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**Original Article**

# Comparison of Maitland Mobilization and Mulligan Mobilization with Movement in Knee Osteoarthritis Patients

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## Abstract

**Background:** Osteoarthritis has no known cure. The management aims to decrease pain and improve the functional capacity and then the quality of life. Physiotherapy has played vital role to prevent all of these remedies for knee osteoarthritis that would be helping in economic burden as well as relieving symptoms of patients.
**Objective:** The purpose of this study was to determine the outcome and comparative efficacy of Mulligans mobilization with movement and Maitland mobilization in the patients with knee osteoarthritis.
**Study type, settings & duration:** A Quasi Experimental study was conducted at physiotherapy department of Kanaan Physiotherapy and Spine Clinic, Lahore from March to September 2020.
**Methodology:** It was a Quasi Experimental study. Sample size was 56. Subjects were randomly distributed in to two groups with use of lottery method of randomization. Both male and female diagnosed knee osteoarthritis patients aged between 40-60 years were included. Patients having contraindication to mobilization, history of recent fractures were excluded. Group 1 patients got Maitland mobilization treatment and Group 2 got Mulligan mobilization with movement treatment. The goniometry, visual analog scale (VAS), knee range of motion (ROM), and Western Ontario McMaster OA (WOMAC) Index for knee osteoarthritis were used to assess all patients before and after 4 weeks of intervention. Statistical analysis was computed by SPSS version 21.0.
**Results:** Pain decreased to greater extent in post treatment of Mulligan's MWM group with mean value 2.64±1.13 as compared to 4.93±1.12 of Maitland Mobilization group. WOMAC Score increased to greater extent in post treatment of Mulligan's MWM with mean value 20±8.52 as compared to Maitland Mobilization group 41.07±9.41
**Conclusion:** It was indicated that combination of mulligan mobilisation along with supervised exercise program was helpful in pain relief, improving range of motion, strength and functional status in subjects with knee osteoarthritis.
**Key words:** Osteoarthritis, knee, manual therapy, manipulative therapy.

## Introduction

Osteoarthritis (OA) is a multifactorial degenerative joint problem, which is the most common cause of disability.[1,2] It is the most commonly occurring form of all arthritis types.[3] It accounts for functional disability and pain in 19.2 - 27.8% of people who are more than 45 years of age.[4]

About 37 % people have knee OA after the age of 60 years diagnosed through knee radiographs. The management aims to decrease pain and improve the functional capacity and quality of life.[5] The most common treatment options available are pharmacological and joint replacement surgeries. Surgery has a higher risk especially in old age population.[6,7]

The Maitland idea can be applied to peripheral or spinal joints; both require technical explanation and differ in technical terms and consequences,

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**Authors Contribution**

ST conceptualized the project. MS & SM did the data collection. ZM did the literature search. Statistical analysis was performed by NA & KK. Drafting, revision & writing of manuscript were done by KK & SM.

but the overall theoretical approach is comparable. Geoffrey Maitland, along with numerous of his colleagues, was regarded as a pioneer of musculoskeletal physiotherapy. The Maitland idea is an excellent way to conduct a first evaluation since it allows you to develop a logical and reasoned hypothesis regarding the nature of the movement disorder or pain's roots.[8] It may be demonstrated that Maitland mobilization reduces pain and improves functional mobility and pain-free squat angle in arthritic knees soon after therapy.[8]

Mulligan Mobilization with movement (MWM) is the simultaneous application of a therapist's sustained auxiliary mobilization and the patient's active physiological movement to end range. Passive end-of-range overpressure, also known as stretching, is then applied without the use of pain as a barrier.[9] In patients suspected of having meniscal disease in the knee, the MC can be used to evaluate and treat them.[10]

Treating knee OA is raising economic burden by usage of different drugs such as NSAIDs or opioids analgesics, inter articular steroidal injections, expensive injections of cartilage which is quite expensive, and increasing surgeries including arthroplasty. Physiotherapy has played vital role to prevent all of these remedies for knee OA that would be helping in economic burden as well as relieving symptoms of patients. The physiotherapy of knee OA includes mobility exercises of knee joint and hip joint (isometric training and strength training) by including different muscles group. Flexibility exercises of other group of muscles, aerobic exercises; aquatic exercises are playing very important role. On other hand Taping electrotherapy modalities including thermotherapy, electro physical modalities are getting more popular nowadays.[11]

Several multidisciplinary approaches have been suggested in literature, begins from lifestyle changes of population and postural correction, medication for symptomatic cure and surgical procedures. Physiotherapy interventions including; physical agents like heat modalities, traditional acupuncturing taping, transcutaneous electrical never stimulation, manual therapy, aquatic exercises, orthosis in the form of medial or lateral insoles, and weight loss programs have proven with strong evidences.[12]

The aim of this study was to compare two non-invasive treatment techniques, one was Maitland Mobilization and other was Mulligan's MWM with heating pad and knee isometrics as baseline treatment in both groups on pain reduction, and improvement in range and functional mobility in Knee osteoarthritis. Previously researches were done on both these techniques alone. Very little literature was found on combined effects of these techniques with knee isometrics.

## Methodology

It was a Quasi Experimental study. Non probability convenience sampling was used. Sample size was calculated through G*power software.[13] Sample Size of this study was 56 (28 in each group). The study was conducted at physiotherapy department of Kanaan Physiotherapy and Spine Clinic, Lahore. Study was completed in six months from March to September 2020. The participants were included between ages 40-60 years, with knee OA (diagnosed already), both male and female patients with reduced knee ROM (greater than 10 degrees) due to pain in one or both knee joints and WOMAC score above 10 chronic stages of knee pain. The participants were excluded in case of having contraindication to mobilization, history of recent fractures, having other major musculoskeletal problems, with recent history of knee trauma and prolonged immobilization and any active inflammation in the knee joint. Subjects were randomly distributed to two groups with use of lottery method of randomization. Group 1 patients got Maitland mobilization treatment and Group 2 got Mulligan mobilization with movement treatment. During the first visit, patient went through following steps. The researcher completed a thorough case history, full physical examination and knee regional assessment. Afterwards patients were assessed using the WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) Score for function, Numeric Pain Rating Scale (NPRS) for pain and Goniometer was used to assess knee flexion and extension range of motion. Treatment was then continued according to allotted group intervention. All participants received a total of 18 treatment sessions over a 6-week period, which consists of 3 treatment sessions per week. Researcher took a follow up value after 18 sessions. A follow up assessment was done at the end of 18 sessions as the post treatment reading.

The data was evaluated by IBM statistical package of social sciences version 21. The quantitative variables were presented as mean and standard deviation. For checking the normality in the data kolmogoroy-smirnov test was used before/after comparisons was done using parametric methods as data was normally distributed. For within group comparison, paired sample t-test and for between groups comparison independent t test was applied.

An alpha-level of 0.05 was selected for level of significance.

The Ethical approval was obtained from Ethical Review Committee of Kanaan Physiotherapy and Spine Clinic, Lahore.

## Results

Participants in Maitland Mobilization were presented with mean age of 37.76±10.23 years and in Mulligan MWM group with 37.85±10.71 years. Participants in Maitland Mobilization were presented with mean height of 163.44±7.91 centimeters and in Mulligan MWM group with 158.87±8.38 centimeters. Participants in the Maitland Mobilization group had mean weight of 66.10±11.23 kg and in Mulligan MWM category with 63.25±10.62 kg. Participants in Maitland Mobilization group were with mean BMI of 24.67±3.69kg/m2 and in Mulligan MWM group with 25.02±3.80kg/m2.

Table-1 shows the between group comparison of numeric pain rating sale. Participants of Maitland mobilization group shows pre-treatment values 7.36±1.45 and post treatment value 4.93±1.12. Mulligan with movement mobilization group shows pre-treatment value of 7.11±1.364 and post treatment value 2.64±1.13.

Table-2 shows the between group comparison of WOMAC SCORE. Participants of Maitland mobilization group shows pre-treatment values 68.96±14.84 and post treatment value 41.07±9.41. Mulligan with movement mobilization group shows pre-treatment value of 71.93±9.41and post treatment value 20±8.52

**Table 1: Comparison between groups based on numeric pain rating scale (NPRS).**

| | | *Treatment Group* | | *p value* |
|---|---|---|---|---|
| | | *Maitland Mobilization (n=28)* | *Mulligan's MWM (n=28)* | |
| NPRS | Pre-treatment (Mean±SD) | 7.36±1.45 | 7.11±1.34 | 0.51 |
| | Post-treatment (Mean±SD) | 4.93±1.12 | 2.64±1.13 | 0.000 |

There was statistically significant difference between both groups in pre-treatment and post-treatment scores of NPRS with *p* value <0.05. But there was marked reduction of pain in group A with mean value 2.70±0.65 than group B with mean of 3.50±0.94.

**Table 2: WOMAC score comparison between two groups.**

| | | *Treatment group* | | *p value* |
|---|---|---|---|---|
| | | *Maitland Mobilization (n=28)* | *Mulligan's MWM (n=28)* | |
| WOMAC | Pre-treatment (Mean±SD) | 68.96±14.84 | 71.93±13.88 | 0.443 |
| | Post-treatment (Mean±SD) | 41.07±9.41 | 20.00±8.52 | 0.000 |

Represented higher mean difference in group A (4.06) compared to group B (3.2). Results disclosed that both groups with *p* value <0.05 differed significantly. Group A showed peak movement range enhancement with mean 142.75±9.66 compared to the other group with mean value of 107.40±8.14.

The findings disclosed a statistically pronounced distinction between the two *p* value groups < 0.05. The mean value of group A of 54.65±5.65 showed a marked rise in movement spectrum than group B with a mean value of 43.95±6.12.In Group A, (9.73), the mean difference was more pronounced than in Group B (3.75).

There was significant difference of mean between two groups. Group A presented with mean of 142.85±9.05 that was higher than mean of Group B 116.25±11.22. A significantly higher mean difference of (22.11) in group A relative to group B (10.5) was found. Findings showed that there was a substantial distinction in movement range between two groups with p value < 0.05 with mean value of 71.60±8.74 in group A and 55.20±7.00 in group B. A greater mean difference of 7.9 from group B 1.25 in group A was found. Findings were considerably distinct and maximum movement range improvement was observed in group A as compared to group B with the mean of 83.50±5.87 and 74.50±10.99 respectively. There higher mean difference in group A (11.05) as compared to group B (2.5).

## Discussion

The aim of this study was to compare two non-invasive treatment techniques, one was Maitland Mobilization and other was Mulligan's MWM with heating pad and knee isometrics as baseline treatment in both groups on pain reduction, and improvement in range and functional mobility in Knee osteoarthritis. This study directed the focus of researchers on the efficacy of Maitland mobilization and Mulligan's mobilization with movement in males

and females suffering from knee osteoarthritis. In current study, there is statistically significant difference in results of NPRS in between group analysis. Pain decreased to greater extent in post treatment of Mulligan's MWM group with mean value 2.64±1.13 as compared to 4.93±1.12 of Maitland Mobilization group. The decrease in pain intensity in group B could be linked to the rationale that Mulligan Mobilization with movement eases the tense nervous system, specially the posterior horn by normalising the painful stimulus. The mechanism of this pain reduction by MWM is still not understandable, however, neurophysiological and biomechanical mechanisms might be the reason. Biomechanically, it was found that MWM might correct the alignment of bones making a joint and some sources propose positional fault.[14] Currently, the evidence is insufficient to correction of faults in position of bones.[15] The pain was also reduced in Maitland group and it was attributed to the hypothesis that Maitland mobilization techniques cause the activation of mechanoreceptors in the joint that is stretched by these techniques. Initially, there is a short impulses burst from type II that changed in to longer activity of receptors of type I. Maitland mobilization consists of oscillatory movements that has an inhibitory effect on the pathway of painful impulses that are repetitively produced by activation of mechanoreceptors that block the nociceptive signals at the brainstem or spinal cord level. Mobilization improves the blood supply of tissue and nerves and thus plays an important role in the dispersal of pain chemicals. There is better secretion of synovial fluid around the avascular structures inside the joint e.g. cartilage. There is increased venous drainage and reduction in pressure on nerve endings in return. All this leads to reversal of swelling, ischemia and effusion in the joint.[16]

The results are in accordance with one study conducted in 2018 in which mobilization based treatment was given for Knee osteoarthritis to check the effects on pain and function.[17] Mobilization was found to be very effective in reducing the pain. Another study was done by Heywood S et al. and results were similar as far as pain is concerned.[18]

The results of present study showed that there was statistically significant difference between post-treatment Knee flexion of 02 groups with *p* value <0.05. Angle increased to greater extent in post treatment of Mulligan's MWM group with mean value 129.64±15.13 as compared to Maitland Mobilization group 125.86±8.25. These results are consistent with another previous research which shows the similar results in terms of improvement in quality of life measured by WOMAC.[19] The results showed that there was statistically significant difference between Post-Treatment Knee extension range of motion of 02 groups with *p* value <0.05. Score increased to greater extent in post treatment of Mulligan's MWM group with mean value 1.64±2.22 as compared to Maitland Mobilization group 4.25±3.43. These results are supported by a previous research which shows improvement in knee flexion after MWM as well as Maitland mobilization but results are clinically more significant in Mobilization with movement group.[20] The improvement in range of motion of knee may be due to breakdown of adhesions and maintenance of joint nutrition due to better supply of blood after the application of mobilization. Maitland mobilization not only improves the blood circulation but also stretch the shortened tissues around and inside the joint. Greater increase in range in Mulligan mobilization with movement might be due to the fact that it is applied in functional position and thus joint is functionally better.[21]

The results of this study concluded that Mulligans mobilization with movement is more effective technique to improve pain, ROM and function in knee osteoarthritis patients. Maitland technique is also effective but results showed significant effects of Mulligan's MWM.

There was small sample size and there were more male patients as compared to females, so it is not possible to generalize outcome to entire population. No long term follow-up was conducted. Well-randomized clinical trial with random sampling including control group should be designed in future.

**Conflict of interest:** None declared.

## References

1. Panush RS, Lane NE. Exercise and the musculoskeletal system. Baillière's clinical rheumatology. 1994; 8(1): 79-102.
2. Control CfD, Prevention. Prevalence of disabilities and associated health conditions among adults-United States, 1999. MMWR Morb Mortal Wkly Rep 2001; 50(7): 120-5.
3. Creamer P, Hochberg MC. Osteoarthritis. Lancet 1997; 350(9076): 503-8.
4. Al-Arfaj A, Al-Boukai AJCr. Prevalence of radiographic knee osteoarthritis in Saudi Arabia. Clin Rheumatol 2002; 21(2): 142-5.
5. Jordan JM, Helmick CG, Renner JB, Luta G, Dragomir AD, Woodard J, et al. Prevalence of knee symptoms and radiographic and symptomatic knee osteoarthritis in African Americans and Caucasians: the Johnston County Osteoarthritis Project. J Rheumatol 2007; 34(1): 172-80.
6. Mease PJ, Hanna S, Frakes EP, Altman RDJTJor. Pain mechanisms in osteoarthritis: understanding the

role of central pain and current approaches to its treatment. J Rheumatol 2011; 38(8): 1546-51.
7. Ledingham J, Regan M, Jones A, Doherty M. Radiographic patterns and associations of osteoarthritis of the knee in patients referred to hospital. Ann Rheum Dis 1993; 52(7): 520-6.
8. Rao RV, Balthillaya G, Prabhu A, Kamath A. Immediate effects of Maitland mobilization versus Mulligan Mobilization with Movement in Osteoarthritis knee-A Randomized Crossover trial. Randomized Controlled Trial 2018; 22(3): 572-9.
9. Altmış H, Oskay D, Elbasan B, Düzgün İ, Tuna ZJIo. Mobilization with movement and kinesio taping in knee arthritis—evaluation and outcomes. Int Orthop 2018; 42(12): 2807-15.
10. Rhinehart AJ. Association AHSOJotOAT. Effective treatment of an apparent meniscal injury using the Mulligan Concept. JSMAHS 2015; 1(2): 4.
11. Page CJ, Hinman RS, Bennell KL. Physiotherapy management of knee osteoarthritis. Int J Rheum Dis 2011; 14(2): 145-51.
12. Hochberg MC, Altman RD, April KT, Benkhalti M, Guyatt G, McGowan J, et al. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. Arthritis Care Res 2012; 64(4): 465-74.
13. Faul F, Erdfelder E, Lang A-G, Buchner AJBrm. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 2007; 39(2): 175-91.
14. Deyle GD, Allison SC, Matekel RL, Ryder MG, Stang JM, Gohdes DD, et al. Physical therapy treatment effectiveness for osteoarthritis of the knee: a randomized comparison of supervised clinical exercise and manual therapy procedures versus a home exercise program. PhysTher 2005; 85(12): 1301-17.
15. Takasaki H, Hall T, Jull G. Immediate and short-term effects of Mulligan's mobilization with movement on knee pain and disability associated with knee osteoarthritis–A prospective case series. Physiother Theory Pract2013; 29(2): 87-95.
16. Takasaki H, Hall T, Jull G. Immediate and short-term effects of Mulligan's mobilization with movement on knee pain and disability associated with knee osteoarthritis--a prospective case series. Physiother Theory Pract 2013; 29(2): 87-95.
17. Kiran A, Ijaz MJ, Qamar MM, Basharat A, Rasul A, Ahmed W. Comparison of efficacy of mulligan's mobilization with movement with maitland mobilization along with conventional therapy in the patients with knee osteoarthritis: A randomized clinical trial. Libyan Int Med Uni J 2018; 3(1): 26.
18. Heywood S, McClelland J, Geigle P, Rahmann A, Villalta E, Mentiplay B, et al. Force during functional exercises on land and in water in older adults with and without knee osteoarthritis: Implications for rehabilitation. The Knee 2019; 26(1): 61-72.
19. Vicenzino B, Paungmali A, Teys P. Mulligan's mobilization-with-movement, positional faults and pain relief: current concepts from a critical review of literature. Manual Ther 2007; 12(2): 98-108.
20. Vicenzino B, Paungmali A, Buratowski S, Wright A. Specific manipulative therapy treatment for chronic lateral epicondylalgia produces uniquely characteristic hypoalgesia. Man Ther 2001; 6(4): 205-12.
21. Pollard H, Ward G, Hoskins W, Hardy K. The effect of a manual therapy knee protocol on osteoarthritic knee pain: a randomised controlled trial. J Can Chiropr Assoc 2008; 52(4): 229-42.