

# Vertigo as a Problem in the Emergency Department

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## Article History:

**Received:** April 12, 2023

**Accepted:** August 22, 2023

**ePublished:** September 23, 2023

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## Abstract

**Objectives:** To assess patients with vertigo who came to the emergency department.

**Design:** Cross-sectional study.

**Setting(s):** Emergency department of Imam Reza Hospital, Tabriz, Iran.

**Participants:** 280 patients admitted to the emergency department with a complaint of vertigo.

**Outcome measures:** The relationship between age, gender, previous medical history, computerized tomography (CT) scan, and magnetic resonance imaging (MRI) findings were investigated in this study.

**Results:** Vertigo was the most common complaint among emergency department visitors, accounting for 2.1% of all visits. Furthermore, 30.3 % (85 of 280) of all patients with vertigo were identified with central vertigo. The average age of central vertigo patients was 65.9±10.9. Females made up 58.6% and 41.2% of all vertigo patients and central vertigo patients, respectively. In the group with central vertigo, hypertension (HTN) was the most common risk factor (44.7%).

**Conclusions:** Patients who refer to the emergency department with vertigo often do not respond to the usual treatments, and this is the main reason for them to visit the emergency department, so a good history and complete examination along with a suitable imaging modality can help assess these patients.

**Keywords:** Vertigo, Dizziness, Emergency department

## Introduction

Vertigo and/or dizziness are movement illusions in which people perceive themselves or their surroundings as moving.<sup>1</sup> The findings have demonstrated the role of emotion in patients with vertigo, which is important for the treatment and appropriate psychotherapy interventions for patients with vertigo.<sup>2</sup> Approximately 7.5 million people are contacted by emergency departments in the United States with complaints of vertigo and dizziness every year.<sup>3</sup> Peripheral and central vertigo should be distinguished. Central nervous system involvement at the fourth ventricle, dorsal vermis, or nucleus of the vestibular nerve can lead to vertigo.<sup>3</sup> Vertigo is caused by diseases such as multiple sclerosis (MS), cerebral hemorrhage, brain stem infarction, cerebral tumors, and malformations of the posterior fossa. In addition, some studies suggested that an unruptured angioma can cause vertigo.<sup>1</sup> Cerebellar infarction and bleeding symptoms may appear minor at first, but they can quickly escalate into a life-threatening illness.<sup>4</sup> Peripheral vertigo is generally intermittent; however, it might be accompanied by transient ischemic attack (TIA). The symptoms of peripheral vertigo are more severe than those of central vertigo.

Central vertigo is favored by hyperreflexia<sup>1</sup>, while nausea and vomiting are more intense in peripheral vertigo.<sup>2</sup> The

best technique to rule out a central lesion is to rule in a peripheral lesion like Meniere's disease, vestibular neuritis, or benign positional vertigo, which all have their panel of symptoms.<sup>5,6</sup> Due to the thickness of the occiput, which generates artifacts and limited resolution, computerized tomography (CT) scans have low sensitivity in detecting posterior fossa lesions.<sup>3</sup>

This study aimed to assess patients with vertigo who were referred to the emergency department, and it can be viewed as a fundamental study to improve our knowledge about patients with vertigo.

## Methods

### Study Type

This was a prospective cross-sectional study. From all patients with chief complaints of vertigo/dizziness referred to the emergency department of Imam Reza Hospital of Tabriz University of Medical Sciences as a general hospital during one year, 280 patients were included in the sample population using Morgan's approach.<sup>7,8</sup> Patients who left the emergency department despite the physicians' advice and patients with any sign of bleeding, known chronic vertigo, and cardiac dysrhythmia were excluded.

### Data Gathering

Variables in this study were pre-specified and included



age, sex, magnetic resonance imaging (MRI) findings, CT scan findings, type of vertigo, patient's history of hypertension (HTN)/diabetes/hyperlipidemia (HLP), and other diseases. In T1, T2, and diffusion-weighted study data, the diagnoses of vertigo were retrieved from the patient's history, physical examination, and MRI.

**Data Analysis**

All the data were analyzed by SPSS® 15.0.0 Software (Microsoft LTD, Chicago). The mean, median of the data, standard deviation, and frequency were calculated descriptively.

**Results**

Patients with vertigo who visited the emergency department were enrolled in this study (N=280). The incidence of patients complaining of vertigo was found to be 2.1% (from 13350 medical patients) of all patients who came to the emergency department, and 30.3% of those complaining of vertigo were diagnosed with central vertigo.

Based on MRI findings or arterial angiography, 77 patients were diagnosed with vertebrobasilar insufficiency (VBI), 4 patients with ischemic stroke, 2 patients with intracerebral hemorrhage (ICH), 1 patient with a cerebellar tumor, and 1 patient with hemangioma.

The age of the patients ranged from 11 to 89 years old, and the interquartile range of the age of patients was 45 to 60 years old with a median of 58. Of all patients with a complaint of vertigo, 58.6% were female, and 41.4% were male, while 58.8% of patients with central vertigo were men, and 41.2% were women.

For 175 (62.5%) of the 280 patients who complained of vertigo, a CT scan was requested.

MRI was also performed for all patients who did not respond to treatments and were suspected to have a central lesion. That is, after a CT scan, an MRI was also done for 175 people. For 76% of individuals over the age of 65 (59 out of 77 patients), a CT scan was suggested. CT scan findings revealed one of the four cerebral ischemia lesions and all cases of ICH, cerebellar tumor, and hemangioma, whereas an MRI revealed three ischemic lesions (Table 1).

Patients with vertigo had the following medical history: 31% HTN, 16% HLP, and 11% diabetes mellitus (DM). In patients with central vertigo, HTN was the most common medical history (44.7%); furthermore, 21.2 % and 20% of the patients with central vertigo had DM and HLP, respectively (Table 2). Symptoms of central vertigo in patients included imbalance (86%), dysarthria (4.7%), and diplopia (2.4%), respectively.

**Discussion**

In this study, females accounted for 58.6% of all vertigo patients, while males accounted for 41.4% of patients with central vertigo. According to certain research, women have a higher percentage of vertigo complaints than males, whereas men have a higher frequency of central vertigo. In research by Campbell et al, 40% of male patients and 60%

**Table 1.** CT Scans Findings

	Central Vertigo	Observed CT Scan Cases
VBI	77	0
Ischemic stroke	4	1
ICH	2	2
Tumor	1	1
Hemangioma	1	1

Note. CT: Computerized tomography; ICH: Intracerebral hemorrhage; VBI, Vertebrobasilar insufficiency.

**Table 2.** Risk Factors of Patients

	HTN (%)	DM (%)	HLP (%)
All patients	31	11	16
Patients with central vertigo	44.7	21.2	20
Patients with ischemic stroke/ICH	83	17	21

Note. HTN: Hypertension; DM: Diabetes mellitus; HLP: Hyperlipidemia; ICH: Intracerebral hemorrhage.

of female patients had vertigo.<sup>9</sup> In a study by Kerber et al, men made up 36% of patients with vertigo, while women constituted the rest. In addition, males made up 55% of patients diagnosed with stroke or TIA.<sup>6, 10</sup> According to the findings of this and previous studies, women account for a greater proportion of patients with vertigo, whereas men have a higher risk of vascular events.<sup>11</sup>

In this study, 30% of patients with complaints of vertigo (85 patients out of 280 patients) had central vertigo, which constituted 77 patients with VBI, 4 patients with ischemic stroke, 2 cases of ICH, 1 case of hemangioma tumor of the cerebellum, and 1 case of hemangioma tumor of the cerebellum, respectively. In addition, the patient's average age was 53.2 ± 17.5. Patients with central vertigo and ischemic stroke/ICH had an average age of 65.9 ± 10.9 and 69.8 ± 14.09 years, respectively. In a study by Kerber et al on patients over 46 years old with vertigo and dizziness, the diagnosis of stroke/TIA was verified in 53 cases (3.2% of patients with vertigo), confirming that ischemic stroke was the most common cause of diagnosis of stroke/TIA with a 33% frequency.<sup>3</sup> The findings of this and other research demonstrated that the risk of a cerebrovascular stroke rises with age.

True vertigo was reported by 2.1% of patients admitted to the hospital's emergency department in this study. According to a study by Kerber et al, patients with vertigo made up 2.5% of all patients admitted to the emergency department from 1995 to 2004.<sup>6</sup> Moreover, CT scans were requested by 62.5% of patients with vertigo and 83% of patients over 65 years old in this study. The symptoms of 5 patients out of 85 patients with central vertigo were confirmed by a CT scan. In addition, the major risk factor for atherosclerosis and stroke is high blood pressure (HLP). A systolic blood pressure of more than 160 or a diastolic blood pressure of more than 95 raises the risk of a stroke. Stroke is also linked to DM and high blood pressure.<sup>12</sup>

According to this study, HTN was the most common risk factor in patients with central vertigo, accounting for

44.7% of central causes. Furthermore, DM accounted for 21.2% of core causes, while HLP accounted for 20%. In a study by Kerber et al, 72% of stroke/TIA patients were HTN, 32% were DM, and 21% were HLP.<sup>3</sup>

### Limitations

This study was conducted as a fundamental study, and due to the lack of personnel and time, it was better to enroll all patients not a sample of them to improve the power of the study. Moreover, if this study was done in a multi-center situation, the findings could be generalized to a wider population.

### Conclusions

The majority of patients with vertigo in this study were females although central vertigo was more common in male patients. Patients who were referred to the emergency department with vertigo often did not respond to the usual treatments, and this was the main reason that they visited the emergency department, so a detailed history and complete examination along with a suitable imaging modality can help assess these patients.

### Acknowledgments

Special thanks to all emergency staff in Imam Reza hospital.

### Author contributions

**Conceptualization:** Samad Shams Vahdati.

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### Funding

There is not any fund support.

### Ethical approval

This research was approved by the ethics committee of Tabriz University of Medical Sciences with the ethics code IR.TBZMED.REC.1391.245.

### Consent for publication

Written informed consent was obtained from patients who participated in this study.

### Peer-review

Externally peer-reviewed.

### Conflict of interests

The authors declare that there is not any conflict of interest.

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