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ORIGINAL ARTICLE

An evaluation of patients who present to the emergency department with dizziness

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Abstract

This study aimed to analyze the data of patients presenting with dizziness at our hospital's emergency department (ED) by determining the etiology of dizziness and to contribute to the medical data of our country and the literature. This prospective study was conducted with 116 volunteering patients who presented to the Emergency Department of Afyon Kocatepe University, Faculty of Medicine for one year with dizziness complaints. After the anamnesis, physical examination, diagnostic tests (blood tests, Dix-Hallpike maneuver, audiological-vestibular tests, carotid-vertebral artery color Doppler ultrasonography, and computerized brain tomography), and psychiatric interrogation, the patients were divided into four etiology groups: Peripheral, central, psychogenic, and other causes of dizziness. Clinical features were compared between peripheral and central dizziness groups. A total of 116 (3.4%) of patient admissions to the emergency department complained of dizziness. Forty-nine (42.2%) of these patients were male, 67 (57.8%) were female. In the cohort, 33.9% were under 40, and dizziness increased with older age. Seventy (60.3%) patients had no formal education or were primary school graduates. The initial evaluation at the ED revealed that dizziness mostly shifted with the position (71.6%) and was mainly accompanied by headache (67.2%). Based on their diagnosis, 50 patients (43.1%) were in the peripheral group, 30 patients (25.8%) were in the central group, 22 patients (19%) were in the psychogenic dizziness group, and 14 patients (12%) were in the other causes group. Intergroup analysis between peripheral and central vertigo groups identified that the hearing loss, ear fullness, recent upper respiratory tract infection (URTI), nausea, vomiting, and shifting position was statistically significant ($p<0.05$). Dizziness is one of the common complaints of admission to the ED and may arise from different etiologies. Our study demonstrated that psychogenic dizziness was common in this patient cohort.

Keywords: Dizziness, etiology, emergency department, psychogenic dizziness

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Introduction

Dizziness is defined as "a sense of disorientation in space". The symptoms of dizziness described by the patients may occur due to different pathophysiologic situations such as vertigo, ataxia, syncope, and panic attacks. In addition to peripheral and central vestibular system pathologies, many different metabolic, cardiac, and psychiatric causes should be considered in its etiology. In a study conducted by Skiendzielewski et al., on 106 patients with complaints of dizziness, 46 different diseases were identified concerning the etiology [1]. Dizziness affects approximately 20-30% of the general population, is common in general medical practices, and accounts for approximately 2% of emergency admissions [2,3].

Patients who experience dizziness due to peripheral vestibular causes such as benign paroxysmal positional vertigo (BPPV) and vestibular neuritis in the ED may have a benign and self-limiting clinical course. However, dizziness experienced due to central causes such as cerebellar stroke and multiple sclerosis may have more severe consequences. Most admissions to the ED consist of patients with a benign course. Studies have found that 5% of patients presenting to the ED with dizziness have serious neurological diagnoses [4]. It is also possible to detect metabolic, cardiac, and psychogenic causes in the etiology of dizziness in patients without any impairment in vestibular system functions. Various studies have reported that psychogenic factors are responsible for 20-50% of the etiology of dizziness [5]. In today's world, where the number of admissions to the emergency is increasing, it is crucial to understand the etiology in patients with dizziness since it can cause life-threatening conditions in some instances. The etiology of the pathology should be clarified through anamnesis, physical examination, laboratory, and radiological evaluations, and the appropriate treatment should be planned by reviewing the possible causes.

Few studies in our country visited the demographic and clinical characteristics of patients presenting to the ED with dizziness. The present study aimed to determine the demographic and clinical characteristics of this patient cohort, identify the etiological subgroups by making differential diagnoses of dizziness, and contribute to the data collection in the literature and our country.

Materials and Methods

The present prospective study was conducted with 116 patients that presented to the ED with dizziness. The study was carried out with the approval obtained from the Afyon Kocatepe University, Faculty of Medicine Ethics Committee (Registration Number: 2009/7) and the consent of all participants.

The study sample consisted of patients over 18 years of age, who were admitted to the emergency with the complaint of dizziness within a year, and who voluntarily accepted to participate in the study. On the other hand, patients under 18 years of age, those who rejected to participate in the study, patients whose main complaint was not dizziness, and those who were noncompliant with the necessary tests during their follow-up were excluded from the research.

Initially, the vital signs of the patients were evaluated. Next, their demographic data with a detailed anamnesis including the features of their dizziness complaint and the other symptoms accompanying their dizziness were collected, and the physical examination data were recorded for all patients. In addition, a psychiatric interrogation was performed for each patient. Possible clues regarding the etiology of dizziness were sought in patients who underwent general physical and neurological examinations. Subsequently, basic blood tests indicative of body functions was requested.

Cerebral computed tomography imaging (CCT) and carotid-vertebral artery color Doppler ultrasonography (CDUS) were scheduled for the patient group whose etiology was thought to be due to the central pathologies following their initial evaluation in the emergency hall, and possible diagnoses were reviewed. Abnormal findings seen on CCT that were compatible with the patient's clinical status were recorded. In vertebral artery CDUS, cases with a total blood flow of both vertebral arteries below 200 ml/min were considered vertebrobasilar insufficiency. The patient group was also evaluated for any

metabolic and cardiac etiologies of dizziness.

The Dix-Hallpike maneuver was performed in the ED for patients whose etiology was attributed to peripheral pathologies based on the anamnesis and examination findings. The patients were referred to the otorhinolaryngology department for audiological and vestibular tests later under elective conditions. Patients with documented hearing loss were further evaluated for the possible cause of hearing loss and its relationship with dizziness.

In patients with unexplained vestibular dysfunctional etiology and without any metabolic and cardiac causes, antecedent or coexisting psychiatric symptoms with dizziness were interrogated regarding the possibility of psychogenic dizziness [6].

According to their initial evaluation, laboratory, and radiological results, the patients were divided into peripheral, central, psychogenic, and other causes (endocrine, metabolic, cardiac, medication use, and unknown causes) subgroups. Clinical features were compared between peripheral and central dizziness subgroups.

SPSS (Statistical Package for Social Sciences) for Windows 15.0 software was used to analyze the obtained data. Descriptive statistical methods (frequency tables) were used to evaluate the study data. Chi-square test was applied to assess the difference between groups. $p<0.05$ was considered significant.

Results

The present study was conducted in the Emergency Department of Afyon Kocatepe University (AKU), Medical Faculty Hospital, with patients admitted due to dizziness complaints within a year. Of the 15559 patients, 542 (3.4%) presented owing to dizziness. Among these patients, 116 consented to participate in the present study.

Forty-nine (42.2%) patients were male, and 67 (57.8%) were female. The present study observed that admission to the emergency department with dizziness was reported mainly for patients aged 40 years and younger (33.9%) (Table 1).

A review of the patient history data showed that 21 (18.1%) patients had hypertension (HT), four had (3.4%) diabetes mellitus (DM), and seven patients (6%) had both HT and DM. While previous stroke was detected in five patients (4.3%), other health problems were detected in 30 patients (25.9%). Forty-nine patients (42.2%) did not report any comorbid disease (Table 1).

The educational status distribution of the patients showed that 20 patients (17.2%) did not receive any formal education, 50 patients (43.1%) were primary school graduates, 13 patients (11.2%) were secondary school graduates, 18 patients (15.5%) were high school graduates, and 15 patients (12.9%) were university graduates. Thirty-four patients (29.3%) were employed, 76 (65.5%) were unemployed, and six (5.2%) were students.

In terms of dizziness-related symptoms, dizziness shifted with the position (dizziness occurred with positional change) in 83 patients (71.6%), dizziness was accompanied by headache in 78 patients (67.2%), 75 patients (64.7%) had nausea and vomiting with dizziness, and 65 of them (56%) described loss of balance with dizziness. Tinnitus was present in 41 patients (35.3%). Ear fullness with dizziness was reported in 39 patients (33.6%), hearing loss was reported in 32 patients (27.6%), and a recent URTI was found in 21 (18.1%) patients. In addition, dizziness was accompanied by loss of consciousness in 10 (8.6%) patients, visual impairment was observed in seven patients (6%), sensory-motor deficits were observed in six patients (5.2%), and speech impairment was associated with dizziness in three patients (2.6%) (Table 1).

As a result of the history, examination, and diagnostic tests, 50 patients (43.1%) were diagnosed with dizziness from peripheral vestibular system pathologies. Of these patient complaints, 29 (25%) were related to benign paroxysmal positional vertigo, eight were associated (6.9%) with vestibular neuritis, and 13 (11.2%) with other pathologies. Dizziness originating from the central system was identified in 30 patients (25.8%); 13 (11.2%) of these patients were found to be compatible with stroke, 12 (10.3%) with vertebrobasilar system failure, and five (4.3%) with other less

common diagnoses causing centrally induced vertigo. Furthermore, psychogenic dizziness was detected in 22 patients (19%), whereas the presence of dizziness due to other causes (endocrine, metabolic, cardiac, medication use, and unknown causes) was found in 14 patients (12%) (Table 2).

Statistical analysis of disease-related symptoms and signs between peripheral and central vertigo groups showed significant differences in hearing loss, ear fullness, recent infection, nausea, vomiting, and shifting with position (p<0.05). These findings indicate that peripheral vertigo patients have more severe hearing loss, ear fullness, recent URTI, and nausea-vomiting than central vertigo patients. Moreover, it seems that the disease is highly position-dependent in patients with peripheral vertigo. There was no statistically significant difference between the groups in terms of the symptoms of loss of balance, headache, tinnitus, and visual impairment (p>0.05) (Table 3).

Table 1. Distribution of patients according to demographic data.

		Number (*n*)	Percent (%)
Gender	Male	49	42.2
	Female	67	57.8
Age	40≤	39	33.9
	41-50	21	18.3
	51-60	25	21.7
	61≥	30	26.1
History of comorbid diseases	HT	21	18.1
	DM+HT	7	6.0
	Stroke	5	4.3
	DM	4	3.4
	Other	30	25.9
	None	49	42.2
Educational status	Noformal education	20	17.2
	Primary school	50	43.1
	Secondary school	13	11.2
	High school	18	15.5
	University	15	12.9
Work Status	Employed	34	29.3
	Unemployed	76	65.5
	Student	6	5.2
Accompanying symptoms	Shifting with position	83	71.6
	Headache	78	67.2
	Nausea and Vomiting	75	64.7
	Loss of Balance	65	56.0
	Tinnitus	41	35.3
	Ear fullness	39	33.6
	Hearing loss	32	27.6
	Past URTI	21	18.1
	Loss of consciousness	10	8.6
	Speech impairment	3	2.6
	Motor sensory deficit	6	5.2
	Visual impairment	7	6.0

*** HT:** Hypertension; **DM:** Diabetes mellitus

Discussion

The present study aimed to demonstrate the demographic and clinical characteristics of patients admitted to the ED with the complaint of dizziness and to outline their etiology by evaluating their differential diagnosis.

Dizziness is among the most common causes of admission to the ED [7]. A study by Ljunggren et al., reported that approximately 2% of all patients admitted to the ED complained about dizziness yearly [3]. Another study by Newman-Toker et al., stated this frequency as 3.3% [8]. The present study results showed that 3.4% of the patients admitted to the ED within one year presented with dizziness. This finding, supported by previous evidence in the literature, proved that dizziness is one of the most common causes of admissions to the ED of our hospital.

Table 2. Distribution of etiologies of the dizziness.

	Number (*n*)	Percent (%)
Peripheral	50	43.1
BPPV	29	25.0
Vestibular Neuritis	8	6.9
Other	13	11.2
Central	30	25.8
Stroke	13	11.2
Vertebrobasilar Insufficiency	12	10.3
Other	5	4.3
Psychogenic	22	19.0
Other *(Endocrine, metabolic, cardiac, medication use, unknown cause)*	14	12.0

* **BPPV:** Benign Paroxysmal Positional Vertigo

Female patients comprised 57.8% of our study group. A prospective study by Gülalp et al., reported this ratio as 64.6% [9], whereas Navi et al.,'s study reported it as 58% [4]. Although different studies investigating the high incidence of dizziness in women indicated that hormonal changes associated with the premenstrual period or medication use may increase the risk of vestibular system-related diseases, this relationship has not been supported by other studies [10,11]. Nevertheless, the relationship between migraine, which is known to be more common in women, and dizziness may cause the complaint of dizziness to be encountered at a higher rate in women than in men [12].

It was observed that 33.9% of the patients in the present study were younger than 40 years, and the incidence of dizziness increased with age. Other studies in the literature report that dizziness increases with advanced age [13]. It is a fact that vascular risk factors and systemic diseases are more frequently encountered in older ages; thus, the risk of dizziness is increased. Therefore, the result of our study is in concordance with the literature.

Table 3. Distribution of symptoms and *p* values for the peripheral and central vertigo groups.

	Peripheral Vertigo (*n*=50)	Central Vertigo (*n*=30)	*p*
	Number (*n*)	Number (*n*)	
Shifting with position	44	20	**0.037**
Nausea-vomiting	42	18	**0.027**
Loss of balance	35	18	0.366
Headache	33	21	0.716
Tinnitus	23	8	0.080
Hearing loss	22	5	**0.007**
Ear fullness	20	5	**0.020**
Past URTI	17	3	**0.008**
Visual impairment	3	2	0.907
Motor sensory deficit	3	3	0.517
Loss of consciousness	1	5	**0.050**
Speech impairment	1	2	0.293

The present study observed HT in 24.1% of the patients, DM in 9.4%, and previous stroke in 4.3% as comorbid diseases. The study by Warninghoff et al., with 131 patients reported HT in 29% and DM in 6.1% as comorbid diseases in dizzy patients [14]. Various studies have investigated the relationship between dizziness and chronic diseases. For instance, Kao et al., demonstrated the relationship between dizziness and DM [15]. However, although the study by Chang et al., showed a strong relationship between dizziness and stroke, they could not find an exact relationship between dizziness and HT [16]. A different study suggested that dizziness in HT patients may be primarily related to the use of antihypertensive medications [17].

Our study concluded that 68.9% of the patients had dizziness originating from the peripheral and central vestibular systems. Psychogenic causes were identified in 19% of the patients, and other causes such as endocrine, metabolic, and cardiac problems, medication use, and unknown causes seemed in the etiology in 12% of the patients. It has been observed that dizziness originating from the vestibular system is mainly related to peripheral causes (43.1%), while central-related causes occur less frequently (25.8%). There are differences between the results from various studies using different methodologies for evaluating patients presenting to the ED with dizziness. In a review by Kroenke et al., the etiology was peripheral vestibular causes in 44%, psychogenic causes in 16%, central vestibular causes in 11%, other causes in 26%, and the underlying condition remained obscure in 13% of patients [18]. In the study conducted by Newman-Toker et al., with 9472 dizziness patients admitted to the ED, peripheral vestibular causes were observed in 32.9%, central in 11.2%, and psychogenic in 7.2% of the patients [8].

On the other hand, Koçer et al., found 41.3% peripheral, 4.9% central, 13.1% systemic, and 0.3% psychiatric causes in the etiology of dizziness patients who presented to the ED [19]. It can be concluded that the results obtained in the etiologic evaluation of dizzy patients differ.

The difference in results may be due to the

diversity of methodologies used in the studies or demographic parameters in the patient groups.

The high rate of psychogenic causes in the etiology of dizziness is one of the most striking results of the present study. The frequency of psychogenic dizziness in this patient cohort has been previously reported at varying rates. Newman-Toker et al., found this rate as 7.2%, but Kroenkebet al.,'s study reported dizziness associated with psychiatric diseases in 40% of the patients [8,20]. Psychogenic dizziness may occur without vestibular dysfunction as a symptom in anxiety, depression, conversion, posttraumatic stress disorder, and rarely in psychosis [6,21]. The fact that dizziness can be explained neither by vestibular dysfunction nor by metabolic or cardiac causes and the presence of antecedent or coexisting psychiatric symptoms accompanying vertigo supports the diagnosis of psychogenic dizziness. In the study by Chang et al., it was found that people who experience severe stress and depression experience more dizziness [16]. Gomez et al.,'s study stated that poor socioeconomic conditions such as insufficient income, low education level, low social status, and unemployment might trigger dizziness at a higher rate as a source of psychological stress [22]. In the present study, most of the patients had low income, and their education levels might have facilitated the development of psychogenic dizziness.

Although low mortality is reported in dizzy patients, reasons such as delayed or incomplete evaluation of the pathology and loss of time in cases that require urgent intervention, which is imperative in patients with vertigo originating from the central vestibular system, may cause an increase in morbidity and mortality. It should be remembered that vascular occlusions of the posterior fossa can mimic peripheral vestibular diseases. However, in a study by Idil et al., it was reported that the incidence of a central neurological pathology in patients with isolated dizziness is scarce [23]. Shahrami et al., proved that anamnesis and clinical examination have high sensitivity and specificity in differentiating peripheral and central vertigo [24]. Their study reported that nausea, vomiting, and headache are more common in peripheral vestibular system-induced dizziness in patients. In the present study, the dizziness shifting with position, the presence of nausea-vomiting, hearing loss, and ear fullness, a history of previous URTI, and the frequency of loss of consciousness showed a significant difference between vertigo patient groups originating from the peripheral and central vestibular system, which is parallel to the evidence in literature [25,26]. In most cases, it will be possible to avoid unnecessary tests and waste time in patients evaluated for dizziness only with a detailed anamnesis and physical/ neurological examination.

The limitations of the present study include the small number of patients, the difficulty of access to detailed radiologic interventions such as Magnetic Resonance Imaging, which may lead to a straighter forward diagnosis in the ED, the methodological differences between the etiological classifications in previous studies, and the difficulties in interpreting our study in the light of these.

Conclusion

In this study, data on dizzy patients who came to the emergency department of our hospital were presented. Dizziness is one of the frequent causes of admission to the emergency department, and many different diseases can be detected in the etiology. The high rate of psychogenic dizziness in the etiology is one of the remarkable results of this study. In the differential diagnosis of patients evaluated in the emergency department due to dizziness, the diagnosis of psychogenic dizziness should be kept in mind. With the right diagnosis and correct treatment planning, it will be possible to increase the quality of life and prevent loss of time and labor.

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Conflict of interest

The authors approve that there is no conflict of interest.

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