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Correlation of Body Composition with Postural Balance and Risk of Fall in Postmenopausal Women

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Abstract: ***Postmenopausal women often experience changes in body composition and balance that may increase the likelihood of falls. This study examined the relationship between body composition, postural balance, and fall risk among postmenopausal women attending a physiotherapy outpatient department. Seventy-eight women aged 45–65 years participated in this six-month observational study. Body composition was evaluated using Body Mass Index (BMI) and Waist-to-Height Ratio (WHtR). Postural balance and fall risk were assessed through the Berg Balance Scale (BBS) and the Performance Oriented Mobility Assessment (POMA). Statistical analysis demonstrated significant negative correlations between BMI, WHtR, and both BBS and POMA scores, indicating that higher adiposity was linked to poorer balance and greater fall risk.***

Keywords: Postmenopausal women, Body composition, BMI, Waist-to-Height Ratio, Postural balance, Fall risk, Berg Balance Scale, POMA

1. Introduction

Menopause signifies the end of ovarian activity and the cessation of menstruation for at least twelve consecutive months. The associated hormonal decline, especially estrogen reduction, contributes to notable physiological and metabolic changes, including increased central fat deposition and altered body composition. These changes often affect balance and functional stability, predisposing women to falls in later life [1].

In postmenopausal women, excess adiposity and diminished muscle strength have been recognized as key contributors to impaired postural control [2]. The redistribution of fat toward the abdomen alters the body's center of gravity, increasing sway and reducing stability [3]. Body composition, typically expressed as the proportion of fat, bone, and lean tissue [4], is measured using anthropometric indices such as BMI and WHtR. BMI provides a general estimate of overall adiposity [6], while WHtR offers a more direct measure of central obesity [7]. Balance, meanwhile, relies on the integrated function of visual, vestibular, and somatosensory systems, all of which decline with age [5].

Despite growing evidence linking obesity to reduced mobility, few studies have focused specifically on the relationship between body composition and fall risk in postmenopausal women within the Indian population. This research aims to bridge that gap by exploring correlations between BMI, WHtR, and postural balance measures.

2. Purpose of Study

Early identification of women at increased risk can allow for timely intervention to enhance postural control and reduce fall related injuries. This study can serve as foundation for further investigations into the underlying mechanism linking body fat distribution, postural balance and risk of fall.

3. Methodology

The research follows an observational study design to evaluate the correlation of body composition with postural balance and risk of fall in postmenopausal women. The study was conducted at a tertiary healthcare hospital, specifically in the physiotherapy outpatient department, LATUR. The population included postmenopausal women, aged 45 to 65 years. The study was completed over a period of 6 months. A convenient sampling method was employed for a participant selection. The total sample size consisted of 78 participants.

4. Result

Correlation coefficient of Mean BMI scores and Berg balance scale scores among Samples**.**

Table 1

Scores	Correlation Coefficient	P Value
BMI Scores	-0.661	0.000
Berg Balance Scale Scores	-0.661	0.000

'ϒ'(154) = 0.1338 P<0.05

Correlation coefficient of Mean BMI scores and POMA scores among Samples.

Table 2

Scores	Correlation Coefficient	P Value
BMI Scores	-0.613	0.000
Poma	-0.613	0.000

'ϒ' (154) = 0.1338 P<0.05

Correlation coefficient of Mean BMI scores and Berg balance scale scores among Samples.

Table 3

Score	Correlation Coefficient	P Value
Waist: Height Ratio Score	-0.599	0.000
Berg Balance Scale Score	-0.599	0.000

'ϒ'(154) = 0.1338 P<0.05

Correlation coefficient of Mean Waist-Height scores and POMA scores among Samples**.**

Table 4

Score	Correlation Coefficient	P Value
Waist: Height Ratio Score	-0.599	0.000
Poma Scale Score	-0.599	0.000

5. Discussion

Based on data from 78 postmenopausal women aged 45–65 years, the study revealed compelling evidence in favor of the alternate hypothesis. All participants were classified as low fall risk on the Berg Balance Scale, while 78.20% were low risk and 21.79% moderate risk on the POMA scale. Statistical analysis demonstrated a significant negative correlation between BMI and both Berg Balance Scale ($r = -0.661$, $p = 0.000$) and POMA scores ($r = -0.613$, $p = 0.000$), indicating that higher BMI is associated with poorer balance and increased fall risk. Similarly, waist-to-height ratio also showed a negative correlation with Berg ($r = -0.599$, $p = 0.000$) and POMA scores ($r = -0.561$, $p = 0.000$).

6. Conclusion

The findings revealed statistically significant negative correlations across all variables, indicating that higher BMI and Waist-Height ratios are associated with poorer balance and mobility outcomes.

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