

Etiological factors and management of vertigo - A retrospective study

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ABSTRACT

Introduction: Vertigo and dizziness are symptoms of various underlying conditions, ranging from benign to severe, affecting up to 40% of adults. Understanding the etiological factors and demographic characteristics associated with these symptoms is crucial for improving diagnostic accuracy and management. This study aims to identify the etiological factors contributing to vertigo and dizziness in a clinical setting and assess the effectiveness of treatment strategies.

Materials and Methods: Retrospective cohort study conducted at Department of ENT and Head & Neck Surgery, Saveetha Medical College Hospital, Thandalam, Chennai, Tamil Nadu, India from September 2022 to March 2024. We included patients presenting with vertigo or dizziness, excluding those with non-vestibular dizziness or incomplete medical records. We analysed demographic data, medical history, and clinical findings from patient records. Data analysis was performed. Continuous variables were compared using independent sample t-tests and categorical variables using chi-square tests.

Results: The study included 268 patients, predominantly females (57.8%) and individuals aged 40-50 years (29.9%). Benign Paroxysmal Positional Vertigo (BPPV) was the most common etiological factor (41.0%), followed by orthostatic dysregulation (17.2%) and vestibular peripheral dysfunction (VPD) (16.0%). Clinical presentations and outcomes varied with the underlying etiology. Overall, 91.0% of the patients showed improvement following treatment, with 7.1% achieving full recovery.

Conclusion: This study highlights the complexity of vertigo and dizziness, which are influenced by various factors and demographics. This emphasizes the importance of tailored management strategies and a patient-centered, multidisciplinary approach, emphasizing customized treatments to improve patient outcomes.

KEYWORDS:

Dizziness, nystagmus, BPPV, Vestibular, Meniere's disease

INTRODUCTION

Vertigo and dizziness are complex symptoms that represent significant challenges in both diagnosis and management within the clinical setting.¹ These symptoms are not diseases themselves but are rather manifestations of a range of

underlying conditions, which can span from benign to life-threatening.² The prevalence of vertigo and dizziness in the general population is substantial, with studies suggesting that up to 40% of adults experience these symptoms at some point in their lives, leading to a significant impact on quality of life and work productivity.^{2,3}

The etiology of vertigo and dizziness varies and can be classified into categories such as peripheral vestibular, central vestibular, systemic, and psychological origins. Among these, disorders of the peripheral vestibular system such as benign paroxysmal positional vertigo (BPPV), Meniere's disease, and vestibular neuritis are common causes.^{4,5} However, central nervous system issues, cardiovascular problems, medications, and psychological factors can also contribute significantly to these symptoms. This multifactorial nature necessitates a comprehensive and systematic approach to diagnosis and management.⁶ The demographic factors play a crucial role in the presentation and etiology of vertigo and dizziness.⁷⁻⁹ Age, for instance, is a critical factor; while younger individuals may experience dizziness primarily due to psychological reasons, older adults are more likely to suffer from vertigo due to vestibular disorders.^{10,11} Similarly, gender differences have been observed in the prevalence and causes of these symptoms, with certain conditions such as Meniere's disease being more common in women.^{12,13}

Despite the high prevalence and significant impact of vertigo and dizziness, there remains a gap in understanding the precise etiological factors and demographic correlations in diverse populations.¹⁴ This lack of detailed knowledge hinders the development of targeted and effective management strategies, leading to suboptimal patient outcomes and increased healthcare costs.¹⁵⁻¹⁷ In light of these challenges, our study aims to identify and analyse the etiological factors contributing to vertigo and dizziness among patients presenting to the Ear, Nose and Throat (ENT) department. By examining the demographic characteristics of these patients and assessing correlations between these characteristics and etiological factors, we sought to shed light on the complex dynamics underlying these conditions. This research is essential for advancing our understanding of vertigo and dizziness, paving the way for more accurate diagnoses and personalized treatment approaches, ultimately enhancing patient care and outcomes in clinical practice.

Through this retrospective study, we aim to contribute valuable insights into the patterns and predictors of vertigo

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and dizziness, offering a foundation for future research and improved therapeutic strategies in the field of otorhinolaryngology. In this study, we are guided by two primary objectives: first, to dissect the etiological landscape of vertigo and dizziness in our patient population and second, to elucidate the interplay between these etiological factors and the demographic characteristics of the patients.

MATERIALS AND METHODS

Study Design

This retrospective cohort study aim to identify and analyze the etiological factors contributing to vertigo and dizziness in patients presenting to the ENT department.

Study Setting

This study was conducted at the ENT Department of Saveetha Medical College Hospital, Thandalam, Chennai, India from September 2022 to March 2024. This period included medical record review, data extraction, and subsequent analysis, ensuring a rich dataset for retrospective examination. Institutional ethical committee approval was obtained.

Study Population

The study population comprised of patients attending the ENT department with symptoms of vertigo or dizziness. Inclusion criteria were symptomatic presentation within the study period and confirmed diagnosis of vestibular disorders. Exclusion criteria included non-vestibular-related dizziness, incomplete medical records, or conditions mimicking vertigo with different underlying etiologies such as hypoglycemia or panic attacks.

Selection of Participants

All consecutive patients were included based on the inclusion criteria to minimize selection bias. Given its retrospective nature, the study included all eligible records during the specified period without a predetermined sample size. This approach ensured comprehensive coverage of the patient population, enhancing the representativeness and generalizability of findings.

Study Variables and Outcomes

The study variables included demographic characteristics (age and gender), medical history (comorbidities and prior episodes), and symptomatology (duration and severity). Factors such as pre-existing health conditions, medication use, and lifestyle were also recorded. The primary outcome included the identification of predominant etiological factors (vestibular, central, cardiovascular) and assessment of management outcomes.

Data extraction

The medical records were used as the primary data source. The extracted information included demographic details, medical history, clinical findings, diagnostic test results, and management strategies. The diagnostic criteria were based on established clinical guidelines for conditions such as BPPV, Meniere's disease, and vestibular neuritis. The assessment methods for each patient were standardized according to the department's protocols developed based on international guidelines for vestibular case diagnoses to

ensure consistency.¹⁸ The department protocol was that a vertigo patient should have a minimum requirement of positional history, short duration of symptoms and Dix-Hallpike positive for classifying as BPPV; triad of roaring tinnitus, episodic vertigo and fluctuating hearing loss associated with or without aura should be classified as Meniere's disease; presence of differentiating features of central and peripheral causes, postural changes, cardiac issues, migrainous / psychiatric association were documented in detail. The neurologist who reviewed medical records was blinded to the study objectives

Statistical Analysis

Data were analyzed using SPSS software version 20.0 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) Continuous variables were reported as mean \pm standard deviation (SD) and assessed using the independent sample t-test for normally distributed data. Categorical variables were expressed as percentages and analyzed using the chi-square test, applying Yates continuity correction or Fisher's exact test when appropriate. All tests were two-sided, with a p-value < 0.05 considered statistically significant.

RESULTS

Sociodemographic characteristics

Within the duration of this investigation, 268 patients were evaluated for vertigo and dizziness, with ages ranging from under 30 to over 60 years. The mean age groups were well-represented, with the largest cohort being those aged 40-50 years (29.9%), demonstrating a diverse patient population. The gender distribution leaned towards a higher female presence (57.8%) than males (42.2%). The duration of symptoms varied, with a significant number of patients experiencing symptoms for 1-4 weeks (43.3%). The associated symptoms were prevalent, including nausea and vomiting (30.6%), tinnitus (25.0%), and headache (15.3%). Regarding past medical history, hypertension was notably common (40.1%), followed by diabetes (17.2%) and dyslipidemia (13.4%), as detailed in Table I.

Aetiological Factors

Analysis of etiological factors revealed that Benign Paroxysmal Positional Vertigo (BPPV) was the predominant cause (41.0%), underscoring its significant role in vertigo etiology. Orthostatic dysregulation and Vestibular Peripheral Dysfunction (VPD) were also notable causes, accounting for 17.2% and 16.0% of the cases, respectively. Other etiologies, such as Meniere's disease (4.1%), vestibular migraine (7.1%), and psychogenic vertigo (4.9%), were less common. A small percentage of patients remained undiagnosed (3.7%) (Table II).

Examination Findings

Physical and auxiliary examination findings highlighted a range of abnormal outcomes. Nystagmus was observed in 27.9% of the patients, and abnormal S-test results were the most frequent finding (44.0%), indicating a high incidence of sensory integration issues in balance. Other significant findings included abnormal Subjective Visual Vertical (SVV) tests (25.7%) and video head impulse test (vHIT) (13.0%).

Table I: Sociodemographic characteristics of the study participants (n=268)

Sr. No.	Sociodemographic factors	Number (n=268)	Percentage (%)
1.	Age (years)		
	<30 years	46	17.2
	30-40 years	43	16.0
	40-50 years	80	29.9
	50-60 years	59	22.0
2.	>60 years	40	14.9
	Sex		
3.	Male	113	42.2
	Female	155	57.8
3.	Duration		
	< 1 week	41	15.3
	1-4 weeks	116	43.3
	4-12 weeks	93	34.7
4.	>12 weeks	18	6.7
	Associated symptoms		
	Ear fullness	11	4.1
	Headache	41	15.3
	Tinnitus	67	25.0
	Fluctuated hearing	18	6.7
	Nausea & vomiting	82	30.6
5.	Past medical history		
	Hypertension	107	40.1
	Diabetes	46	17.2
	Dyslipidemia	36	13.4
	Coronary heart disease	24	9.0
	Stroke/transient ischemic attack	13	4.9

Table II: Description of the etiological factor for the vertigo among study participants (n=268)¹⁸

Sr. No.	Etiology	Number (n=268)	Percentage (%)
1.	Benign Paroxysmal Positional Vertigo	110	41.0
2.	Vestibular Peripheral Dysfunction	43	16.0
3.	Meniere's disease	11	4.1
4.	Orthostatic dysregulation	46	17.2
5.	Vestibular migraine	19	7.1
6.	Gravity Perception Disturbance	16	6.0
7.	Psychogenic vertigo	13	4.9
8.	Unknown	10	3.7

Table III: Description of the abnormal findings of the study participants

Sr. No.	Examination findings	Number (n=268)	Percentage (%)
1.	Nystagmus	75	27.9
2.	Abnormal Caloric-test	29	10.8
3.	Abnormal video Head Impulse Test	35	13.0
4.	Abnormal cervical-Vestibular Evoked Myogenic Potential 1	23	8.5
5.	Abnormal Subjective Visual Vertical	69	25.7
6.	Abnormal interictal episodic Magnetic Resonance Imaging	18	6.7
7.	Abnormal Skew-test	118	44.0
8.	Hypertension	73	27.2

These results are consolidated in Table III, which illustrates the complexity of diagnosing vestibular disorders.

Clinical Presentation and Diagnosis

The clinical presentation varied significantly among different etiologies. Patients diagnosed with BPPV had a mean age of 49.5 years and had symptoms for an average of 4.3 weeks. Patients with Vestibular Peripheral Dysfunction (VPD) were younger and had longer symptom durations. Meniere's disease was associated with distinctive symptoms, such as ear fullness (27.3%) and rotatory dizziness (36.4%). Orthostatic

dysregulation was observed in younger patients (mean age 39.0 years) with longer symptom durations (8.2 weeks). These detailed analyses provide insight into the specific clinical manifestations related to each etiology, as summarized in Table IV.

Management Outcomes

Regarding the management outcomes of patients with vertigo, a substantial majority (91.0%) showed improved recovery following treatment interventions. Full recovery was achieved in a small fraction (7.1%), highlighting the

Table IV: Description of the study participants according to the etiological factor (n=268)

Etiology	Total number of subjects	Mean ± (SD) Age	Mean duration of symptoms (in weeks)	Headache n (%)	Ear fullness n (%)	Evoked Dizziness n (%)	Rotatory dizziness n (%)
Benign Paroxysmal Positional Vertigo	110	49.5 ± 13.8	4.3 ± 2.2	12 (11)	3 (2.7)	99 (90)	10 (9.1)
Vestibular Peripheral Dysfunction	43	42.1 ± 23.2	6.6 ± 3.8	1 (2.3)	0 (0)	38 (88.4)	0 (0)
Meniere's disease	11	50.8 ± 18.3	2.5 ± 2.0	2 (18.2)	3 (27.3)	7 (63.6)	4 (36.4)
Orthostatic dysregulation	46	39.0 ± 12.2	8.2 ± 5.6	13 (28.3)	1 (2.2)	41 (89.1)	0 (0)
Vestibular migraine	19	44.6 ± 17.3	4.3 ± 5.5	8 (42.1)	0 (0)	1 (5.3)	0 (0)
Gravity Perception Disturbance	16	51.4 ± 16.7	6.4 ± 4.8	2 (12.5)	2 (12.5)	14 (87.5)	0 (0)
Psychogenic vertigo	13	36.3 ± 12.6	7.2 ± 6.7	1 (7.6)	0 (0)	0 (0)	0 (0)
Unknown	10	48.2 ± 16.6	10.2 ± 6.7	2 (20)	2 (20)	4 (40)	0 (0)

Table V: Outcome of the management done for patients with vertigo (n=268)

Sr. No.	Treatment effect	Number (n=268)	Percentage (%)
1.	Full recovery	19	7.1
2.	Improved recovery	244	91.0
3.	Discharged from hospital; without treatment of dizziness	3	1.1
4.	Deceased	2	0.7

effectiveness of treatment strategies employed. A minimal number of in-patients were discharged without specific treatment for dizziness (1.1%), and the mortality rate was low (0.7%), indicating an overall favorable prognosis for most patients when appropriately managed (Table V)

DISCUSSION

The exploration of vertigo and dizziness in our study, encompassing 268 patients from an ENT department, provides a rich tapestry of data that elucidates the intricate nature of these conditions. By delving deep into demographic characteristics⁷⁻⁹, etiological factors, examination findings, and treatment outcomes, our study contributes to the broader discourse on these prevalent yet often perplexing conditions. This discussion seeks to contextualize our findings within the existing body of knowledge, emphasizing critical insights and identifying areas for further investigation.

The gender disparity observed in our study, with a higher prevalence of vertigo and dizziness among females (57.8%) than males (42.2%), is consistent with previous research indicating a gendered dimension to these conditions.^{12,13,19,20} This finding could be attributed to various biological and hormonal factors that may predispose women to certain types of vestibular disorders more than men. Additionally, the age distribution in our cohort, particularly the prominence of symptoms in the 40-50 years age bracket, raises important considerations regarding the life stage at which these conditions tend to manifest more frequently. This age-related trend might reflect not only the natural aging process and its impact on vestibular function but also the accumulation of risk factors such as cardiovascular diseases, hypertension, or diabetes, which are known to influence vestibular health.^{10,11,21,22}

The identification of BPPV as the leading cause of vertigo in our patient population corroborates its established prevalence in the general and clinical settings.^{14,23} This reaffirms the importance of BPPV in the differential diagnosis

of vertigo, underscoring the need for clinician awareness and proficiency in its diagnosis and management.²⁴ Furthermore, the significance of vestibular peripheral dysfunction and orthostatic dysregulation observed in our study points to the multifactorial nature of vertigo and dizziness, necessitating a comprehensive assessment approach to accurately pinpoint the underlying etiologies.²⁵ The variance in symptom duration, with a notable segment experiencing symptoms for 1-4 weeks, underscores the complexity of these conditions, highlighting potential delays in seeking treatment or the persistence of symptoms, which could significantly impact patients' quality of life and overall wellbeing.

The role of vestibular function tests, as evidenced by the prevalence of abnormal S-test results and nystagmus among our patients, is pivotal in the diagnostic process for vertigo and dizziness.²⁶ These findings not only underscore the value of such assessments in elucidating the vestibular contributions to patient symptoms but also highlights the challenges clinicians face in achieving a definitive diagnosis. The heterogeneity in examination findings necessitates a holistic diagnostic strategy, integrating comprehensive patient history, symptomatology, and targeted tests to navigate the diagnostic labyrinth of vertigo and dizziness effectively.² The predominance of improved recovery outcomes in our study (91.0%) mirrors the potential of current management strategies to ameliorate symptoms and enhance patient quality of life. This observation is particularly encouraging, as it reinforces the efficacy of tailored treatment plans based on a thorough understanding of the etiology of the condition. However, the variability in recovery trajectories underscores the importance of personalized medical approaches, considering the individual patient's clinical profile, etiological factors, and lifestyle considerations to optimize treatment efficacy.

The diversity in the treatment responses observed in our cohort underscores the critical importance of personalized approaches for managing vertigo and dizziness. This finding

aligns with the evolving paradigm in healthcare towards individualized patient care, which considers the unique aspects of each patient's condition and life circumstances. For instance, the application of vestibular rehabilitation, an evidence-based approach recommended for many vestibular disorders (Hall et al., 2016), could be tailored to the specific needs and capabilities of each patient, enhancing the overall effectiveness of the intervention and helping to develop targeted and effective management strategies, leading to optimal patient care and curbing increased healthcare costs.^{15-17,27}

A major strength of our study is its detailed analysis of a sizeable cohort from a specialized clinical setting, offering a nuanced understanding of vertigo and dizziness. However, this study had some limitations. The retrospective design, reliant on medical records, may have introduced biases related to documentation quality and completeness. Additionally, our findings, derived from an ENT department, might not fully encapsulate the broader spectrum of vertigo and dizziness presentations encountered in other clinical settings such as neurology or primary care. Addressing these limitations, future studies could adopt a prospective design that incorporates standardized assessment tools and protocols to ensure uniformity and comprehensiveness in data collection. While comprehensive, our study opens several avenues for future research. One area of particular interest is the exploration of the long-term outcomes in patients with vertigo and dizziness. Studies examining the persistence of symptoms, recurrence rates, and impact of various treatment modalities over time could provide valuable insights into the chronic nature of these conditions and the effectiveness of current management strategies. Furthermore, research on the development and validation of standardized protocols for the diagnosis and treatment of vertigo and dizziness could significantly enhance clinical practice, leading to improved patient outcomes.

The complex interplay of demographic factors, etiological contributors, diagnostic challenges, and treatment outcomes is observed as vertigo which encompasses a wide spectrum of disorders. This interplay may mask the initial presentation of vertigo and can lead to misdiagnosis, as the patient at times may not be in a state to correctly give the precipitating events in chronological order. Attenders who accompany patients may provide version of their understanding of their symptoms at the initial assessment of the patient. It is the clinician's experience and acumen that should be carefully sorted through this complex interplay to properly diagnose and treat the patient.

CONCLUSION

Our study contributes to the body of knowledge on vertigo and dizziness by highlighting the complex interplay between demographic factors, etiological contributors, diagnostic challenges, and treatment outcomes. This underscores the necessity for a patient-centered, multidisciplinary approach to managing these conditions tailored to the unique needs of each individual. As we advance, it is imperative that we continue to refine our understanding of vertigo and dizziness through rigorous research, ultimately guiding the evolution

of clinical practice towards more effective and personalized patient care.

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