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RASCON: Future of Rehabilitation and Allied Health Sciences in Pakistan

Kamran Shoukat

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Editorial

Healthcare is a crucial aspect in our society. With the improvement in technology and education, more people are opting for this profession. In recent decades, rehabilitation, allied health sciences and emerging fields in biological sciences have received considerable attention at both international and national platforms. The Superior University has the largest and highly qualified faculty in the key disciplines of Rehabilitation & Allied Health Sciences. In Current Senior, Faculty of Allied Health has Organized RASCON, the first ever international conference, on 9th-11th December 2022 under the theme “Interdisciplinary approaches to create socio-economic impact through research, innovation and commercialization for healthcare professionals and scientists.” The conference has attributed to augmentation and expansion of research, education and commercialization in these domains. The main objective of this conference is to bring together the health care professionals, Allied Health care professionals, Rehabilitation specialists, Physical Therapists, Speech Language Pathologists, Clinical Psychologists, Clinical Nutritionists, Occupational Therapists, Leading scientists, Researchers, Educationists and allied health care professionals to exchange interdisciplinary approaches to contribute to socio-economic impact to achieve SDGs.

It has been planned to provide an intercontinental platform for the sharing of scientific knowledge and hands on training sessions. Similar to other conferences, while the major audience included researchers around the globe, it specifically provided a research knowledge sharing venture for the students, which are going to be our future researchers. In this regard, various workshops (26) were conducted on 9th December in collaboration with different hospitals and industries. The main objective of these workshops was to provide hands on training and facilitate students to grab emerging technologies relating to their respective fields. On 10 and 11 December, around 17 International and 56 National keynote speakers attended the conference to present their latest research in their specialized fields. . Our global speakers included professors from USA, Canada, Malaysia, UK, Iran, China, Germany, Sri Lanka, Australia, Russia, Sweden, Turkey, Thailand and South Korea. Furthermore, participants of this conference also presented scientific posters highlighting the outcomes of their recent projects. Additionally, several talk sessions were also conducted to answer the queries of the students and other participants. This conference was successfully held with the collaboration of

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National/Multinational industries including food industries, academic institutes and healthcare sectors.

The prime knowledge products of RASCON 22 were: research articles, patents, books, research protocols, manuals, policies, advanced technologies in therapeutics, outreach and assessment resources, blogs on socio-economic impacts of research, and finally the entrepreneurial implications of research. Of all the planned undertakings, the greatest impact was seen in societal projects, followed by manuals, advanced therapeutic technologies, blogs, policies and protocols, in ascending order. The manuals provided information and necessary steps for improvements in physiotherapy and rehabilitation. Some key protocols included posture control, communication and swallowing management along with a stepwise diagnosis protocol for dyslexia – a learning disability that has affected more than 700 million people worldwide and 12 million children in Pakistan alone. Correspondingly, the advanced therapeutic technologies included robotic rehabilitation options in the fields of orthotics, cochlear implantation and prosthetics. Major policies focused on the investment and management so as to build a high-quality workforces and services for improving rehabilitation combined with a feedback system via data collection for continual improvement. All of these would ultimately have a strong societal impact in the form of community-based rehabilitation culminating in the better quality of life.

Overall it was a fantastic conference, we are grateful to have of thoughtful and effective organization.” The level of expertise and knowledge of the presenters are excellent. In addition, I appreciate their positive attitudes, willingness to explain concepts, clarity of visual aids and handouts, and opportunities to ask questions.

The insights I have gained from this one conference far exceed any other conference I have attended to date. Wonderful, insightful, well presented! Excellent sessions, challenging and thought-provoking.

I am always impressed with the commitment and efficiency of those who plan this conference.” “I really enjoyed my time at the conference. I am looking forward to next year's conference.”

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Comparison of Mirror Therapy and Motor Relearning Program in improving the lower limb motor function of patients with stroke

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Original Research Article

ABSTRACT

Objective: The purpose of this research is to contrast the effects of mirror therapy & motor learning programs in ameliorating the function of the lower limb in patients with stroke.

Methods: The research was conducted in R.Y.K (Rahim Yar Khan) at Al-Jannat Medicare & Al-Noor hospital. The time duration was January-July 2020. The technique used was RCT. The data was collected after ethical approval from Isra University. The sample consisted of 30 subjects with an age range of 40 to 65 years. Group A received MRP treatment while mirror therapy was given to Group B. Modified Fugl Meyer Assessment scale was used to measure the outcomes of variables. SPSS 20 was applied to assess the research facts. Non-parametric Friedman T-Test was applied for intra-group comparison whereas inter-group comparison was checked by the Kruskal Wallis test. Three assessments were performed, pre-assessment at 0 weeks, mid-assessment at 3rd week, and post-assessment at 6th week.

Results: Out of the total 30 participants in the study, males were 21 while females were 9. Patients with left hemiplegia were 22 while 8 were with right hemiplegia. The mean age was 53.80±7.66. The results show that both treatments are effective in increasing the motor activity of patients with stroke. But motor relearning techniques are more effective as a significant difference manifested between the two treatments. ($p < .005$)

Conclusion: This conclusion showed that a motor relearning program is more beneficial than mirror therapy in enhancing the lower limb motor activity of patients with stroke.

Keywords: Motor control, Mirror Therapy, Motor, relearning, Stroke

Introduction:

A stroke is defined as the sudden death of some of the cells of the brain because of a deficiency of O₂ when an artery providing nutrition to the brain is blocked/ruptured¹. Hemorrhagic & Ischemic are the two major types of stroke. Ischemic type is associated with blockage of an artery while hemorrhagic stroke is associated with rupture of an artery². Generally, 80% of stroke cases are due to an ischemic stroke while 20% of cases result from hemorrhagic stroke³. Signs & symptoms related to stroke include unilateral paresis & speech problems⁴. The risk factors linked with stroke can be categorized into two groups such as modifiable & non-modifiable. The modifiable group includes hypertension, unhealthy diet, sedentary lifestyle, obesity & smoking while the non-modifiable group includes gender, age & ethnicity⁵. Globally, CVA is the third leading source of dysfunction & the 2nd leading source of death⁶. In Pakistan, the rate of occurrence of stroke is higher than in other developing countries⁷. In 2013 the number of incidents and prevalence of stroke was significantly higher as compared to 1990 for women & men⁸. In Bangladesh, the incidence of stroke was higher the male & elderly individuals. Patients with

hypertension or diabetes are at greater risk of having a stroke⁹. Different therapeutic interventions are used for the treatment of stroke such as Mirror Therapy, Motor Relearning Program, Constrained Induced Movement Therapy, and Proprioceptive Neuromuscular Facilitation¹⁰. Initially, Mirror therapy was used to decrease the phantom limb's pain after amputation. The mirror image of the sound limb gave the sensation to move both arms. Ramachandran explained the process of relearning in an unlearned brain¹¹. The motor relearning techniques were introduced by Australian physios; Janet Carr and Roberta Shepherd. The motor relearning technique comprises 4 steps the scanning of function, execution of lost components, & sustained implementation and transference of training. It's a goal-oriented technique that enhances function and concentrates on relearning activities¹². The Fugl-Meyer scale was structured as the primary quantitative instrument for the evaluation of sensory and motor recovery in stroke. Fugl Meyer is a convenient perfectly invented & constructive clinical scale used widely in stroke patients. Fugl Meyer's motor domain has 100 points. It has excellent inter-rater intra-rater and constructs validity¹³. There is a demand to integrate patient-directed, simple, easy, and productive treatment

approaches that improve function after CVA. Literature shows few studies which compare the effect of MRP & mirror therapy in patients with stroke. Moreover, those researches are only about the upper limb. Therefore, this peculiar research will contribute to stroke rehabilitation. This study aims to contrast the efficacy of motor learning & mirror therapy programs in ameliorating the mobility of the lower limb of patients with CVA.

Methods:

The study was conducted in R.Y.K (Rahim Yar Khan) at Al-Jannat Medicare & Al-Noor hospital. The time duration was January-July2020. The technique used was a randomized controlled trial. The data was collected after ethical approval from Isra University. The sample consisted of 30 subjects in the age range of 40 to 65 years; both males and females with ischemic and hemorrhagic strokes were incorporated in the study. The subjects excluded were those with Mini-Mental State Examination and any musculoskeletal disorder. Computerized randomization was done at an external place through concealed allocation manner. A total of 5 sessions in a week with a duration of 40 minutes for six weeks were included in the treatment protocol. In this study, the group receiving MRP treatment was Group A, in which manipulation, reaching and different task-specific exercises were included. For lower limb flexion/extension in side lying, abduction/adduction in supine lying of the hip joint. Flexion/extension in (knee joint). Dorsi-Plantar flexion of the ankle joint. Functional mobility exercises include mobility on the bed, side-to-side movement on both affected & unaffected sides, lying on back to a sitting position, and forward-backward steeping. Initially, simple tasks were performed with fewer repetitions with a gradual increase in task complexity & repetitions.

The group receiving mirror therapy was Group B. In this group, activities were performed with the non-affected limbs in front of the mirror. The size of the mirror was 20*25. The guidelines (verbal or visual) regarding the task were given. The mirror was centrally placed. The sound limb was placed the same as the paretic one. Then, participants were commanded to see the mirror for 2 minutes. Motor exercises (unilateral) were performed with the non-paretic limbs. The evaluation of all the patients was done at pre-assessment, mid-assessment & post-assessment. . Pre-assessment was performed at 0-week, mid-assessment at 3rd week, and post-assessment at 6th week.

A Modified Fugl Meyer Assessment scale was used to measure the outcomes. SPSS 20 was applied to assess the research facts. Friedman Test was applied for intragroup comparison while inter-group comparison was checked by the Kruskal Wallis test.

Results:

30 participants were in the research, males 21(70%) while females 9(30%). Patients with left hemiplegia were 22(73.33%), while 8 (26.66%) were with right hemiplegia. The mean age was 53.80±7.66(Table # 1).

Table-I Shows the Gender and affected side of patients

Demographics	Group A %age	Group B %age	Total with %
Male	11(73.3 %)	10(66.7 %)	70%
Female	4(26.7)	5(33.3)	30%
Left Hemiplegic	10(66.7 %)	12(80%)	73.33 %
Right	5(33.3%)	3(20%)	26.66

Hemiplegic)	%
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The results presented remarkable differences in mobility in patients with stroke from baseline to after assessment in groups (p< .005). Group A showed the pre-assessment median (IQR)=7(3), mid-assessment median=17(5), and post-assessment median 24(9). Group B showed pre-assessment median 7(3), mid-assessment median=11(7), and post-assessment median 20(2). (Table # 2).

Table-II Within-group Contrast of Fugl Meyer Scale. Friedman test is used.

	PRE	MID	POST	P - value
	Median(IQR)	Median(IQR)	Median(IQR)	
Group A	7(3)	17(5)	24(9)	.000
Group B	7(3)	11(7)	20(2)	.000

Between-group, the comparison showed that the motor relearning program is more effective in comparison to mirror therapy in terms of lower limb motor function. A significant difference was found between the two treatments. (Table # 3).

Table-III Between Group contrast of Fugl Meyer scale. Karuskal –Wallis test is used.

	Group A	Group B	P- value
	Median(IQR)	Median(IQR)	
PRE	7(3)	7(3)	.610
MID	17(5)	11(7)	.002
POS T	24(9)	20(2)	.012

Discussion:

The purpose of the research was to contrast the results of the Motor relearning program & Mirror therapy in stroke patients. These two interventions were analyzed in thirty stroke patients for six weeks. In the trial, the mean age of participating candidates was 53.80±7.66. CVA is a root cause of critical prolonged dysfunction. Motor relearning program and mirror therapy both treatments improved lower limb mobility in patients with stroke but the motor relearning techniques proved to be more efficient as compared to mirror therapy. The results of this trial are assisted by another research that was carried out in India in 2013. The objective of the research was to compare the clinical outcomes of the bobath approach with a motor learning program in the recovery of motor function of patients suffering from a stroke. The conclusion of that research revealed that a motor relearning program facilitates motor recovery after stroke compared to other treatments¹⁴. Our study states that mirror therapy is effective in enhancing the lower limb mobility of participants with stroke. This is also reinforced by another research that was carried out by Arya KN and co-workers in 2019. They concluded that Mirror therapy significantly improves functional mobility of the lower limb after stroke¹⁵. Another study related to this research was carried out by Sütbeyaz S and co-workers in 2007. The results of the research manifested that Mirror therapy facilitates motor recovery of the lower limb¹⁶. Similarly, the current study is also supported by

another study that was conducted in 2015. According to the results of their study Mirror therapy enhances motor recovery in stroke patients¹⁷. This study is also strongly supported by another study that was carried out in 2018. It was review research & 9 studies were included in that research. The results of their research showed that Mirror therapy improves functional mobility after stroke¹⁸. Another study that was closely related to our study was conducted in 2017 in UAE. The purpose of the research was to explore & contrast the clinical outcomes of motor relearning program & PNF (Proprioceptive neuromuscular facilitation). They concluded that the motor relearning program was more efficient in enhancing motor function after stroke¹⁹. Another research that was carried out in 2020 in India analyzed the effects of conventional training & motor relearning programs on motor recovery of patients suffering from a stroke. Results of the research manifested that the motor relearning program was highly significant in enhancing motor function as compared to conventional training in stroke patients²⁰.

Conclusion:

This study concluded that both motor learning & mirror therapy programs are effective in ameliorating the motor function of the lower limb in patients suffering from a stroke. But a motor relearning program is more effective than mirror therapy.

Disclaimer of the study: None

Conflict of Interest: None

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Comparison of Satisfaction Level with Physiotherapy Care between Male and Female Patients of Sialkot

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ABSTRACT

Background: Patient satisfaction become a major component in evaluating the different concerns of patients which are not only related to patients health but also co-relate with the quality of the organization. It seems that satisfaction in physical therapy is also concerned with gender in many healthcare corporations.

Objective: To compare female and male patients satisfaction with physiotherapy care.

Methods: This comparative cross-sectional study was conducted from February to August 2022 at different public and private hospitals in Sialkot, Pakistan. Non-probability simple convenient sampling technique was used and data was collected taking informed consent. The Med Risk was used as a data collection tool for patient satisfaction which was based on a 12-item questionnaire and data was analyzed by using SPSS 16. The mean and standard deviation and independent-t test was used for the comparison of physiotherapy care between male and female patients. P-value \leq .05 was taken as statistically significant.

Results: Out of 260 patients, 95(36.54%) were male and 165(63.46%) were female. The total mean score 47.78 ± 13.75 of patient satisfaction between male and female which determines significantly a higher level of satisfaction. While the satisfaction level of male patients mean score was 48.77 ± 5.22 and females was 45.98 ± 5.58 . The factors which showed a significant difference between male and female patient satisfaction were waiting area, therapist did not spend enough time, therapist treats me respectfully, and therapist answers all my questions and returns to this office for future services with a p-value of .00.

Conclusion: The results of our study showed an overall higher level of satisfaction but males were more satisfied in some factors as compared to females.

Key Words: Female, Male, Musculoskeletal, Neuromuscular, Patient Satisfaction, Physiotherapy, Hospitals.



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Original Research Article

Introduction:

The medical-care sectors are statistically the most remarkable units in a country because they have medical, political, social, moral, business, and economical significances and outcomes that affect other areas¹. Physical therapy is a branch of rehabilitation sciences that plays a vital role in maintaining health and to control disabilities such as musculoskeletal and neuromuscular disabilities. It involves patients having direct or indirect access to therapy for the treatment of these injuries or disabilities; each therapy session is based on proper examination, evaluation and systemic review². In order to be considered satisfactory, a service must provide sufficient components of treatment to the patients. Satisfaction is the declaration of an attitude, which is an emotive response to the therapist, type of treatment and organization. Thus, satisfaction is described as a positive assessment of an individual's perception of many aspects of the service and is created on the basis of customer's expectation³. While, expectations of the patients can be indicated by some mandatory components such

as communication, past experience, healthcare givers status, mass media and some other adjoining factors.² Patient satisfaction is influenced by a wide range of variables; however, we may categorize them into two broad groups which are major and minor factors. In major factors which affect patient satisfaction are waiting time, time spent with doctor, interpersonal communication, treatment outcome and services provided which are related to hospital. Minor factors which are usually non-modifiable include age, gender, educational status and health because patient satisfaction also variates according to gender, age, level of education and health status, but outcomes of these studies are conflicting^{4,5}.

Patients who are male and those whose age are older than 50, short spanned and fined health condition and education status at the primary level indicates a higher level of satisfaction⁶. However, it also seems that gender, age, education level and health status had not any significant effect on overall satisfaction⁸. Actually, these factors like age and gender are non-modifiable and are inappropriate conditions which are

difficult for health care managers to improve them for the enhancement of satisfaction⁹. Some studies also reveal that patients who are older people, females and with acute conditions are more satisfied than younger ones with chronic conditions. Moreover, on behalf of therapist, physiotherapist knowledge, skills, professionalism, effective communication, friendly attitude, frequency of treatment and adequate duration may lower the level of dissatisfaction¹⁰.

Thus patient satisfaction is an important factor due to which we can assess the physical health of patients. We can also signify those factors on behalf of which satisfaction discriminates between males and females. This study will be beneficial for improving the quality of physiotherapy services. The objective was to compare female and male patient's satisfaction with physical therapy care.

Methods:

This Comparative cross-sectional study design was conducted after approval of synopsis from the Institutional Review Committee (IIRS/DPT/PRI-IRB457) the study was completed from February to August, 2022. The data was collected from Social Security hospital, Islam Center hospital, Saeed Medical Complex Sialkot, Imran Idrees Teaching hospital, Allma Iqbal Memorial Teaching hospital and Sialkot Institute of Health Sciences, Amin Welfare and Teaching hospital. We have taken 260 patients with neuromuscular and musculoskeletal problems visiting hospitals for physical therapy services were selected. The sample size was calculated by using Cochran's formula keeping the confidence interval equal to 95% and level of precision equal to 0.05. $n = z^2pq/e^2$, where Confidence Interval= C.I = 95%, table value (z) =1.96, estimated proportion of success (p)=0.5, 1-p (q)=0.5, Level of precision (e) =0.05. The data was collected using Non-Probability Simple convenient sampling technique. The participants were male and female patients aged 20 to 40 years⁵ patients with neuromuscular and musculoskeletal disorders and least matriculation. Other than neuromuscular and musculoskeletal disorders and under matriculation were excluded. All the ethical principles and rules for conducting the research were followed. The subjects were asked to sign an informed consent, showing that they were willing to participate in the study. A semi-structured questionnaire with demographic details and Med-Risk Outcome tool was filled to measure their satisfaction level. A 12-item questionnaire of Med Risk instrument was used to compare the patient satisfaction level with physiotherapy care between male and female. The validity and reliability range from r = 0.68 to r = 0.80. The Standard error Mean (SEM) is 0.17 for external factors and 0.20 for internal factors. The high Cronbach's alpha value illustrates internal consistency. The small values for the SEM indicate that mean scores have a low measurement error¹¹. Each of participants was asked to rate their scores of each section of Med -Risk from 1-5 (from strongly disagree to strongly agree)¹². The Med-Risk scoring is I range of 0-60 as maximum to minimum respectively. The subscale had score range of 0-5, the scores are calculated by addition of the scores in the respective section. The satisfactory score is 5 for each section. The overall satisfaction score is assessed on global items of satisfaction , higher score will categorize the patient falling in higher satisfaction. The response in sub-item 1st and 2nd combined for lower satisfaction, while 3rd option indicted moderate and the 3rd and 4th option shows a higher level of satisfactory response according to MED-Risk.¹⁰ The data were analyzed by using SPSS version 16. The comparison of patient

satisfaction level of physiotherapy care between male and female patients was obtained by using independent sample t-test. While, p-value of <0.05 was taken as significant. While for the quantitative variables was gained by using mean and standard deviation, and categorical variables was obtained by using cross-tabulation and frequency distribution.

Results:

Out of 260 participants, 95 (36.54%) were males and 165(63.46%) were females while 115 patients were from public and 145 from private hospitals. The mean age of males was 29.98±5.74 and females was 27.98± 6.30, while the mean BMI was 24.18±3.00 and 23.13±3.4, respectively. 76 (29.23%) respondents were from upper class, 115 (59.61%) from middle class and 29 (11.15%) from lower class. 4(1.538%) subjects were inpatients and 256(98.46%) from outpatient department.

Table-I Demographic Profile of Participants

Descriptive statistics	Category	Male N=115	Female N=165	Frequency (%age) 260(100%)	P value
Socioeconomic Status	Upper class	29	47	76 (29.23%)	0.00
	Middle class	48	107	155(59.61%)	
	Lower class	18	11	29(11.15%)	
Marital Status	Married	62	73	135(51.92%)	0.00
	Unmarried	33	92	125(48.07%)	
Education Level	Matric	27	42	69(26.53%)	0.75
	Intermediate	23	37	60(23.07%)	
	Graduation	45	86	131(50.38%)	
Patient Type	Inpatient	1	3	4(1%)	0.53
	Outpatient	94	162	165(63%)	
Hospital	Public	39	76	115(44%)	0.25
	Private	56	89	145(55%)	
Type of Disorder	Musculoskeletal	77	136	213(81.92%)	0.69
	Neurological	18	28	46(17.69%)	
Occupation	Students	8	68	76(29.23%)	0.00
	Teachers	12	16	28(10.76%)	
	Therapist	4	3	7(2.692%)	
	Shopkeepers	4	0	4(1.538%)	
	Housewives	0	68	68(26.15%)	
	Other	67	10	77(29.61%)	

The variables which show a significant difference in patient satisfaction between male and female physiotherapy care are waiting area, therapist did not spend enough time, therapist treats me respectfully, and therapist answers all my questions and returns to this office for future services with a P-value of 0.00 respectively.

Table-II MED-Risk Mean Score of Participants

Sub-Category	Sub-Items	Group Statistics				P value
		Category	N	Mean± Std. Deviation	Std. Error Mean	
External factor	1. The office receptionist is courteous.	Male	95	4.34 ±.75	.07	0.67
		Female	165	4.16±.81	.06	
	2. The registration process is appropriate.	Male	95	4.44±.67	.06	0.76
		Female	165	4.20±.71	.05	
	3. The waiting area is comfortable.	Male	95	4.31±.86	.08	0.00
		Female	165	3.62±1.24	.09	
Internal factor	4. My therapist did not spend enough time with me.	Male	95	2.04±.77	.07	0.00
		Female	165	2.07±1.0	.08	
	5. My therapist thoroughly explains the treatment I receive.	Male	95	4.4±.73	.07	0.65
		Female	165	4.08±.90	.07	
	6. My therapist treats me respectfully.	Male	95	4.8±.39	.04	0.001
		Female	165	4.58±.6	.04	
	7. My therapist does not listen to my concerns.	Male	95	2.09±.7	.08	0.52
		Female	165	2.10±.86	.06	
	8. My therapist answer my all questions.	Male	95	4.67±.47	.04	0.00
		Female	165	4.24±.89	.07	
9. My therapist advise me on way to avoid future problems.	Male	95	4.41±.72	.07	0.08	
	Female	165	4.15±.90	.07		
10. My therapist gives me detailed instructions regarding my home program.	Male	95	4.31±.77	.07	0.98	
	Female	165	4.28±.78	.06		
Global factor	11. Overall I am completely satisfied with the services I receive from my therapist.	Male	95	4.43±.67	.06	0.25
		Female	165	4.24±.78	.06	
	12. I would return to this office for future services or care.	Male	95	4.46±.64	.06	0.00
		Female	165	4.22±.90	.07	

Mean score of patient satisfaction level for male was 48.77±5.22 and the mean score of female participants was 45.98±5.58. (Table No.3)

Table-III MED Risk Mean Score of Male and Female

Gender	Level of Patient Satisfaction		Mean difference	Std. Error Difference	P-Value
	N	Mean± SD			
Male	95	48.77±5.22	2.79	.53	0.75
Female	165	45.98±5.58	2.79	.43	
Total	260	47.78±13.75			

Discussion:

The aim of this study was to compare patient satisfaction level of physiotherapy care between male and female patients of Sialkot. In Pakistan, it seems that every single individual is endured by neuromuscular and musculoskeletal problems. In this study, we indicated that the overall satisfaction level was higher in both male and female patients with physiotherapy care they experienced. But the satisfaction level of male patients was slightly higher as with a significant difference in some factors. Jose M Quintana using MED-Risk study in Scotland on patient satisfaction with hospital care showed a higher satisfaction level in males. In which there was response rate of male participants was 54.3% and female participants was 45.7%. According to this study, socio-demographic variables like gender, age, marital status and education also correlate with patient satisfaction⁶. Another study which was conducted in the United States of America with 32 different tertiary hospitals shows a higher level of satisfaction in male patients⁷. Similar to our study in which the overall satisfaction level of both male and female patients was higher with a mean score of 47.78±13.75. A cross-sectional comparative study was conducted by Maria Hamid shows a significantly higher level of satisfaction¹³. A current study which was conducted by Muhammad Naveed Babar et al. in Islamabad showed a moderate patient satisfaction level with physiotherapy in which male and females showed a response rate of 50%. On behalf of this study, both male and female patients showed an equal level of satisfaction². In contrast to our study on the level of

physiotherapy care in patients receiving musculoskeletal physical therapy services reveals that female patients were more satisfied compared to male patients. As male patients have a higher set of expectations than females¹⁴. another study by Medeiros et al. indicates that males have a higher set of expectations as compared to females¹⁵. Rezk et al conducted a study to investigate patient satisfaction from faculty of physical therapy settings in Egypt. The report shows that patients were approximately satisfied with physical therapy care in outpatient settings of the faculty of physical therapy¹⁶. In our study the level of satisfaction was higher as compared to previous studies. The fact behind this achievement is due to the enhancement and advancement of physical therapy-related treatments and technology. This study must be helpful not only for the patients but also for the therapists and health organizations to improve those factors which have significant effect on satisfaction such as waiting area, therapist did not spend enough time with patient, therapist treats me respectfully, therapist answer all my questions and return to office for future services. Limitations of this study included that we did not consider the type of treatment received by the patient that may also influence the patient’s satisfaction level, future studies should be accompanied on the quality of treatment to improve the level of patient satisfaction. But the sample of male and female was not equal which can affect the generalization and further studies can be conducted which can be easy to be generalized.

Conclusion:

This study shows an overall higher mean score that indicates the high level of patient satisfaction between both male and female participants. But the satisfaction level of male patients shows a significant difference in p-value. 0.00 in some factors. Acknowledgments: We are thankful to the administration and physical therapy departments of Ijaz Amin medical complex, social security hospital Sialkot, Islam center hospital Sialkot,

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Knowledge and Experiences of Pregnant Females Towards Physiotherapy in Lahore

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ABSTRACT

Objectives: To assess physiotherapy knowledge and experiences among pregnant females in antenatal care culture meanwhile aims to raise awareness about importance of physiotherapy in antenatal care.

Methodology: This study was cross sectional. After the approval from IRB SMDC subjects were recruited using convenient sampling. Study setting was gynecology department of Shalamar hospital Lahore. Written consent form and study description was provided to each participant. After giving complete description of study data and signing the consent information was recorded through in person interview with each subject using a self-administered questionnaire, it took 5-10 minutes with each subject. Online Google form was sent to pregnant women. The data was entered and analyzed using SPSS 25.

Results: With a response rate of 100% it was found that most of women (n=106 79.1%) knew about physiotherapy, but knowledge and awareness of antenatal physiotherapy and its benefits were fairly low (n=46, 34.1%. Prevalence of low back pain (n=112, 82.9%), urine leakage (n=48, 35.5%), and other musculoskeletal stresses were seen to be high among pregnant females. While there was little guidance (n=23, 17%) about antenatal physiotherapy and referral to physiotherapy (n=22, 15.07%) was also quite low.

Conclusion: Pregnant females had quite insufficient knowledge and experiences in antenatal physiotherapy. There is a need to educate masses about physiotherapy and its benefits in antenatal care. Appropriate measures should be taken to spread awareness and knowledge among pregnant females, families and health care providers for improvement of quality of life among pregnant females.

Key words: Pregnant females, Physiotherapy, Pregnancy, Exercise, Knowledge, Experiences.



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Original Research Article

Introduction:

Pakistan as a developing country having population of 200 plus million is reportedly ranked 5th on largest countries list^{1,2} and has a crude birth rate of 27.034³ with maternal mortality ratio (MMR) of 140 per 1000 women. Pregnancy always sees complications and is associated with maternal mortality⁴.

Pregnancy a physiological process comes up with several bodily changes and complications which need medical attention and care i.e., antenatal care. It includes medical, nutritional, psychological and social care and help. Antenatal care/services help with identifying and providing solutions to problems occurring in antenatal and postnatal periods⁵. Most issues arise when the female remains unattended and these issues can be reduced and prevented with proper education of female and health care provision.

Along with medical help Physical therapy plays an important role in antenatal and postnatal period. Physical therapy helps with correcting problems of cardiopulmonary, circulatory and neuromuscular systems e.g., low back pain, altered mechanics

of joints, core weakness, pedal swelling, shortness of breath, numbness in peripheries, muscular strength/power deficits.

In recent times there's been a tremendous increase in the cesarean section delivery rate in Pakistan from 14% in 2012 to 22% in 2018⁶. A c-section delivery might give rise to complications like anesthesia-related mortality when females are obese⁷, wound infection, perineal numbness, diastasis recti, low back pain, and urine incontinence. Physiotherapy training plays an important role in facilitating fetal position and normal vaginal deliveries in nullipara⁸. Moreover, moderate-intensity postpartum physiotherapy exercise programs reduce the problem of urinary incontinence⁹.

Physical activity plays an important role in well-being. A carefully designed and structured physical activity plan is called exercise. Pregnancy comes with tremendous physiological, emotional and musculoskeletal stresses /discomforts on the female body. Antenatal caregivers aim to provide with supreme and optimal care so one can bear pregnancy with minimum complications. Exercise programs during pregnancy add up to benefits like overall fitness and

alleviate discomforts associated with pregnancy. Postural education, aerobic training, strength training, stretching maneuvers and Kegel exercises are some forms of exercises that are beneficial in pregnancy. After complete examination an individually designed combination of aforementioned exercises under supervision of trained physical therapist can help a pregnant female with stresses of labor and delivery, posture related low back pain, urinary/fecal incontinence, pelvic organ prolapses, nerve compression syndromes, muscular strength/power deficits, pelvic girdle pain¹⁰.

Antenatal care aims to provide mother with best of health care in which physical therapy can play an essential role. Limited information is present on knowledge (understating and familiarity of a subject gained by education or experience) and experiences (occurrence of an incident or to undergo an occurrence that leaves impression) of physiotherapy among pregnant women is inadequate¹¹.

Therefore, this study was done to observe the physiotherapy knowledge and experiences among pregnant females, determine the frequency of pregnant females going for antenatal physical therapy and find out gaps coming in way of physical therapy practice in antenatal care culture. In the future, it will help in taking measures to introduce physiotherapy practice in antenatal care and initiating discussions and campaigns to raise awareness about physical therapy and its benefits during pregnancy.

Methodology:

This was a cross-sectional study. After the approval from the institutional review board subjects were recruited using convenient sampling. IRB number was SSAHS-IRB/LA/28/2022. Duration of study was 5 months. The study was carried out at outdoor of Gynecology department Shalamar Institute of Health Sciences, Lahore. The sample size of this study was 135. After complete description about study and questionnaire, consent form was signed by all participants. Pregnant women (second and third trimester) were included as participants and women that were unwilling to participate in the study or women that were recruited after duration of 3 months were excluded. The study instrument was a self-designed questionnaire that was given to the participants. Online survey was also conducted on social media sites, where questionnaire link was put. The questionnaire had 3 sections. In 1st section subject's demographics were recorded, 2nd section was based on subject's knowledge about physiotherapy and in 3rd section information about subject's experiences related to physiotherapy was recorded. Person interview with each subject using a self-administered questionnaire was conducted. it took 5-10 minutes with each subject. The data was entered and analyzed using SPSS 25. Numerical data like age and number of pregnancy were presented in the form of mean \pm SD, whereas qualitative/categorical data like occupation, mode of delivery, knowledge and experiences were presented in form of frequency (percentage) after fulfilling parametric assumptions. Pearson Chi square test was applied to determine association between variables. A value of > 0.5 was considered to be insignificant and value of < 0.5 was considered to significant find any association between variables.

Results:

Total 135 pregnant females were involved. The response rate of the study was 100%. Mean age of participants was 27.50 ± 3.84 . Out of 100% 72.6% (n=98) were housewives. From the total population, 97.0% (n=131) of participants were

from urban areas. 56 (n=41.5%) ladies had graduation education. Out of the 135 antenatal subjects, 79 (n=58.5%) were in their third trimester as shown.

Table-I Demographic data of participants

Variables	Frequency (%)
Occupation	
House wife	98(72.6%)
Working	36(26.7%)
Student	1(0.7%)
Total	135 (100.0%)
Locality/Area	
Urban	131(97.04%)
Suburban	4(2.96%)
Education	
Matriculation	7(5.2%)
Intermediate	31(23.0%)
Graduate	56(41.5%)
Masters	41(30.4%)
Total	135(100.0%)
Trimester of pregnancy	
Second trimester	56(41.48%)
Third trimester	79(58.52%)
Number of pregnancies	
1	50(37.0%)
2	43(31.9%)
3	18(13.3%)
4	14(10.4%)
Total	135

The parity of the subject population in which 37% (n=50) were conceiving for the 1st time and remaining 63% (n=85) were multiparous. Of the 50 subjects who were primiparous 96.0% (n=48) preferred normal delivery and 4% (n=2) preferred caesarean section, while out of 85 multiparous women 76.5% (n=65) preferred normal delivery and 23.5% (n=20) preferred caesarean section. Among multiparous women rate of caesarean sections was 44.44% (n=60) and of normal delivery it was 16.30% (n=22) during their last child birth, remaining 39.3% (n=53) were primiparous.

Asking about the physiotherapy experience it was noted that 37.8% (n=51) women said it was effective. Musculoskeletal issues that study participants faced during current or previous pregnancy, it was seen that 112 subjects faced low back pain, 94 women faced fatigue, and 57 women faced breathing issues. One hundred and thirteen subjects addressed these issues with their doctor, of whom 44 subjects were primiparous, and 69 were multiparous, while twenty-two of all did not address musculoskeletal issues with their doctor of which 6 were primiparous and 16 were multiparous. Out of all 34.1% (n=46) women believed that physiotherapy is important during pregnancy and 49.6% (n=67) women were unsure about role of physiotherapy in pregnancy shown

Table-II Knowledge and Experiences of Pregnant Females Towards Physiotherapy

Variables	Frequency
Do you know about physiotherapy:	
Yes	106(79.1%)
No	28(20.9%)
What do you know about physiotherapy:	
Exercise	47(34.81%)
Rehabilitation	35(25.93%)
Muscle joint issue	32(23.70%)
Non medicinal treatment	6(4.44%)
Don't know	1(10.37%)
Electrotherapy	67(0.74%)
Is physiotherapy important during pregnancy:	
No	22(16.3%)
Yes	46(34.1%)
May be	67(49.6%)

Have you experienced Physiotherapy before? If yes what was that experience like	
Effective	51(37.8%)
No experience	60(44.4%)
Not Effective	3(2.2%)
Painful	1(.7%)
Slightly effective	20(14.8%)
Musculoskeletal issues faced during pregnancy	
Body weakness	75(55.5%)
Chest discomfort	57(42.2%)
Fatigue	94(69.6%)
Muscle cramp	86(62.7%)
Tingling numbness in feet and hand	53(39.2%)
Hand swelling	18(13.3%)
Feet leg swelling	48(35.5%)
Urine leakage	48(35.5%)
Low back pain	112(82.9%)
Did you address these issues with you doctor?	
Yes	113(83.7%)
No	22(16.3%)
Did your doctor guide you about physiotherapy treatment for these issues?	
Yes	23(17%)
No	112(83%)
Pregnancy * did your doctor refer you to physiotherapy treatment?	
Yes	22(15.7%)
No	113(84.3%)
Any suggestions/recommendations you would like to make regarding pregnancy care:	
Diet	27(20%)
Stay active	19(14.1%)
Exercise	10(7.4%)
Rest	7(5.2%)
Dr should give proper time	9(6.7%)
Physiotherapy	10(7.4%)
No stress	6(4.4%)
None	23(17.4%)
Consult Dr	9(6.7%)
Emotional support	2(1.5%)
Don't know	9(6.7%)
Family planning	4(3%)

From the collected data, it was evident that 79.1% (n = 106) knew about physiotherapy but knowledge about role of physiotherapy in pregnancy was limited. Moreover, prevalence of musculoskeletal complaints among pregnant females was high while guidance about physiotherapy and referral to physiotherapy was limited.

Level of education shows strong correlation with parity. Also, level of education shows a good correlation with the preferred mode of delivery (P=.212) and response to musculoskeletal complaints faced during pregnancy. There is also a good correlation between parity and response to musculoskeletal complaints faced during pregnancy. Parity showed a strong correlation with preferred mode of delivery (P=.003) and the last mode of delivery (last child birth) (P=0.000). Meanwhile parity doesn't show any significant correlation with subject's knowledge and perception about physiotherapy and antenatal care. Moreover, parity showed a good correlation with subjects and their doctor's response to the musculoskeletal complaints that subjects faced.

Table-III Pearson Chi Square Correlation of Education (Section A) and Number of Pregnancies (Section B) With Other Variables

A. Knowledge

Variable	Asym. Sig.(2-sided)
Education: * Number of pregnancies	.019
Education: * What method of delivery do you prefer	.212
Education: * Did you address these issues with you doctor?	.397
Education: * Any suggestions/recommendations you would like to make regarding pregnancy care?	.694

B. Experience

Number of pregnancies * Did you address these issues with you doctor?	.333
Number of pregnancies * What method of delivery do you prefer:	.003
Number of pregnancies * How was your last child delivered: (skip if it's your first pregnancy)	.000
Number of pregnancies * Do you know about physiotherapy?	.844
Number of pregnancies * What do you know about physiotherapy:	.224
Number of pregnancies * Is physiotherapy important during pregnancy:	.948
Number of pregnancies * Is physiotherapy important for health care:	.215
Number of pregnancies * Did you address these issues with you doctor?	.300
Number of pregnancies * Did your doctor guide you about physiotherapy treatment for these issues?	.034
Number of pregnancies * Did your doctor refer you to physiotherapy treatment for these issues?	.033
Number of pregnancies * Any suggestions/recommendations you would like to make regarding pregnancy care?	.763

Discussion:

This study was conducted to assess the knowledge and experiences of antenatal physiotherapy in pregnant women of Lahore. The mean age of the women was 27.50 ± 3.840 years. Most of them complained of back pain, swelling, urine leakage, muscle cramps and numbness in various stages of pregnancy. A meta-analysis of studies shows that pregnant women have deep concerns about their health and well-being and that of their baby. (12) These concerns insight health professionals to help, guide and design physical activity interventions for pregnant women. The knowledge of the subjects regarding physiotherapy and antenatal physiotherapy was found to be high and fairly low respectively. The perception of physiotherapy in most subjects was limited to exercises, rehabilitation, and treatment for muscle joint issues. Hence, it can be said that although the subjects seemed fairly knowledgeable about the role of physiotherapy in backache and general health, but they were fairly unaware of the advantages of physiotherapy in pregnancy-related urinary incontinence and other musculoskeletal issues and the science behind the therapy. A randomized controlled trial in which assessor was blinded showed improvement in symptoms of urinary incontinence, pelvic organ prolapse and morphology of pelvic floor after 6 months of pelvic floor muscle training¹³.

A cross-sectional study concluded that knowledge and Awareness of pelvic floor muscle training in Pakistani women is very low though the majority of subjects were interested to perform them if adequate information is given. It is mandatory for healthcare professionals to educate women about pelvic floor muscle training and promote its implementation¹⁴.

While in this study most women when asked for suggestions to how to combat pregnancy related stresses on body, most responses were to take care of diet, rest, and consult doctor for professional help. Another study showed that most of the subjects had idea about physiotherapy treatments for orthopedic and musculoskeletal issues but had minimal information about role of physiotherapy in pregnancy, Labor, and post-partum issues¹⁵.

A cross sectional study affirmed that prenatal antenatal physical activity is safe and beneficial for the baby¹⁶. While this study showed an unsatisfactory response about knowledge regarding antenatal physiotherapy care and referral to physiotherapist for antenatal care despite having a satisfactory response about past physiotherapy encounters and experiences. Another study showed that awareness about rehabilitation and physiotherapy among antenatal women was satisfactory but awareness and practice of antenatal exercises was very poor. The solution for this can be proper awareness campaigns to promote rehabilitation services, educate pregnant women and health care providers for best outcomes of maternal life¹⁷.

A general notion that physiotherapy is just about exercises and massages has always been prevalent. Moreover, this has been once again proved in the above-conducted study. The solution for this can be proper counseling of subjects and prescribing shorter exercise programs during pregnancy¹⁸ As seen in earlier studies, economic factor played an important role in the results¹⁹

The present study shows an improvement (79.1%) when compared to similar studies in the country, where the resultant knowledge regarding physiotherapy was less than 50%. Similarly, a study conducted in Nigeria shows that the knowledge regarding the importance of antenatal physiotherapy is at 13.7% when compared with the 34.1% as observed here²⁰. The attitude toward antenatal physiotherapy was less positive in this study (34.1%) compared to the one conducted in Puducherry (51%).

Conclusions:

The participants' understanding of antenatal physiotherapy was limited to massages for muscle/joint pain and fatigue, a very few individuals were aware of antenatal physiotherapy and had an unsatisfactory understanding of its benefits, owing to lack awareness and experience of physiotherapy, incorrect perceptions about physiotherapy, and a lack of advice and referral to physiotherapy by doctors.

Conflict of interest:

There is no conflict of interest.

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Mobility Related Confidence Level in Chronic Stroke Patients Through Task Oriented Walking Intervention

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ABSTRACT

Introduction: Stroke is a neurological insufficiency caused by cerebrovascular injury resulting in major motor deficits in lower limbs. Different therapeutic interventions are being used for stroke rehabilitation. A unique approach used for stroke rehabilitation is task-oriented walking interventions. This research work was planned to study the effects of task-specific walking Interventions on improving the mobility-related confidence level in chronic stroke patients.

Method: This randomized control trial study was conducted on 48 stroke patients in hospital settings. Informed consent was taken from all the study participants before inclusion in the study population and the data from the study subjects was collected through a specially designed questionnaire, 06 minutes-walk test (6MWT), Timed "Up and Go" test (TUG), and Activity-specific Balance Confidence (ABC) Scale. The study population was randomly divided into two groups as interventional group and control group. Interventional group was trained for Task-Oriented Walking Interventions along with the conventional rehab treatment while the control group was trained only with conventional rehab interventions.

Results: On statistical analysis, performed after 6 weeks of interventions, significant improvement in mobility related confidence level for all the three scales TUG (P=0.000), ABC (P=0.000) and 6MWT (P=0.000) was observed in interventional group as compared to the control group where P>0.05 after six weeks of interventions.

Conclusion: The study concluded that task oriented walking interventions is an effective approach for improving mobility related confidence level in post stroke patients.

Keywords: Task oriented training, Mobility related confidence, Stroke, Activity-specific Balance Confidence Scale



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Original Research Article

Introduction:

Stroke or the cerebrovascular injury occurs because of the reduced flow of the blood to brain cells¹. It is deliberated as one of the leading causes of the death and/or disability in the affected population. It has been reported that stroke is most prevalent and severe health related condition that can lead to the disability and even death in all over the world². Stroke is actually a cardiovascular lesion of the neurological origin which can lead to multiple health issues including physical ailments³ including physical, social, cognitive and other behavioral abnormalities. All of these can lead to serious complications⁴. The affected individuals may have pronounced physical symptoms including aphasia or difficulty in talking⁵, disability ranging from monoparesis to quadriplegia⁶, as in case of brain stem stroke⁷. The common aftereffects of stroke include some sensory and some motor deficits for the affected areas or the limbs however, the everyday impacts or lesions include the motor abnormalities or dysfunctions⁸. In short, it can be noted that the spectrum and pattern of the signs and

symptoms of stroke may vary from person to person that may lead to damage in the affected area of the brain⁹.

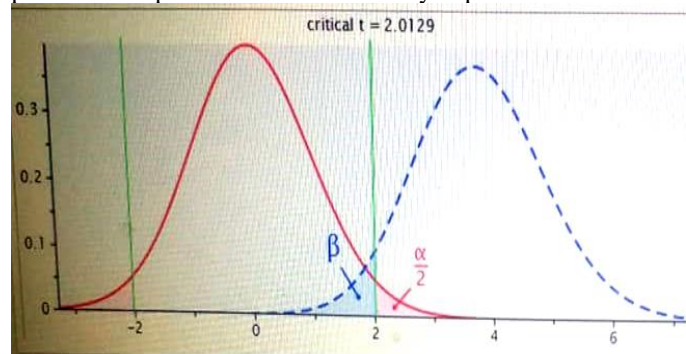
The pathology of stroke is complex and there are many different clinical presentations, each with distinctive impairments particularly motor insufficiencies and activity limitations¹⁰. So, it is vital for the restoration and rehabilitation to enhance the functional status and functional capabilities of the affected individual as soon as possible by functional regain¹¹. The conservative stroke management includes rehab exercises, brainstorm methodology, PNF (Proprioceptive Neuromuscular Facilitations), NDT (Neuro Developmental Techniques) and multiple diverse exercises¹². Stroke patients whom lower extremity is effected and dysfunctional may have remarkable issues for ADLs performance and have compromised performance because of the motor deficits. It is utmost need to search for novel strategies for stroke rehabilitation in order to help the affected individuals for achieving high levels of independence functionally.

A lot of work has been done in the field of rehabilitation in the past few years and it was found that the functional

improvement can occur even in the chronic stages of the stroke¹³. This discovery urged the researchers and clinicians to find out the new and modified interventions in order to make the rehabilitation process more effective and to transfer the attention towards the patients with chronic stroke¹¹. Task oriented walking interventions is not a single method of treatment or management of stroke but it is a group of interventions specially designed for the patients to make them able to participate actively in rehabilitation process¹⁴. Moreover, it also intends to develop the interest of the patient in the treatment procedure¹⁵. task-oriented walking interventions include ten different rehab exercises that are designed to foster the rehab process related to the mobility of the stroke affected patients¹⁶. The present research work was planned to study the effects of Task specific or oriented walking Interventions on improving the mobility related confidence levels in chronic stroke patients. Although, multiples researches have shown the effects of particular interventions on stroke but still there is lack of multi-component interventional studies to show the effects on mobility related confidence of the patients with chronic stroke. Moreover, no such study has been conducted in Pakistan yet despite of its utmost significance and this is the uniqueness of this research study.

Materials and Methods:

This randomized control trial was conducted on 48 stroke patients. Sample size was calculated by G power



Purposive sampling technique was used for sampling and the randomization was done by coin toss method and then study participants were randomly divided into two groups as the interventional group (n=24) and the control group (n=24) according to inclusion (Age 40-65 years, both genders, 1st stroke > 3 months, MOCA (Montreal Cognitive Assessment) scoring >26, Ability to comprehend the instructions for the testing procedures) and exclusion criteria (Individuals having other neurological deficits, Modified Ashworth scale > 2, BBS <20, Acute systemic illness, Comorbidity precluding participation in either intervention).

The tools used for the assessment were six minutes' walk test, timed up and go tests and ABC (Activity-specific Balance Confidence) scale. The study settings were DHQ Hospital Chiniot, Al- Amin medical complex and Ali hospital Chiniot. The study plan was approved by the Research Ethical Committee (REC) of Riphah College of rehabilitation sciences (REC Letter no: 00546). The baseline data and the terminal readings of the treatment were recorded from both the groups, 'interventional and control'. The Interventional group received about 10 minutes warm up exercises and then were advised to perform the task-oriented walking interventions (for about 20-25 minutes) for 3 days in a week and the session was continued for 6 consecutive weeks on alternative days. The individuals in

interventional groups have received task-oriented walking interventions along with the conventional rehab exercises. The session time was approximately 40-45 minutes. While, the control group received 10 minute warm up exercises and then were advised to perform the conventional rehab exercises which included the mild to moderate and pain free sustained stretching exercise, leg swinging exercises, the balance training including the side shuffles, the arm circles, the wobble board exercise and active and passive ROMs (performed by the individuals of control group who have difficulty in performing active ranges initially), balance beam exercises for independent walk training and some exercises to improve the component of balance during walking. This session time was approximately 40 to 45 minutes. Figure 1 mentioned below showing the consort diagram for this study.

The data was collected from the participants after their consent and the obtained data was analyzed using SPSS 24 by applying Kolmogorov test (to assess the normality of the data so that parametric or non-parametric tests can be applied further), Wilcoxon signed rank test (for within group analysis) and Mann-Whitney test (for analysis between the groups). Data was presented in the form of median inter-quartile range (IQR), and the p values less than 0.05 was considered significant.

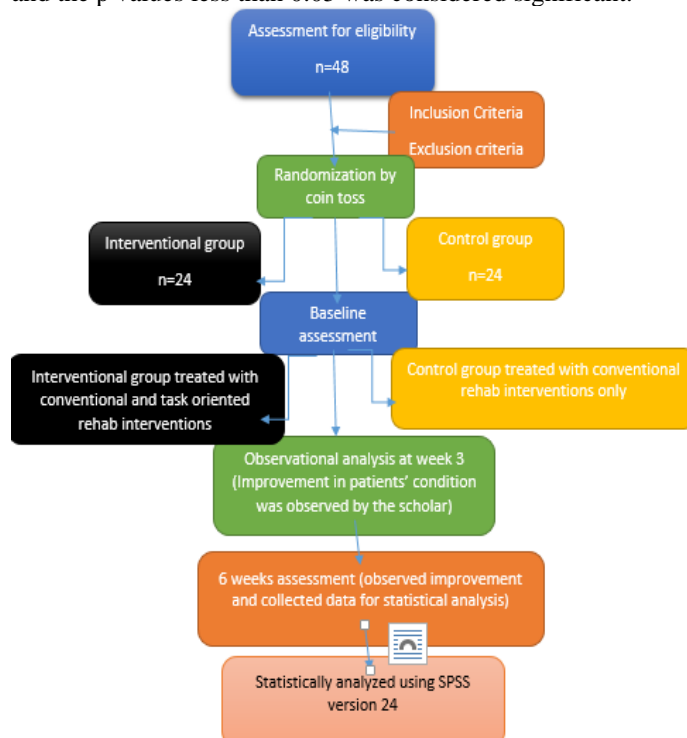


Figure-I Consort diagram.

Results:

The results of this study depicted that most of the study participants were male (54%) between 29-57 years of age. Most of the participants ~60% belong to low socioeconomic status and ~60% participants were non-smokers. It has been found that almost 44% of the participants had stroke since a year or 2 while only 27% participants had stroke since more than 2 years and less than 3 years. It has been found that about 87.5% of the participants have other health issues along with stroke while only 12.5% claimed that they just have stroke. The Kolmogorov test showed that the data was skewed (Table 1) Therefore, Wilcoxon signed rank test was used for within group analysis of interventional group and control group (Table 2) and Mann-Whitney test was used for intra group analysis of the data before and after session (Table 3).

The results of Wilcoxon signed rank test showed significant ($p < 0.05$) variations among study participants between the sessions within the interventional group while no significant ($p > 0.05$) variations were observed among study subjects within the control group. Intra group analysis through The Mann-Whitney test showed highly significant ($p = 0.00$ i-e $p < 0.05$) variations before and after the sessions between interventional and control groups.

Table 1: Tests of Normality (Kolmogorov Smirnov)

Variables	Statistics:	DF	P value
Difference TUG	0.349	17	0.000
	0.346	31	0.000
Difference 6MWT	0.410	17	0.000
	0.379	31	0.000
Difference ABC	0.410	17	0.000
	0.346	31	0.000

Table 2: Comparison within groups by Wilcoxon Signed rank test

Variable	Interventional Group			Control Group		
	Pre-Median (IQR)	Post-Median (IQR)	P-Value	Pre-Median (IQR)	Post-Median (IQR)	P-Value
6MWT	2.00 (1.00)	2.00 (1.00)	0.000	2.00 (1.75)	2.00 (1.75)	0.317
TUG	3.00 (1.75)	2.00 (2.00)	0.000	3.00 (1.75)	2.50 (1.75)	0.157
ABC	1.00 (1.00)	2.00 (.75)	0.000	2.00 (2.00)	2.00 (2.00)	0.317

Table 3: Mann-Whitney Test showing intra group comparison

Variables	Group	Pre-Analysis				Post-Analysis			
		Mean Rank	P Value	IQR	Median	Mean Rank	P Value	IQR	Median
TUG	Control Interventional	22.00	0.195	1.75	2.46	15.00	0.000	1.75	2.38
		27.00		1.75	2.88	34.00		2.00	2.00
6MWT	Control Interventional	21.38	0.089	1.75	2.08	16.00	0.000	1.75	2.04
		27.63		1.00	2.38	33.00		1.00	1.71
ABC	Control Interventional	28.96	0.016	2.00	1.96	15.00	0.000	2.00	2.00
		20.04		1.00	1.42	34.00		0.75	2.25

Discussion:

Mobility is one of the prime goals of rehabilitation after stroke. Every patient wants to be independent in terms of the walking ability. However, sometimes the patients cannot cope with the situation and may sway or even fell off the ground. The patients thus need any rehabilitation exercise to regain their confidence. Task-oriented walking interventions fulfilled the purpose and it has been reported in published studies. In the past 20 years, a number of new and modified approaches have been added to the rehabilitation of patients with chronic stroke. Most of the studies, however favored the task oriented training regime as

that of results of this study and this approach is regarded as the best possible rehab treatment after stroke⁶.

A lot of people searched this area of stroke rehabilitation and the final conclusion of this study can be favored by the results of the other studies like a study reported that only concentrating on the performance was a lot simpler than focusing on the improvement in the participation and movement. It was concluded in the study that the clinicians should look for the approaches to improve mobility related confidence by implementation of the task oriented walking interventional training or the similar rehab mediations in the post stroke patients¹⁷

Another study was labelled as “The effects of task oriented walking interventions” was explored by Salbach. The results of the study showed a significant improvement in the interventional group ($P < 0.05$) compared with the control group¹⁸. Salbach led another multivariable interventional study for checking the impacts of task-oriented walking interventional training on mobility related confidence looking at the impacts of upper and lower extremities in the post stroke patients. The consequences of this multivariable research study concluded that the improvement to be decided and Mobility related confidence of post stroke patients was subject to numerous variables including the age, sex of the participants, time after stroke and the patient's status of functional mobility¹⁹.

Salbach did a lot of work in this area of research and in the recent years, Salbach and his partners led a systemic review to build up a standard protocol for stroke rehabilitation. They looked through 7 different data-bases and explored the researches as per their titles, the abstracts and their strength. The final conclusion affirmed the past outcomes and it was discovered that a standard protocol of six minute walk test is required and the task oriented walking rehab interventional training was increasingly productive and compelling strategy for treatment in post stroke patients²⁰.

A research study was conducted in Korea by Choi and Kang on post stroke patients. The results showed great variations in scores of all of these measurement scales and it was found that the interventional group has improved more ($P < 0.005$) as compared with the control group and it was concluded that task specific walking exercises were real magic to improve the balance and the mobility related confidence of the patients after stroke as compared with the traditional rehabilitation interventions and methods¹⁵.

Another study was conducted for aneurysms and it referred that task-oriented walking interventions can be helpful in early recovery of the patients²¹. A similar study was conducted by Lee et.al in 2011 to evaluate the risk factors and treatment options for stroke and they also found that task-oriented walking interventions can be proved best for stroke rehabilitation²² All of these studies favored the results of this study and the researchers found that the task oriented walking interventions can be used extensively to foster the rehabilitation process after the stroke.

Conclusion:

The study concluded that the patients improved formerly if the rehabilitation session is concise and task specific. From the study it was summed up that the task oriented or task specific walking interventions are one of the best therapeutic interventions to improve mobility related confidence of the patients after stroke.

Key Finding:

Task-oriented walking interventions are one of the best therapeutic interventions to improve mobility related confidence of the patients after stroke.

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Normative Data of Fugl Meyer Assessment on Upper Extremity in Post Stroke Population

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ABSTRACT

Background: Stroke is clinically diagnosed as an acute, localized neurological impairment that is caused by vascular damage (infarction, hemorrhage) to the central nervous system. This main leading cause of demise and dysfunction worldwide resulting in frequent deficit, hemiplegia, which briefly affects upper limb. This multicentered study is the first to provide updated normative reference values for FMA-UE in post-stroke adults in wide range of age in Pakistan's population.

Objective: To determine Pakistani normative values of Fugl-Meyer Assessment on upper extremity in post-stroke population.

Methods: Descriptive cross-sectional study on 1260 post-stroke patients was conducted in various public and private physiotherapy centers of country using Fugl-Meyer Assessment (Upper-Extremity) FMA-UE scale after ethical approval. Hemiplegic survivors of both genders aged 45-75 years were taken using convenience sampling technique, informed consent was taken. Statistics was done using SPSS version 25.

Results: Patients included were 88.3% ischemic and 11.7% hemorrhagic. 44.1% were in acute phase (less than 2 weeks) while 55.9% were in sub-acute (2 weeks to 6 months) phase. Mean score of FMA-UE was 88.63±30.09. The cutoff score/mean value for motor impairment and sensation was recorded as 41.49 ±19.7 and 8.6±3.9 while passive joint motion and pain were calculated 18.93±5.47 and 19.57±5.1 respectively.

Conclusion: The scoring, in acute and subacute phases, accentuates the need to follow Pakistani-specific modified norms in Asian inhabitants instead of reference values applicable to the western population.

Keywords: Fugl-Meyer scale, Hemiplegia, Motor control, Post Stroke, Upper extremity



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Original Research Article

Introduction:

Stroke is defined as an acute, localized neurological impairment that is clinically diagnosed by vascular damage (infarction, hemorrhage) to the central nervous system¹. Despite development in medical field, pharmaceuticals approach, and medical technology, stroke is still an important a risk of death and suffering for patients, and a health economic burden too. With roughly 6.7 million stroke fatalities worldwide in 2015, stroke causes largest death rate after ischemic heart disease². Cerebrovascular illnesses remain the fourth biggest cause of mortality, despite a declining trend, with a prevalence of 6.6 percent in 2016. The burden of stroke is predicted to rise dramatically as the population ages, putting a strain on already scarce healthcare resources. As a result, a thorough stroke rehabilitation programs must be developed for effective disease treatment plan³. Globally, it is the 3rd leading cause of death and the primary reason of disability. Stroke-related deficiencies have major influence on survivors' independence, quality of life, and productivity⁴. Multiple studies in adult stroke survivors have confirmed age regarding mobility improvement and time of leaving the hospital.

According to cohort study on stroke community in Denmark, more than 58 percent of old age were sent to medical facilitated old homes or had expired while long stay at hospital⁵. In order to prevent elderly population from being handicapped, advance rehabilitation plans and care takers are required which will help them to be independent in their ADLs⁶. Tunk mobility is greatly affected due to atrophy of muscles leading to poor posture with functional disorders⁷. Fugl-Meyer Assessment (FMA) is a validated and popular tool for evaluating motor function following a stroke. It is considered a gold standard for use in clinical and research settings all around the world. Reflex activity, voluntary movements inside and outside of synergies, capacity to produce independent movement, and coordination are all assessed on the scale. This hierarchical construct measures one-dimensional underlying concept, motor impairment. This means that the scale can be used in pre and post rehabilitation to investigate the movement level⁸. For early post-stroke impairment investigation, assessment is mostly done pre-treatment, within treatment and after rehabilitation. A standardized globally usage of FMA-UE for comparison of hemiplegic or paraplegic recovery results in

improving standards of treatment⁹. Team of Hira Rehman in 2022 conducted a randomized control trial to ascertain the results of cortical mapping in chronic stroke and observed combining action observation therapy with standard therapy an effective strategy for rehabilitating upper trunk or limb movement in patients¹⁰. In 2021, Yuta Tauchi et al investigated different aspects of movement and problematic usage of items for stroke exercises in Japanese and proved FMA-UE a multidimensional and reliable tool for assessing stroke-related damage to upper extremities¹¹. Nanako Hijikata and colleagues found FMA-UE an authentic tool for measuring upper limb mobility in people with chronic stroke¹². While Nadinne Roman and colleagues translated and validated the Upper Extremity Functional Motor assessment scale (UEFMA) resulting a Romanian version of the UEFMA that showed excellent validity and reliability for post-stroke examination¹³. Edwin Daniel Ona proposed FMA to be a high-resolution, autonomous, and objective tool for motor assessment in neurorehabilitation¹⁴. The use of FMAUE would enable for comparisons of stroke recovery across regions and nations, thereby improving the quality of treatment and rehabilitation for stroke patients throughout the world¹⁵. Shogo worked and used anchor-based approaches to determine the lowest clinically relevant difference for FMA-UE in stroke sufferers and observed score of 12.4 significant in hemiparesis to hemiplegia category⁸. Won-Seok Kim studied upper limb movement evaluation in hemiplegics using sensor camera and concluded Kinect-based FMA scoring method most reliable in giving new quantitative metrics of stroke patients' motion smoothness¹⁶. S. Toluue stated that test-retest authenticity and less assessable alterations of the FMA-UE in sub-acute stroke individuals and showed good tool authenticity¹⁷. It was need of time to have normal values of FMA-UE for Pakistani population due to certain atmospheric and geographic changes that might impact health-related quality of life along with that stroke care facilities are not good in Pakistan as compared to western stroke centers. Therefore, the rationale of this study was to make it easier for the clinicians and researchers of Pakistan to obtain FMA-UE threshold scores, allowing them to more easily assess and describe the patients' condition. These updated norms will certainly help the clinicians to develop better quality of rehabilitation in early stroke phase ultimately benefitting the patients of Pakistan as no data was available for stroke assessment using FMA scale in Pakistan.

Material & Methods:

This was a descriptive Cross-sectional study conducted in main government and private physical therapy setups in each province of country after ethical approval of Research ethical committee of Riphah international university (REC/RCR &AHS/21/0257). Hospitals include Sahiwal Teaching Hospital, DHQ South City Okara, Jinnah hospital Lahore, Services Hospital Lahore, Lahore General Hospital, Agha Khan University Hospital Karachi, Benazir Bhutto hospital Abbottabad, FC hospital Quetta, DHQ Gilgit, DHQ Mardan, DHQ Skardu and DHQ Khanawal etc. Data was collected from 1260 stroke patients using 33 item Fugl-Meyer Assessment upper extremity scale and sample size was calculated using Open Epi calculator according to stroke prevalence in Pakistan with Margin of error 5%, Confidence level 95%¹⁸. Convenience sampling technique was used for data collection. Post-stroke patients of both genders with age between 45 to 75 years old who presented with history of 1st stroke, history of hemiplegic stroke of acute phase (last about 2 weeks) or sub-

acute phase (last up to 6 months from onset)^{19,20}, who can understand Urdu /English language and a cognitive function score was between 24-30 on Mini Mental Examination (MME) score. While patients having other neuromuscular diseases before stroke (e.g., Parkinson's disease, Epilepsy), any degenerative joint disease with severe comorbidities (e.g., Rheumatoid Arthritis, stage 3 or 4 Osteoarthritis), or having serious medical complications requiring intensive care (e.g., pneumonia, seizures, UTIs) were excluded. For collection purpose, few tools were required i.e., bed, cotton ball, scrap of paper, ball, pencil, stopwatch, reflex hammer and chair for the assessment of sensation, reflexes, and range of motion. With informed consent, patients were enrolled considering inclusion and exclusion criteria. After approval from ethical committee of RCR&AHS, study conducted using questionnaire consisted of demographic data like name, age, sex, type of stroke, and phase of stroke. Some risk factors were also assessed like hypertension, diabetes and smoking. Univariate analysis of some variables regarding mean and standard deviation was calculated along with frequencies of age, gender, smoking and some other variables.

Results:

Table-I Demographics of patients with age 45-75 years were determined with frequency and percentage.

Demographics	Frequency (Percentage)
Male	616 (47.3%)
Female	644 (52.7%)
Hypertension	1058 (84%)
Diabetes	501 (39.1%)
Smoking	733 (58.2%)
Acute phase	556 (44.1%)
Subacute phase	704 (55.9%)
Right hemiplegic	543 (43.1%)
Left hemiplegic	717 (56.9%)
Ischemic stroke	1112 (88.3%)
Hemorrhagic stroke	148 (11.7%)

Table-II Domains of Fugl Meyer Assessment (FMA)

Domains (n=1260)	Minimum	Maximum	Mean score
Motor function	.00	66	41.49± 19.73
Sensation	.00	12	8.61± 3.99
Passive joint motion	.00	24	18.93± 5.47
Joint pain	.00	24	19.62± 5.12
Sum	24	126	88.63± 30.09

Mean score of motor impairment was 41.49±19.7 which showed moderate type, while mean score of sensation was 8.61±3.9. Passive joint motion and joint pain scored mean of 18.9±5.7 and 19.6±5.12 which showed moderate to good and good scoring respectively. These normative scores also showed moderate score of sensation. Mean normative values of FMA-UE for Pakistani Post stroke survivors were concluded to be 88.63±30.9. (Table 2)

Discussion:

Many studies underwent to investigate stroke's normative data in western countries. Due to certain climatic or geographic differences from west and other Asian states, it is considered to observe usual mean scoring in Pakistan. The risk factors like smoking, hypertension and diabetes were also identified which played leading role in acquiring stroke illness. FMA, cost-efficient gold standard approach, is reliable by giving new quantitative metrics of stroke patients in rehab outcomes and seems useful in the evaluation of sensorimotor recovery after stroke at home (16). In current study the prevalence of smoking was 58.2%, hypertension was 84% and diabetes in stroke patients was 39.8%. The results of the study are in conformation of previous study which was conducted to find prevalence observed in diabetes, smoking, obesity and

hypertension to be the common risk factors associated with Pakistani stroke population. Prevalence of diabetes was 5.9%, hypertension was 21.8% and smoking prevalence among stroke patients was 6.6% (18). H. Rehman et al found mean scores of FMA-UE of experimental group in randomized control trial on chronic stroke. Each domain showed significant increase in mean score after treatment provision. Current study supported the evidence by concluding mean score of sensation (8.61 ± 3.9) having moderate association with tool efficacy. The joint motion and pain domains also gave moderate to good cut off scores than previous study¹⁰. The mean value of upper extremity (including reflexes) showed moderate association with tool and supported the study of Rietschel et al. who computed mean FMA-UE score to be 26.9 ± 15.7 by using 33-item (including reflexes) and 22.1 ± 15.3 by using 30-item (without reflexes) (21). Won Seok Kim and colleagues found correlation between Fugl Meyer UE using Kinect and real scores and validated it for hemiplegic stroke patients. In contrast current study provided Fugl Meyer upper limb reference values for hemiplegic post stroke individuals¹⁶. Tarek M Youssef and colleagues predicted good robotic therapy effects on Fugl Meyer score and grip strength in early and late chronic stroke at Cairo University. Current study in correlation by previous research showed moderate association of sensorimotor mean values of this assessment tool in acute and subacute stroke²². Italian version of culturally validated FMA scale was developed by Cecchi et al. for better assessment of Italians²³. Roman established official Romanian version of upper extremity FMA instrument validity¹³. In contrast current study developed validated norms for Pakistani population of acute and sub-acute stroke. R Hegazy et al. reported mean of total motor function in a correlative study for observing motor deficit and motor dysfunction relation in hemiplegic stroke patients²⁴. The mean score (5.64 ± 12.5) was less than current study mean score of upper extremity domain which is 41.49 ± 19.7 . Ferrero et al. concluded that the reflex activities of biceps and elbow were not dependent upon impairment levels, which showed that most of the Spanish patients had intact reflexes despite of impairment levels. This study is in difference with the current study which calculated the usual reflex activity of the biceps, triceps, and finger flexors depended on impairment level²⁵. The study covered acute and sub-acute stroke phases of stroke but chronic patients were not taken. The reason being the follow-up of the survivors is least in Pakistan, chronic cases are usually not reported in district head quarter hospitals from where data is collected. Financial and physical resources limited the data collection from different cities of Pakistan. Mostly data was collected from Punjab and Sindh provinces, while least data was collected from Gilgit Baltistan, Baluchistan and Khyber Pakhtunkhwa due to lack of physical therapy facilities and consent of patients to assess them. The author recommended that sponsored researches should be conducted to cover all private public setups in Pakistan. Chronic phase stroke patients should also be covered from different regions and researches should include lower extremity Fugl Meyer Assessment along with upper limb.

Conclusion:

This multicenter study is the first to provide updated normative reference values for FMA-UE in post-stroke adults with wide range of age in Pakistan's population. This scoring, in acute and sub-acute phases, also accentuates the need to follow

Pakistani specific modified norms in Asian inhabitants instead of reference values applicable on western population.

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The Relationship of Navicular bone drop with Increased Body Mass Index

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ABSTRACT

Background: Increased navicular bone drop is associated with increased body mass index in adults.

Objective: To evaluate the correlation between navicular bone drop and increased body mass index.

Material and Methods: The research was carried out in University of Lahore (Gujrat campus) in which two hundred participants were taken as a sample size using convenience sampling technique. The sample size was divided into four categories on basic classification of body mass index as obese, overweight, normal and underweight. Navicular drop test was used to find the navicular bone drop. Their mean and standard deviation was calculated. The correlation was found by using Pearson correlation coefficient. For analysis of data, version 21 of Statistical Packages for Social Sciences (SPSS) was used.

Results: Entire population was consisted on two hundred subjects in which ninety eight participants were male and one hundred and two participants were females. The mean for age was 24 with standard deviation ± 3.2 , for body mass index was 23 with standard deviation ± 5.3 while the mean value for navicular bone drop was 8.3 with standard deviation ± 3.3 . Concerning different categories of body mass index, navicular drop was calculated with the navicular drop test. Around 24% navicular bone drop was observed in underweight population, 43% was seen in normal population, 40% seen in overweight population and about 90 % navicular bone drop seen in obese population. A positive correlation found among the navicular drop test and body mass index. Pearson coefficient was $r=0.359$ and for association the p value was $p=0.00$.

Conclusion: The current study suggests that a direct and positive correlation was found between the navicular bone drop and the Body Mass Index.

Key words: Body Mass Index, Navicular Bone Drop, Navicular Drop Test, Obesity

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Original Research Article

Introduction:

Recently in many countries a large number of people were categorized as overweight population¹. Frequent increase in body adipose tissues also results in large number of musculoskeletal system problems. Musculoskeletal pain and difficulty in ambulation is seen more frequently in people with increased body mass index². The prevalence of overweight and obese population has been rising globally and their increased consequences on well-being of a person is also concerning. An increased in the body mass index is a warning for different long-term diseases³.

In standing navicular bone drop is the measurement of the distance that sub-talar joint and the navicular tuberosity normally slide from their original dimension to relaxed position⁴. Body mass index is a commonly used tool to appraise the obesity among populations⁵. Body mass index is defined as the extent of the mass of body in accordance with the height of body. It is obtained by dividing weight that is in kilogram of a person by height (m)⁶.

As body weight or obesity is increased the abnormalities are also increased. BMI has a negative correlation with the navicular height⁷. The effects of obesity on entire body are evident but they are more prominent on the feet. As the weight increases, the force on the longitudinal arch of foot especially the medial arch and also on the planter aponeurosis is also increased⁸. It is found that females have poor BMI as compared to males of their age⁹.

In a study it is also suggested that as the body weight increased the pressure on the feet also increased¹⁰. Another study conducted in Japan recommend that decrease in weight results in thinning of the feet that results in enhanced movement in ankle joint and there is also improvement in the strength is noted¹¹. A significant difference in the prevalence of flatfoot occurred between; under-weight (13.9%), normal-weight (16.1%), overweight (26.9%), and obese (30.8%)¹².

Literatures encompassing the relationship of the drop of navicular bone with body mass index were studied and according to the investigator information, the relationship

between navicular bone drop and body mass index is not described in detail in prior studies. So necessity to add information in the field of physical therapy is evident that will explore the relationship in above mentioned factors.

Materials and Methods:

The ethical approval letter was obtained from institutional review board of The University of Lahore and a cross sectional study was conducted (Ref: REG/GRT/22/AHS-78). The study duration was 03 months after the ethical approval from Oct 2019 to Jan 2020. Data was entirely collected from the University of Lahore Gujrat campus. Consent form was taken by all participants prior to the collection of data. Setting of the study was The University of Lahore Gujrat campus and the participants of age 20-35 years were included. Participants with any kind of systemic disease which had direct or indirect impact on the foot and any history of trauma or acute injury to the foot were excluded. The participants' heights and weights were taken for measuring the body mass index and navicular height of right foot was measured by navicular drop test. Navicular drop test exhibit excellent reliability. The height of subjects was taken in inches and their weight was calculated in kilograms. All subjects were relaxed and comfortable in sitting position. The most prominent part of navicular bone was marked which indicates the navicular tuberosity. An index card was used to measure the height of navicular tuberosity and the subjects were in the relaxed sitting position with both feet flat touching the ground. Then the participants were instructed to stand up straight so that both feet bear an equal weight. The navicular bone height was again assessed on an index card while standing. Angular ruler was used to measure the difference in millimeters between these two values of navicular bone height. This difference showed the navicular drop. This value of navicular drop was excluded in cases which could not bear equal weight on both feet. The collected data was entered and analyzed in SPSS version 21. Frequencies and percentages alongwith mean and standard deviation (S.D) are measured that represents qualitative data in the form of frequency table. To determine the correlation and degree of association of navicular bone drop with body mass index, Pearson correlation coefficient is used. The confidence level was set to 95%.

Results:

In this study, 200 participants were included following the inclusion criteria. There were 102(51%) females and 98(49%) males. Mean value for age was 24 with standard deviation ± 3.2 , for body mass index (BMI) was 23 with standard deviation ± 5.3 and for the navicular drop, it was 8.3 with standard deviation ± 3.3 . Table No.1 represents that 140(70%) of the participants were in age range of 20-25 years, 44(22%) were in age range of 26-30 years and 16(8%) were of age 31-35 years. Out of 200 subjects, 166(83%) were unmarried and 34(17%) were married. There were 94(47%) students, 60(30%) were non-teaching staff and workers and 46(23%) subjects were teachers. The BMI values showed that 34(17%) participants were underweight, 88(44%) were normal, 54(27%) overweight and 24(12%) were obese. It was observed that the values of navicular bone were >3.5 in underweight population. Table No.2 represents the correlation of body mass index with the navicular drop test values. The P value was less than 0.05 and the value was $r=0.359$ for the Pearson correlation coefficient. This value indicated that there is a positive relation found between navicular bone drop and body mass index. These results show that when the body mass index is increased, a little bit increase in navicular bone drop is also seen. Fig.1 explains

the relationship of navicular bone drop among BMI classification groups. This shows that the value of navicular drop was < 3.5 mm in underweight group and there was no increase in navicular bone drop observed in this population. In normal BMI group, navicular drop was observed in 43% of the subjects (> 3.5 mm) and rest of the participants of this group had normal navicular bone drop value. Navicular drop was also observed in 40% of the subjects of overweight BMI group while in obese BMI group, 90% of the participants had increased navicular drop value. These results show that the navicular drop value increases as the BMI of a person increases.

Table-I Demographic Features of Participants

Characteristics		n(%)
Gender	Male	98(49)
	Female	102(51)
Age	20-25	140(70)
	26-30	44(22)
	31-35	16(8)
Occupation	Student	94(47)
	Worker	60(30)
	Teachers	46(23)
Marital status	Un married	166(83)
	Married	34(17)
BMI group	Underweight(< 18.5)	34(17)
	Normal (18.5-24.9)	88(44)
	Overweight(25-30)	54(27)
	Obesity (more than 30)	24(12)
NDT group	<3.5	10(5)
	3.6-9	114(57)
	≥ 10	76(38)
Total		200

Table-II The Association of Navicular Drop Test value with Body Mass Index

BMI	Pearson correlation	.359
	p-value	.000
	N	200

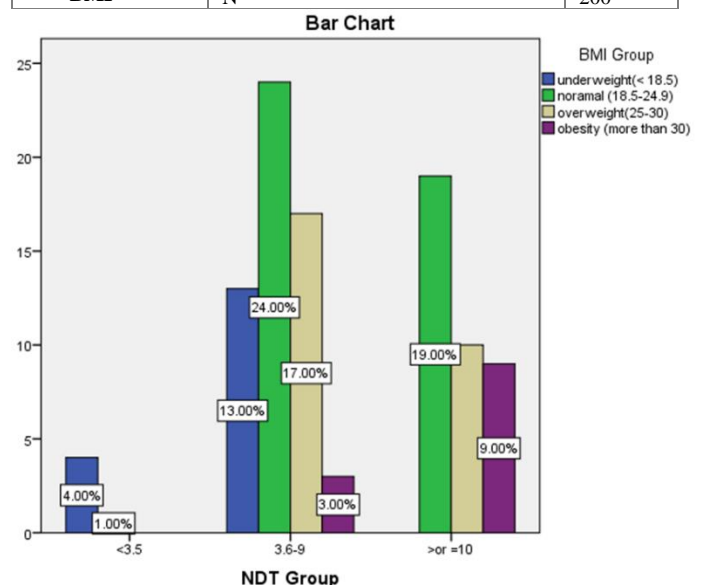


Figure -I. Association of Navicular Drop with BMI

Discussion:

In this study we find out the relationship of navicular drop and increased BMI and it was found that there is positive but weak association was existed in study population. A previous study conducted in 2019 concluded that there was a positive relationship between the body mass index and the height of foot

arch. The results of this study showed 70.4% subjects have normal arch level while 15.5% subjects have decreased arch height as navicular drop value was ≥ 10 mm. There was an inverse relationship of the navicular height with body mass index¹³. These study results are similar to our study that body mass index changes have an impact on the height of navicular bone.

A study was done in 2019 in which the results showed that obese population had a significant high arched foot when compared to the non obese population. Mean value was 9.23 for their arch height which is very close to the flat feet. Also, there were extra abnormalities related to the height of medial longitudinal arch in obese than the normal population⁸. These study results are also similar to our study. Results of a study done in 2018 showed that there was no relation found significantly in medial arch height and body mass index in both males and females. In healthy adults, the value for Pearson's coefficient correlation was found 0.129 between the foot arch height and body mass index. This represented that the correlation was very poor in both males and females. However a positive association was found between BMI and arch height but that association was also fair and very poor¹⁴. The results of another study showed the similar results to our study that as the body mass index increased, there is also increase in the drop of navicular bone is evident. A strong correlation in body mass index and the total leg length is also present¹⁵. Another research was done on 132 participants with age range of 18-22 years in 2018. They found a negative correlation in the navicular height and BMI. They concluded that the height of navicular bone drops with the increase in BMI. Participants in which body mass index was increased, were more prone to have flat feet and navicular drop⁷. These results are also consistent with our study results.

This study had a limitation that data was collected from a single setting and thus a small sample size of underweight and obese population obtained. A study should be conducted on a large sample size with multiple settings in order to confirm the correlation of navicular bone drop with increased BMI.

Conclusions:

A direct and positive correlation was found in the drop of navicular bone and increased body mass index. It is concluded that a person must lose his or her weight in order to decrease the pressure on feet so that navicular bone drop could be prevented.

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Disclosure and Conflicts of Interest:

No conflict of interest.

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Patient/Participants Consent:

Informed consent was taken from the subjects prior to their inclusion in the study.

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Effectiveness of Manual Therapy Versus Electrotherapy in Patients with Neck Pain due to Poor Posture –A Non-Randomized trial

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ABSTRACT

Background: Neck pain has become increasingly common in general population and individuals. Due to prolonged bending posture of cervical spine the structure including shoulders, scapular, thoracic spine is affected leading to flexion and extension deformity of cervical segment and extension deformity of lower cervical spine. The overuse of the muscles leads to muscular imbalances.

Objective: The main objective of this study was to compare the effectiveness of manual therapy versus electrotherapy in patients with neck pain due to poor posture.

Methodology: The data was collected from different Physiotherapy Clinics in Lahore. The study was completed four months after the approval. The sample size was 40 participants. The participant's male and female patients were in the age range 18-45 years and numeric Pain rating score of 3 from last 3 months with forward head posture were included. In group A manual therapy (post-isometric stretching, Jones technique) and in group B portable digital TENS model BE-660 was used with frequency 80Hz, intensity level 6 (strong but comfortable) was used. Outcome was assessed using Numeric pain rating, Goniometry and Neck disability index (NDI). The data was analyzed using SPSS Version 16. Paired t test and independent sample t-test was used for within and between group analysis.

Results: In group A 6(30%) were underweight and 2(10%) were overweight whereas in group B 10(50%) were under weight and 1(5%) was obese with a mean age of 29.5±8.23. In both groups, pre post mean difference of pain, neck disability index, neck flexion (and neck extension) was statistically significant. The mean value of pain and neck disability index of both groups were statistically significant

Conclusion: The current study shows that both treatment methods including manual therapy and electrotherapy play a significant role in treating the patients with chronic neck pain related to poor posture.

Key words: Manual therapy, Electrotherapy, Patients, Neck pain, Posture, Exercise, Neck disability, Range of Motion



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Original Research Article

Introduction:

The neck pain is a discomfort sensation which occurs below the head and above the shoulder region¹. The connecting part between head and the trunk is neck which provides degree of freedom for neck movement. It consists of four regions which are muscular, bony, and vascular and organs of the body². As the technology is improving day by day, we are dependent on use of devices, machines, laptops and other devices. Despite job work which is time limited, the prolonged use handheld devices, which needs sustained position of hand, shoulder in forward posture in seated posture can lead to faulty posture. These postures not only effect the tissue perfusion but also put pressure in opposite areas which becomes over stretch³. Due to prolonged bending of cervical spine shoulders, scapula thoracic spine is affected that leads to flexion deformity of

upper segment and extension deformity of lower cervical spine (forward head position will lead to extension at upper cervical C0-2 and flexion and lower Cx). The overuse of the muscles leads to muscular imbalances and overworked work of the upper quadrant muscles that generates cleave in deltoid muscle which causes shoulder impaction, inflammation of tendons, bursa, strength weakness and stretch weakness of upper quadrant muscles⁴. This pain is associated with an adopted posture of the neck during mobile phone usage, headache was prevalent among 28.75 % most of them were in younger age⁵) similar to the study stating it to be 67.22% headache among university students⁶ The neck pain is not only caused by single risk factor, it involves the multiple risk factor that combine and causes the neck pain, inappropriate body alignment, wide degree of movement and its repetition, personal factors

(genetic factors, neuromuscular factor, age, weight to height ratio, level of satisfaction from work, social and marital life⁷ These factors lead to increase stress on shoulder and neck and lead to pain and reduction in normal functioning. The muscles involved in elevating and lowering of shoulder blades i.e., trapezius and levator scapulae, pectoralis minor and major in chest and Sternocleidomastoid in neck⁸ Many techniques including Postural correction, manual therapies and exercise regimens, Instrument Assisted soft tissue mobilization^{9,10} are available for conservative management. But lack of evidence with use electrical modalities in combination with mobilization and manipulation techniques for neck pain due to upper crossed syndrome, it has less treatment duration. We hypothesized that there is a significant difference in effectiveness of manual therapy and electrotherapy in patients with neck pain related to poor posture. The Primary objective was to compare the effectiveness of manual therapy and electrotherapy in patients with neck pain related to poor posture and secondary objective was to compare effectiveness of manual therapy and electrotherapy on ROM and neck functional index.

Methodology:

This was quasi-experimental clinical study. The sample size was 40 participants¹¹. The data was collected from different Physiotherapy Clinics of Lahore including Reactive Physio and Lifeline health care and pain center Lahore and the study was completed in four months after the approval. The data was collected by using non-probability purposive sampling technique. The participants inclusion criteria included male and female’s patients in age 18-45 years having numeric Pain rating score of 3 and with history of pain for last 3 months with a forward head posture were included while trauma or surgery with in last 6-8 Months and systemic diseases affecting musculoskeletal system were excluded from study. In group A manual therapy (post-isometric stretching & Jones technique) were used. In post isometric stretching, the patient was asked to assume a certain stretched alignment that was comfortable according to the affected muscle, followed by the isometric contractions for 5-7 seconds. After this, another hindrance was observed and the same order was replicated for up to three times In Jones technique the pressure was applied to the painful points which was previously located, until the pain appeared. Then, a pain-free position (the maximum comfortable position) was sought. It was held there for 90 seconds before being passively returned to the initial position¹². The portable digital TENS model BE-660 was used with frequency 80Hz, intensity level 6 (strong but comfortable) in Group B was given. The outcome was assessed using numeric pain rating scale (NPRS) which is a 10-point numbering scale ranges from 0 which indicates no pain and 10 the worst pain (debilitating condition which markedly reduces the capacity to do work) ,it has construct validity, the NPRS was shown to be highly correlated with the VAS and other chronic pain conditions (pain>6 months): correlations range from 0.86 reliability¹³ Neck disability index (NDI) consist of the different sections / components that relates to self-care, reading, lifting, headaches, recreation, sleeping, driving, concentration of work¹⁴ The ROM of neck was measured with goniometer¹⁵ The written consent was taken from participants showing their willingness to participate in the study. Prior to the treatment sessions, age, gender, socioeconomic status, occupation, BMI (Body Mass Index) was recorded following inclusion criteria of the study. All participants fulfilling criteria of study, were included i.e., and data was collected using non-probability

purposive sampling technique. Their posture was assessed by asking patient to lie supine and their neck was observed as because abnormal shape because mobility and thoracic muscle tightness, the neck and head will collapse into hyperextension but chin will be moved to upward direction due to compensation of tight muscles¹⁶ standing along wall, while on their back towards wall and forward head posture was assessed¹⁷. Then participants rated their pain from 0-10 on Numeric Pain scale. Then a pre-session of their neck pain disability index for the different ADLs (activity of daily livings) were noted by assessor and score was converted to the score NDI having 50 scores 0-5 for each its section, having 10 sections. The goniometer was placed at zero before the start of assessment. The goniometer was placed on top of head with conformation that still it’s at zero reading. For extension, similarly reading is turned to zero and subjects will be asked to move the neck and try to touch the head to the back of chest by looking up towards the ceiling¹⁵. The baseline data was noted and each patient received 3 sessions /week for 16 weeks. The data was analyzed on SPSS V.22. Appropriate statistical tests including paired t tests and independent sample tests were used as per data distribution. The rules and regulations set by the ethical committee of followed while conducting the research and the rights of the research participants were respected.

Results:

In group A 6(30%) were underweight and 2(10%) were overweight whereas in group B 10(50%) were under weight and 1(5%) was obese with men age of 29.5±8.23 (no relation of BMI with neck pain discussed earlier). But the difference was not statistically significant (p-value 0.410). (Table 1)

Table-I Demographics of participants

Demographics	Category	Group A	Group B	P-value
Gender	Male	9(45%)	15(75%)	0.050
	Female	11(55%)	5(25%)	
Marital status	Married	12(60%)	13(65%)	0.500
	Single	8(40%)	7(35%)	
Socioeconomic status	Upper class	2(10%)	3(15%)	0.500
	Middle Class	12(60%)	14(70%)	
	Lower Class	6(30%)	3(15%)	
Body Mass Index	Under-weight	6(30%)	10(50%)	0.410
	Normal	12(60%)	9(45%)	
	Over-Weight	2(10%)	1(5%)	

At the time of baseline, all the study variable were not statistically significant. In both groups, pre post mean difference of pain (p-value <0.001), Neck disability index (p-value <0.001), neck flexion (p-value <0.001) and neck extension (p-value <0.001) was statistically significant. Mean Pain (p-value <0.001) and Neck disability Index (p-value <0.001*) of both groups were statistically significant at the end of study. (Table 2)

Table-II Group wise comparison of Pain, Disability and ROM

Evaluation		Outcomes		
		Pre-test	Posttest	
Pain	Group A	5.80±0.69	1.50±0.51	<0.001*
	Group B	5.55±0.51	2.25±0.44	<0.001*
NDI	Group A	20.05±2.06	10.90±1.83	<0.001*
	Group B	19.25±2.71	14.90±3.22	<0.001*
Neck flexion	Group A	19.80±4.06	43.35±4.94	<0.001*
	Group B	18.25±2.98	38.60±7.34	<0.001*
Neck Extension	Group A	22.80±7.19	46.45±6.90	<0.001*
	Group B	19.45±3.26	42.50±7.22	<0.001*

Significant level set at <.01

The between comparison had shown that Group had dominant effects compared to group B at P values <.01 (Table 3)

Table-III Between Group comparison of Pain, Disability and ROM

Outcomes	Mean Difference	P-value
Pain	2.50	.20
	.750	.00
NDI	0.800	.30
	-4.00	0.00
Neck Flexion	1.550	0.17
	4.750	0.21
Neck Extension	3.350	0.66
	3.950	0.85

Discussion:

This study shows that study variables were not statistically significant at the time of baseline. In both groups, pre post means difference of pain, neck disability index, and neck flexion and neck extension were statistically significant. - Repetition. Results also showed that within the group comparison both techniques show good outcomes as per their mean difference values show it and their p values are significant. The studies by Ian Ahearn and Seth Bird stated that that effects of postural imbalances can be decreased by using kinesio taping It leads to improvement in biomechanical dysfunction and muscular micro trauma and stress in subjects with UCS¹⁸. The effects of Active Release technique (ART) warranted use of ART with use of addition of variables before a strong decision¹⁹ This current study concluded that manual therapy and electrotherapy both plays significant role in treating chronic neck pain due to bad posture. The studies of Won-Ski Bee showed that trapezius strengthen exercises along with levator scapulae and upper trapezius stretching exercises were more effective in treatment of pain due to poo posture²⁰. There has been proven effectiveness of manual therapy with stabilization exercise in patients with neck pain due forward head and shoulder postures but follow-up was limited to 6 weeks²¹. Many techniques including Kinesio taping, Postural correction, other manual therapies including Maitland²² mobilization and exercise regimens are available for its conservative management. The Instrument assisted soft tissue mobilization has been used to break the adhesions present in the muscles leading to poor posture, significant effects were shown for improving pain, ROM²³ and disability in patients having neck pain²⁴. There are beneficial effects of manual therapy compared to physiotherapy alone and also better compared to placebo but studies suggest long-term follow-up²⁵. The evidence is still uncertain about the effects of TENS in management of neck pain²⁶ But another study has stated that TENS was effective in improving disability and reduction of neck pain²⁷ This study was limited to small sample that can warrant results and single center study, further studies with large sample, multi center and randomization can further improve the clinical application and generalization of results.

Conclusion:

The results of current study showed that manual therapy and electrotherapy play a significant role in treating the patients or chronic neck pain due to poor posture.

Conflict of Interest: None declared

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Impact Among Body Mass Index, Q-Angle and Flat Foot in Students of University of Lahore

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ABSTRACT

The objective of this study is to find an association between Body Mass Index, Q-Angle and flat foot in university students.

Materials And Techniques: Cross-sectional study design was followed. 200 healthy university students, aged between 18-25 years were selected from different universities in Lahore Pakistan on the basis of the Non-Probability Sampling Technique. 49.5% of which were females while 50.5% were males. BMI, Q-angle and Foot Disability Index tools were used and records were examined on SPSS version 25.0.

Results: The current study shows that the Q-angle of group A, which was made up of healthy male high school students, went up more than that of group B, which was made up of male high school students with flat feet. Therefore, there is a strong connection between flat feet and a rising Q angle.

Conclusion: This study concluded that greater BMI had a significant effect on flat feet as well as plantar arch index and Q angle.

Keywords

Flat foot, Q-angle, BMI, Patellofemoral pain.



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Original Research Article

Introduction:

A wide range of ligament and tendon defects that cause substantial deformity and impairment are included in ankle and foot disability. Despite the lack of extensive epidemiological investigations, reported rates for women over 40 and all persons over 65 are both over 3 percent and over 10 percent, respectively¹.

In the lower extremities, the patellar tendon and quadriceps pull are joined to generate the Q-angle. The Q-angle is used to assess the mechanical status of the knee joint in athletes. Females typically have a higher range of Q-angle than males, who typically have a low range, with the normal range being between 12 and 20 degrees^{2,3}.

The risk factors for increased Q-angle include ankle sprains, dynamic balance issues, patella instability, anterior cruciate ligament injuries, overuse injuries, osteoarthritis of the knee, chondromalacia patella, patella dislocation and subluxation, and patella-femoral pain PEP. Chondromalacia, patella Alta, and patella-femoral pain PEP are further conditions that could reduce Q-angle^{4,5}.

The human foot exhibits a system of three arches that can be flattened and slightly recoiled by upward pressure, bearing flexibility. Two arches run longitudinally, and one arch runs transversely. The longitudinal arch attaches to the scaphoid, three cuneiforms and inner three metatarsals after beginning at the calcaneal tuberosity. The transverse arch connected to the scaphoid, five metatarsals, and three cuneiform cuboids from the tarsus. Walking causes mechanical harm to the lower limbs because of flat feet's anatomical and functional defects. It is further described as increased hindfoot eversion and decreased medial longitudinal arch height during weight bearing. Though

less obvious and more frequent in youngsters, the development of musculoskeletal injuries as a result of foot type⁶.

Idiopathic or neurological conditions can be the cause of pes cavus. Clinical management of these individuals is highly challenging due to the lack of knowledge about the mechanism underlying pes cavus-related foot discomfort. One of the most frequent reasons people seek medical attention is idiopathic pes cavus. Tibial internal rotation during running is delayed to reach maximum if Q-angle is larger than 15 degrees, although it is slowed down by 10 to 20 milliseconds in participants with Q-angles greater than 17 degrees⁷.

Idiopathic flatness in children can be symptomatic or asymptomatic. The characteristics of the flat foot include increased hallux dorsiflexion, supination, adduction, and increased eversion at the tibia of the hindfoot as internal and external rotation. Due to open growth plates in children, certain postural problems, such as flat feet, may be accompanied by musculoskeletal injury. Arch height affects the alignment of the pelvis, the amount of lumbar acceleration, and the activity of the glutes and erector spinae. Therefore, the knee, ankle, and hip areas of youngsters with flat feet are more painful and distressed⁸. The prevalence of flat feet varies depending on the kind of population, age, and presence of any co-morbidity. According to a study, flat feet are more common in children between the ages of 2 and 6 (between 21 and 57 percent) and less common in adults (13.6 to 26.62 percent). In a healthy person, the longitudinal arch in the middle is raised 15–18 mm from the surface, while the arch on the side is raised 3–5 mm. Based on the numbers above, pes planus is a condition in which the height of the foot goes down. Pes cavus develops if the foot height is greater than 18mm⁹.

Early infancy shoe wear, a higher BMI, and extensive ligamentous slackness are all precipitating factors in flat feet, albeit the precise etiology is yet unknown. Individuals typically complain of foot pain at the end of the day. Flat feet depend on the intrinsic muscles' active contraction to maintain the foot's arch, which can wear out the muscles and make your feet feel sore and tired. There is proof that being overweight results in flat feet, foot pain, and gait problems. Widespread ligamentous laxity that is inherited elevated BMI, the type of shoes worn in early infancy, and many other triggering events all contribute to the development of flat feet. However, the precise root reason remains unknown. At the conclusion of the day, the person typically laments feeling achy in the feet. This is due to the flat foot's increased reliance on the intrinsic muscles' active contraction to maintain the arches, which causes overuse, tiredness, and an "achy sensation" at the end of the day. This is a result of a chronic inflammatory reaction^{10,11}.

BMI is used as the basis for classification, screening, and diagnosis of overweight and obesity. Being overweight is designated by a BMI of 25 to 29.9 kg/m², and obesity is indicated by a BMI over 30 kg/m². BMI measures weight and height rather than adipose tissue, where fat deposits lead to obesity¹².

People who have a normal BMI have healthy eating habits. Food preferences vary by gender, with women more likely to consume fruits and vegetables than men, who prefer soft drinks. People with risk factors for postoperative problems frequently exhibit malnutrition and weight loss prior to surgery. Malnutrition, on the other hand, is correlated with low (BMI), weight loss, and reduced muscle mass. A study was conducted in China to examine the relationship between low body mass index and the mortality risk from COPD in the case of low BMI. Adult-onset flatfoot deformity numbers nine¹³.

It is assumed that persons with BMI > 25 kg/m² have documented risk factors such as cardiovascular diseases, metabolic disorders, and musculoskeletal diseases. Flatfoot pes planus promotes contact between the patellar articulation surfaces and mechanical pressure in the knee, both of which contribute to knee pain. Due to severe loading and ligament stretching over their elastic limit, weight growth can increase the likelihood of developing flat feet¹⁴.

Obesity prevalence has recently expanded quickly in both industrialized and developing nations. By 2025, it is predicted that the rate of obesity will continue to climb quickly, reaching a global prevalence of 18% for men and more than 21% for women. According to statistics from the Centers for Disease Control between 2011 and 2014, 36.5 percent of American adults and 17 percent of American kids are obese¹⁵.

Males and females have high average (BMI). When energy intake is high and energy expenditure is unusually low, body weight increases. Sleep and circadian disruptions, in addition to conventional risk factors, are two additional factors that contribute to obesity and other metabolic problems. These factors can be changed to lessen their negative effects¹⁶.

Methods:

1. Study design:

Observational cross-sectional study design was used.

2. Setting:

Data was collected from University of Punjab, University of Lahore, University of Central Punjab.

3 Period of study:

This study was completed in 6 months after approval of the synopsis.

4 Sample size:

N= 200

5 Sampling technique:

Non-probability convenient sampling technique was followed

6 Assortment criteria:

6.1 Inclusion criteria:

- Age group 18-25 years
- Undergraduate students
- Healthy participant

6.2 Exclusion criteria:

- History of foot fracture
- Traumatic injury in the foot or lower limb
- Congenital disorder e.g., lymph edema, DVT.

Data collection:

Data was collected by using Foot 200 individuals through a standardized questionnaire. The informed consent form was taken from participants. The objective and protocol of the study were explained to them. They were ensured that they would have a right to extract from the study at any time. It was made sure that data will remain confidential and anonymity will be maintained.

The disability index, BMI and measurement of Q-angle tools were used. By using the FDI level of foot disability measured. Detailed demographic data, past medical history and work history were also collected. No religious and cultural morals were harmed during this study.

Data analysis:

Data was compiled and analyzed by SPSS version 25.0. Quantitative variables such as frequency tables, bar charts and histograms were also created by SPSS. Computed results were also done by this software.

Step 1: Demographic Data

Out of total 200 participants of age 18 to 26 years, 53 or 26.5% were 18-20 years' age, 102 out of 200 were 21-23 years' age and 45 of them were between 24-26 years' age. All of them were young adults and participated fully. Out of total 200 participants of both genders, 101 (50.5%) were males whereas 99 out of 200 (49.5%) were females. All of them were young adults and participated fully without gender discrimination. When checked for BMI out of total 200 participants, 21 (10.5%) were <18kg/m², 124 out of 200 were having BMI 18-25 kg/m² whereas 55 out of total 27.5% had BMI >25 kg/m². Majority of them were between 18 and 25 kg/m².

Table-I Demographic Data

Variables	Mean	Median	Standard Deviation
Age	20.97	21.00	2.112
Gender	Male	Female	Total
	101	99	200
BMI	<18 kg/m ²	21	10.5
	18-25 kg/m ²	124	62.0
	>25 kg/m ²	55	27.5

Step 2: Q-Angle

When checked for Q-Angle, out of total 200 participants, 31 (15.5%) had angle <10cm, 83 out of 200 were having angle >16-20cm whereas 86 (43%) out of total had angle 10-15cm that is normal. Majority of them were having Q angle between 10-15 cm being normal

Table-II Q-Angle

	Frequency	Percentage
<10 cm	31	15.5
>16- 20 cm	83	41.5
10_15 cm(normal)	86	43.0
Total	200	100.0

Step 3: Plantar Arch Index

When checked for Plantar Arch Index, out of total 200 participants, 95 (47.5%) had index <1.2cm, 62 out of 200 were having index between 1.21-1.28cm whereas 43 out of total (21.5%) had index >1.28cm. Majority of them were having index <1.21cm being normal.

Table-III Plantar arch index

	Frequency	Percentage
<1.21 cm	95	47.5
1.21-1.28 cm	62	31.0
>1.28 cm	43	21.5
Total	200	100.0

Step 4: Foot Disability Index

When evaluated Foot Disability Index, out of total 200 participants, 9 (4.5%) had no disability, 61 out of 200 were having mild disability, 108 (54%) had moderate disability whereas 22 (11%) out of total had severe disability. Majority of them were having moderate disability.

Table-IV Foot disability index

	Frequency	Percentage
No disability	9	4.5
Mild disability	61	30.5
Moderate disability	108	54.0
Severe disability	22	11.0
Total	200	100.0

Discussion:

In this paper, the flatfoot is discussed as a typical foot form that affects a significant portion of the population. Children have more flat feet than adults do. During the first ten years of life, the arch naturally raises in the majority of children. There is no proof that any external forces or equipment may induce a longitudinal arch in a child's foot. Contrary to ordinary flexible flatfoot, flexible flatfoot with a short Achilles tendon is known to cause pain and incapacity in some adults and teenagers. In those situations, the Achilles tendon lengthens. Many flatfeet also have rigid forefoot supination, which must be detected and addressed concurrently during surgical reconstruction if it exists¹⁷.

The Q-angle of the right knee of the participants increased in a way that was statistically significant (P=0.05), as the mean value of Q-angle was 16.14° with 1.2° in group A, which was made up of healthy male high school students, and 20.6° with 1.2° in group B, which was made up of male high school students with flat feet. There was a statistically significant increase in the Q-angle of the Left Knee of the participants (P=0.05), as the mean Q-angle for healthy male secondary school students in group A was 17.03° and for flat-footed male secondary school students in group B, it was 22.4°¹⁸. Therefore, there is a strong connection between flat feet and a rising Q angle. People with natural foot arches stand one foot longer than those with impaired arches, undertake a loco motor activity, and tire less easily because the foot's arches absorb the impulses and stresses from the ground. However, irregularities impair the functionality of the static, dynamic, and postural control systems, particularly when it comes to bodily movement. Proprioceptive inputs may be interfered with by abnormalities. Subtalar pronation may be too much of a connection with flat feet (for abnormal compensatory pronation may cause instability and excessive foot joint movement). As a result, while bearing weight, the flat foot may become unstable and affect postural control¹⁹.

Conclusion:

This study concludes that a higher BMI had a substantial impact on flat feet, plantar arch index, and Q angles. In light of the findings of this study, we came to the conclusion that flat

foot deformity may result in an increase in Q angle, but it may also result in patella lateral rotation and an increase in Q angle, both of which cause knee pain.

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Disclaimer:

This manuscript's abstract has not been presented at a conference or published in a book of abstracts. This article is not a part of a PhD thesis. This study talks about how poor visual ergonomics cause neck pain for computer users.

Conflict of interest:

Nothing to state.

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