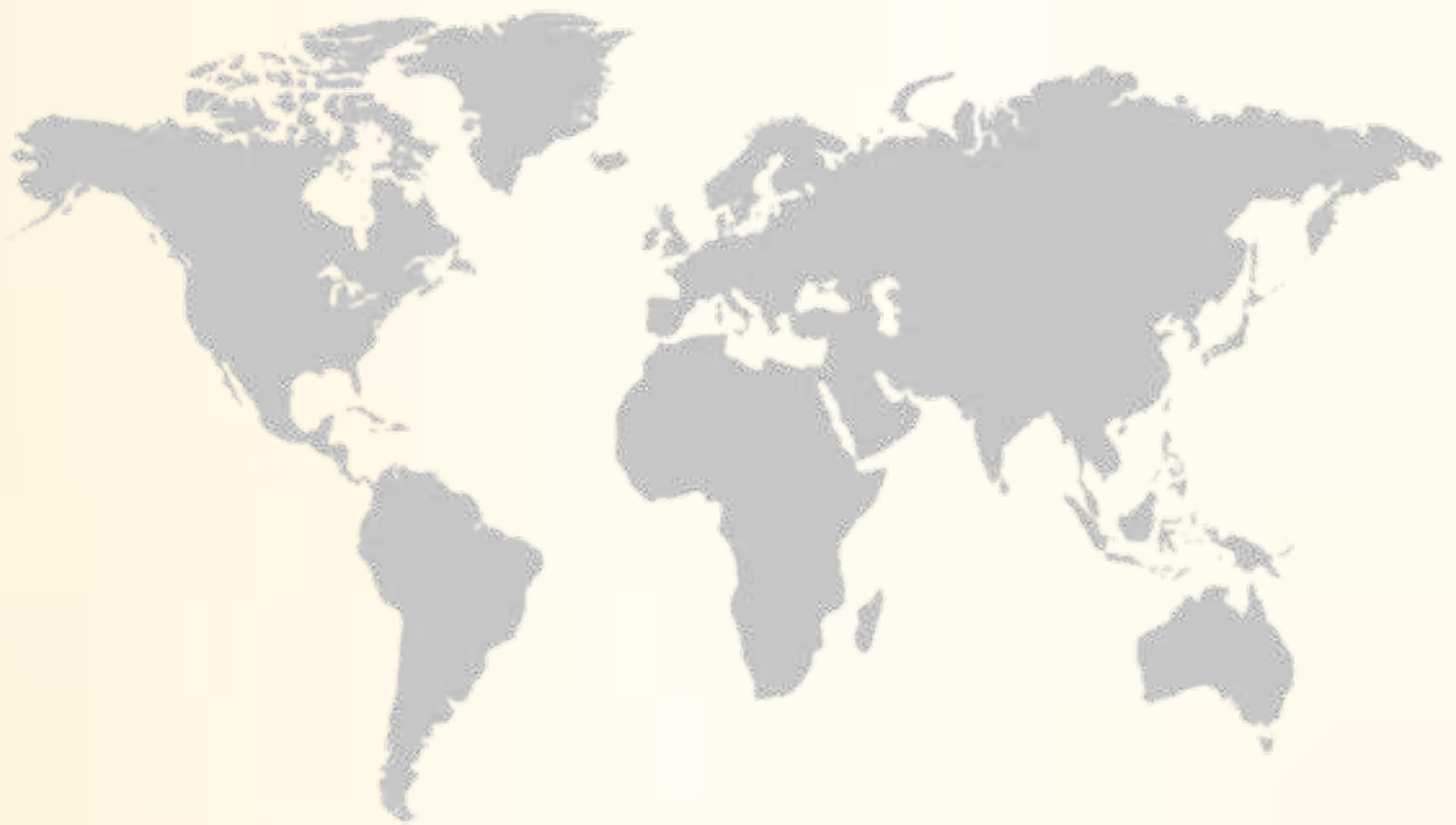


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Pain Scale Reduction After a Morning Walking Program among Older Adults with Osteoarthritis: A One-Group Pretest-Posttest Study at Tlogosadang Health Center

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Abstract

Background: Osteoarthritis is a common degenerative joint condition in older adults and is frequently accompanied by pain, stiffness, limited mobility, and reduced quality of life. Exercise is recommended in osteoarthritis management, and walking is a low-cost activity that may be feasible in community and primary health service settings. However, evidence from small primary-care-based morning walking programs remains limited, particularly when pain medication use and the absence of a control group are considered.

Objective: This study aimed to examine changes in osteoarthritis knee pain scores after a structured morning walking program among older adults in the working area of Tlogosadang Health Center, Paciran District, Lamongan Regency, Indonesia.

Methods: This quantitative pre-experimental study used a one-group pretest-posttest design. The sample included 35 older adults with knee osteoarthritis selected by consecutive sampling from February to March 2026. Eligible participants were aged over 60 years, had controlled knee joint pain and limited knee movement, were able to walk, and provided informed consent. The morning walking program was delivered for 15 minutes, twice weekly for 3 weeks. Pain intensity was measured before and after the program using the Numeric Rating Scale (NRS). Data analysis treated NRS as paired ordinal pain data. The Shapiro-Wilk test was used as a distributional check, and the Wilcoxon signed-rank test was selected as the primary inferential test. Results were reported with Z statistic, p-value, and effect size r.

Results: Before the program, 22 participants (62.9%) reported mild pain, 12 (34.3%) reported moderate pain, and 1 (2.9%) reported severe pain. After the program, 2 participants (5.7%) reported no pain, 28 (80.0%) reported mild pain, and 5 (14.3%) reported moderate pain. The number of respondents with moderate-to-severe pain decreased from 13 (37.2%) to 5 (14.3%). The mean NRS score decreased from 3.17 ± 1.38 to 1.86 ± 1.31 , with a 1.31-point absolute reduction and an approximate 41.3% relative reduction from baseline. The Wilcoxon signed-rank test showed a statistically significant within-participant reduction ($Z = -4.372$, $p < 0.001$), with a large effect size ($r = 0.74$).

Conclusion: Older adults with osteoarthritis showed a statistically significant reduction in pain scores after the 3-week morning walking program. Because this study had no control group and 25 participants (71.4%) reported using pain or anti-inflammatory medication, the findings should be interpreted as an observed pre-post reduction rather than definitive evidence of an independent intervention effect. Morning walking may be considered as a feasible supportive activity for older adults with osteoarthritis when safety screening and individual physical capacity are considered, but controlled studies with medication monitoring, adherence data, and adverse-event reporting are needed.

Keywords: Morning walking program; elderly; Numeric Rating Scale; osteoarthritis; pain; pretest-posttest study.

INTRODUCTION

Osteoarthritis is a degenerative joint condition that commonly affects older adults. It causes pain, swelling, stiffness, and difficulty moving the affected joint, particularly the knee, hip, spine, and hand joints. These symptoms can interfere with walking, stair climbing, standing from a sitting position, social participation, and daily functioning (1–3).

The World Health Organization reported that approximately 528 million people worldwide were living with osteoarthritis in 2019, and knee osteoarthritis was the most frequently affected joint site. Osteoarthritis is more common among older adults and women, and its burden is expected to increase as populations age (1). In Indonesia, radiological knee osteoarthritis has also been reported in both men and women, and osteoarthritis remains an important concern in older-adult health services (4).

Local data from Tlogosadang Health Center in 2025 recorded 123 registered patients diagnosed with osteoarthritis. Most registered patients were aged 60-75 years, and many reported mild to moderate pain (5). These local data indicate the relevance of simple, community-based strategies to support pain management and physical function among older adults in the primary healthcare setting.

Osteoarthritis pain is related to degenerative and inflammatory changes in the joint, including cartilage thinning, altered joint structures, reduced synovial fluid, and involvement of surrounding muscles and tissues. Pain and stiffness may reduce mobility, limit physical activity, and worsen quality of life (2,3). Pharmacological treatment such as nonsteroidal anti-inflammatory drugs may reduce pain, but prolonged or inappropriate use can be problematic in older adults because of potential gastrointestinal, renal, and cardiovascular risks (6,7).

Current osteoarthritis management guidelines recommend exercise as a core non-pharmacological intervention. Exercise programs for knee osteoarthritis may include walking, strengthening, neuromuscular training, aquatic exercise, balance exercise, or other physical activities tailored to patient preference and capacity (3,8–12). Walking is particularly relevant in community settings because it is inexpensive, does not require special equipment, and can be adapted to the physical condition of older adults.

Previous studies have reported that walking-related activities and structured exercise may reduce pain complaints and support function among older adults with knee osteoarthritis (11–14). However, many studies focus on general exercise, joint exercise, or other therapeutic movements. Evidence specifically examining a brief morning walking program in a primary healthcare and community setting remains limited, especially when medication use and the absence of a comparison group are considered.

This study aimed to examine changes in osteoarthritis knee pain scores after a morning walking program among older adults in the working area of Tlogosadang Health Center, Paciran District, Lamongan Regency. Because the study used a one-group pretest-posttest design without a control group, the objective was to describe and test pre-post pain-score reduction rather than to establish a definitive causal effect.

METHODS

Study Design

This study used a quantitative pre-experimental design with a one-group pretest-posttest approach. Pain intensity was measured before and after a morning walking program in the same participants. This design was selected because of community-field feasibility, but it does not include a control group; therefore, it cannot establish causality and is vulnerable to threats to internal validity, including history, maturation, regression to the mean, medication changes, attention effects, and natural fluctuation in osteoarthritis symptoms (15).

Setting

The study was conducted from February to March 2026 in the working area of Tlogosadang Health Center, Paciran District, Lamongan Regency, Indonesia. The health-center working area included Weru Village, Sidokumpul Village, Paloh Village, Warulor Village, and Tlogosadang Village. Data collection was linked to older-adult community health activities and community-based contact with eligible respondents.

Population and Sample

The study population consisted of 123 registered older adults with osteoarthritis recorded by Tlogosadang Health Center from January to October 2025. The final sample

included 35 respondents selected using consecutive sampling. No a priori power calculation was reported; therefore, the sample size should be interpreted as a practical recruitment sample rather than a statistically powered sample for causal inference.

The inclusion criteria were older adults aged more than 60 years, diagnosed with knee osteoarthritis in the health-center record, experiencing controlled knee joint pain with limited knee movement, willing to participate, able to provide informed consent, and still able to perform walking activity. The exclusion criteria were refusal to participate, fractures or injuries involving bones and joints, inability to perform walking activity, and dementia or cognitive impairment that would prevent reliable self-reporting of pain. Dementia screening was based on health-center records and field assessment by the researcher; a formal cognitive test was not reported.

Intervention

The intervention was a morning walking program delivered for 15 minutes per session, twice weekly for 3 weeks, resulting in six planned sessions. The program was implemented in the community setting, including participants' home or village environment and Jalan Sadang, a common local location for morning walking, light exercise, and cycling. The original intervention protocol documented the duration and frequency of walking but did not provide detailed records of walking distance, step count, target heart rate, perceived exertion, warm-up, cool-down, individual pace, missed sessions, or per-session adherence. These reporting limitations are important because exercise interventions should be described with sufficient detail for replication and safety monitoring (3,12).

Basic safety screening was conducted through the eligibility criteria by excluding participants with fractures, bone or joint injury, dementia, or inability to walk. However, the study did not systematically record adverse events such as falls, increased pain, dizziness, fatigue, or dropout. Therefore, the intervention should not be described as proven safe; it should be interpreted as a feasible community activity that requires individual safety screening and monitoring in future studies.

Measurement Instrument

Pain intensity was measured using the Numeric Rating Scale (NRS), an 11-point self-report scale

ranging from 0 to 10, where 0 indicates no pain and 10 indicates the worst possible pain. Respondents were asked to indicate the number that best represented their knee pain at the time of assessment. NRS scores were categorized as no pain (0), mild pain (1-3), moderate pain (4-6), and severe pain (7-10). The NRS is widely used for pain assessment and has demonstrated validity, reliability, and measurement responsiveness in musculoskeletal and osteoarthritic knee pain populations (9,10,20).

Medication Use and Potential Confounding

Medication use was recorded descriptively as yes or no. A total of 25 respondents (71.4%) reported using pain-relief or anti-inflammatory medication, whereas 10 respondents (28.6%) reported not using medication. The study did not record medication type, dose, timing, frequency, duration, or whether medication changed during the intervention period. Medication use was not standardized or controlled. This is a major confounding factor and is considered in the interpretation and limitations of the study, especially because analgesic and anti-inflammatory medication can influence pain scores in older adults (6,7).

Data Collection Procedure

Initial respondent identification was conducted through older-adult community health activities and health-center records. Respondents who met the eligibility criteria were approached, informed about the study, and invited to participate. After informed consent, baseline pain was measured using the NRS. Participants then received the morning walking program for 3 weeks. After the final planned session, pain was measured again using the same NRS procedure. Some respondents were assessed through door-to-door contact, while others were met at Jalan Sadang. Variation in measurement environment could not be fully eliminated and is acknowledged as a methodological limitation.

Data Analysis

Data were analyzed using SPSS software. Descriptive statistics were used to summarize respondent characteristics, medication use, and pain categories. NRS scores were treated as paired ordinal pain data because the same respondents were measured before and after the program. Normality was checked narratively in the analysis plan using the Shapiro-Wilk test because the sample size was less than 50. The Shapiro-Wilk results indicated that the pretest

and posttest pain-score distributions were non-normal (pretest $p = 0.004$; posttest $p < 0.001$). Therefore, the Wilcoxon signed-rank test was selected as the primary inferential test rather than the paired t-test.

The Wilcoxon signed-rank test was reported using the Z statistic, p-value, and effect size r . Software-rounded zero p-values were reported as $p < 0.001$. Effect size was calculated as $r = |Z|/\sqrt{N}$, where N was the number of paired observations, and interpreted as small (0.10), moderate (0.30), or large (0.50 or higher). Clinical relevance was interpreted descriptively using the absolute NRS reduction, the approximate relative change from baseline, baseline pain severity, and the presence of uncontrolled medication use. Medication-adjusted analysis and medication-stratified analysis were not performed because medication type, dose, timing, frequency, and medication changes during the study were not measured. Hodges-Lehmann paired difference and confidence intervals were also not calculated because individual-level paired ranks were not available in the aggregate report. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study obtained ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Lamongan, approval number 062/EC/KEPK-S1/03/2026. Respondents received an explanation of the study purpose and procedures and signed informed consent before participation. Respondent confidentiality was maintained by using codes, and participation was voluntary.

RESULTS

Respondent Characteristics

A total of 35 older adults with osteoarthritis were included in the final analysis. Most respondents were aged 60-70 years (88.6%). Regarding education, the largest group had completed elementary school (48.6%). The most frequent occupational category was not working (34.3%), followed by housewives (31.4%) and

self-employed respondents (25.7%). Medication use was common, with 25 respondents (71.4%) reporting pain-relief or anti-inflammatory medication use.

Pain Categories Before and After the Morning Walking Program

Before the morning walking program, no participants reported no pain, 22 respondents (62.9%) reported mild pain, 12 (34.3%) reported moderate pain, and 1 (2.9%) reported severe pain. After the program, 2 respondents (5.7%) reported no pain, 28 (80.0%) reported mild pain, 5 (14.3%) reported moderate pain, and no respondents reported severe pain.

Pain Score Change

The mean NRS pain score decreased from 3.17 ± 1.38 before the program to 1.86 ± 1.31 after the program, with a mean reduction of 1.31 points and an approximate 41.3% relative reduction from baseline. The number of respondents with moderate-to-severe pain decreased from 13 respondents (37.2%) at pretest to 5 respondents (14.3%) at posttest. Because NRS is an ordinal pain scale, the mean and standard deviation were used only as descriptive summaries, while the primary inferential conclusion was based on the paired non-parametric Wilcoxon signed-rank test. The clinical meaning of the 1.31-point reduction should be interpreted cautiously because baseline pain was mostly mild.

Wilcoxon Signed-Rank Test

The Wilcoxon signed-rank test showed a statistically significant reduction in pain scores after the morning walking program ($Z = -4.372$, $p < 0.001$). The effect size was large ($r = 0.74$), indicating a strong within-participant pre-post change. However, because this was a one-group pretest-posttest design, the statistical result demonstrates an observed within-participant reduction only and does not establish a controlled causal effect. A more complex adjusted model was not performed because medication type, dose, timing, frequency, and medication changes were not measured, and no control group was available.

Table 1. Respondent characteristics (n = 35)

Characteristic	Category	n	%
Age	60-70 years	31	88.6
	71-80 years	4	11.4
Education	No formal schooling	0	0.0
	Elementary school	17	48.6
	Junior high school	5	14.3
	Senior high/vocational school	9	25.7
	Undergraduate degree	3	8.6
	Diploma	1	2.9
Occupation	Housewife	11	31.4
	Self-employed	9	25.7
	Fisherman	1	2.9
	Civil servant/government employee	2	5.7
	Not working	12	34.3
Medication use	Yes	25	71.4
	No	10	28.6

Note. Medication use was recorded only as yes/no; medication type, dose, timing, and changes during the study were not available.

Table 2. Pain categories before and after the morning walking program (n = 35)

Pain category	NRS score range	Pretest n (%)	Posttest n (%)
No pain	0	0 (0.0)	2 (5.7)
Mild pain	1-3	22 (62.9)	28 (80.0)
Moderate pain	4-6	12 (34.3)	5 (14.3)
Severe pain	7-10	1 (2.9)	0 (0.0)
Total		35 (100.0)	35 (100.0)

Note. NRS = Numeric Rating Scale. Categories were defined as no pain = 0, mild pain = 1-3, moderate pain = 4-6, and severe pain = 7-10.

Table 3. Pretest and posttest pain scores

Pain score	n	Mean $\pm$ SD	Minimum-maximum	Mean change
Pretest NRS	35	3.17 $\pm$ 1.38	1-7	
Posttest NRS	35	1.86 $\pm$ 1.31	0-5	1.31

Note. NRS = Numeric Rating Scale. Median and interquartile range require raw score distribution and were not reconstructable from the available aggregate data.

Table 4. Wilcoxon signed-rank test results

Statistic	Value
Z	-4.372
p-value	<0.001
Effect size r	0.74

Note. Effect size r was calculated as $|Z|/\sqrt{N}$, where $N = 35$ paired observations. The value $r = 0.74$ was interpreted as a large within-participant pre-post effect size. This result should not be interpreted as a causal intervention effect because the study had no control group.

DISCUSSION

This study found that pain scores among older adults with osteoarthritis decreased after a 3-week morning walking program. The mean NRS score decreased by 1.31 points, equivalent to an approximate 41.3% relative reduction from baseline, and the Wilcoxon signed-rank test showed a statistically significant within-participant reduction with a large effect size. However, because this study did not include a control group, the finding should be interpreted as pain reduction after the program rather than proof of an independent intervention effect (15).

Most respondents had mild pain at baseline. This is important when interpreting the clinical meaning of the observed 1.31-point reduction. In osteoarthritic knee pain, previous psychometric evidence has reported a minimum detectable change for the NRS of approximately 1.33 points (16). Therefore, the average change in this study was close to that threshold, but individual-level clinically important improvement could not be assessed because raw paired scores and patient global improvement ratings were not available (16–18).

The observed improvement may be consistent with the role of physical activity in osteoarthritis management. Walking can support circulation, muscle activation around the joint, joint mobility, and functional confidence. Guidelines and systematic reviews on osteoarthritis management recommend exercise as a core intervention, and walking may be one practical option for older adults when adapted to individual capacity (3,8–12). Nevertheless, walking dose, intensity, adherence, and safety monitoring should be documented carefully in future studies.

Medication use is a major issue in interpreting the findings. In this study, 25 respondents (71.4%) reported using pain-relief or anti-inflammatory medication. The study did not record the medication type, dose, timing, frequency, or changes during the intervention period. Therefore, medication use could have contributed to the reduction in pain scores, either independently or together with the walking program. Future studies should standardize medication use when possible or record it in sufficient detail for stratified or adjusted analysis, with particular attention to medication safety in older adults (6,7).

The one-group pretest-posttest design also creates several threats to internal validity. Pain

may decrease because of natural symptom fluctuation, regression to the mean, attention from researchers, changes in daily activities, improved self-care during the study period, or expectation effects. These alternative explanations cannot be excluded without a comparison group. A randomized controlled or quasi-experimental design with a control group would provide stronger evidence (15).

The intervention was feasible within a community and primary health service context because it used a simple walking activity and did not require special equipment. However, feasibility should not be equated with proven safety. The study excluded respondents who could not walk or had fractures or injuries, but it did not systematically record adverse events, falls, worsening pain, dizziness, missed sessions, or dropout. Future studies should include predefined stopping criteria and adverse-event monitoring (19,20).

The findings may still have practical value for nursing and community health practice. Morning walking may be considered as a supportive, low-cost physical activity option for older adults with osteoarthritis when implemented with individual assessment, safe walking environments, appropriate footwear, gradual progression, medication monitoring, and follow-up evaluation. Health workers should avoid presenting it as a replacement for individualized medical care (3,8,9).

Study Limitations

This study has several limitations. First, the one-group pretest-posttest design without a control group prevents causal inference. Second, the small sample size and consecutive sampling limit generalizability and statistical power. Third, baseline pain was mostly mild, which may limit the possible magnitude of improvement and complicate interpretation of clinical meaningfulness.

Fourth, medication use was common and was recorded only as yes/no; medication type, dose, timing, frequency, and changes during the study were not collected. Fifth, pain was measured using self-report, which may be affected by recall, expectation, and measurement context. Sixth, intervention details such as walking distance, pace, intensity, warm-up, cool-down, adherence, missed sessions, and adverse events were not recorded. Seventh, the study had short follow-up and did not assess whether pain reduction was sustained.

CONCLUSION

Older adults with osteoarthritis in the working area of Tlogosadang Health Center showed a statistically significant reduction in NRS pain scores after a 3-week morning walking program. The mean pain score decreased from 3.17 to 1.86, with a mean reduction of 1.31 points, an approximate 41.3% relative reduction, and a large Wilcoxon effect size ($r = 0.74$).

Because the study had no control group and medication use was common, the findings should be interpreted as an observed pre-post reduction rather than definitive evidence that morning walking alone caused the improvement. Morning walking may be considered as a supportive community-based activity for older adults with osteoarthritis when safety screening and individual capacity are considered. Future controlled studies should include medication monitoring, detailed intervention reporting, adherence assessment, adverse-event reporting, and longer follow-up.

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Conflict of Interest

The author declares no financial, personal, or professional conflict of interest related to this study.

Author Contributions

Conceptualization, N.N.C. and M.U.; methodology, N.N.C., D.K., and M.U.; investigation, N.N.C.; data curation, N.N.C.; formal analysis, N.N.C. and D.K.; writing—original draft preparation, N.N.C.; writing—review and editing, D.K. and M.U.; supervision, M.U. All authors have read and agreed to the published version of the manuscript.

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