

# Evaluation of dizziness at Jordan University Hospital

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## ABSTRACT

**Objective:** This study was performed prospectively to evaluate the dizzy patients in the Neurotology Outpatient clinic at Jordan University Hospital, Amman, Jordan during the period 1993-2000 and to discuss the prevalence and etiology of dizziness.

**Methods:** Data were collected from 108 patients (52 males and 56 females) with a mean age of 45.6-years. Diagnosis was made on the basis of history, physical, otolaryngological and neurological examination and confirmed by relevant investigation including laboratory, radiological and audio vestibular tests.

**Results:** Secure diagnosis were made in 98% of patients (14% had one cause alone and 84% had multiple causes). Cardiovascular disorders accounted for 31.5% of primary and 49% of secondary causes, peripheral vestibular disorders, 25% of primary and 3% of secondary causes, central vestibular disorders 17% of primary and 9% of secondary causes, metabolic

endocrine 13% of primary and 38% of secondary causes, cervical osteoarthritis 5.5% of primary and 28% of secondary causes and psychogenic 4.6% of primary and 6.5% of secondary causes.

**Conclusion:** Our findings demonstrate that vertigo is the most common subtype of dizziness (50%). Multiple causes are more prevalent in older age and the single cause is more prevalent in younger age. Cardiovascular was the most common cause of dizziness followed by vestibular disorders, metabolic and cervical osteoarthritis. Vestibular disorders are primary causes and non vestibular are predominantly secondary causes of dizziness. Hyperlipidemia, diabetes and cervical causes are major secondary contributors to dizziness. We recommend a multi disciplinary setting and application of a comprehensive diagnostic and treatment approach without unnecessary protracted investigative scheme and installment of rehabilitation facilities.

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**D**izziness is a common and non specific symptom. It is often a distressing complaint of patients and frustrating to treating physicians, for it is a term which covers a wide range of sensations, difficult to define with a great variety of diagnostic findings and is troublesome to treat. Most of dizziness sensations fall into one of 5 categories or subtypes: 1. A rotational sensation or vertigo, 2. Unsteadiness or disequilibrium, 3. Light headedness or syncope like fainting, 4. Oscillopsia and 5. Other

sensations (vague and difficult to describe) including psychogenic dizziness.

In many studies, investigators described the etiology of dizziness in patients referred to specialized clinics or in primary care settings<sup>1-10</sup> and in tertiary referral settings.<sup>11</sup> The diagnostic results of these studies showed a large variation which is believed to be due to different populations and different diagnostic criteria used.<sup>1</sup> Seventy percent of dizziness was diagnosed of having organic cause

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from the initial visit and comes to be the third symptom (5.5%) among the 14 common symptoms in 1000 Internal Medicine Outpatients clinics.<sup>12</sup> In this study, we report our experience prospectively evaluating dizzy patients. We discuss the prevalence and the etiology of dizziness of these patients.

**Methods.** During the period 1993 through to 2000, 108 patients with main complaint of dizziness were seen in the Neurotology Outpatient Clinic, Jordan University Hospital, University of Jordan, Amman, Jordan, who were referred by general internal physicians, neurologists or were self referred. The Neurotology clinic was dedicated to the clinical evaluation, investigation and treatment of the dizzy patient besides deafness and tinnitus. Data was collected prospectively from each patient and separately noted from their clinical record. Differential diagnosis were made on a clinical criteria including detailed relevant history, physical examination supported by rationally chosen investigations from a battery of hematological, radiological and audio vestibular tests.<sup>4,11,13</sup> Each specific clinical diagnosis was based on international criteria of available studies, namely, vertebrobasilar insufficiency,<sup>13</sup> migraine,<sup>14</sup> vestibular neuronitis,<sup>15</sup> vestibulopathy,<sup>16</sup> benign paroxysmal positional vertigo,<sup>17-19</sup> Ménière's disease,<sup>20,21</sup> intracranial hypertension,<sup>22</sup> psychogenic disorder.<sup>10</sup> The data from each patient were reviewed by the authors and a final diagnosis was determined by consensus and classified as primary or secondary cause of dizziness.

**History.** The evaluation of the dizzy patient begins with the medical history. Patients were asked to describe their exact subjective feelings during attacks in order to determine whether they complain of true vertigo of rotational sensation, unsteadiness or disequilibrium, light headedness or syncope like fainting, oscillopsia or other sensations including psychogenic. Patients were asked regarding the onset, duration, severity, frequency of dizzy spells and whether this was constant or episodic. They were asked whether the spells were related to head and body movements or changing position and on accompanying vegetative symptoms such as nausea, vomiting and perspiration which are indicative of vestibular system disorder in case of severe vertigo. The next major area of questioning was on associated symptoms. The otological test included hearing loss, tinnitus, otorrhea and otalgia. The neurological dysfunctions such as diplopia, dysphagia, paresis and loss of consciousness was noted. A review of the body system and previous history on diseases such as cardiac arrhythmia or infarction, visual impairment, head trauma, hypertension, diabetes, arthritis, gastrointestinal disturbances, psychiatric disorders, previous

surgeries, allergies, medications, alcohol consumption and smoking was also considered.

**Physical examination.** A full neurological examination was carried out such as otoscopy, tuning fork tests, fistula test cranial nerves, oculomotor examination, spontaneous and gaze nystagmus, temporomandibular joints, motor reflexes and cerebellar function tests. Simple clinical tests and maneuvers were performed including Romberg test, gait and posture, toe heel test, past pointing test, Unterberger's test, Babinski-Weil's test, head shake test and Hallpike's positioning maneuvers. Blood pressure measurements in supine and sitting positions, heart rate and respiration rate were also recorded.

**Investigation and laboratory tests.** A battery of routine studies were ordered such as hematological and blood chemistry investigations including complete blood count, sedimentation rate, glucose tolerance test, lipid profile, folate and vitamin B12. Also included was the thyroid functions, kidney functions, urinalysis and serology studies for syphilis. As for radiological studies, it included x-ray of petrous bones, skull, internal auditory meatus, cervical spine in antero posterior, lateral and oblique positions, sinuses and chest x-ray. Audio vestibular tests included pure tone audiogram, tympanometry, speech audiometry and caloric tests. Where applicable, brainstem evoked response audiometry, site of lesion tests for recruitment and adaptation hearing test, electronystagmography, electrocardiography, computerized tomography scan and magnetic resonance imaging were performed if needed and in relevant cases.

**Results.** A total of 108 patients (52 males and 56 females) were enrolled in this study. Their ages ranged from 18-78-years, with a mean of 45.6-years. The gender and age by decades at presentation are shown in **Table 1**. Secure primary diagnosis could be made in 106 patients (98%), of whom 15 patients (13.8%) had one cause alone. Vestibular neuritis (VN) was found in 4 patients (3.7%), hypotension in 2 patients (1.9%), orthostatic hypotension in 2 patients (1.9%) and benign paroxysmal positional vertigo (BPPV), diabetes, multiple sclerosis (MS), Ménière's disease, ocular (retinal detachment), stroke and vestibulopathy in one patient (0.9%) and 91 patients (84.2%) had multiple causes. Two patients (1.9%) had unknown causes for their dizziness.

The average duration of an episode of 1-60 minutes was reported by 54 patients (50%), seconds to one minute by 33 patients (30.6%), more than one hour by 12 patients (11.1%) and persistent dizziness by 9 patients (8.3%). The frequency of monthly episodes was reported by 27 patients (25%), a year

**Table 1** - Distribution of patients according to age and gender.

Age groups	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
10-20			5	(4.6)	5	(4.6)
21-30	5	(4.6)	7	(6.5)	12	(11.1)
31-40	9	(8.3)	12	(11.1)	21	(19.4)
41-50	21	(19.5)	12	(11.1)	33	(30.6)
51-60	9	(8.3)	13	(12)	22	(20.4)
61-70	7	(6.5)	5	(4.6)	12	(11.1)
71-80	1	(0.9)	2	(1.9)	3	(2.8)
<b>Total</b>	<b>52</b>	<b>(48.1)</b>	<b>56</b>	<b>(51.8)</b>	<b>108</b>	<b>(100)</b>

**Table 2** - Distribution of number of diagnosis and age.

Number of diagnosis	N=108 (%)	Mean age in years	Range
<b>One cause alone</b>	15 (13.9)	37	(19-65)
Vestibular neuronitis	4 (3.7)		
Hypotension	2 (1.8)		
Osteoarthritis	2 (1.8)		
Others (BPPV, diabetes, MS, Ménière's disease, ocular, stroke, vestibulopathy)	7 (6.5)		
<b>Multiple causes</b>	91 (84.2)		
2 causes	28 (25.9)	45	(19-70)
3 causes	30 (27.8)	45.4	(20-73)
4 causes or more	33 (30.5)	51.6	(29-78)
Unknown	2 (1.8)	47.5	(38-57)
<b>Total</b>	<b>108 (100)</b>		

BPPV - benign paroxysmal positional vertigo, MS - multiple sclerosis

**Table 3** - Distribution of symptoms with gender.

Symptoms	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
<b>One symptom alone</b>	44	(40.7)	48	(44.4)	92	(85.2)
Vertigo	23	(21.3)	31	(28.7)	54	(50)
Unsteadiness	13	(12)	9	(8.3)	22	(20.4)
Light headedness	5	(4.6)	2	(1.8)	7	(6.5)
Oscillopsia	2	(1.8)	3	(2.8)	5	(4.6)
Other	1	(0.9)	3	(2.8)	4	(3.7)
<b>More than one symptoms</b>	8	(7.4)	8	(7.4)	16	(14.8)
Vertigo + unsteadiness	7	(6.5)	7	(6.5)	14	(13)
Vertigo + light headedness	1	(0.9)	1	(0.9)	2	(1.9)
<b>Total</b>	<b>52</b>	<b>(48.1)</b>	<b>56</b>	<b>(52)</b>	<b>108</b>	<b>(100)</b>

or more by 23 patients (21.3%), weekly by 20 patients (18.5%), one attack by 19 patients (17.6%), daily by 10 patients (9.2%) and persistent dizziness by 9 patients (8.3%). The number and percentage of symptoms according to gender and overall total are shown in **Table 3**. One symptom alone was seen in 92 patients (85.2%). Vertigo was the most common sub type of dizziness. It was seen in 54 patients (50%) of the primary diagnosis, followed by unsteadiness in 22 patients (20.4%), more than one symptom in 16 patients (14.8%), light headedness in 7 patients (6.5%), oscillopsia in 5 patients (4.6%) and others in 4 patients (3.7%). There was a clear preponderance of females in vertigo group.

**Tables 4 & 5** shows the diagnosis of primary and secondary vestibular and non vestibular causes of dizziness. Of the 45 patients with primary vestibular causes (**Table 4**), 27 patients (25%) had peripheral vestibular diseases, VN in 8 (7.4%), vestibulopathy in 7 (6.5%), Ménière's disease in 6 (5.5%), BPPV in 3 (2.8%) and acute labyrinthitis, ototoxicity and chronic suppurative otitis media (CSOM) in one patient (0.9%). Eighteen patients (16.7%) had central vestibular diseases, vertebrobasilar insufficiency (VBI) in 6 patients (5.5%), cerebellar ischemia in 3 patients (2.8%), migraine and intracranial hypertension (ICH) in 2 patients (1.9%) and MS, stroke, seizure, Wallenberg's syndrome and acoustic neuroma in one patient (0.9%).

Of the 63 patients with primary non vestibular causes (**Table 5**), 34 (31.5%) had cardiovascular diseases: orthostatic hypotension in 14 (13%), hypotension in 8 (7.4%), hypertension (HTN) in 5 (4.6%), ischemic heart disease (IHD) in 4 (3.7%), congestive heart failure (CHF) in 2 (1.9%) and syncopic attack in one patient (0.9%). Fourteen patients (13%) had metabolic endocrine diseases: hypoglycemia in 4 (3.7%), anemia and hyperlipidemia in 3 patients (2.8%) and diabetes and menopausal syndrome in 2 patients (1.9%). Six patients (5.5%) had cervical osteoarthritis. Five patients (4.6%) had psychogenic diseases. Ocular diseases and drugs intoxication were seen in one patient (0.9%). Two (1.9%) of the 63 patients had unknown causes.

A total of 156 secondary causes (144.4%) contributed to dizziness, of which 13 patients (12%) were in vestibular category (**Table 4**), 3 (2.8%) peripheral vestibular, 10 (9.2%) central vestibular diseases and 143 (132.4%) in non vestibular category (**Table 5**). Which includes 53 (49%) cardiovascular diseases, 41 (38%) metabolic endocrine, 30 (27.7%) cervical osteoarthritis, 7 (6.5%) psychogenic, 9 (8.3%) ocular and 3 (2.8%) drugs intoxication. This 156 (144.4%) overall total of secondary causes exceeds the number of patients for 91 patients (84.2%) had multiple causes contributing to the complaint of dizziness (**Table 2**).

**Table 4** - Diagnosis of predominant (primary) and associated(secondary) vestibular causes of dizziness and age.

Diagnosis	Mean age in years	Primary cause		Secondary cause		Total	
		N=45	(%)	N=108	(%)	N=108	(%)
<b>Peripheral vestibular diseases</b>	43.2	27	(25)	3	(2.8)	<b>30</b>	<b>(27.8)</b>
Vestibular neuronitis	41	8	(7.4)			<b>8</b>	<b>(7.4)</b>
Vestibulopathy	57	7	(6.5)			<b>7</b>	<b>(6.5)</b>
Ménière's diseases	31	6	(5.5)			<b>6</b>	<b>(5.5)</b>
BPPV	40	3	(2.8)			<b>3</b>	<b>(2.8)</b>
Acute labyrinthitis	42	1	(0.9)			<b>1</b>	<b>(0.9)</b>
Ototoxicity	51	1	(0.9)			<b>1</b>	<b>(0.9)</b>
CSOM	40	1	(0.9)	3	(2.8)	<b>4</b>	<b>(3.7)</b>
<b>Central vestibular diseases</b>	53	18	(16.7)	10	(9.2)	<b>28</b>	<b>(25.9)</b>
Vestibulobasilar insufficiency	61	6	(5.5)	5	(4.6)	<b>11</b>	<b>(10.2)</b>
Cerebellar ischemia	54	3	(2.8)			<b>3</b>	<b>(2.8)</b>
Migraine	61	2	(1.9)	4	(3.7)	<b>6</b>	<b>(5.5)</b>
Intracranial hypertension	54	2	(1.9)			<b>2</b>	<b>(1.9)</b>
Multiple sclerosis	25	1	(0.9)			<b>1</b>	<b>(0.9)</b>
Stroke	37	1	(0.9)	1	(0.9)	<b>2</b>	<b>(1.9)</b>
Seizure	60	1	(0.9)			<b>1</b>	<b>(0.9)</b>
Wallenberg's syndrome	35	1	(0.9)			<b>1</b>	<b>(0.9)</b>
Acoustic neuroma	45	1	(0.9)			<b>1</b>	<b>(0.9)</b>
<b>Total</b>	<b>47</b>	<b>45</b>	<b>(41.7)</b>	<b>13</b>	<b>(12)</b>	<b>58</b>	<b>(53.7)</b>

BPPV - benign paroxysmal positional vertigo,  
CSOM - chronic suppurative otitis media.

**Table 5** - Diagnosis of predominant (primary) and associated (secondary) non vestibular causes of dizziness and age.

Diagnosis	Mean age in years	Primary cause		Secondary cause**		Total	
		N=63	(%)	N=108	(%)	N=108	(%)
<b>Cardiovascular diseases</b>	44 (47)*	34	(31.5)	53	(49)	<b>87</b>	<b>(80.5)</b>
Orthostatic hypotension	44.5	14	(13)	3	(2.8)	<b>17</b>	<b>(15.7)</b>
Hypotension	32	8	(7.4)	12	(11.1)	<b>20</b>	<b>(18.5)</b>
Hypertension	54	5	(4.6)	30	(27.7)	<b>35</b>	<b>(32.4)</b>
Ischemic heart disease	55.5	4	(3.7)	7	(6.5)	<b>11</b>	<b>(10.2)</b>
Congestive heart failure	44.5	2	(1.8)	1	(0.9)	<b>3</b>	<b>(2.8)</b>
Syncopic attack	20	1	(0.9)			<b>1</b>	<b>(0.9)</b>
<b>Metabolic endocrine</b>	47	14	(13)	41	(38)	<b>55</b>	<b>(50.9)</b>
Hypoglycemia	43	4	(3.7)	4	(3.7)	<b>8</b>	<b>(7.4)</b>
Anemia	40	3	(2.8)	2	(1.9)	<b>5</b>	<b>(4.6)</b>
Hyperlipidemia	44	3	(2.8)	24	(22.2)	<b>27</b>	<b>(25)</b>
Diabetes	63	2	(1.8)	10	(9.2)	<b>12</b>	<b>(11.1)</b>
Menopausal syndrome	53	2	(1.8)	1	(0.9)	<b>3</b>	<b>(2.8)</b>
Cervical osteoarthritis	57	6	(5.5)	30	(27.8)	<b>36</b>	<b>(33.3)</b>
Psychogenic	41	5	(4.6)	7	(6.5)	<b>12</b>	<b>(11.1)</b>
Ocular	48	1	(0.9)	9	(8.3)	<b>10</b>	<b>(9.2)</b>
Drugs intoxication	78	1	(0.9)	3	(2.8)	<b>4</b>	<b>(3.7)</b>
Unknown	47.5	2	(1.9)			<b>2</b>	<b>(1.9)</b>
<b>Total</b>	<b>46 (48)*</b>	<b>63</b>	<b>(58.3)</b>	<b>143</b>	<b>(132.4)</b>	<b>206</b>	<b>(190.7)</b>

\* mean age without counting the hypotension patients.  
\*\* The number of causes and percentages exceed the number of patients (100%) as 91 patients had multiple causes contributing to vestibular and non vestibular categories. (see Table 2)

**Table 6** - Other associated (accompaniments) diagnosis in order of frequency.

Diagnosis	n	(%)*
Hearing loss	38	(35)
Gastrointestinal diseases	36	(33.3)
Smoking	30	(27.7)
Nasal and throat diseases	21	(19.4)
Renal and urinary tract diseases	17	(15.7)
Allergy to drugs	9	(8.3)
Obesity	9	(8.3)
Gynecological diseases	7	(6.5)
Rheumatoid diseases	4	(3.7)
Brain concussion	2	(1.9)
Locomotor diseases	2	(1.9)
Respiratory diseases	2	(1.9)
Goiter	1	(0.9)
<b>Total</b>	<b>178</b>	<b>(165)</b>

\* Number exceeds 100% as most patients had multiple diagnosis.

An overall total of 264 primary and secondary causes (244.4%) were diagnosed in our 108 patients contributing to their dizziness (**Tables 4 & 5**). Ordered in hierarchical fashion, 87 patients (80.5%) had cardiovascular diseases. Fifty-five patients (55%) had metabolic endocrine diseases. Thirty-six patients (33.3%) had cervical osteoarthritis. Thirty patients (27.7%) had peripheral vestibular diseases. Twenty-eight patients (26%) had central vestibular diseases. Twelve patients (11.1%) had psychogenic diseases. Ten patients (9.2%) had ocular diseases and 4 patients (3.7%) had drugs intoxication.

**Table 4** shows a total of 178 other associated (accompaniments) condition or diseases in hierarchical order, 38 patients (35%) had hearing loss, 36 patients (33.3%) had gastrointestinal diseases, 30 patients (27.7%) were smokers, 21 patients (19.4%) had nasal and throat diseases, 17 patients (15.7%) had renal and urinary tract diseases, 9 patients (8.3%) had allergy to drugs, 9 patients (8.3%) had obesity, 7 patients (6.5%) had gynecological diseases, 4 patients (3.7%) had rheumatoid arthritis, 2 patients (1.9%) of each of brain concussion, locomotor and respiratory diseases and one patient (0.9%) had goiter.

**Discussion.** Dizziness usually results from a mismatch among the sensory input informations of

the different systems that contribute to the balance and equilibrium of the body. This mismatch results when a single system is severely impaired or when several systems are affected by a variety of diseases. However, dizziness is considered a multifactorial problem<sup>1,4,8,10,11</sup> and associated with cardiovascular, psychiatric, sensorineural diseases and use of several medications in the elderly patients.<sup>1,4,23-25</sup> As in the previous studies, most patients in our study had more than one major diagnosis. The primary vestibular causes accounted for 41.7% and 58.3% for primary non vestibular causes. These percentage and the frequency of these diseases are changed drastically when added to associated (secondary) or contributing causes (**Tables 4 & 5**). Almost 14% of our patients with mean age of 37-years had one cause (diagnosis) alone and 84% had multiple causes. In which, 26% had 2 causes with mean age 45-years, 27.7% had 3 causes with mean age 45.4-years and 30.5% had 4 causes or more with mean age 51.6-years (**Table 2**). These results supports the previous studies in that dizziness is a multifactorial problem and patients of multiple causes are skewed towards the older age.

Our findings showed a slight preponderance of females like in other similar studies<sup>4,8,11,26</sup> and are in accordance with other studies in that most dizzy patients are likely to be middle aged.<sup>11,26</sup> Seventy percent of our patients fall between the ages of 30-60-years (36% of males and 34% of females). The females outnumber the males in all age groups except in the 40-50 and 60-70-year bracket. On the other hand, there were marked variations in the reported diagnostic results and prevalence in studies of a similar clinical based setting including our study.<sup>8,10,11,26</sup> These variations are probably due to different populations<sup>1,27</sup> and investigator's bias<sup>27</sup> as a result of their different approaches to the target patients. Also the multifactorial nature of dizziness may account for these variations in the frequency of diagnosis. Moreover, in previous studies, their clinics received referrals from family practitioners besides the primary care. The secondary and tertiary nature of referrals in our clinic may have accounted for our findings compared to those of previous studies. Also, our patients were somewhat younger than those in previous studies. From **Tables 4 & 5** we conclude that peripheral vestibular, hypotension and psychogenic diseases<sup>10,26</sup> are specific to young patients while central vestibular, cardiovascular, cervical osteoarthritis and diabetes diseases are specific to elderly patients. The remaining diseases fall in between (middle-age patients). As other researchers<sup>1,8</sup> we found a marked discrepancy in the duration and frequency of the episodes of dizziness, 1-60 minutes duration (50%) and monthly frequency (25%) were the most prevalent in our patients. Also, in many studies, subtypes of the

symptom of dizziness were not evaluated in details<sup>1,8,10,11</sup> or not discussed at all in others. There is discrepancy in the prevalence of each subtype symptom between these studies as well as in our study. This discrepancy is probably due to different patients' description of their feeling and more than half of patients (approximately 56%), mainly elderly, described more than one subtype.<sup>1,28</sup> Almost 15% of our patients reported more than one subtype (**Table 3**). We believe that this lower percentage in our patients are somewhat younger (mean age 45.6-years) than the patients in the previous studies and the high percentage of old patients having multiple causes of their dizziness. Vertigo accounted for half of the subtypes in our patients, followed by unsteadiness 20.4%, light headedness 6.5% and oscillopsia 4.6%. We define oscillopsia as a subjective visual sensation of oscillating objects up and down with head movement on walking or rapid head movement. Aoki et al<sup>29</sup> and Bohmer<sup>30</sup> described this sensation as tilting of the environment, which is generally caused by otolithic disorders. Heaton et al<sup>11</sup> reported 3% of their patients had oscillopsia and 1.25% had constant dizziness plus oscillopsia, thereby approximating the 4.6% of our findings.

In our study, we conclude that cardiovascular disorders are the most common causes of dizziness (orthostatic hypotension as primary and HTN as secondary causes, followed by hypotension). The second most common cause of dizziness was peripheral vestibular disorders (VN, vestibulopathy, Ménière's disease and BPPV). From these results, specific vestibular disorders are the primary cause of dizziness as Kroenke et al<sup>8</sup> concluded. The third most common cause of dizziness was the central vestibular disorders (VBI, cerebellar ischemia and migraine, ICH as primary causes, and VBI, migraine and stroke as secondary causes). The fourth most common cause of dizziness was metabolic endocrine disorders (hypoglycemia, anemia, hyperlipidemia, diabetes and menopausal syndrome as primary causes and hyperlipidemia, diabetes and hypoglycemia as secondary causes). This indicates that hyperlipidemia and diabetes are major contributors of the symptom of dizziness. In addition to the above mentioned disorders, the fifth most common cause of dizziness was cervical osteoarthritis as primary and secondary with an overall total of 33.3% representing the highest contributing cause among specific diagnosis. Other studies reported even higher percentage, indicating that cervical origin of dizziness is extremely prevalent in elderly patients.<sup>4,8,31</sup> The sixth most common cause of dizziness was psychiatric disorders as primary and secondary causes with an overall total of 11% as Heaton et al<sup>11</sup> reported (11.5%), but far less than Kroenke et al<sup>8</sup> results

(16%), Drachman and Hart<sup>10</sup> results (32%) and Nedzelski et al<sup>26</sup> results (21%).

This disparity between results is probably due to different criteria used, different populations and clinical settings and researchers bias. It is noteworthy that the following 11 diagnosis were seen in one patient each; acute labyrinthitis, gentamycin ototoxicity, CSOM, MS, stroke, seizure, Wallenberg's syndrome, acoustic neuroma, syncopic attack, ocular (retinal detachment) and drugs intoxication. Finally, unlike other studies, the history, examination and investigation in our study revealed a widespread accompaniments of dizziness in most patients. The 8 most common accompaniments diagnosis were hearing loss, gastrointestinal diseases, smoking, nasal throat diseases, renal urinary tract diseases, allergy to drugs, obesity, gynecological diseases, and others (**Table 6**). These are not directly related to dizziness and can be present without dizziness.

The results of our study showed that vestibular diseases are themselves primary causes of dizziness, while non vestibular diseases are predominantly secondary causes of dizziness. Although, cardiovascular diseases category was the most common primary cause of dizziness in 34 patients (31.5%), it was found to be secondary contributing cause in 53 patients (49%). Also, most patients (84%) had dizziness attributable to more than one cause. Another feature of our study is that hyperlipidemia and diabetes are major contributors to dizziness and cervical origin of dizziness is extremely prevalent.

In light of our results and those of other investigators, we conclude and highlight the following facts and aspects of dizziness that might respond to many questions concerning this symptoms: 1. Dizziness symptom is predominantly of middle age population with slight female preponderance. 2. Dizziness is a multifactorial problem in which multiple causes are skewed towards the older age and the single cause of dizziness is mostly seen in younger patients. 3. Peripheral vestibular disorders, hypotension and psychogenic causes of dizziness are more prevalent in younger patients and central vestibular disorders, cardiovascular, diabetes and cervical causes are more prevalent in older patients. 4. Discrepancy in prevalence of primary and secondary causes of dizziness between published clinical studies of dizziness probably due to the differences across the population, different clinical settings with different diagnostic criteria, different sources of referrals, multifactorial nature of dizziness and in part investigators' bias. In our experience, we believe that age factor plays a role in this discrepancy. Furthermore, the discrepancy in prevalence of subtype symptoms of dizziness is mainly due to

patients' different description of their sensations and to the multiple sensations with multiple causes. Given the tremendous physical and psychological effect of dizziness, clinical and research efforts should be directed at identifying and managing treatable diseases, whether primary or secondary causes. It is very clear that if we are to serve the dizzy patients properly we should direct our efforts to the more common disorders efficiently and without unnecessary redundancy in investigative scheme. The effective management for dizziness is best achieved through a multidisciplinary setting and application of a comprehensive diagnostic and treatment approach. Future research should focus at improving management and installment of a rehabilitation program especially for persistent dizziness and for elderly patients as the balance of these patients can be improved by training.<sup>32,33</sup>

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