



COMPARISON OF NORDIC WALKING AND *SENAM LANSIA* ON FUNCTIONAL CAPACITY IN POSTMENOPAUSAL WOMEN

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ABSTRACT

Background: Functional capacity is the ability to perform physical activities without pain or fatigue. In postmenopausal women, there are significant changes in cardiovascular, musculoskeletal, and pulmonary functions, which can lead to a decrease in functional capacity. Regular and controlled physical activity can enhance muscle metabolism and cardiopulmonary fitness, thereby increasing functional capacity. Nordic walking and *senam lansia* are examples of popular physical activities in the Indonesian community, particularly among postmenopausal women. **Objective:** To compare the effect of Nordic walking and *senam lansia* on functional capacity of postmenopausal women. **Methods:** This study was a quasi experimental pretest-posttest control group design. There were 26 participants divided into two groups: group A (n=13) received Nordic walking training 3 times a week for 12 weeks, and group B (n = 13) received *senam lansia* 3 times a week for 12 weeks. Functional capacity is obtained through the measurement of METs scores, converted from the result of 6-minute walking test (6MWT) using the Nury formula. **Results:** After twelve weeks, there was a significant improvement in METs scores in both the Nordic walking group (p=0.001) and the *senam lansia* group (p<0.001). There was a statistically significant difference in delta METs score between the Nordic walking group (0.98±0.12) and the *senam lansia* group (0.40±0.24) (p<0.001). **Conclusion:** Both Nordic walking and *senam lansia* improved functional capacity in postmenopausal women after 12 weeks, with Nordic walking producing a greater effect.

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INTRODUCTION

Functional capacity can be defined as an individual's ability to perform physical activities without experiencing pain and fatigue.¹ Several key physiological factors can influence an individual's functional capacity, such as cardiovascular function, the musculoskeletal system, and pulmonary capacity. The hormonal changes characteristic of the postmenopausal period are the primary drivers of significant alterations in key physiological systems, which can result in a substantial reduction in an individual's functional capacity.² One way to improve functional capacity in postmenopausal women is through regular physical exercise. Regular and controlled physical activity can enhance muscle

metabolism and cardiopulmonary fitness, thereby increasing functional capacity.³

Community-based physical activities are currently very popular among the Indonesian people. *senam lansia* is one of the most frequently practiced forms of community-based physical activity.⁴ Previous research has shown that *senam lansia* can improve physical health aspects such as muscle strength, lung function, and cardiovascular function. These three components are important aspects in efforts to enhance an individual's functional capacity.⁵

Since it was first introduced in 1997, Nordic walking has become increasingly popular and is recognized as an easy-to-do exercise option that offers many benefits.⁶ Nordic walking is a type of physical



exercise that is still relatively uncommon in Indonesia. Although it is not yet as well-known as *senam lansia*, Nordic walking is slowly becoming one of the popular choices for physical exercise among Indonesians. It can be performed using two specially designed poles for walking. The use of poles while walking increases the engagement of the upper and lower extremity muscles as well as the trunk, providing propulsion and enhancing the body's oxygen intake.⁷

Unlike *senam lansia*, there is still very little research on Nordic walking in Indonesia, including its effects on functional capacity in postmenopausal women. Therefore, the researchers are interested in understanding and comparing the effects of Nordic walking and *senam lansia* on functional capacity in postmenopausal women.

METHODS

Subjects

The research was conducted in December 2024–February 2025 at the Masjid Agung Jawa Tengah and GOR Tri Lomba Juang Semarang, Indonesia. Sampling was conducted using the purposive sampling method. All female participants in the Nordic walking group and the *senam lansia* group were screened through anamnesis and physical examination. A total of 26 postmenopausal women (13 in the Nordic walking group and 13 in the *senam lansia* Group) met the inclusion criteria, received explanations and information regarding the research and procedures to be undertaken, and were willing to participate in the study by signing an informed consent.

The study inclusion criteria were women who have been postmenopausal for more than eight years and fit into the Stages of Reproductive Aging Workshop (STRAW) +2, normal score on the Indonesian version of the Montreal Cognitive Assessment (MoCa-Ina) (≥ 26), able to walk without assistive devices, can engage in light to moderate physical activity for 60 minutes without problems, and are cooperative and willing to participate in the study and complete the informed consent.

Exclusion criteria were women who experience secondary menopause due to gynecological diseases, hormonal therapy, and/or ovarian removal procedures, uncorrected visual impairments ($< 6/60$), comorbidities such as congestive heart failure NYHA

II-IV, a history of uncontrolled diabetes (Random blood glucose > 250 mg/dL), stroke, parkinson's disease and history of chronic obstructive pulmonary disease, moderate to severe pain in the shoulders, wrists, pelvis, knees, or ankles (Visual Analog Scale ≥ 4), severe neuromuscular and musculoskeletal disorders, consumption of medications with sedative side effects, leg length discrepancy > 2 inches, Falls Efficacy Scale score > 70 , Mini Nutritional Assessment score ≤ 11 , and Geriatric Depression Scale score ≥ 10 .

The criteria for dropping out were subjects who do not participate in the Nordic walking or *senam lansia* program for more than three consecutive sessions, do not attend the initial and final assessments of the study, or withdraw from the study. This study received ethical approval from the Health and Medical Research Ethics Commission at Diponegoro University, Semarang, Indonesia.

Intervention

All subjects who met the inclusion criteria were then divided into two groups: the Nordic walking group and the *senam lansia* group. Research subjects were instructed not to engage in any other physical activities or aerobic exercises for 2 weeks before and during the course of the study.

The Nordic walking group was given a Nordic walking program three times a week, with a duration of 60 minutes per session, for 12 weeks.

Meanwhile, the *senam lansia* group was provided with a *senam lansia* program that consists of warmup, core, and cool-down movements developed by the Indonesian State Minister for Youth and Sports three times a week, also with a duration of 60 minutes per session, for 12 weeks.

Measurements

In this study, functional capacity was determined through the metabolic equivalent for tasks (METs) value, which was converted from the results of the 6-minute walking test (6MWT). This test can provide an overview of an individual's global and integrated ability to perform activities, including cardiopulmonary, systemic circulation, and neuromusculoskeletal components. An increase in functional capacity of each 1 METs can reduce the risk of early death after myocardial infarction by 8-10%.⁸ To define the distance covered in the 6MWT into a



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person's METs value, several formulas are used. In this study, the author chose to use the Nury formula, as it has been tested on the Indonesian population.^{9,10}

Statistical Methods

Data analysis includes descriptive analysis and hypothesis testing. Before testing the hypothesis, the normality of the data distribution was carried out using the Shapiro-Wilk test.

Wilcoxon test was used to determine the difference in METs scores before and after the intervention in the Nordic walking group, meanwhile paired t test was used to determine the difference in METs scores before and after the intervention in the *Senam lansia* group. Mann-Whitney test, was used to find out the difference in delta METs scores between the two groups.

All data is processed with the help of a computer using SPSS[®] software. Significance in this study was obtained if a p value <0.05 with a 95% confidence interval.

RESULTS

Until the end of the study, the data analyzed was 26 subjects. There were no subjects who dropped out in this study. No side effects were reported during the intervention in either the Nordic walking group or *senam lansia* group.

The study flow diagram was available in Figure 1. Participant characteristics were described in Table 1. The two groups did not differ statistically significantly (p-value>0.05). In this study, the average age of the respondents was $65.08 \pm SD$ years in the Nordic walking group and $64.31 \pm SD$ years in the *senam lansia* group.

Improvements have occurred significantly (p=0.001) between pre-test scores (5.72 ± 1.11) and post-test scores (6.70 ± 1.07) in the Nordic walking group. (Table 2)

In the *senam lansia* group, improvements have also occurred, which is significant (p<0.001) between pre-test scores (6.55 ± 1.19) and post-test (6.94 ± 1.14). (Table 2)

The delta METs score in the Nordic walking group (0.98 ± 0.12) was higher than the *senam lansia* group (0.40 ± 0.24); this difference was significant (p <0.001). (Table 2)

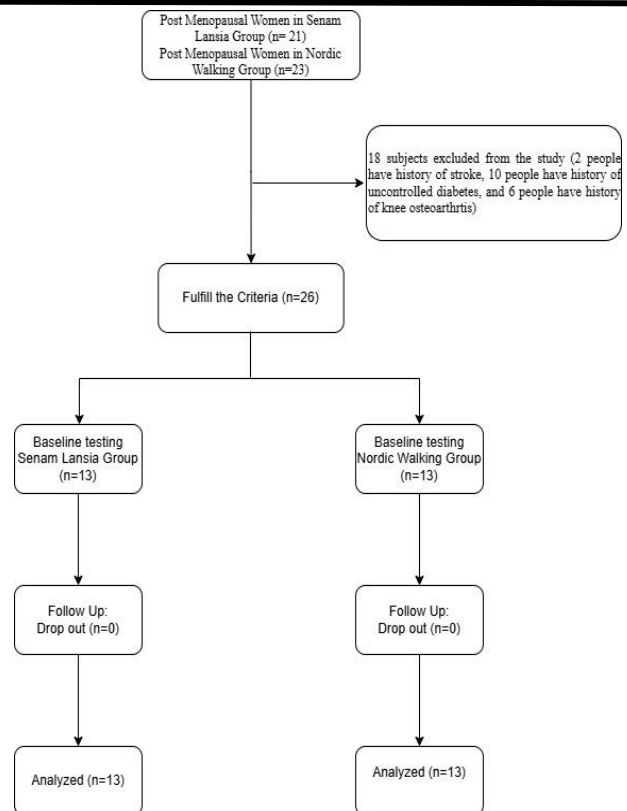


Figure 1. Flow diagram of the study

DISCUSSION

Participants' demographic data did not show significant differences (Table 1). Participant characteristics were said to be homogeneous based on data on age, menopause duration, physical activity based on PASE scores, nutritional intake based on mini nutritional asses and heart rate assessment.

Sample recruited using purposive sampling from the *Senam lansia* Group in GOR Tri Lomba Juang and Nordic Walking Group in Masjid Agung Jawa Tengah. A total of 44 subjects (21 in the *Senam lansia* Group and 23 in the Nordic Walking Group) participated in the preliminary screening of the study. Subsequently, 18 subjects were excluded from the research. They had history of stroke (n=2), history of uncontrolled diabetes (n=10) and history of knee osteoarthritis (n=6). Thus, a total of 26 subjects were involved.



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Table 1. Baseline characteristic

Variable	Group		P
	Nordic Walking	Senam lansia	
Age	65.08 ± 2.02	64.31 ± 2.72	0.375‡
Menopause duration	12.38 ± 1.81	11.85 ± 1.73	0.415‡
PASE	120.77 ± 2.56	119.62 ± 3.40	0.392‡
Mini Nutritional Asses	12.46 ± 0.78	12.62 ± 0.77	0.515‡
HR max	154.92 ± 2.02	155.69 ± 2.72	0.375‡
RHR	74.31 ± 8.10	77.46 ± 6.67	0.289§
HRR min	106.55 ± 4.90	108.75 ± 4.25	0.233§
HRR max	122.68 ± 3.42	124.40 ± 3.27	0.201§

Note : ‡ Mann-Whitney; § Independent-t

In this study, a significant increase in METs scores was observed in both subject groups, either the *senam lansia* group or the Nordic walking group. *Senam lansia*, classified as multicomponent training, encompasses critical elements including aerobic conditioning that enhances cardiorespiratory fitness and strengthening exercises aimed at improving the musculoskeletal system—comprising muscle tissue, bone density, and joint integrity.^{11,12} These modalities collectively contribute to the improvement of overall physical function. Incorporating these components is essential for optimizing functional capacity and mitigating age-related decline in physiological performance among older adults.

In the Nordic walking group, this increase is consistent with the research conducted by Iveta et al.¹³ The higher the METs values achieved by an individual, the better their functional capacity will be. The results of this study indicate that Nordic walking exercises for postmenopausal women can lead to a more significant change in METs scores (0.98 ± 0.12) compared to elderly exercises (0.40 ± 0.24).

Table 2. The comparison of METs score pre and post in each group

METs	Group		P
	Nordic Walking	Senam lansia	
Pre	5.72 ± 1.11	6.55 ± 1.19	0.079§
Post	6.70 ± 1.07	6.94 ± 1.14	0.574§
p	0.001†*	<0.001†*	
Delta	0.98 ± 0.12	0.40 ± 0.24	<0.001‡*

Note : * Significant ($p < 0.05$); § Independent t; ‡ Mann-Whitney; † Wilcoxon; † Paired t

Nordic walking is a form of physical exercise that involves walking with poles, which not only strengthens the lower extremity muscles but also trains the strength of the upper extremity muscles.¹⁴ In addition to its effects on muscle strength, Nordic walking is one of the aerobic exercises that offers numerous benefits for cardiorespiratory fitness.^{15,16} Nordic walking improves respiratory efficiency by using the poles for support and stabilization of the upper body.¹⁷ Research findings indicate that Nordic walking is an effective intervention in the field of cardiopulmonary health, as it has been shown to enhance VO₂max, the distance covered in a 6-minute walk test (6MWT), exercise duration, and quality of life.¹⁸

Nordic walking can be an effective option for improving functional capacity in postmenopausal women. In addition to being economical and easy to perform, Nordic walking can be done independently, allowing individuals to adjust the intensity to their tolerance, while still providing a significant impact on the functional capacity of postmenopausal women.

CONCLUSION

In conclusion, our study demonstrates that both Nordic walking and *senam lansia* can increase METs scores in postmenopausal women. The increase in METs scores is positively correlated with improvements in functional capacity. However, Nordic walking is known to provide more significant changes in MET values compared to *senam lansia*, making it a viable option as a new, affordable, easy, and beneficial form of physical exercise for postmenopausal women.

ETHICAL APPROVAL

The Research Ethics Committee at the Health and Medical Research Ethics Commission of RSUP Dr. Kariadi Semarang, Indonesia granted ethical approval with the ethical clearance number No. 637/EC/KEPK/FK-UNDIP/2024.

CONFLICTS OF INTEREST

The authors declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.



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AUTHOR CONTRIBUTIONS

The authors confirm contribution to the article areas as follows: Conceptualization, Hari Peni Julianti, Novita Sari Dewi, Hernanda Haudzan Hakim; methodology, Hernanda Haudzan Hakim; software, Hernanda Haudzan Hakim; validation, Hernanda Haudzan Hakim; formal analysis, Hernanda Haudzan Hakim; investigation, Hernanda Haudzan Hakim; resources, Hernanda Haudzan Hakim; data curation, Hernanda Haudzan Hakim; writing—original draft preparation, Hernanda Haudzan Hakim; writing—review and editing, Hernanda Haudzan Hakim; visualization, Hernanda Haudzan Hakim; supervision, Hari Peni Julianti, Novita Sari Dewi; project administration, Hernanda Haudzan Hakim; funding acquisition, Hernanda Haudzan Hakim.

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