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EFFECT OF MAITLAND MOBILIZATION VERSUS MULLIGAN'S MOBILIZATION WITH MOVEMENT ALONG WITH CONVENTIONAL TREATMENT IN OSTEROARTHRITIS OF KNEE JOINT

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Abstract : Osteoarthritis (OA) also known as degenerative joint disease and is associated with degradation of articular cartilage, subsequently affecting the underlying bone. OA knee has an increasing prevalence noted in India. Maitland Mobilization or Mulligan Mobilization with Movement (MWM) approaches have been widely used clinically for pain relief and improving mobility in Osteoarthritis knee. The aim of the study was to find the compare the effect of mulligan mobilization verses Maitland mobilization in participants with osteoarthritis and determine the better of these to get best results & greater benefits for the population. Comparative study with 3-week intervention 30 participants with mean age 53.89±6.46 with features of Osteoarthritis knee joint were studied. They were divided into 2 groups by convenience sampling; Group A received Maitland's mobilization along with conventional exercise program and Group B were treated Mulligan Mobilization along with conventional exercise program. Pre and post treatment data was collected and analyzed using SPSS 26.0. Paired and unpaired t test were used to find out the significance of the treatment. A significant improvement in pain, disability through modified version of WOMAC and knee Range of motion ($p<0.05$) after the treatment was found in both the Groups. No statistical significant difference was seen between Group A and Group B. The study concluded that Maitland mobilization and Mulligan MWM, both are equally effective in osteoarthritis knee in reducing pain and improving functional mobility and increasing Knee Range of Motion.

IndexTerms **- osteoarthritis knee joint, maitland mobilization, mulligan mobilization, knee range motion, pain, functional disability.**

INTRODUCTION:

Osteoarthritis (OA) is a degenerative joint disease and is the most common arthritis in worldwide and approximately 10% of world's population who are 60 years or older have symptomatic OA. In India, it is the most prevalent form of arthritis and it is estimated that about 15 million people in the country are afflicted with OA.[1,2]

Osteoarthritis of the knee is a condition characterized by the progressive destruction of cartilage that lines the knee joint. The sub-chondral bone surface and synovial accompanied by pain, immobility muscle weakness and reduction in function and the ability to complete activities of daily living.[3]The prevalence of OA increases with age and eventually leads to joint stiffness, progressive deformity and functional impairment, which, in turn, negatively affect the individual's quality of life.[4]

Two types of OA are recognized, the more prevalent primary OA of the knee is the result of the progressive destruction of joint cartilage over time whereas secondary OA of the knee can be by trauma, inactivity, and overweight or disease process. Some evidence indicates that abnormal motion at knee often precedes degenerative changes.[5]

Knee mobilization may be beneficial for individuals with a variety of conditions, including post operative rehab and knee OA. Several studies have used knee mobilization for treatment of knee pathology. [5,6]

Mobilization with Movement (MWM) is a manual therapy technique advocated by Brian Mulligan for treating joint pain, stiffness, and dysfunction. In this technique, the painful movements are performed actively by the patient while the Physiotherapists applies a sustained glide perpendicular or parallel to the joint.[7]

MWM are required to achieve a successful therapeutic result, eventually with the additional application of over pressure, with immediate positive results even within the first treatment session .mulligan concept of mobilization with movement is a contemporary from of joint mobilization, consisting of a therapist applied pain free accessory gliding force combined with active movement.[8]

Maitland concept is a process of examination; assessment and treatment of musculoskeletal disorder by manipulative physiotherapy where a chain of oscillatory joint mobilization grades based on the pathological limit of tissue are used. Maitland Mobilization or Mulligan Mobilization with Movement (MWM) approaches have been widely used clinically for pain relief and improving mobility in Osteoarthritis knee. However the experimental evidence supporting the usage of these mobilization techniques as sole interventions in management of Osteoarthritis knee is insufficient.[9,10]

Several studies have been conducted in the past to investigate which of the two techniques is better in the management of knee osteoarthritis. Hence, this study the aims of the effective the long time along with conventional exercise program in knee joint of OA between mulligan and Maitland Mobilization.[11]

NEED AND SIGNIFICANCE OF STUDY Osteoarthritis is the second most common problem and is most frequent joint disease with prevalence of 22% to 39% in India. OA occurs commonly in female above 45 years of age while before 45 years it is common in males.

Though the various studies have utilized mulligan and Maitland mobilization to improve the knee joint ROM and functional performance intervention with the immediately but their effectiveness for 3 weeks has not been studied yet.

Thus the need of the study is to compare the effect of mulligan versus Maitland mobilization along with 3weeks the conventional treatment program in osteoarthritis of knee joint.

AIM OF THE STUDY

The aim of the study was to compare the effect of mulligan mobilization versus Maitland mobilization in participants with osteoarthritis of knee joint.

OBJECTIVES OF THE STUDY

a) To find out whether there was any significant difference between the effectiveness of Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

b) To find out whether there was any significant difference between the effectiveness of Mulligan's movement with mobilization technique along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

c) To find out whether there was any significant difference between the effectiveness of Mulligan's movement with mobilization technique versus Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

HYPOTHESIS:

NULL HYPOTHESIS [H_0]

1. [$H_0$1]: There will be no significant effect of Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

2. [$H_0$2]: There will be no significant effect of Mulligan's movement with mobilization technique along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

3. [$H_0$3]: There will be no significant difference in the effect of Mulligan's movement with mobilization technique versus Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

ALTERNATIVE HYPOTHESIS

1.[$H_1$1]: There is significant effect of Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

2.[$H_1$2]: There will be a significant effect of Mulligan's movement with mobilization technique along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

3.[$H_1$3]: There will be a significant difference in the effectiveness of Mulligan's movement with mobilization technique versus Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint.

MATERIALS AND METHODOLOGY

RESEARCH DESIGN:

Comparative Study design.

SAMPLE DESIGN:

Convenience Sampling.

STUDY POPULATION:

Patients with Knee Osteoarthritis attending OPD of Nootan General Hospital and are referred for Physiotherapy.

SAMPLE SIZE:

30 subjects

STUDY SETTING:

Nootan College of Physiotherapy, Orthopedic department OPD, Visnagar, Gujarat.

STUDY DURATION:

6 Months (December 2022 to May 2023).

TREATMENT DURATION: 3 Weeks

SELECTION CRITERIA:

INCLUSION CRITERIA:

1. Age group :-45 to 65
2. Subjects with OA Knee (Grade III-Kellgren Lawrence)
3. Both males & females
4. Unilateral Involvement.

EXCLUSION CRITERIA:

1Any associated fractures of lower limbs.
2.Intra articular knee infusion.
3.Intra articular fixation in knee joint.
4.Connective tissue disorder.
5.Systemic and neurological problems.
6.Previous injury or surgery to back, hip ,knee or major injury to ankle or distal leg.
7.Bilateral OA knee.
8.Presence of severe vascular diseases.
9.Use of anti coagulant or anti-inflammatory medications, receiving any other physiotherapy treatment during the study.

TOOLS

1. Assessment Form.
2. Consent Form.
3. Universal Goniometer.
4. Mobilization Belt.
5. Plinth & Pillow.
6. Chair.
7. Weight cuff.
8. Towel.

OUTCOME MEASURES

Intensity of pain (NPRS).

Knee Range of Motion (Goniometer).

Functional disability (WOMAC Gujarati Version).

DATA COLLECTION PROCEDURE

All the participants who completed a detailed orthopedic assessment. The Orthopedic assessment was obtaining information about demographic details, history, analysis of pain, ROM, special tests, investigation reports and functional activities of the participants. Participants, who fulfilled the selection criteria, were informed about the study and requested to sign written consent forms.

Pre-participation evaluation form consists of NPRS, Goniometry and modified Western Ontario and McMaster Universities Osteoarthritis Index Gujarati version. The treatment protocol consists of 5 sessions of conventional treatment program/ week, and 3 sessions of MWM & Maitland Mobilization for 3 weeks.

The patients were divided into two groups, Group A was given Maitland mobilization along with a conventional treatment program & Group B was given Mulligan's Mobilization with movement (MWM) along with a conventional treatment program. Each patient was evaluated prior to the first session and after the last session for intensity of pain, ROM and functional disability.

TREATMENT PROTOCOL

Conventional treatment program for both Groups A & B

(1 session /day x 5sessions/week for 3weeks)

Therapeutic Exercises:

Strengthening exercises

Knee isometric exercises

Resisted quadriceps exercises

Quadriceps setting.

Straight leg raise

Stretching exercises ;

GROUPA: CONVENTIONAL EXERCISES WITH MAITLAND MOBILIZATION

The physiological movements flexion, extension, rotations) and accessory movements (Antero-posterior, Postero -Anterior, Medial, Lateral, Compression, and Distraction glides; Rotations) were assessed for pain and restriction. Frequency of Glide applied ranged from 1 oscillation per 2 s (gentle oscillations per second (staccato rhythm) and if it was sustained then it would be each glide to be sustained for 5 s. In pain predominant scenario, low amplitude grades 1 and 2 of mobilization at initial range to mid ranges were applied for pain relief through circulation of synovial fluid within the joint cavity and mechanoreceptor mediated activation of pain gate. In presence of restriction with without pain, high amplitude grade 3 through the range or grade 4 at the end of the range mobilization was applied Duration for which glides were applied could from minimum of 3 (for high SIN for pain relief) to 5 min (for low SIN to reduce joint stiffness).

Treatment: 5 sessions of conventional treatment program/ week along with 3 sessions of Mobilization for 3 weeks.

GROUPB:CONVENTIONAL EXERCISESWITHMULLIGAN MOBILIZATION

The application of appropriate glide at the affected knee (medial glide, lateral glide, medial rotation, and lateral rotation of the tibia on femur) which should result in the offending movement becoming pain free. If the movement combined with the glide showed no change in pain or increased the pain beyond 3 repetitions, the glide had to be changed and whichever glide applied with the offending movement made the movement pain free beyond 3 repetitions, the repetitions were continued further as per the response of the reduction in pain with mobilization.

ETHICAL CLEARANCE:

The study was approved by the Institutional committee of Nootan College of Physiotherapy.

STATISTICAL ANALYSIS:

Statistical analysis was done using SPSS 26 software for windows. Descriptive analysis was obtained by mean & standard deviation. Intergroup comparison of pre-treatment scores of mWOMAC Scores was done using unpaired t- test. Intergroup comparison of pre-treatment scores of NPRS score was done using unpaired t-test. Intergroup comparison of pre-treatment scores of Knee ROM was done using unpaired t-test. Intra group comparison of pre & post treatment scores of mWOMAC was done using paired t-test. Intra group comparison of pre & post treatment scores of NPRS score was done using paired t-test. Intra group comparison of pre & post treatment scores of Knee ROM was done using paired t-test. Unpaired t-test of post treatment scores of mWOMAC was done to compare the difference in effectiveness within groups. Intergroup comparison of post treatment scores of NPRS was done using unpaired t-test. Unpaired t-test was done to compare the difference in effectiveness within the groups for Knee ROM.

Result & Interpretation:

Table 1 Subject Demographics

Demographic Details		Group A	Group B
Age	Mean	53.33	54.46
	SD	±6.46	±6.81

Table 1 shows the mean age of subjects in Group A (53.33±6.46) and Group B (54.46±6.81). No statistically significant difference was found between the ages of the subjects in both groups, proving that the groups are homogenous in terms of age.

Table 2: Gender distribution in Group A (Maitland group), Group B (Mulligan group)

Groups	Male	Female
Group A	8	7
Group B	7	8
Total	15	15

Table 2 shows the Gender distribution among Group A & Group B. A total of 15 male and 15 female subjects participated in the study. Out of thirty subjects, Group A consisted of 8 male and 7 females and Group B consisted of 7 Females and 8 male participants.

Table 10: Intra group comparison of pre and post treatment NPRS for Group A

OUTCOME	PRE		POST		T VALUE	P VALUE
	MEAN	SD	MEAN	SD		
NPRS	6.86	±1.45	2.86	±1.06	7.74	0.00

Graph 9: Intra group comparison of pre and post treatment NPRS for Group A

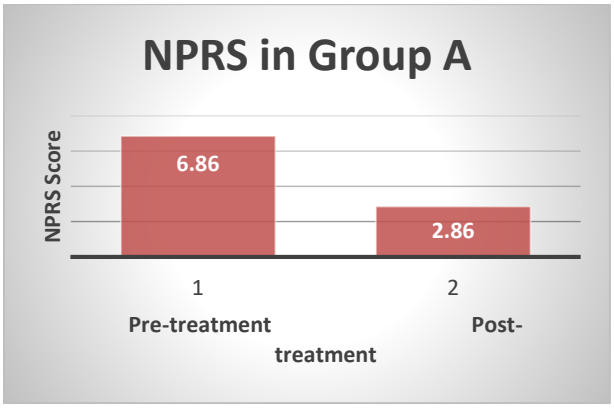

Table 10 and graph 9 shows intra group comparison of pre and post treatment NPRS in Group A, where the p value is < 0.05. A statistically significant difference was found between the pre and post treatment NPRS, with a significant improvement in NPRS after treatment

Table 11: Intra group comparison of pre and post treatment mWOMEC score for Group A

OUTCOME	PRE		POST		T VALUE	P VALUE
	MEAN	SD	MEAN	SD		
mWOMAC	64.66	±12.16	28.33	±6.17	11.70	0.04

Graph 10: Intra group comparison of pre and post treatmentmWOMAC score for Group A

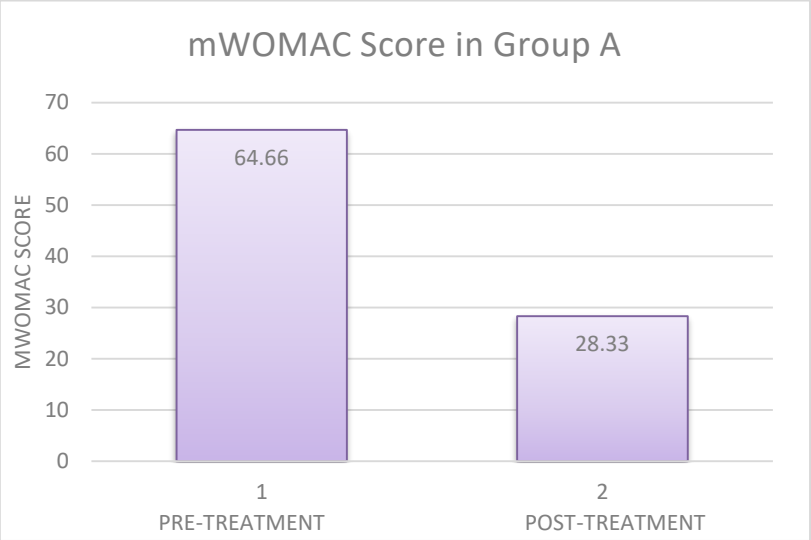

Table 11 and graph 10 shows intra group comparison of pre and post treatment mWOMAC score in Group A, where the p value is < 0.05. A statistically significant difference was found between the pre and post treatment WOMEC score, with a significant improvement in mWOMAC score after treatment.

Table 12: Intra group comparison of pre and post treatment NPRS for Group B

OUTCOME	PRE		POST		T VALUE	P VALUE
	MEAN	SD	MEAN	SD		
NPRS	6.6	±1.54	2.73	±1.03	12.9	0.04

Graph 11: Intra group comparison of pre and post treatment NPRS for Group B

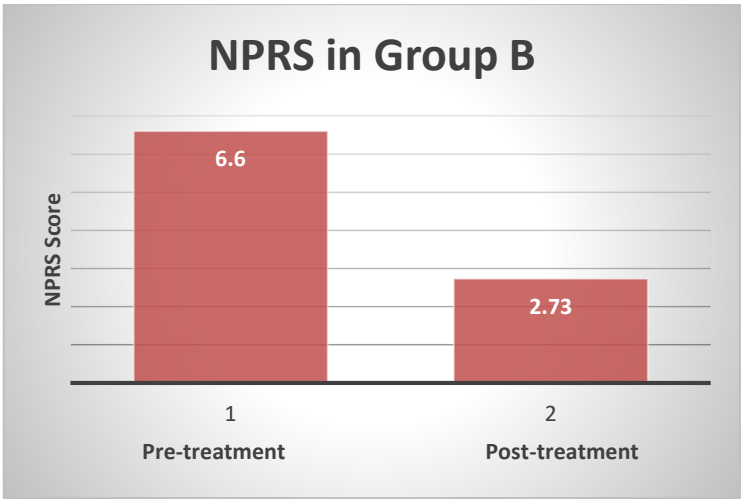

Table 12 and graph 11 shows intra group comparison of pre and post treatment NPRS in Group B, where the p value is < 0.05. A statistically significant difference was found between the pre and post treatment NPRS, with a significant improvement in NPRS after treatment.

Table 13: Intra group comparison of pre and post treatment mWOMAC score for Group B

OUTCOME	PRE		POST		T VALUE	P VALUE
	MEAN	SD	MEAN	SD		
mWOMAC	64	±11.52	29.02	±4.70	12.30	0.04

Graph 12: Intra group comparison of pre and post treatment mWOMAC score for Group B

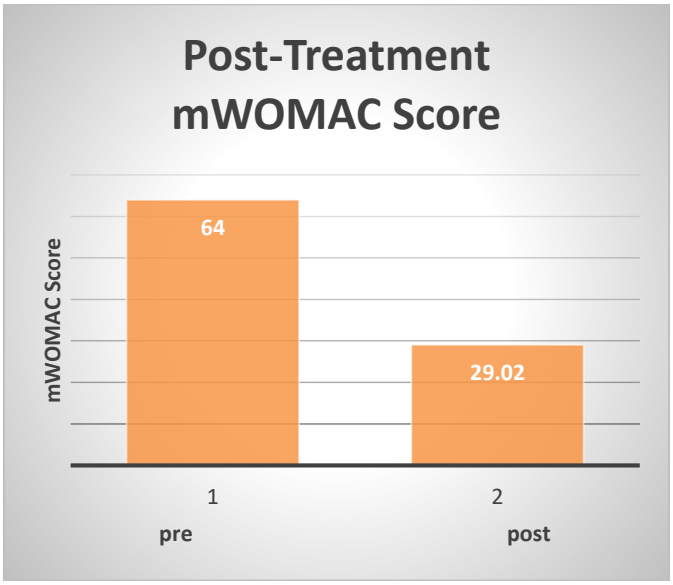

Table 13 and graph 12 shows intra group comparison of pre and post treatmentmWOMAC score in Group B, where the p value is < 0.05. A statistically significant difference was found between the pre and post treatment WOMEC score, with a significant improvement in mWOMAC score after treatment

DISCUSSION

The present study intended to compare the effectiveness of MWM technique versus Maitland mobilization along with a conventional treatment program in increasing the knee flexion range of motion, reducing pain & improvement of function in participants with osteoarthritis of knee joint. The results obtained in this study state that, there is no significant difference between the effects of Maitland mobilization and Mulligan MWM in OA Knee at the end of 3 weeks and also that both are equally effective in increasing the knee flexion range of motion, reducing pain and improving functional mobility.

The sample of 30 subjects have been equally distributed into two groups through convenient sampling, 15 subjects received Maitland mobilization with conventional treatment program and the remaining 15 subjects received Maitland mobilization conventional treatment program for 3 weeks duration.

In Group A, received Maitland mobilization with clinical exercise shows effectiveness on pain Based on statistical analysis using Paired sample t test results, NPRS [p-value = 0.000 < 0.05, mean = 6.13 & SD= 0.99]. This may be due to activation of central and peripheral pain inhibitory system and chemical changes in peripheral nociceptors and also altering the neuro physiological mechanism and kinesiological mechanism either alone or in combination. Apart from that end-range Maitland mobilization may decrease peripheral and central sensitization leads to reduction in pain and improvement in function.

Similar findings can be found by the author M. Pozsgai et al 2020 that Maitland mobilization can be used not only during longer period of rehabilitation, but also in outpatient service leading to rapid improvement of functional status of patients with Knee OA.

The study showed improvement of functions with MWM along with exercise is one of the important reasons for improvement in functional status with MWM treatment in osteoarthritis is that it caused considerable reduction in pain and stiffness, and thus the pain free range of movement allows the subjects to perform exercises and daily activities more successfully without pain. Improvement in outcome measure scores maybe explained in terms of temporary correction of minor articular malposition defects in affected knee as in Mulligan MWM (Mulligan, 2011) and improved circulation or pain gate mediated analgesia following mobilization of the biomechanically impaired arthritic knee (Sluka and Wright, 2001).[9]

The findings of the present study were consistent with those of previous studies by Ramya V. Rao et al (2017) to determine from Maitland Mobilization and Mulligan MWM, which mobilization technique will be more effective in reducing pain and improving mobility and function in OA knee that Maitland mobilization and Mulligan MWM, both are equally effective in osteoarthritis knee in reducing pain and improving functional mobility and pain free squat angle immediately post treatment.[9]Conventional Exercise Program including isometric and isotonic exercises for quadriceps, Range of Motion exercise may helps to decrease pain, improve health status and physical function and prevent the condition from progressing.

Though both MWM and Maitland's Mobilization along with conventional exercises program reduced the Pain and Improved knee Range of motion and knee function, by comparing the post treatment variables in both experimental groups, the results revealed that there was no statically significant difference between the

groups A and B in reduction in NPRS score improvement of the WOMAC scores. Thus the alternate hypothesis [$H_1$1] and [$H_1$2] were accepted and [$H_1$3] was rejected.

LIMITATION

1. Long term follow up was not taken.
2. The study includes treatment period of 3 weeks only.
3. The study involves small sample size.
4. The study includes OA (Kellegren Lawrance III) only.

SUGGESTIONS AND RECOMMENDATIONS

1. The study can be done with long term follow up.
2. The study can be done with longer treatment duration.
3. The study can be revised involving a larger sample size.
4. Further studies can be done using the same intervention with different outcomes.

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