



Comparison Of Regular Exercise on Strength, Flexibility and Endurance in Postmenopausal Women: An Observational Study

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Abstract : Menopause is the critical transition period in the life of a woman, usually occurring between 45 and 55 years of age, characterizing a decrease in the level of estrogen. This hormonal change gives rise to significant changes in the body, such as bone density loss, increased risk of osteoporosis, muscle mass and strength reduction (sarcopenia), reduced flexibility, and aerobic capacity. These further increase the risk of fracture, falls, metabolic syndrome, and other chronic diseases, besides affecting daily function and independence adversely. Regular physical activity is considered one of the important strategies that can help diminish these risks; however, its prevalence is still low among postmenopausal women. Previous studies have shown improvements in muscle strength, bone health, cardiovascular risk, and well-being following exercise, but there is a scarcity of research among Indian women, and few studies have compared multiple aspects of physical fitness among exercisers and non-exercisers in this population. Hence, this study was specifically designed to rectify these lacunae and provide evidence for health strategies among postmenopausal women.

IndexTerms - Exercise, Flexibility, Muscle strength, Postmenopausal women.

I.INTRODUCTION

Menopause is a critical period marked by a decline in oestrogen leading to significant physiological changes affecting multiple organ systems including musculoskeletal and cardiovascular health ⁽¹⁾. Oestrogen deficiency during menopause results in rapid loss of bone mass and strength increasing risk of osteoporosis and fractures in aging women ⁽²⁾. Sarcopenia, characterized by loss of muscle mass and strength, is prevalent in postmenopausal women and is associated with impaired functional ability and increased risk of falls ⁽³⁾. The metabolic syndrome emerges with menopause, featuring increased central obesity, insulin resistance, and dyslipidaemia, elevating cardiovascular disease risk ⁽⁴⁾. Regular exercise including resistance, aerobic, and flexibility training is shown to improve muscle strength, cardiovascular fitness, and overall physical function in postmenopausal women ⁽⁵⁾. Despite benefits, adherence to exercise is hindered by psychosocial and cultural factors; hence effective, tailored exercise interventions are needed for this population ⁽⁶⁾. Research specific to Indian postmenopausal women remains limited; studying this group's strength, flexibility, and endurance will aid in designing localized health programs ⁽⁷⁾.

II.NEED OF THE STUDY

This study evaluates the effectiveness of exercise in mitigating or reversing menopause-related declines in physical fitness, providing valuable evidence for clinical recommendations. By highlighting the benefits of physical activity, the research can inform public health policies and initiatives that promote healthy aging and encourage physical activity among postmenopausal women.

III.RESEARCH METHODOLOGY

- Study type: Analytical observational cross-sectional study.
- Participants: 60 postmenopausal women aged 45–55 years; 30 exercising regularly (≥ 3 times/week for 3–4 years pre-menopause), 30 sedentary.
- Setting: Residential areas and wellness centres in Pune.

- Inclusion criteria: Menopausal ≥ 12 months, consented to participate.
- Exclusion criteria: Chronic illnesses, recent injuries/surgeries, hormone therapy, surgical menopause.
- Assessments:
 - Muscle strength by handgrip dynamometer (right and left).
 - Flexibility by sit-and-reach test.
 - Endurance by 6-minute walk test.
- Data analysis: Normality checked (skewness/kurtosis ± 2) independent t-tests for group comparisons, significance level $p < 0.05$.

IV. DEMOGRAPHIC DATA OF PARTICIPANTS

Group	Number of Participants	Mean Age (years)
Exercising Group	30	49.6 \pm 4.9
Non-Exercising Group	30	49.3 \pm 5.3

Table 1 shows the demographic comparability between the exercising and non-exercising postmenopausal women in the study.

V. RESULTS AND DISCUSSION

The study included 60 postmenopausal women divided equally into two groups: 30 who regularly exercised (Group 1) and 30 with sedentary lifestyle (Group 2). The mean age of participants was approximately 49.5 years in both groups, ensuring demographic comparability.

5.1 Major Findings

- Exercising group showed significantly higher values:
 - Right hand grip strength: 25.07 \pm 4.56 kg vs 14.9 \pm 4.22 kg ($p < 0.001$).
 - Left hand grip strength: 22.47 \pm 3.97 kg vs 12.77 \pm 3.96 kg ($p < 0.001$).
 - Sit-and-reach flexibility: 12.57 \pm 4.42 cm vs -1.05 \pm 6.59 cm ($p < 0.001$).
 - 6-minute walk distance: 548.43 \pm 51.24 m vs 387.23 \pm 55.44 m ($p < 0.001$).
- Data distribution was approximately normal, parametric tests valid.

Tabular Summary			
Variable	Exercising Group (Mean \pm SD)	Non-Exercising Group (Mean \pm SD)	p-value
Grip Strength Right (kg)	25.07 \pm 4.56	14.9 \pm 4.22	<0.001
Grip Strength Left (kg)	22.47 \pm 3.97	12.77 \pm 3.96	<0.001
Flexibility (cm)	12.57 \pm 4.42	-1.05 \pm 6.59	<0.001
6-Minute Walk Distance (m)	548.43 \pm 51.24	387.23 \pm 55.44	<0.001

Table 2 presents the comparison of muscle strength, flexibility, and endurance between regular exercisers and non-exercisers among postmenopausal women.

VI. DISCUSSION

This study assessed the effects of regular exercise on muscular strength, flexibility, and endurance in postmenopausal women, demonstrating significantly improved physical fitness in exercisers. Higher grip strength among exercisers aligns with existing research showing resistance exercise combats sarcopenia and maintains muscle function. Improved flexibility likely results from routine stretching reducing connective tissue stiffness, facilitating daily mobility and reducing injury risk.

Endurance as measured by the 6-minute walk test was markedly greater in exercisers, suggesting enhanced cardiovascular and muscular capacity potentially due to aerobic conditioning. These findings corroborate prior studies on the protective role of combined resistance and aerobic exercise on musculoskeletal and cardiovascular health in this population.

Limitations include cross-sectional design limiting causal inference, moderate sample size, and reliance on self-reported exercise history. Confounding factors like dietary habits, medications, and comorbidities were not controlled. Future longitudinal and randomized trials with larger samples and detailed exercise protocols are needed to further elucidate mechanisms and optimize intervention strategies.

VII. CONCLUSION

Regular exercise significantly improves muscular strength, flexibility, and endurance in postmenopausal women, effectively mitigating menopausal health declines and promoting healthy aging.

VIII. ACKNOWLEDGEMENTS

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IX. REFERENCES

- [1] Greendale GA, Lee NP, Arriola ER. The menopause. *Lancet*. 2010;376(9745):1331-1340.
- [2] Eastell R, Rosen CJ, Black DM, Cheung AM, Murad MH, Shoback D. Pharmacological management of osteoporosis in postmenopausal women: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2020;105(3): dgaa048.
- [3] Peterson MD, Sen A, Gordon PM. Influence of resistance exercise on muscle quality in older adults: a meta-analysis. *Ageing Res Rev*. 2011;10(4):226-237.
- [4] Carr MC. The emergence of the metabolic syndrome with menopause. *J Clin Endocrinol Metab*. 2003;88(6):2404-2411.
- [5] Khalafi R, Tahmasebi S, Jolfaie N, et al. Molecular mechanisms of oestrogen deficiency-induced osteoporosis: a comprehensive review. *Front Endocrinol (Lausanne)*. 2023; 14:1154927.
- [6] Schutzer KA, Graves BS. Barriers and motivations to exercise in older adults. *Prev Med*. 2004;39(5):1056-1061.
- [7] Mishra SI, Scherer RJ, Cooksey RC, et al. Correlates of physical activity among women: a structural equation modelling approach. *J Women Aging*. 2011;23(3):236-250.