

# Effect of Mulligan's Mobilization on Unilateral Tibiofemoral Osteoarthritis; A Randomized Control

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## Author's Contribution

<sup>1,2</sup>Conception and design, Collection and assembly of data, Critical revision of the article for important intellectual content, Statistical expertise, Final approval and guarantor of the article.

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## A B S T R A C T

**Objective:** To determine the effect of Mulligan's Mobilization on unilateral tibiofemoral osteoarthritis.

**Methodology:** A randomized control trial was conducted at Hayatabad Medical Complex, Khyber Teaching Hospital, and Naseer Ullah Khan Babar Memorial Hospital Peshawar. Thirty patients with unilateral tibiofemoral osteoarthritis were randomly assigned into two groups. Both males and females aged 40 to 60 years and diagnosed with case of tibiofemoral OA were included in the study. Patients with a history of TKR and metabolic and endocrine disease were excluded from the study. Each group consists of 15 patients. Group "A" received Mulligan's Mobilization along with diathermy (experimental group). Group "B" received conventional physical therapy along with diathermy (control group). Both groups were treated for four weeks with three sessions per week on alternate days. WOMAC scale was used for functional activity, stiffness, and pain. VAS was used for pain severity. A goniometer was used for the assessment of the range of motions.

**Results:** A total of thirty patients with unilateral knee osteoarthritis participated in this study, the percentage of male and female participants were 33.3% and 66.7% respectively. The experimental and control groups showed no statistical differences in pain intensity post-study with a  $P = 0.60$  ( $P > 0.05$ ). The scores of WOMAC also show no statistical differences in both groups after intervention with a  $P = 0.34$  ( $P > 0.05$ ). The experimental and control groups showed no statistical differences in flexion range post-study with a  $P = 0.30$  ( $P > 0.05$ ).

**Conclusion:** Both Mulligan's Mobilization and conventional therapy can effectively increase the range of motion, decrease pain, and increase the functional activity of patients with knee osteoarthritis.

**Keywords:** Manual Therapy, Knee Osteoarthritis, Mulligan's Mobilization, Range of Motion, Articular.

## Introduction

Osteoarthritis is a degenerative disorder of multifactorial etiology with loss of periarticular bone remodeling characterized by loss of articular cartilage. It is a combination of joint injuries and different genetic abnormalities.<sup>1</sup> OA is the leading cause of disability and chronic musculoskeletal disorder.<sup>2</sup> The most important risk factors are overweight, previously injured knee, Heberden's nodes, and positive family history.<sup>3</sup> According to the world health organization, osteoarthritis has become the fourth most important cause of disability in females and the eighth-most important cause in males.<sup>4</sup> Osteoarthritis of the knee is clinically characterized by

pain in weight-bearing, crepitus, tenderness, effusion, local inflammation, and limited range of motion of the knee joint. Pain is common in individuals with knee osteoarthritis.<sup>2, 5</sup> stiffness, reduced muscular strength, proprioception, crepitus on movement are features of osteoarthritis.<sup>6</sup> In addition, people with knee OA often exhibit poor walking speed, balance deficit, quadriceps weakness, poor neuromuscular control, difficulty in functional activities like stair climbing, decrease walking ability and increase susceptibility to falling.<sup>7</sup> Pain is a common symptom in individuals with osteoarthritis that leads to psychosocial, social, and economic burdens.<sup>8</sup> The person

needs medical attention and rehabilitation that can cause financial problems.<sup>2</sup> Individuals with OA experience more psychological distress as compared to patients having other diseases like diabetes.<sup>9</sup>

For the management of OA, several interventions are available including NSAIDs, intraarticular corticosteroid injections, pharmacological treatment with analgesics, weight loss, use of devices like orthotics and canes, joint lavage, arthroscopic joint debridement, total joint replacement, strengthening exercises, and education counselling.<sup>10</sup> Medical literature showed more than 50 modalities of non-pharmacological, pharmacological, and surgical therapy for knee OA, however international guidelines suggested conservative treatment on the first line. Among these exercise programs are beneficial.<sup>11, 12</sup> TENS, capsaicin cream, and laser therapy reduce pain caused due to osteoarthritis. Evidence showed that knee joint functions were improved by exercises and exercises also decrease the symptoms.<sup>13</sup> Literature has shown that aerobic or cardiovascular exercises are also effective as adjunct therapy.<sup>14</sup> Strengthening exercises and manual therapy techniques have shown to be beneficial in terms of pain, functional ability, and stiffness.<sup>15</sup> Quadriceps strengthening exercises are affected in knee osteoarthritis to reduce pain and increase range of motion.<sup>16</sup> Hydrotherapy can improve pain and functional activity in a patient having knee osteoarthritis.<sup>17</sup> Few studies have been done to determine the effect of mulligan mobilization on unilateral tibiofemoral osteoarthritis. Other studies in this area compare mulligan mobilization with different therapeutic techniques. Thus it is not ascertained whether this technique reduces the proportion of pain and disability or other therapeutic adjunctive therapy. This study aims to determine the effect of mulligan mobilization on unilateral tibiofemoral osteoarthritis.

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## Methodology

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A randomized control trial was conducted at the physiotherapy departments of Hayatabad Medical Complex (HMC), Khyber Teaching Hospital (KTH), and Naseer Ullah Khan Babar Memorial Hospital, and the whole study was completed in approximately six months, from August 2016 to Jan 2017. The sample size was calculated by the OpenEpi tool by taking the post mean values of WOMAC scores from the parent study.<sup>18</sup> A sample of (n=30) patients with Consecutive sampling techniques was randomly assigned by the sealed envelope method and divided into two equal groups. Each group consisted of 15 participants. One group (Experimental) was treated with mulligan mobilization, and conventional therapy along with diathermy and the second group (Control) was treated with conventional physical therapy along with

diathermy. Both males and females aged 40 to 60 years and diagnosed with case of unilateral tibiofemoral OA were included in the study. Patients with a history of TKR, and metabolic and endocrine disease were excluded from the study. All the participants were evaluated at baseline and after completion of the intervention. The pain intensity was measured through a visual analogue scale (VAS). The visual analogue scale (VAS) is a commonly used tool for measuring pain, and a change in the VAS score signifies a change in the amount of pain experienced.<sup>19</sup> The functional activity was measured by the WOMAC index. The Western Ontario McMaster University Osteoarthritis Index (WOMAC) has three components: pain, stiffness, and physical function, which can be reported separately or as an overall index. The WOMAC is a valid tool in osteoarthritis trials.<sup>20</sup> The knee flexion and extension were measured by a goniometer. The Goniometer is a simple and accurate method of determining ROM objectively.<sup>21</sup> The subjects of both groups received treatment for 4 weeks in 3 scheduled sessions per week one session per day. In the control group, each subject received conventional therapy i-e Quadriceps Strengthening Exercise, Hamstring Stretching, Adductor Isometric Exercises, Abductor Isometric Exercises, and Short wave diathermy. In the experimental group, each subject received Mobilization with movement (MWM) including a lateral glide, medial glide, rotational glide and conventional therapy along with Short wave diathermy. For the implementation of the MWM technique, patients were instructed to lie down in a supine position with their knees flexed and then stabilized the distal part of the thigh of the affected knee. The examiner grasped the proximal part of the tibia and apply lateral glide to the tibia and asked the patient to extend and flexed the knee and were questioned about the pain, if the patient has pain then add a medial rotation of the tibia with lateral glide and asked the patient to extend and flexed the knee and were a question about the pain, if the patient has pain then add lateral rotation with lateral glide and performed the same procedure and were asked about the pain then applied the same procedure with medial glide and were asked about the pain. The most effective was lateral glide but we applied the procedure which was suitable for that patient. The data were analyzed through SPSS version 23. Shapiro Wilk test was applied to check the normal distribution of data. According to the Shapiro-Wilk test, all data were normally distributed (P>0.05). For the comparison of the variables independent t-test and paired t-test were applied.

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## Results

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A total of thirty participants were included in the study out of which fifteen participants (50%) were allocated to the

Experimental group and fifteen participants (50%) were allocated to the Control group. Out of the total 30 participants, 10 (33%) were male and 20 (66%) were females. The experimental group received mulligan mobilization, and conventional therapy along with diathermy whereas the control group received conventional physical therapy along with diathermy. Based on the Kellgren Lawrence scale, the majority of participants i.e. 60% had grade 1 knee osteoarthritis and minimum participants i.e. 16% were in grade III knee osteoarthritis (Table I).

Characteristics	N (%)
<b>Gender</b>	
Male	10(33)
Female	20(66)
<b>Age</b>	
40-49	12(39)
50-60	18(60)
<b>Kellgren Lawrence Scale</b>	
Grade I	18(60)
Grade II	7(23)
Grade III	5(16)
<b>Total</b>	30(100)

Variables	Group	Mean ± SD	P-Value <sup>a</sup>
Post VAS	control	4.60 ± 1.9	0.60
	experimental	5.73 ± 1.6	
Post WOMAC scale	control	30.53 ± 9.4	0.34
	experimental	29.87 ± 7.5	
Post flexion	control	131.67 ± 5.5	0.30
	experimental	130.67 ± 5.9	

<sup>a</sup>Independent t-test

Variables	Mean ± SD	P-value <sup>a</sup>	
<b>Control</b>	Pre-VAS	7.47 ± 1.3	0.000
	Post- VAS	4.60 ± 1.9	
<b>Experimental</b>	Pre-VAS	8.00 ± 0.8	0.000
	Post- VAS	5.73 ± 1.6	
<b>Control</b>	Pre-WOMAC Scale	58.07 ± 11.2	0.000
	Post-WOMAC Scale	30.53 ± 9.4	
<b>Experimental</b>	Pre-WOMAC Scale	60.13 ± 13.2	0.000
	Post-WOMAC Scale	29.87 ± 7.5	
<b>Control</b>	Pre flexion	126.6 ± 9.3	0.008
	Post flexion	131.6 ± 5.5	
	Pre-Extension	3.33 ± 4.8	
	Post Extension	2.0 ± 4.1	
<b>Experimental</b>	Pre flexion	126.3 ± 10.0	0.010
	Post flexion	130.6 ± 5.9	
	Pre-Extension	10.0 ± 10.6	
	Post Extension	3.67 ± 4.8	

<sup>a</sup>Paired t-test

The experimental and control groups showed no statistical differences in pain intensity post-study with a P = 0.60 (P>0.05). The scores of WOMAC show no statistical differences in both groups after intervention with a P = 0.34 (P>0.05). The experimental and control group shows no statistical differences in flexion range at post-study with a P = 0.30 (P>0.05) (Table II).

Within-group analysis of the Experimental group shows that all studied factors are statistically significant at pre-test and post-test levels (Table III). Within-group analysis of the Control group shows that all studied factors except for extension are statistically significant at pre-test and post-test levels as mentioned in (Table III).

## Discussion

In our study majority of the patient were females. The ratio of knee osteoarthritis between female and male were 2:1. These findings are consistent with Felson DT et al. conducted the study on incidence and natural history of osteoarthritis. The author reported that the ratio of OA is higher in women than men. New symptomatic OA was also more likely to occur in women. Both progressive knee OA and contralateral knee OA were also somewhat more common in women than in men.<sup>22</sup> Another study "A meta-analysis of sex differences prevalence, incidence, and severity of osteoarthritis" was conducted by Velandai K. Srikanth et al. The study showed that women have more tendency to develop knee OA usually after menopausal age.<sup>23</sup>

The visual analogue scale was used in our study to determine the pain severity of knee osteoarthritis. The study found a significant difference in pain severity in each experimental and control group. There were no statistical differences between the two groups. These findings were observed by R. A. Razek et al conducted an RCT pilot study to find the efficacy of MWM in knee osteoarthritis patients. A total of 30 patients were equally randomized into two groups. Both groups received 12 sessions. Group A was treated with traditional therapy and Group B was treated with mobilization with movement along with traditional therapy. The author concluded regarding pain intensity that there were significant differences between groups in favour of group B with p< 0.05.<sup>24</sup>

Our study used the WOMAC scale to assess pain, stiffness, and functional activity. The study found a significant difference in WOMAC scores in both groups (P< 0.05 in both groups). Although there were no statistical differences between the two groups (P> 0.05). These findings were observed by M. S. Shenouda et al conducted an RCT to compare

extracorporeal shock wave therapy vs MWM in patients with knee osteoarthritis. For this purpose, 45 osteoarthritis patients were randomly assigned into three groups. Disability was measured by the WOMAC scale. Both groups were effective in relieving knee pain and functional activity.<sup>25</sup>

For the assessment of knee range of motion, our study found there is a significant difference in both groups ( $P < 0.05$  in both groups) except no significant difference was observed in the extension range of the control group.<sup>15</sup> These findings were observed by Cheraladhan E et al conducted an RCT to compare the effect of Mulligan mobilization and Maitland mobilization on inpatients with unilateral Knee OA. A total of 60 patients were randomly allocated into three groups. Group A was treated with Mulligan mobilization, Group B received Maitland mobilization and Group C was treated with conventional therapy. The author reported that a comparison of ROM within groups showed significant improvement in three groups but the group treated with Mulligan mobilization showed more improvement.<sup>1</sup>

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## Conclusion

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The study found that both Mulligan mobilization and conventional therapy can be effective in the treatment of knee osteoarthritis.

Study limitation: The sample size of this study was small.

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