mann Whitney U-test was used. The α level set at $p<0.05$ and SPSS ver. 20 was used for data analysis.

RESULTS

The mean age of study participants was 10.13±5.29 years. A total of n=11 participants were male and n=5 was female.

Both the easy onset and pantomiming {MR=3.50 Vs MR=2.50, Z=-2, p=0.04} technique showed significant reduction in severity of stuttering.

Table 1: Changes in Severity of stuttering (pre & post)

	Assessment	Median (IQR)	Mean Rank	Z score	p-value
Easy onset (Group A)	Pre	1.5(1.00)	3.50	-2.449[b]	.014*
	Post	1(.75)			
Pantomiming (Group B)	Pre	1(1.00)	2.50	-2.000[b]	.046*
	Post	1(.00)			

Significance level: p<0.05, p<0.01**, p<0.001****

While comparing both groups, no significant difference between Easy onset and Pantomiming technique {MR=9 ver MR=8, U=28, p=0.535} in the management of stuttering after three months of intervention. (Table 2)

Table 2: Mann Whitney Test (Comparison of techniques between groups)

Assessment	Groups	Median (IQR)	Mean Rank	U-stats	p-value
Pre	Easy onset (Group A)	1.5(1.00)	9	28	0.626
	Pantomiming (Group B)	1(1.00)	8		
Post	Easy onset (Group A)	1(.75)	8	28	0.535
	Pantomiming (Group B)	1(.00)	9		

Significance level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The objective of the study was to compare the Pantomiming and easy onset technique on blocking in stammering. The stuttering is possibly in the form of repetitions, prolongations or abnormal stoppages of sounds and syllables[13]. The review of the literature suggested that both techniques are helpful in decreases stammering. However, most of the studies are focused on effectiveness of single technique rather than their comparison[8, 9,10].

The easy onset used in fluency shaping program. In the present study, the easy onset was applied to group A and pantomiming was applied to group B. With-in group analysis of both groups showed significant improvement in stuttering severity. In a comparative study, easy onset and stuttering modification techniques were compared which showed clinically significant improvement in stuttering severity and attitude change of the clients[14]. Another study conducted where the stuttering participants were examined who stutter on initial syllables by introducing pantomiming, silent reading, and redacted speech conditions. The result showed approximately 100% reduction of severity during silent articulation in pantomime speech[15]. The Easy onset can be assisted by aspirating speech sound at the beginning of phrases and accompanying them with slight puff of air/h/. It helps because during the production of /h/ sound vocal folds are nearly fully abducted it reduces the any hard attack as vocal folds come together more gently[16]. Similarly in the Pantomiming technique low exhalation with no perceivable sound reduces the excess pressure on laryngeal area[17].

As both interventions improved the severity of stuttering, the results do not suggest any difference between the groups regarding effectiveness of intervention in reducing severity. In a similar study, fluency shaping techniques were suggested as an effective technique for people with stuttering. By employing gentle contact of articulators, slow and prolonged speed of speech, extending and exaggerating all syllables in expression, and easy and light beginning of phonation, were proved to be effective in reducing stuttering severity[18].

The present study results showed the comparison of Easy onset and Pantomiming treatment on blocking in stammering. However, the study results were limited due to limited time, small sample size and age range, and sample was collected only from one hospitals of Islamabad, which is not the representative of the whole Pakistani population.

CONCLUSION

The results revealed that easy onset and pantomiming techniques are both equally effective in reducing severity of blocking in stuttering among school going children and adolescents. It is recommended that future studies should be conducted multicentre study with larger sample size and considering the confounding variable like age, gender, and mental health.

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RESEARCH ARTICLE

GENDER BASED DIFFERENCES OF BURNOUT AMONG CLINICAL AND ACADEMIC PHYSICAL THERAPISTS

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ABSTRACT

Background: Burnout can develop due to various risk factors including socio-economic, conventional and personal, for both men and women. Some studies suggest increased prevalence of burnout in female individuals, which may be due to actual aspects like how the assessment tools are used or the way burnout manifests in both genders, including levels of emotional exhaustion, feelings of decrease in personal effectiveness in the work environment. **Objective:** To determine the gender based differences of burnout among clinical and academic physical therapist. **Methodology:** This cross-sectional comparative study was conducted at major various educational institutes, hospitals and private clinical setups of twin cities Rawalpindi and Islamabad from January to June 2021 (6 months) The total sample was n= 324 participants enlisted using non-probability purposive sampling. The adults aged 25-40 years, with at least 1 year of working experience, both male and female were included. The data was collected using Copenhagen Burnout Inventory (CBI) tool. The data analysis was done by SPSS 21 version. **Results:** The mean age of participant was 29.69±4.34 years. The level of burnout among the physical therapist on the basis of gender ($p<0.001$) and occupational differences ($p=0.001$), both showed statistically significant association. **Conclusion:** Level of burnout in physical therapists was found to be low. Female physical therapists exhibited greater level of burnout as compared to their male counterparts and also academicians tended to have greater burnout as compared to those working in clinical settings

Keywords: Academic training, burnout, gender, health care delivery, physical therapist.

INTRODUCTION

Burnout is a long-drawn-out reaction to constant enthusiastic and relational stressors at work and is characterized by the three basics of depletion, negativity and inefficacy[1].People who are experiencing burnout typically show mental issues, obsessive issues, disposition issues and social issues among different issues[2].

A burnt-out individual experiences additional exhaustion and incapability to carry out on the occupation. Burnout can impact all occupations particularly healthcare professionals[3].Professional burnouts are a significant issue in social services defined as healthcare professionals' reaction to long-term stress[4].Employees in the health-care industry are at a significant risk of burnout[5].Burnout also impacts the job, goals and mental health of one. Burnout is not a severe condition, according to Friedenberger, instead, it is a persistent stress state[6].

Many relate their burnout experiences to workplace conditions[7].Medical care experts have been portrayed as especially, defenseless against burnout[8].Rehabilitation professionals had a high risk of burnout, specially occupational therapists and physical therapists[8, 9].

Physical therapists work with people for physical stress management and to enhance their ability to perform everyday activities and functioning to make patients independent in life. The responsibility may likewise be the reason for work related pressure[10].Physical therapists are in everyday contact with the physical and mental stress of patients as they face different conditions of incapacity. This may lead clinicians to safeguard themselves by removing themselves from associations with their patients. As they spend most of the work day profoundly associated with their patients, the treatment they give is inwardly, emotionally, and mentally testing. Burnout is caused by similar mechanisms in the many professional groups studied[8].

Among male, low burnout was attributed to fulfillment with one's work and occupation, companions, family members and colleagues. Burnout among women decreased in conjunction with increasing satisfaction with one's health, spare energy, and companions, family members, and colleagues, and increased as a result of working in a

location other than a medical care unit or educational center[3].

Burnout related studies have been performed worldwide, but no data was found in Pakistan related to physical therapist burnout where both gender and occupation were observed. The current study determined the gender-based disparity in the likelihood of burnout in physical therapists working in academia or clinical settings which could determine the need for future researches exploring the factors which lead up to this condition.

METHODOLOGY

This comparative cross-sectional study was conducted on of n=324 physical therapist from Jan to June, 2021, working at various hospitals, clinical settings and institutions of Islamabad. The Physical Therapists enrolled in the study belonged to either clinical practice or academia, both genders ranging from 25-40 years of age with at least 1 year of working experience. Those unwilling to participate were excluded from the study.

The data was collected after taking ethical approval from Ethical Committee of Riphah International University, as well as written informed consent from the subjects enlisted using non-probability purposive sampling. The Copenhagen Burnout Inventory (CBI) was applied to assess Level of Burnout among Physical Therapists. The degree of physical and psychological fatigue experienced in the questionnaire consisted of three sub components; Personal burnout, Work-related burnout and Client-related burnout. Copenhagen Burnout Inventory (CBI) is a 19-item scale measuring burnout in three domains: personal burnout (6 items: questions 1–6), work-related burnout (WRB) (7 items: questions 7–13), and client-related burnout (CRB) (6 items: questions 14–19)[11].In reliability analysis, Cronbach's alpha exceed 0.7 for all subscales indicating a high level of internal consistency[12].

It was applied on a sample participants calculated via Epitool. The data on demographics including age in years, gender, and type of job of the Physical therapists was acquired after taking permissions from their respective heads and written informed consent from participants.

The demographic data was presented as mean±SD, n (%), while the frequency distribution responses of CBI individual items were presented in the table. The comparison was made between the genders as well as job type regarding CBI subdomain and total score, with independent t-test.

The level of significance was set at p<0.05.The data collected was analyzed using SPSS 21.

RESULTS

The overall mean age of n=324 physical therapist was 29.69±4.35 years with range between 25-40 years. A total n=162 males and n=162 females were also equally obtained from academic (n=81 female, n=81 male) and clinical setting (n=81 female, n=81 male).

The detailed frequency distribution regarding academic and clinical physical therapist's score on individual items of Copenhagen Burnout Inventory and for its total are shown in (Table.1).

Table.1.Comparison and frequency distribution of CBI regarding Gender & Job type

Domain of Burnout	Group	Mean±Sd	p-value	Low n(%)	Moderate n(%)	High n(%)
Personal Burnout	Male	8.38±4.870	0.000***	140(85.9)	17(10.4)	6(3.7)
	Female	11.99±5.42		105(64.4)	37(22.7)	21(12.9)
	Academics	11.21±5.45	0.001**.	109(66.5)	41(25.0)	14(25.0)
	Clinical	9.14±5.27		136(84)	13(8)	13(8)
Work-related Burnout	Male	9.19±5.39	0.000***	143(87.7)	16(9.8)	4(2.5)
	Female	11.77±5.87		129(79.1)	24(14.2)	10(6.1)
	Academics	11.56±5.62	0.001**	133(81.1)	25(15.2)	6(3.7)
	Clinical	9.38±5.74		139(85.8)	15(9.3)	8(4.9)
Client-related Burnout	Male	6.39±5.61	0.165	142(87.1)	16(9.8)	5(3.1)
	Female	7.21±4.96		144(88.3)	14(8.4)	5(3.1)
	Academics	7.51±5.46	0.016**	136(82.9)	23(14)	6(3)
	Clinical	6.09±5.05		142(87.1)	16(9.8)	5(3.1)
Total CBI Score	Male	24.98±14.10	0.000***	138(84.7)	15(9.2)	10(6.1)
	Female	30.95±13.78		112(68.7)	20(12.3)	31(19.0)
	Academics	30.47±14.50	0.001**	120(73.2)	23(14.0)	21(12.8)
	Clinical	25.46±13.55		130(80.2)	12(7.4)	201(12.3)

Significance level: p<0.05*, p<0.01**, p<0.001***

Independent t-test was used to analyze and compare the groups and statistically significant difference was observed in level of burnout between the two genders (p=0.000) with females (30.95±13.78) having a higher level of burnout as compared to males (24.98±14.10). Similarly, significant difference (p=0.001) was found in level of burnout when comparison was done between academic physical therapists (30.47±14.50) and clinicians (25.46±13.55).

DISCUSSION

To the best of our knowledge, the present study is the first to investigate level of burnout in both genders and different types of job occupancies which could affect the efficiency and work capacity of physical therapists.

Females associated with academia had high level of burnout, emotional fatigue and neuroticism than males[13].Another study observing the height of burnout, individual intolerance skill, and work pressure on the basis of gender differences for therapists they find out that female therapist had high level of burnout than male therapists[8].Female therapists at the age of 20s working in small sized hospitals are at high level of burnout due to work pressure[5].Similar relationship was demonstrated in the present study where the level of burnout was not found to be associated with gender disparities which may be associated with physical vulnerability of the female gender.

Factual investigations revealed no significant differences between female and male physiotherapists in terms of the BSI (Burnout Syndrome Inventory) spaces, the overall burnout record, or the assessment of life satisfaction[3].High level of burnout was examined in all three domains of Copenhagen Burnout Inventory[14].Another study reported that degree of burnout was low-grade among physical therapists and the association between job stressors and burnout were also measured[15].Differences are seen across literature owed to the type, duration and varying reflections upon one's own level of exhaustion. In the present study the physical therapists have low degree of burnout probably owed to the majority of participants in the study of being young age and having low levels of perceived exertion but females exhibited greater degree of burnout as compared to their male counterparts.

A study determined that gender difference was a cause in the practice of job burnout among academic employees. This study accomplished that female and male had high level of burnout whereas not gender nor type of job affected the degree of burnout among physical therapists[16].In hospitals emotional fatigue was extensively elevated among physiotherapists working with adults and workers in hospitals[17].Present study showed evident association of type of job or activity with degree of burnout among physical therapists but most of the therapists reported low degree of burnout which was not affecting their personal well-being and relationships.

The occurrence of burnout disorder in intensive care units was seen between health care professionals who were working there. This study highlighted that it was achievable to examine the low occurrence of burnout disorders, among professional physical therapists, on the other hand an elevated threat for its increment existed due to elevated job demands and stressors[15].The physiotherapists who participated in present study however did not report greater levels of burnout nor did they seem to be exposed to high stressors at most as they were likely to be at comfort with their working environment and the job demands expected of them. However, academicians reported greater level of burnout probably owed to the multitude of tasks and continuously evolving job demands.

The current study was a multi-center study where physiotherapists of both gender working in clinical locations and academia were questioned. Validated questionnaire enabled us to compare our results with previous studies. However, it was a comparative study that utilized a self-reporting questionnaire and has a chance of respondent bias. The perceptions of physical therapists and associated risk factors were not assessed which are limitations of the current study.

On the basis of findings from the present study, we recommend that physical activity levels should be accounted for which could determine its effect upon the level of burnout among physical therapists.

CONCLUSION

Level of burnout in physical therapists was found to be low. Female physical therapists exhibited greater level of burnout as compared to their male counterparts and also academicians tended to have greater burnout as compared to those working in clinical settings.

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RESEARCH ARTICLE

EFFECT OF MODIFIED EPLEY'S & SEMONT'S MANOEUVRES WITH OR WITHOUT BETA-HISTINE ON BENIGN PAROXYSMAL POSITIONAL VERTIGO

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ABSTRACT

Background: Benign Paroxysmal Positional Vertigo (BPPV) is a condition related to vestibular system accompanied by dizziness, tinnitus and balance problems leading to increased fall risk and potential disability. Various treatment options are available including pharmacotherapy and vestibular rehabilitation with varied results. **Objective:** To compare the efficacy of Modified Epley and Semont's manoeuvre with and without Beta-histine for BPPV. **Methodology:** A single blinded Randomized control trail, registered at clinicaltrial.gov under clinical trial registry NCT05309538, was conducted on n=90 patient having Benign Paroxysmal Positional Vertigo; at the Neurocouncil Hospital & the physiotherapy clinic. from June 2021- August 2021. The participants between 18 to 60 years with positive modified Dix Hil pike test were included in the study. The n=90 participants were equally divided via lottery method into Group A and B, Both group received mEpley's and Semont's Manoeuvres, Group B additionally received beta-histine. The dizziness handicapped inventory and EQ-5D-5L questionnaire were used for dizziness and quality of life respectively. The data were collected at the baseline and at the end of 4th week. The data was analyzed with SPSS version 21. **Results**: The wilcoxon rank test showed that there was significant improvement ($p<0.001$) in dizziness handicapped inventory, all domains and the total score of EQ-5D quality of life questionnaire. While comparing both groups no significant ($p\geq0.05$) additional effects of Betahistine with modified Epley's and Semont's manoeuvres on dizziness handicapped inventory and quality of life. **Conclusion**: The study concluded that the Betahistine has no additional effects in the management dizziness of BPPV

Keywords: Disability, psychological Adjustment, Stress BPPV, Modified Epley's manoeuvre, Semont's manoeuvre, vertigo, dizziness, quality of life.

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is a vestibular condition which manifests itself in the form of short but repetitive dizziness spell along with nystagmus due to positional change of head[1]. The Vertigo and dizziness are the main complaint of patients visiting emergency department [2]. Most frequently this condition affects the persons between 20-50 years of age. But its distribution in both genders is same[3].

The diagnostic manoeuvre was used by Dix Hill pike standardized diagnostic tool for BPPV along with roll test[4].The Problem in all three semicircular canals can cause BPPV[5]. But most frequently occurring BPPV is in posterior semicircular canal[6,7]. The Posterior canal BPPV occurrence is more than 80%[8]. Clinicians confirm this condition by performing a manoeuvre knows as Dix hill pike manoeuvre [9].

Several treatment options are proposed by few clinicians[10]. Physicians generally perform Dix Hill pike manoeuvre to elicit the expected nystagmus & vertigo[11,12]. The pharmacological therapy as well as canalith repositioning manoeuvres is available treatment options for the management of BPPV but in severe cases surgical intervention may be opted[13]. For the management of benign paroxysmal position vertigo the best treatment option is canal with reposition manoeuvres[14,15].In case of resistant cupulolithiasis to move crystal to its normal position a liberatory Manoeuvre such as Semont's is used[16]. Both manoeuvres are chiefly used to move the crystal out of these semicircular canals towards utricle[17]. Brandt-Daroff exercises are also used for vestibular system, which works on the principal of central compensation or spontaneous resolution of positional vertigo which can be performed at home [18].

Betahistine is commonly used for the treatment of vertigo and meniere's disease & BPPV [19,20,21]. Betahistine is considered a safe drug for BPPV. The betahistine act as H_1 receptor agonist and also as an antagonist of H_3 receptor which in turn further augment the effects of H_1[22,23]. By this way it enhances the blood circulation in inner ear vessels and helps in postural stability as well.

Due to most prevalence of positional vertigo and excessive use of betahistine in routine we tried to compare the efficacy of this drug alone and in combination with positioning manoeuvres to show

whether beta-histine has any significant additional effects or not. The objective of this study was to compare the effectiveness of combined semont's manoeuvre & modified Epley's manoeuvre with and without Betahistine to treat benign paroxysmal positional vertigo.

METHODOLOGY

After taking written approval from ethical committee of the Physiotherapy clinic, Rawalpindi a single blind RCT registered (NCT05309538) was conducted. The participant's age, between 18-60 with positive Modified Dix Hill Pike test and repetitive vertigo spells affecting activities of daily livings (ADLs) to a greater extent were included in this study. A total of n=97 subjects were evaluated for inclusion and n-90 met the criteria. Whereas those participants suffering from any cervical spine problem or vertigo due to central disease, having tumors, systemic disease, cardiac disease, Parkinson disease or totally immobile patients were excluded from the study.

The lottery methods were used to randomly allocate the participants into both groups. Both groups were managed with modified Epley and Semont's manoeuvres twice a day for two weeks. The Group B received additionally beta-histine 8mg twice a day for two weeks.

The demographic data was included age, gender marital status and onset BPPV. While outcome measures were dizziness handicap inventory questionnaire for dizziness and Euro Quality of life 5-dimension questionnaire to measure the quality of life were used [24,25]. The data was collected at the baseline and after two weeks after the intervention. The assumptions of parametric tests were not met so non-parametric tests for applied. For within group analysis Wilcoxon Sign Rank test and Mann Whitney U test for between groups analysis. The mean, standard deviation, median, interquartile range was used to demonstrate the descriptive statistics. The level of significance was set at less than p<0.05. For the analysis of data, IBM software SPSS version 21 was employed.

RESULTS

The mean age of study participants was 31.565±11.27 years. A total of n=32(35.56%) were males and remaining n=58(64.44%) were females in the study. The data marital status showed that n=73(81.11%) married and n=17(18.89%) were unmarried. For within group analysis, the wilcoxon rank test showed that there was significant improvement (p<0.001) in dizziness handicapped inventory, all domains and the total score of EQ-5D quality of life questionnaire. (Table 1)

Table 1 With Group changes (DHI & EQ-5D-5L)

Variable	Groups	Pre		Post		Z	*p-value*
		Median	IQR	Median	IQR		
Dizziness	Group A	74	18	10	11	-5.81	0.000*
	Group B	82	12	8	8	-5.84	0.000*
Exercise	Group A	4	1	2	1	-5.54	0.000*
	Group B	4	1	2	2	-5.33	0.000*
Self	Group A	4	1	1	1	-5.78	0.000*
	Group B	3	1	2	1	-5.39	0.000*
Daily	Group A	4	0	2	1	-5.76	0.000*
	Group B	4	0	2	0	-5.89	0.000*
Pain	Group A	5	1	2	1	-5.79	0.000*
	Group B	4	1	2	1	-5.77	0.000*
Anxiety	Group A	5	1	2	0	-5.80	0.000*
	Group B	4	1	2	1	-5.77	0.000*
Total EQD5	Group A	20	18	80	20	-5.84	0.000*
	Group B	25	10	77	17	-5.84	0.000*

Significance level: p<0.05, p<0.01**, p<0.001****

While comparing the both groups after two weeks, no significant (p≥0.05) additional effects of beta-histine on dizziness handicapped inventory and quality of life. (Table 2).

Table 2: Comparison between the groups (DHI & EQ-5D-5L)

Variable	Groups	Median	IQR	U	*p-value*
Dizziness	Group A	10	11	780.00	0.06
	Group B	8	8		
Exercise	Group A	2	1	944.500	0.55
	Group B	2	0.5		
Self	Group A	1	1	867.500	0.20
	Group B	2	1		
Daily	Group A	2	1	943.500	0.51
	Group B	2	1		
Pain	Group A	2	1	906.500	0.33
	Group B	2	0		
Anxiety	Group A	2	0	946.500	0.56
	Group B	2	1		
Total EQD5	Group A	80	20	821.500	0.12
	Group B	77	17		

Significance level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The objective of the current study was to compare the effects of Semont's and modified epley's manoeuvre (mEpley) with or without Betahistine on benign paroxysmal positional vertigo. It was observed that both treatment options are effective in reducing the symptoms of BPPV and improving QoL. The result also showed that behistine has no additional effect in combination with Semont's and modified epley's manoeuvre on dizziness and quality of life. There are several studies that showed that positioning manoeuvres including eplay's, semont significantly improve the symptoms of BPPV[26,27,28]. The Steenerson RL et al conducted a

retrospective study on 923 patients suffering from benign paroxysmal positional vertigo. The patients were treated by positioning manoeuvres, liberatory along and log roll methods for 6 months. The results revealed that 94% of cases suffering from posterior canal BPPV were cured by positioning manoeuvres and 98 % by liberatory manoeuvres and 100% by log roll methods[26]. The results of this study support the treatment used in current study which were both the repositioning (Modified Epley's) and Liberatory (Semont's) manoeuvres.

A retrospective review as done in March 1993 to June 1995 by JS Wolf et al for the patients diagnosed with BPPV. The diagnostic tool used for this condition was dix hil pike manoeuvre. They performed modified Epley's on patients and asked to remain upright for a duration of 48 hours. If patients were not cured by single treatment, they further executed this manoeuvre for three times after that patient's evaluation was done. It was observed that around 93.4% patients were cured by mEpley's manoeuvre[27]. The results also support the current study

Richard et al conducted a student in 376 patients of positional vertigo and treated them by Canolith repositioning manoeuvres and liberatory manoeuvres. It was observed that after a single treatment sessions 79% patients cured and after two treatments 17% and after three session 3.5% patients cured. And patients treated via semont's manoeuvre had low recurrence rate[28]. A study conducted by Lee J.D et al compared the epley, Semont and sham manoeuvres and the result revealed that eplays manoeuvre is more effective for management of BPPV and higher success rate then other manoeuvres [29].

A randomized control trail conducted by WU Wan-yu et al for the efficacy of modified epley manoeuvre with and without betahistine. They randomized participants in two groups the control group of those who were given just position manoeuvre and experimental group received mEpley along with 60 mg of Betahistine in T.D (thrice daily). After one month all the participants were evaluated. The results showed that experimental group had more successful outcome as compared to control group. But the current study showed no significant difference after adding the betahistine for the management of BPPV[30].

Another RCT study conducted by K Stambolieva et al to evaluate, the efficacious effects of betahistine in combination of Epley's manoeuvre in postural stability of BPPV patients. In this study, they divided participants into four groups based on duration of BPPV and treated then by epley's manoeuvre with and without betahistine hydrochloride. They observed that if betahistine is administered after this manoeuvre it increases the postural stability along with BPPV. After removal of otoconia from inner ear canal by Epley's this betahistine increases the blood flow to inner ear and helps in stabilizing posture of BPPV patients[31]. Betahistine is more effective if administered within 60 days of positional vertigo onset. Betahistine increases microcirculation in the inner ear by creating vasodilatation. This mechanism is reported to be effective in recurrent BPPV by increasing vestibular compensation[33].

A prospective study was conducted by M Cavaliere et al to compare the effectiveness of positioning manoeuvres with and without pharmacological treatment. They randomized patients into four groups first group was given Semont with and without betahistine and Brandt Daroff with and without betahistine. Evaluation was carried out on 3rd, 7th, 14th ,30th and 60th day. On the 14th day a group administered with semont manoeuvre with betahistine showed improvement of 100% the other group with betahistine who showed 96% improvement as compared to just alone semont & Brandt Daroff groups. But, at the end of this study all groups demonstrated significant results which support our results that both interventions show marked improvement with and without betahistine[32].

The limitation of the current study was short duration study and assessment was done at the baseline and at the end of two week, so the changes if occurred between to assessment were missed.

CONCLUSION

As positioning manoeuvres along liberatory manoeuvres have much beneficial effects on the quality of life and DHI score to enhance the patient's functional ability with and without Betahistine use. This study suggests combination of positioning manoeuvres along with liberatory

manoeuvres can be adopted without any drug. A large scale double blinded study should be conducted to evaluate the effectiveness of these manoeuvres with and without pharmacological intervention. At each week readings should be taken, and proper follow up should be done for more the 6 months.

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RESEARCH ARTICLE

EFFECT OF MIRROR THERAPY VERSUS REPETITIVE FACILITATION EXERCISE ON UPPER LIMB FUNCTION IN POST STROKE PATIENT

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ABSTRACT

Background: After stroke one of the most devastating consequences is the hemiparetic arm. Difficulty in using this UL in daily tasks has been related to lower quality of life, improving use of the affected UL is important. **Objective:** To compare the effects of task-based mirror therapy and Repetitive Facilitation Exercise on upper limb function in post stroke patient**. Methodology:** A randomized controlled trial was conducted in Pakistan Railway general hospital, Rawalpindi. The duration of this study was from 10th July to 31st December 2019. Non-probability purposive sampling technique was used with n=50 male and female subacute and chronic post-stroke patients between 40-50 years. The patients with Modified Ashworth Scale <3 and the first-ever stroke was included. The participants were randomly divided by the sealed envelope method into mirror therapy group (n=25) and Repetitive Facilitation Exercise group (n=25). The Upper extremity functional index (UEFI) was used to assess the functional impairment in individuals with upper limb dysfunction, Fugl Meyer (FMA-UE) for assessment of activity in post stroke patients, "Wolf Motor Function Test (WMFT) for upper extremity performance and functional capability" and Brunnstrom recovery scale (BRS) for motor function of the upper limb was used in a post stroke patient. All the patients were assessed at baseline than after 3 weeks and again after 6week for interventional session of 30 min,3 days of the week. Data were analyzed through SPSS version 23. **Results**: The mean age of Group A (MT) was 50.97±6.741 and 49.76±12.66 of Group B (RFE). After 6 weeks of intervention between groups analysis of Task-based mirror therapy showed significant improvement in mirror therapy group as compare to Repetitive Facilitation Exercise group, for upper extremity functional index scores($p<0.001$) but for motor assessment (FMA-UE), Wolf Motor Function Test (WMFT) and for stroke recovery (Brunnstrom) no statistically significant difference ($p\geq0.05$) was found. Within-group analysis of both groups showed statistically significant results in all variables ($p<0.001$). **Conclusion**: Mirror therapy and Repetitive facilitation Exercise both were found to be effective in improving upper limb motor functions of acute stroke patients. However, Mirror therapy has shown significant effects in upper extremity functional index.

Keywords: Mirror therapy, Physical therapy, Repetitive Facilitation Exercise, Stroke, Upper extremity.

INTRODUCTION

The World Health Organization (WHO) defines stroke as focal or global disturbance of cerebral function with rapidly developing clinical signs having vascular origin[1]. Global rate of incidence of stroke is 150.5 per 100,000 in 2017. The prevalence of stroke has increased by 3 percent from 1990 to 2017 which is increased to 1300.6 per 100,000 [2]. In Pakistan, the incidence rate is 250 per 100,000 in comparison with other developed countries[3]. The incidence rate was 584,000 out of 650,000 in years 2000 till 2016 and was maximum among people in the 75 to 85 years age group[4].

A wide diversity of clinical signs and symptoms are exhibited with Stroke impairments. A common and unfortunate sequel of stroke is activity limitation due to the paretic upper[5]. The upper limb (UL) stroke impairments are as high as 80%. After stroke one of the most devastating consequences is the hemiparetic arm. Difficulty in using this UL in daily tasks has been related to lower quality of life, improving use of the affected UL is important[6]. A popular and new therapeutic intervention used these days is mirror therapy (MT) which is pain less, affordable, and moreover patient-directed care which targets the movement of the unimpaired limb[6]. Ramachandran and Roger Ramachandran discovered this method to enhance treatment procedures for phantom limb pain after surgical removal of a limb, also known as amputation[7]. Theory of MT is that it uses a mirror to generate visual feedback for the patient which creates an illusion and tricks the brain into believing that the motion was painless[8]. A mirror is placed between both limbs and the patient is instructed to perform a task with the unaffected hand, followed by moving the affected arm at the same time and the same way all the while looking in the mirror[9].

Another recently discovered technique known as Repetitive facilitative exercise (RFE) is popular in

the rehabilitation of limb impairment because of stoke. It combines high rate of repetition and neuromuscular facilitation[10]. RFE uses skin–muscle or a stretch reflex such that isolated muscle movements are encouraged. It provides a physical stimulation either when the patient attempts to move the hemiplegic part, or just before the movement[11].Number of repetitions of the movements using RFEs are proportional to the rate of clinical improvement or the functional status of the patient's hemiplegic upper limb and hand, mainly when they are altered by a synergic pattern[12].

Impairments of upper extremity functional are common in stroke. Therefore, continuous investigation of effective interventions for upper extremity functions after stroke is necessary. This study aims to determine which protocol is best for upper limb function improvement so that protocol could be followed and the function of the upper limb of post-stroke patients can be maximised and the quality of life of stroke can be improved.

METHODOLOGY

A randomized controlled study (*NCT04468945*) was conducted from 10th July to 31st December 2020 at Pakistan Railway general hospital Rawalpindi after approval from ethical view committee and clinical trial registry. The sample size was n=50 patients (25 in each group) Calculated through open epi tool[13].The participants were selected by non-probability purposive sampling technique. A written informed consent was taken from each patient. The assessor-blinded technique was used for randomization by the sealed envelope method The Inclusion criteria were male and female hemi paretic patients suffering from first attack of stroke having good sitting balance, with the age between 40-60 years, also having scores over 24 on Mini Mental State Examination and less than 3 score on Modified Ashworth scale. The exclusion criteria were unstable, uncooperative patient, orthopedic deformity, Aphasia, visual defect, Joint pain (shoulder, elbow, wrist, hip, knee, ankle) having any co-morbidities and other medical complications. The n=25 participants were recruited in the Mirror Therapy group and n=25 was in the Repetitive Facilitation Exercise group. Out of which n=4 participants were dropped out from the Mirror Therapy (n=21) and 5 from the Repetitive Facilitation Exercise (n=20) group. (Figure 1).

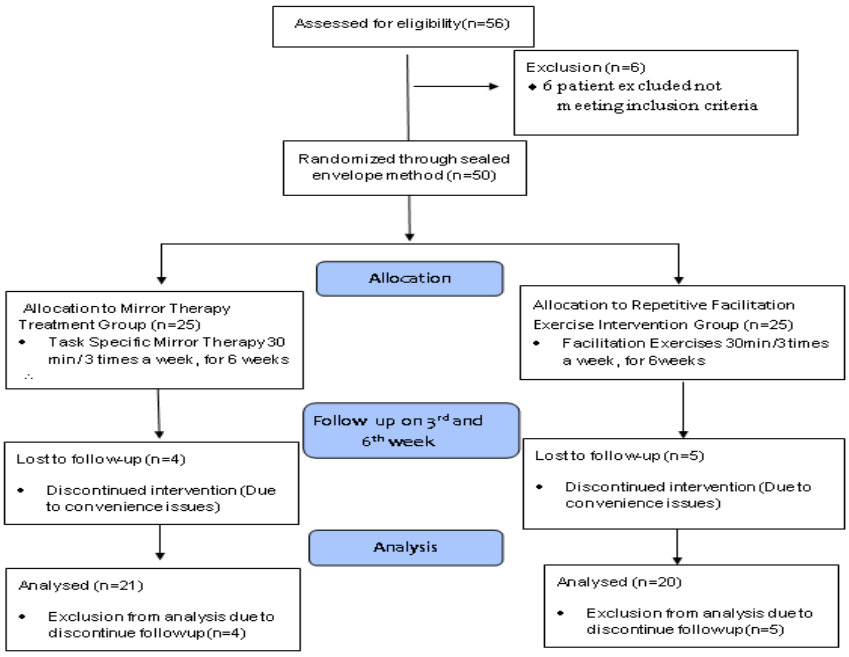

Figure 1: CONSORT diagram

The assessment was done through Fugal-Meyer assessment tool for the assessment of upper extremity motor activity and total upper limb score is 66. The Wolf Motor Function for upper extremity performance and functional capability in post stroke patient. The movement quality during the task is measured by functional ability using a 6-point ordinal scale, where 0=does not attempt with

the involved arm and 5=arm does participate/movement appears to be normal. The Upper extremity functional was also used to assess the functional impairment in upper limb dysfunction. It consists of 20-item questionnaire and each item scored on 5-point ordinal scale. The total sum of all items score is 80 points. The Brunnstrom recovery scale is used to evaluate the motor recovery in stroke patient It consist of 7-stages 1st one represents the flaccid paralysis, and 7th shows normal.

The Group A received mirror therapy (MT) using Task specific mirror box therapy for 30 min per day thrice a week for consecutive 6 weeks. The patients were seated close to table and a mirror is vertically placed. The affected hand was placed behind the mirror while normal hand in front of the mirror. For the task specific mirror therapy the duster, glass, wooden block of different sizes and shapes, beads, coin, paper cards and spongy ball were used. In all these activities the movements performed at shoulder level are horizontal flexion-extension and adduction-abduction, at elbow flexion-extension, at forearm supination-pronation, at wrist flexion-extension and finger flexion, extension, abduction, adduction & opposition were performed cooperatively. The patients were asked to transfer a small cube from the middle position to the lateral side, placing pegs in holes and taking them out, turning over paper cards, placing steel needles in holes, stacking blocks, and putting glass on a shelf. During the sessions subjects was asked to do these activities by non-paretic limb and asked to do same movement simultaneously with the paretic hand.

The Group B received Repetitive Facilitation Exercises (RFE) for 30 minutes. a day, 2 set of 50 repetitions with 1 -2 minutes rest time for 3 times a week for consecutive 6 weeks. The repetitive facilitative techniques were designed to minimize the synergy patterned movements of the shoulder, elbow, wrist, and fingers. This Treatment protocol used rapid passive stretching of the targeted joints muscles combined with tapping and rubbing the skin to assist the contraction of muscle. The activities performed are Shoulder horizontal flexion & extension, adduction-abduction, elbow flexion-extension, forearm supination-pronation, wrist flexion-extension, finger flexion-extension, abduction, adduction, and opposition. Participants were asked to concentrate on generating movement on that joint being treated while avoiding non-targeted muscles contractions. The verbal directions & commands such as bend/straighten or one, two & three were provided by therapist. Participant efforts were required to achieve a full range of motion (ROM).

After completing the assessments on 3rd and 6th week the data was analyzed by using the SPSS version 21. The demographic data was presented as mean±Sd and categorical variable as frequency and percentages. As the assumptions of parametric test were not met, for between group analysis Mann Whitney U was performed and Friedmann test with pairwise comparison for week wise analysis was used. The level of significance was set at $p<0.05$ and SPSS version 21 was used for data analysis

RESULTS

The mean age of Group A (MT) was 50.97±6.741 and 49.76±12.66 of Group B (RFE). The percentages of male patients were 20(81%) in Group A and 19(76%) were in group B while 5(19%) females were in group A and 6(23%) in group B with right hemiplegia 10(42%) in group A and 14(52%) in group B while 15(57%) in Group A and 11(47%) in group B were left hemiplegic patients.

When comparing the groups, the upper extremity functional index (UEFI) shows significant result in both groups as $p<0.05$ which is ($p=0.07$) at baseline, at 3rd week ($p=0.006$) and at 6th week ($p=0.005$) while between group analysis Fugyl-Meyer Total A-D, Wolf motor scale (gross), Wolf motor scale (fine), Wolf and Brunnstrom recovery scale shows non-significant results as $p>0.05$. (Table 1)

Friedman Test was applied for week wise analysis within both groups which shows median (IQR) of upper extremity functional index (UEFI), FMA-UE, WMS (gross), WMS (fine) and Brunnstrom recovery scale in group A ($p<0.001$) and in group B the ($p<0.001$) as p-value of both groups were $p<0.05$ which shows significant improvement from baseline to 6th week within both groups. (Table 2)

The within group analysis of both groups was performed by Wilcoxon Signed Rank Test in upper extremity functional index (UEFI), FMA-UE, WMS (gross), WMS (fine) and Brunnstrom recovery scale shows significant results as ($p<0.05$). (Table 2)

Table-1: Comparison Group A and Group B. (UESFI, FM, WM-G, WM-F & BRC.)

Variables		Group A (n=21)	Group B (n=20)	
	Assessment	Median (IQR)	Median (IQR)	p-value
Upper Extremity Functional Index	Baseline	12(6)	10(2)	0.07
	3rd week	26(6)	21(5)	0.006
	6th week	35(6)	28(6)	0.005
Fugl Meyer Total	Baseline	14(6)	12(3.5)	0.5
	3rd week	24(3)	24(8)	0.5
	6th week	35(7)	34(5)	0.6
Wolf Motor (Gross)	Baseline	14(2)	14(6)	0.2
	3rd week	21(3)	21(6)	0.07
	6th week	28(4)	24(5.5)	0.08
Wolf Motor (Fine)	Baseline	10(2.5)	11(4)	0.2
	3rd week	15(7)	16(4)	0.1
	6th week	19(5.5)	19(3)	0.3
Brunnstrom Recovery Scale	Baseline	5(1)	4(1)	0.3
	3rd week	6(1)	6(1)	0.4
	6th week	6(0)	6(0)	0.4

Significance level: p<0.05, p<0.01**, p<0.001****

Table 2: With-in group changes from baseline to 6th week in both groups

Variables	Assessment	Group A (n=21)			Group B (n=21)		
		Median (IQR)	Mean Rank	p-value	Median (IQR)	Mean Rank	p-value
Upper Extremity Functional Index	Baseline	12(6)	1.1	a0.001***	10(2)	1.1	a0.001***
	3rd week	26(6)	1.1	b0.001***	21(5.5)	1.1	b0.001***
	6th week	35(6)	1.1	c0.001***	32(6)	1.1	c0.001***
Fugl Meyer Total	Baseline	14(6)	1.1	a0.001***	12(3)	1.1	a0.001***
	3rd week	24(3.5)	1.1	b0.001***	24(3)	1.1	b0.001***
	6th week	35(7)	1.1	c0.001***	34(5)	1.1	c0.001***
Wolf Motor(G)	Baseline	14(2)	10.0	a0.001***	14(6)	11.5	a0.001***
	3rd week	21(3)	10.5	b0.001***	21(6)	8.5	b0.001***
	6th week	28(4)	11.0	c0.001***	24(5)	11.5	c0.001***
Wolf Motor (F)	Baseline	10(2.5)	11.0	a0.001***	11(4)	11.0	a0.001***
	3rd week	15(7)	10.4	b0.001***	16(4)	10.4	b0.001***
	6th week	19(5)	11.0	c0.001***	19(3)	11.4	c0.001***
Brunnstrom Recovery Scale	Baseline	5(1)	10.0	a0.001***	4(1)	9.6	a0.001***
	3rd week	6(1)	5.0	b0.003**	6(1)	5.0	b0.004**
	6th week	6(0)	10.0	c0.001***	6(0)	9.5	c0.001***

a baseline to 3rd week, b 3rd week to 6th week & c baseline to 6th week.
Significance level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The results of current study suggested that in terms of improving hemiplegic upper limb motor impairment, both treatments were effective equally with Mirror Therapy (MT) seemed to have beneficial effects over RFE as indicated by Upper extremity functional index. The results of this study showing significance of both treatment options is in accordance with a previous study, the current study has the strength of a larger sample size with a 2-week longer study duration[7].

The mechanism of mirror therapy is to create normal movement mirror illusion of the affected hand, helping the premotor cortex by increasing the proprioceptive information, and intimate connection between visual input and premotor areas[7].Improved recovery was observed in MT, it affects the motivation of the patient which will eventually increase concentration and participation activities in the program[14].Present literature reported mirror therapy has significant potential to improve upper limb function and daily living activities[15].Another study presented that mirror therapy with the functional task is effective on the upper limb which showed similar findings that upper limb function significantly improved in task-based mirror therapy group with p<0.001 measured by Fugl-meyer assessment of upper limb[l6].Upper limb impairment in the range, speed, and accuracy has been improved through mirror therapy in chronic stroke patients[23].However a study reported that the effect is due to the action of mirror illusion of a visual image is still not clear, however it can be added along with task-specific exercises as it will improve the recovery[17].

Another study stated that they did not observe mirror-related activity in motor or mirror neuron system areas but showed increased activity in the precuneus and posterior cingulated cortex, areas associated with awareness of the self and spatial attention during bimanual movement. It was reported by increasing awareness of the affected limb, the mirror illusion might reduce learnt non-use[18].A systematic review advocating mirror therapy (MT) stated that it was better than sham therapy, mainly in the subacute phase as the therapy uses the mirror to make illusions about movement occurring in painless way thus enhancing the motor ability, but the meta-analyses were nonsignificant[22].

The effect of RFE was developed on the isolation from synergy and the manipulation of objects of the hemiplegic upper limb was assessed and seen for 6 weeks. Depicting significant results in within-group analysis in Upper extremity functional index (UEFI), Fugl Meyer assessment of upper extremity (FMA-UE), Wolf Motor Function Test (WMFT) and Brunnstrom recovery scale (BRS). A previous study indicated the positive effect of repetitive facilitative over the conventional neuro facilitation therapy, to improve the lower-limb motor function after 4 week of exercise sessions[19]. Another study compared the efficacy of repetitive facilitation exercise on the upper limb in a subacute stroke patient, which shows significant improvement in repetitive facilitation exercise group measured by action research arm test and by Fugl meyer assessment of upper extremity with $p<0.01$. 9) Same results were achieved through REF in another study whereas they focused on repetitive grasping and griping activity that provides physical stimulus used by RFE is proportional to the rate of improvements in functional movements of upper limb. The MT and RFE has proven to be better than standard rehabilitation therapy as combine repetitive facilitation exercises and visual illusion using mirror therapy helps in improving functions by integration of movements. These can be integrated into stroke rehabilitation therapy to improve upper extremity function[20].

Limitation of study was the study duration which is 3 days a week for 6-week longer time duration is recommended to record long term benefits with larger sample size.

CONCLUSION

Mirror therapy and Repetitive facilitation Exercise both were found to be effective in improving upper limb motor functions of acute stroke patients, However, Mirror therapy has shown significant effects in upper extremity functional index.

The future studies with right and left hemiplegia, gender-based differences, sub-acute and chronic stroke studies are also recommended. The study can also be done to improve lower extremity function. With longer duration of study and various outcome measure can be used to record that functional independence in a better way.

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RESEARCH ARTICLE

EFFECTS OF NEUROMUSCULAR TRAINING ON SINGLE LIMB STABILITY IN YOUNG FEMALE ATHLETES

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ABSTRACT

Background: Lower limb injuries in sports affect postural stability and balance. Muscular imbalance, postural malalignments, and altered biomechanics occurred in athletes due to injuries. **Objective:** To determine the effects of the 6-week neuromuscular training program on single-limb stability in young female athletes. **Methodology:** A single-subject study design was used in which n=20 female athletes aged between 18 to 25 years with previous lower limb injuries that lead to impaired balance and postural instability participated in this study included by the convenience sampling from the Faisalabad sports complex. Athletes completed 6-week neuromuscular training program, with every session of 90 min and 3 times a week. Assessment of athletes was performed before and after the completion of the neuromuscular training program at 6 weeks, with a single-limb stance test, Stork balance stand test, and star excursion balance test. **Results:** The mean age of participants was 20.6±1.82 years. The pre-post analysis of Single limb stance test, stork balance test, Star excursion balance test right and left anterior, left medial, right and left lateral also showed significant results ($p<0.01$). But star excursion balance test right medial no significant change ($p=0.234$) in score observed after 6th week of training. **Conclusion:** Although 6-week neuromuscular training program showed a significant improvement on single-limb stability in young female athletes. But without control or comparative group we cannot establish its gender specific effectiveness.

Keywords: Neuromuscular training, static and dynamic balance, single limb stance test, stork balance stand test, star excursion test.

INTRODUCTION

Lower limb injuries are most common in sports that occurred during sports and competitions. If inadequate training sessions were done during practice or before a sports competition, it can cause lower limb injuries, and sometimes these injuries are very extensive and damage the muscle tissues or ligaments. Anterior cruciate ligament (ACL) injuries, patellofemoral, hamstring, and ankle lateral ligament injuries are common[1, 2].

Neuromuscular training includes balance training, and plyometric and resistance training. ACL, hamstring, and ankle injuries are mostly traumatic while the patellofemoral injuries are due to repetitive use. Previous injuries in sports can also give evidence for future injuries[1, 3, 4].

Neuromuscular training improves physical fitness and reduces the risk of future injuries. Muscle strength, power, agility, and balance are improved and increase the abilities of the athletes, functional assessment is very essential. Static and dynamic balance assessment is necessary because in sports it is very important to assess and it can lead to future problems, and muscle or ligament injuries that affect the athletes' life[5, 6].

Several factors contribute to lower limb injuries, including altered biomechanics, postural mal-alignments, physical inactivity, sedentary lifestyle, improper landing and cutting, and improper sports technique[7].

Non-contact sports are the major contributors to ligamentous injuries in female players, especially during the stop, jumping, landing, and changing directions. Several risk factors are responsible including anatomical and hormonal factors. For the prevention of knee injuries by the development of effective training programs were introduced that focus on modifying risk factors causing knee injuries in women[8].A study was conducted in 2012 in Brazil in which female athletes were more prone to be injured during training especially involved the lower limb (Hip, Knee and Ankle injuries)[9].

Prevention strategies based on current understanding have been developed to increase grip over neuromuscular coordination and lower limbs to lessen the rates of lower limb injuries. A range of training courses, extending from injury awareness to multi-component exercise, have been utilized in these attempts. Lower limb mobility patterns are altered by several training programs[10, 11].

In this study prevention of postural instability and balance that occurred after lower limb injuries in athletes was treated with neuromuscular training. Best preventive strategies and treatment plans can improve the efficiency of the female athletes because the prevalence rate is high in female

athletes as compared to males. The purpose was to find out the effects of neuromuscular training protocols to improve the balance.

METHODOLOGY

A single subject study design was used, and study was carried out at Faisalabad Sports Complex, Faisalabad. The study was completed in six months after the approval of the research ethical committee, Ref. No. REC/Lhr/21/0414. The study was clinically registered by ClinicalTrials.gov ID: NCT04967937. The Study duration was from November 2020 to April 2021. The sample size was n=20, the female Athletes with an age range from 18-25 years with postural instability and impaired balance after lower limb injuries. The participants with malignancy, infection, systemic illness, and trauma are excluded from the study. A convenience sampling technique was used for sample selection. The single-limb stability was assessed with Single Limb Stance Test for postural balance[12, 13]. The Star Excursion Balance Test for Dynamic Balance and the Stork balance stand the test for static balance. Before the start of data collection written informed consent was taken from all the participants[14,15].

The neuromuscular training program consisted of 90-minute training per session and a total of 3 sessions per week for 6 weeks. The 3 components of the dynamic neuromuscular training protocol were used in this study, including *The Balance training and hip/pelvis/trunk strengthening* including Superman pose, crunches, single leg hop, 180-degree jump stick landing and Medicine ball catch/Slam. *The Plyometric and dynamic movement training* including Zigzag jumps, Barrier jumps (Front to back), Barrier jumps (Side to side), Wall jumps, squat jumps). *The Resistance training* which included Leg curls, Lunge circuit, Leg press, Lunges, Ankle eversion, Inversion exercises.

Each participant was assessed at the baseline and after 6th week of the training program[6, 8, 16-18]. The paired sample t-test was used to determine changes between pre-training and post-training readings. The data was analyzed by using the statistical tool SPSS version 25. The level of significance was set at $p<0.05$ and to determine the effect size Cohen's d was used.

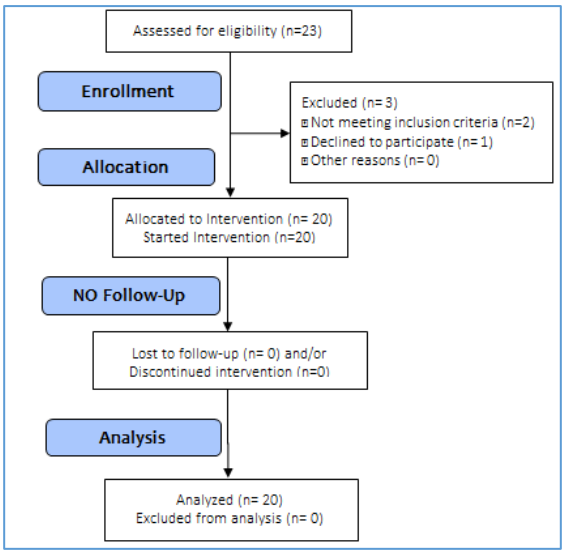

Figure.1 Flow diagram

RESULTS

The mean age of female participants was 20.6±1.82 years. The average BMI was 20.37±3.52, which showed that majority of participant were in normal BMI range.

Table 1: Pre-post analysis (SLST, SEBT, SBST)

	Pre	Post	MD	p-value	Cohen's d
Single Limb Stance Test Score Eyes Open	27.70±13.85	40.75±16.45	13.05	.000***	5.01
Single Limb Stance Test Score Eyes Closed	13.35±8.28	16.60±8.46	3.25	.000***	18.05
Stork Balance Test Score	28.40±17.25	38.85±14.54	10.45	.000***	3.85
Star Excursion Balance Test Right Anterior	45.91±6.62	50.84±7.06	4.94	.000***	11.2
Star Excursion Balance Test Left Anterior	44.02±6.30	49.97±10.15	5.95	.000***	1.54
Star Excursion Balance Test Right Medial	25.76±12.25	27.84±9.15	2.08	.000***	0.66
Star Excursion Balance Test Left Medial	22.84±4.63	26.47±4.32	3.63	.000***	12.1
Star Excursion Balance Test Right Lateral	37.02±3.70	43.61±3.45	6.59	.000***	25.3
Star Excursion Balance Test Left Lateral	38.18±4.81	41.90±4.63	3.72	.000***	21.8
Star Excursion Balance Test Right Posterior	39.41±8.27	44.39±8.15	4.98	.000***	41.5
Star Excursion Balance Test Left Posterior	36.18±7.37	41.055±8.33	4.87	.000***	5.07

Single Limb Stance Test (SLST), Star Excursion Balance Test (SEBT), Stork Balance Stand Test (SBST)
Significance level: p<0.05, p<0.01**, p<0.001****

The paired t-test was used to assess the pre and post readings of the groups. The pre-post analysis of single limb stance test score with eyes open and closed showed significant results (27.70±13.85 Vs 40.75±16.45, p<0.001) with large effect size. The stork balance test also showed significant improvement (28.40±17.25 Vs 38.85±14.54, p<0.001) with large effect size. The star excursion balance test right and left anterior, left medial, right and left lateral also showed significant improvement (p<0.001) after 6 weeks of training with large effect size. But the star excursion balance test (right medial) did not show significant improvement (p=0.234) after 6th weeks training. (table 1)

DISCUSSION

The purpose was to find out the effect of neuromuscular training program on balance in young female athletes. Neuromuscular training program with standardized protocols were adopted and balance was assessed with three balance tests including both dynamic and static balance. There are many training protocols. Balance and other training methods or exercise programs showed significant improvement. A study in 2017 was conducted on plyometric training and balance training; an eight-week program improved the different physical components of physical fitness including muscle power, strength, speed, and balance in adult male soccer athletes but in the current study only balance was assessed in athletes[19].

In 2021 a study was conducted to see the effect of neuromuscular training on ACL injury risk factors. It was done during the rehabilitation process after the reconstruction of the ACL in post-operative rehabilitation and in this study after injury neuromuscular training was done that produced significant results[20]. A systematic review in 2020 was done. Ankle sprains are a common sports-related injury, and female athletes are more likely to sustain this injury than their male counterparts. The reviews have evaluated the efficacy of prevention programs in reducing ankle sprains in athletes, but no reviews have specifically focused on female athletes. The objective of this systematic review was to examine the sex-specific effectiveness of neuromuscular training programs in reducing the risk of ankle sprains in female athletes[21].

A randomized controlled trial was conducted in 2018 to evaluate the effects of eight-week neuromuscular training program on dynamic postural control in elite junior skiers. Neuromuscular training proved to be an effective intervention in increasing lower limb joint awareness and postural control showed results like the current study[22]. The limitation of this study was that it was a single group study with small sample size, in future further extension of this work can be done based on its limitation.

CONCLUSION

The 6-week neuromuscular training program showed a significant improvement on single-limb stability in young female athletes. But without control or comparative group we cannot establish its gender specific effectiveness. So, future study must be incorporated to find gender-based differences and with longer duration and multiple comparisons.

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RESEARCH ARTICLE

EFFECTIVENESS OF LATERAL WEDGE INSOLE ON KNEE OSTEOARTHRITIS OUTCOMES IN PAKISTANI POPULATION

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Nasir Khan[6]: Revised and accountable for all aspects

ABSTRACT

Background: Osteoarthritis (OA) is a persistent joint disorder, which normally affects the weight bearing joints especially knee joint. Lateral wedge insole is one such approach suggested by professionals to manage the knee osteoarthritis. **Objective**: To determine the effectiveness of lateral wedge insoles on knee osteoarthritis outcomes in Pakistani population **Methods:** A single-blinded, pretest-posttest comparison conducted at District Headquarter (DHQ) Hospital, Bahawalnagar and National Institute of Rehabilitation Medicine (NIRM), for a time period of one month. The patients with the age criteria of 40-70 years, and who had knee OA were included in the study: Participants were randomly divided in two groups; lateral wedge insoles (LWI) group (n=20), and conventional physical therapy (CPT) group (n=20). Pain, stiffness, activities of daily living, sports and recreational activities, and quality of life was assessed on Urdu version of Knee Injury and Osteoarthritis Outcome Score scale (KOOS) on every week till 4th week of intervention. Mixed ANOVA was used for interaction effect of between-subject factor (group) and within-subject factor (time) with-in group analysis and one way ANOVA for between group comparisons with their effect size (ηp^2). **Results: S**ignificant improvement with large effect size was observed in Symptoms and stiffness ($p<0.001$, $\eta p^2=.329$}, pain ($p<0.001$, $\eta p^2=.559$), functional activities ($p<0.001$, $\eta p^2=.394$), recreational activities ($p<0.001$, $\eta p^2=.369$) and quality of life ($p<0.001$, $\eta p^2=.280$). The CPT group showed more significant improvement ($p<0.001$) in all domains of KOOS as compared to LWI group. **Conclusion:** Lateral wedge insoles (LWI) and conventional physical therapy (CPT) both have positive impact on knee osteoarthritis outcomes. But conventional physical therapy was more effective in improving functional independence.

Keywords: Knee osteoarthritis, functional independence, geriatric population, musculoskeletal physiotherapy, orthotics, quality of life, rehabilitation.

INTRODUCTION

Osteoarthritis is a degenerative and progressive disorder of joints which gradually involves cartilage and leads to bony spurs in joint's margins[1].It usually affects the weight bearing joints such as knee, hip and back which varies from very mild to severe, therefore, middle age and older adults are more prone to OA[2].Abnormal load distribution due to shifting of the centre of pressure of the tibiofemoral force, resulting in locally increased stress on the articular cartilage that leads to degenerative changes[3,4]. The most common cause of musculoskeletal pain, [3] and disability in the geriatric population is knee osteoarthritis. It occurs symptomatically in 6% and 11% of the population with the age criteria of 30 years and 65 years respectively[4].Osteoarthritis is more prevalent in 54-61 years of age, and of which, 95% were affected from Knee OA[2].

One of the most common rheumatic disease in the Asia-pacific region is non-specific knee osteoarthritis[5]. The prevalence of knee OA in India is 5.78% while Bangladesh reported 10.20%[6,7]. A study conducted in Pakistan showed 25% rural and 28% urban population has been affected by knee OA[8].According to the previous literature, females are more prone to osteoarthritis in contrast to males,[2] due to menopause in women (66.7%), and obesity (42.4%)[9]. The American College of Rheumatology (ACR) and European League against Rheumatism (EULAR) recommended physiotherapy for knee OA, which is a non-surgical and non-pharmacological intervention[10, 11]. It includes exercises, knee tapping, manual techniques, and patient education and a study reported the clinically significant effectiveness of physiotherapy treatment for knee OA[11].

Moreover, lateral wedge insoles are also being used for the medial compartment knee OA, because of the less complexity, cost and side effects[12].The load on the tibiofemoral joint promotes varus deformity which increases the load on the medial compartment and leads to the damage of the compartment[13].While, lateral wedge insoles reduce 4-12% of adduction movement, which decreases stress on the medial compartment. Also, previous literature supports the efficacy of lateral wedge insoles[14].

The studies by Hinman RS et. al, Esfendiari E et. al, on the effectiveness of lateral wedge insole in Knee OA

reported contradictory results i.e. either no improvement or improvement with small effect size[15-18].Lateral wedge insole was not currently an option as conservative management along with conventional physical therapy for osteoarthritis in Pakistan. It was hypothesized that lateral wedge insole (LWI) significantly improve pain, stiffness, activities of daily living, sports and recreational activities and Quality of life in knee osteoarthritic patients, along with conventional physical therapy (CPT).

METHODOLOGY

A single-blinded randomized control trial, pretest-posttest comparison group design (NCT03848130) was conducted at National Institute of Rehabilitation Medicine (NIRM) Islamabad and District Headquarter Hospital (DHQ), Bahawalnagar, Pakistan for a period of six months from June 2019 to December 2019. The study was initiated after taking ethical approval from the Medical Superintendent of DHQ Hospital Bahawalnagar and Executive Director NIRM Islamabad. Written informed consent was obtained from each participant before the intervention and assured them about the confidentiality of the data, according to Declaration of Helsinki.[19] Patients with the age criteria of 40-70 years, and who had a history of knee OA were included in the study. However, patients had knee OA due to trauma or any pathology, multiple fractures, or had a medical condition due to which rehabilitation wasn't possible, and not willing to participate in the clinical trials were excluded from the study. A total of n=104 patients were recruited through the non-probability convenience sampling technique and were thus evaluated for the inclusion criteria. Of which, n=40 participants fulfilled the inclusion criteria. Participants were randomly divided through the sealed envelope method in two groups: lateral wedge insoles with home exercises group (n=20), and traditional physiotherapy with home exercises group (n=20). Each group received 1 month-long intervention as shown in Figure 1.

Conventional Physical Therapy (CPT) Group: Each participant received 40-45 minutes long session, started in lying position. The therapeutic low-intensity pulsed ultrasound (US) was used for 7 minutes with the frequency of 1 MHz, Spatial Average Intensity was 0.2 W/cm^2, pulsed duty cycle 20%, therapeutic dose was 112.5 J/cm2 with fixed application on the medial side of the knee joint. The model of US was Unit Intelect Mobile, (Chattanooga Inc). After US therapy passive stretching of calf, hamstring, quadriceps, hip flexors, adductors & abductor s was done, which was followed by the manual strengthening exercises and strengthening with quadriceps bench. The session was repeated thrice a week and 12 sessions per month.

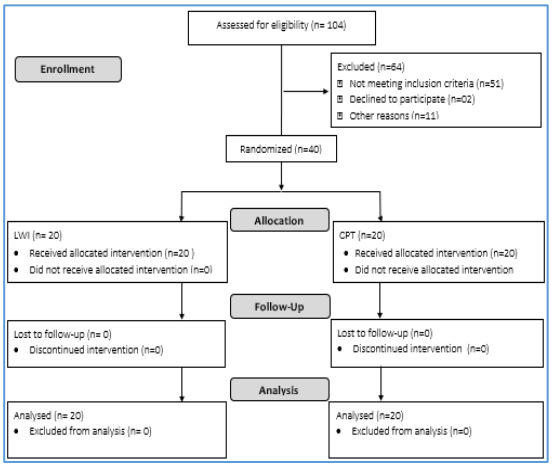

Figure 1: CONSORT diagram

The home program was guided in both groups including avoiding low sitting, cross leg sitting along with Isometrics of quadriceps at least 3 times a day, with 5-10 seconds hold of each contraction.

The data was collected through a general demographic questionnaire and Knee injury and Osteoarthritis Outcome Score (KOOS) in Urdu to determine the severity of pain, stiffness, functional activities, recreational activities and Quality of life to promote functional independence in osteoarthritic patients[23].The level of significance was set at $p<0.05$. Statistical Package for the Social Sciences (SPSS) ver. 23 was used for data analysis.

The demographics of the participants were presented in the form of mean±SD and n(%). As the assumption of the parametric test was met, mixed ANOVA was used for the interaction effect of between-subject factor (group) and within-subject factor (time). As the sphericity was not assumed, the Greenhouse-Geisser values showed that there is significant interaction effect between interventions and time factor/assessment in all domains. With-in group analysis and one way ANOVA was used for between-group comparisons to determine the effect size (ηp^2). The mean difference was also compared between the groups for functional activities while controlling bassline differences.

RESULTS

The mean age of study participants was 55.13±7.03 (R=43-70) years. The gender distribution of n=26 female and n=14 male. The mean BMI was

27.39±3.377 (R=21-35) showed that most of the population was overweight. (Figure 2)

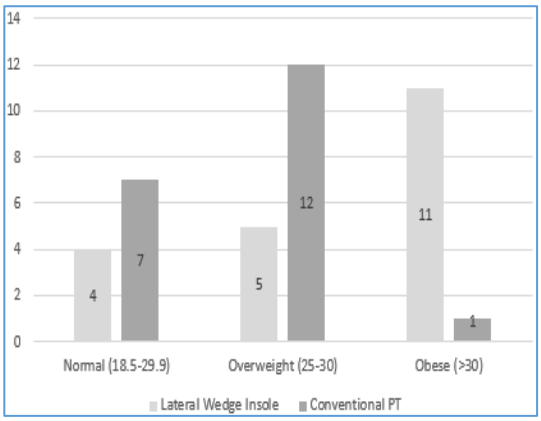

Figure 2: BMI distribution of study participants

As the sphericity was not assumed, the Greenhouse-Geisser values showed that there is significant interaction effect between interventions and time factor/assessment in all domains, Symptoms and stiffness, {F=18.669(2.695,102.423), p<0.001, ηp^2=.329} , Pain {F=48.156(2.742, 104.205), p<0.001, ηp^2=.559} , functional activities {F=24.659(2.741, 104.165), p<0.001, ηp^2=.394} and recreational activities {F=22.195(2.794,106.170), p<0.001, ηp^2=.369}.

With-in group analysis, all the domains showed significant improvement in the Convectional physical therapy (CPT) and lateral wedge insole (LWI) group with large effect size. The symptoms and stiffness related to osteoarthritis (OA) showed significant improvement in both LWI and CPT group throughout the treatment duration (*p<0.05*). In LWI it was observed that in the initial two weeks symptoms and stiffness were significantly improved (*p<0.05*) but at the end of the 3rd week and 4th week, no significant change (*p≥0.05*) in score was observed, whereas in the CPT group at the end of every week significant Improvement (*p<0.05*) was observed. The pain was also significantly improved in both groups throughout treatment duration except in LWI where no change was (*p=1*) observed in between the 3rd and 4th week, while in the CPT group significant improvement (*p<0.05*) was observed at the end of every week. While observing functional activities score, changes in both groups were significant (*p<0.05*) except in the LWI group where no significant changes were observed between the 3rd & 4th week (*p=0.053*).

Table 1: Within- group changes –KOOS subscale

		LWI						CPT					
		Mean	SD	*p-value (Pairwise)*	F(df)	p-value (Main Effects)	ηp^2	Mean	SD	*p-value*	F(df)	p-value (Main Effects)	ηp^2
Symptoms & Stiffness	0 week	16.75	13.757	0.001^{a**}	48.14(4,76)	<0.001	0.717	14.60	12.107	0.000^{a***}	244.74(4,76)	<0.001	.928
	week 1st	25.95	12.955	0.000^{b***}				29.85	10.210	0.000^{b***}			
	week 2nd	34.35	11.212	0.126^{c}				43.40	10.947	0.000^{c***}			
	week 3rd	38.75	14.917	1.000^{d}				54.60	8.617	0.042^{d*}			
	week 4th	41.30	15.944	0.000^{e***}				58.00	9.537	0.000^{e***}			
Pain	0 week	8.90	9.313	0.000^{a***}	68.336(4,76)	<0.001	0.782	6.70	9.056	0.000^{a***}	328.77(4, 76)	<0.001	.945
	week 1st	18.80	8.205	0.010^{b*}				23.55	8.556	0.000^{b***}			
	week 2nd	23.95	10.390	0.000^{c***}				37.35	11.403	0.000^{c***}			
	week 3rd	32.05	10.531	1.00^{d}				53.40	12.059	0.037^{d*}			
	week 4th	32.55	10.674	0.000^{e***}				58.80	9.099	0.000^{e***}			
Functional Activities	0 week	3.10	4.471	0.000^{a***}	91.150(4,76)	<0.001	0.828	7.10	7.055	0.000^{a***}	239.220(4,76)	<0.001	.926
	week 1st	11.50	5.853	0.000^{b***}				20.60	6.676	0.000^{b***}			
	week 2nd	20.75	4.865	0.005^{c**}				32.65	8.725	0.000^{c***}			
	week 3rd	27.75	10.161	0.053^{d}				49.40	9.875	0.012^{d*}			
	week 4th	31.10	9.591	0.000^{e***}				56.40	8.923	0.000^{e***}			
Recreational Activities	0 week	3.75	5.821	0.066^{a}	39.155(4,76)	<0.001	0.673	1.25	3.193	0.000^{a***}	166.224(4,76)	<0.001	.897
	week 1st	10.00	9.597	0.003^{b**}				18.75	9.716	0.000^{b***}			
	week 2nd	19.90	9.101	0.435^{c}				31.00	10.208	0.000^{c***}			
	week 3rd	24.40	6.636	0.421^{d}				42.50	12.618	0.001^{d**}			
	week 4th	25.40	6.451	0.000^{e***}				49.25	12.594	0.000^{e***}			
Quality of life	0 week	14.00	10.402	0.006^{a**}	40.28(2.22, 42.26)	<0.001	0.697	18.50	7.193	0.000^{a***}	241.28(3.003, 57.05)	<0.001	0.927
	week 1st	24.40	8.917	0.161^{b}				37.55	8.236	0.000^{b***}			
	week 2nd	30.30	6.959	0.000^{c***}				46.90	8.932	0.000^{c***}			
	week 3rd	37.20	8.770	0.354^{d}				59.20	8.383	0.022^{d*}			
	week 4th	39.60	9.185	0.000^{e***}				63.35	7.095	0.000^{e***}			

^{a}0 week vs. week 1st, ^{b} week 1st vs. 2nd week, ^{c}2nd week vs. week 3rd, ^{d}3rd week vs. 4th week, ^{e}0 week vs. 4th week

Significance Level: p<0.05, p<0.01**, p<0.001****

Both groups showed significant improvement (*p<0.05*) in recreational activities after Four-week interventions, except in LWI group did not significantly improve between baseline and after 1st week (*p=0.066)* as well as between 2nd & 3rd week (*p=0.435*), but between 1st week and 2nd-week significant improvement (*p=0.003*) was observed.

The quality of life after 4 week intervention significant improvement was observed in both groups. While pairwise comparison in LWI showed no significant

improvement was observed between 1st week to 2nd week (*p=0.161*) and 3rd week to 4th week (*p=0.354) but* significant improvement was observed after 4th week (*p<0.05*). (Table 1)

While comparing both groups, no significant difference (p≥0.05) observed in symptoms & stiffness (SS) and pain after 1st week, but the conventional Physical Therapy (CPT) group showed more significant improvement (p<0.05)as compare to the LWI group at the end of 2nd, 3rd and 4th week. The recreational activities and quality of life showed more significant improvement (p<0.05) in the CPT group than LWI group at the end of 1st week to 4th week with a large effect size in. (Table 2). Although there was baseline significant difference between LWI and CPT group, the one ANOVA on mean difference showed of overall treatment duration.

Table 2: Comparison between LWI &CPT

Variables	Outcome time	LWI		CPT		F(df)	*p-value*	ηp^2
		Mean	SD	Mean	SD			
Symptoms & Stiffness	0 week	16.75	13.75	14.60	12.10	.275(1,38)	.603	0.007
	1st week	25.95	12.95	29.85	10.21	1.118(1,38)	.297	0.029
	2nd week	34.35	11.21	43.40	10.94	6.671(1,38)	.014**	0.149
	3rd week	38.75	14.91	54.60	8.61	16.931(1,38)	<0.001***	0.308
	4th week	41.30	15.94	58.00	9.53	16.160(1,38)	<0.001***	0.298
Pain	0 week	8.90	9.31	6.70	9.05	.574(1,38)	.453	0.015
	1st week	18.80	8.20	23.55	8.55	3.211(1,38)	.081	0.078
	2nd week	23.95	10.39	37.35	11.40	15.091(1,38)	<0.001***	0.284
	3rd week	32.05	10.53	53.40	12.05	35.569(1,38)	<0.001***	0.483
	4th week	32.55	10.67	58.80	9.09	70.046(1,38)	<0.001***	0.648
Functional Activities	0 week	3.10	4.47	7.10	7.05	4.587(1,38)	.039*	0.108
	1st week	11.50	5.85	20.60	6.67	21.009(1,38)	<0.001***	0.356
	2nd week	20.75	4.86	32.65	8.72	28.377(1,38)	<0.001***	0.428
	3rd week	27.75	10.16	49.40	9.87	46.693(1,38)	<0.001***	0.551
	4th week	31.10	9.59	56.40	8.92	74.598(1,38)	<0.001***	0.663
Recreational Activities	0 week	3.75	5.82	1.25	3.19	2.836(1,38)	.100	0.069
	1st week	10.00	9.59	18.75	9.71	8.210(1,38)	.007**	0.178
	2nd week	19.90	9.10	31.00	10.20	13.175(1,38)	.001**	0.257
	3rd week	24.40	6.63	42.50	12.61	32.237(1,38)	<0.001***	0.459
	4th week	25.40	6.45	49.25	12.59	56.814(1,38)	<0.001***	0.599
Quality of life	0 week	14.00	10.40	18.50	7.19	2.53(1, 38)	0.120	0.62
	1st week	24.40	8.91	37.55	8.23	23.47(1, 38)	<0.001***	0.382
	2nd week	30.30	6.95	46.90	8.93	42.98(1, 38)	<0.001***	0.531
	3rd week	37.20	8.77	59.20	8.38	42.98(1, 38)	<0.001***	0.634
	4th week	39.60	9.18	63.35	7.09	83.74(1, 38)	<0.001***	0.688

Significance Level: p<0.05, p<0.01**, p<0.001*

DISCUSSION

The hypothesis of the study was the lateral wedge insoles are more effective; however, according to the results of the study conventional physical therapy was more effective for knee osteoarthritis. Hence, the null hypothesis was accepted.

Within-group analysis showed that the stiffness, pain, activities of daily living, sports and recreational activities, and quality of life measured on the KOOS scale was significantly improved in both groups but conventional physical therapy showed more clinically significant improvement throughout the intervention. While between groups comparison didn't show a significant difference in lateral wedge insoles group but significant difference was observed in the group of conventional physical therapy.

The findings of this study also supported a previous study in which after using lateral wedge insoles significant improvement was observed in KOOS subscales i.e. pain, symptoms, sports-recreational and functional activities and quality of life[24]. The medial knee osteoarthritis is more prevalent as compared to lateral knee osteoarthritis,[25] because during walking load on medial condyles is 2.5 times more than the lateral compartment[14]. The possible reasons for significant improvement could be decreased mechanical load on the medial compartment which may reduce pain and hence leads to improved quality of life[20]. Moreover, wedge under the feet changes the angle of the limb and affect the mediolateral moment which is applied on the limb during standing and walking. Also, lateral wedge insoles are responsible for the reduction in knee varus torque, and it is assumed that increased Varus torque is responsible for knee osteoarthritis progression[14]. The literature mentioned above also supported the findings of current study.

Similar to the results of the current study, it has been discussed in previous study that 7mm insoles relieve pain and improves the quality of life because of the shifting of applied load to the lateral part of the subtalar joint and centre of position to the lateral side of the knee. Thus, pain is reduced by shifting the body weight from one side of the foot to the other. However, increasing the thickness of 7mm lateral wedge insoles more than normal may cause foot discomfort[14]. Also, pronation and ankle invertor

moment may increase due to the lateral wedge insoles and increased invertor moment cause fatigue of those muscles, after prolonged use. Therefore, arches in lateral wedge insoles reduce the ankle invertor moment and eversion of the ankle[21]. These studies emphasized on the thickness of 7mm lateral wedge insoles which also supported current study in the same way that lateral wedges of full length and thickness of 7mm are effective in reducing pain and improving the quality of life of medial compartment knee OA patients.

In some previous studies, it has been concluded that lateral wedge insoles reduces the moment arm by shifting the ground reaction force on lateral foot during walking. Therefore, the load on knee is redistributed, which reduces the medial knee adduction moment, so that load on the medial knee is reduced[22,24,26]. However, in recent literature, it has been discussed that lateral wedge insoles are effective for only 20% of osteoarthritic patients because of very small reductions in knee adduction angular impulse and medial knee adduction moment, thus, is not significantly affected for medial knee osteoarthritis[27]. Similar to the results of this study, literature also has discussed that type of insole and the degree of the wedge are the possible reasons for less significant improvement. The same degree of wedge insoles for all the participants has been used in different studies i.e. 5 or 6 degrees[28]. the problem of lack of customization of insoles, similar to the current study may contribute to less significant improvement[29].

Traditional physical therapy including ultrasound modality and stretching followed by strengthening may contribute in improving pain and stiffness supported by previous literature[30]. Also, a previous study discussed the multiple exercises i.e. stretching and strengthening with a home exercise plan improves the pain symptoms and dysfunction by reducing the load on the medial knee joint[31]. Thermal and non-thermal effects of therapeutic ultrasound-induced analgesic effect and reduce soft tissue pain by increasing tissue metabolism, capillary permeability and fibrous tissue extensibility through the thermal mechanism. However, the non-thermal mechanism also relief pain by promoting tissue regeneration, increasing intracellular calcium in the nervous system and changing the permeability of the cell membrane[32]. Therefore, therapeutic ultrasound may also block pain transmission receptors[30].

Furthermore, similar to the results of this study, ultrasound,[33] and strengthening exercises improves KOOS score in domains of pain, stiffness, activities of daily living, sports and recreational activities and quality of life. The possible reasons of improved symptoms and stiffness maybe the healing and thermal effects of US on periarticular structures. The flexibility of tendons, ligaments and joint capsule can be improved through ultrasound, heating, and strengthening exercises[34]. Whereas, non-thermal effects regulate collagen synthesis, fibroblast production, cell diffusion, breakdown adhesions, alter extracellular matrix arrangement and all these factors promote healing[33, 34].

Moreover, in previous literature, it has been found that ultrasound with supervised exercise protocol not only reduces pain but also improves function and thus the quality of life in chronic osteoarthritic patients[35]. The patients with OA has decrease muscle strength, joint instability and pain which also limits the functional capacity, therefore, isometrics and strengthening of quadriceps is highly recommended for OA patients[36]. A study conducted by Fatih Tok et al, supports the findings of the current study that continuous motion either active or passive, conventional physical therapy and modality strengthen the muscles which improve balance and coordination, thus, leads to decreased pain, improved functional capacity and quality of life without deteriorating the disease.[37]

The limitation in the study is the variation in BMI category in relation to distribution in treatment groups may also have confounding effects on the results.

CONCLUSION

Lateral wedge insoles (LWI) and conventional physical therapy (CPT) both have positive impact on knee osteoarthritis outcomes. But conventional physical therapy was more effective in improving the functional independence of osteoarthritic patient. It is recommended that future study should be conducted to evaluate the combined effects of both interventions as some degrees of biomechanical adjustment of LWI may augment the effects of conventional Physical Therapy.

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RESEARCH ARTICLE

EFFECTS OF MODERATE PHYSICAL ACTIVITY ON GLYCEMIC CONTROL IN TYPE-2 DIABETES MELLITUS: A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: Sedentary lifestyle cause obesity that can disturb body composition, metabolic profiles and insulin resistance which may then lead to ectopic fat in organs and thus leads to diabetes. Physical activity and life style modification was found to be very effective in reducing diabetes and its risk in adults**. Objective:** The objective of this study was to determine the effectiveness of moderate physical activity on glycemic control in Type-2 Diabetes Mellitus. **Methodology:** The participants with the age criteria of 35 years and above and non-insulin dependent type II diabetic mellitus were included in a study. A total of n=45 diabetic patient were assigned to three groups i.e. group A (brisk walk, n=16), Group B (aerobic training, n=16) and group C (resistance training, n=13). Each group performed these exercises for three months for five days a week, a total of 150 minutes per week. HbA1c test was used to determine the glucose level in blood. The data was presented in terms of frequency, percentage, mean, standard deviation, median, and mode. Depending on normality of the data, MANCOVA test was used for within group changes while paired sample T test was used for between group comparisons. Paired sample T test was used to determine correlation. **Results:** The mean age of n=45 study participants were 49.75 ±7.86 years. Between groups analysis showed that all groups significantly improved ($p<0.001$) regarding HBA1c level after 12 weeks intervention. However, no significant difference {$F(2,39)$, $p=0.117$} was observed among the groups regarding HBA1c level after 12 week intervention. **Conclusion:** Moderate physical activity showed significant improvement on HbA1c levels.

Keywords: Type 2 diabetes mellitus, moderate physical activity, HbA1c.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder and caused by insufficient secretion of insulin hormone due to malfunctioning of beta cells of pancreas. DM is mainly divided in two types; type-1 diabetes which occurs when pancreas fails to secrete insulin whereas in type-2 the pancreas retains some capacity to secrete insulin but insulin resistance is increased and leads to hyperglycemia. The prevalence of diabetes reported in Pakistan is 11.77% which comprised 14.81% in urban areas and 10.34% in rural areas of Pakistan[1]. However, the incidence of diabetes is increasing day by day due to obesity and ethnic changes in population. It is expected that the prevalence of diabetes would be double in upcoming decade[2].

The common signs and symptoms of hyperglycemic patient are polydipsia, polyuria, polyphagia, weight loss and visual impairments. Diabetic patients are exposed to lipid abnormalities, cardiovascular atherosclerosis, and peripheral arterial and cerebrovascular diseases along with micro vascular complications including nephropathy, retinopathy, and neuropathy. The other complications of chronic hyperglycemia included damage to kidneys, eyes, nerves, heart, and blood vessels. Therefore, glycemic control is the most basic way to manage this disease[3].

Sedentary lifestyle cause obesity that can disturb body composition, metabolic profiles and insulin resistance which may then lead to ectopic fat in organs and thus leads to diabetes[4]. Exercise has been considered one of the three cornerstones in the management of diabetes, the other two being dietary measures and drug therapies[5]. The moderate and vigorous intensity physical activity has great effects on improving health status of patients by preventing them from many diseases like cardiovascular, diabetes, stroke and cancers. World health organization reports one must need 150-300 minute moderate intensity of physical activity in a week to stay healthy [6].

Physical activity and life style modification was found to be very effective in reducing diabetes and its risk in adults[7]. Physical activity reduces the incidence of Type 2 Diabetes along with preventing from hyper insulinemia, fasting plasma/blood glucose, HbA1c, body fats, cholesterol, blood pressure, cardiovascular risk, and dosage of antidiabetic medications. Also, physical activity can

improve sensitivity to insulin, increases muscular strength, oxygen consumption, enhances aerobic capacity, and positively affects mental health of patients with diabetes[8]. A diabetic patient can do aerobic physical activity of 75-150 minutes using all major muscle groups for two or more days a week.

Many studies have been done on diabetic patients and their correlation with different exercise interventions to lower the glycemic levels such as strength training, aerobics training, brisk walk, combination of aerobics training and strength training. However, in this study brisk walk, aerobics and strength training was studied in a single study to determine which exercise intervention has more drastic effect in controlling the levels of HbA1c. It would contribute to the science literature and help professionals to choose the suitable exercise protocol for diabetic patients.

METHODOLOGY

A multi-arm, single cantered, randomized clinical trial was conducted at Fitness facility of Alpha gym, Islamabad for a time period of six months. The study was initiated after taking approval from Research Ethical Committee (REC) of Riphah International University, Islamabad. The written informed consent was taken from all participants and assuring them about confidentiality of the data according to the deceleration of Helsinki.

Patients were included with the age between 30-70 years, who had diagnosed Type-2 diabetes, were overweight with a BMI of 25 or greater, had HbA1c level more than 48mmol/mol or >6.5%, fasting Plasma Glucose level >126 mg/dl (7.0 mmol/l), random plasma glucose level >200 mg/dl (11.1 mmol /l), and were physically active without any mobility problems. While subjects who had Type-1 diabetes, insulin dependent type 2 diabetes, gestational diabetes, hypertension, smokers, cardiovascular disease, cerebrovascular disease, cardiopulmonary disorders, cognition problems, peripheral artery disease, dyslipidemia, proliferative or pre-proliferative retinopathy, nephropathy, neuropathy, radiculopathy and amputation during the time period of the study were excluded.

The total of n=45 participants were accessed for eligibility that fulfilled the inclusion criteria and were thus recruited through non-probability purposive sampling technique as shown in figure 1. The participants n=45 were randomly divided into three interventional groups i.e. group A (n=16), group B (n=16) and group C (n=13). It was a single blinded study and participants were kept blind to the allocated treatment.

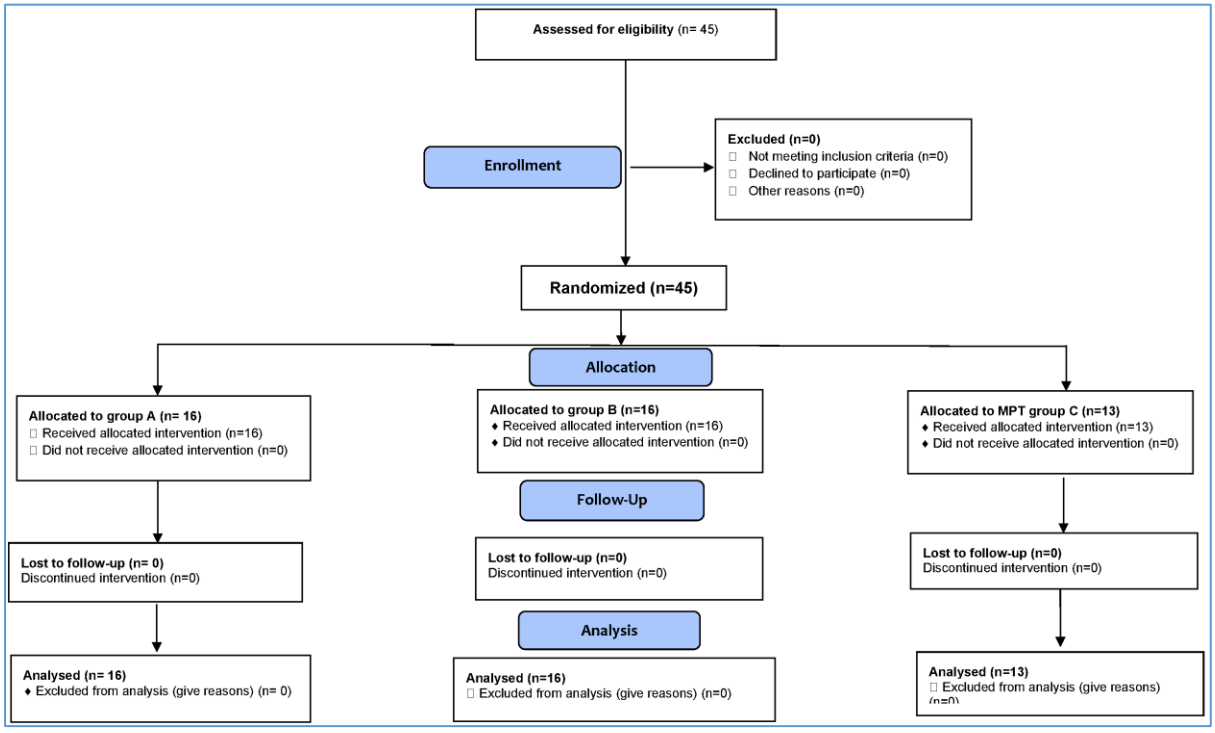

Figure 1: Consort diagram

The participants in group A were asked to do brisk walk of moderate intensity, while aerobics training was practiced in group B and strength training were performed by group C. The intervention was three months long and five-days a weeks. Each session lasted for 30 minutes as shown in table 1.

Table 1: Intervention given to the study participants

Group A	Group B	Group C
Intervention: Brisk Walk	Intervention: Aerobics: Body weight training (jumping jacks, high knees, wall push-ups)	Intervention: Strength Training: Weight training: bench press, shoulder press, squats, and leg press
Time: Approximately 30mins	Time: Approximately 30mins	Time: Approximately 30mins
Frequency: Once a day	Frequency: Once a day Repetitions: 3 sets and 20 reps each exercise	Frequency: Once a day Repetitions: 3 sets and 8-10 reps each exercise
Intensity: Moderate	Intensity: Moderate	Intensity: Moderate

The pre interventional data was collected before the start of intervention and post interventional data after 3 months. The demographics such as age, gender was obtained at baseline. HbA1c test was used to determine the glucose level in blood.

The data was presented in terms of frequency, percentage, mean, standard deviation, median, and mode. Depending on normality of the data, ANCOVA test was used for within group changes while paired sample t-test was used for between group comparisons. Paired sample t-test was used to determine correlation. Data was analyzed using SPSS version 26. The level of significance was set at 95% CI ($p<0.05$).

RESULTS

The mean age of n=45 study participants was 49.75 ±7.86. Of all the participants, n=35 were overweight n=35 and n=10 were obese with mean BMI of 29.47±2.16. The total number of male and female participants were n=33 and n=12 respectively.

Before the intervention all participants (n=45) were diabetic (7.50±0.803). In brisk walk group, after 12 weeks of intervention n=4 participant improved to pre-diabetic level and remaining n=12 have no change in the diabetic category. While in aerobic exercises group n=8 improved to pre-diabetic level and n=2 improved to normal range, and remaining n=6 showed no improvement. Furthermore the group who were receiving resistance training, only n=3 improved to pre dietetic level, and remaining n=10 showed no change in the dietetic category. The paired t-test showed that all groups significantly improved ($p<0.001$) regarding HBA1c level after 12 weeks intervention. (Table 2)

Table 2: Comparison Group A and Group B. (UESFI, FM, WM-G, WM-F & BRC.)

Variables	Assessment	Group A Median (IQR)	Group B Median (IQR)	p-value
Upper extremity Functional Index	Baseline	12(6)	10(2)	0.07
	3rd week	26(6)	21(5)	0.006
	6th week	35(6)	28(6)	0.005
Fugl meyer total	Baseline	14(6)	12(3.5)	0.5
	3rd week	24(3)	24(8)	0.5
	6th week	35(7)	34(5)	0.6
Wolf Motor(gross)	Baseline	14(2)	14(6)	0.2
	3rd week	21(3)	21(6)	0.07
	6th week	28(4)	24(5.5)	0.08
Wolf Motor(fine)	Baseline	10(2.5)	11(4)	0.2
	3rd week	15(7)	16(4)	0.1
	6th week	19(5.5)	19(3)	0.3
Burnnstrom Recovery scale	Baseline	5(1)	4(1)	0.3
	3rd week	6(1)	6(1)	0.4
	6th week	6(0)	6(0)	0.4

Significance level: p<0.05, p<0.01**, p<0.001****

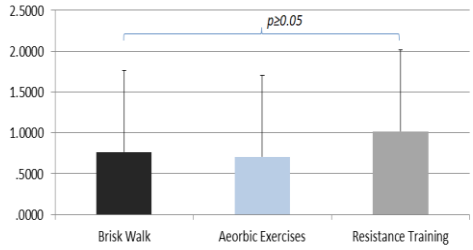

Figure 2: Comparison of HBA1c level (MD) among groups

One way ANCOVA was applied on mean differences of HBA1c while controlling the age, fat and BMI, which showed no significant difference {F(2,39), p=0.117} among the groups regarding HBA1c level after 12 week intervention. (Figure 2) The adjusted means for mean differences of HBA1c level were as follows; brisk walk group 0.794, aerobic exercises group 0.670 and resistance training group 1.028.

RESULTS

The aim of the study was to determine the effects of moderate physical activity on HbA1c level in type-2 diabetic patients. The post interventional analysis showed significant improvement in HbA1c values.

According to the results, brisk walk significantly improved the glucose level in blood which is concurrent with the previous study[9]. A previous study reported that brisk walk for 45-minutes showed significant improvement in hyperglycemia[10]. However, in a recent study 30-minutes brisk walk significantly improved the hyperglycemia, which may clinically beneficial. The possible reasons of significant improvement is the moderate intensity of brisk walk increases the requirement of glucose for muscles to work which lowers the blood glucose levels. Also, greater uptake of glucose by working muscles and less hepatic output of glucose leads to controlled HbA1c levels[11]. Hence, moderate intensity of brisk walk is important to control hyperglycemia.

Moreover, the findings of the current study showed that aerobic training significantly reduced the hyperglycemic level after the 12-weeks of intervention, which correlates with previous study that showed significant improvement in hyperglycemic levels in type 2 diabetic patients[12]. It has been observed that aerobic exercise significantly reduces the blood pressure, triglycerides, insulin resistance and A1C and also improves the oxidative capacity of skeletal muscle, insulin sensitivity and thus glycemic level[13].

Also, recent study reported significant improvement in hyperglycemia after 12-week of moderate intensity strength-training which corresponds with the previous study[13]. Since, diabetes is a major risk factor for low muscle strength[14] and ultimately functional status[15]. The resistance training exercise in adults improves body composition, strength, physical function, muscle strength and mass[16]. Therefore, resistance training not only improves muscle strength, lean muscle mass, bone mineral density but also enhancing glycemic control and prevent sarcopenia and osteoporosis thus improve functional status[17].

However, in context to the previous literature, combination of aerobics and strength training reported more significant results rather the aerobics and strength training alone. Sigal et al., conducted a 4-week follow-up study which correlates the effects of aerobic training and resistance training on patients with diabetes and determined combination of both has greater impact on controlling hyperglycemia[18].

The limitation of the study included daily BSR pre and post values were not monitored because of prick hesitation every day and it could be a factor to changed results with time. Moreover the study was conducted in Ramadan which may modify the results because of altered routine and changed dietary timings of fasting. The sample size was also small due to pandemic and single setting was available due to short time duration and thus results cannot be generalized.

CONCLUSION

It was concluded that all groups such as moderate intensity brisk walk, aerobics and resistance training showed significant improvement in hyperglycemic level after 12 weeks of intervention. While comparing the groups all modes of physical activity are equally effective in improving HBA1c level.

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RESEARCH ARTICLE

EFFECTS OF ELECTROMYOGRAPHIC BIOFEEDBACK ON THE PERFORMANCE OF VASTUS MEDIALIS OBLIQUE MUSCLE IN KNEE OSTEOARTHRITIS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: Knee osteoarthritis is a common musculoskeletal disorder, enhancing performance of Vastus Medialis Oblique (VMO) can reduce the symptoms**. Objective:** The study objective was to determine the effects of Electromyographic Biofeedback (EMG BF) on the performance of VMO in patients with knee osteoarthritis (OA). **Methods:** A Randomized Controlled Trial (RCT) was conducted at Pakistan Railway General Hospital, Rawalpindi from July to December 2019. In this study, n=30 patients with a diagnosis of knee OA were recruited with the age ranging from 50 to 65 years. The participants were randomly allocated to two groups. Group A has received isometric exercises with Electromyographic Biofeedback (EMG BF) training and Group B has received only isometric exercises for 6 weeks. The Assessments were taken at the baseline and after 6th week of intervention. The outcome measure of vastus medialis oblique (VMO) performance was maximum voluntary isometric contraction (MVIC), measured by an EMG BF device, and one-repetition maximum (1RM)). The VMO muscle thickness was measured by musculoskeletal ultrasound. SPSS version 21 was used for data analysis. **Results:** The mean age of the group A was 58.94±3.1 years and of group B was 59.44±2.9 years. There was found significant between-group improvement ($p<0.001$) in VMO thickness and 1RM. But for MVIC between-group difference was not significant ($p>0.05$). Within-group analysis for all variables was statistically significant ($p 0<.001$) in both experimental and control groups. **Conclusion:** It is concluded that VMO training with an EMG BF device is more effective to enhance VMO thickness and strength in terms of 1RM in patients with knee osteoarthritis.
Keywords: Osteoarthritis, Electromyography Biofeedback, One repetition maximum.

INTRODUCTION

Knee extensor weakness is a typical characteristic of knee osteoarthritis (OA) and it is related to the development of symptomatic knee as well as a decrease in function over time in people with knee OA[1].In most countries of the world knee OA is a primary cause of pain and disability[2].The Quadriceps muscle weakness plays a major role in worsening knee pain, poses instability to the knee joint, and makes it susceptible to more degeneration. Literature supports that there occurs 76 % reduction in quadriceps strength in Knee OA[3]. Patients with knee osteoarthritis suffer mostly from a walking disability[4]. Specifically, weakness of Vastus medialis oblique (VMO), a component of the Quadriceps, is found to be linked with severe pain in patients with knee OA[5]. Literature indicates strength deficits ranging between 20 to 45%[6]. A variety of different modalities have been used to optimize the effects of quadriceps enhancing therapies. Electromyographic biofeedback (EMGBF) is a modality that aims specifically at reducing cortical mechanisms associated with strength generation. It is reliable tool (r=0.89) to train and assess muscles performance[11,12]. It is hypothesized to increase muscle strength and quadriceps muscle group neuromuscular control[7].

EMGBF facilitates the regeneration of the peak torque of quadriceps more effectively in conjunction with the strengthening exercise program in osteoarthritis[8]. It is already known that isometric exercises results in less intra articular pressure, inflammation and gradual bone degeneration, a study has evaluated the effectiveness of EMGBF with isometric quadriceps reinforcement in patients with knee OA and has proposed increased muscle strength of quadriceps compared to only isometric exercise program[9].

It is evident from all previous studies that EMGBF was used for the treatment of many musculoskeletal disorders for example knee patellar mal alignment has been corrected by VMO strengthening by EMGBF. But very a smaller number of studies has been conducted on effects of EMGBF on knee disorders. Up to best of researcher's knowledge and literature search, no evidence of EMGBF training of VMO in Knee OA has been reported nationally. As per high national prevalence rate of Knee OA and linked disability,

there is need to include more reliable therapeutic tools in routine protocol of knee OA management. So the rational of this was to quantify performance of VMO, the most affected muscle in knee OA, by EMGBF as compared to conventional Physical therapy protocol of knee Isometrics. The objective of this study was to determine the effects of EMGBF on performance and thickness of VMO muscle.

METHODOLOGY

The single blinded randomized controlled trial (RCT) was conducted from July to December 2019, at Pakistan Railway General Hospital, Rawalpindi. This trial was registered at www.ClinicalTrials.gov with registry number NCT04194853. the sample size(n=34) was calculated online using software Open-epi tool at confidence Interval of 95% and power of 80%[10].The Participants were selected through non- purposive sampling technique from patients of age between 50-65 years. The both genders, with diagnosis of Knee OA according to the American college of Rheumatology, and Kelgren-Lawrence scale grade 1 and 2 and Body Mass Index should be <35kg/m^2 were included. the exclusion criteria the patients who has received physical therapy sessions or intra articular injections in last three months, the patients who had taken corticosteroids, the patients with knee surgeries, the patients with a history of diseases like Rheumatoid arthritis and radiculopathy. After taking written informed consent from the enrolled subjects, they were randomized into Group A (n=15) and Group B (n=15) through sealed envelope method as for keeping the participant blinded to their respective allocation. (Figure 1).

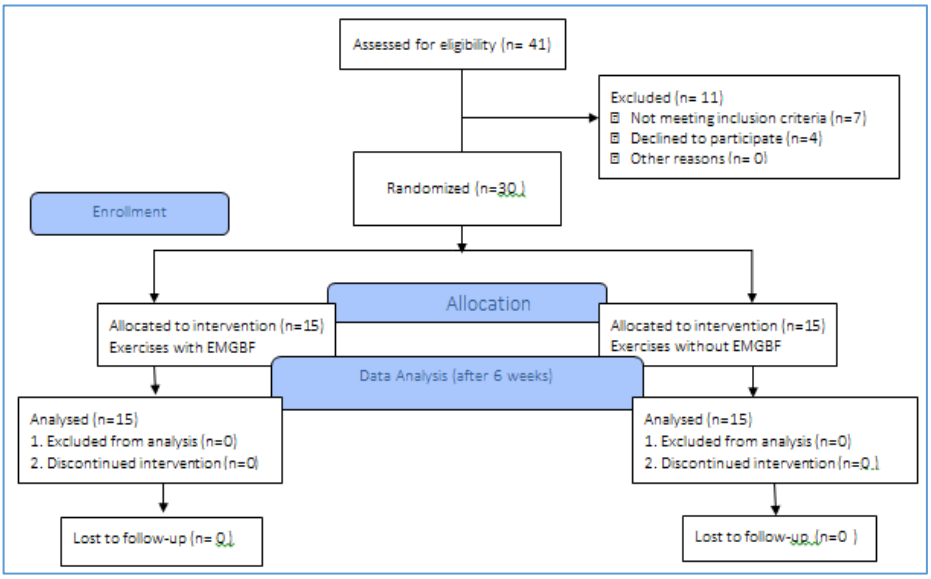

Figure 1: Consort diagram

Baseline assessment was taken which includes demographic data and history was taken. Further patient underwent to diagnostic Musculoskeletal ultrasound procedure by a Consultant Radiologist for measuring the VMO thickness[10]. Muscle performance which was the primary outcome variable was assessed by EMGBF device[11,12]. The Muscle strength was measured through 1 RM. One repetition maximum (1RM) test, the maximal weight that can be lifted once with correct lifting technique, is the gold standard for measuring muscle strength [13].

In the Group A participants has received EMGBF training with isometrics knee exercises. With the patients in supine position, active electrode was applied 4 cm above the patella, the reference electrode was placed 3 cm medially to the superomedial aspect of the patella and the ground electrode was attached to the same leg 2–3 cm inferior to the patella[5]. To perform isometric quadriceps, exercise a rolled towel with a width of 10 cm was put on the popliteal fossa of the patients' knee and asked to press the towel as hard as possible for 5 seconds. The muscle was then relaxed for the 10 seconds and the procedure was repeated for a total of 15 mins (60 cycles)[14]. The patients were advised to do three sets of exercises with 8-10 repetitions three times a day at home. Exercises

were straight leg raising, isometric hip adduction exercise, terminal knee extension exercise, isometric quadriceps exercise[15]. In the Group B, only isometric exercises were performed without the application of EMGBF. Rest of the treatment including home plan was same for the participants in this group. Post assessment was performed by the end of the 6th week. The data was presented as n(%), mean±Sd, median(IQR). The assumption of parametric test was not met, so nonparametric test were used for data analysis. For the comparison of both groups Mann Whitney U-test were applied, while for with-in group changes, Wilcoxon signed rank test was applied. The level of significance was set at p<0.05. The data was analyzed using SPSS ver. 21.

RESULTS

In this study n=30 patients were recruited with the mean age (group A = 58.94±3.1 years and group B = 59.44±2.9 years). In total male participants were n=4 and female participants were n=26. Individually in group A, there were n=13 females and n=2 males and in group B there were n=13 females and n=2 males. Within group analysis for all variables was statistically significant (p <0.001) in both groups. (Table 1) In between group analysis there was found significant improvement (p<0.001) of VMO thickness, 1RM in experimental group as compared to control. For the variable of MVIC, between group comparison has shown non-significant (p>0.05) differences. (Table 2)

Table 1: With-in group changes 1RM, MVIC and VMO muscle thickness

		Group A (EMGBF+CPT) n=15				Group B (CPT) n=15			
Variable	Assessment	Mean ± S.D	M.R	Med (IQR)	P-value	Mean ± S.D	M.R	Med (IQR)	P-value
1 RM (kg)	Pre	2.06± 0.96	8	2(1)	0.001	1.6± 1.03	8	8(1)	0.014*
	Post	4.66± 1.79	0	5(3)		3.06± 1.66	0	2(2)	
MVIC (uv)	Pre	267.5± 122.3	8	294(173)	0.001	356.1± 249.6	8	243(320)	0.001**
	Post	1651.1± 493.8	0	1999(745)		1553.2± 510.9	0	1764(235)	
VMO muscle thickness (mm)	Pre	14.4± 4.65	0	14.6 (7.7)	0.002	12.5± 3.15	8	11.2(3)	0.001**
	Post	17.7± 2.95	8	18.3(2.9)		14.6± 3.4	0	14(4)	

Significance Level: p<0.05, p<0.01**, p<0.001****

Table 2: Between group comparison (1RM, MVIC and VMO muscle thickness)

		Group A (EMGBF+CPT) n=15			Group B (CPT) n=15			
Variable	Assessment	Mean ± S.D	M.R	Med (IQR)	Mean ± S.D	M.R	Med (IQR)	P value
1 RM (kg)	Pre	2.06± 0.96	17.87	2(1)	1.6± 1.03	13.13	8(1)	0.121.
	Post	4.66± 1.79	19.17	5(3)	3.06± 1.66	11.83	2(2)	0.02*
MVIC (uv)	Pre	267.5± 122.3	14.8	294(173)	356.1± 249.6	16.2	243(320)	0.663
	Post	1651.1± 493.8	16.6	1999(745)	1553.2± 510.9	14.4	1764(928)	0.464
VMO muscle thickness (mm)	Pre	14.4± 4.65	16.93	14.6 (7.7)	12.5± 3.15	14.07	11.2(3)	0.372
	Post	17.7± 2.95	19.97	18.3(2.9)	14.6± 3.4	11.03	14(4)	0.005**

Significance Level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The present study indicated that an isometric exercise with biofeedback training is more efficient to improve muscle strength and thickness. In this study 1RM was used as an outcome measure for assessing muscle strength. So, the group of patients who were trained with EMGBF assisted isometrics has shown great improvement in terms of maximum force generation in one maximum contraction of quadriceps as compared to control group after 6weeks of intervention. These results are supported by the study of Anwer S et.al, they aimed to evaluate the effectiveness of Electromyographic biofeedback with isometric quadriceps reinforcement in patients with knee OA. They found that a 5-week isometric exercise program seemed to increase muscle strength of quadriceps compared to exercise program alone in patients with knee OA[9]. Similar findings regarding the muscle strength for this study were demonstrated by Yılmaz OO et.al. In their study one group has received strengthening exercise program with EMGBF, while the other had the same exercise program without EMGBF 3 times a week for 3 weeks. The patients were asked to perform the same exercise program regularly thrice a day. Isometric strength was measured through isokinetic dynamometer. As a conclusion these exercises improved muscle strength equally in both groups [16].

An important primary outcome intended to evaluate the changes in muscle performance was of Maximum voluntary isometric contraction (MVIC) measured by EMGBF device. Participants of the current study in both groups have shown significant improvements after 6 weeks of isometric training either assisted or not assisted by EMGBF. Despite of more clinically significant improvement of MVIC in EMGBF assisted group, there was found not statistically significant (p=0.464) difference between the two groups. Contrary to this finding, Choi YL et.al has reported significantly positive effects on MVIC of VMO amongst groups treated with EMG guided biofeedback and those treated with ultrasound guided biofeedback (USBF) in patients with knee OA. Whereas their control group which has received hot pack, TENS and ultrasound, showed no improvement in MVIC[10]. This finding is comparably different from the present study in which both groups have shown improved MVIC after 6 weeks of intervention. The possible reason is both groups has received same volume of quadriceps isometric training, one with and the other without EMGBF. Whereas in the above-mentioned study the control group has not been treated with exercise therapy that is why no significant improvement was not found. Further they have measured MVIC with strength dynamometer.

Current study evaluates the structural changes in the Vastus medialis Oblique muscle by musculoskeletal ultrasound. Participant of the present study in both groups have shown significant increase in VMO thickness after the 6 weeks of isometric exercises with EMGBF and without EMGBF but there were a greater number of patients with increased VMO thickness in experimental group. This study has also illustrated significant difference (p=0.001) within group analysis. Choi YL et.al has reported the effects of isometric exercises using the EMGFBF on pain in knee OA patients. The Patients in the EMGBF training were trained with the subsequent physical training exercise program targeting the VMO, whereas the patients in the control group were treated with conventional physical therapies. By comparing the VMO thickness between pre and post intervention, significant improvement was noted in the EMGBF group (p=0.005)[10]. These findings support the present study in which experimental group have shown more increased in VMO thickness after 6 weeks of intervention.

The current study has some limitations, Researcher was unable to complete the calculated sample size due to study time limitation, study setting was just a single setup and only those patients were participated who visited the hospital in that time, Repeated charging of device made delay in delivery of sessions to patients sometime.

CONCLUSION

It is concluded from the current study findings that isometric exercises using EMG biofeedback technique enhances VMO performance and thickness in patients with knee Osteoarthritis. The improvement linked with this specific form of muscle training is observed to be due to more interest in exercise participation using audio and visual feedback of device. Exercise training with EMG BF should be used as an adjunct in routine component of physical therapy for knee osteoarthritis, other devices for EMG BF can be utilized in future studies. Data should be collected from multiple clinical set ups to have diversity in patient population with different lifestyles.

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RESEARCH ARTICLE

LEVEL OF PATIENTS' SATISFACTION FROM PHYSICAL THERAPY SERVICES IN OUTPATIENT DEPARTMENT OF TERTIARY CARE HOSPITALS IN PESHAWAR: A CROSS-SECTIONAL SURVEY

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ABSTRACT

Background: Patient satisfaction is a reference point of that degree to which a client is satisfied with the attention and treatment or health care services they get from their health care professional. It provides an idea about the intervention that is effective or not and removes the different malpractice claims. **Objective:** To determine the level of patients' satisfaction in outpatient departments of physiotherapy in tertiary care hospitals of Peshawar. **Methodology:** This study was a cross sectional survey in which purposive sampling was used and data was collected through MED-RISK patient satisfaction questionnaire. Both male and female aged between 18 to 75 and had received at least 3 or more sessions of physiotherapy were recruited in the study The sample size was n=375, participants were selected from physiotherapy (OPD) of Tertiary Care Hospitals of Peshawar. The 13 items, slightly modified form of Med Risk Patient Satisfaction instrument (MRPS) was used for data collection. The data was analyzed and presented in the form of frequencies and percentages. **Results:** The respondent characteristics of 375 patient showed that more than half were male 245 (65.3%) and the remaining were female 130 (34.7%). The overall patient satisfaction from physical therapy services was 4.38±0.70 which showed that majority of the participants were satisfied with physical therapy services. When comparing the public and private setups, it was observed that participant received PT services in private setup are significantly satisfied ($p<0.05$) with services as compared to public setups. **Conclusion:** The level of patient's satisfaction receiving physiotherapy health services in tertiary care hospitals of Peshawar can be considered high. Lower back pain was the most presenting symptom for the selected population receiving physiotherapy treatment. The patient education showed the highest mean as compared to other factors. The private sector showed statistically high level of satisfaction as compared to the public sector while practically the services being delivered by private and public sector were on same level.

Keywords: Med- Risk, outpatient department, patient satisfaction, physical therapy

INTRODUCTION

Patient satisfaction is a reference point of that degree to which a client is satisfied with the attention and treatment or health care services they get from their health professional [1]. It is an important Patient-related health outcome and has an influence on the quality delivery of patient-centred health effects. It provides an idea regarding the intervention that is effective or not and removes the different malpractice claims [2].

Patient satisfaction is a captious sign of the health care system [3]. Health care providers not just require interpretation of the patient's expectations but also necessitate to meet those expectations but also hesitate to meet those expectations [3]. Patient satisfaction is a globally used medical care choice cadent and is a central factor of health-related communication and behaviour. Patient' satisfaction is a dimensional concept, consisting of multiple aspects and all of various aspects do not necessarily have to do with the potential quality of medical services experienced by the clients [4].

Satisfaction is linked to the extent to which the presumptions of a client are accomplished by health care system. In the same manner, respectful behaviour and good communication skills from the Physical Therapist reflect a vital intuition on the effectiveness of the treatment [5].

Currently the concept of health is taking coinage that health is composed of client and healthcare providers equally, patients are now active receivers rather passive makers along with the whole treatment plan [6]. One critique of patient satisfaction evaluation is the inability to encounter expectations about health care which may be influenced by antecedent experiences with medical care system [7].

Patient satisfaction is greatly influenced by a few factors e.g., listening to patients carefully, clinical environment, the interaction between patient and therapist, clear instructions to the patient, approaching the patients in a good way. Accessibility of services that is parking facilities and location of hospital or clinics are not correlated with patient

satisfaction [8]. Satisfied patients usually recommend the hospitals to other peoples in society as it is known that rumours or information travels much faster and is accepted true by patients when coming from their relations or friends rather than any other healthcare provider [9]. Even though patient satisfaction shows a fundamental role in enhancing the quality of health care, limited published work is accessible in developing countries. For the effectiveness of treatment, there must be a strong bond between the patient and the health care professional [10].

In the field of healthcare, the content about the relationship between medical service quality and patient satisfaction also come into an account. Few studies regarding Physical therapist have shown the bond between different factors of satisfaction and adding these factors to clinical practices can improve the services being delivered by the physical therapist.

Patient satisfaction is an important and widely used procedure for assessing health-care quality. Clinical outcomes, patient retention, and medical malpractice lawsuits are all influenced by patient satisfaction. It has an impact on the delivery of high-quality health care in a timely, efficient, and patient-centred manner. Lack of literature is seen in undeveloped and under developing countries, though certain studies channelled, are focused on General practitioner rather than Physical Therapists. The objective of the study is to determine level of patient' satisfaction from physical therapy services in outpatient department of Tertiary Care Hospitals of Peshawar.

METHODOLOGY

It was a cross sectional survey conducted in Physical therapy department of tertiary care hospitals of Peshawar to find out the level of patient satisfaction from physiotherapy services. Permission letter was taken form Northwest General Hospital (NWGH), Rehman Medical Institute-General Hospital (RMI-GH), Lady Reading Hospital (LRH), Khyber Teaching Hospital (KTH), Hayatabad Medical Complex (HMC). The study was completed within 6 months of duration from February 2020 to July 2020.

The sample size for this research was n=375 with a 95% confidence interval calculated by open EPI. The participants with aged between 18-75 receiving at least 3 or more sessions of physiotherapy were recruited in the study. Those patients who had decrease cognition levels on Glasco comma scale (GCS) were excluded because they were unable to give a proper response to the treatment. Patients having low GCS level < 12 and pediatrics patients were excluded from the study.

The participants were invited to be part of this survey by each member of the research team and were explained the benefit and importance of the study. The consent form was translated into Urdu to make it easy and understandable for the patients and their attendants. The patients signed the informed consent and were thus recruited.

The 13 items, slightly modified form of Med Risk Patient Satisfaction instrument (MRPS) was used with Cronbach's α=0.761. The MRPS is divided into four sub domains including interpersonal relationship, convenience & efficiency, patient education and global items. The questionnaire was based on Likert scale. The mean was calculated for each item and as well as for sub domain and over all scoring. The highest the mean indicates highest satisfaction. To compare the satisfaction level of public and private setups were analyzed through independent t-test. The level of significance was set at $p<0.05$ and SPSS ver 21 was used for analysis.

RESULTS

The respondent characteristics of n=375 patients showed that n=245(65.3%) were males and the remaining n=130(34.7%) were females. Most participants, n=132(35.2%) were from lady reading hospital (LRH). (Figure 1)

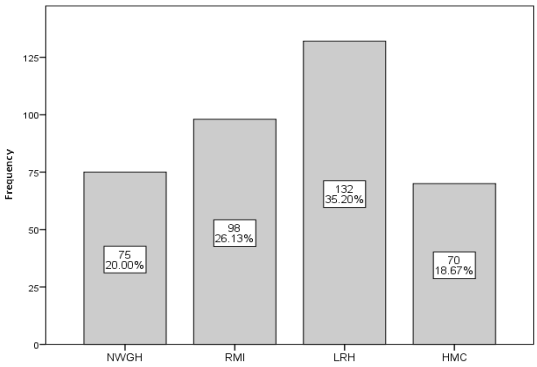

Figure 2: Hospital wise distribution

The overall patient satisfaction from physical therapy services was 4.38±0.70 which showed that majority of the participants were satisfied with physical therapy services. When comparing the public and private setups, it was observed that participant received PT services in private setup are significantly satisfied ($p<0.05$) with services as compared to public setups. (Table 2)

Table 1: Frequency distribution of responses on level of satisfaction (Med-Risk Items)

Questions		Satisfaction level	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Factor 1: Interpersonal Relationship							
The office receptionist was courteous	4.37± 0.73	Satisfied	6(1.6%)	-	21(5.6%)	167(44.5%)	181(48.3%)
The registration process was appropriate	4.31±0.82	Satisfied	6(1.6%)	8(2.1%)	26(6.9%)	157(41.9%)	178(47.5%)
The waiting area was comfortable (lighting, temperature, furnishing)	4.33± 0.67	Satisfied	3(0.8%)	-	26(6.7%)	189(50.4%)	158(42.1%)
My Therapist treated me respectfully	4.58± 0.58	Highly Satisfied	-	-	19(5.1%)	119(31.7%)	237(63.2%)
The office staff was respectful	4.43± 0.80	Satisfied	5(1.3%)	7(1.9%)	25(6.7%)	122(32.5%)	216(57.6%)
The office and its facilities were clean	4.50± 0.59±	Highly Satisfied	-	-	19(5.1%)	148(39.5%)	208(55.5%)
Average	**4.42± 0.49**	Satisfied					
Factor 2: Convenience And Efficiency							
The office hours were convenient for me	4.23±0.88	Satisfied	10(2.7%)	5(1.3%)	39(10.4%)	153(40.8%)	168(44.8%)
My therapist thoroughly explains the treatment I receive		Satisfied	1(0.3%)	7(1.9%)	17(4.5%)	133(35.5%)	217(57.9%)
My Therapist answered all my questions	4.45± 0.76	Satisfied	3(0.8%)	7(1.9%)	23(6.1%)	126(33.6%)	216(57.7%)
Average	**4.39± 0.63**	Satisfied					
Factor 3: Patient Education							
My Therapist advised me on ways to avoid future problems	4.40± 0.75	Satisfied	1(0.3%)	7(1.9%)	34(9.1%)	130(34.7%)	203(54.1%)
My Physical Therapist give detailed instructions regarding my home program	4.54± 0.73	Highly Satisfied	4(1.1%)	3(0.8%)	21(5.6%)	103(27.5%)	244(65.1%)
Average	**4.47± 0.64**	Satisfied					
Factor 4: Global Items							
Overall, I am completely satisfied with services I received from my Therapist	4.38(0.79)	Satisfied	6(1.6%)	3(0.8%)	28(7.5%)	143(38.1%)	195(52.0%)
I would return to this office for future services or care	4.39(0.68)	Satisfied	-	5(1.3%)	28(7.5%)	157(41.9%)	185(49.3%)
Overall Average	**4.38(0.70)**	Satisfied					

Table 2: Comparison between Public and Private hospitals (Med Risk total Score)

Factors	Setting	N	Mean±Std. Deviation	p-value
Interpersonal Relationship	Private	173	4.74±.36	0.000***
	Public	202	4.21±.41	
Convenience And Efficiency	Private	173	4.64±.56	0.000***
	Public	202	4.23±.56	
Patient Education	Private	173	4.74±.53	0.000***
	Public	202	4.31±.63	
Global Items	Private	173	4.80±.51	0.000***
	Public	202	4.09±.62	

Significance level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The main purpose of this research was to assess the level of participants receiving physiotherapy services in outpatient physiotherapy departments of tertiary care hospitals of Peshawar. The data were collected through the questionnaire, Med Risk patient satisfaction instrument which is based on likerts' scale. The interpretations of this study indicate the bond between therapist and patient positively relates with the result of treatment provided to them in outpatient physical therapy department of physical rehabilitation.

In a current study, the highest score was presented in, patient education showed the highest average of 4.47±0.64 of the total score. Followed by Factor 1, interpersonal relationship i.e., 4.42±0.49, while Factor 2, convenience and efficacy showed the lowest average 4.39±0.63. But overall, individually the highest points were presented by the item "My therapist treated me respectfully" which is present in Factor 1 with a mean of 4.58±0.58.

When the items of MRPS were divided into three factors we noticed that Factor 3 'Patient education' was at a greater level of satisfaction. These findings stay completely contradictory to a study conducted by Hussain et al., in 2019[5]. The study was conducted at Inpatient and outpatient department of Rehman Medical Institute Peshawar regarding physical therapy services being received. The Factor 3 'Patient education' through physiotherapist and his/her sincerity to educate patients and raise public awareness, got the lowest level of patient satisfaction from clients while the highest points were presented by the factor 1 'interpersonal relationship[11].This difference may be due to different management of hospitals, population, and treatment protocols. Some national level studies which were conducted in Pakistan have also reported higher level of satisfaction from the Physical therapy services being provided at their respective institution. A study conducted in Urban areas of Pakistan reported high level of patient satisfaction[12].

In this current study, the Factor 1 'interpersonal relationship' got a mean of 4.42±0.49 in which an individual item 'The waiting area was comfortable' got a mean of 4.33±0.67 and in which 91% participants strongly agreed from this item, which is opposite to the means of a study conducted in Nigeria, which revealed that patients were not satisfied from the waiting area and time. Although/ the actual patient waiting time was not evaluated quantitatively. Dissatisfaction from waiting area and time has also been reported in Northern area, Kano, Ibadan and Benin City[13]. The reason behind that may be the environment of waiting area and due to the busy schedule of individuals now a day.

A study Carried out in the USA in which high satisfaction level for these three sections was reported, in which the 'Global Measures' got the highest satisfaction rate, individually the item 'generally I am completely satisfied through my care' got the most points with a mean of 4.84 followed by the item 'I would return in future' with a mean of 4.83 [14]. The reason for high satisfaction was the professionalism of the therapist and quality services delivered timely[15].

Discerning between different factors, multi-items satisfaction processes can provide helpful data by evaluating the relationships of items to overall satisfaction of patient. A study carried out in South Carolina (Columbia) Showed that the item much correlated with the two main global questions was that 'My therapist gives me detailed instructions for my home plans' followed by 'My therapist give answered all my questions'. The other items 'My therapist describes treatment to me', 'My therapist give advices to me, my therapist give respects to me'. Following information is captious component of satisfaction from physiotherapy services. Being involved in treatment decisions and being treated with respect by the practitioner are highly linked to patient satisfaction[16].

Keeping in mind the results of Global items in this study with a mean of 4.38±0.70, A meta-analysis was executed in Australia for the outcome of global satisfaction from physiotherapy care reported in 7 different studies. The forest plot or bologram of these studies showed that patient satisfaction was constantly high, with an estimate of 4.44 (95% CI, 4.41-4.46) on a satisfaction scale of 1 to 5, where 5 indicates "high satisfied", and 1 is "highly dissatisfied". Studies that present the proportion of satisfaction of patients with care indicate that 68% to 91% of patients were completely satisfied with the whole physiotherapy services. High levels of patient satisfaction have been described for different clinical setups and across globally various regions including the United Kingdom, Ireland, Northern Europe and North America. Hence From these studies, we evolved that patients with musculoskeletal issues received a high caliber of treatment from PT management [17].

A Brazilian study by Almeida et al. evaluated level of patients' satisfaction at a public university hospital in Brazil, the study report that even patients at public hospital were satisfied with the service being provided [18]. Studies by Feeney et al & Medeiros et al presented the similar level of patient satisfaction between both private and public sector hospitals [15, 19]. Similarly, current study demonstrated high level of patient satisfaction in both private and public hospitals in Peshawar showing $p<0.05$. However, looking at the mean, the patient satisfaction of private hospitals as compared to public hospitals was slight higher.

The limitation of the study is that it is only restricted to OPD and no data was obtained from

the IPD of Physical Therapy department regarding the physical therapy services being received.

CONCLUSION

The level of patient's satisfaction receiving physiotherapy health services in tertiary care hospitals of Peshawar is very high. The private sector showed statistically high level of satisfaction as compared to the public sector while practically the services being delivered by private and public sector were on same level.

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RESEARCH ARTICLE

PROFESSIONAL PREFERENCES OF SPEECH PATHOLOGIST FOR THE ASSESSMENT AND MANAGEMENT OF DYSPHAGIA AFTER STROKE

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ABSTRACT

Background: Dysphagia is common after stroke, leading to adverse outcome. The clinical decisions are often based on usual practice, however no formal or similar methods exists to determine the efficacy for assessment and treatment of dysphagia after stroke. **Objective:** To determine professional preferences among SLPs in terms of opted techniques and approaches for the assessment and management of dysphagia in major cities of Pakistan. **Methods:** Study design was cross sectional survey and data was collected from practicing speech language pathologists of Rawalpindi, Islamabad, Lahore and Karachi from July 2020 till January 2021 through online medium on Google forms. The non-probability convenient sampling technique was used for data collection from speech language pathologists. Sample size was n=31 out of which n=20 were females and n=11 were males. Responses of all participants were presented in the form of n(%) through SPSS version 20. **Results:** There was variation between all the responses of participants from different cities of Pakistan. The Speech and language pathologists (SLPs)had access to instrumental assessment video fluoroscopy n=5 (16.1%), FEES n= 4 (12.9%) and more than one instrumental assessment tools n= 8 (25.7%) but before recommendation of exercise is rarely n=20 (64.3%) practiced. The two principal outcome measures for direct dysphagia exercises indicated by SLPs were Oral control n=12 (35.2%) and reduced aspiration n=8 (12.9%). To measure direct exercises outcomes SLPs rarely n=25 (80.7%) uses instrumental assessment tools but use rating scales n=29 (93%). SLPs also prefer to see patient for management of dysphagia 1-2 times a day, 1-4 days a week, for 45 minutes. The most frequently preferred direct exercises are lip range movement n=15 (48.4%), lip strength n=16 (51.6%) and effortful swallow n= 16 (51.6%) whereas electrical stimulation method is least practiced n=5 (16.2%). **Conclusion:** The Speech language pathologists showed variability in preferences for assessments and management practices and format.

Key words: Dysphagia, clinical decision making, speech-language pathology, stroke.

INTRODUCTION

Dysphagia is a Greek word which refers to disturbance in eating caused by the impairment in swallowing process[1].Swallowing has four phases including oral preparatory phase, oral propulsive phase, pharyngeal phase, and esophageal phase[2].Swallowing is a very complicated function which involve 25 muscles and five nerves, serving two main purposes; maintenance of hydration and nutrition, reflex of airway protection. It helps in prevention of foreign bodies to enter lungs, larynx and trachea and emptying pharyngeal airway[3].

Dysphagia after stroke comprises of complicated symptoms set arising from muscle weakness results from decreased activity of muscle due to lessen recruitment of voluntary motor unit. Therefore, exercises for strengthening are widely used for rehabilitation purpose in dysphagia. Involuntary muscles moment resulting after stroke causes muscles over activity[2].

The risk of aspiration, malnutrition, pneumonia, dehydration, airway obstruction and weight loss can be a cause of dysphagia which can be life threatening, having high influence on rehabilitation[4]. The patients with dysphagia and additionally having Alzheimer's disease need to stay more at hospital and need more healthcare [5].

As part of a multidisciplinary team, Speech-Language Pathologists play a pivotal role in dysphagia identification, evaluation, diagnosis and management. The SLPs' role is vital for providing improved quality of life and better care of patient, as they not just do assessment but develop a plan for management to improve nutrition and hydration of patient with dysphagia[6]. American Speech-Language and Hearing Association (ASHA) defines and speech language pathologist (SLP) as a qualified individual who is involved in areas of swallowing and communication throughout the life span as professional clinical practice[7].

The assessment of dysphagia is done through subjective evaluation procedures and instrumental evaluation video fluoroscopic swallowing study (VFSS), fiber optic endoscopic examination of swallowing (FEES), surface electromyography) by the speech and language pathologists[8-10]. There is

an agreement of clinicians in non-instrumental and instrumental recommendations for evaluation of patient's condition with decision making variability. Possible influencing factors on decision making in light of previous literature, present status and needs of services and trainings for dysphagia in future in Ireland are discussed[11].

The decision- making is a complicated process, as the clinician looks for client's condition and evidence for the consideration of a plan keeping service factors and experience into consideration while making selections between available options for the diagnosis of swallowing problems and planning a treatment/management course an SLP plays his role. Evidence support different treatment plans which makes it difficult to opt for a specific plan having strong evidence base as majority of research work is done primarily on small cohort studies and case studies[12,13].

Currently the clinical practice of SLPs for dysphagia is not standardized in Pakistan. SLPs have different preferences while assessing and managing the case of stroke patients with dysphagia. But no literature is available on the observation. The present study provides baseline and empirical information regarding direct formal and common dysphagia practices of SLPs based in Pakistan. It highlights the reported methods for treatment and its efficacy on assessment and intervention for dysphagia. The current study is designed to explore the professional preferences among Speech and Language pathologists in terms of opted techniques and approaches for the assessment and management of dysphagia in major cities of Pakistan incudes Karachi, Islamabad, Lahore and Rawalpindi.

METHODOLOGY

A cross-sectional survey was conducted on n=31 SLPs, after the approval from research ethical committee of Riphah International university (Ref # RIPHAH/RCRS/REC Letter 00806 from Rawalpindi, Islamabad, Lahore and Karachi having two or more than two years of clinical experience with adult stroke and dysphagia participated. Participants who were diploma holders, graduates or postgraduates in Speech and language pathology included. The sampling techniques used for this research was nonprobability convenient sampling. The research was conducted from July 2020 till January 2021.

The tool used for data collection was "Survey of speech and language therapist working in stroke" by Sally Archer 2013-15[14]. The original questionnaire was comprised of 24 items, but after the recommendation of research and ethical committee, 3 more items were added. Those items were related to SLPs experience with adult stroke caseload, dysphagia caseload and adult dysphagia caseload. The questionnaire consisted of 27 items comprised of five sections including Relative background information, influencing factors on therapy recommendation decision, biofeedback and format and content of therapy outcomes.

The data was collected by administering through online medium (Google forms) to enable assess, safety and ease of participants. The participants were briefed about the purpose and anticipatory benefits of the study, confidentiality of respondents and responses and contact details of researcher for queries in written informed consent. The participants were given reminders after every two weeks and the survey remained open from August 2020 till November 2020 for participants to fill in the responses. The data analysis was done with statistical package for social sciences (SPSS) version 20 was used.

RESULTS

The questionnaire was shared with n=150 SLPs out of which n=31 participants including males n=11 (35.49%) and females n=20 (64.5%) filled and submitted. SLPs (n=31) from Rawalpindi 16.1% (n=5), Islamabad 32.3% (n=10), Lahore 25.8% (n=8) and Karachi 25.8% (n=8) working in public 9.7% (n=3), private 25.8% (n=8), hospital 22.6% (n=7) and other 41.9% (n=13) (clinicians working in multiple settings, university, tele practice were kept under the category of others) working sectors participated in this research. The background information of the research participants, SLPs experience in years with adult and dysphagia caseload in different clinical settings can be seen table 1.

Table 1: Background information of the participants (n=31)

Question	SLP Years of experience	Frequency	Percentage of participants
SLP experience (years)	2	4	12.9%
	3-5	12	38.7%
	6-10	7	22.6%
	11-20	4	12.9%
	21+	4	12.9%
SLP experience with adult stroke caseload (years)	2	9	29.0%
	3-5	11	35.5%
	6-10	4	12.9%
	11-20	4	12.9%
	21+	3	9.7%
Dysphagia caseload	2	9	29.0%
	3-5	11	35.5%
	6-10	4	12.9%
	11-20	4	12.9%
	21+	3	9.7%
Adult dysphagia caseload	0-2	9	29.0%
	3-5	11	35.5%
	6-10	5	16.1%
	11-20	4	12.9%
	21+	2	6.5%
Adult stroke caseload proportion	All (100%)	0	--
	Most (75%)	10	32.3%
	Half (50%)	8	25.8%
	Some (25%)	13	41.9%
	None	0	--
Stroke and dysphagia experience as clinician	Novice	0	--
	Advanced beginner	13	41.9%
	Competent	7	22.6%
	Proficient	10	32.3%
	Expert	1	3.2%
Clinical setting	All	1	3.2%
	Inpatient rehab	2	6.5%
	Acute inpatients	2	6.5%
	Community	3	19.4%
	Outpatient clinic	6	19.4%
	Other	17	3.2%

The n=22 (71%) participants reported that they use standard method to check the progress of direct exercises on patients but n=9(22%) do not use. There are numerous factors that were considered important for decision making by SLPs in selection of management exercises. Alertness 16(51.6%), evidence base 14(48.4%), patient insight 15(48.4%), dysphagia severity 14(45.2%) mental status 13(41.9%), cognitive status, communication ability, caregiver support availability 12(38.7%) as essential factors for consideration of direct exercises.

The Biofeedback method is not frequently used by therapists n= 23 (74.2%). The reason indicated by respondents was having insufficient training n= 3 (11.7%) and don't having access n=16 (57.7%) to biofeedback. The therapists who use biofeedback method use surface electromyography (sEMG) as biofeedback n= 6 (37.5%). The distribution of Instrumental dysphagia assessment available to patients and Instrumental dysphagia examination before recommending direct dysphagia exercises can be observed in table 2.

The frequency distribution of responses of research participants for recommending direct rehabilitation exercises for dysphagia showed that most of the SLPs 14(45.2%) recommends direct rehabilitation exercise for dysphagia. (table 3)

The Frequency distribution of management techniques such as lip range of movement, lip strength/resistance, tongue range of movement, tongue strength/resistance, thermotactile stimulation, massako/tongue hold, Mendelson manoeuvre, Falsetto voicing, shaker/head raise, effortful swallow, electrical stimulation and supervised swallow trials can be seen Figure 3.

Table 2: Assessment procedures preferred by SLPs (n=31)

Question	Response	Frequency	Percentage of Participants
Instrumental dysphagia assessment available to patients	Video fluoroscopy	5	16.1%
	FEES	4	12.9%
	sEMG	1	3.2%
	Other	7	22.5%
	None	14	45.2%
Instrumental dysphagia examination before recommending direct dysphagia exercises	Never	7	22.6%
	Rarely	13	41.9%
	Half the time	4	12.9%
	Usually	6	19.4%
	Always	1	3.2%

Table 3: Management Procedures Preferred by SLPs (n=31)

Question	Responses	Frequency	Percentage of respondents
Recommend direct rehabilitation Exercises for dysphagia	All (100%)	--	--
	Most (75%)	14	45.2%
	Half (50%)	6	19.4%
	Some (25%)	11	35.5%
	None	-	--

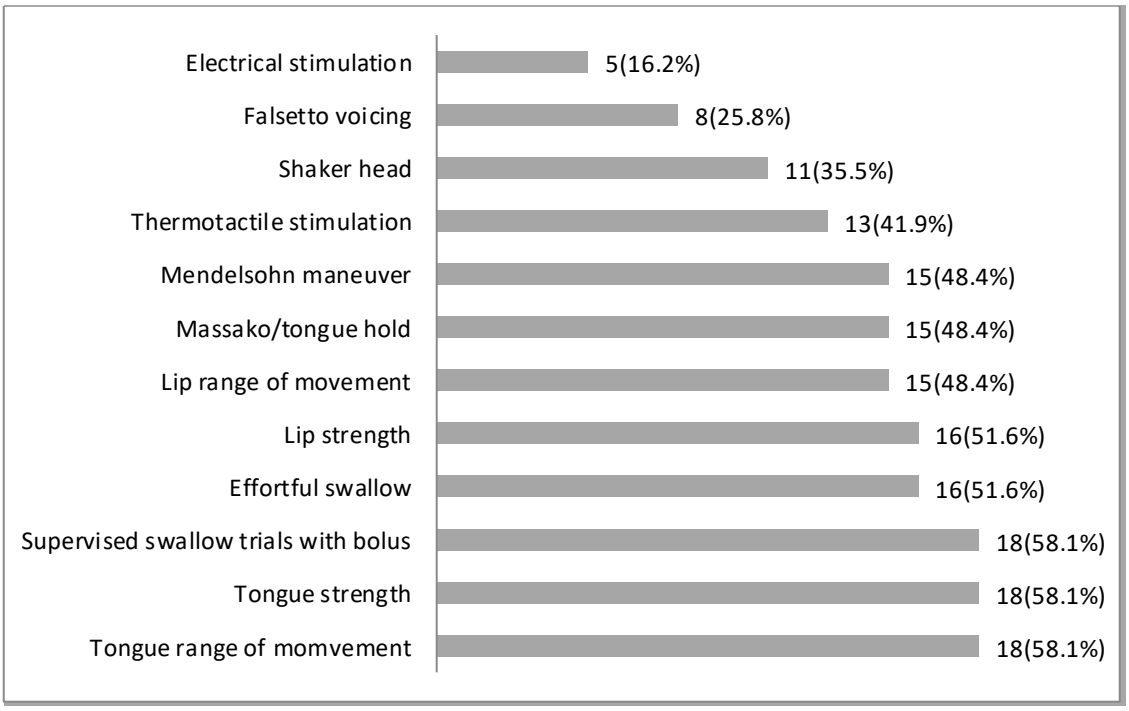

Figure 1: Frequency distribution of management techniques preferred by SLPs

DISCUSSION

This research was based on survey on assessment and management practices of dysphagia after stroke among SLPs of Pakistan. The results showed that SLPs never/rarely n=20 (64.5%) conduct instrumental assessment before recommendation of direct exercises despite of the accessibility n=16 (54.7%) to instrumental assessment tools.

In a survey conducted on SLPs assessing approaches to direct dysphagia therapy, with stroke patients in UK and Ireland. The outcome shows variation in responses which indicates discrepancies between reported approaches and recommendations from existing evidence and

clinical guidelines. In present study professional preferences of SLPs for both assessment and management of dysphagia after stroke were determined[4].

Evidence suggests that VFS (video fluoroscopy) is used before recommendation of exercises it can be effective in determination of management technique for client's dietary modification and supporting factors however FEES seems to be slightly more effective in detection of penetration, detection of residues and aspiration. The effortful swallow manoeuvre along with biofeedback can be used as rehabilitative practice among Parkinson's disease patients with oropharyngeal dysphagia[14]. In present research SLP from Karachi also suggested to use this manoeuvre along with biofeedback for better results. According to demographic information of participants from present research Video fluoroscopy is available in Islamabad, Rawalpindi and Karachi, FEES in Karachi and Islamabad, sEMG is available in Lahore and Karachi. In a research done in Punjab regarding dysphagia assessment practices among SLPs, VFS is used rarely (4.9%) whereas clinical swallowing examination is done most (70%) of the time for evaluation of dysphagia. The sEMG considered as a revolutionary method in field of dysphagia management as it gives feedback to patients, shortens therapy duration and helps in speech recovery[15]. According to present study information extracted from participants' years of experience, it is found that VFS, FEES, biofeedback, sEMG is used by SLPs with minimum to maximum years of experience. However, SLPs with more experience reported using auscultation as assessment method along with VFS and FEES.

There is a varied number of exercise and form of exercise observed in this study, outcome measure varied across the therapy program same as a previously done research in which study interventions included Shaker/head lift (n=13), tongue exercise (n=16), combination exercise programs (n=20), respiratory muscle strength training (n=6), lip muscle training (n=5), mandibular movement exercises (n=7). The frequency of exercise varied with type of exercise. The duration of therapy also varied and was recommended one week to a year range. The range was 1 to 120 reps/day in articles where repetitions were reported (n=66)[16]. In present study, lip range of movement, lip resistance, tongue range of movement and effortful swallow are practiced frequently.

While some trends emerged regarding dysphagia practice patterns among SLPs managing patients with dementia (PWD) in the United States, there is lack of agreement in terms of development of a generalized protocol for assessment and management of dysphagia[17]. This variability is observed in present study as well.

The effortful swallow (ES) is a physiologically beneficial practice, which help increases muscle activity during the process of swallowing. sEMG biofeedback increases the performance of patient during swallowing and is appreciated by patients[18]. In present study four respondents reported that they make use of sEMG as biofeedback and among those four one of therapist use sEMG along with effortful swallow. This shows that if a combination of exercises is used along with biofeedback better results can be achieved.

There is a high need to develop a standardized and effective internationally applicable protocol for evaluation, assessment and management of dysphagia.[19] An increased swallow effort ratio can positively affect intervention of swallow as intensity influences exercise outcomes if used along with a combination of exercises[20]. In Pakistan professionals who use sEMG as biofeedback responded that the time period of treatment plan shortens when biofeedback method is used, as it gives patient a visual feedback which helps condition to improve rapidly.

When a proper management program is followed; early intervention, dietary modification, and active therapeutic approaches can lead to patient's rapid improvement[21]. In present study SLPs reported that they use rating scales to check patient's progress with direct exercise depending on condition of patient.

The resistance exercises are found to be effective in patients with tongue weakness due to stroke; tongue pressure resistance is effective in reducing thin liquid vallecular residue[22]. According to present study these exercises are practiced in Pakistan as well, tongue range of movement and tongue resistance is recommended to patients. The principle outcome measures considered mostly in

result of direct exercise are oral control, reduced aspiration, reduced tube dependency and respiratory status.

The effect of an easy-to-perform and device-free home-based oro-lingual exercise (OLE) program on swallowing and breathing coordination in patients with early-stage Parkinson's disease, a non-invasive assessment tool was used. This program serves as home-practice program helpful in improvement of coordination between swallowing and respiration[23]. The practice at home brings changes more quickly as compare to clinical settings only, as it is practiced in Pakistan as well, where SLPs recommend patients to exercise daily, 2-6 times a day 1-5 sets each.

This study had shortcomings which need to be addressed; as the research was only confined to four cities. The sample size was not equally distributed across the cities which showed variability on the basis of practice. The study lacked the identification of form of dysphagia, which needs to be probed in future.

CONCLUSION

Hence, it is concluded that instrumental assessment before recommendation of direct exercise is usually practiced neither in other countries nor in Pakistan. Direct exercises lip range of movement, lip strength and effortful swallow are commonly suggested to patients, biofeedback methods need to be practiced more, which needs trainings all over Pakistan. It also highlights lack of availability of instrumental assessment and management facilities in terms of training and administration of such tools. This research further recommends exploring the reasons of administering certain rating scales.

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RESEARCH ARTICLE

EFFICACY OF DIGITAL MANIPULATION OF THYROID CARTILAGE, FLUENCY SHAPING THERAPY AND COMBINATION OF BOTH IN TREATMENT OF STUTTERING SEVERITY: A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: The stuttering is manifested by disruption in normal speech flow and fluency that also disturbs social and emotional wellbeing. There is immediate need of rehabilitation for the improvement of fluency and reduce the severity of stuttering. **Objective:** To compare the digital manipulation of thyroid cartilage (DMTC), fluency shaping therapy (FST) and combination of DMTC and FST for improving severity in stuttering patients. **Material and Method**: A randomized clinical trial was conducted at National Institute of Rehabilitation Medicine. The patients were enrolled through non-probability, convenient sampling technique. The participants were randomly allocated into three equal groups (n=10): DMTC group, FST group and combination of both. The Scale of Rating Severity of Stuttering (SRSS) was used to assess the severity level at baseline, 2nd week, 4th week, 8th week and 12th week of intervention. **Results:** The mean age of DMTC, FST and combination group was, 22.25 ±3.33 years, 21.65±3.36 and 21.35±3.76 years respectively. Friedman with post hoc test revealed significant improvement ($p<0.05$) in all groups but combination group had showed better outcome than single DMTC and FST intervention. A Kruskal-Wallis H test showed that there was no significant difference ($p\geq0.05$) among DMTC, FST and Combination group from baseline to 8th weeks of training, but significant difference {$X^2(2) = 5.897$, $p<0.014$} was observed after 12th week of training among the groups. The post hoc test showed that the combination group was more significantly improved as compared to DMTC group {MR=9.10 ver. MR=17.71, $p=0.012$} but not significant difference between difference between combination and FST group ($p=0.317$) as well as DMTC and FST group ($p=0.619$) regarding severity of stuttering. **Conclusion**: It is concluded that combination of digital manipulation of thyroid cartilage and fluency shaping therapy were more beneficial for improving fluency in stuttering patients.

Key words: Digital manipulation therapy, fluency shaping therapy, stammering, stuttering.

INTRODUCTION

Fluent speech is defined as the ability to talk with continuity, at sustained rate and without effort. However, stuttering is manifested by disruption in normal speech flow and fluency that also disturbs social and emotional wellbeing. The pathophysiology and etiology of the stuttering is still poorly defined. It is assumed that the speech characteristics of stuttering is the result of atypical mechanism of brain occurred due to genetics and environmental variables[1]. It usually presents with repetitions, speech block and prolongation of sounds and syllables. The stuttering affects approximately 5% of all children and typically presents between 3-6 years of age and it recovers in early years of life. Stuttering persists after puberty in 1% of general population. It is more prevalent in males as compared to females; with a male to female ratio is 4:1[2].

Stuttering affects many aspects of daily life activity. Many people express their thoughts, beliefs and ideas through verbal communication. When speaking is a challenge, even the ability to introduce one also becomes difficult. Many stutterers feel embarrassment, anger, frustration and sometimes feel ashamed due to their stuttering[3]. The stammerer adopted secondary behaviours that include escape and avoidance behaviour: substitution of words, starters, postponements, anti-expectancy, and circumlocution[4]. In escape behaviour, blinking of eyes, shaking movements of head and jaws are used as techniques to reduce the severity of stuttering[5,6]. While, in avoidance behaviours patient inhibit stuttering through substitutions, postponements as moving hand to say a word[6].

The treatment of stuttering is still a challenge for speech-language pathologist[7]. There are different treatment approaches have been used such as pharmacological, fluency shaping therapy and digital manipulation technique. Fluency shaping therapy consists of retraining of speech components such as stress-free onset, soft

articulatory interaction, prolonged speech and continuous phonation[8]. Fluency shaping improves the fluency by altering prosody of speech such as tempo and rhythm, breathing techniques and easy onset of speech[9]. Digital manipulation and compression of larynx where light pressure is applied on the thyroid cartilage downward with a finger to hold the larynx down and prevent it from moving upward during phonation[10].

There is immediate need of rehabilitation for the improvement of fluency and reduce the severity of stuttering. Therefore this study was conducted to find the best treatment option for stuttering. Many studies have been conducted to determine the effectiveness of fluency shaping therapy (FST) and very less literature was found on effectiveness of digital manipulation of thyroid (DMTC) cartilage. However, in this study effectiveness of FST and DMTC was evaluated along with the combination of FST and DMTC in adults.

METHODOLOGY

A single blinded, randomized clinical trial was conducted at National Institute of Rehabilitation Medicine (NIRM) Islamabad, Pakistan. The study was initiated was after taking approval from authorities. The informed consent was developed according to Declaration of Helsinki and was taken from all study participants. The inclusion criteria was males aged between 18-30 years, and had developmental stuttering disorder measured on Stuttering Severity Rating scale, and the exclusion criteria included patients having language disorder, neurological stuttering and cluttering, hearing impairment, cognitive insufficiency, and who had unwillingness to participate in the study

The participants were recruited through non-probability convenient sampling technique and randomization was done through toss and coin method. It was single-blinded study; patients were kept blind to the other given treatments.

A total n=33 subjects were evaluated for participation in study. Of which n=30 patients fulfilled the inclusion criteria and were recruited. The participants were randomly and equally divided (n=10 in each group) into Digital Manipulation of Thyroid Cartilage (DMTC) group, Fluency Shaping Therapy group (FST) and combination of DMTC and FST. The n=3 patients of DMTC group and n=2 patients from FST group could not continue the treatment sessions due to some personal issues. (Figure 1)

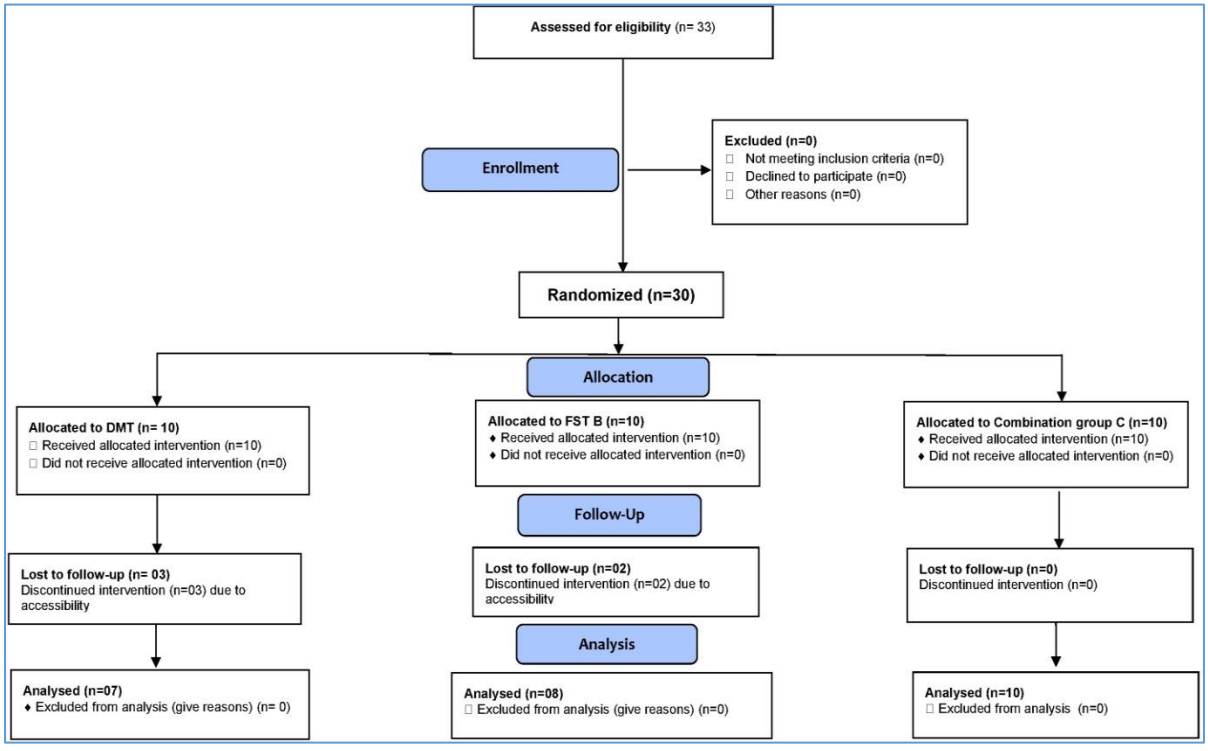

Figure 1: CONSORT diagram

In digital manipulation of thyroid cartilage technique, thyroid cartilage is given gentle pressure downward with a finger in order to hold the larynx down so that it does not go up while phonation. FST group included speech techniques such as prolongation of sounds, easy onset, and continuous phonation, in three speaking situations (speaking with therapist, reading aloud, and free conversation). A total of 24 sessions were given to each patient, the first 15 sessions were provided by the speech therapist while the remaining 9 sessions were self-administered i.e. patient performed on their own. The detailed description of the DMTC and FST treatment protocol is presented in Table 1.

Table 1: Intervention protocol DMTC, FST & combination therapy group

Digital Manipulation of Thyroid Cartilage (DMTC)	Total sessions	24
	Length of a session	15 - 20minutes
	Frequency of sessions	Twice a week
	Number of sets	4/vowel
	Repetition of vowel per set	5
	Total repetitions in each session	60
	Vowel prolongation	5 to 8 second
	Rest between repetitions	5 second
	Rest between sets	10 second
	Overview of session	5 minutes
Fluency Shaping Therapy (FST)	Total sessions	24
	Length of each session	30 minutes
	Frequency of sessions	Twice in week
	Reading Task	80 short sentences
	Free conversation on any topic	5 minutes
	Talking to Therapist with specific method	5 minutes
	Overview of session	5 minutes
Combination Therapy Group (DMT+FST)	Same treatment protocol as DMTC and FST	45 Minutes

The data was collected at baseline, during, and after the intervention. The general demographics questionnaire including age, gender, and family history, number of sibling, family structure, socioeconomic level, and onset of stuttering was obtained at baseline. Scale for Rating Severity of Stuttering (SRSS) is a reliable and valid tool to measure speech- related severity of stuttering. It has a score range from 0 to 7, 0 score means absence of stuttering and 7 means very severe stuttering. [11]

The study has both aspects of within group and between group comparisons. The intervention period for each patient was three months and data was collected at baseline, after 2^{th}, 4^{th}, 8^{th}, and 12^{th} weeks. The Shapiro–Wilk test for normality was applied that showed that data was not normally distributed so non-parametric test was applied. For within the group comparison, Friedman Test with Wilcoxon Signed-Rank Test for post hoc analysis was used. The Kruskal-Wallis H test with post hoc analysis was used for groups' comparison. The results of study were presented as frequency, percentages, mean±SD, mean rank, Z-score, median (IQR), and p-values. The level of significance was set at $p<0.05$. The data was analyzed through SPSS version 21.

RESULTS

The mean age of DMTC, FST and combination group was, 22.25 ±3.33 years, 21.65±3.36 and 21.35±3.76 years respectively. The mean birth order in DMTC group was 2.80±1.67, FST group was 3.80±2.16 and combination group was 3.25± 1.99.63.33%. Patients experienced onset of stuttering between the ages of 2 to 4 years in DMTC (23.33%), FST (15.00%) and combination group (25.00%) whereas remaining started stuttering between the ages of 5 to 7 years in DMTC (10%), FST (18.33%) and combination groups (8.33%).

In DMTC group severity of stuttering along with its individual items including frequency, duration and secondary symptoms reduced significantly throughout the treatment duration $\{X^2(4) = 21.524,$

(p<0.001)}. The post hoc tests revealed significant improvement from 2nd- 4th week (p= 0.01) but there was no significant improvement (p≥0.05) from 4th to 12th week of training. The results also showed that severity of stuttering score was reduced significantly throughout the intervention, from 0-12 weeks (p<0.001). There was an overall statistically significant improvement {$X^2(4)$ =28.00, (p<0.001)} from baseline to 12wks of rehabilitation in FST group. The post hoc test showed significant improvement from 2nd week to 4th week, but onward no significant improvement observed (p≥0.05).The combination group also showed that severity of stuttering was reduced significantly throughout the treatment duration {$X^2(4)$=35.558, p<0.001)}. The post hoc tests showed significant improvement from 2nd week to 4th week (p=0.01) and from 8th week to 12th week (p=0.002) of training. (Table 2)

Table 2: With-in group changes (DMTC, FST and Combination group)

	DMTC Group (n=7)				FST Group (n=8)				DMT + FST (n=10)			
	Median (IQR)	MR	Z-Score	p-value	Median (IQR)	MR	Z-Score	p-value	Median (IQR)	MR	Z-Score	p-value
0 week	5(2)	5.50	0.000	1.00[a]	5(2)	4.50	-2.236	0.25[a]	5(1)	5.50	-2.828	0.05[a]
2nd week	4 (2)	5.50	-3.464	0.01*	4(2)	4.50	-3.051	0.02*[b]	4(1)	4.50	-3.357	0.01*[b]
4th week	4 (1)	4.0	-1.00	.317[c]	4 (1)	4.50	-2.82	0.05[c]	4(1)	5.50	-1.633	1.02[c]
8th week	4(1)	4.0	-.000	1.00[d]	4(1.25)	4.50	1.732	0.83[d]	4(1)	5.50	-3.162	0.002**[d]
12th week	4(1)	4.0	-	0.00***[e]	3(1.25)	4.50	-	0.00***[e]	3(1)	5.50	-	0.00***[e]

[a]0 week ver. week 2nd, [b]week 2nd ver. 4th week ,[c]4th week ver. week 8th, [d]8th week ver. 12th week
Significance level: p<0.05, p<0.01**, p<0.001****

A Kruskal-Wallis H test showed that there was no significant difference (p≥0.05) among DMTC, FST and Combination group from baseline to 8th weeks of training, but significant difference {$X^2(2)$ =5.897, p<0.014} was observed after 12th week of training among the groups. The post hoc test showed that the combination group was more significantly improved as compared to DMTC group {MR=9.10 ver. MR=17.71, p=0.012} but not significant difference between difference between combination and FST group {MR=9.10 ver. MR=11, p=0.317} as well as DMTC and FST group {MR=11 ver. MR=17.71, p=619} regarding severity of stuttering. (Table 3)

Table 3: Comparison among groups (DMTC, FST & combination therapy)

	DMT (n=7)		FST (n=8)		DMT + FST (n=10)		$X^2(2)$	p-value
	Median(IQR)	MR	Median(IQR)	MR	Median(IQR)	MR		
0 week	5(2)	18.25	5(2)	12.69	5(1)	15.80	2.984	0.225
2nd week	4 (2)	18.00	4(2)	12.88	4(1)	12.30	3.429	0.180
4th week	4 (1)	13.71	4 (1)	13.38	4(1)	12.20	.259	0.879
8th week	4(1)	17.29	4(1.25)	11.00	4(1)	11.60	4.504	0.105
12th week	4(1)	17.71	3(1.25)	11.00	3(1)	9.10	5.897	0.014*

Significance level: p<0.05, p<0.01**, p<0.001****

DISCUSSION

The findings of the current study showed that the DMTC, FST and combination group significantly improved stuttering symptoms. Combination group proved to be more effective, as compared to DMTC and FST alone, in improving fluency and reducing severity of stuttering. Current study showed significant improvement in severity of stuttering in DMTC group which is in coherence with the previous (including core behaviours and secondary behaviours such as the percentage of word stuttered, duration of dis-fluency, and associated movements of body throughout the treatment) case study conducted in Pakistan. In a case study DMTC was established to investigate the effectiveness of an adult stutterer. A 21-year-old male was treated with digital manipulation of

larynx twice per week and after 12 sessions of treatment, patient showed improvement and the severity of stuttering was reduced measured on SRSS. The results concluded that DMTC was an effective technique to decrease in the severity of stuttering and improve in laryngeal movement[12]. The improvement noted after DMTC is laryngeal manual therapy that lowered straight up movement of the larynx in the vocal tract which improves quality of voice, and decrease distress of vocal region. Also, the rate of recurrence and severity of vocal region distress was significantly reduced[13].

Current study also indicated that FST group was effective for reducing severity of stuttering. The efficacy of FST in enhancing fluency and decreasing stuttering has also been supported by literature. However, the researcher has suggested that the further studies may be conducted to establish clarity about its usefulness[14]. A Previous study carried out in Egypt to explore whether the fluency shaping therapy was effective or not. The results indicated a remarkable decline in stuttering and rise in fluency of the patient. The result also established the fact that the fluency shaping therapy was instrumental in curing stuttering[1]. The FST improves bad feelings, obstructive attitudes or stuttering related nervousness in stuttering patients[15,16].

In a recent study, both DMTC and FST techniques were used in combination and more significant improvement was found in the management of stuttering in adults. Combination of DMTC, FST is novel treatment option for reducing the severity of stuttering. No study is available for the effectiveness of combination of both for the management of stuttering. However, it is evident from literature that FST in combination with other treatment option is proved to be more beneficial[17]. Findings of current study are fairly reliable with previous studies in literature which report that the digital manipulation of thyroid cartilage and fluency shaping therapy are effective techniques to reduce the severity of stuttering[18,19]. Therefore, suggested that DMTC and FST would reduce the severity of stuttering, however the combination of both would remarkably reduce the severity of stuttering than single alone.

It was a single centred study and sample size was not large enough of generalize the data due to loss of follow ups. The study was single blinded, assessing and treating therapist were same, which may bias the results.

CONCLUSION

It is concluded on the basis of result that combination of digital manipulation of thyroid cartilage and fluency shaping therapy was better than digital manipulation of thyroid cartilage or fluency shaping therapy alone. Different treatment options and their combination should be administered in future studies while considering the confounding factors.

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