

Comparison of Balance and Flexibility between Perimenopausal and Postmenopausal Women Aged 40–55 Years: A Cross-Sectional Study

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Abstract:

Background: Menopause is associated with physiological changes that may affect physical performance, including balance and flexibility. Comparing these outcomes between perimenopausal and postmenopausal women may help identify differences in functional performance.

Objective: To assess and compare balance and flexibility between perimenopausal and postmenopausal women aged 40–55 years.

Methods: A cross-sectional study was conducted in Pune, India, involving 68 women selected through convenience sampling. Participants were divided into perimenopausal and postmenopausal groups, with 34 participants in each group. Flexibility was assessed using the Sit-and-Reach Test, balance using the Single-Leg Stance Test for both legs, and menopausal symptoms using the Menopause Rating Scale (MRS). The thesis reports the use of independent-samples t-tests or Mann–Whitney U tests according to the distribution of the data.

Results: The mean Sit-and-Reach Test score was 38.29 cm in the perimenopausal group and 24.77 cm in the postmenopausal group, with a reported statistically significant difference ($p < 0.001$). Mean right-leg stance times were 39.56 and 24.62 seconds, respectively ($p < 0.001$). Mean left-leg stance times were 37.06 and 19.82 seconds, respectively ($p < 0.001$). Mean MRS scores were 17.50 in the perimenopausal group and 19.09 in the postmenopausal group; the reported difference was not statistically significant ($p = 0.189$).

Conclusion: In this sample, postmenopausal women had lower flexibility scores and shorter single-leg stance times than perimenopausal women. The findings indicate differences in these measures of physical performance between the groups. However, the cross-sectional design does not establish that menopausal status caused these differences.

Keywords: Menopause, Cross sectional studies, Menopause rating scale, Balance and Flexibility

1. INTRODUCTION:

Menopause is a natural biological transition that marks the end of a woman's reproductive period. It is clinically defined as the permanent cessation of menstruation following 12 consecutive months without menstruation. The menopausal transition is associated with hormonal changes, particularly a decline in estrogen levels, which may influence physical, psychological, and functional health. Women may experience symptoms such as hot flashes, sleep disturbances, joint and muscle discomfort, and changes in physical performance during this stage of life [1,2]. Estrogen plays an important role in maintaining

bone health, muscle function, and neuromuscular activity. Changes associated with menopause may therefore affect muscle performance, postural stability, and flexibility. Reduced balance can interfere with daily activities and may increase the risk of falls, while decreased flexibility can restrict joint mobility and functional movements. However, these changes may vary among individuals and can also be influenced by age, physical activity, and other health-related factors [3,4]. Balance and flexibility are important components of physical fitness and functional independence. Balance enables an individual to maintain postural stability during static and dynamic activities, whereas flexibility allows joints to move through their available range of motion. Previous studies have investigated physical performance, balance, and flexibility in women at different menopausal stages, with findings suggesting that postmenopausal women may experience changes in these parameters [2,3,5]. However, the extent of these changes may differ across populations and assessment methods. Assessing balance and flexibility among perimenopausal and postmenopausal women can help identify potential differences in physical function during the menopausal transition. The Menopause Rating Scale (MRS) can be used to assess the severity of menopausal symptoms, while the Sit-and-Reach Test and Single-Leg Stance Test provide practical measures of flexibility and static balance, respectively. Therefore, the present study aimed to assess and compare balance and flexibility among perimenopausal and postmenopausal women aged 40–55 years. The findings may help improve understanding of physical function during these stages and support the need for appropriate assessment, health education, and physiotherapy-based interventions to promote mobility and functional independence.

2. MATERIALS AND METHODS

Study Design and Setting: A cross-sectional study was conducted in Pune city to assess and compare balance and flexibility among perimenopausal and postmenopausal women aged 40–55 years.

Participants and Sample Size: A total of 68 women were recruited using convenience sampling. Participants were divided into two groups: Group A included 34 perimenopausal women, and Group B included 34 postmenopausal women.

Inclusion and Exclusion Criteria: Healthy women aged 40–55 years were included. Women with neurological or musculoskeletal disorders, pregnancy, hearing impairment, abnormal vision, a history of frequent falls during the previous year, hysterectomy, or a history of hormone replacement therapy were excluded.

Outcome Measures: The following assessment tools were used:

1. **Menopause Rating Scale (MRS):** Used to assess the severity of menopausal symptoms across somatic, psychological, and urogenital domains [6].
2. **Sit-and-Reach Test:** Used to assess flexibility, particularly of the hamstring muscles and lower back [7].
3. **Single-Leg Stance Test:** Used to assess static balance by measuring the duration for which a participant could maintain a single-leg standing position [8].

Study Procedure: Following institutional approval, eligible participants were informed about the study, and informed consent was obtained. Participants were classified into perimenopausal and postmenopausal groups according to their menopausal status. The MRS was administered, followed by the Sit-and-Reach Test and Single-Leg Stance Test. Each physical assessment was performed three times, and the average score was recorded.

Statistical Analysis:Data were analysed using SPSS version 25. Normality was assessed using the Shapiro–Wilk test. Appropriate parametric or non-parametric tests were used according to data distribution. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

A total of 68 women participated in the study, comprising 34 perimenopausal women (Group A) and 34 postmenopausal women (Group B).

Comparison of Balance, Flexibility, and Menopausal Symptoms

The mean age of participants was 44.38 ± 2.46 years in Group A and 52.09 ± 2.15 years in Group B. The postmenopausal group demonstrated lower mean Sit-and-Reach scores and shorter single-leg stance times on both sides than the perimenopausal group.

Outcome measure	Perimenopausal group (n=34)	Postmenopausal group (n=34)	Reported p-value
Age (years), mean $\pm$ SD	44.38 ± 2.46	52.09 ± 2.15	Not reported
Menopause Rating Scale score, mean	17.50	19.09	0.189
Sit-and-Reach Test (cm), mean	38.29	24.77	<0.001
Right-leg stance time (seconds), mean	39.56	24.62	<0.001
Left-leg stance time (seconds), mean	37.06	19.82	<0.001

The differences in flexibility and right- and left-leg stance times were reported as statistically significant ($p < 0.001$). However, the difference in mean Menopause Rating Scale scores was not statistically significant ($p = 0.189$).Overall, the findings indicate lower flexibility and reduced static balance performance in the postmenopausal group compared with the perimenopausal group.

4. DISCUSSION

The present study compared balance and flexibility between perimenopausal and postmenopausal women aged 40–55 years. The findings showed that postmenopausal women had lower Sit-and-Reach scores and shorter single-leg stance times on both sides than perimenopausal women. However, the difference in Menopause Rating Scale scores was not statistically significant.

The lower flexibility scores observed in postmenopausal women may be associated with age-related changes in muscle and joint function, physical activity levels, and hormonal changes during menopause. Similarly, the shorter single-leg stance times suggest differences in static balance performance between the groups. These findings are relevant because balance and flexibility contribute to mobility and functional independence.

Previous studies have examined the relationship between menopausal status and physical performance, including balance and flexibility. Research by da Câmara et al. investigated menopausal status in relation to physical performance, while other studies have assessed balance and flexibility in

postmenopausal women. The present findings contribute to this area of research by comparing these parameters in women aged 40–55 years. The Menopause Rating Scale scores were higher in the postmenopausal group, but the difference was not statistically significant. This suggests that the observed differences in physical performance were not accompanied by a statistically significant difference in reported menopausal symptom scores in this sample. The findings should be interpreted cautiously because the study was cross-sectional and the two groups differed substantially in mean age. Therefore, the observed differences cannot be attributed to menopausal status alone. The relatively small sample size and convenience sampling may also limit the generalisability of the results. Further studies involving larger samples, clearly defined menopausal-stage criteria, and adjustment for age and physical activity are recommended. Future research may also investigate whether structured physiotherapy and exercise programmes improve balance and flexibility in women during the menopausal transition.

5. LIMITATIONS OF THE STUDY

This study had several limitations. The sample size was relatively small, with only 68 participants recruited through convenience sampling, which may limit the generalisability of the findings. The cross-sectional design does not establish a causal relationship between menopausal status, balance, and flexibility. The groups also differed in mean age, which may have influenced the observed results. Additionally, factors such as physical activity, lifestyle, and other health-related variables may have affected physical performance. Further studies with larger samples and clearly defined menopausal-stage criteria are recommended.

6. CONCLUSION

The study found that postmenopausal women had lower flexibility and reduced static balance performance compared with perimenopausal women aged 40–55 years. However, the difference in menopausal symptom scores was not statistically significant. These findings highlight the importance of assessing balance and flexibility in women during and after the menopausal transition. Regular physical activity and appropriate exercise programmes may help maintain physical function and mobility. Further studies with larger samples and appropriate adjustment for age are needed to confirm these findings.

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