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Original Article

# 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

**Aniqa Kiran, Muhammad Junaid Ijaz, Muhammad Mustafa Qamar[1], Ayesha Basharat[1], Akhtar Rasul[1], Waqas Ahmed[1]**

Department of Physiotherapy, Mayo Hospital, KEMU, Lahore, [1]Department of Physiotherapy, Sargodha Medical College, UOS, Sargodha, Pakistan

## Abstract

**Objective:** The objective of this study is to determine the outcome and efficacy of Mulligan's mobilization with movement (MWM) with Maitland mobilization along with conventional therapy in the patients with knee osteoarthritis (OA). **Materials and Methods:** A randomized controlled trial study was performed at the Department of Physiotherapy, Mayo Hospital, Lahore, Pakistan. Sixty-two patients were selected for the study. MWM was introduced in half of the patients and Maitland mobilizations in the second half for 2 weeks. The goniometry, visual analog scale (VAS), knee range of motion (ROM), and Western Ontario McMaster OA (WOMAC) Index for knee OA were the assessment tools used to assess all patients before and after 2 weeks of intervention. Paired sample *t*-test was used for analysis of results. **Results:** The mean pre- and postdifferences 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 postmean 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. **Conclusion:** It was concluded that patients in both groups showed improvement in pain, ROM, and functions.

**Keywords:** Knee osteoarthritis, Maitland mobilization, Mulligan's mobilization with movement

## Introduction

Osteoarthritis (OA) is "A diverse group of different conditions leading toward joint indications and signs which are coupled with the imperfect veracity of articular cartilage as well as other changes along the margins of bone underlying in affected joint."[1] The degeneration occurs due to disarrangement in the usual process of repair of a joint. When the process breaks the synchronicity, there is slow deterioration of the articular cartilage. As a result, the biomechanical influences on the joints are also changed due to loss of normal joint line of gravity. This ultimately leads toward symptomatic changes which are a focal loss of the cartilage covering the articular ends; loss of normal joint space requires for smooth grating, osteophyte formation in joint, and remolding of bone on peripheral areas and along the articular sides.[2] In the elder patients of OA, weakening of the mobility patterns and resulting pain and swelling more commonly occurs in the joints of the lower limb preferably the knee[3,4] OA and its radiological associates track a typical course as the disease advancements occur and clinically useful staging system can be devised out of it. The Western Ontario McMaster OA (WOMAC) Index reflects the clinical severity of the disease. The WOMAC Index permits an effective, reproducible assessment of the degree of impairment by pain and loss of function.[5]

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**Address for correspondence:** Dr. Muhammad Mustafa Qamar, Department of Physiotherapy, Sargodha Medical College, UOS, Sargodha, Pakistan.
E-mail: mmustafaqamar@gmail.com

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The etiology of knee OA is vast. Many factors play multiple roles, and these factors include generalized constitutional factors such as the aging of a person, sex of the person, obesity and lifestyle, the genetics and heredity, the reproductive variables, and facts of status or economic backgrounds.[6] OA is certainly most commonly found form of arthritis. Because of the prevalence of OA and due to the recurrent incapacity that goes along with disease in the knee, osteoarthritic patients face more trouble in activities such as climbing stairs, rising from a chair, in walking than any other disease by far.[7] Some latest evaluations suggested that the overall expenses for the treatment of arthritis usually exceed 2% of the gross domestic product which is quite an amount.[6]

The management of OA knee is a multidisciplinary approach mainly focusing on the lifestyle changes of population and education of postural alignments, the medicines which provide symptomatic relief, surgery either minor or major, and any alternative therapy or complementary therapies.[8] Physiotherapy treatment for knee OA includes use of thermal agents, traditional Chinese acupuncture, tai chi programs, taping, transcutaneous electrical nerve stimulation, manual therapy, aquatic exercises, orthoses in the form of medial or lateral insoles, and weight loss programs.[9]

Maitland and Mulligan mobilizations are used for the treatment of OA. A crucial constituent of Mulligan's mobilization with movement (MWM) states that the pain is that factor that always needs to be decreased or reduces while the therapist applies the glide and patient moves to a least possible level. While the application of Mulligan's MWM, advanced improvements can be obtained with the help of overpressure that should be again not causing any pain in the range available.[10]

Maitland's techniques involve applying passive and accessory oscillatory movements to the various joints for treating ache and toughness which is of mechanical nature. This technique aims to reestablish motions generally the spin motion, the gliding motion, and the rolling motion of two joint surfaces, and we usually name the grades depending on what is this amplitude of oscillatory movement.[2] This study aims at the comparison of the effectiveness of Maitland and Mulligan's mobilization in improving the knee range of motion (ROM) and functional evaluation.

## Materials and Methods

### Study design

A randomized clinical trial was carried out at the Department of Physical Therapy, Mayo Hospital, Lahore. The ethical committee approved the study according to the Helsinki accord. Informed consent was obtained from each patient. Sixty-two patients suffering from knee OA were randomly assigned into two groups. Selection criteria were demonstrated in Table 1. The first group ($n = 31$) received MWM along with conservative physiotherapy and the second group ($n = 31$) was treated with Maitland mobilization along with conservative physiotherapy. Each group received 6 sessions of either Mulligan's MWM or Maitland mobilization during 2 weeks (3 sessions/week).

**Table 1: Selection criteria for the participants**

| Inclusion criteria | Exclusion criteria |
|---|---|
| Age 40-60 years | Acute pain and inflammation |
| Both males and females | Recent fractures |
| Patients with knee OA (diagnosed already) | Patients having other major musculoskeletal problems and having with red flag signs and patients with recent history of knee trauma |
| WOMAC score above 10 | Prolonged immobilization |
| Chronic stages of knee pain | |

OA: Osteoarthritis, WOMAC: Western Ontario McMaster Osteoarthritis Index

Conventional physiotherapy, which was applied in both groups, included hot pack for 10 minand quardiceps isometrics. It enables strengthening of muscles to provide proper tracking to patella and ankle pumps to restore circulation that may be low due to prolonged immobility cycles due to pain. After conventional therapy, manual mobilization techniques depending on pain were applied. Grade I, II manual therapy mobilization techniques were applied for pain, however, Grade III applied to improve ROM.

### Data collection procedure

Demographic details such as name, age, gender, socioeconomic status, education level, and marital status were also included in the study.

### Data collection instrument

Outcome measures used for data collection were "WOMAC" Index, and goniometer was used to measure knee ROM. Visual analog scale (VAS) was used to measure the level of pain in patients. The goniometer was used to measure ROM of the knee, and WOMAC Index was used for pain and disability.

### Statistical analysis

Data were entered and analyzed through SPSS (Statistical Package for the Social Sciences, SPSS for Windows, SPSS Inc., Chicago, IL, USA), version 21.0. All qualitative variables were presented in the form of frequency tables and percentages. All quantitative variables were presented in the form of mean ± standard deviation (SD) along with its range (maximum-minimum). Paired sample *t*-test and independent sampling test were used for result analysis. $P < 0.05$ was taken as significant.

## Results

Of the 62 patients enrolled in this study, 48.4% were males and 51.6% were females. The mean age of patients was 47.47 ± 0.61 (range from 40 to 60 years).

### Visual analog scale measurement before and after treatment

The mean paired difference in intensity of pain at VAS in MWM group after 2 weeks was 4.06 ± 0.99, whereas that of Maitland mobilization group was 3.35 ± 1.050. There was a highly significant difference between pre- and posttreatment value of both types of treatments [Table 2].

**Table 2: Visual analog scale, Western Ontario McMaster Osteoarthritis Index and range of motion in Mulligan's mobilization with movement and Maitland group at baseline and posttreatments**

| Treatments | Measures | Mean±SD | | Differences | *P* |
|---|---|---|---|---|---|
| | | Before treatment | Posttreatment | | |
| Mulligan with mobilization (MWM) | VAS scale pain intensity | 5.06±1.06 | 1±0.68 | 4.06±0.99 | 0.01 |
| | WOMAC score | 41±9 | 21.59±8.4 | 19.41±7.58 | 0.00 |
| | Active ROM score (NF) | 111±3 | 121±4 | 10.19±3.87 | 0.00 |
| | Active ROM score (NE) | 5.1±1 | 1±0.5 | 5.45±1.29 | 0.01 |
| Maitland mobilization | VAS scale pain intensity | 4.58±0.92 | 1.23±0.8 | 3.35±1.05 | 0.01 |
| | WOMAC score | 38.4±7.1 | 26.14±8 | 12.28±7.02 | 0.00 |
| | Active ROM score (NF) | 109±5 | 119±6 | 10.19±5.51 | 0.00 |
| | Active ROM score (NE) | 5±1 | 1±0.9 | 2.13±1.85 | 0.01 |

SD: Standard deviation, MWM: Mobilization with movement, VAS: Visual analog scale, WOMAC: Western Ontario McMaster Osteoarthritis Index, ROM: Range of motion, NF: Knee flexion, NE: Knee extension

### Comparison of change in Western Ontario McMaster Osteoarthritis Index

At the end of the 2nd week, the mean paired difference on WOMAC Index in MWM group was 19.41 ± 7.58, whereas that of Maitland mobilization group was 12.28 ± 7.02. There was a highly significant difference between pre- and posttreatment value of both types of treatments [Table 2].

### Comparison of change in range of motion

The mean paired difference in knee flexion after 2 weeks of treatment in MWM was 10.19 ± 3.87, while in Maitland mobilization group, mean paired difference was 10.19 ± 5.51. For knee extension, the mean paired difference of MWM group was 5.45 ± 1.29 and that of Maitland mobilization group was 2.13 ± 1.85 [Table 2].

## Discussion

OA is common in people who are obese, overweight, involved in heavy weight lifting and moving around, laborers and people living in areas where they have to climb stairs daily, etc.[11] Physiotherapy treatment has a big role in the treatment of pain that results in a functional loss. Physiotherapy treatment for knee OA includes use of thermal agents, traditional Chinese acupuncture, tai chi programs, taping, transcutaneous electrical nerve stimulation, manual therapy, aquatic exercises, orthoses in the form of medial or lateral insoles, and weight loss programs.[9] Mobilization is commonly used treatment for knee pain management and to improve ROM. The aim of current study was to compare the effectiveness of Maitland and Mulligan's mobilization in improving the knee ROM and functional evaluation.

The results of this study showed that MWM was more effective in the treatment of knee OA in term of decreasing pain and increasing ROM. It was observed that patients who were treated with MWM technique along with conventional physiotherapy, their pain, functional disability, and knee ROM ranges improved greatly as compared to those who were treated with corrective Maitland mobilization technique along with conventional physiotherapy.

The results of this study were consistent with previous studies. A study has demonstrated that MWM is efficacious and feasible in knee OA.[12] The result of this study is also consistent with studies involving mobilization at other joints. A study carried out on frozen shoulder suggests that Mulligan technique was more effective then Maitland mobilization.[13] The MWM concept has the potential to produce immediate and long-lasting effects, even in patients that had not previously responded to other treatment for an extended period of time.[14]

### The limitation of this study

The sample size was not large enough to generalize the results. Moreover, the study was carried out for short duration with a follow-up for 2 weeks only. Future research is required to determine long-lasting effects of the treatment by taking follow-up assessments for a longer duration.

## Conclusion

This study concluded that both Mulligan and Maitland techniques were effective for management of patients with knee OA.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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## ملخص باللغة العربية

### مقارنة فعالية تحريك مولجان وتحريك ميتلاند جنبا إلى جنب مع العلاج التقليدي في المرضى الذين يعانون من التهاب مفاصل الركبة.

**المؤلفون:** أنيقة كيران، محمد جنيد إعجاز، محمد مصطفى قمر [1*]، عائشة بشارات [1]، أختار رسول [1]، وقاص أحمد [1]

قسم العلاج الطبيعي ، مستشفى مايو ، كيمو ، لاهور، باكستان.

[1] قسم العلاج الطبيعي ، كلية سارجودها الطبية، سرجودها، باكستان.

**المؤلف المسؤول:** محمد مصطفي قمر، بريد إلكتروني: mmustafaqamar@gmail.com

**الهدف**: المقارنة مابين نتيجة وفعالية تحريك مولجان وتحريك ميتلاند مع العلاج التقليدي في المرضى الذين يعانون من التهاب مفاصل الركبة.

**الطريقة**: تم إجراء دراسة عشوائية في قسم العلاج الطبيعي بمستشفى مايو في لاهور، باكستان. تم اختيار 62 مريضا للدراسة تم تقسيمهم إلى مجموعتين، المجموعة الأولي تم علاجها بتحريك مولجان مع العلاج التقليدي والمجموعة الثانية تم علاجها بتحريك ميتلاند مع العلاج التقليدي لمدة أسبوعين. تم تقييم حالة المرضي باستعمال مقياس التناظرية البصرية (VAS) ومقياس وسترن أنتاريو ماكماستر (WOMAC) لالتهاب مفاصل الركبة، وكذلك نطاق حركة الركبة (ROM) وذلك قبل وبعد أسبوعين من التدخل.

**النتائج**: كان الفرق بين كل من التدخلات العلاجية بشكل فردي هامًا جدًا وأظهر أن كلاهما كان فعالًا من الناحية السريرية في علاج التهاب مفاصل لركبة.

**الخلاصة**: استنتج من النتائج أن المرضى في كلا المجموعتين أظهروا تحسنا في الألم، ووظيفة وحركة المفصل.

**الكلمات المفتاحية**: التهاب مفاصل الركبة، تحريك مولجان ، تحريك ميتلاند