



Prevalence and Risk Factors of Benign Paroxysmal Positional Vertigo among Patients with Dizziness in Basrah, Iraq

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Authors' contributions

This work was carried out in collaboration between both authors. Author JNAA designed the study, wrote the protocol, wrote the manuscript, and performed the statistical analysis. Author QAAL managed the literature searches, the clinical examination, and data collection. Both authors read and approved the final manuscript.

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ABSTRACT

Objectives: To estimate the prevalence and risk factors of benign paroxysmal positional vertigo (BPPV) in patients with dizziness.

Methodology: Patients with dizziness attending the otolaryngology outpatient department in Basrah General Hospital during the period from 13th January to 12th of November 2013 were included. All the participants were interviewed according to a special questionnaire. Otoloscopic examination, audiometry, and Dix Hallpike tests were performed.

Results: A convenient sample of 402 patients with dizziness were included in the study. The prevalence of BPPV in patients with dizziness was 26.1% (95% CI, 21.9-30.6). More women than men were affected by BPPV (female: male ratio 2.09:1) with a significant association between female gender and BPPV (adjusted OR, 2.16; 95% CI, 1.29 -3.63; P= 0.003). Most of the affected patients (98.1%) reported sudden onset of attack. The attack lasted for seconds in (64.8%) and it was recurrent in 43.8%. On multivariate analysis; age, sex, level of education, hypertension, and chronic otitis media were independently associated with BPPV.

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Conclusion: BPPV is a common condition in patients with dizziness in Basrah. Certain risk factors such as age, sex, level of education, hypertension, and chronic otitis media were significantly associated with benign paroxysmal positional vertigo.

Keywords: Vertigo; dizziness; prevalence; risk factors.

1. INTRODUCTION

Most dizziness-related conditions are not life threatening, however they are considered as global health problems associated with limitations of daily activities and increased risk of falls especially in elderly people [1]. Many studies reported that it affects 20-30% of the general population [2-4]. However, approximately 3.9% of dizziness/ vertigo patients were referred to specialists [5]. In United States, dizziness accounts for 5.6 million clinic visits per year, 17-42% of them were due to benign paroxysmal positional vertigo [6]. Dizziness is a common complaint used to describe different symptoms categorized into four subtypes; presyncope, lightheadedness, disequilibrium, and vertigo [7].

Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo [8]. The classic BPPV response requires the following characteristics; "a latency of 5-10 seconds, paroxysmal in nature, rotary/torsional nystagmus, nystagmus has a duration of less than 1 minute, response fatigues with repetition and response may reverse when returned to the upright position" [9]. BPPV occurs when otoconia which are tiny calcium crystals detached from the otolithic membrane in the utricle and displaced into the semicircular canal [10]. Most cases of BPPV had no clearly identified cause (idiopathic). However, it could be secondary to many conditions such as head trauma, inner ear diseases, chronic otitis media, osteoporosis or post inner ear surgery [11].

The importance of BPPV as a health problem and the scarcity of epidemiological studies in Basrah about the extent and risk factors of BPPV in patients with dizziness signifies the conduction of this study which aimed to determine the prevalence, clinical characteristics and risk factors of BPPV among patients with dizziness in Basrah.

2. SUBJECTS AND METHODS

2.1 Study Design and Setting

This was a cross-sectional study conducted in the Otolaryngology unit in Basrah General

Hospital for the period from 13th of January to 12th of November 2013.

2.2 Study Population

The study population included all patients aged 18 years and more of both sexes who complained of dizziness or had dizziness for at least two weeks before attending the hospital. Exclusion criteria were; history of stroke, Meniere's disease, Parkinson's disease, acoustic neuroma, cervical spondylosis, patients with signs or symptoms of central nervous system diseases, and pregnant women. A patient was diagnosed as having BPPV if he had history of vertigo associated with changes in head position, and typical signs and symptoms (nystagmus, vertigo and nausea) provoked by Dix-Hallpike test [12].

2.3 Sample Size and Sampling Method

A convenience sample of 402 consecutive patients with dizziness from those who attended the otolaryngology outpatient clinic in Basrah General Hospital during the study period and met the inclusion criteria were invited to participate in the study. All the invited patients agreed to participate and non-response was not reported.

2.4 Data Collection

The participants were interviewed according to a special questionnaire designed for the purpose of the study. It covers aspects related to socio-demographic characteristics, past and present medical history, habits or lifestyle. Anthropometric measurements including weight and height were performed. Otological examination, audiometry, tympanometry and Dix-Hallpike test were performed by one of the researcher with the help of an otolaryngologist.

2.5 Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 19. The results were presented as tables. For categorical variables, frequencies and percentages were reported. Differences between groups were

analyzed using Pearson’s chi-squared test, or Fisher’s exact tests as appropriate. For continuous variables, means and standard deviations were used to present the data while analysis was performed using the Student’s t-test or analysis of variance (ANOVA). A logistic regression analysis was used to identify significant predictors of BPPV. A P value of less than 0.05 was considered statistically significant.

3. RESULTS

A total of 402 participants with history of dizziness were included in the study with a mean age of 43.3±13.6 years, 67.6% of them were females. The prevalence of benign paroxysmal positional vertigo (BPPV) was 26.1% (95% CI, 21.9-30.6%). The right ear was more affected than the left one with a ratio of 1.46:1.

The classical presenting symptoms of BPPV are shown in Table 1. Spinning sensation, positional vertigo, sudden onset, brief duration of attack, and nausea were significantly higher among patients with BPPV compared with those who had no BPPV. No significant difference was

noted between the two groups regarding other symptoms such as recurrence, and imbalance, however, they were more evident among patients with BPPV.

Table 2 presents the association of socio-demographic and clinical characteristics with BPPV. The mean age of patients with BPPV was higher than that among patients without BPPV (43.3±13.6 vs. 40.3±15 years) but without significant association. Female gender was significantly associated with BPPV with a female to male ratio of 2.09:1. (OR, 1.99; 95% CI, 1.25-3.18; P=0.004). No significant association was found between BPPV and other socio-demographic characteristics. Regarding the comorbid conditions, chronic otitis media was the only clinical condition which showed a significant association with BPPV (OR, 2.37; 95% CI, 1.13-4.99; P=0.020).

To examine the independent association of the studied factors with BPPV, a binary logistic regression analysis was performed. Age, sex, education, hypertension, and otitis media were found to be significantly associated with BPPV (Table 3).

Table 1. Classical presenting symptoms of patients with and without BPPV

Symptom	BPPV No. (%)	No BPPV No. (%)	X ² ; P-value
Spinning sensation			
Positive	99 (94.3)	213 (71.7)	22.857;
Negative	6 (5.7)	84 (28.3)	<0.001
Episodic			
Recurrent	46 (43.8)	156 (52.5)	2.357;
Not - recurrent	59 (56.2)	141 (47.5)	0.125
Positional			
Positive	74 (70.5)	166 (54.2)	8.453;
Negative	31 (29.5)	131 (45.8)	0.004
Onset			
Sudden	103 (98.1)	235 (79.1)	20.856;
Gradual	2 (1.9)	62 (20.9)	<0.001
Duration of attack			
Seconds	68 (64.8)	125 (42.1)	18.355;
Minutes or hours	37 (35.2)	172 (57.9)	<0.001
Nausea			
Positive	78 (74.3)	186 (62.6)	4.678;
Negative	27 (25.7)	111 (37.4)	0.031
Vomiting			
Positive	33 (31.4)	83 (27.9)	0.458;
Negative	72 (68.6)	214 (72.1)	0.498
Imbalance			
Positive	73 (69.5)	197 (66.3)	0.359;
Negative	32 (30.5)	100 (33.7)	0.549
Total	105 (26.1)	297 (73.9)	

Table 2. Association of socio-demographic and clinical characteristics with BPPV

Character	BPPV (n=105)	No BPPV (n=297)	P-value	OR (95%CI)
Age (years); Mean±SD	43.3±13.6	40.3±15	0.069	1.66 (1.03-2.67) ^a
Female/Male ratio	2.09	1.05	0.004	1.99 (1.25-3.18)
Higher education; n (%)	22 (20.9%)	46 (15.5%)	0.571	1.28 (0.79-2.07) ^b
Smoking (current); n (%)	19 (18.1%)	65 (21.9%)	0.412	0.79 (0.45-1.39)
Alcohol; n (%)	7 (6.7%)	22 (7.4%)	0.801	0.89 (0.37-2.16)
BMI (Kg/m ²) [Mean ±SD]	29.3±6.1	28.3±6.6	0.158	1.59 (0.95-2.61) ^c
S. Cholesterol (mg/100ml); Mean±SD	190.7±41.5	188.0±98.1	0.369	1.24 (0.78-1.97) ^d
Co-morbidity				
Hypertension; n (%)	28 (26.7%)	55 (18.5%)	0.076	1.60 (0.95-2.69)
Diabetes mellitus; n (%)	12 (11.4%)	29 (9.8%)	0.628	1.19 (0.59-2.43)
Inner ear surgery; n (%)	4 (3.8%)	5 (1.7%)	0.206	2.31 (0.61-8.78)
Migraine; n (%)	43 (41%)	71 (23.9%)	0.557	1.15 (0.73-1.80)
History of chronic otitis media; n (%)	96 (91.4%)	243 (81.8%)	0.020	2.37 (1.13-4.99)

^aAge of 40 years and above vs. <40 years

^b12 years and above level of education vs. <12 years

^cOverweight & obese vs. normal & underweight

^dSerum Cholesterol of 200mg/100ml and above vs. <200mg/100 ml

4. DISCUSSION

Although the prevalence of BPPV is not high, its impact on health system and society is great [13]. The exact prevalence of BPPV may be under estimated for many reasons; its high spontaneous remission rate, many patients may not seek medical advice, and the variation in criteria of diagnosis. Under-diagnosis of BPPV as well as delay of diagnosis and treatment or inappropriate medications had been reported by many studies [14,15]. The prevalence of BPPV among patients with dizziness in this study was 26.1%. It is within the range of that reported by others who showed that BPPV accounts for approximately 20–30% of diagnoses of dizziness/vertigo in specialized dizziness clinics [8]. However, it was lower than that reported by another study done on 38 unselected patients with a diagnosis of dizziness in primary care consultation, 40% had both typical symptoms of BPPV and a positive Dix–Hallpike test [16]. The right ear was involved 1.46 times more often than the left one. Similar results had been reported by Korres et al. [17] and Lopez-Esca'mez [18]. Sleep appears to be involved in the pathophysiology of BPPV where many patients had their first attack when moving in bed after awakening [17]. It was hypothesized that the majority of people prefer to lay their head on the right side during sleeping, probably because of uncomfortable awareness of their heart beats when lying on their left side [19].

In this study spinning sensation, positional vertigo, and nausea were significantly more

common among patients with BPPV than those without. It was reported that vertigo is the most prominent symptom of BPPV, and the initial onset of BPPV is frequently associated with nausea, with or without vomiting [10].

In our study, the multivariate analysis showed that age, female sex, higher education, hypertension, and chronic otitis media were independently associated with BPPV.

Many studies showed that, the peak incidence of idiopathic BPPV occurs at age of 45 -59 years [20]. It rarely appears before the age of 20. It becomes much more common with advancing age [21] due to detachment of otoconia from the otolith organs or due to natural age-related degeneration of the otolithic membrane [22].

The present study revealed that females subjects predominate males with a female: male ratio of 2.09:1. There was a significant association between female gender and BPPV (adjusted OR, 2.16; 95% CI, 1.29 -3.63; P= 0.003). Similar results had been reported by others [23,24] (female: male ratio 1.5 to 2.2:1). This female preponderance is still poorly understood, but partly may be linked to the proposed association of BPPV with migraine [25,26] which was reported to be more common in females than males [27]. Osteoporosis which is more frequent in middle-aged and elderly women probably due to hormonal changes, may also play a role in development of BPPV [28,29].

Table 3. Logistic regression analysis

Variable	B-coefficient	P- value	OR	95% CI	
				Lower	Upper
Age	0.201	0.048	1.11	1.01	1.31
Sex	0.771	0.003	2.16	1.29	3.63
Education	0.231	0.011	1.26	1.05	1.51
Hypertension	0.753	0.047	2.12	1.01	4.47
Chronic Otitis Media	0.785	0.043	2.19	1.03	4.68

In univariate analysis, the proportion of patients with high educational level was higher among patients with BPPV compared with that among those without BPPV (20.9% Vs 15.5%) without significant association. On multivariate analysis, education was found to be significantly associated with BPPV (OR, 1.26; 95% CI, 1.05-1.51; P=0.011). Educational status has often been identified as a key factor affecting health care utilization. Many studies revealed that the level of education influenced utilization of health care services [30,31]. Educational achievement can be assumed to be associated with an increased awareness of illness, and seeking medical help [31]. Therefore, the significant association between high educational level and BPPV in this study may be explained by an overrepresentation of people with high educational level in health care institutes rather than a real association.

The exact aetiology of BPPV is still unclear. Many studies have observed an apparent association between BPPV and certain conditions including head trauma, stapes surgery, viral neurolabyrinthitis, chronic suppurative otitis media, mastoiditis, and vestibular neuronitis [32-34]. The relation between acute or chronic ear infection including otitis media and BPPV is well documented [35,36] through extension into acute labyrinthitis [37]. This study found that 91.4% of patients with BPPV had history of chronic otitis media compared with 81.8% of persons without BPPV with a significant association (adjusted OR, 2.19; CI 95%, 1.03 - 4.68, P= 0.043).

The present study showed that hypertension was prevalent in 26.7% of patients with BPPV compared to 18.5% of persons without BPPV, with a significant association (adjusted OR, 2.12; 95% CI, 1.01-4.47; P<0.05). This finding is in agreement with the results of others who found a significant association between BPPV and hypertension [38].

Hypertension may cause vascular damage to the inner ear and consequently BPPV [39]. BPPV can be a consequence of labyrinthine ischaemia which may enhance detachment of otocania from the otolith membrane [25].

Because vasospasm is well documented in migraine, it has been suggested that spasm of the inner ear arteries with consequent local ischemia which facilitates otoconia detachment from the utricular macula may be the possible causative mechanism of BPPV in migraine [25,26]. In this study, history of migraine was reported among 41% of patients with BPPV compared with 23.9% of patients without BPPV but no association was found between migraine and BPPV.

Cohen et al. [40] reported that diabetes mellitus was unusually prevalent in patients with BPPV. Type 1 diabetes mellitus was reported to cause cupular and free-floating deposits in the semicircular canals [41]. Vascular depletion of inner ear may be another probable mechanism of such association [40,42]. This study showed that diabetes mellitus was more common among patients with BPPV compared with those without BPPV but without significant association (11.4% vs. 9.8%, p >0.05).

One limitation of this study was that clinical history and Dix-Hallipke test were used for diagnosis of BPPV. Although Dix-Hallipke test is not 100% positive but it is well documented that it is a diagnostic maneuver that can be used to identify BPPV [43,44].

5. CONCLUSION

Benign paroxysmal positional vertigo is common in patients with dizziness, and many risk factors were found to be associated with it including age, sex, educational level, hypertension, and chronic otitis media.

CONSENT

All authors declare that an informed consent was obtained from each subject before participation in the study and for publication of this study.

ETHICAL APPROVAL

The study was approved by the Research and Ethics Committee of the College of Medicine, Basrah University.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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