

# Measurement of Grip Strength in Postmenopausal Women of Different Socioeconomic Conditions

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Grip strength, postmenopausal women, socioeconomic status, muscle strength, aging, physical ability, dynamometer measurement

## Disclaimers

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## ABSTRACT

**Background:** Grip strength is a crucial indicator of physical ability, particularly in postmenopausal women who experience muscle and bone mass reduction due to declining estrogen levels. This study aims to evaluate grip strength among postmenopausal women from different socioeconomic backgrounds.

**Objective:** To assess the grip strength in postmenopausal women of varying socioeconomic conditions.

**Methods:** A cross-sectional study was conducted with 106 postmenopausal women aged 50-70 years. Participants were selected through convenience sampling and assessed using a handheld dynamometer. Two grip strength readings for both dominant and non-dominant hands were recorded, with a one-minute interval between trials. Mean grip strength values were calculated. Data were analyzed using ANOVA in SPSS version 26. Ethical approval was obtained.

**Results:** A significant difference in grip strength was observed with increasing age. For the non-dominant hand, mean grip strength decreased from 15.58 kg (SD = 3.95) in the 50-54 age group to 11.03 kg (SD = 3.25) in the 65-70 age group ( $p = 0.003$ ). However, no significant differences were found in grip strength across socioeconomic conditions ( $p > 0.314$ ).

**Conclusion:** Age significantly affects grip strength in postmenopausal women, but socioeconomic status does not show a significant impact.

## INTRODUCTION

Grip strength is a key indicator for assessing muscle strength and overall physical functionality, making it an essential measure in evaluating the health and physical performance of individuals, especially postmenopausal women. Menopause, which typically occurs between the ages of 45 and 55, is marked by the cessation of ovarian function and the subsequent decline in estrogen levels, a hormone crucial to the maintenance of bone density and muscle mass (2). This physiological transition is associated with various adverse effects on a woman's health, including reduced bone mineral density and muscular strength, both of which significantly impact grip strength. Several studies have established that postmenopausal women generally demonstrate poorer physical performance and weaker grip strength compared to their premenopausal counterparts, primarily due to the decline in estrogen, which exacerbates the natural deterioration of muscle mass that begins as early as the third decade of life (4). Additionally, muscle strength, as measured by grip strength, tends to decrease progressively with age, making this a particularly relevant marker of physical decline in postmenopausal women (5). Research exploring the relationship between menopause and grip strength has shown that, while there is a clear association between menopause and reduced physical function, the extent to which this decline is influenced by age, independent of menopausal status, remains unclear (6). Furthermore, socioeconomic factors, such as income level, education, and access to healthcare, are known to

impact health outcomes, including physical performance. It is well established that women from lower socioeconomic backgrounds may experience poorer health outcomes due to factors such as inadequate nutrition, limited access to healthcare services, and lower levels of physical activity (10). This disparity in health resources and lifestyle choices could potentially influence grip strength, particularly in postmenopausal women who already face the physiological challenges associated with aging and hormonal changes. Women engaged in physical activities that promote bone health, such as regular exercise and balanced nutrition, are more likely to maintain better grip strength and overall muscle function post-menopause (11). Conversely, those from lower socioeconomic backgrounds may lack the resources or awareness necessary to engage in such health-promoting activities, thereby increasing their risk of physical decline.

Despite the established link between menopause, age, and reduced muscle strength, the influence of socioeconomic status on grip strength in postmenopausal women has produced inconsistent findings. While some studies have demonstrated a clear relationship between low socioeconomic status and diminished grip strength due to poor access to healthcare and inadequate nutrition, others have not found a significant association (12). Additionally, studies focusing on postmenopausal women have highlighted that certain lifestyle factors, such as physical activity levels and diet, may play a more significant role in determining muscle strength than socioeconomic status alone (20). In this context, grip strength serves not only as a

measure of muscular health but also as a broader indicator of overall well-being, reflecting the cumulative effects of hormonal changes, age-related decline, and external factors such as socioeconomic conditions. However, the extent to which socioeconomic factors directly impact grip strength in postmenopausal women remains a subject of debate in the literature.

The present study aims to further explore this relationship by evaluating grip strength in postmenopausal women across different socioeconomic conditions. Using a dynamometer to measure grip strength, this study seeks to determine whether socioeconomic status has a significant impact on the muscle strength of postmenopausal women, while accounting for the natural decline in strength associated with aging. Given the mixed results of previous research, this study contributes to the ongoing discussion about the interaction between physical health and socioeconomic factors in postmenopausal women, with particular attention to the role of age in determining grip strength (13). By addressing these gaps in the literature, this research provides valuable insights into the factors influencing physical decline in postmenopausal women, with implications for improving health outcomes through targeted interventions, especially for those from lower socioeconomic backgrounds.

## MATERIAL AND METHODS

A cross-sectional study was conducted over six months in Bahria Town, Lahore, to assess grip strength in postmenopausal women from different socioeconomic backgrounds. The study population included postmenopausal women aged 50 to 70 years with no chronic conditions that could affect grip strength. The sample size, calculated using Raosoft software, was 106 participants, with assumptions of an unknown population size, 50% response distribution, a 90% confidence level, and an 8% margin of error (15). The participants were selected using non-probability convenience sampling. Women with a history of ligamentous tears, arthroplasty, neurological conditions, or upper limb fractures were excluded from the study to maintain the focus on grip strength unaffected by these conditions.

Before data collection, ethical approval was obtained from the Akhtar Saeed College of Rehabilitation Sciences' ethics review committee, Lahore, in adherence to the Helsinki Declaration for ethical principles in medical research. Informed consent was obtained from all participants after they were briefed on the study's purpose and methodology, ensuring their voluntary participation and the confidentiality of their data. Permission was also secured from the relevant authorities at Bahria Town, Lahore, to conduct the study on their premises.

Data collection involved measuring grip strength using a handheld dynamometer, a validated tool for assessing hand muscle strength in medical research (16). The participants completed a questionnaire to capture demographic details, socioeconomic status, and relevant medical history. For the grip strength assessment, participants were seated with

their shoulder adducted and elbow flexed at 90 degrees. Each participant was asked to squeeze the dynamometer with maximum force for five seconds, with two readings taken for both hands with a one-minute interval between trials. The average of the two readings was recorded in kilograms for further analysis. This method has been used in similar studies and ensures reliability and consistency in grip strength measurements (17).

The collected data were entered into SPSS version 26 for analysis. Quantitative variables, such as grip strength, were analyzed using descriptive statistics, including mean, standard deviation, and range. Categorical variables, such as socioeconomic status and handedness, were presented as frequencies and percentages. Inferential statistics were employed using analysis of variance (ANOVA) to compare grip strength between different age groups and socioeconomic conditions. A p-value of less than 0.05 was considered statistically significant. The analysis was aimed at identifying any significant differences in grip strength across the study variables, including age and socioeconomic status, while adjusting for potential confounders. By employing this robust methodology, the study aimed to provide reliable insights into the relationship between grip strength, age, and socioeconomic conditions among postmenopausal women, contributing to the broader understanding of the factors that influence physical health in this population.

## RESULTS

The study aimed to evaluate grip strength in postmenopausal women across different age groups and socioeconomic conditions. A total of 106 postmenopausal women participated, with a mean age of 58.2 years (SD = 6.2). Of the participants, 98.1% were right-handed, and 1.9% were left-handed. The distribution of participants across age groups and socioeconomic classes is presented in Table 1. The largest proportion of participants (32.1%) were aged 50–54 years, while the smallest proportion (16%) were aged 65–70 years. In terms of socioeconomic status, the majority (57.5%) of participants belonged to the middle class, with 31.1% from the lower class and 11.3% from the upper class.

The mean grip strength of the non-dominant and dominant hands was analyzed across different age groups, as shown in Table 2. A significant difference in grip strength was observed with increasing age. For the non-dominant hand, participants aged 50–54 years had a mean grip strength of 15.58 kg (SD = 3.95), which decreased to 11.03 kg (SD = 3.25) in the 65–70 age group ( $p = 0.003$ ). Similarly, the dominant hand showed a significant decrease in grip strength from 17.27 kg (SD = 4.47) in the 50–54 age group to 12.12 kg (SD = 4.65) in the 65–70 age group ( $p = 0.001$ ). Grip strength was also analyzed based on socioeconomic status, as shown in Table 3. No statistically significant difference was observed in grip strength between socioeconomic groups. The mean grip strength of the non-dominant hand was 14.61 kg (SD = 3.87) for participants from the upper class, 12.72 kg (SD = 5.18) for the middle class.

**Table 1: Demographics of Participants**

Age Groups (Years)	Frequency (n)	Percentage (%)
50-54	34	32.1
55-59	25	23.6
60-64	30	28.3
65-70	17	16.0
<b>Socioeconomic Status</b>		
Upper Class	12	11.3
Middle Class	61	57.5
Lower Class	33	31.1
Total	106	100.0

**Table 2: Grip Strength by Age Group**

Age Group (Years)	n	Non-Dominant Hand (Mean ± SD)	p-value	Dominant Hand (Mean ± SD)	p-value
50-54	34	15.58 ± 3.95	0.003	17.27 ± 4.47	0.001
55-59	25	12.33 ± 4.84		14.83 ± 5.93	
60-64	30	12.22 ± 5.62		12.96 ± 4.91	
65-70	17	11.03 ± 3.25		12.12 ± 4.65	
Total	106	13.13 ± 4.86		14.65 ± 5.33	

and 13.36 kg (SD = 4.57) for the lower class ( $p = 0.45$ ). Similarly, the dominant hand grip strength was 16.82 kg (SD = 5.05) for the upper class, 14.49 kg (SD = 5.64) for the

middle class, and 14.15 kg (SD = 4.76) for the lower class ( $p = 0.31$ ). The results of this study indicate a statistically significant decline in grip strength with increasing age, for

**Table 3: Grip Strength by Socioeconomic Status**

Socioeconomic Status	n	Non-Dominant Hand (Mean ± SD)	p-value	Dominant Hand (Mean ± SD)	p-value
Upper Class	12	14.61 ± 3.87	0.45	16.82 ± 5.05	0.31
Middle Class	61	12.72 ± 5.18		14.49 ± 5.64	
Lower Class	33	13.36 ± 4.57		14.15 ± 4.76	
Total	106	13.13 ± 4.86		14.65 ± 5.33	

both the dominant and non-dominant hands, among postmenopausal women. However, socioeconomic status did not show any significant impact on grip strength in this population, as evidenced by the non-significant p-values for both hands. This suggests that age is a more critical factor in determining grip strength in postmenopausal women than socioeconomic conditions.

## DISCUSSION

The present study aimed to evaluate grip strength in postmenopausal women from different age groups and socioeconomic conditions. The results demonstrated a significant decline in grip strength with increasing age, consistent with previous research that highlights the association between aging and muscle strength deterioration in postmenopausal women. This age-related decline in grip strength is primarily attributed to the natural decrease in muscle mass and bone mineral density as estrogen levels drop post-menopause, a phenomenon widely reported in the literature (2, 5). The findings of this study align with those of da Câmara et al. (2015), who found that physical performance, including grip strength, decreases significantly with age in postmenopausal women (18). Similarly, studies by Hong and Kim (2021) and Prakash et al. (2021) have also demonstrated that grip strength is strongly associated with age and is an important predictor

of bone health and quality of life in postmenopausal women (19, 21).

However, contrary to some prior research, this study did not find a significant association between socioeconomic status and grip strength. While previous studies, such as those by Roland et al. (2016) and Neha et al. (2019), reported that lower socioeconomic status is associated with reduced muscle strength due to factors like poor nutrition and limited access to healthcare, the current study did not replicate these findings (12, 20). It is possible that the relatively small sample size and the homogeneity of the participants in terms of access to healthcare and general living conditions in Bahria Town, Lahore, may have contributed to the lack of a significant relationship between socioeconomic status and grip strength. Furthermore, the exclusion of participants with chronic health conditions, which are more prevalent in lower socioeconomic groups, might have reduced the variability in the data and the ability to detect differences based on socioeconomic status.

One of the strengths of this study was its focus on a specific, well-defined population of postmenopausal women, which allowed for a detailed analysis of age-related changes in grip strength. The use of a standardized method to measure grip strength, involving a handheld dynamometer, ensures that the results are comparable to those of other studies in the field (16, 17). Additionally, the statistical rigor applied in

analysing the data, including the use of analysis of variance, adds robustness to the conclusions drawn from the study. Nevertheless, there were several limitations that need to be considered when interpreting the results. The cross-sectional design of the study precludes any conclusions about causality or the temporal relationship between menopause and grip strength decline. Longitudinal studies would be necessary to confirm whether the observed decline in grip strength is solely attributable to aging or whether other factors, such as changes in lifestyle or hormonal fluctuations, play a role over time. Another limitation was the relatively small sample size and the narrow geographic focus, which may limit the generalizability of the findings to broader populations. Moreover, the socioeconomic data were based on self-reported measures, which may introduce bias and reduce the accuracy of the results.

In terms of recommendations, future studies should consider including a larger and more diverse sample to better explore the interaction between socioeconomic factors and grip strength in postmenopausal women. Additionally, longitudinal research is warranted to examine the long-term effects of menopause on muscle strength and physical performance. Interventions aimed at improving muscle strength in postmenopausal women, particularly those from lower socioeconomic backgrounds, should be developed and tested to determine their effectiveness in mitigating the age-related decline in physical function. Such interventions could focus on increasing access to physical activity programs and nutrition education, as both exercise and a balanced diet have been shown to improve muscle mass and bone health in postmenopausal women (11, 21).

## CONCLUSION

In conclusion, this study confirmed the significant association between age and grip strength in postmenopausal women but found no significant relationship between socioeconomic status and grip strength. These findings contribute to the growing body of evidence that highlights the impact of aging on muscle strength and the importance of addressing this decline through targeted health interventions aimed at improving the quality of life for postmenopausal women.

## REFERENCES

- Lee SH, Gong HS. Measurement and interpretation of handgrip strength for research on sarcopenia and osteoporosis. *J Bone Metab.* 2020;27(2):85-92.
- García-Alfaro P, García S, Rodríguez I, Bergamaschi L, Pérez-López FR. Relationship between handgrip strength and endogenous hormones in postmenopausal women. *Menopause.* 2023;30(1):11-7.
- O'Leary MF, Jackman SR, Sabou VR, Campbell MI, Tang JC, Dutton J, et al. Shatavari supplementation in postmenopausal women improves handgrip strength and increases vastus lateralis myosin regulatory light chain phosphorylation but does not alter markers of bone turnover. *Nutrients.* 2021;13(12):4282.
- Bohannon RW. Grip strength: An indispensable biomarker for older adults. *Clin Interv Aging.* 2019;14:1681-91.
- Tachiki T, Kouda K, Dongmei N, Tamaki J, Iki M, Kitagawa J, et al. Muscle strength is associated with bone health independently of muscle mass in postmenopausal women: The Japanese population-based osteoporosis study. *J Bone Miner Metab.* 2019;37(1):53-9.
- Cooper R, Mishra G, Clennell S, Guralnik J, Kuh D. Menopausal status and physical performance in midlife: Findings from a British birth cohort study. *Menopause.* 2008;15(6):1079-85.
- Arteaga-Pazmiño C, Sierra-Nieto V, Fonseca-Perez D, Álvarez-Córdova L, Chedraui P. Arm muscle area and handgrip strength in postmenopausal women. *Maturitas.* 2023;173:117-8.
- Lelonek M, Przychodni A, Loriger M, Cieśla E, Suliga E. Handgrip strength and body mass index in Polish and Croatian female university students of preschool and primary education. *Med Stud.* 2022;38(4):287-94.
- Shur N, Creedon L, Skirrow S, Atherton P, MacDonald I, Lund J, et al. Age-related changes in muscle architecture and metabolism in humans: The likely contribution of physical inactivity to age-related functional decline. *Ageing Res Rev.* 2021;68:101344.
- Macêdo P, Cavalcante A, Fernandes S, Salustiano M, Lima M, Jerez-Roig J, et al. Association between menopausal status and physical function: A systematic review protocol. *PLoS One.* 2023;18(1).
- Fernandes SGG, Pirkle CM, Sentell T, Costa JV, Maciel ACC, da Câmara SMA. Association between self-rated health and physical performance in middle-aged and older women from Northeast Brazil. *PeerJ.* 2020;8.
- Roland J Jr, Simonsick E, Zonderman A, Evans MK. Association between race, household income and grip strength in middle- and older-aged adults. *Ethn Dis.* 2016;26(4):493-9.
- Kapuš O, Gába A, Lehnert M. Relationships between bone mineral density, body composition, and isokinetic strength in postmenopausal women. *Bone Rep.* 2020;12:100255.
- Sternäng O, Reynolds CA, Finkel D, Ernsth-Bravell M, Pedersen NL, Dahl Aslan AK. Factors associated with grip strength decline in older adults. *Age Ageing.* 2015;44(2):269-74.
- Almouaalamy N, Adem SH, Alsubhi AA, Alansari AB, Yahya MA, Alsadan SA. Sarcopenia and associated risk factors in oncology outpatients in specialized cancer centers in Saudi Arabia: A cross-sectional study. *Ann Med Surg.* 2023;85(6):2592-7.
- Li YZ, Zhuang HF, Cai SQ, Lin CK, Wang PW, Yan LS, et al. Low grip strength is a strong risk factor of osteoporosis in postmenopausal women. *Orthop Surg.* 2018;10(1):17-22.
- Sánchez-Borrego R. A strong handshake! Do not forget to measure grip strength in menopause: A simple way to predict general frailty/impairment. *Menopause.* 2022;29(1):3-5.

18. da Câmara SMA, Zunzunegui MV, Pirkle C, Moreira MA, Maciel AC. Menopausal status and physical performance in middle aged women: A cross-sectional community-based study in Northeast Brazil. *PLoS One*. 2015;10(3).
19. Hong YS, Kim H. Hand grip strength and health-related quality of life in postmenopausal women: A national population-based study. *Menopause*. 2021;28(12):1330-9.
20. Neha SK. A study on handgrip strength in pre-and post-menopausal women of Amritsar on the basis of their rural and urban habitat. *Hand*. 2019;9(1):11-7.
21. Prakash KO, Choudhary R, Singh G. Lean body mass, body fat percentage, and handgrip strength as predictors of bone mineral density in postmenopausal women. *J Midlife Health*. 2021;12(4):299-303.