

Comparison of the Effectiveness of Exercise Therapy VS Mulligan's Mobilization with Movement on Pain and Activity of Daily Living Among Patients with Knee Osteoarthritis in Household Females

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ABSTRACT

Background: Knee OA is the most common degenerative disease in old individuals which affects ability of walking, sitting and climbing stairs. There are several manual therapy techniques for limited and painful knee flexion, but there is very few evidence about the combined effect of Exercise therapy and Mulligan's Mobilization with Movement (MWM) in osteoarthritis of the knee.

Objective: To determine the effect of exercise therapy and mulligan*s mobilization with movement techniques on pain and difficulty in performing ADLs with knee OA in household females.

Methodology: It was randomized control trail study. The study was done among the household females with knee OA. The study was completed in six months after the approval of synopsis. The 38 participants involved in this study age ranges from 40-60. The participants were divided into 2 groups. Group A include 19 patients which receive Exercise therapy and group B also include 19 patients which received the MWM. Outcome measures were WOMAC score and VAS score.

Results: In this study 38 female participates. The results shows that the participants with different age and percentage. Before treatment the Mean and Standard deviation for VAS scale as follow Mean 7.08 with SD 0.997. After treatment the VAS scale shows Means 3.42 with SD 1.826 for both groups. On the other hand the pre WOMAC index shows the Mean 50.87 with SD 13.368 and post WOMAC index shows Mean 26.97 with SD 14.070 for both groups. Lower score implies a better post-treatment improvement. P-value shows that the mean difference of knee Osteoarthritis before and after treatment is significant.

Conclusion: The research shows that that the group which receives the Mulligan's Mobilization with movement are more effective than the group which receives Exercise therapy and is important in the treatment and reducing symptoms of grade I and II knee osteoarthritis among household female patients.

Keywords: Knee Osteoarthritis; Stretching Exercises; Strengthening Exercises; Mobilization with Movement; WOMAC; VAS

Abbreviations: MWM: Movement with Mobilization; MWM: Mobilization with Movement; RCT: Randomized Controlled Trial; ACR: American College of Rheumatology; NAGS: Natural Apophyseal Glide; SNAGS: Sustained Natural Apophyseal Glide; WOMAC: Western Ontario and MacMaster; VAS: Visual Analogue Scale

Introduction

Knee Osteoarthritis is joint arthritis commonly found in old people but now days it is also found in middle aged people having functional disability of their knees which makes them unable to maneuver properly. Though the risk is higher in former one and there is no known cure for it yet.), but there are some interventions like pharmacological and non-pharmacological treatments to help improve the patients. Including aerobics, strength exercise, hydrotherapy and weight loss [1]. It is observed that manual therapy improves range of motion ROM and enhancing physical functioning by decreasing pain and discomfort with help of mobilization with movement which is a type of manual therapy [2]. It is also observed that MWM minimizes the positional faults of joints which occurred following a joint injury, but there are not enough studies that confirm the effectiveness of MWM without any other manual exercises and therapies. It is also experienced that with the help of home exercises with manual therapy is far more helpful in attaining positive results of improvement than home exercises alone. It is derived that MWM is the technique to perform pain free mobilization of the patients joint and improve functional status rather than patients performs with pain ineffectively. Felson, Zhang [3] Experiences shows that with proper exercise, modality and supplements there is improvement in joint cartilage. The purpose of this study is to provide short and long-term effects of treatments of Knee OA that are affordable and easily performable [4].

With this study it is required to note and observe results of immediate and current effects of Movement with Mobilization (MWM) upon ability to engage the joint and to check the pain threshold in localized and distant areas of knee OA. That will be compared to exercise therapies in house maid females [5]. The manual therapy technique, mobilization with movement (MWM) is advocated by Brian Mulligan for the treatment of stiffness, joint pain and dysfunction [6]. According to this technique, the movement which is painful is performed by the patient actively. And at the same time the sustained glide parallel to the joint is applied by the physiotherapist. The aim of MWM is to make the patient free from joint pain and also performs full range of motion in joint. The technique of MWM reduces the positional mistakes at joint which occurs in a joint injury [7]. The treatment through MWM shows the rapid recovery in function and pain in different studies. But the effect of Mobilization with Movement on knee OA is not evaluated in these studies. Therefore, the first aim of the study is to find the effect of MWM on pain and function of the joints. Exercise is an important component playing role in active living for a normal human healthy life as well as in patients having joint issues and disability. The universal guideline also shows its importance especially in management of knee osteoarthritis patients. Exercise therapy is defined as the interventional programs that we use for improvement of functional performances, disability. These consist of different range of motion; for redevelopment of movement,

endurance, polymetric activities, strength training improving balance and coordination exercises i.e. for overall prevention and promotion of health-wellness and fitness [8]. Knee Osteoarthritis is a prevalent musculoskeletal disorder that often affects the knees and hips. Hip and knee OA patients frequently suffer discomfort and diminished joint function [3-5], which can lower quality of life and impact one's capacity to work. Young and additionally, earlier mortality and a higher prevalence of comorbidities are linked to knee OA. This rationale of this study is to help us to determine the effect of exercise therapy and MWM in patients with knee osteoarthritis. Through this the patients of knee OA get relief from pain and able to perform activities of daily living better. The management of knee OA is aim to control pain while improving the quality of life and functional ability of the patient. Thus the patients will be able to do activities of normal living. This also helps the patients to prevent from surgery by daily exercise interventions and therapy.

Materials and Methods

The Study design was Randomized controlled trial (RCT). This Clinical trial was registered in US Clinical Trial registry with reference no. NCT05403645. Data was collected from Chaudhary Akram Teaching Hospital affiliated with Azra Naheed Medical College Superior University, Physiotherapy department of DHQ hospital, Kasur and Govt. kot Khawaja Saeed hospital, Lahore. Study population was the patients with knee OA. The study took 6 months to complete from June 2022 to November 2022. Sample size measuring by open epi tool [9]. The total sample size calculated was 32. Considering a drop-out rate of 10 % total sample size required was 38 (19 in each group) [10] Simple random sampling technique used for sample collection. This study was Assessor Blind. The trial of this study got registered in US clinical Trial Registry. Eligibility criteria were consisted of following including points. Subject with age group of 40-60 included in this study [11] Patients had History of knee osteoarthritis, with grade I or II [11]. Patients included with No impairment in other body parts [12]. Only female gender include in this study. Patients already diagnosed with osteoarthritis by orthopedic surgeon [11] Diagnostic criteria of ACR (American college of rheumatology) for knee OA-knee pain + 5 of 9, Age 40-60, Stiffness < 30 min, Crepitus, Bony tenderness, No palpable warmth, bony enlargement, ESR < 40 mmol/hour, RF < 1/40 and synovial fluid signs of osteoarthritis. Exclusion criteria were consisted of following points like Patients with communication problems [13]. Patients with a history of previous stroke or other neurological diseases or disorders [14]. Patients with any type of wound [13]. Patients who had undergone any surgery [15]. Infection or dermatological conditions [15]. Cardiovascular problems (unstable angina, recent myocardial infarction within the last three months, significant heart valve dysfunction, congestive heart failure etc) [16].

The total Population of 38 participants were divided into 2 groups. In which the Group A receives Exercise therapy and group B receives

Mulligan’s Mobilization with movement. Both groups received total 24 treatment sessions. The data were collected from participants at day 0 and 6 month of the treatment. The Exercise therapy group (Group A) receives the exercises in combination with physical modalities. Exercises included 3 strengthening exercises and 3 stretching exercises for knee joint. The participants were asked to perform strengthening exercises and perform each exercise daily a repeated for 10 times in 3 sets. The stretching exercises were also performed daily for 15 seconds for 4 times a day. The physical modalities which given to participants were include TENS, HOT PACK and delorme etc. [17]. The participant in Group B receives an intervention of Mulligan’s MWM techniques such as Natural apophyseal glide (NAGS) and Sustained natural apophyseal glide (SNAGS) with medial glide, medial rotation MWM and also Anterior and Posterior glides. On day 0 of treatment the participants assessed about the sensitivity of pain in

both weight bearing and non-weight positions. If the patient had pain in both positions he was given MWM in both positions first weight bearing and then non weight bearing with 2 sets of 10 repetitions [18]. Total 38 patients were fulfilling the inclusion criteria selected. Informed consent was taken from the subjects. The participants were educating regarding basic characteristics of research. Every participator has right to refuse to take part in any time during the study. Questionnaires were given to participants in the form of hangouts. Study was organized after acceptance from administration and ethics panel. Surety given to students that their identity remained hidden and their data has not been leaked. SPSS version 23 was be used for analysis of data. Mean and standard deviation was calculated for quantitative variables. Independent subject t-test was used for comparison of quantitative variables between the two groups. P-value (< 0.05) was considered significant.

Table 1: Frequency of different age groups BMI and Severity of Disease.

Age of Patient					
		Frequency	Percent	Valid Percent	Cumulative Percent
Age	41	1	2.6	2.6	2.6
	42	1	2.6	2.6	5.3
	44	1	2.6	2.6	7.9
	45	4	10.5	10.5	18.4
	46	3	7.9	7.9	26.3
	47	3	7.9	7.9	34.2
	48	1	2.6	2.6	36.8
	49	4	10.5	10.5	47.4
	50	2	5.3	5.3	52.6
	52	5	13.2	13.2	65.8
	55	3	7.9	7.9	73.7
	56	2	5.3	5.3	78.9
	57	1	2.6	2.6	81.6
	58	1	2.6	2.6	84.2
	59	1	2.6	2.6	86.8
60	5	13.2	13.2	100	
Treatment Groups	Exercise therapy	19	50	50	50
	Mobilization with movement	19	50	50	100
BMI	underweight	7	18.4	18.4	18.4
	normal	31	81.6	81.6	100
Severity Grading	grade 1	5	13.2	13.2	13.2
	grade 2	33	86.8	86.8	100

Results

This study was conducted among the household women having knee osteoarthritis. The study was on females between the age range of 40 to 60 and the total participants were 38 and were divided into two groups 19 participants in each group .the results show that the participants with a mean age and percentage as following 41 (2.6%),42 (2.6%) and 44 (2.6%),45(10.5%),46 (7.9%),47 (7.9 %),48 (2.6%),49 (10.9 %),50 (5.3 %),52 (13.5 %) ,55 (7.9 %),56 (5.3%),57 (2.6%),58 (2.6%),59 (2.6%),60(13.5%). Group A includes 19 participants that received exercise therapy. Group B 19 patients were received MWM. The patients with underweight BMI were 7(18.4%) and the patients with normal BMI were 31(81.4%). The severity of the symptoms in patients with grade 1 were 5(13.2%) and grade 2 were 33(86.8%) (Table 1). Frequency of different age groups. BMI and Severity of disease Outcomes were assessed by using two scales VISUAL ANALOG SCALE and Western Ontario and McMaster universities Osteoarthritis Index Scale. The test of normality was also applied and data was normally distributed and showed non-significance so parametric test is applied. The within group assessment was analysed by paired sample T test whereas the between group assessment was assessed by independent sample T test. According to paired sample test, The Mean and Standard deviation value of the Visual analog scale on pre score is 7.08±0.997 and the Mean and standard deviation value of the visual analog scale on post score is 3.45±1.826 for both groups with their mean difference between pre and post value of visual analog scale is 3.63±0.829. The p value between them is 0.00 and within the groups is (<0.05) which shows significant difference .The Mean and Standard deviation value of the WOMAC on pre score is 50.87±13.368 and the Mean and standard deviation value of the WOMAC scale on post score is 26.97 ±14.070 for both groups with their mean difference between pre and post value of Womac scale is 23.9±0.702 The p value between them is 0.00 and within the groups is (<0.05) which shows significant difference (Table 2). The mean, standard deviation value, mean difference and P value of paired sample test table (VAS and WOMAC Score) Paired samples test.

Table 2: The mean, standard deviation value, mean difference and P value of paired sample test table (VAS and WOMAC Score) Paired samples test.

VAS	Group A And Group B	P value
Pre Vas	7.08±0.997	
Post Vas	3.45±1.826	0.000
Mean difference	3.63±0.829	
Pre WOMAC	50.87±13.368	
Post WOMAC	26.97±14.070	0.000
Mean difference	23.9±0.702	

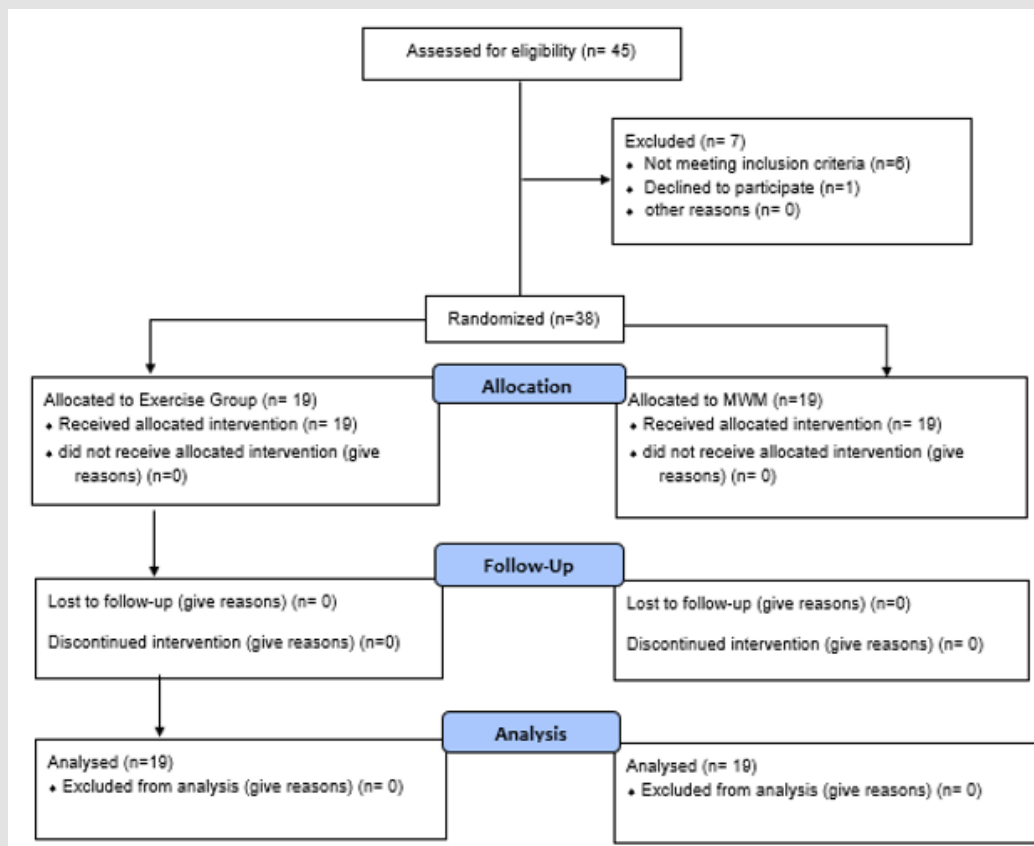
The results of independent sample T test showed that the Mean and Standard deviation value of the VAS at pre level in Group A was 7.11±0.685 and Group B was 7.05±1.26. The Mean and standard deviation value of post VAS score in group A was 5.16±0.688 and in group B was 1.74±0.452. The P value in Pre VAS was 0.873 (>0.005) and the post comparison between Group A and B has showed the significant difference because the p value was 0.000 (<0.005). The results of independent sample T test shows that the Mean and Standard deviation value of the WOMAC at pre level in Group A was 50.95±14.71 and Group B was 50.79±12.90. The Mean and standard deviation value of post WOMAC score in group A was 37.74±11.19 and in group B was 16.21±6.088. The P value in Pre WOMAC was 0.972 (>0.005) and the post comparison between Group A and B has showed the significant difference because the p value was 0.000 (<0.005). Lower score implies a better post-treatment improvement. P value indicated that the mean pain score before and after therapy, The P value between pre and post score with in group (<0.05) shows significant difference. Hence P-value shows that the mean difference of knee Osteoarthritis before and after treatment is significant. The test of normality was also applied and data was non-significant (Table 3). The Mean, Standard deviation, Mean difference and p value of both groups in independent sample test results.

Table 3: The Mean, Standard deviation, Mean difference and p value of both groups in independent sample test results.

VAS	Group A	Group B	P value
Pre VAS	7.11±0.685	7.05 ± 1.268	0.873
Post VAS	5.16±0.688	1.74±0.452	0.000
Mean Difference	1.95±0.003	5.31±0.816	
Pre WOMAC	50.95±14.171	50.79±12.904	0.972
Post WOMAC	37.74±11.194	16.21±6.088	0.000
Mean Difference	13.21±2.977	34.58±6.816	

Consort Flow Diagram

(Flow Chart 1).



Flow Chart 1: CONSORT Flow chart showing enrollment, intervention allocation and follow up of the patients.

Discussion

The aim of the study was to determine the effect of exercise therapy and Mulligan's mobilization with movement techniques on pain and difficulty in performing ADLs with knee OA in household females. At the end of the study, results showed that there is a significant improvement in functional status and pain in patients with knee OA by applying exercise therapy and mobilization with movement in both groups. But the Group B showed more improvement in pain and functional status in patients which received Mulligan's Mobilization with movement and was indicated by significant reduction in VAS and WOMAC scores. This study suggested that WOMAC index scores reduced by a minimum of 20% to 25% level were considered as meaningful [19]. The participant in Group B received an intervention of Mulligan's MWM techniques with medial glide, medial rotation MWM and also Anterior and Posterior glides. On day of treatment, the participants assessed about the sensitivity of pain in both weight bearing and non-weight positions. If the patient had pain in both positions, he was given MWM in both positions first weight bearing and then non-weight bearing with 2 sets of 10 repetitions [20].

The results of our study were coherent with the Systematic review based on the randomized Clinical trial conducted by (Gidey Gomera Weleslassie, et al. [21]) to compare the effectiveness of MWM in patients with knee OA. Total 704 participants from 15 RCTs were included in the study. According to the current systematic review, there were significant differences in flexion range of motion, the Western Ontario and MacMaster Universities Osteoarthritis Index (WOMAC), and the visual analogue scale (VAS) between MWM groups and control groups. The results of this study's systematic review imply that Mulligan's MWM might be an alternative for treating patients with knee osteoarthritis. This study confirms the research showing that Mulligan's MWM helps patients with knee osteoarthritis feel less pain and function better physically [21]. (Aniqa Kiran, et al. [22]) and the findings of this study demonstrated that MWM was more successful in treating knee OA in terms of reducing pain and enhancing ROM. When MWM technique was used in conjunction with traditional physiotherapy, it was found that patients' pain levels, functional limitations, and knee ranges of motion significantly improved as compared to when corrective Maitland mobilization. The mean pre- and post differences in MWM group were 4.06 ± 0.99 ,

10.19 ± 3.87, and 19.41 ± 7.58 for VAS, ROM flexion, and WOMAC Index, respectively, while the pre- and post mean difference values for Maitland mobilization group were 3.355 ± 1.05, 10.19 ± 5.5, and 12.28 ± 7.029 for VAS, ROM flexion, and WOMAC Index, respectively. The mean differences of both treatment interventions individually were significant and showed that both were clinically effective in treating the patients of knee OA. This study result showed the similarity with our result [22].

It has seen that the Value of p in the Pre and Post Level in same group and the comparison of the post value of the exercise group with MWM group showed the significant improvement because the p value was (<0.05). The POST WOMAC scale comparison between MWM the exercise group also showed that the morning stiffness significantly reduced in MWM group and the daily life function were enhanced in MWM group. This showed the similarity with study conducted by S Mahmooda et al. (2020) Effects of Mulligan's mobilization with movements versus myofascial release in addition to usual care on pain and range in knee osteoarthritis. However, MWM was found to be more effective in improving knee range of motion. The p-value for the difference between the two groups was (<0.001) [23]. A randomized controlled trial by Hani A. Alkhawajah (2019) compared the effectiveness of MWM and exercise therapy in knee OA patients According to the current study, MWM, but not sham MWM, has a local and systemic hypoalgesic impact, raises knee flexion range of motion, boosts knee flexor and extensor strength, and enhances physical function in knee OA patients. More studies are required to determine the long-term effectiveness of this strategy, even though this study showed immediate and short-term improvements that maintained for two days following the intervention. The P-value was less than 0.05 for this comparison. These findings suggest that MWM may be more effective in improving knee range of motion in knee OA patients. This study is coherent with our results [24]. Anjali Vyankatesh Kulkarni, et al. in 2017 conducted a study and the result showed that Both groups experienced satisfactory outcomes at the conclusion of the three days of therapy, as shown by significant VAS decreases (p 0.05) and improvements in the distance covered by the 6-minute walk test during the three days. However, the experimental group's post-treatment distance travelled (mean =37, Compared to the post-treatment distance covered in the control group (mean =35, SD=23.146), SD=16.882 was noticeably better. They concluded that individuals with knee osteoarthritis can experience pain relief using Mulligan's Mobilization with Movement (MWM) approach. Following treatment, the experimental group showed a statistically significant decrease in VAS (pain) and a notable improvement in the distance travelled by the individuals. The study result coherent with our study because the group who received the mobilization treatment showed the significant improvement in reducing the pain and improving the function of the daily living

Conclusion

The results concluded that that the group which receives Mulligan's Mobilization with movement are more effective than the other group which receives Exercise therapy and is important in the treatment and reducing symptoms of grade I and II knee osteoarthritis in household female patients with age of 40-60.

Limitations and Recommendations

The limitations of study are that the data was collected from small population and treatment is done for short duration of time. The patients are included in this study are only household females with knee osteoarthritis history and excluded the patients with other disease and injury It is highly recommended that the study conducted on large number of population and area, for long duration of time. It is recommended to include patients with other body disease and injuries. It is also recommended that to have further study to find out how long the effect of Exercise therapy and Mobilization with Movement effects last for weather its effect remain or reduced on long term basis.

Ethical Approval Letter and Consent to Participant

All the study protocol was applied to conduct this study accordance to the relevant guidelines and regulation. Data was collected from the patients fulfilling the inclusion criteria after the informed consent. It has not affected patient's cultural norms, values and ethics. This study was approved from the ethical committee of the superior university and participant in this study has given their proper consent before the start of the study. The Consent form also available and will provided on request.

Consent of Publication

Consent from all the patients was taken including the study publication.

Availability of Data and Materials

The datasets used and/or analyzed during the current study and available from the corresponding author or reasonable request.

Competing Interest

The authors declare that they have no competing interests.

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