

ORIGINAL ARTICLE

Effectiveness of Maitland Mobilization versus Pain release phenomena for pain, range of motion and disability in early knee osteoarthritisSAEEDA TAJ¹, KINZA ANWAR², HAFSAH ARSHAD³, MARIA KHALID⁴, MOHAMMAD QASIM ALI⁵, EJAZ HUSSAIN⁶¹Lecturer, Bashir Institute of Health Sciences, Islamabad²Senior Lecturer, Department of Rehabilitation and Allied Health Sciences, Riphah International University, Islamabad³Senior Lecturer, Ibadat International University, Department of Physical Therapy, Islamabad⁴Assistant Professor, Department of Rehabilitation and Allied Health Sciences, Riphah International University, Islamabad^{5,6}Demonstrator, Yusra institute of rehabilitation sciencesCorrespondence to Dr. Kinza Anwar, Email: kinza.anwar@riphah.edu.pk, Cell: 03239735427**ABSTRACT****Aim:** To compare the effectiveness of Maitland mobilization and pain release phenomena for Pain, Range of motion disability in early knee osteoarthritis.**Methodology:** Randomized control trail was conducted at Department of Physical Therapy, Railway General Hospital, Rawalpindi, Pakistan within a duration of 6 months. Participants aged between 35-60 years including both genders, diagnosed with stage 1 and 2 knee osteoarthritis were included. Range of motion (ROM) was assessed by Goniometer, Numeric pain rating scale(NPRS) used for pain and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores used for knee disability. IBM SPSS 24 was used for statistical analysis. Non-parametric tests were used for NPRS while parametric test were used for knee ROM and knee disability .**Results:** Total 47 participants, were analyzed in which mean age in Experimental Maitland mobilization group A was 45.3±6.06 while mean age in experimental pain release phenomena group B was 45.4±4.59. Between-group analysis for NPRS was significantly improved at post intervention having p value (0.03). Between group comparison of knee ROM and WOMAC also showed significant p value. (p value=<0.05).**Conclusion:** It is concluded that both techniques are equally effective in decreasing pain, improving knee ROMs and functional mobility in early knee osteoarthritis.**Keywords:** Knee Osteoarthritis; Early Mobilization ; Knee Joint Pain; Knee Joint Range Of Motion; Knee Disability.**INTRODUCTION**

Painful musculoskeletal condition known as knee osteoarthritis (OA) commonly occur at knee joint due to the extensive use and degeneration that causes the loss of articular cartilage over time¹. Worldwide around 250 million people suffer from knee osteoarthritis usually including the elderly population of age about more than 55 years². A survey by Global Burden of Disease on knee osteoarthritis showed that 3.8% suffered globally knee OA in which the highest ratio was found in Asia Pacific high income countries while this ratio was gradually decreased in United states and South Asia respectively³. Study conducted in Twin cities identified the association of knee OA with poor quality of life and history of fall⁴.

Knee degenerative disorder causes functional impairment and marked movement limitations that lead to a negative impact on individual's quality of life⁵. Knee Osteoarthritis affects around 13% of females and 10% of men over the age 60 years and this frequency increases to as higher as 40 percent over the age of 70 years, while male patients have a lower likelihood ratio than women⁶. The common symptoms of knee OA included morning stiffness, crepitus, persistent pain and discomfort during mobility, that leads to the functional impairments and limitations⁷. Obesity, female gender congenital deformities, increasing age, hormonal changes in menopausal women, and muscle imbalances are commonly associated to risk factors of knee OA⁸. Abnormal wear and tear, fracture, trauma, muscle imbalances, articular cartilage dysfunction of knee joint facilitate the symptoms of knee OA⁹. The treatment of knee OA includes various pharmacological treatment such as steroids, analgesics¹⁰ as well as exercise therapy comprises various stretching, strengthening exercises and proprioception training. Recently manual therapy is also endorsed as an important intervention for the treatment of various degenerative disorders including various mobilization, and manipulation techniques¹¹.

Maitland Mobilization comprises of 5 grades ranges from pain relief to restore full range of motion. Literature supported that Maitland mobilization induced hypoalgesic effects, restore optimal

kinematics between the joint surfaces and also improve the functional status of joints.^{12, 13} Pain Release Phenomenon technique showed improvement in knee functional status and it's also an effective technique in reducing the severity of pain when used in combination with conventional treatment and home exercise plan¹⁴. Another research concluded that Pain Release Phenomenon (PRP) along with kinesiotaping depicted drastic improvement in functional status of patients with patellofemoral osteoarthritis.¹⁵ To our knowledge this is the first study in Pakistan that investigated the comparison of effectiveness of Maitland mobilization technique and compression therapy (PRP) for pain management, ROM and disability on early knee OA. Therefore, the aim of this study was to compare the effectiveness of Maitland mobilization versus pain release phenomena for pain, for Knee Range of motion and knee functional healthy status (disability) in early knee osteoarthritis.

METHODOLOGY

This single blinded, randomized control trail was conducted at Department of Physical Therapy, Railway General Hospital, Rawalpindi, Pakistan. Study was completed within a duration of 6 months. Sample size was calculated with the help of EpiTool¹⁶. Randomization was done by coin and toss method using convenience sampling technique. Participants aged between 35-60 years including both genders, clinically diagnosed with stage 1 and 2 knee osteoarthritis, associated with unilateral knee pain and decrease knee range of motion were included in this clinical trial¹⁷. Exclusion criteria were: lower extremity burn, infection, fracture, ligamentous injuries, Total Knee Replacement and Rheumatoid Arthritis¹⁸. Maitland Mobilization Group A having (n=24) participants and Pain release phenomena Group B (PRP) having (n=24) participants. Maitland's mobilization technique comprises of various grades of passive and oscillatory movements known as manipulations applied on spine and peripheral joints to treat joint hypo mobility, discomfort and stiffness¹⁹. The grade of manipulation depends on the amplitude of oscillations^{20,21}. Pain Release Phenomenon (PRP) technique including compression approach produce beneficial effects on the cartilage of degenerative joint and also used to treat patellar misalignment and functional status of knee joint²².

Received on 19-07-2022

Accepted on 07-12-2022

For Maitland Mobilization Group : Ultrasound was applied for 8 min at the start of treatment, Maitland Mobilization of 3 repetitions, and Hamstring, Gastrocnemius, Soleus and Rectus Femoris stretching of 3 sets of 10 repetitions with 10 seconds hold were given for tightened muscle. While Pain release phenomena (PRP) Group B received Ultrasound for 8 min at the start of treatment, pain release phenomena compression technique for 5 repetitions with 20 sec hold, and Hamstring, Gastrocnemius, Soleus and Rectus Femoris stretching of 3 sets of 10 repetitions with 10 seconds hold were given for tightened muscle.

Goniometer was used to assess the knee Range of motions (ROM), and Numeric pain rating scale (NPRS) was used for measurement of pain intensity and knee health status and disability was measured by Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores. Numeric pain rating scale (NPRS) ²³ is a reliable, self-reported, scale to use to evaluate the intensity of pain. It has 11 points scoring system ranging from 0-10. 0 identify ("no pain") while 10 identify ("worst imaginable pain"). ²⁴ Data was collected by the help of semi structured questionnaire and informed consent of participants was also taken.

Statistical Analysis: Descriptive analysis was done for the demographic variables. Nominal variables were analyzed by count and percentage. Variables were subjected to tests of normality (Shapiro-Wilk). The p-value of NPRS is less than 0.05 at 95% confidence interval, so the non-parametric test using (Mann Whitney U- test) was applied. However, analysis showed data was normally distributed for the knee ROM (flexion, extension) and knee health status (WOMAC scale). So parametric test including (independent t-test) was used. Base line measurements were taken and then measurements were taken after 6 weeks of treatment. IBM SPSS 24 was used for statistical analysis and presented in the form of tables.

Table 2: Knee pain intensity in early knee OA

Variable	Quartile(Q1)	Median (Q2)	Quartile(Q3)	IQR	Mann- Whitney U	Z	p-value (2-tailed)
Maitland Mobilization group A	1.0	1.0	2.0	1	184.5	-4.25	0.03
(PRP) group B	2.0	3.0	3.0	1			

Table 3: Intergroup post-value comparison of Knee ROM(Flexion, Extension) scores in early knee OA

Groups	Mean	SD	Mean Difference	95% CI of difference		d.f.	p value (2 tailed)
				Lower	Upper		
Knee flexion							
Group A (Maitland Mobilization)	119.9	4.61	-10.38	-13.38	-7.38	45	0.001
Group B (PRP)	130.0	5.5					
Knee extension							
Group A (Maitland Mobilization)	13.3	4.53	6.33	4.22	8.44	45	0.002
Group B (PRP)	7.04	2.20					

SD = Standard deviation, d.f. = Degree of freedom

Table 4: Intergroup post-value comparison of WOMAC scores in early knee OA

Groups	Mean	SD	Mean Difference	95% CI of difference		d.f.	p value (2 tailed)
				Lower	Upper		
Group A (Maitland Mobilization)	57.08	13.4	15.7	7.745	23.818	45	0.001
Group B (PRP)	41.3	13.8					

DISCUSSION

The current clinical trial was intended to compare the effect of pain release phenomena and Maitland mobilization on pain, knee ROM and health status (disability) in patients with early knee osteoarthritis. Literature review identified there is a lack of evidence available on the comparison of effectiveness of Maitland mobilization effects and pain release phenomena technique in early knee OA patients. The findings concluded that both groups showed improvement in Knee ROM and Disability but there was clinical significant improvement in pain intensity. Literature identified that findings of some previous clinical trials in which a combination of different mobilization/ soft tissue techniques with conventional physical therapy were used are in line with the findings of this study in terms of decreasing knee pain, disability and improvement in knee range of motion.

RESULTS

Total 47 participants, were analyzed at the end of 6 weeks in which mean age in Experimental Maitland mobilization group A was 45.3±6.06 while mean age in Experimental pain release phenomena (PRP) group B was 45.4±4.59. There was drop of 1 patient from Group B due to some personal reasons. Majority of the participants in group A were females 83.3% while group 2 contained 60.9% females. Descriptive characteristics are found in Table 1. Between-group analysis was done by Mann Whitney U test for Knee Pain intensity in early knee OA Patients: NPRS was significantly improved at post intervention having p value (0.03) (Table 2). For knee ROM between groups comparison of end value was assessed by Independent T-test. Knee flexion ROM was improved significantly at the end of 6 weeks having (p-value=0.001) and knee extension ROM also improved with (p value=.002) (Table 3). For knee WOMAC score, between groups comparison of end value was assessed by Independent T-test. WOMAC score showed significant (p value=.001) on post intervention (Table 4).

Table 1: Socio-demographic characteristic of early knee OA

Variables	Attributes	Experimental Maitland Mobilization group A	Experimental (PRP) group B
Age		45.3±6.06	45.4±4.59
Gender	Male	16.7%	39.1%
	Female	83.3%	60.9%
Onset of pain	3 months	25.0%	17.4%
	6 months	16.7%	39.1%
	9 months	25.0%	31.7%
	1 year	16.7%	13.0%
	>1 year	16.7%	8.07%

and betterment in functional status of knee joint than conventional physical therapy alone¹³.

The findings of our study can be acknowledged by the outcomes of previous clinical trials declared by Aniqi Kiran et al²⁰, Priya Singh Rangey et al²⁷ and other researchers. Furthermore, RCT done by Sana Shahid et al on Pain Release Phenomenon and conventional physical therapy. They used 6 weeks follow up treatment plan to assess knee pain and functional status of knee joint. They identified that pain release phenomena played an important role in reducing knee pain intensity and also decreasing knee disability by improving knee functional status. The time period used in this RCT is quite similar to our study duration and outcomes achieved in terms of decreasing pain intensity, and disability by improving functional status of knee joint are also facilitated the findings of study¹⁴.

CONCLUSION

The present randomized controlled trial provided evidence to support the use of physical therapy regimen in the form of Maitland mobilization and mulligan pain release phenomena technique in patients with early knee osteoarthritis. It is concluded that both techniques are equally effective in decreasing knee pain, disability and improving knee ROMs of early knee OA.

Limitations and Recommendations: This study has few limitations, firstly this clinical trial has conducted in single setting with a small sample size. In addition, only early stages of knee osteoarthritis were assessed. Therefore, future studies would be conducted on other stages of knee OA on longer follow-up duration (6 months -1 year), by using advanced objective tools.

Conflict of Interest: Authors declare no conflict of interest.

Funding: None to declare

Ethical approval: Ethical approval was taken from Internal Review Board of Riphah College of Rehabilitation and Allied Health Sciences.

Authors' contributions: Kinza Anwar: Research concept, design, manuscript writing, Hafsa Arshad: Data analysis and interpretation

Hafsa Arshad, Kinza Anwar: Literature search, Saeeda Taj : Data collection and assembly of data, **Mohammad Qasim Ali, Maria Khalid, Dr.Ejaz Hussain,;** Critical revision of the article

REFERENCES

- Bacon K, LaValley MP, Jafarzadeh SR, Felson DJAotrd. Does cartilage loss cause pain in osteoarthritis and if so, how much? *J Annals of the rheumatic diseases*. 2020;79(8):1105-10
- Kohn MD, Sassoon AA, Fernando NDJCO. Classifications in brief: Kellgren-Lawrence classification of osteoarthritis. *J Clinical Orthopaedics*. 2016;474(8):1886-93
- Callahan LF, Cleveland RJ, Allen KD, Golightly Y. Racial/ethnic, socioeconomic, and geographic disparities in the epidemiology of knee and hip osteoarthritis. *J Rheumatic Disease Clinics*. 2021;47(1):1-20
- Shaukat S, Mazhar M, Javed M, Naeem M, Naeem A, Kayani SJJoRMC. Kinesiophobia and its association with balance and mobility in knee osteoarthritis patients in Rawalpindi & Islamabad. *J Journal of Rawalpindi Medical College*. 2021;25(4):485-9
- Khan M, Adili A, Winemaker M, Bhandari MJC. Management of osteoarthritis of the knee in younger patients. *J Crmaj*. 2018;190(3):E72-E9
- Hendrika W, Reswari AJJoM, Research H. The effect of physiotherapy on pain improvement in patients with early knee osteoarthritis at RSU UKI. *J International Journal of Medical*. 2021;7(6):52-9
- Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I. *Caspian journal of internal medicine*. 2011;2(2):205
- Georgiev T, Angelov AKJRi. Modifiable risk factors in knee osteoarthritis: treatment implications. *J Rheumatology international*. 2019;39(7):1145-57
- Mora JC, Przkora R, Cruz-Almeida YJJoPr. Knee osteoarthritis: pathophysiology and current treatment modalities. *J Journal of pain research*. 2018;11:2189
- Katz JN, Arant KR, Loeser RFJJ. Diagnosis and treatment of hip and knee osteoarthritis: a review. *J Jama*. 2021;325(6):568-78
- Susko AM, Fitzgerald GKJOarr, reviews. The pain-relieving qualities of exercise in knee osteoarthritis. *J Open access rheumatology: research*. 2013;5:81
- Nerul NMJNEAB. Comparative Study of Short Term Response between Maitland Mobilization and Mulligan's Mobilization with Movement of Hip Joint in Osteoarthritis of Knee Patients Identified as Per Clinical Prediction Rule. *J NATIONAL EDITORIAL ADVISORY BOARD*. 2014;8(4):6
- Pozsgai M, Kövesdi E, Nemeth B, Kiss I, Farkas N, Atlasz T, et al. Clinical Effect of End-range Maitland Mobilization in the Management of Knee Osteoarthritis—A Pilot Study. *J in vivo*. 2021;35(3):1661-8
- Shahid S, Ahmed A, Ahmed U. Effectiveness of Routine Physical Therapy with and Without Pain Release Phenomenon in Patello-Femoral Pain Syndrome. *Int J Sci Res*. 2016;5(7):1891-919
- Bhosale N, Kanase SB, Bathia KJJJoPHR, Development. Effect of Mulligan's Pain Release Phenomenon with Kinesiotaping in Chronic Patellofemoral Osteoarthritis. *J Indian Journal of Public Health Research*. 2019;10(4)
- Calculators SEEE. Epitools 2018 [Available from: <https://epitools.ausvet.com.au/samplesize>].
- Kise NJ, Risberg MA, Stensrud S, Ranstam J, Engebretsen L, Roos EMJb. Exercise therapy versus arthroscopic partial meniscectomy for degenerative meniscal tear in middle aged patients: randomised controlled trial with two year follow-up. *J bmj*. 2016;354
- Alkawahjah HA, Alshami AMJBMD. The effect of mobilization with movement on pain and function in patients with knee osteoarthritis: a randomized double-blind controlled trial. *J BMC Musculoskeletal Disorders*. 2019;20(1):1-9
- Sailor CESSN, Alagesan JJJoP, Sciences B. Effect of Mulligan mobilization and Maitland mobilization in subjects with unilateral tibiofemoral osteoarthritis-randomized controlled trial. *Journal of Pharmaceutical Biomedical Sciences* 2011;11(11)
- Kiran A, Ijaz M, Qamar M, Basharat A, Rasul A, Ahmed WJLIMUJ. 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. *J Libyan International Medical University Journal*. 2018;3(01):26-30
- Bhavsar PJJAOGE, Sciences M. A study to compare the effectiveness of maitland mobilization protocol on pain and functional mobility of patients with knee osteoarthritis. *J Annals of Geriatric Education Medical Sciences* 2021;8(2):46-55
- Babaji GA, Shinde SBJWwic. Effect of the Mckenzie's Method of Mechanical Diagnosis and Therapy and Pain Releasing Phenomenon in Subjects with Dequervain's Tenosynovitis. *J Website: www ijpot com*. 2017;11(3):162
- Cuenca Zaldivar JN, Calvo S, Bravo-Esteban E, Oliva Ruiz P, Santi-Cano MJ, Herrero PJAiM. Effectiveness of dry needling for upper extremity spasticity, quality of life and function in subacute phase stroke patients. *J Acupuncture in Medicine* 2021;39(4):299-308
- Bernstein DN, Kelly M, Houck JR, Ketz JP, Flemister AS, DiGiovanni BF, et al. PROMIS pain interference is superior vs numeric pain rating scale for pain assessment in foot and ankle patients. *J Foot Ankle International*. 2019;40(2):139-44
- Rao RV, Balthillaya G, Prabhu A, Kamath AJJob, therapies m. Immediate effects of Maitland mobilization versus Mulligan Mobilization with Movement in Osteoarthritis knee-A Randomized Crossover trial. *J Journal of bodywork movement therapie*. 2018;22(3):572-9
- Anwar S, Javaid M, Malik S, Asghar MU, Perveen W, Chaudary MJJoM, et al. Effects of Mulligan Pain Release Phenomenon Technique in Management of Patellofemoral Pain Syndrome: RCT. *J Pakistan Journal of Medical Health Sciences*. 2022;16(03):72-
- Rangey PS, Sheth MS, Vyas NJJP. Comparison of Immediate Effect of Two Different Maitland Mobilization Protocols on Pain and Range Of Motion in Subjects with Osteoarthritis of Knee. *Pain and Headache*. 2015;6:8.