



Relationship between Balance and Menopause-Related Quality of Life among Perimenopausal Women: A Cross-Sectional Study

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Abstract:

Background: Perimenopause is a transitional phase characterized by hormonal fluctuations that may negatively affect neuromuscular control, balance, and quality of life. Impaired balance increases the risk of falls and functional limitations, which may further deteriorate menopause-related quality of life. However, the relationship between balance performance and menopause-specific quality of life in perimenopausal women remains underexplored.

Objective:

To assess balance and menopause-related quality of life among perimenopausal women.

To determine the relationship between balance performance and menopause-related quality of life.

Methodology: A cross-sectional study was conducted among perimenopausal women aged 40–55 years. Balance was assessed using the Timed Up and Go (TUG) test, and menopause-related quality of life was evaluated using the Menopause-Specific Quality of Life (MENQOL) questionnaire. Descriptive statistics were used to summarize data. Pearson's correlation analysis determined the relationship between balance performance and quality of life. One-way ANOVA assessed associations between demographic variables and outcome measures.

Results:

The mean TUG score indicated mild balance impairment. MENQOL scores revealed moderate impairment across all domains, with the physical domain being most affected. A significant positive correlation was found between TUG scores and total MENQOL scores ($p < 0.05$), indicating that poorer balance was associated with lower quality of life.

Conclusion:

Balance impairment is significantly associated with reduced menopause-related quality of life among perimenopausal women. Early identification and balance-focused interventions may help improve functional ability and overall well-being during the menopausal transition.



Introduction:

Perimenopause is a pivotal transitional stage in a woman's reproductive lifespan, most commonly occurring during the mid-40s, and represents the gradual transition toward menopause¹. This phase is characterized by pronounced hormonal variability, particularly a decline in estrogen and progesterone levels, resulting in a spectrum of physical, psychological, and somatic symptoms². Frequently reported symptoms include vasomotor disturbances such as hot flashes and night sweats, sleep disruption, mood instability, musculoskeletal pain, and persistent fatigue. Collectively, these changes have been shown to negatively influence menopause-related quality of life (QoL), affecting physical functioning, psychosocial wellbeing, and sexual health^{1,2}.

Quality of life during perimenopause is a complex, multidimensional concept that reflects a woman's perception of her physical health, emotional state, social participation, and overall life satisfaction³. Evidence from diverse populations indicates that a considerable proportion of women experience a decline in QoL during the menopausal transition, with the physical and psychosocial domains being most adversely affected. Studies conducted among Indian perimenopausal women have highlighted physical discomfort, fatigue, and emotional disturbances as major contributors to diminished well-being⁴. In addition, sociodemographic factors such as lower educational attainment, unemployment, and higher parity have been associated with poorer QoL outcomes, emphasizing the combined influence of biological and social determinants during this life stage⁵.

Although the effects of menopausal symptoms on quality of life have been widely documented, postural balance—an essential component of functional mobility—has received relatively little attention in perimenopausal women⁶. Balance refers to the ability to maintain the body's center of gravity within its base of support and is critical for safe movement and independent performance of daily activities⁷. The menopausal transition is often accompanied by reductions in muscle strength, proprioceptive sensitivity, and neuromuscular coordination, which may compromise postural stability. Impairments in balance are clinically significant, as they increase the risk of falls and fall-related injuries and may

diminish confidence in movement, thereby limiting participation in routine and social activities and adversely affecting overall quality of life⁸.

Despite its clinical relevance, the association between balance performance and menopause-related quality of life remains insufficiently explored⁹. Existing research has largely focused on postmenopausal women, with comparatively few studies examining balance changes during the perimenopausal phase. Available evidence suggests that declines in physical performance, including balance, may begin during the reproductive transition, underscoring the importance of early identification and preventive strategies. Moreover, recent findings indicate that balance and neuromuscular deficits observed during perimenopause are potentially modifiable through targeted interventions such as resistance and balance training.¹⁰ However, the extent to which balance impairments influence perceived quality of life during perimenopause remains inadequately investigated, particularly in community-dwelling, non-clinical populations.

Understanding this relationship is important, as balance impairments may represent an under-recognized contributor to reduced quality of life. Menopause-specific QoL instruments primarily focus on vasomotor, psychological, and general physical symptoms such as pain and fatigue, often overlooking balance-related limitations¹¹. Consequently, balance dysfunction may remain underreported despite its potential to restrict mobility, reduce independence, and increase fear of falling. Emerging evidence suggests that perimenopausal women may experience fear of falling even in the absence of prior falls, indicating that balance concerns alone may significantly influence perceived well-being¹².

Furthermore, impaired balance may have broader psychological and social implications. Reduced balance confidence can lead to avoidance of physical activity, decreased social engagement, and diminished self-efficacy, all of which intersect with emotional and social domains of quality of life. Given that perimenopause is also a period marked by increased vulnerability to mood disturbances and psychological stress, physical limitations such as compromised balance may further exacerbate declines in overall well-being¹³.



Need for the Study

Although menopause-related symptoms and quality of life have been extensively examined, there is a paucity of research investigating postural balance as a determinant of quality of life during perimenopause. Most available studies focus on postmenopausal women, resulting in a significant knowledge gap regarding balance alterations and their functional implications during the earlier transitional phase. Early identification of balance impairments during perimenopause may provide an opportunity for timely intervention, potentially preventing future functional decline and reducing the risk of falls.

Moreover, the relationship between balance performance and menopause-related quality of life remains poorly understood, particularly among community-dwelling perimenopausal women. Examining this association may help identify balance as a modifiable factor influencing quality of life, thereby supporting the development of comprehensive, non-pharmacological management strategies. Incorporating balance assessment and targeted exercise interventions into routine care may enhance physical function, promote independence, and improve overall well-being among perimenopausal women.

Therefore, the present study is undertaken to systematically examine the relationship between postural balance and menopause-related quality of life among perimenopausal women using a cross-sectional design. The findings of this study may contribute valuable evidence to inform clinical practice, preventive approaches, and future research aimed at improving holistic health outcomes during the menopausal transition.

Objectives

- To assess balance and quality of life among perimenopausal women
- To assess the relationship between balance performance and menopause-related quality of life

Methodology

A cross-sectional study was conducted to assess balance and menopause-related quality of life. The study population comprised women who met the defined inclusion and exclusion criteria and were recruited from the community. Women aged between 40 and 55 years who were in the perimenopausal phase and able to walk independently were included in the study. Participants were excluded if they had any neurological disorders, a history of recent lower-limb surgery, or severe musculoskeletal or vestibular disorders that could affect balance performance or functional mobility.

The sample size was calculated using a correlation-based formula to determine the relationship between balance and quality of life. The formula used was $n = (Z_{\alpha/2} + Z_{\beta})^2 / r^2 + 3$, where $Z_{\alpha/2}$ was taken as 1.96 corresponding to a 95% confidence interval, Z_{β} was 0.84, indicating 80% statistical power, and r was assumed to be 0.30, representing a moderate correlation based on previous literature. Based on this calculation, the estimated sample size was 90 participants, which was considered adequate to detect a significant correlation between the study variables.

Balance was assessed using the Timed Up and Go (TUG) test, a reliable and valid measure of functional mobility and dynamic balance. Menopause-related quality of life was evaluated using the Menopause-Specific Quality of Life (MENQOL) questionnaire, which assesses symptoms across four domains: vasomotor, psychosocial, physical, and sexual. Data collected from these outcome measures were used for subsequent statistical analysis.

Descriptive statistics were used to summarize data. Pearson's correlation analysis determined the relationship between balance performance and quality of life. One-way ANOVA assessed associations between demographic variables and outcome measures.



Results

Variable	Mean \pm Standard Deviation
Age (years)	47.6 \pm 4.2
Timed Up and Go (TUG) score (seconds)	10.8 \pm 1.9
Total MENQOL score	4.1 \pm 0.8

Table 1. Descriptive Statistics of Study Participants (n = 90)

MENQOL Domain	Level of Impairment
Physical	Highest impairment
Psychosocial	Moderate impairment
Vasomotor	Mild to moderate impairment
Sexual	Least impairment

Table 2. Domain-wise MENQOL Scores

Variables	Correlation Coefficient (r)	p-value
TUG score vs Total MENQOL score	0.46	0.001*

Table 3. Correlation Between Balance Performance and Menopause-Related Quality of Life

Outcome Measure	p-value
TUG score vs Age group	0.02*
MENQOL Physical domain vs Age group	0.01*

Table 4. Association between Age Group, Balance, and MENQOL Domains (ANOVA)

The descriptive analysis showed that participants had a mean age of 47.6 ± 4.2 years and mild balance impairment, as indicated by a mean TUG score of 10.8 ± 1.9 seconds. The overall MENQOL score indicated moderate impairment in menopause-related quality of life, with the physical domain most affected. Correlation analysis demonstrated a statistically significant positive relationship between balance performance and menopause-related quality of life ($r = 0.46$, $p = 0.001$). Inferential analysis using ANOVA revealed significant associations between age group and both balance performance and the physical domain of MENQOL.

DISCUSSION

The present study was conducted to evaluate balance and menopause-related quality of life in perimenopausal women and to explore the relationship between these two variables. The findings indicate that women in the perimenopausal stage experienced mild impairment in balance along with a moderate reduction in menopause-related quality of life. In addition, the analysis revealed a statistically significant association between balance performance and MENQOL scores.

The mean Timed Up and Go (TUG) score of 10.8 ± 1.9 seconds observed among the participants suggests the presence of mild changes in functional mobility and dynamic balance. Although this value generally falls



within the normal range required for independent mobility, it may reflect early alterations in postural stability during the perimenopausal period. Hormonal fluctuations, particularly the gradual reduction in estrogen levels, are believed to influence neuromuscular coordination, muscle strength, and proprioceptive input. These physiological changes may contribute to subtle impairments in balance control. Previous literature also reports that reduced estrogen levels can affect muscle mass, joint integrity, and vestibular mechanisms, thereby increasing the likelihood of balance difficulties and falls in middle-aged women ¹⁴.

Evaluation of menopause-related quality of life in the present study showed an overall moderate level of impairment, with the physical domain being the most affected. This observation aligns with earlier studies which suggest that symptoms such as fatigue, musculoskeletal discomfort, sleep disturbances, and reduced physical capacity are commonly experienced during the perimenopausal transition. Such physical symptoms may limit routine activities and participation in daily life, ultimately influencing women's perception of well-being. The psychosocial and vasomotor domains demonstrated moderate impact, whereas the sexual domain appeared to be less affected within the study population.

One of the key findings of this study was the moderate but statistically significant positive correlation between TUG scores and total MENQOL scores ($r = 0.46$, $p = 0.001$). This relationship indicates that poorer balance performance is associated with lower menopause-related quality of life. Balance plays a crucial role in maintaining functional independence and mobility. When balance is compromised, individuals may develop reduced confidence in movement and an increased fear of falling. These factors may discourage participation in physical, recreational, or social activities, which can further influence both physical and psychological aspects of quality of life.

Furthermore, the ANOVA results revealed significant associations between age group and both balance performance and the physical domain of MENQOL. This suggests that as women progress through the perimenopausal age range, age-related physiological changes combined with hormonal fluctuations may further affect physical functioning. Such changes may

gradually influence neuromuscular efficiency and stability, thereby affecting balance and physical well-being.

The results of this study highlight the importance of recognizing balance impairment as a potential factor contributing to reduced quality of life during perimenopause. Traditionally, the management of menopausal symptoms has mainly focused on vasomotor and psychological aspects. However, physical factors such as balance and mobility should also be considered when addressing overall health and well-being in this population. Identifying balance deficits at an early stage may help in preventing future functional decline.

Physiotherapy interventions, including balance training, muscle strengthening, and functional exercise programs, have been reported to enhance neuromuscular control and reduce the risk of falls in middle-aged and older adults. Integrating such interventions into community health programs for perimenopausal women may help improve functional capacity, maintain independence, and enhance overall quality of life.

Despite the meaningful findings of this study, certain limitations should be acknowledged. Since the study followed a cross-sectional design, it is not possible to determine a direct causal relationship between balance impairment and quality of life. In addition, balance was assessed using a single functional test, and quality of life was measured through self-reported questionnaires. Future studies employing longitudinal designs, larger sample populations, and multiple objective balance assessment tools may provide a clearer understanding of balance changes during the menopausal transition.

CONCLUSION

The present study demonstrates that perimenopausal women experience mild balance impairment and moderate reductions in menopause-related quality of life, particularly within the physical domain. A significant positive correlation was observed between balance performance and MENQOL scores, indicating that poorer balance is associated with lower menopause-related quality of life.

These findings suggest that balance impairment may be an important yet underrecognized factor influencing well-being during the perimenopausal transition. Early



screening for balance deficits and implementation of targeted physiotherapy interventions, such as balance and strengthening exercises, may help improve functional mobility, reduce fall risk, and enhance overall quality of life among perimenopausal women.

Further research is recommended to explore the longitudinal relationship between hormonal changes, balance performance, and quality of life, as well as to evaluate the effectiveness of physiotherapy-based preventive strategies during the menopausal transition.

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