Journal of Health, Wellness and Community Research
ISSN: 3007, 0570

OPEN ACCESS

JHWCR

Type: Original Article
Published: 28 October 2025
Volume: III, **Issue**: XV
DOI: https://doi.org/10.61919/x0q3pg32

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Received 21, 09, 25 **Accepted** 18, 10, 2025

Authors' Contributions
Concept: HK, HRJ; Design: HRJ, RR; Data Collection: HK, SA, ES, SA; Analysis: HRJ, RR; Drafting: HK, HRJ

Declarations
No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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Prevalence of Balance Impairment and Its Association with Quality of Life Among Older Adults

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ABSTRACT

Background: Balance impairment is common in aging and is strongly associated with falls, disability, and reduced health-related quality of life (HRQoL). Objective: To determine the prevalence of balance impairment and examine its association with HRQoL among older adults in Sialkot, Pakistan. Methods: A cross-sectional study was conducted from December 2024 to August 2025 across hospitals, outpatient clinics, and old homes in Sialkot. Using convenience sampling, 267 adults aged ≥60 years were recruited. Balance was assessed using the Berg Balance Scale (BBS) and categorized as normal (40–56), mild (21–39), moderate (11–20), or severe impairment (0–10). HRQoL was evaluated using the SF-36 questionnaire. Associations between balance categories and HRQoL categories were tested using chi-square with effect size estimation, and correlation between total BBS and HRQoL scores was assessed using Pearson's correlation. Results: Participants had a mean age of 67.62 ± 7.46 years; 70.8% were female. Normal balance was observed in 37.5%, while 44.2% had mild, 10.1% moderate, and 8.2% severe impairment (mean BBS = 33.79 ± 13.64). Mean HRQoL score was 93.73 ± 10.15. Balance category showed a borderline association with HRQoL category ($\chi^2 = 12.475$, $df = 6$, $p = 0.052$; Cramér's $V = 0.153$), while total BBS correlated positively with HRQoL ($r = 0.308$, $p < 0.001$). Conclusion: Balance impairment was highly prevalent and was positively associated with HRQoL, supporting the need for routine balance screening and targeted rehabilitation interventions in older adults.

Keywords

Balance impairment, Berg Balance Scale, older adults, SF-36, health-related quality of life, falls risk.

INTRODUCTION

Falls and fall-related injuries are among the most disabling and costly outcomes of aging, frequently leading to reduced independence, increased fear of movement, social withdrawal, and deterioration in health-related quality of life (HRQoL) among older adults. Balance impairment is a central and modifiable contributor to fall risk and functional decline, often emerging from age-related reductions in proprioception, cutaneous sensitivity, neuromuscular control, and lower-limb muscle strength, all of which compromise postural stability during routine activities such as transfers, turning, and ambulation (1). Progressive reductions in muscle mass and strength, which may accelerate with inactivity, malnutrition, and chronic disease, further limit walking capacity and increase instability, making balance impairment particularly relevant in older populations where mobility is essential for self-care and social engagement (2). In parallel, aging-related shifts toward passive routines and reduced meaningful participation may worsen functional reserve and psychosocial well-being, reinforcing a cycle where balance limitation contributes to restricted activity and lower HRQoL (3).

Epidemiological evidence suggests that balance and gait problems increase substantially with age, with imbalance and gait disturbances becoming increasingly prevalent in the oldest age groups and often remaining under-recognized until an adverse event occurs (4–6). Beyond physical function, balance impairment may influence psychological health through fear of falling and reduced confidence, and these factors are consistently linked to poorer HRQoL outcomes in older adults (7). The clinical relevance of this relationship is underscored in chronic conditions such as peripheral diabetic neuropathy, where impaired postural control is associated with reduced HRQoL and heightened fall risk, illustrating how balance dysfunction may amplify disability in aging populations with multimorbidity (8). In addition, falls and walking limitations are influenced by a complex interaction of biological, behavioral, and environmental determinants, including chronic illness burden, pain, polypharmacy and sedative use, physical deconditioning, and depressive symptoms, all of which may contribute to both impaired balance and reduced HRQoL (9,11). Standardized tools such as the Berg Balance Scale (BBS) provide objective assessment of functional balance across daily-task conditions, while the SF-36 offers a validated framework to evaluate HRQoL across physical and mental health domains (10,16). Evidence-based interventions—including structured balance training, strength exercises, and multicomponent physical activity programs—are recommended to preserve functional independence and support healthy aging, with international guidance emphasizing regular aerobic activity combined with strengthening and balance activities in older adults (12,13). Despite consistent global evidence linking balance impairment with functional outcomes, local estimates of balance impairment prevalence and its association with HRQoL remain limited in many low- and middle-income settings, where aging populations are increasing and healthcare access may differ across community and facility settings. Therefore, this study aimed to determine the prevalence of balance impairment and examine its association with health-related quality of life among older adults in Sialkot using the Berg Balance Scale and SF-36 questionnaire.

MATERIALS AND METHODS

This observational cross-sectional study was conducted between December 2024 and August 2025 in Sialkot, Pakistan, across hospitals, outpatient clinics, and old homes to estimate the prevalence of balance impairment and evaluate its association with health-related quality of life among adults aged 60 years and older. A non-probability convenience sampling approach was used to recruit eligible participants from the selected facilities, with enrollment conducted onsite through direct approach by trained data collectors. Individuals were included if they were aged ≥60

years and able to follow instructions required to complete functional balance testing and questionnaire responses. Participants were excluded if they had conditions likely to independently impair balance beyond typical aging-related change, including hemiplegic stroke, diagnosed genetic neuromuscular disorders (e.g., Charcot–Marie–Tooth disease, Usher syndrome, spinocerebellar ataxia), acute spinal or lower-limb fractures affecting mobility, clinically evident vestibular disorders (including dizziness, vertigo, nystagmus), diagnosed Parkinson's disease or other major neurological disorders affecting gait, or active psychological disorders that could compromise valid functional performance and questionnaire reliability. Written informed consent was obtained prior to participation, and confidentiality was maintained through de-identified data recording. The required sample size (n = 267) was estimated using an online sample-size calculator (Raosoft), assuming a 95% confidence level and a 5% margin of error with an assumed target population of 1500 older adults within the accessible facility catchment. Data collection was performed using two validated assessment tools. Functional balance was measured using the Berg Balance Scale, which consists of 14 functional tasks scored from 0 to 4, producing a total score range of 0–56, with higher scores indicating better balance performance (10). Based on predefined score thresholds, balance status was categorized as normal (40–56), mild impairment (21–39), moderate impairment (11–20), and severe impairment (0–10), consistent with functional interpretation used in older adult assessment contexts (15). Health-related quality of life was assessed using the SF-36 questionnaire, which evaluates eight health domains and is scored on a 0–100 scale per domain, where higher values represent better perceived health status (16). For analytic comparability within the current study, SF-36 scores were summarized into an overall HRQoL index as previously applied in local practice, with higher total values representing better HRQoL, and additionally categorized into three interpretive levels ("Healthy," "Mild impairment," and "Moderate impairment") to support categorical association testing with balance impairment categories.

Demographic variables included age and sex. The primary outcome variable was balance status (BBS categories), and the secondary outcome variable was HRQoL (SF-36 overall score and categories). Data were entered into SPSS version 27 and checked for completeness and plausibility through double-entry verification of a random sample. Descriptive statistics were reported as mean ± standard deviation (SD) for continuous variables and frequency with percentage for categorical variables. The association between balance impairment categories and HRQoL categories was evaluated using the chi-square test of independence, reporting χ^2 statistics, degrees of freedom, exact p-values, and Cramér's V as an effect size. The relationship between total BBS score and overall HRQoL score was assessed using Pearson's correlation coefficient, reporting r and p-value. Statistical significance was interpreted at $\alpha = 0.05$.

RESULTS

A total of 267 older adults participated, with a mean age of 67.62 ± 7.46 years. Females represented 70.8% (n = 189) of the sample and males 29.2% (n = 78). Balance performance showed substantial impairment overall: only 37.5% (n = 100) demonstrated normal balance, whereas 62.5% (n = 167; 95% CI: 56.6%–68.1%) had some degree of impairment. Mild impairment was most frequent (44.2%, n = 118), followed by moderate impairment (10.1%, n = 27) and severe impairment (8.2%, n = 22). The mean BBS score was 33.79 ± 13.64, indicating an overall performance within the mild impairment range.

Table 1. Demographic Characteristics and Summary Statistics of Balance and HRQoL (n = 267)

Variable	Category / Statistic	n (%) or Mean ± SD
Age (years)	Mean ± SD	67.62 ± 7.46
Sex	Male	78 (29.2)
	Female	189 (70.8)
BBS category	Normal (40–56)	100 (37.5)
	Mild impairment (21–39)	118 (44.2)
	Moderate impairment (11–20)	27 (10.1)
	Severe impairment (0–10)	22 (8.2)
Any balance impairment	Mild–Severe (≤39)	167 (62.5)*
Total BBS score	Mean ± SD	33.79 ± 13.64
Total HRQoL score (SF-36 overall index)	Mean ± SD	93.73 ± 10.15

*Wilson 95% CI for prevalence of any balance impairment: 56.6% to 68.1%.

Table 2. Association Between Balance Impairment (BBS Categories) and HRQoL Categories (Chi-square Test)

BBS category	HRQoL: Moderate n (%)	HRQoL: Mild n (%)	HRQoL: Healthy n (%)	Row Total
Normal (n=100)	0 (0.0)	88 (88.0)	12 (12.0)	100
Mild impairment (n=118)	2 (1.7)	106 (89.8)	10 (8.5)	118
Moderate impairment (n=27)	0 (0.0)	26 (96.3)	1 (3.7)	27
Severe impairment (n=22)	2 (9.1)	18 (81.8)	2 (9.1)	22
Column total	4	238	25	267

Chi-square test of independence: $\chi^2 = 12.475$, df = 6, p = 0.052

Effect size: Cramér's V = 0.153 (small)

Table 3. Correlation Between Balance Performance and HRQoL (Pearson Correlation)

Variables	Pearson r	95% CI for r	p-value
Total BBS score vs. Total HRQoL score	0.308	0.195 to 0.413	<0.001

Quality-of-life outcomes suggested relatively preserved HRQoL despite balance limitations, with a mean overall HRQoL score of 93.73 ± 10.15. When HRQoL categories were compared across balance groups, mild HRQoL impairment predominated across all balance strata, affecting 88.0% of those with normal balance and rising to 96.3% in those with moderate balance impairment. Participants classified as having severe balance impairment showed the highest proportion of moderate HRQoL impairment (9.1%), compared with 0–1.7% in other balance strata. The chi-square

test demonstrated a borderline association between BBS category and HRQoL category ($\chi^2 = 12.475$, df = 6, p = 0.052) with a small effect size (Cramér's V = 0.153), indicating that categorical HRQoL differences across balance strata were present but modest.

In contrast, continuous-score analysis provided clearer evidence of association: total BBS score showed a statistically significant positive relationship with HRQoL score (r = 0.308; 95% CI: 0.195–0.413; p < 0.001), indicating that better balance performance was moderately associated with better perceived health status. Together, these findings suggest that balance impairment is common in this population and relates to HRQoL most consistently when both constructs are analyzed on continuous scales.

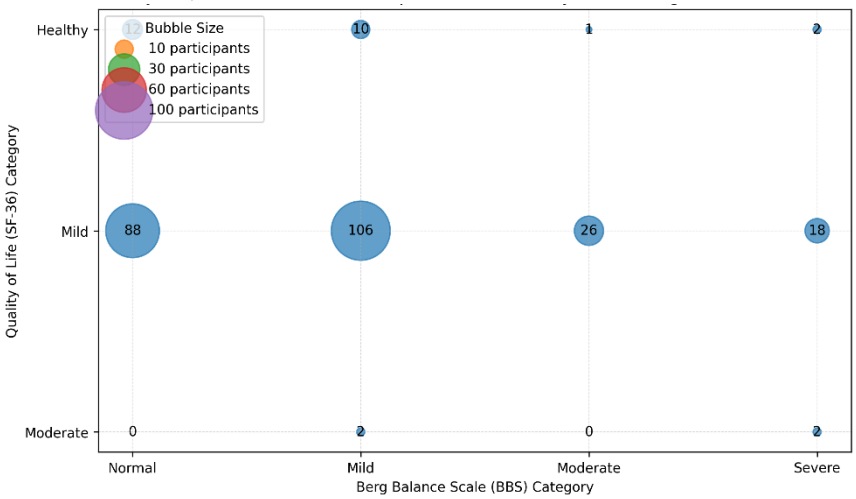

Figure 1. Joint Distribution of Balance Impairment and HRQoL Categories (n = 267).

Most participants clustered in the "mild HRQoL impairment" category regardless of balance status, with the largest concentrations in the normal balance–mild HRQoL cell (n = 88) and the mild balance impairment–mild HRQoL cell (n = 106). Notably, moderate HRQoL impairment occurred primarily among participants with mild and severe balance impairment (n = 2 each), while it was absent in the normal and moderate BBS groups, suggesting a non-uniform distribution of poorer HRQoL across balance strata. The relative scarcity of "healthy" HRQoL classifications in the moderate and severe balance groups (n = 1 and n = 2, respectively) supports a clinically plausible gradient in which declining balance performance is accompanied by reduced perceived health status, consistent with the observed positive correlation between continuous BBS and HRQoL scores (r = 0.308, p < 0.001).

DISCUSSION

This study evaluated the prevalence of balance impairment and its association with health-related quality of life (HRQoL) among older adults in Sialkot using standardized functional balance assessment and self-reported quality-of-life measurement. The findings demonstrate that balance impairment was highly prevalent in this sample, with nearly two-thirds of participants classified as having mild-to-severe impairment based on Berg Balance Scale (BBS) thresholds. Although HRQoL was relatively high on average, balance performance showed a statistically significant positive correlation with HRQoL scores (r = 0.308, p < 0.001), indicating that better balance function was associated with better perceived health status. This association is clinically relevant because balance limitations contribute not only to fall occurrence but also to activity restriction, fear of movement, loss of confidence, and reduced participation, which can progressively influence well-being across physical and psychosocial domains in older populations (17).

The prevalence patterns observed in this study are consistent with international evidence that balance and fall-related problems are common and increase with age, though prevalence varies according to sampling frame and health profile. Studies conducted in community-dwelling populations in low- and middle-income settings have reported substantial fall and balance-related burdens, while facility-based recruitment (including clinics and old homes) may overrepresent older adults with mobility limitations and comorbidity, contributing to higher impairment estimates (17). This consideration is important for interpreting the current results, as the sampling strategy may have increased the likelihood of capturing participants already experiencing functional decline, pain, or chronic conditions that affect balance performance. Nevertheless, the high burden of impairment observed emphasizes the need for routine screening and early intervention to prevent progression toward falls and disability.

The relationship between balance impairment and quality of life aligns with previous work showing that functional balance and postural stability are strongly linked to patient-centered outcomes. In older adults, fall history, fear of falling, and impaired balance can reduce HRQoL by restricting mobility and independence, and this effect may persist even when falls have not yet occurred because perceived instability alters behavior and social participation (17). In particular, large-scale epidemiological evidence from the United States indicates that falls and balance or walking problems are prevalent and associated with significant health burden and disability in older adults (18). Similarly, research in chronic stroke populations demonstrates that balance performance is meaningfully associated with quality-of-life outcomes, supporting the concept that postural control is not merely a physical attribute but a determinant of broader well-being (19). Although the correlation in the current study was moderate in magnitude, it remains clinically meaningful because balance is modifiable and interventions often yield gains in both function and confidence, which may translate to improved HRQoL.

The current study also reports that categorical association testing between balance categories and HRQoL categories approached conventional statistical significance ($\chi^2 = 12.475$, df = 6, p = 0.052) with a small effect size (Cramér's V = 0.153). This borderline finding should be interpreted cautiously; it may reflect limited discriminatory capacity of the HRQoL categories, ceiling effects in SF-36 summary scoring, or residual confounding from unmeasured factors such as pain severity, comorbidity burden, medication use, and physical activity levels. International evidence suggests that balance impairment interacts with sensory impairments and fall-related concerns; for example, concerns about falling and balance deficits are associated with increased risk of injurious falls in older adults, further supporting the clinical importance of balance screening

and fall-prevention strategies (20). Additionally, evidence indicates that balance and muscle strength partially mediate the relationship between physical activity and HRQoL, suggesting that interventions improving these functional components may be particularly impactful for older adults (21). In settings where chronic musculoskeletal pain is common, pain may act as both a contributor to balance dysfunction and a driver of HRQoL reduction, consistent with findings linking hip and knee pain to impaired balance, gait limitations, and reduced quality of life (22).

From a rehabilitation and public health perspective, these findings support implementation of structured programs targeting balance, strength, and confidence-building among older adults. Evidence in community-dwelling populations demonstrates that balance confidence and balance performance are associated with quality of life, emphasizing that successful interventions must address both physical capacity and fall-related self-efficacy (23). Likewise, fear of falling has been shown to influence balance and dual-task performance, which may contribute to reduced participation and HRQoL decline (24). Therefore, interventions that combine progressive balance training with education and psychological support may be more effective than physical exercises alone. Although causal inference is not possible due to the cross-sectional design, the observed association between balance and HRQoL, together with the high prevalence of impairment, reinforces the importance of integrating routine balance assessment into geriatric screening and rehabilitation pathways in local healthcare settings.

Several limitations should be acknowledged. The non-probability convenience sampling design and recruitment from clinics and old homes limit generalizability to the broader community-dwelling older adult population. Potential confounding variables such as comorbidities, pain, medication use, and physical activity levels were not incorporated into an adjusted analytic model, which may influence the strength and direction of observed associations. In addition, the use of an overall HRQoL score and categorical HRQoL groupings may introduce ceiling effects and reduce sensitivity compared with reporting SF-36 domain-specific outcomes. Despite these limitations, the study provides locally relevant estimates of balance impairment prevalence and demonstrates a clear positive association between functional balance performance and HRQoL, supporting the need for targeted rehabilitation approaches for older adults in this setting.

CONCLUSION

Balance impairment was highly prevalent among older adults in Sialkot, with nearly two-thirds demonstrating mild-to-severe impairment on the Berg Balance Scale, and balance performance showed a significant positive association with health-related quality of life. Although the cross-sectional design limits causal inference, the findings suggest that older adults with better functional balance tend to report better perceived health status, highlighting balance as a clinically important and modifiable contributor to well-being. Routine screening for balance impairment and implementation of structured strength, balance, and stability interventions—particularly in facility-based older populations—may help preserve independence, reduce fall-related disability, and support healthy aging.

REFERENCES

1. Song Q, Zhang X, Mao M, Sun W, Zhang C, Chen Y, et al. Relationship of proprioception, cutaneous sensitivity, and muscle strength with balance control among older adults. 2021;10(5):585-593.
2. Aartolahti E, Lönnroos E, Hartikainen S, Häkkinen A. Long-term strength and balance training in prevention of decline in muscle strength and mobility in older adults. Aging Clin Exp Res. 2020;32(1):59-66.
3. Park S, Lee HJ, Jeon BJ, Yoo EY, Kim JB, Park JH. Effects of occupational balance on subjective health, quality of life, and health-related variables in community-dwelling older adults: a structural equation modeling approach. PLoS One. 2021;16(2):e0246887.
4. Osoba MY, Rao AK, Agrawal SK, Lalwani AK. Balance and gait in the elderly: a contemporary review. Laryngoscope Investig Otolaryngol. 2019;4(1):143-153.
5. Papalia GF, Papalia R, Diaz Balzani LA, Torre G, Zampogna B, Vasta S, et al. The effects of physical exercise on balance and prevention of falls in older people: a systematic review and meta-analysis. J Clin Med. 2020;9(8):2595.
6. Xu F, Soh KG, Chan YM, Bai XR, Qi F, Deng N. Effects of Tai Chi on postural balance and quality of life among the elderly with gait disorders: a systematic review. PLoS One. 2023;18(9):e0287035.
7. Schoene D, Heller C, Aung YN, Sieber CC, Kemmler W, Freiberger E. A systematic review on the influence of fear of falling on quality of life in older people: is there a role for falls? Clin Interv Aging. 2019;14:701-719.
8. Ernandes RC, Brech GC, Luna NMS, Bega A, Guimarães DS, Bocalini DS, et al. Impact of diabetic neuropathy on quality of life and postural balance in Brazilian older adults. 2020;28(6):275-279.
9. Jia H, Lubetkin EI, DeMichele K, Stark DS, Zack MM, Thompson WW. Prevalence, risk factors, and burden of disease for falls and balance or walking problems among older adults in the US. Prev Med. 2019;126:105737.
10. Miranda-Cantellops N, Tiu TK. Berg balance testing. 2021.
11. Ha VA, Nguyen TN, Nguyen TX, Nguyen HTT, Nguyen TTH, Nguyen AT, et al. Prevalence and factors associated with falls among older outpatients. Int J Environ Res Public Health. 2021;18(8):4041.
12. Nascimento MM, Gouveia ER, Gouveia BR, Marques A, França C, Freitas DL, et al. Exploring mediation effects of gait speed, body balance, and falls in the relationship between physical activity and health-related quality of life in vulnerable older adults. Int J Environ Res Public Health. 2022;19(21):14135.
13. Dunsky A. The effect of balance and coordination exercises on quality of life in older adults: a mini-review. Front Aging Neurosci. 2019;11:481520.
14. Maetzler W, Nieuwhof F, Hasmann SE, Bloem BR. Emerging therapies for gait disability and balance impairment: promises and pitfalls. Mov Disord. 2013;28(11):1576-1586.
15. Godi M, Franchignoni F, Caligari M, Giordano A, Turcato AM, Nardone A. Comparison of reliability, validity, and responsiveness of the mini-BESTest and Berg Balance Scale in patients with balance disorders. Phys Ther. 2013;93(2):158-167.
16. Açma A, Carrat F, Hejblum G. Comparing SF-36 scores collected through web-based questionnaire self-completions and telephone interviews: an ancillary study of the SENTIPAT multicenter randomized controlled trial. J Med Internet Res. 2022;24(3):e29009.
17. Janakiraman B, Temesgen MH, Jember G, Gelaw AY, Gebremeskel BF, Ravichandran H, et al. Falls among community-dwelling older adults in Ethiopia: a preliminary cross-sectional study. PLoS One. 2019;14(9):e0221875.

DOI: https://doi.org/10.61919/x0q3pg32

18. Patel KV, Phelan EA, Leveille SG, Lamb SE, Missikpode C, Wallace RB, et al. High prevalence of falls, fear of falling, and impaired balance in older adults with pain in the United States: findings from the 2011 National Health and Aging Trends Study. J Am Geriatr Soc. 2014;62(10):1844-1852.
19. Schmid AA, Van Puymbroeck M, Altenburger PA, Miller KK, Combs SA, Page S. Balance is associated with quality of life in chronic stroke. Top Stroke Rehabil. 2013;20(4):340-346.
20. Welmer AK, Frisendahl N, Beridze G, Trevisan C, Calderón-Larrañaga A. Association between concerns about falling and risk of injurious falls in older adults: the role of balance impairment. J Am Med Dir Assoc. 2023;24(12):1984-1989.e2.
21. de Maio Nascimento M, Gouveia BR, Gouveia ÉR, Campos P, Marques A, Ihle A. Muscle strength and balance as mediators in the association between physical activity and health-related quality of life in community-dwelling older adults. J Clin Med. 2022;11(16):4857.
22. Yanardag M, Şimşek TT, Yanardag F. Exploring the relationship of pain, balance, gait function, and quality of life in older adults with hip and knee pain. Physiother Man Ther. 2021;22(4):503-508.
23. Roberts HJ, Johnson KM, Sullivan JE, Hoppes CW. Balance confidence and balance performance, but not fall history, are associated with quality of life in community-dwelling older adults: a cross-sectional study. J Geriatr Phys Ther. 2023;46(1):82-89.
24. Sapmaz M, Mujdeci B. The effect of fear of falling on balance and dual task performance in the elderly. Gait Posture. 2021;87:111250.