Original Article

THE FREQUENCY OF BALANCE DISORDERS AND THEIR CORRELATION WITH THE RISK OF FALLS IN THE ELDERLY POPULATION AT RAWALPINDI CLINICS

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ABSTRACT

Background: The elderly and geriatric population exhibited the highest prevalence of balance disorders. The prevalence of fall risk increased along with the growth in balancing disorders. Falls are ranked as the second most common cause of unintentional injury worldwide. The primary health concern for older persons was falls. **Objectives:** The purpose of our study was to ascertain the prevalence of balance problems and how often they occur in the elderly population, as well as how these problems relate to falls. **Methodology:** In our study, information was gathered from 184 elderly individuals. There were 78 females and 106 guys among them. Every participant was 65 years of age or older. We employed the Berg Balance Scale (BBS) to gather data. Each point on the 14-item Berg Balance Scale (BBS) is rated from 0 to 4, with 4 denoting normalcy and 0 denoting severity. 56 was the final BBS score. **Results:** The findings demonstrated that participants in our study, both male and female, experienced a higher chance of falling. The gender distribution of the participants was classified as follows: 1 for males and 2 for females. In our data, there were 184 persons in the entire sample size; 106 of them were men (576.6% of the sample size) and 78 were women (42.4%). **Conclusion:** We deduced that balance disorders afflicted the elderly population and increased their risk of falling. We also found that the prevalence of fall risk was higher in the male population than in the female population.

KEYWORDS: Balance disorder, Risk of falls, Senior population.

INTRODUCTION

The term "elderly population" or "geriatric population" refers to any adult population who is 65 years of age or older. Sixty-five was the most prevalent age at which a patient was classified as geriatric. But in the years to come, geriatrics and the aged accounted for one-fifth of the world's population.[1] The epidemiology revealed two increases in the ratio or segment of the population that is 65 years of age or older. The percentage of older people increased from 7% to 14%. By 2040, there will be 1.4 billion people on the planet, up from 506 million in 2008. The life expectancy at 65 years of age or older grew. A 2003 American survey stated that a 65-year-old lady might anticipate living longer than 19 years and a 65-year-old man longer than 16.8 years.[4] By 2000, there would be 5 million people of color, 10 million or so by 2010, and 20 million by the end of 2030. Although they accounted for about 75% of the population in non-Hispanic areas, white people would only contribute 35% of the population growth between 1990 and 2000. From 2000 to 2010, this growth rate would decrease to 23%, and from 2030 to 2036, it would decrease to 14%.[5] The process of aging is just a typical biological phenomenon that inevitable. It was unclear when aging began. Nobody is certain of the exact age at which aging begins. The aging process began naturally some 3.5 billion years ago.[7]

Since the turn of the 20th century, there have been dramatic changes in the size, age distribution, health profile, and patterns of healthcare usage of the US population. The population of the United States was greater than three times that of its land area. The proportion of the population over 65 had increased to about 13%, more than three times the level in 1900 as the population had gotten older. Currently, more than 70% of people reach the traditional retirement age of 65.[8]

Balance: Balance refers to the body's capacity to process information related to an individual's location, such as proprioceptive and sensory impulses. The body may also generate appropriate motor responses. The body uses

these reactions to control movement.[10] Although postural control and balance depend on the workings of several different systems, balance is essential for stability and mobility. But as we age, the postural control mechanism loses some of its efficacy due to changes in its constituent parts. It has been noted that older persons' muscular response methods alter during balance activities. There had also been diminished function in the vestibular, somatosensory, and visual systems.[11] Within the context of cognition, which takes thought and response time into account, the stability resulting from excellent posture was a process that involved the quick, programmed reconciliation of data from the vestibular, somatosensory, visual, and outer muscle frameworks. Poor balance arises from a loss of control over one's posture due to damage or modifications in the vestibular, musculoskeletal, central nervous system, and vision of the body. These deficiencies caused balance and stability issues in the elderly population, increasing their risk of falling.[13]

Balance Issues: The main factor contributing to the drop in balance problems was age. It is possible to identify damage or an imbalance early in life. This occurs because a person's sensory system responds poorly when they execute the most taxing task. The reason for the balance problem in the younger demographic group can be a decline in the stability of human body posture. For someone who is attempting to maintain balance, these postural deteriorations provide new challenges. The process of losing equilibrium quickens as time passes.[15]

Balance Disorder in Geriatric Population: The elderly and geriatric population exhibited the highest prevalence of balance disorders. Balance problems can result in a variety of disorders due to the increased risk of falls. One estimate states that one-third of the population, or the elderly and geriatric population, may have balance disorders, and some have complained of dizziness.[17] In 2020, one in five individuals worldwide was 70 years of age or older. The capacity to keep balance and alignment in an upright or anatomical position while resisting the pull of gravity was known as posture control. People need to be able to control their posture since it makes it easier for them to go about their daily lives, which involve walking and keeping balance. Falls among older persons and the elderly population are more likely when the sensory and motor components of the postural control system are interfered with or rendered inoperable.[18]

Epidemiology of Falls: According to estimates, 13% of adults between the ages of 65 and 69 reported having trouble with their balance, and this percentage increases to 46% for adults 85 and older. This is consistent with the estimated 35% prevalence of gait impairment among ambulatory older adults aged 70 and older, and the estimated 28% annual fall rate for adults over 65.[15] In clinical and public health settings, falls have gained more importance due to the aging of the US population.

Approximately thirty percent of those over 65 report falling at least once a year, with environmental conditions and issues with gait/balance and muscle strength being the two main causes of falls in older adults.[30] The proportion of falls-related deaths in the United States among individuals over 85 was much greater than that of falls-related deaths among younger people.[31] In the US, 147 million people visited emergency departments for injuries between 1992 and 1995. With 24% of these visits resulting in external injuries, falls were the most common cause. Individuals 65 years of age and above and children under five were more likely to attend an emergency room following a fall. When an elderly person falls, they have an eight times higher chance of dying from their injuries and are ten times more likely to be admitted to the hospital than youngsters. 1,800 people lose their lives to falls each year. Annually, falls are associated with about 9,500 deaths among the elderly in the United States.[29]

Research gap
There is evidence of balance issues in the elderly population, but there is little information available in Pakistan regarding the correlation between balance issues and fall risk.

Rationale
Evidence is available highlighting the issues of balance in the geriatric population. However, in Pakistan very limited data is present. This study aims to focus on balance disorders and their association with the risk of falls in the geriatric population in Rawalpindi.

AIMS AND OBJECTIVES
The concerns older persons have about their balance are supported by evidence. Nevertheless, Pakistan lacks statistical data. This study aims to investigate the association between poor balance and the risk of falls in the senior population of Rawalpindi.

Literature review
Diego Urrunaga-Pastor et al. (2018) studied factors associated with poor balance ability in older adults of nine high-altitude communities. They chose 365 senior citizens from nine distinct communities for their study. Of them, 49.3% had a poor capacity to balance. According to their study's findings, drinking alcohol, having a fast stride, being tired, experiencing at least one fall in the previous year, having at least one comorbidity, or having several comorbidities were all associated with poor balancing ability. Thus, they conclude that 50% of the elderly in these communities struggle with balance.[32]

Suleiman I. Sharif et al. (2018) investigated the prevalence of falls among older adults aged 60 years and above to determine the risk factors associated with falls. They picked out 510 families to study. There is at least one elderly member in this family. Half of the participants in the research had experienced a fall within

the preceding two years. According to their study's findings, participants who were 70 years of age or older experienced more falls than their younger counterparts. They conclude that falls were most common among the senior population and that actions should be taken to lower the falls ratio.[33]

Tahsin Barış Değer et al. (2019) investigated a study on the prevalence of balance disorders, the effect of sociodemographic, medical, and social conditions on postural balance, and the relationship between balance and falls in the elderly. The researchers used stratified random sampling to pick 607 older adults from the community; these individuals' average age was 74 years old. The findings indicated that the prevalence of balance issues in the elderly population was 34.3%. An increase in balance difficulties has been primarily linked to several chronic conditions, aging, incontinence, disrupted gait, and obesity. They conclude that balance issues are more common in the elderly population and are caused by a variety of variables.[10]

Mir Muhammad Jalali et al. (2015), investigated a study on fall history among active elderly individuals in Iran and estimated risk factors for falls in this population. They included 448 active senior citizens from rural Rasht city, Iran, in their study. Three groups were formed out of these participants. Participants are divided into three age groups: the youngest participants are in group 1, the middle-aged participants are in group 2, and the oldest participants are in group 3. Among them, the falling rate was 27 percent. The cut-off time for the TUG exam was 13.75 seconds. They have an 84.7% sensitivity and a 56% specificity. The OLB test had a cut-off point of 12.7% and sensitivity and specificity of 63% and 83.5%, respectively. They concluded that the OLB and Romberg tests were useful for detecting balance issues in elderly people.[34]

METHODOLOGY
The study used a cross-sectional survey approach that was descriptive. Non-probability convenience sampling was used as the sampling method. The private clinic in Rawalpindi served as the study site. Our study took place over six months, from December 2023 to May 2024. The following criteria had to be met: participants had to be 60 years of age or older, male or female, have experienced at least one fall, have balance or walking issues in the past, and be free of cognitive impairment, cancer, traumatic brain injury, stroke, other neurological

disorders, and drug use that impairs balance. Sample Size: 184 persons met the OpenEpi sample size calculation criteria with an expected frequency of 13.9%, a 95% confidence interval, and a 5% margin of error.

Outcome measure
Berg balance scale
The Berg balance scale was utilized to evaluate the elderly residents of the community's fall risk and balance. The 14-item Berg Balance Scale (BBS) was developed by evaluating therapists' observations of their patients' activities. It takes ten to thirty minutes to finish the scoring. BBS can be used to evaluate a patient's ability to maintain balance in both dynamic and static positions. BBS has a dependability score of 0.992-0.994.

Scoring
In (BBS), the scoring typically ranges from 0 to 4. On the Berg Balance Scale (BBS), a patient's score of 0 indicates that they are incapable of performing any function. A score of 4 indicates that the patient completes all tasks and functions.

Interpretation
A score between 0 and 20 denoted impairment in the equilibrium. Mild or acceptable balance was indicated by a score between 21 and 40. A good score fell between 41 and 56. balance.

RESULTS
Table 4.2 demonstrates that participants in our study who experienced the risk of falls were of both genders. The gender distribution of the participants was classified as follows: 1 for males and 2 for females. Our data comprise a total sample size of 184 individuals, of which 106 were male (57.6%) and 78 were female (42.4%) of the total sample size. The elderly population has a high risk of falls, as indicated by the numbers ranging from 0 to 20. There was a mild risk of falls among the population, as indicated by values from 41 to 56, whereas values from 21 to 40 indicate a moderate risk of falls. The study involved 184 participants in all, 106 of whom were men and 78 of whom were women. There are sixteen females and twenty boys that are in the range of 0 to 20 and have a high fall risk. 129 persons with a moderate fall risk were between the ages of 21 and 40. Of these, 59 women and 70 men have a moderate risk of falling. There were fourteen individuals with a mild fall risk. There were three ladies and eleven males among the.

Table 4.1

Age of patients	Frequency	Percentage
65	18	9.8%
66	16	8.7%
67	18	9.8%
68	18	9.8%
69	13	7.1%
70	22	12.0%
71	8	4.3%

72	11	6.0%
73	3	1.6%
74	4	2.2%
75	7	3.8%
76	4	2.2%
77	5	2.7%
78	6	3.3%
79	6	3.3%
80	8	4.3%
82	6	3.3%
84	2	1.1%
85	1	0.5%
86	2	1.1%
87	1	0.5%
88	2	1.1%
90	2	1.1%
92	1	0.5%
Total	184	100%

The population's age, frequency, and percentage are displayed in Table 4.1. Of the 184 individuals, 18 were 65 years of age or older, making up 9.8% of the total; 16 were 66 years old, making up 8.7%; and 18 were 67 and 68 years old, making up 9.8% of the total. Thirteen individuals, or 7.1% of the total, were 69 years old; twenty-two, or 12%, were 70 years old; and eight, or 4.3%, were 71 years old. Three persons, or 1.6% of the total population, were aged 73, whereas there were eleven people, or 6%, who were 72 years old. There were 4 individuals, or 2.2% of the total population, who were 74 years old, and 7 individuals, or 3.8%, who were 75 years old. Four individuals were 76 years old (2.2%), five who were 77 years old (2.7%), and six who were 78 and 79 years old (3.3%). Six individuals, aged 82 (3.3%), two individuals, aged 84 (1.1%), one individual, aged 85 (0.5%), two individuals, aged 86 (1.1%), one individual, aged 87 (0.5%), two individuals, aged 88 and 90 (1.1%), and one individual, aged 92 (0.5%), comprised the total population.
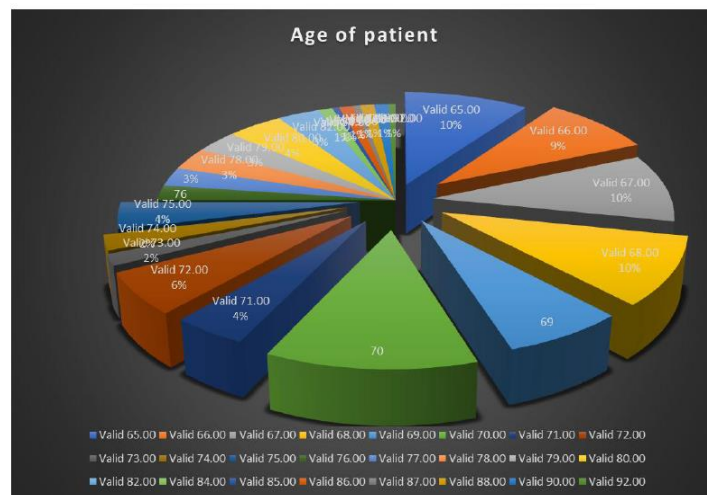

Figure 1

The participants' gender distribution. Males were categorized as 1, and females as 2. In our data, there were 184 persons in the entire sample size; 106 of them were men (576.6% of the sample size) and 78 were women (42.4%). The value is displayed in Table 4.2.

Table 4.2: Gender of patient.

Gender	Frequency	Percentage
Male	106	57.6%
Female	78	42.4%
Total	184	100%

The patient's gender * the Berg Balance Scale overall score*

Table 4.3 displays the elderly population's risk of falls. Both men and women on this table experience falls. The elderly population has a high risk of falls, as indicated by the numbers ranging from 0 to 20. There was a mild risk of falls among the population, as indicated by values from 41 to 56, whereas values from 21 to 40 indicate a moderate risk of falls. The study involved 184 participants in all, 106 of whom were men and 78 of whom were women. Twenty-six females and twenty males, or 22.3% of the total, are between the ages of 0 and 20 and have a high risk of falling. 129 persons with ages ranging from 21 to 40 have a moderate fall risk. Out of them, 70 men and 59 females, or 70.1% of the total, have moderate falls risk. Fourteen are the people who had a slight chance of falling. Of these, 3 are female and 11 are male, making up 7.6% of the total.

Table 4.3: Gender of patient.

The total score of the berg balance scale	Risk of fall	Males	Females	Total	Percentages
	High chance of falling from 0 to 20	25	16	41	22.3
	Moderate chance of falling from 21 to 40	70	59	129	70.1
	Mild chance of falling from 41 to 56	11	3	14	7.6
Total		106	78	184	100

Table 4: Chi-Square test.

	Value	Df	Asymptomatic significance (2- sided)
Pearson chi-square	3.301*	2	0.192
Likelihood ratio	3.513	2	0.173
Linear-by-linear association	0.193	1	0.661
N of valid cases	184		

a. The predicted count for 0 cells (0.0%) is less than 5. 5.93 is the bare minimum predicted count.

When the sample size was large, a statistical hypothesis test was employed for the analysis and examination of the possibility tables. This test is also known as the $\chi 2$ test or chi-square test. The purpose of this test was to determine whether the measurement of the test statistic (values within the table) was affected by two variables (two dimensions of the possibility table) freely or independently. In that instance, the test was only valid when the chi-square test statistic was distributed under the null hypothesis. Particularly in the Pearson chi-square test, this happens. To determine whether there was a discernible, significant contrast or difference between the normal frequencies and the observed frequencies in at least one class of a possibility table, Pearson's chi-squared test was employed. The chi-square test results are displayed in Table 4.4. The Pearson chi-square test with asymptomatic significance on 2-sided data had a result of 0.192. In other words, there was a significant positive correlation between the two variables as indicated by the chi-square test.

Table 4.5: Patient's age * Berg Balance Scale total score*
Cross-tab: Patient's age

Total BBS score		65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	82	84	85	86	87	88	90	92	Total
	High Risk of fall from 0 to 20	1	2	1	3	4	9	0	2	0	0	0	1	1	1	2	2	3	2	1	2	1	2	0	1	41
	Moderate risk of fall from 21 to 40	12	12	16	15	7	13	7	7	3	4	7	3	3	5	4	6	3	0	0	0	0	0	2	0	129
	Mild risk of fall from 41 to 56	5	2	1	0	2	0	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	14
Total		18	16	18	18	13	2	8	1	3	4	7	4	5	6	6	8	6	2	1	2	1	2	2	1	184

The patient's age and overall Berg balance scale score are displayed in Table 4.5. There were 129 persons with a moderate risk of falling, 14 with a low risk, and 41 elderly adults with a high risk of falling.

Table 4.6: Chi-Square test.

	Value	Df	Asymptomatic significance (2- sided)
Pearson chi-square	74.723*	46	0.005
Likelihood ratio	77.741	46	0.002
Linear-by-linear association	20.632	1	0.000
N of valid cases	184		

a. The predicted count for 63 cells (87.5%) is less than 5. The anticipated count is at least 08.

The chi-square test values are displayed in Table 4.6. The Pearson chi-square test yielded a diagnostic significance value of 0.005 on a 2-sided sample. This indicates that the two variables have a weak association, as indicated by the chi-square test.

DISCUSSION
Our study's justification and objective was to determine the prevalence of balance disorders and how they relate to fall risk in Rawalpindi's senior population. Only those who volunteered to participate in our study were included. The process of choosing participants for our study was rather simple as we were limited to individuals who had a history of at least one fall, balance disorder, or walking difficulties. Considering that every participant in our study was at least 65 years old. We used the Berg Balance Scale (BBS) to calculate the risk of falls in our study.

Each of the 14 items on the (BBS) will receive a score between 0 and 4. Four is considered normal, whereas a score of 0 indicates severe. The BBS had a total of 56 points. After gathering the data utilizing BBS, we discovered that while the majority of the population had a moderate risk of falling, some had a high danger, and some were normal and had a low risk. As per Khanuja K. et al. (2018), falls rank as the second most common cause of unintentional injuries worldwide. These unintentional wounds may result in fatalities. Fall prevention was the main health concern for the elderly population. Every year, almost one-third of the population and about half of those residing in community care facilities suffer from falls.[21]

Suleiman I Sharif et al. in 2019, carried out a study to find the risk variables linked to falls as well as the prevalence of falls among older persons 60 years of age and older. They picked out 510 families to study. Every family member has at least one elderly person in their care and has experience within the last one to two years. According to the results, 50.8% of the participants had fallen at some point in the previous two years. In their study, women and those 70 years of age or older account for the majority of falls; whereas, in our analysis, males 65 years of age or older account for the majority of falls relative to females. Because the elderly population in both studies was at risk for falls, this investigation validated our findings.[33]

Regards In 2016, a study was carried out by Criter et al. to determine which balance metrics are more likely to indicate recent falls. The average age of the thirty participants who were chosen for the study was 77.2 years. According to their research, older adults with balance problems fell more frequently and were more afraid of falling than other groups. Both men and women in our study experienced balance disorders and fell more frequently. Thus, this investigation validated our findings.[28]

CONCLUSION
We looked at balance disorders and their relationship to falls among the elderly in our descriptive cross-sectional study. In our study, both men and women are included. We concluded that balance disorders and fall risk were prevalent in the elderly population. In our study, the male population had a higher prevalence of falls than the female group.

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