

Postural Balance among Elderly with Diabetes Mellitus: A Descriptive Study in the Geriatric Polyclinic of Level II Udayana Hospital

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Abstract

Background: Advancing age is often accompanied by physical decline in the elderly, including impaired balance. One of the most serious consequences of this impairment is the risk of falling. Diabetes mellitus is suspected to be a contributing factor to postural imbalance in older adults.

Objective: This study aims to analyze postural balance among elderly individuals with diabetes mellitus at the Geriatric Polyclinic, Level II Udayana Hospital.

Method: This quantitative study employed a cross-sectional design and involved 94 elderly patients diagnosed with diabetes mellitus at the Geriatric Polyclinic of Level II Udayana Hospital, Denpasar. Data were collected through direct observation using the Berg Balance Scale to assess postural balance. Descriptive univariate analysis was used for data interpretation.

Results: Demographically, 68 respondents (72.34%) were aged 60–74, 54 (57.45%) were male, and 38 (40.42%) had completed senior high school. A majority, 62 respondents (65.96%), had lived with diabetes for more than five years. In terms of balance, 60 respondents (63.83%) were classified as independent, while 32 (34.04%) required walking assistance. The mean Berg Balance Scale score was 31.3, indicating the need for walking assistance.

Conclusion: Elderly individuals with diabetes mellitus are at increased risk of postural imbalance due to aging and disease-related factors. These findings highlight the importance of early detection and may inform the development of targeted fall-prevention interventions for this population.

Keywords: Elderly; Postural Balance; Diabetes Mellitus; Postural Imbalance; Berg Balance Scale.

INTRODUCTION

Balance defined as the individual ability to maintain the center of body gravity within the limits of the base of support, refers to postural stability and control (1). The impairment of balance is caused by multiple factors depending on the structures affected and other underlying diseases (2). The negative impacts of postural balance impairment are the possibility of falling and decreasing mobility (2,3). It is important to measure postural balance, specifically lateral stability, because it may be influenced by high levels of fear of falling (4). National Institute of Aging stated that if the balance impairment is getting undetectable and chronic, it is a consequence of disruptions of relationships, declining work performance, and lowering the ability to carry out daily activities (5).

Globally, the elderly are found to be the highest prevalence victims due to falls. In America, 20 to 30% of elders who fall experience moderate to severe injuries, such as bruises, hip fractures, or head trauma, with the level of seriousness based on advanced age, loss of balance, and more common in women (6). The previous study found that the elders with type 2 diabetes mellitus have a 59% possibility to fall higher than nondiabetic elders. Linked to insulin use, the likelihood of falls among insulin users is 162 higher compared to those without insulin (7). Based on time to reach stability, the age after 60 needs 17% longer

compared with the under (8). The research that compared the postural balance due to gender found that male elders have better stability than females when tested by opening and closing their eyes on hard or soft areas to step (9). In the research that compared active older adults, inactive older adults, and younger adults, the center of pressure sway and velocity of older adults was greater than that of younger adults. It is reflected that older adults tend to be physically inactive and present a high risk of falling due to balance impairment (10). The study to measure anticipatory postural adjustment based on age found that older adults were unable to adjust their postural responses. It is indicated that the elderly faced the problem in transition for the change from standing to walking (11).

Losing balance in the elderly induces faintness, nausea, or unsteadiness. The following symptoms, like spinning when standing, dizziness without explanation, or feeling like floating, may persist after 50 years old. In elders with diabetes, low blood sugar may contribute to dizziness and sudden anxiety (12). The balance problem in the elderly with diabetes mellitus may be caused by several factors, such as neuropathy related to diabetes, degradation of sensory and motor skills ability, and cognitive problems (13). The review about age-related balance and gait impairment reveals that the elderly have a dependency on vision to maintain posture that increases the risk of falls (14). It may increase gradually due to advanced age, specifically in overweight and obese elderly compared to the elderly with a normal body mass index. Overweight, obesity, and underweight were related to a higher proportion of dynamic balance impairments (15).

The exercise to increase the capability of elders to maintain balance and prevent falls needs to be performed routinely. A lifestyle such as healthy food consumption, exercise, sleep, and good rest may ensure the elders stay active in their old age (16). The research in Indonesia proved that balance exercise for institutionalized elderly with a risk of falling is able to improve the postural balance after evaluation using the Berg Balance Scale (17). The activities for older adults that help them to maintain their body's strength and stability are tai chi, yoga, one-foot standing, heel-to-toe walking, balance walking, sideways walking, and other changing-position training. By combining three types of physical activities as a combination of aerobic, muscle strengthening, and balance as weekly activities (18).

Despite the high prevalence of diabetes among the elderly, limited studies in Indonesia have explored postural balance using standardized measurement tools of the Berg Balance Scale. The study performed in Level II Udayana Hospital which never performed the balance function specifically in diabetes mellitus elders. This study aims to identify the demographic characteristics and postural balance in elderly with diabetes mellitus. The balance of elderly measure by using the Berg Balance Scale as the effort to screen the balance impairment specifically in diabetes mellitus elderly.

METHOD

This study uses a quantitative research method with a cross-sectional approach to determine the postural balance in elderly patients with diabetes mellitus. The research was conducted in March 2025 at the Geriatric Polyclinic of Level II Udayana Hospital with the sampling technique was purposive sampling. The population in this study consists of 156 respondents, calculated based on the average number of outpatients over the past 3 months. The sample calculation found 94 people who were involved in this study based on the inclusion and exclusion criteria.

The inclusion criteria for this study were: aged 60 years or older, diagnosed with diabetes for at least one year, able to read and write, and willing to participate as a respondent. Exclusion criteria included not undergoing routine medical examinations and having inadequate health conditions, such as blindness.

Postural balance was assessed using the Berg Balance Scale (BBS), a globally recognized, valid, and reliable instrument. The BBS demonstrates high relative reliability, with an inter-rater reliability of 0.97 (95% CI: 0.96–0.98) and intra-rater reliability of 0.98 (95% CI: 0.97–0.99). The results are categorized into three levels: 0–20 (wheelchair-bound), 21–40 (walking assisted), and 41–56 (independent).

During the balance assessment, three nurses were positioned around the patient—on the left, right, and behind—while the researcher stood in front of the chair used for support during movement. All participants provided written informed consent after receiving a clear explanation of the study. Ethical approval was granted by the Health Research Ethics Committee of STIKES Kesdam IX/Udayana (Approval No: 06/EC-KEPK-SK/II/2025).

RESULT

The study was conducted at Level II Udayana Hospital, a military hospital and the highest referral center within the Kodam IX/Udayana region. Located at Jalan P.B. Sudirman No.1, Dauh Puri, Denpasar Barat, Kota Denpasar, the hospital offers a range of services including inpatient and outpatient care, treatment rooms, a pharmacy, and other supporting facilities, all complemented by a comfortable waiting area. Elderly patients with diabetes mellitus receive professional care from internists and nurses at the geriatric polyclinic.

A total of 94 respondents participated in this study, selected from 112 potential participants based on the sample size calculation formula. Eighteen individuals were excluded: 8 due to severe visual impairment, 4 with a diabetes duration of less than one year, and 6 who were first-time patients referred to the geriatric polyclinic at Level II Udayana Hospital. The demographic data of the respondents show that the majority are aged 60–74, with 68 people (72.34%), 54 men (57.45%), 38 people (40.42%) with a high school education and 62 people (64.04%) having diabetes for more than 5 years, as shown in Table 1.

Table 1. The Demographic Distribution of the Elderly with Diabetes Mellitus in the Geriatric Polyclinic of Level II Udayana Hospital

Categories	Frequencies (f)	Percentage (%)
Age		
60-74	68	72,34
75-90	26	27,66
Sex		
Male	54	57,45
Female	40	42,55
Level of education		
None	4	4,26
Elementary	12	12,76
Junior high school	30	31,91
Senior high school	38	40,42
University	10	10,65
Duration of diabetes		
1-5 years	32	34,04
>5 years	62	65,96

Table 1 shows that 68 respondents (72.34%) were aged between 60–74 years, 54 respondents (57.45%) were male, 38 respondents (40.42%) had completed high school, and 62 respondents (65.69%) had been living with diabetes for more than five years.

Table 2. Distribution of postural balance in elderly in Geriatric Polyclinic at Level II Udayana Hospital

Categories	Frequencies (f)	Percentage (%)	Mean
1 (<i>wheelchair bound</i>)	2	2,13	31,33
2 (<i>walking with assistance</i>)	32	34,04	
3 (<i>independent</i>)	60	63,83	
Total	94	100,00	

Tabel 2 reveals that 60 respondents (63,83%) were independent, while 32 respondents were walking with assistance (34,04%). The mean result of balance by using the Berg Balance Scale is 31,33 which categorized as walking with assistance.

DISCUSSION

According to the research's findings, the elderly are predominantly 60-74 years old, which is in line with the report from the Endocrine Society that those 65 or older are more at risk of developing diabetes mellitus. Most of them experienced complications such as hypoglycemia, kidney failure, and heart disease more than the younger (19). The retrospective study found that one of five elderly (≥ 65 years old) people has diabetes mellitus, and it is higher among overweight participants. Male respondents in the current study found a greater percentage of diabetes mellitus. In the United States, male and older adults also have a higher prevalence of type 2 diabetes mellitus (20). Based on the level of education, the respondents are predominantly in senior high school. A previous study found that the average duration of formal education was eight years. The participants with low levels of education may have low access to information and find it difficult to follow the recommended treatments (21). According to the duration of being diagnosed, this study found that the respondents have more than 5 years of experience as patients of diabetes mellitus. The study in Indonesia found that almost all of the respondents with diabetes mellitus ≥ 5 years had peripheral neuropathy (77.4% of 31 respondents), which may impact the balance and stability (22). Therefore, the American Diabetes Association recommends assessing for neuropathy on the first day of diagnosis of diabetes mellitus type 2 and after 5 years for type 1. It may benefit from early detection of the risk of imbalance (23).

The current study reveals that elderly respondents with diabetes mellitus, based on postural balance measurement, are elderly who are dependent and require assistance to walk using aids. During the assessment, the movements that respondents found difficult included standing on one leg and alternating placing their feet on a bench, while the movements that all respondents were generally able to perform well included sitting to standing and standing without support. The category of walking with assistance is experienced by respondents who need help walking and climbing stairs, using canes, walkers, or crutches, or holding onto handrails installed in the room. Respondents in the independent category are generally able to perform daily activities independently, but aspects of balance, such as climbing stairs and standing on one leg, still require assistance. After conducting a more detailed data collection regarding demographic data and health history, several supporting factors for the condition were found, including that the respondents were predominantly female, over 70 years old, had a history of recurrent falls in the past year, had very minimal physical activity, and had a more frequent history of pain-relief medication use. Some of these conditions greatly affect the elderly's ability to achieve good postural balance. The results of this study indicate that diabetes and postural imbalance conditions are very likely to occur in the elderly, accompanied by various other risk factors due to aging.

Postural balance may be affected by several factors besides disease conditions. The frailty, handgrip strength, unintentional weight loss, level of physical activity, and fatigue also contribute to postural instability (24). The previous research in Indonesia, the demographic data that may worsen postural balance were female gender, the age over 80 years old, the history of frequent falls, osteoarthritis with pain, irregular activity, and a history of pain (17). In elderly individuals with diabetic neuropathy, there is a possibility of experiencing postural and gait instability. Neuropathy conditions will impact daily activities as they increase the risk of falls (25). The latest research in 2024 compared the balance among diabetic and non-diabetic persons in the group. It is found that individuals with diabetes without neuropathy had shorter tandem on unstable surfaces and worse anticipatory postural adjustments and reactive postural responses than individuals without diabetes (26). It is also in line with the research in China that compared the postural static among different age groups. It was suggested that individuals with diabetes mellitus and older age had worse static postural balance. The poorer balance function was found to correlate with advanced age. It may happen due to the worsened function of the visual, somatosensory, and central nervous system levels (27). The previous study in community-dwelling older adults that linked diabetes mellitus with gait and falls found that vision and cognition were mediators of DM and gait speed impairment. It is a consequence of balance problems and an increasing risk of falling (28).

Based on the research findings, although most elderly participants remained independent, this indicates that they are still physically productive. Cognitive status contributes to better postural balance among older adults (29). Those who engage in routine activities or regular exercise, such as tai chi, also demonstrate higher balance performance (30). Additionally, elderly individuals with good vision and hearing, and no history of cerebrovascular disease, tend to maintain better static and dynamic balance despite their advanced age (15).

CONCLUSION

The demographic data show that most elderly participants were aged between 60–74 years, had completed high school, and had been living with diabetes for more than five years. In terms of postural balance, the majority were categorized as requiring walking assistance. The Berg Balance Scale is a standardized and user-friendly tool for assessing balance in the elderly, suitable for use both independently and by healthcare professionals. As an early detection instrument, its application can support healthcare providers in enhancing fall prevention interventions, particularly for elderly patients with related health conditions.

RECOMMENDATION

The results of postural balance measurements serve as foundational data for future research aimed at developing fall prevention programs or balance improvement strategies that can be performed independently. This assessment is recommended for use in clinical settings, particularly in geriatric clinics, and is also valuable for designing community-based health promotion programs to help reduce hospital admissions due to falls.

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