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Original Research Paper

Effects of handgrip strength training on menopausal symptoms among active and inactive elderly community women

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Abstract
Menopausal symptoms can reduce quality of life in elderly women and their severity is influenced by physical activity levels. In European regions approximately 70-80% women experiencing menopausal symptoms, whereas in America the proportion is around 60% and in Asia, reports indicate that approximately 10% of women in Japan and Indonesia experience menopausal symptoms. Hand grip training as a form of resistance training has the potential to increase muscle strength and help reduce menopausal symptoms. This study aims to evaluate the effect of hand grip training on menopausal symptoms in active and inactive elderly women in the community. The study used a quasi-*experimental* pre-test and post-test two-group design consisting of 34 elderly women aged 50–60 years who were divided into active and inactive groups based on their physical activity levels using the International Physical Activity Questionnaire Short Form (IPAQ-SF) questionnaire. The hand grip training intervention was given for 4 weeks with a frequency of 3 times per week for 12 training sessions. Menopausal symptoms were measured using the Menopause Rating Scale (MRS). Data were analyzed using the Wilcoxon Signed Rank Test for the active group and Paired Sample T-Test for the inactive group. In the active group, the median MRS scored decreased from 7.00 to 6.00 (p=0.001). In the inactive group, the mean MRS scored decreased from 12.24±3.80 to 8.53±3.52 (p=0.000). Hand grip training siginificantly reduces menopausal symptoms in both active and inactive elderly with greater improvement observed in the inactive group. This simple exercise can be effectively implemented in community-based settings to help manage menopausal symptoms among postmenopausal elderly women.

Keywords: elderly; hand grip training; menopausal symptoms; physical activity

1. Introduction

Menopause represents a biological phase in women marked by the end of menstrual cycles due to declining ovarian function and reduced estrogen production (Wu et al., 2023). Based on demographic data from the World Health Organization (WHO), approximately 25 million women worldwide enter menopause each year and the number of postmenopausal women globally is predicted to reach 1.2 billion by 2030 (Du et al., 2020). According to the Badan Pusat Statistik (2022), the global elderly population reached approximately 901 million people. In Indonesia, the precentage of older adults increased from 7.57% in 2021 to 10.48% in 2022 with projections indicating a rise to 19.9% by 2045. Given the high elderly population and the increasing number of elderly people entering menopause, special attention is needed to health during this phase (Badan Pusat Statistik, 2022).

Menopause is characterized by physiological and psychological changes due to changes in estrogen levels, which can lead to various health problems and impact a woman's quality of life. These various symptoms are known as menopausal symptoms (Wu et al., 2023). Common menopausal symptoms include hot flushes, night sweats, insomnia, fatigue, anxiety, depressive symptoms, and musculoskeletal syndrome of menopause (Fruitasari, 2024).

Active older adults are those who engage in physical activity according to the World Health Organization (WHO) recommendations, which are 150–300 minutes of moderate-intensity aerobic activity per week or 75–150 minutes of vigorous-intensity activity, or a combination of moderate-high intensity activity in equivalent amounts (Bull et al., 2020). Inactive older adults are those who spend most of their time sitting or lying down and rarely engage in regular physical activity or do not participate in activities that require a lot of body movement (Mo et al., 2023). This condition could lead to greater declines in muscle strength, including reduced hand grip strength, impaired mobility, and an increased risk of falls and balance problems (Dos Santos et al., 2024).

Menopause is frequently accompanied by physical and musculoskeletal symptoms that may reduce functional capacity and quality of life in older women (Wu et al., 2023). Previous studies have shown that non-pharmacological strategies, particularly physical activity, can help alleviate the severity of menopausal symptoms. Women with higher levels of physical activity tend to report milder symptoms compared to those who are less active (Wu et al., 2023). However, muscle and joint pain during menopause is significantly associated with decreased muscle strength, which may further limit daily activities and negatively affect objective measures such as Hand Grip Strength (HGS) (Terauchi et al., 2020). Although Community-Based Rehabilitation (CBR) programs have been shown to improve several components of physical fitness in older adults, their impact on HGS remains inconsistent (Xin et al., 2022). Furthermore, resistance training including CBR programs has been widely reported to improve physical function in elderly however evidence regarding its specific effect on menopausal symptoms remains limited particularly in community based settings.

Previous studies have reported inconsistent findings regarding the effectiveness of CBR programs on hand grip strength while resistance training is generally known to improve physical function in older adults. Limited evidence exists on the specific effects of simple resistance exercises such as hand grip training on menopuasal symptoms particularly in community-based settings. Moreover, no prior studies have clearly compared the effectiveness of these interventions between physical active and inactive postmenopausal elderly women.

Given the association between muscle strength, physical activity levels, and menopausal symptoms, more specific and targeted interventions focusing on hand grip strength may provide additional benefits. Therefore, this study aims to evaluate the effect of hand grip training on menopausal symptoms among active and inactive elderly women as well as to provide evidence for a simple and feasible intervention that can be implemented in community settings.

2. Research Methods

This study used a quasi-experimental design with a pre-test and post-test two-group design conducted at the Plaosan Integrated Health Post (Posyandu), Mlati District, Sleman Regency, Special Region of Yogyakarta, Indonesia. Ethical approval was obtained from the Health Research Ethics Committee of the Ministry of Health Poltekkes Yogyakarta (No.DP.04.03/e-KEPK.1/047/2026). All participants provided written informed consent prior to their participation in the study.

The study population was menopausal elderly registered at the Plaosan Integrated Health Post (Posyandu). The sample size was determined using the Slovin formula, resulting in 34 respondents after an additional 10% attrition rate to anticipate dropouts. Respondents were divided into two groups based on their physical activity levels using International Phsyical Activity Questionnare Short-Form (IPAQ-SF). The active group consisted of 17 respondents with moderate to high physical activity (≥600 MET-minutes/week) based on the IPAQ-SF and actively participated in Posyandu activities, while the inactive group comprised 17 respondents with low physical activity (<600 MET-minutes/week) based on the IPAQ-SF and inactively participated in Posyandu activities.

Inclusion criteria included postmenopausal elderly aged 50-60 years, willing to participate, and able to participate in the exercise program. Exclusion criteria included uncooperative elderly during the study, currently ill or injured, and undergoing hormonal therapy. All respondents received Hand Grip Training (HGT) intervention three times over four weeks, totaling 12 training sessions. The exercises were performed using hand grippers (spring hand exercise), therabands, and rubber balls in which training procedures and dosages were consistent with the previous research (Kavitha, 2018; Hua-rui et al., 2025) as shown in Table 1.

Table 1. Training Procedures and Dosages

Time	Hand Grip Training (HGT)		
	HGT Components	**Procedure**	**Exercise Dosage**
Week 1	1. Spring hand exercise 2.Ball squeeze 3.Theraband (wrist flexion - extension) 4.Theraband (shoulder flexion – extension)	1.Press the spring hand slowly – then back 2. Hold the ball for 5 seconds 3. Pull the theraband up – Pull the theraband down 4. Pull the theraband up – Pull the theraband down	Frequency: 3x/week Set : 2 Set Repetitions: 10 repetitions
Week 2	1.Spring hand exercise 2.Ball squeeze 3.Theraband (wrist flexion - extension) 4.Theraband (shoulder flexion – extension)	1.Press the spring hand slowly – then back 2. Hold the ball for 5 seconds 3. Pull the theraband up – Pull the theraband down 4. Pull the theraband up – Pull the theraband down	Frequency: 3x/week Set : 2 Set Repetitions: 12 repetitions
Week 3	1.Spring hand exercise 2.Ball squeeze 3.Theraband (wrist flexion - extension) 4.Theraband (shoulder flexion – extension)	1.Press the spring hand slowly – then back 2. Hold the ball for 5 seconds 3. Pull the theraband up – Pull the theraband down 4. Pull the theraband up – Pull the theraband down	Frequency: 3x/week Set : 3 Set Repetitions: 12-14 repetitions
Week 4	1.Spring hand exercise 2.Ball squeeze 3.Theraband (wrist flexion - extension) 4.Theraband (shoulder flexion – extension)	1.Press the spring hand slowly – then back 2. Hold the ball for 5 seconds 3. Pull the theraband up – Pull the theraband down 4. Pull the theraband up – Pull the theraband down	Frequency: 3x/week Set : 4 Set Repetitions: 14-16 repetitions

Data were collected using the Menopause Rating Scale (MRS) to assess the severity of menopausal symptoms and a hand dynamometer CAMRY to measure hand grip strength. Physical activity levels were assessed using the International Phsyical Activity Questionnare Short-Form (IPAQ-SF). Measurements were conducted before and after the intervention period. Data were analyzed using SPSS version 25. Descriptive analysis was used to describe the characteristics of the respondents that include age, physical activity level, and HGS score.

Table 2. Results of Normality Test

Group	P-value (MRS)	
	MRS Pre-Test	MRS Post-Test
Active	0.005	0.12
Inactive	0.231	0.764

Data normality was tested using the Shapiro Wilk Test (Table 2) the results showed that the active group data were not normally distributed ($p<0.05$) while the inactive group data were normally distributed ($p>0.05$). Therefore, the Wilcoxon Signed Rank Test was used to analyze the active group while the Paired Sample T-Test was used for the inactive group (Table 2). This study has several limitations. The quasi-experimental design without a non-intervention control group limits the ability to establish causal relationships. In addition the relatively small sample size and the specific community setting may limit the generalizability of the findings.

3. Results and Discussion

This study was conducted at the Plaosan Integrated Health Post (Posyandu) in Mlati District, Sleman Regency, for four weeks. A total of 34 respondents were given hand grip training. Menopausal symptoms were evaluated using the Menopause Rating Scale (MRS) questionnaire administered before and after the intervention. The results are presented in tables and descriptions as follows :

3.1.Basic Characteristics

According to Table 3, the respondents age characteristics show that the active group (n = 17) had a mean age of 55.18 ± 2.60 years, while the inactive group (n = 17) had a mean age of 55.24 ± 3.13 years. Overall, the 34 participants had an average age of 55.21 ± 2.84 years. Advancing age is associated with a gradual decline in physiological function. In women, aging is accompanied by reduced hormonal levels, particularly estrogen. Menopause is often marked by various physical and psychological symptoms that may decrease comfort and quality of life. Yong et al. (2025) further reported that menopausal symptom severity differs across age groups, with older women aged 50–56 experiencing more pronounced symptoms compared to women aged 40–44.

Regarding physical activity levels, Table 3 indicates that the active group had a mean activity score of 4967.01 ± 6909.65, whereas the inactive group (n = 17) had a mean of 515.94 ± 39.39. Previous research by Dąbrowska-Galas et al. (2019) found that women with moderate to high physical activity levels tend to report milder menopausal symptoms than physically inactive women. Additionally, resistance training has been shown to induce beneficial endocrine and metabolic adaptations, including improved insulin sensitivity, reduced systemic inflammation, and increased anabolic hormone activity such as insulin-like growth factor-1 (IGF-1) (Tan et al., 2023). By modulating inflammatory pathways, resistance exercise may also support bone health and contribute to symptom reduction. Specific forms of resistance training, such as handgrip exercises, can enhance peripheral circulation and improve autonomic nervous system regulation (Nemoto et al., 2021).

Table 3 demonstrates that in the active group, the mean right-hand HGS increased from 17.76 ± 1.12 before intervention to 18.11 ± 1.18 after intervention. For the left hand, the mean increased from 14.41 ± 0.89 to 14.63 ± 0.94. In the inactive group, the mean right-hand HGS improved from 17.03 ± 0.84 to 17.31 ± 0.88, while the left-hand mean increased from 12.99 ± 0.66 to 13.34 ± 0.67 following the intervention. According to Tan et al. (2023), resistance training is effective in enhancing muscle strength and physical function in postmenopausal women and it may also help alleviate menopausal symptoms associated with functional capacity and quality of life. Previous studies consistently indicate that resistance training contribute to improve physical function and muscle strength in postmenopausal women which may also influence symptom severity. The active groups demonstrated relatively smalller

improvements in hand grip strength compared to the inactive group. This finding may be attributed to the better baseline physical condition of participants in the active group which may limit the magnitude of improvement. In contrast, the inactive group showed more pronounced gains in hand grip strength due to a stronger physiological stimulus resulting from their lower initial activity levels. This greater adaptation may have contributed to a more substantial reduction in menopausal symptoms observed in the inactive group.

Table 3. Basic Characteristics

Variables	Characteristics of Respondents	
	Active Elderly (n=17) (Mean ± SD)	Inactive Elderly (n=17) (Mean ± SD)
Age (years old)	55.18±2.60	55.24±3.13
Physical Activity IPAQ-SF Score	4967.01±6909.65	515.94±39.39
HGS Right (kg)		
HGS Pre-training (R) (kg)	17.76±1.12	17.03±0.84
HGS Post-training (R) (kg)	18.11±1.18	17.31±0.88
HGS Left (kg)		
HGS Pre-training (L) (kg)	14.41±0.89	12.99±0.66
HGS Post-training (L) (kg)	14.63±0.94	13.34±0.67

3.2.Menopausal Symptoms After HGT

After completing 12 sessions of Hand Grip Training (HGT), the active elderly group demonstrated a significant reduction in median Menopause Rating Scale (MRS) scores, indicating that HGT had a statistically significant effect on menopausal symptoms. Similarly, the inactive elderly group exhibited a more pronounced improvement, with a reduction in MRS scores approximately three times greater than the initial change, suggesting that HGT significantly alleviated menopausal symptoms in this group (Table 3).

Table 4. MRS After HGT

Sample	Pre	Post	p
Active Elderly (Median)	7.00	6.00	0.001*
Inactive Elderly (Mean±SD)	12.24±3.80	8.53±3.52	0.000

*Wilcoxon Signed Rank Test

These findings indicate that although participants in the active group were already engaged in regular physical activity, the addition of a structured hand grip training program provided further benefits in reducing menopausal symptoms. Resistance-based exercise such as HGT may enhance upper extremity muscle strength, improve energy metabolism, stimulate endorphin release that modulates pain perception, and promote psychological well-being (Abe et al., 2023). This is consistent with previous evidence demonstrating that resistance training performed two to three times per week is associated with reductions in the frequency and severity of menopausal symptoms (Berin et al., 2021). Furthermore, higher levels of habitual physical activity have been linked to fewer somatic complaints and mood disturbances during menopause.

Moreover, the significant improvement observed in the inactive group suggests that HGT may be particularly beneficial for elderly women with low baseline physical activity levels. Resistance training interventions in sedentary older adults have been shown to improve physical function, particularly muscle strength and flexibility (Baker et al., 2020). In addition, resistance training programs for

menopausal women with low physical activity levels have been reported to significantly reduce vasomotor symptoms and enhance overall quality of life (Berin et al., 2022). Furthermore, resistance training has been reported to reduce menopausal symptoms such as depression, anxiety, while also improving quality of life in postmenopausal women (Trujillo-muñoz et al., 2025). These findings support the potential of hand grip training as an effective, simple, and accessible intervention to reduce menopausal symptoms in both active and inactive elderly in community.

4. Conclusion

Based on the research findings, hand grip training significantly reduced menopausal symptoms in both active and inactive postmenopausal women. However, greater improvements were observed in the inactive group due to lower baseline physical activity levels. These findings indicate that hand grip training is a simple and effective intervention that can be implemented in community settings to reduced menopausal symptoms.

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