PREVALENCE OF ORTHOSTATIC HYPOTENSION AND RISK OF FALL AMONG ELDER POPULATION IN OLD AGE HOME

Zainab Khan[1], Moater Iftikhar[2*], Aleena Qadeer[3], Maryam[4], Mehwish[5]

[1]Physiotherapist, Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan
[2*]Lecturer, Department of Rehalilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan
[3]Physiotherapist, Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan
[4]Physiotherapist, Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan
[5]Physiotherapist, Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan

*Corresponding author: Dr. Moater Iftikhar
*E-mail: moaterhassankazmi@gmail.com

ABSTRACT

Background: Orthostatic hypotension is a condition described by the American Societies of Neurology and Autonomy in which there is a 20mmHg decrease in systolic blood pressure or 10mmhg decrease in diastolic blood pressure within three minutes as a person stands up. Orthostatic hypotension causes pre-syncope within seconds of standing requiring a patient to sit down immediately decline in condition can be caused secondary to systemic illness or autonomic failure. The most controversial risk factor related to falls is orthostatic hypotension. Recent studies have shown that OH is the leading cause of morbidity related to accidental falls which increase as the person ages.

Aims and objectives: This study aimed to determine the prevalence of orthostatic hypotension and the risk of falls among the elderly population in old-age homes.

Study design: A cross-sectional study

Place and Duration: This data was collected from Old Age Homes (Aafiyat Faisalabad, Pakistan), (Old Age Home M.B.Din, Pakistan), (Daar-ul-Sawab Old Age Home Lahore, Pakistan). The study was completed within 4 months after the approval of the synopsis.

Methodology: The data of 114 participants was collected. The Orthostatic Hypotension Symptoms Questionnaire was used to assess the prevalence of orthostatic hypotension and the risk of falls among the elderly population in old-age homes.

Results: The study included participants with a mean age of 62.45 ± 7.67 years, comprising 52.6% males and 47.4% females. Analysis revealed a moderate prevalence of orthostatic hypotension (OH)

with a mean ± SD score of 16.09 ± 3.26 on the OH symptoms questionnaire. The participants of this study had a moderate Risk of Falls (ROF) with a mean ± SD score of 16.09 ± 3.26 on the Fall assessment part of the OH symptoms questionnaire. The correlation between OH and ROF was found to be strongly positive with a correlation coefficient of 0.892 and a very significant p-value of 0.000.

Conclusion: In conclusion, our study demonstrates a moderate prevalence of orthostatic hypotension as well as a moderate risk of falls among elderly individuals residing in old-age homes.

Keywords: Elders, Old Age Homes, Orthostatic Hypotension, Risk of fall

INTRODUCTION
Orthostatic hypotension is a condition described by the American Societies of Neurology and Autonomy in which there is a 20mmhg decrease in systolic blood pressure or a 10mmhg decrease in diastolic blood pressure within three minutes as a person stands up. It is a common condition reported in medicine, sometimes showing symptoms and sometimes not showing symptoms at all (1). It is certainly a cardiovascular condition that occurs when there is a fault in normal cardiac working to compensate for increasing venous return as a person stands up. When a person is standing the venous return increases causing an increase in heart rate and orthostatic hypotension occurs if the heart is unable to compensate for it (2). Orthostatic hypotension is reported in all ages but is more prevalent in older age. It may be correlated with various intrinsic heart conditions. Common signs and symptoms include headache, light-headedness, vertigo, etc. (3). Orthostatic hypotension causes pre-syncope within seconds of standing requiring a patient to sit down immediately to prevent further decline in condition can be caused secondary to systemic illness or autonomic failure. Also, patients with chronic hypertension have a high risk of developing orthostatic hypotension (4). In elderly patients living in nursing homes, there is a high prevalence of falls, and is the leading cause of death in this population. It is associated with impaired cardiovascular reflex control (5). Falls were video captured and 11 percent were associated with loss of consciousness and 41% were associated with due to faulty body mechanics. Falls due to orthostatic hypotension constitute almost 85% of hospital admissions, which shows that there is a high risk of falls associated with orthostatic hypotension in the elderly population living in nursing care homes (6).

To diagnose OH a series of tests and screening is done which includes a proper medical history and systemic reviewing followed by an active bedside standing test and then a detailed autonomic functioning test. Non-pharmacological management of OH includes education and counseling, physical maneuvers, increasing salt intake if there is no history of hypertension, eating frequent small portions, more water intake, review of medication, and physical activity to avoid deconditioning (7).

The Orthostatic Hypotension Questionnaire is a valid patient report tool to check the symptom burden of people with orthostatic hypotension people. Because the symptoms associated with orthostatic hypotension are frequently non-specific, it will be a clinically useful tool to measure and quantify symptom load in people with orthostatic hypotension. The validity of the Orthostatic Hypotension Questionnaire was tested against the aforementioned questionnaires for symptoms and quality of life. Test-retest reliability was evaluated using intraclass correlation coefficients at baseline and crossover in a subgroup of patients who reported no change in symptoms across visits on patient global impression scores of change. Responsiveness was examined by determining whether worsening or improvement in the patient's underlying disease status produced an appropriate change in OHQ scores (8).

METHODOLOGY

The participants who satisfied the inclusion criteria were interviewed The study comprised elderly people, 50-75 years of age, both male and female participants, living in old age homes who were willing to participate in the study as well as the participants who can understand the instructions.

Exclusion criteria:

- Participants with Autonomic dysfunction were not included in the study.
- Participants with any Neurodegenerative diseases were excluded from the study.
- Participants who had Active malignancy were not included.
- Elderly people with Irregular pulses were also excluded from the study.
- Participants with any psychological issues were excluded.
- Elderly participants with a history of vestibulocochlear issues were not included in the study.

RESULTS

The study included 114 participants with a mean age of 62.45+7.67 years, ranging from a minimum age of 50 years and a maximum age of 75 years.

Age of Participants:

Table 1: Descriptive Statistics of Age

N	Minimum	Maximum	Mean	Std. Deviation
114	50	75	62.45	7.67

Gender of Participants:

Table 2: Descriptive Statistics of Gender

Gender	Frequency	Percentage(%)
Male	60	52.6%
Female	54	47.4%
Total	114	100%

The study included 114 participants, out of which 60 were male (52.6%) and 54 were female (47.4%).

Orthostatic Hypotension Symptom Questionnaire: (OH SymptomsAssessment)

Table 3: Symptoms Assessment for Orthostatic Hypotension

Symptoms	Never	Rarely	Sometimes	Often	Everytime	Mean $\pm$ SD
1. Light- headedness	0.9%	21.9%	28.9%	34.2%	14.0%	3.17 $\pm$ 1.13
2. Dizziness	4.4%	21.1%	28.9%	31.6%	14.0%	3.19 $\pm$ 1.11
3. Fainting	3.5%	27.2%	31.6%	28.9%	8.8%	3.17 $\pm$ 1.13
4. Blackout	6.1%	16.7%	35.1%	29.8%	12.3%	3.25 $\pm$ 1.07
5. Imbalance	0.9%	16.7%	40.4%	34.2%	7.9%	3.31 $\pm$ 0.87

Table 3 shows the assessment of symptoms of 114 participants for orthostatic hypotension in the form of percentage and mean $\pm$ Standard Deviation of all the individual symptoms. This table shows that 34.2% of participants experienced the symptoms of light-headedness more often, and 31.6% of participants also reported that they experienced the symptoms of Dizziness frequently. For fainting, blackout, and Imbalance, the majority of participants reported that they experienced these symptoms sometimes.

Table 4: Orthostatic Hypotension Symptom Questionnaire Score

N	Minimum	Maximum	Mean	Std. Deviation
114	5	25	16.09	3.26

Table 4 shows the orthostatic hypotension questionnaire score of 114 participants. The maximum value of this questionnaire is 25 and the minimum value is 5, the mean $\pm$ SD is 16.09 $\pm$ 3.26 which lies in the moderate range of these symptoms.
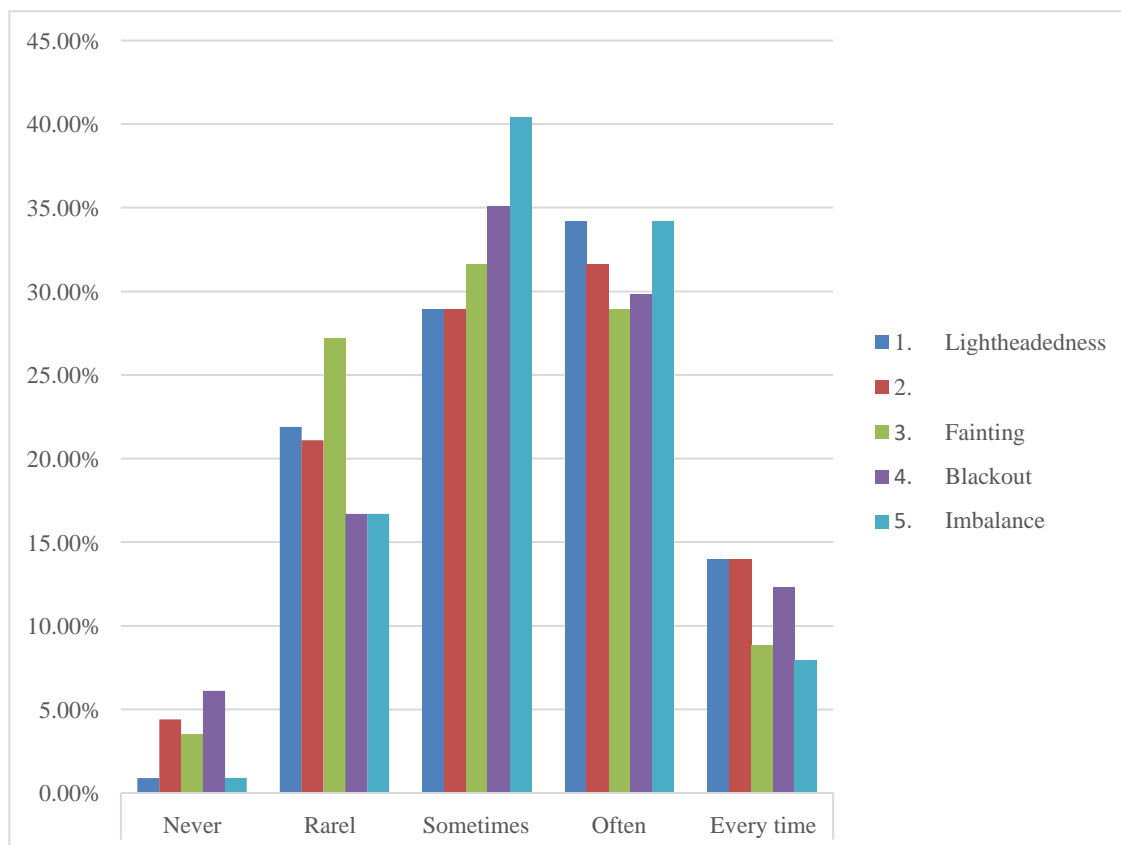

Figure 1: Symptoms Assessment of Orthostatic Hypotension Questionnaire

Figure 1 represents the visual representation of the detailed responses of the participants in the form of a histogram.

Orthostatic Hypotension Symptom Questionnaire: (Falls Assessment)

Table 5: Falls Assessment of Orthostatic Hypotension Questionnaire

Questions	Responses	Frequency	Percentage	Mean $\pm$ S.D
Have you experienced anyfalls in the past year?	No	7	6.1%	
	Yes	107	93.9%	0.94 $\pm$ 0.241
If yes, how many times didyou fall in the past year?	Never	28	24.6%	
	1-2 times	49	43.0%	
	3-5 times	35	30.7%	
	>5 times	2	1.8%	1.10 $\pm$ 0.787
Since turning age 65, have you ever broken a bone, visited an emergency room, or been hospitalized because of a fall?	No	58	50.9%	
	Yes	56	49.1%	0.49 $\pm$ 0.502

According to this table, the majority of participants (93.9%) reported a history of falls in the past year. The number of falls reported by the majority of participants was 1-2 times (43%) and 50.9% of participants reported that they have not broken a bone, visited an emergency room, or been hospitalized because of a fallin the past 65 years of age.

Table 6: Risk of Fall Assessment

N	Minimum	Maximum	Mean	Std. Deviation
114	0	5	2.53	1.278

Table 6 shows with a maximum value of this questionnaire of 5 and a minimum value of 0, the mean $\pm$ SD is 2.53 $\pm$ 1.278 which lies in the moderate range of risk of fall in these participants.

Correlation Between OH Symptoms and Risk of Fall

Table 7: Correlation Between OH symptoms and Risk of Fall

Orthostatic	Risk of FallHypotension		
Orthostatic Hypotension	**Correlation Coefficient**	1.000	0.892**
	Sig. (2-tailed)	.	0.000
	N	114	114
Risk of Fall	**Correlation Coefficient**	0.892**	1.000
	Sig. (2-tailed)	0.000	.
	N	114	114
**. Correlation is significant at the 0.01 level (2-tailed).			

With a correlation coefficient of 0.892 and a very significant p-value of 0.000, Spearman's rho correlation analysis revealed a very strong positive association between orthostatic hypotension (OH) and the risk of falls (ROF) among older persons in old age homes. The correlation coefficient's proximity to +1 suggests that there is a nearly perfect correlation between these two variables, which also means that falls will greatly rise in risk when the incidence of orthostatic hypotension rises. The significance level of $p < 0.01$ emphasizes the reliability of these results by showing that the association is rather unlikely to have developed by by chance.

DISCUSSION

The The research aimed at understanding and assessment of orthostatic hypotension (OH) as there is a correlation between the OH and risk of falling in elderly people. In our data, we have presented a lesser percentage of OH prevalence, and also more or less a risk of falling in this population. The discovery of this relationship further reiterates the need to be fully aware of OH and the impacts of the same on fall prevention actions in the context of geriatric care settings.

Yearlong study by Hectare et al. (2021) was conducted in Finland which sought to assess the relationship of the OH to the likelihood of falls among older people who had experienced falls. Their work shifted the emphasis on OH recognition, and they pointed out the need to take the OH assessment within 30 seconds of standing at the early stage since it is the main factor for the prediction of fall (9). These findings also amplify our observations on the elevated risk of falls that are encountered by individuals with OH, which in turn shows the magnitude of prompt implementation in fall prevention programs.

This research was not restricted to Finland, but considered in systemic review with data about OH spread in different precaution settings (Nor I'zzati et al.) (10). In their scrutiny over a range of cohorts, the prevalence rates of OH were consistently observed and should be taken into account for the consideration of individuals whether living at home or in long-term care. This affirms that OH is probably an important health issue in many aged care facilities in any country, thus the practice of geriatric medicine all over the world should focus on it.

There was another study conducted that was a meta-analysis by Laura et al., and another study by Dennis et al., both yielding contradicting conclusions on the topic of OH and fall risk (11). Although marked a strong OH and falls relation according to patient results, no association revealed between the parameters was as significant in regression models. This difference illuminates the role of measuring falling risk while holding other traits constant and is also a clear indication of the need for further studies to understand this relationship.

Moreover, studies including Aldis et al. look into the relatedness between the time of day of OH and other events during these OH episodes may provide some insight into the probable sequence of events that lead to falls and thus could be used in developing fall prevention strategies (12). The data suggest this might be connected with temporal factors that lead to the exposure. Therefore, specific periods may exist in which the incidence of OH may also occur. These reproductions could be part of developmental processes that eventually lead to the design of personalized interventions aimed at reducing fall-risk incidence due to OH.

Miia, et al. (13), Nykanen, et al. (14), and Keijo (15) elucidated OH causes, revealing the fact that, often, diverse things can be the triggers. While as a result of the first study, the dietary status was recognized to be a considerable factor independently of the OH, the diastolic and systolic OH were identified to become predictive markers alone for cardiovascular mortality in the second one conducted on the older populations. This indicates the multifactorial nature of OVF, the importance of full geriatric assessment in the prevention of falls is stressed hence as a doubling effort to curbing the menace.

Similarly, studies by Adrien et al., Hanna et al., Kornelis et al., and Marco et al. indicated the viability of OH screening technologies and the relationship of these techniques with others like diabetes and metastasis (16, 17). Their findings stress the importance of the use of targeted screening as one of the active processes in the prevention of falls and the increased risk of falling connected with some medical conditions.

CONCLUSION
In conclusion, our study found that the prevalence of Orthostatic Hypotension Symptoms in the elderly population living in old age homes is moderate levels and they also have a high risk of falls.

Funding source
None

Conflict in the interest
None.

Permission
Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

References
1. Gupta V, Lipsitz LA. Orthostatic hypotension in the elderly: diagnosis and treatment. The American journal of medicine. 2007;120(10):841-7.
2. Verwoert GC, Mattace-Raso FU, Hofman A, Heeringa J, Stricker BH, Breteler MM, et al. Orthostatic hypotension and risk of cardiovascular disease in elderly people: the Rotterdam study. Journal of the American Geriatrics Society. 2008;56(10):1816-20.
3. Bradley JG, Davis KA. Orthostatic hypotension. American family physician. 2003;68(12):2393-9.
4. Di Stefano C, Milazzo V, Totaro S, Sobrero G, Ravera A, Milan A, et al. Orthostatic hypotension in a cohort of hypertensive patients referring to a hypertension clinic. Journal of Human Hypertension. 2015;29(10):599-603.
5. Ricci F, Fedorowski A, Radico F, Romanello M, Tatasciore A, Di Nicola M, et al. Cardiovascular morbidity and mortality related to orthostatic hypotension: a meta-analysis of prospective observational studies. European heart journal. 2015;36(25):1609-17.
6. Shaw BH, Borrel D, Sabbaghan K, Kum C, Yang Y, Robinovitch SN, et al. Relationships between orthostatic hypotension, frailty, falling and mortality in elderly care home residents. BMC geriatrics. 2019;19:1-14.

7. Dusenbury WL. Evaluation and Feasibility of a Head Positioning Intervention in Patients with Intraparenchymal Hemorrhage: The University of Tennessee Health Science Center; 2021.
8. Kaufmann H, Malamut R, Norcliffe-Kaufmann L, Rosa K, Freeman R. The Orthostatic Hypotension Questionnaire (OHQ): validation of a novel symptom assessment scale. Clinical Autonomic Research. 2012;22:79-90.
9. Luukinen H, Herala M, Koski K, Honkanen R, Laippala P, Kivelä S-L. Fracture risk associated with a fall according to type of fall among the elderly. Osteoporosis International. 2000;11:631-4.
10. Low PA, Tomalia VA. Orthostatic hypotension: mechanisms, causes, management. Journal of clinical neurology. 2015;11(3):220-6.
11. De Laet CE, Pols HA. Fractures in the elderly: epidemiology and demography. Best Practice & Research Clinical Endocrinology & Metabolism. 2000;14(2):171-9.
12. Hiitola P, Enlund H, Kettunen R, Sulkava R, Hartikainen S. Postural changes in blood pressure and the prevalence of orthostatic hypotension among home-dwelling elderly aged 75 years or older. Journal of human hypertension. 2009;23(1):33-9.
13. Liu BA, Topper AK, Reeves RA, Gryfe C, Maki BE. Falls among older people: relationship to medication use and orthostatic hypotension. Journal of the American Geriatrics Society. 1995;43(10):1141-5.
14. Mol A, Hoang PTSB, Sharmin S, Reijnierse EM, van Wezel RJ, Meskers CG, et al. Orthostatic hypotension and falls in older adults: a systematic review and meta-analysis. Journal of the American Medical Directors Association. 2019;20(5):589-97. e5.
15. Juraschek SP, Daya N, Appel LJ, Miller III ER, Windham BG, Pompeii L, et al. Orthostatic hypotension in middle-age and risk of falls. American journal of hypertension. 2017;30(2):188-95.
16. Gangavati A, Hajjar I, Quach L, Jones RN, Kiely DK, Gagnon P, et al. Hypertension, orthostatic hypotension, and the risk of falls in a community-dwelling elderly population: the maintenance of balance, independent living, intellect, and zest in the elderly of Boston study. Journal of the American Geriatrics Society. 2011;59(3):383-9.
17. Shibao C, Lipsitz LA, Biaggioni I, Group ASoHW. Evaluation and treatment of orthostatic hypotension. Journal of the American Society of Hypertension. 2013;7(4):317-24.