

COMPARATIVE EFFECTS OF MACQUARIE INJURY MANAGEMENT GROUP PROTOCOL IN ADDITION TO ROUTINE PHYSICAL THERAPY ON PAIN, RANGE OF MOTION AND FUNCTIONAL DISABILITY IN PATIENTS WITH KNEE OSTEOARTHRITIS

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ABSTRACT

The progressive and degenerative disease of the joint affects almost 250 million individuals all around the world. Knee osteoarthritis refers to a common condition characterised by inflammation of the joint, which imposes significant socioeconomic burdens. **Objective:** To determine the effects of the Macquarie Injury Management Group Protocol, in addition to Routine Physical Therapy, on Pain, Range of Motion and Functional Disability in Patients with Knee Osteoarthritis. **Methods:** A randomised comparative trial was conducted on a total of 84 participants, 49 females and 35 males. The data was collected from the OPD of the Physical Therapy Department of Avicenna Hospital, Lahore, for six months from 13 April to 14 October 2021. In the routine physical therapy, 25 females and 17 males were allocated, while in the other group, 24 females and 18 males were recruited. The Routine physical therapy group received TENS, stretching for gastrocnemius, hamstrings as well as quadriceps muscle and strengthening exercises for quadriceps range of motion exercises and patellar mobilisations, grade III and IV, 30 minutes/session lasting for 12 sessions on alternate days, three sessions/week. The other group received the Macquarie Injury Management Group Knee Protocol (soft tissue mobilisation) for 2 to 3 minutes, along with routine physical therapy exercises for 45 minutes/session lasting for 12 sessions on alternate days (3 sessions/week). The data was obtained using NPRS, Western Ontario and McMaster Universities Arthritis. (WOMAC) Scale for functional disability and goniometer for ROM. **Results:** The mean age of participants in the control group was 48.81±7.229, and in the experimental group was 53.24 ±5. 355. The pre-session P-value of WOMAC is 0.195, while it is 1.33 in the post-treatment session. VAS mean value in the experimental group at the pre-treatment level is 8.38; at the post-treatment session, it is reduced to 1.95. ROM mean at the post-treatment session is increased to 65.78. **Conclusion:** Both groups are effective in the reduction of pain and disability and improvement in range of motion.

Keywords: Functional disability, Knee osteoarthritis, Macquarie Injury Management Group Protocol, Routine physical therapy, ROM

INTRODUCTION

Knee osteoarthritis refers to a common condition characterised by inflammation of the joint, which imposes significant socioeconomic burdens¹. The progressive and degenerative disease of the joint affects almost 250 million individuals all around the world². In older people, it is the common cause

of pain and disability. Osteoarthritis of the knee primarily affects the synovium, bones, and cartilage within the joint³. Specific site-specific components defined in the local joint environment determine the distribution of weight across the articular cartilage of a given joint. However, the outcome of these aspects on the progression of osteoarthritis or the patient-centred consequences is generally not studied. This

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was the primary diagnosis of hospital carried out and many in hospital costs, 2004 according to the US National Inpatient Sample ^{4,5}.

A method used by Kellegren and Lawrence is a validated approach utilised to categorise osteoarthritis (OA) into five grades^{6,7}, relying on the level of damage visible in radiographic images. Grade 0 signifies a normal knee with no structural changes evident. Grade 1 indicates minimal osteoarthritic changes, typically characterised by small bone spurs. The spurs are the small developments of bone that grow between the joints. At this stage, the patient has no pain or discomfort. Moreover, the second grade of knee osteoarthritis is the “mild” condition^{8,9}.

Moreover, in the third grade, characterised as the “moderate” stage, there is visible cartilage damage in the bone and insufficient synovial fluid in the joint¹⁰. Patients often encounter pain and limitations while kneeling, walking, running, and sitting. Likewise, the fourth stage represents the most severe form of knee osteoarthritis. Individuals in this grade typically experience intense pain and swelling around the joint, as well as meaningful restrictions in daily activities¹¹.

The Macquarie Injury Management Group (MIMG) Knee Control is an innovative and non-invasive manual therapy technique pioneered by Dr. Henry Pollard, a functional chiropractor and clinical scientist from Sydney. Two main techniques are used in the MIMG protocol for managing knee pain: myofascial manipulation & soft tissue release. These methods give physiotherapists fresh perspectives on how to emphasise patient care while successfully managing pain¹².

A study evaluating the impact of Mulligan’s Mobilization with Movement (MWM) & the Macquarie Injury Management Group (MIMG) protocol on pain and functional improvement in patients with osteoarthritis of the knee was carried out. The research indicates that both approaches – the Mulligan and Macquarie Injury Management Group knee protocols are equally effective in managing knee osteoarthritis ¹³.

The rationale of the study is that a lot of work has been done on the pain of knee osteoarthritis, but limited literature supports the use of this technique. Hence, this study intends to find the therapeutic effects of the Macquarie injury management group for knee protocol with routine physical therapy

exercises, as it could be used as the preferred choice of therapy. Evidence-based data will add to the knowledge of treatment strategies for knee osteoarthritis in the community.

The study’s objective is to determine how routine physical therapy and the Macquarie Injury Management Group knee protocol affect knee osteoarthritis patients’ pain and function.

MATERIALS AND METHODS

In the six months from April 13 to October 14, 2021, a Randomized Controlled Trial was carried out in the physical therapy department of Avicenna Hospital in Lahore. The sample size of 42 in each group was calculated using G-power version 3.1.9.2 software by putting values from the previous study¹³ with a study power of 0.80 and an error margin of 5% by taking the mean score of NPRS. Considering a 10% attrition rate, 42 participants in each group were recruited out of a total of 84 participants. The sampling was conducted using a non-probability sampling method in which participants were chosen in accordance with preset standards.

The inclusion criteria included those with knee osteoarthritis diagnosed at Grade II or III on the Kellegren Lawrence grading system¹⁴ regardless of gender, and between the ages of 40 and 60. Those with a history of lower limb surgery, infection, post-traumatic knee stiffness, secondary osteoarthritis in the knee, or peripheral vascular disease were among the exclusion criteria. A goniometer¹⁵ was used to quantify a range of motion, an NPRS¹⁶ was used to measure pain, and a WOMAC¹⁷ was used to measure functional impairment.

Data was collected by giving an informed signed consent. Subjects were divided randomly into two equal groups using a lottery method of randomisation using computer-generated numbers. The study was a single-blind study. Data was collected at baseline, 6th sessions, 12th, and follow-up after one month.

The data was collected by using a well-developed questionnaire. In all, 84 participants who met the inclusion criteria and had Grade II and III knee osteoarthritis as determined by a thorough orthopaedic physical examination were enlisted to participate in this randomised controlled research. Forty-two individuals completed standard physical therapy activities, which included strengthening exercises for the quadriceps, stretching exercises

for the gastrocnemius, hamstrings, and quadriceps, and Transcutaneous Electrical Nerve Stimulation (TENS). The regimen also includes patellar mobilisations and range of motion exercises.

These exercises were administered to participants classified as Grade III and IV according to their Kellegren Lawrence grading. (30 minutes/session) lasting for 12 sessions on alternate days (3 sessions/week). Forty-two participants received the Macquarie Injury Management Group Knee Protocol (soft tissue mobilisation).

The patient is placed supine with the knee extended while the Macquarie Injury Management Group (MIMG) procedure is being applied. The therapist then does mild soft tissue release for two to three minutes while keeping both hands on the knee. Physical therapy activities are the next step, lasting 45 minutes per session. Twelve sessions, three sessions a week, are held on different days as part of the treatment plan.

Statistical analysis: SPSS version 26 was used to analyse the data. The mean $\pm$ Std. was used to depict quantitative variables like age and range of motion. Frequency and percentage representations were provided for qualitative factors such as gender. One-way ANOVA was performed once the data's normality was confirmed for between-group analyses.

RESULTS

Table 1 presents the mean age of the participants of the routine physical therapy (RPT) group was 51.02 ± 6.704 , and of routine physical plus Macquarie Injury Management Group (MIMG) Knee Protocol was 49.09 ± 5.204 .

Table 1. Age of participants in both groups

Group	Mean $\pm$ Std. Deviation
Routine physical therapy	51.02 $\pm$ 6.704
MIMG + Routine physical therapy	49.09 $\pm$ 5.204

According to Table 2, out of 84 participants, 25 were females, and 17 were males in the routine physical

therapy group and the experimental group; 24 were females, and 18 were males.

Table 2. Gender distribution among both groups

Groups	Gender	Frequency	Percentage
Routine physical therapy group	Female	25	29.76%
	Male	17	20.24%
Experimental group (MIMG + routine physical therapy)	Female	24	28.57%
	Male	18	21.43%

As portrayed in Table 3, the pre-session mean value of WOMAC in the experimental group is 3.43; in the control group, it is 3.53, 3.33 at the 6th session, 2.52 at the 12th session, and 1.33 at the post-treatment session. VAS mean value in the experimental group at the pre-treatment level is 8.38; in the 6th session, it is 6.52.

In the 12th session, it is 4.57, and in the post-treatment session, it is reduced to 1.95. ROM mean value in the experimental group at the pre-treatment level is 22.714; at the 6th session, it is 30.22. At the 12th session, it is 40.00, and at the post-treatment session, it is increased to 65.78. Table 4 shows the repeated measures ANOVA analysis of both techniques within the group. P value is found to be less than 0.05, which means both interventions showed significant effects over time.

DISCUSSION

The current study compared the efficacy of the Macquarie Injury Management Group protocol with routine physical therapy on pain, range of motion, and functional disability in patients with knee osteoarthritis.

Upon analysing the outcome measures, it was noted that both groups exhibited significant improvement. However, the Macquarie Injury Management Group protocol group revealed statistically momentous enhancements in pain relief and functional outcomes compared to the routine physical therapy exercise group.

Table 3. One Way ANOVA between two groups

Variables	Between groups variables	Group A (control) Mean $\pm$ Std.	Group B (experimental) Mean $\pm$ Std.	p value
WOMAC	Pre-intervention score	3.57 $\pm$ 0.501	3.43 $\pm$ 0.501	1.95
	Post-intervention score (6 th session)	3.33 $\pm$ 0.477	3.38 $\pm$ 0.492	0.654
	Post-intervention score (12 th session)	2.24 $\pm$ 0.431	2.52 $\pm$ 0.505	0.024
	Follow-up session	0.95 $\pm$ 0.731	1.33 $\pm$ 0.786	0.051
ROM	Pre-intervention score	23.09 $\pm$ 1.461	22.71 $\pm$ 1.95	3.15
	Post-intervention (6 th session)	30.33 $\pm$ 2.816	30.952 $\pm$ 2.870	3.21
	Post-intervention score (12 th session)	39.52 $\pm$ 4.043	40 $\pm$ 3.812	0.05
	Follow-up session	65.904 $\pm$ 2.87	65.66 $\pm$ 3.097	0.02
VAS	Pre-intervention score	8.67 $\pm$ 0.477	8.38 $\pm$ 0.492	0.008
	Post-intervention (6 th session)	6.52 $\pm$ 0.505	6.52 $\pm$ 0.505	0.005
	Post-intervention score (12 th session)	3.9 $\pm$ 0.878	4.57 $\pm$ 1.233	0.005
	Follow-up session	1.29 $\pm$ 1.503	1.95 $\pm$ 1.577	0.051

Table 4. Repeated measure ANOVA within both groups

Measure	Type III Sum of Squares	Mean Square	F	p value
ROM	Sphericity assumed 87742.9	29247.6	4025.58	0.000
VAS	Sphericity assumed 2229.86	743.286	999.65	0.000
WOMAC	Sphericity assumed 298.571	99.524	455.302	0.000

This observation aligns with the findings of a study conducted by Yashasvi *et al.* (2018), which aimed to investigate the immediate effects of the Macquarie Injury Management Group (MIMG) protocol on pain as well as ROM in primary osteoarthritis knee¹⁸. The results of their study indicate that by utilising the MIMG method, patients with osteoarthritis in their knees may significantly improve their functional impairment while also experiencing reduced discomfort. The trial's outcomes replicate the findings of the earlier investigation and

provide additional proof of the MIMG protocol's effectiveness for treating knee osteoarthritis.

A study conducted by Heggannavar *et al.* (2008) conflicts with the findings of the current study, which demonstrate that there is a difference between the two treatment protocols in which the MIMG protocol is more effective than the MWM¹⁹. It was found that both treatment protocols are equally effective for the treatment of osteoarthritis. As the study conflicts with the results of current research,

more investigation is needed to understand the effectiveness of different therapies used to treat knee osteoarthritis fully.

Another study was conducted by Alkhaeaja *et al.* (2019) on knee osteoarthritis to find out the difference between two therapies, MWM and sham MWM. The outcome measures were pain and functional improvement in knee OA. This study compared MWM with a sham MWM intervention. The results revealed that patients treated with MWM experienced more significant improvements in pain compared to those who received sham MWM treatment²⁰.

Nejati *et al.* (2015) conducted an RCT to investigate the effect of exercise therapy on knee osteoarthritis. The results of the study showed strong positive evidence for MIMG, MWM and Quadriceps strengthening exercises. Moreover, moderate to weak evidence was depicted for stretching and the use of steroid injections. Hence, this study provides strong evidence for MIMG supporting the findings of the current study²¹.

Although the current research addresses a significant clinical condition, it has limitations as long-term effects were not studied. Also, chronicity was not contemplated during categorising the outcomes. This study can be done on a large population to get future precise results. For clinical practice, further investigation should be conducted into other manual therapies to treat knee osteoarthritis.

CONCLUSION

It was concluded from the study that the Macquarie Injury Management Group Protocol presented a significant reduction in pain and disability. The range of motion was equally improved in both groups.

DECLARATION

Conflict of interest: There were no conflicts of interest associated with the research.

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