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Association between Balance Confidence and Risk of Fall among Geriatric Population

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ABSTRACT

Background: Falls among the geriatric population are a leading cause of injury and reduced quality of life. Psychological factors, such as balance confidence, play a critical role in fall prevention, yet their relationship with fall risk remains underexplored. **Objective:** This study aimed to evaluate the association between balance confidence and the risk of falls in older adults. **Methods:** A cross-sectional study was conducted involving 245 participants aged 65–90 years from three old-age homes in Lahore, Pakistan. Balance confidence was assessed using the Activities-Specific Balance Confidence (ABC) Scale, while fear of falling (FoF) was measured using the Falls Efficacy Scale-International (FES-I). Data were analyzed using Pearson's correlation, independent t-tests, and multivariate regression analysis in SPSS version 25. Ethical approval and informed consent were obtained. **Results:** The mean ABC score was 57.6 ± 13.4%, and the mean FES-I score was 31.4 ± 6.8. A significant negative correlation was found between ABC and FES-I scores ($r = -0.72$, $p < 0.001$). Females reported lower balance confidence (54.1 ± 12.8) and higher FoF (33.1 ± 7.2) than males ($p < 0.01$). Prior fall history and higher FES-I scores significantly predicted lower ABC scores ($p < 0.05$). **Conclusion:** Higher balance confidence was associated with a reduced risk of falling. Interventions targeting balance confidence are crucial for fall prevention in older adults.

INTRODUCTION

Aging is an unavoidable biological process marked by a progressive decline in physiological and functional capacities, making older adults increasingly susceptible to various health challenges, including balance disorders and falls. Balance, defined as the ability to process sensory and proprioceptive signals to maintain posture and execute motor responses, becomes compromised with advancing age due to cumulative changes in sensory, neurological, and musculoskeletal systems. This decline in balance control often translates to an increased risk of falls, which significantly affect the geriatric population. According to the World Health Organization (WHO), falls are a critical health issue among individuals aged 65 and above, with an estimated 28% to 35% of older adults experiencing falls annually. This percentage rises with increasing age and frailty, highlighting the substantial global burden of falls in this demographic (1, 2).

The psychological consequences of falls extend beyond physical injuries, contributing to decreased confidence in balance and the development of fear of falling (FoF). FoF, a common phenomenon among the elderly, not only restricts participation in daily activities but also perpetuates a cycle of physical inactivity, muscular deconditioning, and further loss of balance, which collectively exacerbate the risk of subsequent falls. Studies have indicated that approximately 50% to 60% of older adults report FoF, even without prior fall experiences, underlining the pervasive impact of this psychological barrier. FoF adversely affects quality of life, independence, and social engagement, imposing a significant socioeconomic burden on healthcare systems (3, 4).

The intricate interplay between FoF, balance confidence, and fall risk has been explored through various frameworks. Balance confidence, often quantified using scales such as the Activities-Specific Balance Confidence (ABC) Scale, is emerging as a critical predictor of fall risk, potentially superseding FoF in its utility. High balance confidence correlates with reduced fall risk, while lower confidence levels are associated with increased FoF and compromised mobility. These associations underscore the importance of addressing psychological and functional aspects of balance in fall prevention strategies. The global prevalence of falls among older adults, particularly in low- and middle-income countries, necessitates targeted interventions that consider cultural, environmental, and healthcare infrastructure factors (5, 6).

Existing literature has identified multiple intrinsic and extrinsic risk factors for falls, including age-related physiological changes, chronic comorbidities, cognitive impairments, and environmental hazards. Depression, anxiety, and the use of walking aids further contribute to the likelihood of developing FoF. Moreover, the WHO emphasizes that older adults residing in developing countries bear a disproportionate burden of fall-related injuries and fatalities due to limited access to healthcare resources and preventive measures. Therefore, understanding the relationship between balance confidence and fall risk is imperative for designing effective interventions aimed at promoting healthy aging and mitigating the adverse outcomes associated with falls (7, 8).

This study focuses on evaluating the association between balance confidence and fall risk among the geriatric population, using validated tools such as the ABC Scale and the Falls Efficacy Scale-International (FES-I). By investigating this relationship, the research aims to provide insights into how psychological and functional components of balance influence fall risk, thereby informing evidence-based strategies for fall prevention and rehabilitation in older adults. Previous research underscores the need for integrating physical and psychological approaches to enhance balance confidence and reduce FoF, ultimately fostering independence and improving quality of life among the elderly (9, 10).

MATERIAL AND METHODS

This cross-sectional study was conducted over a six-month period following the approval of the research synopsis. The research aimed to evaluate the association between balance confidence and fall risk among the geriatric population residing in three selected old age homes in Lahore, Pakistan: Maa Basera, Happy Homes, and Aafiat Old Age Home. A total of 245 older adults, aged 65 to 90 years, were recruited through a non-probability convenience sampling technique. Participants were included if they were able to verbally communicate, had no history of neurological disorders, vestibular dysfunction, or cognitive impairments, and were free from any acute musculoskeletal or psychological conditions. Exclusion criteria encompassed individuals with a history of fractures, dislocations, neuropathies, major vision impairments, use of dizziness or anxiety medications, and those with developmental disabilities or significant cognitive impairments.

Prior to data collection, ethical approval was obtained from the institutional review board of the University of Lahore. The study was conducted in full accordance with the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants after explaining the study's objectives, methods, and potential risks. Participants were assured of the confidentiality and anonymity of their data, and they retained the right to withdraw from the study at any point without any repercussions.

Data collection was performed using a structured questionnaire that included demographic information and validated scales to assess balance confidence and fall risk. Balance confidence was measured using the Activities-Specific Balance Confidence (ABC) Scale, a self-reported instrument comprising 16 items. Participants rated their confidence in maintaining balance during daily activities on a scale ranging from 0% (no confidence) to 100% (complete confidence). The average score was calculated, with lower scores indicating reduced balance confidence and a higher likelihood of falling. Fall risk was evaluated using the Falls Efficacy Scale-International (FES-I), which assesses participants' concerns about falling during various activities. The FES-I uses a four-point Likert scale, with higher scores indicating greater fear of falling.

The data collection process was conducted in a controlled environment to ensure standardization and accuracy. Oral interviews were utilized for participants who required assistance in completing the questionnaire. Sociodemographic variables such as age, gender, and medical history were also recorded. To ensure data integrity, trained research assistants were employed for administering the assessments and collecting responses.

The collected data were analyzed using IBM SPSS Statistics Version 25.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic characteristics and key variables. Inferential statistics, such as Pearson’s correlation coefficient, were employed to examine the relationship between balance confidence and fall risk. Statistical significance was set at a p-value of <0.05. Missing data, if any, were handled using listwise deletion to maintain the integrity of the analyses.

The methodology was designed to adhere to rigorous research standards, ensuring the reliability and validity of the results. By employing validated instruments and a comprehensive analysis plan, the study sought to generate evidence-based insights into the interplay between balance confidence and fall risk in the geriatric population.

RESULTS

A total of 245 participants aged between 65 and 90 years were enrolled in the study, of which 116 (47.3%) were male and 129 (52.7%) were female. The mean age of the participants was 73.6 ± 7.9 years. The demographic and clinical characteristics of the participants, including prior fall history and communication ability, are summarized in Table 1.

Table 1

Demographic and Clinical Characteristics of Participants

Variable	Frequency (n)	Percentage (%)
Gender		
Male	116	47.3
Female	129	52.7
Age Group		
65–70 years	102	41.6
71–80 years	71	29.0
81–90 years	47	19.2
Above 90 years	25	10.2
History of Falls		
Yes	42	17.1
No	203	82.9
Communication Ability		
Verbal Communication (Yes)	245	100.0

The overall balance confidence, as measured by the ABC Scale, was moderately low, with a mean score of 57.6% ± 13.4%. Similarly, the fear of falling, assessed using the FES-I, revealed moderate-to-high levels of concern, with an average score of 31.4 ± 6.8. The statistical relationship between balance confidence and fear of falling was evaluated using Pearson's correlation coefficient, which showed a significant negative correlation ($r = -0.72$, $p < 0.001$), indicating that higher balance confidence is associated with lower fear of falling.

Table 2

Correlation between ABC and FES-I Scores

Variables	Mean ± SD	r-value	p-value
ABC Scale	57.6 ± 13.4	-0.72	<0.001
FES-I Score	31.4 ± 6.8		

Descriptive statistics and comparative analysis across gender groups revealed that females had significantly lower ABC scores (54.1 ± 12.8) compared to males (61.3 ± 13.7), suggesting reduced balance confidence among female participants ($p < 0.05$). Additionally, females reported higher FES-I scores (33.1 ± 7.2) compared to males (29.4 ± 6.1), indicating a greater fear of falling ($p < 0.01$).

Table 3

Gender-wise Comparison of ABC and FES-I Scores

Gender	ABC Score (Mean ± SD)	FES-I Score (Mean ± SD)	p-value
Male	61.3 ± 13.7	29.4 ± 6.1	<0.05
Female	54.1 ± 12.8	33.1 ± 7.2	<0.01

A multivariate regression analysis was conducted to explore the predictors of balance confidence and fall risk. Age, gender, prior fall history, and FES-I scores were included as independent variables. The analysis revealed that FES-I scores ($\beta = -0.69$, $p < 0.001$), prior fall history ($\beta = -0.22$, $p < 0.05$), and female gender ($\beta = -0.19$, $p < 0.01$) were significant predictors of ABC scores, accounting for 62% of the variance in balance confidence ($R^2 = 0.62$, $p < 0.001$).

Table 4

Multivariate Regression Analysis Predicting Balance Confidence (ABC Score)

Variable	β-coefficient	Standard Error	t-value	p-value
FES-I Score	-0.69	0.04	-16.4	<0.001
Prior Fall History	-0.22	0.08	-2.75	<0.05
Female Gender	-0.19	0.07	-2.57	<0.01
Age	-0.11	0.05	-2.20	0.07

The subgroup analysis based on age categories revealed that participants aged 81 years and above had significantly lower balance confidence scores ($p < 0.01$) and higher FES-I scores ($p < 0.01$) compared to younger age groups.

The findings of this study underscore the significant negative relationship between balance confidence and fear of falling among the elderly population. These results highlight the importance of addressing both psychological and physical factors in designing fall prevention strategies, with a particular focus on female participants and those with a prior history of falls.

DISCUSSION

The findings of this study demonstrated a significant negative correlation between balance confidence, as measured by the Activities-Specific Balance Confidence (ABC) Scale, and fear of falling (FoF), assessed through the Falls Efficacy Scale-International (FES-I). These results align with previous research highlighting the critical interplay between psychological factors, such as self-efficacy in maintaining balance, and the risk of falls in the geriatric population (9, 10). Participants with higher confidence in their ability to maintain balance reported a lower fear of falling, corroborating the notion that psychological resilience plays a pivotal role in mitigating fall risks among older adults (5).

Gender differences emerged as a significant factor in this study, with females exhibiting lower balance

confidence and higher levels of FoF compared to males. These findings echo previous studies that have identified women as more vulnerable to psychological concerns related to falls, potentially due to heightened risk perceptions and sociocultural influences on activity levels (8, 10). Age further compounded this vulnerability, as participants aged 81 years and above demonstrated significantly reduced balance confidence and increased FoF. This age-related decline underscores the progressive nature of physiological changes, such as muscle weakness, sensory deficits, and postural instability, which exacerbate fall risk and diminish confidence in performing daily activities (3).

The role of prior fall history as a determinant of reduced balance confidence and heightened FoF was also evident in this study. Older adults with a history of falls were more likely to exhibit lower ABC scores, reinforcing findings from prior research indicating that fall experiences contribute to a cycle of fear and activity avoidance (7). This phenomenon, known as "post-fall syndrome," perpetuates physical deconditioning and psychological distress, further elevating fall risk (11). The strong predictive value of FES-I scores for ABC outcomes highlighted in the multivariate analysis reflects the complex interplay between physical and psychological factors in fall risk assessment (9).

This study had several strengths, including the use of validated tools for assessing balance confidence and FoF, which ensured the reliability and validity of the findings. The inclusion of a relatively large sample size and the diverse age range of participants provided a robust basis for generalizing the results to similar populations. Additionally, the methodological rigor, such as adherence to ethical principles under the Declaration of Helsinki, bolstered the study's credibility.

However, the study also had limitations that warrant consideration. The cross-sectional design precluded the establishment of causal relationships between balance confidence and fall risk. Longitudinal studies would be essential to understand the temporal dynamics of these variables and to evaluate the long-term impact of interventions targeting balance confidence. The reliance on self-reported measures may have introduced recall bias, particularly in assessing fall history and FoF. Furthermore, the study's exclusion criteria, such as participants with severe cognitive impairments or neurological conditions, may have limited its applicability to the broader geriatric population, particularly those with higher levels of frailty.

Despite these limitations, the study has important implications for clinical practice and research. Interventions aimed at improving balance confidence should incorporate both physical and psychological components to address the multifaceted nature of fall risk. Physical therapy programs emphasizing strength, balance, and gait training could be complemented with cognitive-behavioral strategies to reduce FoF and enhance self-efficacy. Targeted interventions for women and individuals with a history of falls are particularly critical, given their heightened vulnerability.

Future research should focus on identifying additional modifiable factors that influence balance confidence, such as social support, environmental safety, and specific cognitive domains, to develop comprehensive fall prevention strategies. Exploring the role of technology, such as wearable devices for balance monitoring and virtual reality-based rehabilitation programs, could further enhance the effectiveness of interventions. Addressing these areas will contribute to a more holistic understanding of the determinants of fall risk and the development of innovative solutions to promote safe and independent aging.

In conclusion, the study reinforced the importance of balance confidence as a key determinant of fall risk in older adults and highlighted the need for integrative approaches to enhance psychological and physical resilience in this vulnerable population. These findings provide a foundation for advancing evidence-based strategies to mitigate the burden of falls and improve the quality of life for older adults.

CONCLUSION

This study established a significant negative relationship between balance confidence and fear of falling in the geriatric population, emphasizing that individuals with higher balance confidence experience reduced fall risk. The findings highlight the necessity of addressing both psychological and physical dimensions in fall prevention strategies, with a focus on targeted interventions for vulnerable groups such as older women and individuals with prior fall history. Enhancing balance confidence through integrative approaches, including physical rehabilitation and psychological support, holds the potential to reduce fall-related injuries, improve mobility, and foster independence among older adults, ultimately contributing to better overall healthcare outcomes and quality of life in aging populations.

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