

EPIDEMIOLOGY AND RISK FACTORS OF VERTIGO IN GERIATRICS POPULATION

*Tahreem Nawaz, **Hafiz Usman Asad, **Asim Raza, **Farooq Islam,** Abdul Hanan

*University Institute of Physical Therapy, University of Lahore, Gujrat, Pakistan

**Department of Rehabilitation Sciences, University of Chenab, Gujrat, Pakistan

ABSTRACT

Background: Vertigo, a common symptom found mostly in old age population. It is spinning sensation of the environment around you that may be barely noticeable or may be severe. Objective of this current study was to estimate the prevalence and risk factors related to vertigo among old age population.

Methodology: An analytical cross sectional study was carried out on 424 old age people of having age 65 and more than this, that were selected with non-probability convenient sampling from August to November 2022 from general population of Wazirabad, Punjab, Pakistan. Selection of participants was done on the basis of inclusion and exclusion criteria. Statistical package for the Social Sciences (SPSS) version 24.0 was used to analyze the data at 95% confidence interval. Chi square test applied to find the association of vertigo with risk factors. Odd ratio showed how many times risk is more common in people having risk than people without risk factor.

Results: Out of 424 old age participants having age 65 years and more than it, vertigo symptoms were analysed. Out of total, 287(68%) were found having vertigo symptoms and 137(32%) were found without vertigo. Stress/anxiety, high blood pressure issue, low blood pressure issue, bone weakness/osteoporosis, history of head trauma, long time computer use, orthostatic hypotension, cerebrovascular disease, history of fall, vitamin d deficiency, cigarette smoker, obstructive sleep apnea, history of dengue, migraine, cervical spondylosis, low hemoglobin level were found statistical significant with p-value ≤ 0.05 between vertigo and without vertigo.

Conclusion: Prevalence of vertigo was observed in more than half of sample size. Risk factors associated with vertigo with significant p-value ≤ 0.05 are stress/anxiety, high blood pressure, low blood pressure, bone weakness/ osteoporosis, history of head trauma, long time computer use, orthostatic hypotension, cerebrovascular disease/stroke, history of fall, vitamin D deficiency, cigarette smoker, obstructive sleep apnea, history of dengue, migraine, cervical spondylosis, low hemoglobin level.

Keywords: Vertigo symptom scale(VSS),Risk Factors, Geriatrics, Osteoporosis

INTRODUCTION

Vertigo is a condition that causes a mistaken sense of movement, which is typically described as a rotation. The term "vertigo" refers to a sense of disorientation in connection to the objects in space around you, together with non-rotatory swaying, weakness, faintness, and unsteadiness that are indicative of vertigo.¹ 20–30% of people experience dizziness at some point in their lives. Vertigo, which is characterized by the sense of spinning objects and instability, has a negative impact on one's quality of life, doubles the prevalence of functional disability, exacerbates depressive symptoms, and increases one's risk of falls. Vertigo patients have restriction on their work activities by 69.8% of the time, and 63.3% take multiple days off.²

Approximately every fifth adult experiences vertigo or dizziness at some point in their lifetime. According to recent studies on the lifetime prevalence of dizziness and vertigo, old persons have an increasing prevalence of 30% to 50%. Vertigo and dizziness, particularly in older people, are linked to inactivity, social isolation, melancholy, disability brought on by dizziness, and an increased risk of falling. As a result, vertigo and dizziness in and of themselves as well as frequently present psychological comorbidities, like anxiety or depression.³

The most prevalent and concerning complication of dizziness, unbalance, and vertigo in older patients is the danger of falling. Older patients tend to report less rotatory vertigo and more non-specific dizziness and unsteadiness than younger patients who present with the same conditions, so a thorough patient history is essential for treatment. The terms "dizziness" and "vertigo" are

frequently used to demonstrate a variety of symptoms regarding disorders of motion perception.⁴ Balance disorders with symptoms of dizziness and vertigo are caused by a variety of diseases.⁵

Benign Paroxysmal Positional Vertigo (BPPV), a most common vestibular disorder characterized by persistent, brief episodes of vertigo.⁶ One of the most common vestibular diseases, particularly in the aged, is benign paroxysmal positional vertigo.⁷ According to a neurotologic survey of the general population, the 1-year prevalence of vertigo was 4.9%, migrainous vertigo was 0.89%, and benign paroxysmal positional vertigo was 1.6%.⁸

One of the most frequent complaints in clinical practice is dizziness or vertigo. Every sixth person was found to have vertigo or dizziness. Compared to younger persons, vertigo, dizziness, and impaired balance are more common in older patients. It is more common in older people, and complaints of dizziness and vertigo severely restrict everyday activities, leaving old age patients with severe disabilities. It has been demonstrated that experiencing dizziness and vertigo increases the chance of falling, social isolation, and depression as well as physical inactivity, poorer lower-extremity function, and depression. Recent study was conducted on adults and prevalence of vertigo was found 12 to 50 % in them.⁹ In our study prevalence 68% is found in old people which is higher than in adults. Objective of study was to find epidemiology and risk factors of vertigo in geriatric population.

METHODS

Design, study population, duration and study setting

An analytical Cross-sectional study was carried out on 424 general geriatric population of Wazirabad, Punjab, Pakistan during August to November 2022.

Selection, sample size and sampling technique

Geriatric population was selected by non-probability convenient sampling and were taken according to inclusion and exclusion criteria. Sample size was 424 participants. Participants both male and females aged 65 years and above were taken. According to Pakistan Demographic Survey 2020, geriatric age distribution is considered 65 years and above than this. Participants with sensory impairments (deafness, blindness) were excluded. Mentally disabled, having speech problem, comatose and bed ridden patients were also excluded from my study

Measures and Data collection

Study included a questionnaire and a risk factors related performa. A pre-tested and standardized questionnaire VSS (Vertigo Symptom Scale), was used to find out the prevalence of vertigo from the past 1 month.¹⁰ A pilot study was conducted to establish a questionnaire for risk factors that was validated and reliable with cronbach's alpha=0.76.

First section included demographic details like age and gender. Second section included 15 items related to symptoms of vertigo with response 0 to 4. 0 means never and 4 means very often. The total score ranged from 0 to 60. 0 means no vertigo whereas 1-20 means mild, 21-40 moderate and 41-60 means severe symptoms of vertigo. Third section holds twenty questions of risk factor performa which had response of no and yes.

Ethical approval

The study protocol was approved by the institutional review board (IRB), University of Lahore, Gujrat, Pakistan. Informed consent was taken from all the participants before data collection and they were informed that they could withdraw at any point. Confidentiality of data was maintained.

Statistical analysis

Data was entered and analyzed using statistical package for Social Sciences (SPSS) software version 20. For descriptive analysis, frequency and percentages was calculated for qualitative variables. For inferential statistics, chi square and odd ratio were applied. Chi square test was applied to find out association of risk factors with vertigo. All results are calculated at 95% confidence interval and P-value ≤ 0.05 was considered as a significant value.

RESULTS

Table 1: Descriptive analysis of study population

Variable	Responses	n(%)
Gender of participants	Male	167 (39.40)
	Female	257 (66.60)
Prevalence of vertigo	Yes	287 (67.70)
	No	137 (32.30)
Total		424 (100)

Table 1 shows that out of 424 total participants 167 (39.39%) of participants involved were male and 257(60.61%) were females whereas 287(67.69%) of participants had vertigo and 137 (32.31%) of participants had no prevalence of vertigo.

Table 2: Descriptive analysis of demographic variables

Variables	Responses	Yes	No
		n(%)	
Age of participants (Years)	65-69	95(33.1)	36(26.3)
	70-74	72(25.1)	24(17.5)
	75-79	60(20.9)	0(0)
	80-84	24(8.4)	24(17.5)
	85-89	12(4.2)	36(26.3)
	90-94	12(4.2)	17(12.4)
	95-99	12(4.2)	0(0)
Gender or participants	Male	96(33.4)	71(51.8)
	Female	191(66.6)	66(48.2)
Vertigo symptom scale	None	0(0)	137(100)
	Mild	179(62.4)	0(0)
	Moderate	84(29.3)	0(0)
	Severe	24(8.4)	0(0)
Total		287(100)	137(100)

Table 2 indicates that most of population with vertigo had age ranges from 65-69 years whereas less population found with vertigo has age ranges between 85-99 years. Female with vertigo(67%) were more common than male with vertigo(33%). Most common vertigo symptoms found were mild (62%) and less common symptoms(9%) were severe.

Table 3 shows that most common risk factors associated with vertigo were anxiety/stress(52%) vitamin D deficiency(51%), high blood pressure issue(49%), osteoporosis/bone weakness(48%) and subjective impairment in mobility(44%). It was found that less common risk factors

associated with vertigo were cigarette smokers(11%), long time computer use(3%), history of dengue(3%).

Table 3: Distribution of Risk Factors

Variables	Responses	n%
Do you feel subjective impairment in mobility?	Yes	188(44.3)
	No	236(55.7)
Do you feel anxiety or stress?	Yes	221(52.1)
	No	203(47.9)
Do you have high blood pressure issue?	Yes	206(48.6)
	No	218(51.4)
Do you have low blood pressure issue?	Yes	100(23.6)
	No	324(76.4)
Do you have bone weakness or osteoporosis?	Yes	203(47.9)
	No	221(52.1)
Do you have history of head trauma?	Yes	69(16.3)
	No	355(83.7)
Do you use computer for long time?	Yes	12(2.8)
	No	412(97.2)
Do you feel orthostatic hypotension?	Yes	153(36.1)
	No	271(63.9)
Do you ever effected by cerebrovascular disease or stroke?	Yes	91(21.5)
	No	333(78.5)
Do you have history of fall?	Yes	168(39.6)
	No	256(60.4)
Do you feel allergy to dust or pollen?	Yes	72(17.0)
	No	352(83.0)
Are you effected by vitamin d deficiency?	Yes	215(50.70)
	No	209(49.3)
Are you cigarette smoker?	Yes	48(11.3)
	No	376(88.7)
Do you feel obstructive sleep apnea?	Yes	123(29.0)
	No	301(71.0)
Do you have history of dengue?	Yes	12(2.8)
	No	412(97.2)
Do you feel migraine?	Yes	108(25.5)
	No	316(74.5)
Do you have asthma?	Yes	63(14.9)
	No	361(85.1)

Are you ever effected by cervical spondylosis?	Yes	105(24.8)
	No	319(75.2)
Is your hemoglobin level low?	Yes	158(37.3)
	No	266(62.7)

Table 4: Associated risk factors of vertigo in geriatric population

Variables		Prevalence of vertigo		Total	Chi-Square	p-value	OR	Confidence 95% CI	
		Yes	No					LL	UL
Do you feel subjective impairment in mobility?	Yes	131(45.6%)	57(41.6%)	188(44.3%)	0.62	0.44	1.18	0.79	1.78
	No	156(54.4%)	80(58.4%)	236(55.7%)					
Do you feel anxiety or stress?	Yes	182(63.4%)	39(28.5%)	221(52.1%)	45.39	<0.001*	4.36	2.8	6.78
	No	105(36.6%)	98(71.5%)	203(47.9%)					
Do you have high blood pressure issue?	Yes	183(63.8%)	23(16.8%)	206(48.6%)	81.917	<0.001*	8.72	5.25	14.51
	No	104(36.2%)	114(83.2%)	218(51.4%)					
Do you have low blood pressure issue?	Yes	81(28.2%)	19(13.9%)	100(23.6%)	10.602	0.001*	2.44	1.411	4.226
	No	206(71.8%)	118(86.1%)	324(76.4%)					
Do you have bone weakness or osteoporosis?	Yes	191(66.6%)	12(8.8%)	203(47.9%)	124.11	<0.001*	20.73	10.92	39.35
	No	96(33.4%)	125(91.2%)	221(52.1%)					
Do you have history of head trauma?	Yes	69(24.0%)	0(0.0%)	69(16.3%)	39.34	<0.001*		1.5	1.77
	No	218(76.0%)	137(100.0%)	355(83.7%)					
Do you use computer for long time?	Yes	12(4.2%)	0(0.0%)	12(2.8%)	5.9	0.015*		1.4	1.6
	No	275(95.8%)	137(100%)	412(97.2%)					
Do you feel orthostatic hypotension?	Yes	128(44.6%)	25(18.2%)	153(36.1%)	27.92	<0.001*	3.6	2.2	5.9
	No	159(55.4%)	112(81.8%)	271(63.9%)					
Do you ever effected by cerebrovascular disease or stroke?	Yes	74(25.8%)	17(12.4%)	91(21.5%)	9.85	0.002*	2.46	1.39	4.35
	No	213(74.2)	120(87.6%)	333(78.5)					
Do you have history of fall?	Yes	144(50.2)	24(17.5%)	168(39.6%)	41.34	<0.001*	4.75	2.89	7.8
	No	143(49.8%)	113(82.5%)	256(60.4%)					
Do you feel allergy to dust or pollen?	Yes	48(16.7%)	24(17.5%)	72(17.0%)	0.041	0.84	0.95	0.56	1.63
	No	239(83.3%)	113(82.5%)	352(83.0%)					
Are you	Yes	203(70.7%)	12(8.8%)	215(50.7%)	142.49	<0.001*	25.1	13.22	47.97

effected by vitamin d deficiency?	No	84(29.3%)	125(91.2%)	209(49.3%)			8		
Are you cigarette smoker?	Yes	24(8.4%)	24(17.5%)	48(11.3%)	7.75	0.005*	0.43	0.24	0.79
	No	263(91.6%)	113(82.5%)	376(88.7%)					
Do you feel obstructive sleep apnea?	Yes	107(37.3%)	16(11.7%)	123(29.0%)	29.52	<0.001*	4.5	2.54	7.98
	No	180(62.7%)	121(88.3%)	301(71.0%)					
Do you have history of dengue?	Yes	12(4.2%)	0(0.0%)	12(2.8%)	5.9	0.015*		1.4	1.6
	No	275(95.8%)	137(100.0%)	412(97.2%)					
Do you feel migraine?	Yes	108(37.6%)	0(0.0%)	108(25.5%)	69.174	<0.001*	1.77	1.6	1.95
	No	179(62.4%)	137(100.0%)	316(74.5%)					
Do you have asthma?	Yes	47(16.4%)	16(11.7%)	63(14.9%)	1.62	0.203	1.49	0.8	2.7
	No	240(83.6%)	121(88.3%)	361(85.1%)					
Are you ever effected by cervical spondylosis?	Yes	85(29.6%)	20(14.6%)	105(24.8%)	11.23	0.001*	2.47	1.44	4.22
	No	202(70.4%)	117(85.4%)	319(75.2%)					
Is your hemoglobin level low?	Yes	134(46.7%)	24(17.5%)	158(37.3%)	33.76	<0.001*	4.13	2.5	6.79
	No	153(53.3%)	113(82.5%)	266(62.7%)					
Total		287(100.0%)	137(100.0%)	424(100%)					

(*) indicates statistical significant difference that was calculated by chi square test

Association between prevalence of vertigo and subjective impairment in mobility was not found statistically. Association between prevalence of vertigo and stress/anxiety was found statistically significant with p-value ≤ 0.05 , OR=4.36 that shows there is four times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and high blood pressure issue was found statistically significant with p-value ≤ 0.05 , OR=8.72 that reveals there is eight times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and low blood pressure issue was found statistically significant with p-value ≤ 0.05 , OR=2.44 that represents there is two times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and subjective bone weakness or osteoporosis was found statistically significant with p-value ≤ 0.05 , OR=20.73 that indicates there is twenty times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and history of head trauma was found statistically significant with p-value ≤ 0.05 . Association between prevalence of vertigo and longer time computer use was found statistically significant with p-value

≤ 0.05 . Association between prevalence of vertigo and orthostatic hypotension was found statistically significant with p-value ≤ 0.05 , OR=3.6 that reveals there is three times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and cerebrovascular disease/stroke was found statistically significant with p-value ≤ 0.05 , OR=2.46 that indicates there is two times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and history of fall was found statistically significant with p-value ≤ 0.05 , OR=4.75 that reveals there is four times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and allergy to dust or pollen was not found statistically significant. Association between prevalence of vertigo and vitamin D deficiency was found statistically significant with p-value ≤ 0.05 , OR=25.18 that shows there is twenty five times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and cigarette smoker was found statistically significant with p-value ≤ 0.05 , OR=0.43 that reveals there is less than one time more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and obstructive sleep apnea was found statistically significant with p-value ≤ 0.05 , OR=4.5 that reveals there is four times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and migraine was found statistically significant with p-value ≤ 0.05 , OR=1.76 that shows there is one time more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and asthma was not found statistically significant. Association between prevalence of vertigo and cervical spondylosis was found statistically significant with p-value ≤ 0.05 , OR=2.47 that indicates there is two times more risk to develop vertigo in geriatrics. Association between prevalence of vertigo and low hemoglobin level was found statistically significant with p-value ≤ 0.05 , OR=4.13 that reveals there is four times more risk to develop vertigo in geriatrics.

DISCUSSION

Our study was conducted on 424 general population of Wazirabad having age 65 years and above than it. The purpose of study was to find out the epidemiology and risk factors of vertigo in geriatric population.

In 2019, a study held in Punjab, Pakistan find out the overall health status of geriatrics. The study concluded that 72% old age participants had poor status. Females were more likely to have

poor health than man.¹¹ Pakistan is a developing country and have many health related issues which are most commonly present and get worse in old age. Likewise, prevalence of vertigo found out by our study is 68% in Wazirabad, Punjab, Pakistan.

Recent cross-sectional study in 2020 conducted in Rawalpindi, Pakistan researched about how tinnitus and vertigo symptoms were precursors of psychiatric suffering. That study explained that a variety of psychiatric issues like stress, anxiety, depression may affect tinnitus and vertigo among patients. That study concluded that around 80% of participants has both vertigo and tinnitus symptoms.¹² Our study revolves around only symptoms of vertigo which were found to be 68% in geriatrics of Wazirabad. Like other health issues, vertigo symptoms are becoming common in Pakistan most commonly in old age.

In a recent epidemiological study from Göteborg, Sweden, they found the prevalence of balance symptoms (vertigo, dizziness, and dysequilibrium) in old age population. They find out that at age 70 years, prevalence of balance was 36%(women) and 29% (men) . Balance problems were more commonly present in women than in men, and they worsened with age. The corresponding values at 88-90 years were 51-45%. General unsteadiness was the most common symptom (11-41%) whereas rotatory symptoms were found to be 2-17%.¹³ Our study showed that prevalence of vertigo is more common in females(61%) than in males (39%).

A study in Taiwan researched about prevalence and characteristics of dizziness in elderly community. They found that 30% of their population was presented with dizziness whereas symptoms that were reported once per month 27% and symptoms longer than 1 minute were 37%. Dizziness was significantly associated with angina and previous myocardial infarction ($P<0.001$). Our study reported symptoms of vertigo present in old population from past 1 month and vertigo was associated with stress/anxiety, high blood pressure, history of head trauma, bone weakness/osteoporosis, vitamin D deficiency, migraine.¹⁴

A cross-sectional study was conducted in Pakistan determined the prevalence of fall among geriatric population and risk factors associated with fall. That study concluded that there are significant numbers of older adults who had fall. Females were at high risk of fall. Vertigo was found to be most prevalent risk factor associated with fall.¹⁵ Our study is consistent with previous study in which high prevalence of fall was more common in females and association of vertigo and fall.

CONCLUSION

The study concluded that there is high prevalence of vertigo in old age population of Wazirabad. Mild symptoms were most commonly reported whereas severe symptoms were least reported according to interpretation of Vertigo Symptom Scale (VSS). Risk factors associated with vertigo were stress/anxiety, high blood pressure, low blood pressure, bone weakness/osteoporosis, history of head trauma, long time computer use, orthostatic hypotension, cerebrovascular disease/stroke, history of fall, vitamin D deficiency, cigarette smoker, obstructive sleep apnea, history of dengue, migraine, cervical spondylosis, low hemoglobin level.

Conflict of interest: None

Funding Disclosure: None

REFERENCES

1. Salvinelli F, Firrisi L, Casale M, et al. What is vertigo? *La Clinica Terapeutica* 2003; 154(5): 341-8.
2. Patiño JEP, Moreno JLB, Matos YR, et al. Effectiveness of a training intervention to improve the management of vertigo in primary care: a multicentre cluster-randomized trial. 2022.
3. Prell T, Finn S, Axer H. How healthcare utilization due to dizziness and vertigo differs between older and younger adults. *Frontiers in medicine* 2022; 9.
4. Casani AP, Gufoni M, Capobianco S. Current Insights into Treating Vertigo in Older Adults. *Drugs & Aging* 2021; 38(8): 655-70.
5. Bouccara D, Rubin F, Bonfils P, Lisan Q. Management of vertigo and dizziness. *La Revue de médecine interne* 2018; 39(11): 869-74.
6. Vadlamani S, Dorasala S, Dutt SN. Diagnostic Positional Tests and Therapeutic Maneuvers in the Management of Benign Paroxysmal Positional Vertigo. *Indian Journal of Otolaryngology and Head & Neck Surgery* 2022; 74(1): 475-87.
7. Chen J, Zhang S, Cui K, Liu C. Risk factors for benign paroxysmal positional vertigo recurrence: a systematic review and meta-analysis. *Journal of neurology* 2021; 268(11): 4117-27.
8. Neuhauser HK. Epidemiology of vertigo. *Current opinion in neurology* 2007; 20(1): 40-6.
9. Wassermann A, Finn S, Axer H. Age-associated characteristics of patients with chronic dizziness and vertigo. *Journal of Geriatric Psychiatry and Neurology* 2022; 35(4): 580-5.
10. Wilhelmsen K, Strand LI, Nordahl SHG, Eide GE, Ljunggren AE. Psychometric properties of the Vertigo symptom scale–Short form. *BMC Ear, Nose and Throat Disorders* 2008; 8(1): 1-9.
11. Ejaz A, Sughra U. Health status of geriatrics in Gujrat, Pakistan. *JPMA The Journal of the Pakistan Medical Association* 2019; 69(5): 610-4.
12. Ahmed A, Aqeel M, Ahmed B. Tinnitus and Vertigo Symptoms: Precursors of Psychiatric Suffering. *Journal of the College of Physicians and Surgeons Pakistan* 2020; 30(3): 346-7.
13. Jönsson R, Sixt E, Landahl S, Rosenhall U. Prevalence of dizziness and vertigo in an urban elderly population. *Journal of vestibular research* 2004; 14(1): 47-52.
14. Colledge NR, Wilson JA, Macintyre CC, MacLennan WJ. The prevalence and characteristics of dizziness in an elderly community. *Age and ageing* 1994; 23(2): 117-20.

15. KHATTAK HG, ARSHAD H, ANWAR K, MAJEED Y. Fall Prevalence and Associated Risk Factors in Geriatric Population. *Age*; 60(64): 65-9.