



HOME BASED EXERCISE AND MYOFASCIAL RELEASE TECHNIQUE EFFECTIVELY DECREASE HAMSTRING TIGHTNESS, PAIN, AND DISABILITY IN ELDERLY WITH KNEE OSTEOARTHRITIS

Putu Ayu Sita Saraswati*, Sayu Aryantari Putri Thanaya, Made Hendra Satria Nugraha, I Gusti Agung Ayu Ari Candra Laksmi

Department of Physiotherapy, Faculty of Medicine, Universitas Udayana, Jln. P.B. Sudirman, Dangin Puri Klod, Denpasar Barat, Denpasar, Bali 80234, Indonesia

*sitasaraswati@unud.ac.id

ABSTRACT

Osteoarthritis is one of the most common age-related diseases and is a primary cause of disability and pain. Cases of osteoarthritis cause pain, hamstring tightness, and limited range of motion, which reduce productivity and quality of life. Physiotherapy management for this condition may include Home-Based Exercise (HBE) and the Myofascial Release Technique (MRT). The purpose of this study was to compare the effectiveness of HBE and MRT in reducing hamstring tightness, pain, and disability caused by knee osteoarthritis in the elderly. This study employed an experimental design with a single-blinded randomized pre-test and post-test control group design. A total of 30 participants were recruited using consecutive purposive sampling and randomly divided into two groups. Knee disability was assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), pain was measured using the Visual Analog Scale (VAS), and hamstring tightness was evaluated using the active knee extension test. The Paired T-Test revealed a significant reduction in knee disability, pain, and hamstring tightness before and after intervention in both the Myofascial Release Technique group ($p < 0.001$) and the Home-Based Exercise group ($p < 0.001$). However, Home-Based Exercise demonstrated greater effectiveness compared to the Myofascial Release Technique.

Keywords: disability; exercise; myofascial; osteoarthritis; pain

How to cite (in APA style)

Saraswati, P. A. S., Thanaya, S. A. P., Nugraha, M. H. S., & Laksmi, I. G. A. A. C. (2026). Home Based Exercise and Myofascial Release Technique Effectively Decrease Hamstring Tightness, Pain, and Disability in Elderly with Knee Osteoarthritis. *Indonesian Journal of Global Health Research*, 8(3), 1265–1270. <https://doi.org/10.37287/ijghr.v8i3.1251>.

INTRODUCTION

Osteoarthritis (OA) is a degenerative disease caused by inflammation of the cartilage, bone, and synovium, making it a leading cause of disability among older adults aged over 65 years, affecting approximately 30% (Gao et al., 2023). Knee osteoarthritis is a health problem predominantly experienced by older adults. Factors contributing to knee osteoarthritis include gender, age, and occupation, which are associated with the balance between bone degradation and hormonal regulation. (Ahmad Muhyi, Brilian Sinta Adiratna, 2023). According to data from the World Health Organization (WHO) in 2017, the global prevalence of osteoarthritis was approximately 9.6% in men and 18% in women. In Indonesia, the prevalence of knee osteoarthritis is reported to be 5% among individuals under 40 years of age, 30% among those aged 40–60 years, and 65% among individuals over 61 years of age. Radiologically diagnosed knee osteoarthritis is also relatively high, reaching 15.5% in men and 12.7% in women. Furthermore, the Global Burden of Disease (GBD) reported a 114.5% increase in disability due to knee osteoarthritis between 1991 and 2019 (Long et al., 2022).

Osteoarthritis causes various problems, including decreased physiological function, psychological changes, limited social interaction, reduced ability to fulfill spiritual needs, and decreased work productivity. These conditions have a substantial psychological, economic, and social impact on individuals with osteoarthritis, as well as on their families and communities (Masyhurrosyid et al., 2014). Pain is a major physiological problem experienced by older adults with osteoarthritis. The

effects of pain in osteoarthritis include fatigue, reduced range of motion, pain during movement, and morning stiffness that is more pronounced upon waking. These conditions lead to decreased movement ability, particularly during extension, and limited physical mobility, which may result in disability and threaten the quality of life of older adults (Masyhurrosyid et al., 2014). Patients with osteoarthritis often experience reduced hamstring muscle flexibility, commonly referred to as hamstring tightness, due to the long duration of the disease or altered gait patterns. Muscles play an important role in joint structure and function. In knee osteoarthritis, muscle dysfunction leads to a loss of knee joint stability, resulting in decreased performance and independence in activities of daily living, as well as reduced self-confidence, which ultimately contributes to disability and dysfunction.

Physiotherapy management for pain and disability caused by knee osteoarthritis in older adults may include physiotherapy modalities, exercise therapy, and the myofascial release technique. Exercise therapy that can be performed independently or as home-based exercise within standard physiotherapy interventions has been shown to provide positive effects in reducing pain and disability, thereby improving the quality of life of older adults. However, this type of home-based exercise intervention is still rarely applied and studied; therefore, the authors are interested in conducting further research on this topic. The purpose of this study was to compare the effectiveness of HBE and MRT in reducing hamstring tightness, pain, and disability caused by knee osteoarthritis in the elderly.

METHOD

This study employed an experimental design using a single-blinded randomized pre-test and post-test control group design to compare the effectiveness of Home-Based Exercise (HBE) and Myofascial Release Technique (MRT) in reducing pain, hamstring tightness, and disability among older adults with knee osteoarthritis. The study was single-blinded from the assessor's perspective. The independent variables were HBE and MRT, while the dependent variables included pain, knee disability, and hamstring tightness. Ethical approval for this study was obtained from the Research Ethics Committee, Faculty of Medicine, Udayana University (Approval No. 2182/UN14.2.2.VII.14/LT/2025), in accordance with ethical and legal guidelines.

The research was conducted at private physiotherapy clinics in Denpasar and Badung, Indonesia, over a four-month period from July to October 2025. Therapeutic interventions were provided three times per week for four weeks. In addition, participants in the HBE group performed exercises daily at home. The inclusion criteria were individuals aged 60 years or older who experienced knee pain almost daily during the previous month due to knee osteoarthritis, as confirmed by a physician's referral. Participants were required to have an average pain score between 3 and 7 on the 11-point Numerical Rating Scale (NRS), good cognitive function indicated by a Mini-Mental State Examination (MMSE) score of 24–30, and the ability to walk independently on a flat surface without assistive devices. Exclusion criteria included a history of knee joint replacement or arthroscopic surgery, lower extremity surgery within the past six months, severe knee deformities (varus or valgus), and medical conditions that could increase the risk of adverse events during exercise, such as uncontrolled hypertension, myocardial infarction, cerebral infarction, unstable angina, arrhythmias, severe visual impairment, or neurological disorders. Dropout criteria included failure to attend sessions, worsening clinical condition, or voluntary withdrawal.

Participants were recruited through physiotherapy assessments and physician referrals. Sample size estimation was performed using G*Power software. Based on the calculation and to account for potential dropouts, 15 participants were allocated to each group, resulting in a total sample of 30 participants. Knee disability was assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Pain intensity was measured using the Visual Analogue Scale (VAS). Hamstring tightness was evaluated using the Active Knee Extension Test, with a positive

result defined as an active knee extension angle greater than 20°, indicating hamstring muscle tightness.

The Myofascial Release Technique consisted of manual therapy aimed at releasing fascial restrictions, reducing fascial shortening, and improving joint range of motion. MRT was applied to the hamstring muscle region 12 times over one month. The Home-Based Exercise program was taught by a trained researcher during four initial visits of approximately 30 minutes over the first two weeks, followed by periodic follow-up visits. Participants were instructed to perform exercises for 20–30 minutes daily, gradually increasing repetitions to a maximum of 20 per limb. Exercise adherence was monitored using a self-reported diary collected weekly. The exercise program included strengthening, stretching, and functional exercises targeting the hip and knee musculature. Descriptive statistics were used to summarize participant characteristics. Data normality was assessed using the Shapiro–Wilk test, and homogeneity of variance was evaluated using Levene’s test. Within-group comparisons were analyzed using the paired t-test for normally distributed data or the Wilcoxon signed-rank test for non-normal data. Between-group comparisons were performed using the independent t-test or the Mann–Whitney U test, with a significance level set at $p < 0.05$.

RESULT

This section presents the study findings in detail. Table 1 summarizes the participants’ characteristics, including age, sex, body weight, height. Table 2 presents the mean changes in disability, pain, and hamstring length before and after the intervention in both groups. The vertical analysis (within-group comparison) using the paired *t*-test demonstrated statistically significant improvements in all outcome variables in both Group 1 (MRT) and Group 2 (HBE) ($p < 0.001$). The horizontal analysis (between-group comparison) using the independent *t*-test revealed no significant differences in baseline (pre-test) values between Group 1 and Group 2 for disability ($p = 0.424$), pain ($p = 0.759$), and hamstring length ($p = 0.890$), indicating comparable initial conditions between groups. However, post-intervention (post-test) comparisons between groups showed statistically significant differences across all variables ($p < 0.001$). In addition, comparisons of the mean change (difference) scores demonstrated significant between-group differences for disability ($p < 0.001$), pain ($p = 0.002$), and hamstring length ($p < 0.001$). These findings indicate that Group 2 achieved greater improvements than Group 1 in all measured outcomes.

Table 1.

Characteristic of subjects

Characteristic	Kelompok1	Kelompok 2
Age	68,27±2,2	66,07 ±2,8
Sex:		
Male	5 (33,3)	6(40,0)
Female	10 (66,7)	9 (60,0)
Height	164,9±8.9	159.9±5.9
Weight	66,3±13,5	66,5±11,1

Table 2.

Mean Improvement in All Variables Before and After Exercise

Variable	Group	Pre	Post	Difference	p*
Disability	1 (MRT)	30,20±5,1	19 ±3,66	11,20±2,5	<0,001
	2 (HBE)	28,73±4,78	13± 3,30	15,73±3,2	<0,001
	p value**	0,424	<0,001	<0,001	
Pain	1 (MRT)	5,35±0,49	2,82±0,96	2,52±0,79	<0,001
	2 (HBE)	5,29±0,56	2,03 ±0,46	3,26±0,34	<0,001
	p value**	0,759	<0,001	0,002	
Hamstring Length	1 (MRT)	21.07 ± 1.50	18.87 ± 1.39	2.20 ± 0.82	<0,001
	2 (HBE)	21.00 ± 1.30	13.67 ± 0.98	7.33 ± 0.98	<0,001
	p value**	0.890	<0,001	<0,001	

*with Paired T-Test

**with Independent T-Test

DISCUSSION

Knee osteoarthritis (OA) was more prevalent in women than in men, which is consistent with global epidemiological evidence indicating a higher burden of knee OA among females, particularly after menopause (Xu et al., 2025). Postmenopausal hormonal changes, especially estrogen deficiency, contribute to altered cartilage metabolism, subchondral bone remodeling, and increased inflammatory activity, which collectively accelerate joint degeneration. Additionally, menopause-related changes in body composition predispose women to weight gain and increased mechanical loading on the knee joint, further exacerbating cartilage degeneration and OA progression (Kim et al., 2022).

The present study demonstrated that the myofascial release technique (MFR) produced a significant reduction in knee pain in older adults with knee OA ($p < 0.001$), confirming its analgesic potential. These findings are consistent with recent systematic reviews reporting that MFR applied to periarticular soft tissues can reduce pain and improve joint mobility in individuals with knee OA, particularly when used as an adjunct to conventional rehabilitation (Farshchi, 2025; Nouman et al., 2024). The analgesic effects of MFR are thought to be mediated by reductions in fascial stiffness, improved local microcirculation, and modulation of nociceptive input via mechanoreceptor stimulation and central neuromodulatory pathways (Rahman et al., 2022).

Significant improvements in WOMAC scores were also observed in the MFR group, indicating reduced functional disability and enhanced performance of daily activities. Manual therapy interventions have been shown to reduce pain-related movement inhibition and improve functional outcomes in knee OA; however, evidence consistently suggests that these benefits are smaller and less durable than those achieved through active exercise-based interventions (Farshchi, 2025). Furthermore, stimulation of fascial mechanoreceptors during MFR may reduce sympathetic nervous system activity and enhance parasympathetic responses, potentially improving movement confidence and pain perception (Sur et al., 2024).

Hamstring flexibility improved significantly in the MFR group ($p < 0.001$), although the magnitude of improvement was lower than that observed in the exercise group. The effects of MFR on flexibility are attributed to increased fascial viscoelasticity, reduced adhesions, and transient neuromuscular inhibition, which facilitate greater tissue extensibility (Maras et al., 2024). Nonetheless, evidence suggests that passive interventions such as MFR are most effective when combined with active exercise to achieve sustained improvements in flexibility and function (Santos et al., 2024; Mao et al., 2024).

The home-based exercise (HBE) group demonstrated a statistically significant reduction in knee pain ($p < 0.001$), with a slightly greater effect than the MFR group. Exercise-induced pain reduction in knee OA is attributed to improved periarticular circulation, reduced joint stiffness, enhanced neuromuscular control, and exercise-induced hypoalgesia mediated by endogenous opioids (Mao et al., 2024). Meta-analyses have shown that structured HBE programs can reduce knee pain by up to 40% when adherence is high (Mao et al., 2024).

WOMAC scores decreased more substantially in the HBE group than in the MFR group, reflecting superior functional improvement. Strengthening and neuromuscular exercises enhance joint stability, proprioception, and motor control, while dynamic loading promotes cartilage nutrition through improved synovial fluid circulation (Guede-Rojas et al., 2024; Si et al., 2023). Exercise-induced increases in brain-derived neurotrophic factor (BDNF) may further support motor learning and central pain modulation, contributing to sustained functional gains (Sorkpor et al., 2021).

Hamstring flexibility, measured by active knee extension, improved significantly in the HBE group and exceeded that of the MFR group. Active stretching and strengthening reduce muscle stiffness,

enhance reciprocal inhibition, and improve movement efficiency, leading to reduced medial knee joint loading (Page, 2014; Santos et al., 2024). Overall, these findings confirm that HBE provides superior benefits over MFR in reducing pain, improving function, and enhancing flexibility in older adults with knee OA. Independent t-test analysis demonstrated significant differences in post-test and change scores for pain, disability, and flexibility ($p < 0.001$), while pre-test values did not differ significantly ($p > 0.05$), indicating comparable baseline conditions.

CONCLUSION

Based on the study findings, Home-Based Exercise effectively reduces knee pain, disability, and hamstring tightness in patients with knee osteoarthritis, while the Myofascial Release Technique effectively reduces knee pain and disability. Overall, Home-Based Exercise is more effective than Myofascial Release Technique in improving pain and functional outcomes in patients with knee osteoarthritis.

ACKNOWLEDGEMENTS

We gratefully acknowledge the Institute for Research and Community Service (LPPM) of Udayana University for its support and facilitation during the conduct of this study, which is expected to contribute meaningful benefits to the elderly community.

REFERENCES

- Ahmad Muhyi, Brilian Sinta Adiratna, S. M. B. P. (2023). Prevalensi Osteoarthritis Genu berdasarkan Karakteristik Demografi pada Pasien Geriatri di RSUD K.R.M.T Wongsonegoro. *JKM (Jurnal Kesehatan Masyarakat) Cendekia Utama*, 11(2), 152, 152–160.
- Farshchi, F. (2025). The Role of Myofascial Release Techniques as an Adjunct to Other Therapies in Knee Osteoarthritis : A Systematic Review. <https://doi.org/10.1002/hsr2.71507>
- Gao, B., Li, L., Shen, P., Zhou, Z., Xu, P., Sun, W., Zhang, C., & Song, Q. (2023). Effects of proprioceptive neuromuscular facilitation stretching in relieving pain and balancing knee loading during stepping over obstacles among older adults with knee osteoarthritis: A randomized controlled trial. *PLoS ONE*, 18(2 February), 1–14. <https://doi.org/10.1371/journal.pone.0280941>
- Guede-Rojas, F., Benavides-Villanueva, A., Salgado-González, S., Mendoza, C., Arias-Álvarez, G., Soto-Martínez, A., & Carvajal-Parodi, C. (2024). Effect of strength training on knee proprioception in patients with knee osteoarthritis: A systematic review and meta-analysis. *Sports Medicine and Health Science*, 6(2), 101–110. <https://doi.org/10.1016/j.smhs.2023.10.005>
- Kim, H. I., Ahn, S. H., Kim, Y., Lee, J. E., Choi, E., & Seo, S. K. (2022). Effects of sarcopenia and sarcopenic obesity on joint pain and degenerative osteoarthritis in postmenopausal women. *Scientific Reports*, 1–8. <https://doi.org/10.1038/s41598-022-17451-1>
- Long, H., Liu, Q., Yin, H., Wang, K., Diao, N., Zhang, Y., Lin, J., & Guo, A. (2022). Prevalence Trends of Site-Specific Osteoarthritis From 1990 to 2019: Findings From the Global Burden of Disease Study 2019. *Arthritis and Rheumatology*, 74(7), 1172–1183. <https://doi.org/10.1002/art.42089>
- Mao, Y., Qiu, B., Wang, W., Zhou, P., & Ou, Z. (2024). Efficacy of home-based exercise in the treatment of pain and disability at the hip and knee in patients with osteoarthritis: a systematic review and meta-analysis. *BMC Musculoskeletal Disorders*, 25(1), 1–14. <https://doi.org/10.1186/s12891-024-07585-w>
- Maras, G., Arikan, H., & Citaker, S. (2024). Comparison of the effects of 4-week instrument assisted soft tissue mobilization and static stretching on strength, ROM, flexibility, and painthreshold in hamstring muscle shortness. *Journal of Bodywork and Movement Therapies*, 40(May), 575–583. <https://doi.org/10.1016/j.jbmt.2024.05.008>

- Masyhurrosyid, H., Kumboyono, & Wiji Utami, Y. (2014). Effect of Ginger Stew Warm Compresses Against Subacute and Chronic Pain Levels In Elderly with Knee Osteoarthritis in Arjuna Public Health Center, Klojen Malang. *Majalah Kesehatan FKUB*, 1, 39–44.
- Nouman, M., Shabnam, J., Anwar, S., Perveen, W., Alexe, D. I., Sánchez-Gómez, R., Sava, M. A., & Alexe, C. I. (2024). Effect of Iliotibial Band Myofascial Release Combined with Valgus Correction Exercise on Pain, Range of Motion, Balance, and Quality of Life in Patients with Grade II Knee Osteoarthritis: A Randomized Clinical Trial. *Life*, 14(11). <https://doi.org/10.3390/life14111379>
- Page, P. (2014). Clinical Commentary Current Concepts In Muscle Stretching For Exercise And Rehabilitation. *The International Journal of Sports Physical Therapy*, 7(1), 109. <http://link.springer.com/10.1007/s00421-018-3874-3>
<http://journal.frontiersin.org/Article/10.3389/fpsyg.2015.01128/abstract>
<http://www.ncbi.nlm.nih.gov/pubmed/26642915>
<http://content.ebscohost.com/ContentServer.asp?T=P&P=AN&K=104054298&S=R&D=ccm&Ebs>
- Rahman, S., Habibur, B., Deepthi, G., Singh, K., & Wah, Y. C. (2022). Effect of Myofascial Release on Hamstring Tightness among Knee Osteoarthritis Patient. 6(3), 4027–4034.
- Santos, A. C. G., Caiado, V. da S., Moreira-Marconi, E., Teixeira-Silva, Y., De Meirelles, A. G., Seixas, A., Lacerda, A. C. R., Souza, A., Mendonça, V. A., Bernardo-Filho, M., & De Sá-Caputo, D. da C. (2024). The Influence of Physical Exercises on the Flexibility of Older Individuals with Knee Osteoarthritis: A Systematic Review. *Iranian Journal of Public Health*, 53(2), 255–267. <https://doi.org/10.18502/ijph.v53i2.14911>
- Si, J., Sun, L., Li, Z., Zhu, W., Yin, W., & Peng, L. (2023). Effectiveness of home-based exercise interventions on pain, physical function and quality of life in individuals with knee osteoarthritis: a systematic review and meta-analysis. *Journal of Orthopaedic Surgery and Research*, 18(1), 1–18. <https://doi.org/10.1186/s13018-023-04004-z>
- Sorkpor, S. K., Galle, K., Teixeira, A. L., Colpo, G. D., Ahn, B., Jackson, N., Miao, H., & Ahn, H. (2021). The Relationship Between Plasma BDNF and Pain in Older Adults With Knee Osteoarthritis. *Biological Research for Nursing*, 23(4), 629–636. <https://doi.org/10.1177/10998004211012479>
- Sur, M., Roy, S. D., & Singha, P. (2024). Unlocking relief: Myofascial release in chronic musculoskeletal pain management. 6(1), 17–20.
- Xu, H., Xiao, W., Ding, C., Zou, J., Zhou, D., Wang, J., Ding, L., Jin, C., Sun, L., & Li, Y. (2025). Global burden of osteoarthritis among postmenopausal women in 204 countries and territories: a systematic analysis for the Global Burden of Disease Study 2021. 1–11. <https://doi.org/10.1136/bmjgh-2024-017198>