

## THE FREQUENCY OF BENIGN PAROXYSMAL POSITIONAL VERTIGO IN CHRONIC MIGRAINE

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### Abstract

**Objective:** To determine the frequency of benign paroxysmal positional vertigo (BPPV) in chronic migraine.

**Study design:** Cross-sectional study

**Place and duration:** Neurology Department of Pak Emirates Military Hospital, Rawalpindi, for a duration of 6 months i.e. from July/2024 till Dec/2024

**Patients and methods:** After obtaining written informed consent, 87 patients who met the selection criteria were enrolled. Frequency, intensity, duration, VAS pain score for migraine were recorded. All patients underwent the Dix-Hallpike technique that was used for the positioning exam and BPPV was documented if present. All findings were then subjected to statistical analysis.

**Results:** The mean age of the patients was  $40 \pm 6.69$  years. The median frequency of headache at baseline was 8 (2) per month. The median duration of headache at baseline was 10 (9). The median VAS score at baseline was 7 (2). There were 33 (37.9%) males and 54 (62.1%) females in the study. BPPV was present in 7 (8%) patients, out of which the left side was involved in 2 (2.3%) patients, right was involved in 2 (2.3%) patients and both sides were involved in 3 (3.4%) patients.

**Conclusion:** In patients with chronic migraine, BPPV can be encountered and has a frequency of 8%.

### INTRODUCTION

Migraine is characterized by moderate to severe headaches that can continue for hours or days. Migraines affect between 12% and 15% of people worldwide; the prevalence varies by nation, race/ethnicity, and age. From 2005 to 2012, the National Health Interview Survey found that 14.2% of Americans had migraines, with Native Americans having the highest frequency (17.7%) and Asians having the lowest (9.2%). Women are more likely

than men to suffer from migraines. Studies on the rate in Asian nations differ<sup>1</sup>.

Although a number of studies have proposed various pathophysiological reasons for migraine, including vascular and genetic variables as well as cortical spreading depression, the underlying mechanism remains contentious<sup>2</sup>. One of the prevalent symptoms of migraine is vertigo, which is why the International Headache Society-3 has classified it as

"atypical migraine with brainstem aura" within the subclassification of migraine variations<sup>3</sup>. In people who are vulnerable to migraines, unexplained vertigo that is not accompanied by a headache is also recorded as an uncommon migraine variation<sup>4</sup>.

The most prevalent cause of vertigo in adults is benign paroxysmal positional vertigo (BPPV), which has a lifetime prevalence of 2.4%, according to one study<sup>5</sup>. It happens when one or more of the three semicircular canals receive displaced otoconia, which are often found in the utricle. In addition to obtaining a history and performing a physical examination using techniques like the Dix-Hallpike test and head roll test, a BPPV diagnosis is made by identifying distinctive nystagmus<sup>6</sup>.

BPPV and migraine are two of the most common conditions seen in otoneurologic clinics<sup>7</sup>. However, compared to other inner-ear disorders including Meniere disease, vestibular migraine, and vestibular neuritis, there has been less research on the relationship between migraine and BPPV because they do not have a pathophysiologic link<sup>8</sup>. Only a small number of large-scale cohort studies have been conducted, which found that migraine was linked to an increased risk of BPPV<sup>9,10</sup>. Locally, no such study has been conducted so far. So, the rationale of the current study was to determine the frequency of BPPV in patients with chronic migraine. The study results would provide guidance to the treating neurologist and audiologist regarding this common cause of vertigo which can occur in patients with migraine and should be diagnosed earlier in order to provide correct early treatment to reduce patient's discomfort and improve functionality.

## PATIENTS AND METHODS:

The study had a cross-sectional design. After receiving approval from the Ethical Review Committee, the study was conducted for six months, from July/2024 to Dec/2024, at the Neurology Department of the Pak Emirates Military Hospital in Rawalpindi. The study enrolled 87 patients who had chronic migraine. The sample size of 87 patients was calculated by keeping 95% confidence level, 5% margin of error, taking expected frequency of BPPV in CM patients as 6%<sup>11</sup>. Non-probability consecutive sampling technique was used.

Inclusion criteria: The study included patients aged 18 to 60 years, of both genders and who fulfilled the criteria of chronic migraine according to the International Classification of Headache Disorders.

Exclusion criteria: Patients were excluded if they had an experience of BPPV before having migraine, if they had Meniere's disease, labyrinthitis, acoustic neuroma, sudden hearing loss, vestibular neuritis or history of head injury.

The International Headache Society's (IHS) most recent categorization defined a chronic migraine (CM) as one that lasted for 15 days or more each month, with at least 8 of those headaches having migrainous characteristics or responding to treatment tailored to migraines. Migraine without aura was defined as attacks of recurrent headache problems that lasted anywhere from four to seventy-two hours. The headache was usually unilateral, pulsating, moderate to severe in severity, aggravated by regular physical activity, and associated with phonophobia, photophobia, and/or nausea. Migraine with aura was defined by progressive development, a combination of positive and negative aspects, complete reversibility, and symptoms that included visual, sensory, and/or speech/language issues without any muscular weakness<sup>12</sup>. BPPV was defined if the patient displayed distinctive positional nystagmus during the evaluation<sup>13</sup>.

After obtaining written informed consent, all individuals who met the selection criteria were recruited. A thorough history was taken of each subject, with particular attention paid to specifics regarding the primary vestibular symptoms i.e., vertigo (onset, course, duration, what increases or decreases, precipitating factors "head or body movement), associations, accompanied by loss of consciousness "or not," headache, etc. Furthermore, comprehensive data regarding migraine was gathered, including the onset, progression, length, and frequency of acute attacks, the effectiveness of treatment, any complications (such as seizures provoked by migraine), and family history of migraine. The general examination and the otological examination were the two stages of the clinical evaluation. For confirmation of BPPV, The Dix-Hallpike technique was used for the positioning exam. The patient was seated on the table. After the subject's head was rotated 45 degrees to the right (or

left), the patient was placed in a supine position with their head 30 degrees down. This position was maintained for 30 seconds. The patient was put back in the sitting posture if there was no nystagmus. In the event that nystagmus developed, it was noted, and the patient remained seated once it subsided. The findings of BPPV were noted down, as well as the side of ear involved, the affected canal and the risk factors of BPPV were noted down and findings were subjected to statistical analysis.

The data was analyzed through Statistical Package for social sciences (SPSS) version 25.0. Normality of data was assessed using the Shapiro-Wilk test and it was found that the data for age was normal in distribution and so was presented as mean and standard deviation, whereas, the data such as frequency, duration of headache, VAS score, was non-normal in distribution and so was presented as median and interquartile range (IQR) as these variables were non-normal in distribution. Qualitative data such as age group, gender, severity of migraine, type of migraine, BPPV presence, side of ear involved, type of canal affected and the risk factors were presented as frequency and percentages. Data was stratified for age, gender and severity of migraine, and post-stratification Chi square test was applied to deal with effect modifiers with respect to BPPV and a p value of  $\leq 0.05$  was considered significant.

## RESULTS:

A total of 87 patients were enrolled. The mean age of

the patients was  $40 \pm 6.69$  years. The median frequency of headache at baseline was 8 (2) per month. The median duration of headache at baseline was 10 (9). The median VAS score at baseline was 7 (2) (Table-I).

There were 19 (21.8%) patients of age group 18 to 35 years, 64 (73.6%) patients of age group 36 to 50 years and 4 (4.6%) patients of age group 51 to 60 years. There were 33 (37.9%) males and 54 (62.1%) females in the study. Moderate to severe migraine was reported by 26 (29.9%) patients, very severe pain was reported by 57 (65.5%) patients and worst pain was reported by 4 (4.6%) patients. In terms of type of migraine, migraine with aura was reported by 41 (47.1%) patients and without aura was reported by 46 (52.9%) patients. BPPV was present in 7 (8%) patients, out of which the left side was involved in 2 (2.3%) patients, right was involved in 2 (2.3%) patients and both sides were involved in 3 (3.4%) patients. Posterior canal was affected in 3 (3.4%) patients with BPPV, lateral canal was affected in 2 (2.3%) patients and mixed canals were affected in 2 (2.3%) patients. Among the risk factors, recent trauma was reported by 1 (1.2%) patient, recent infection was reported by 2 (2.3%) patients, motion sickness was reported by 3 (3.3%) patients and vitamin D deficiency was reported by 1 (1.2%) patient (Table-II).

Data was stratified for age, gender and severity of migraine and it was found that none of the effect modifiers had any significant association with BPPV (Table-III).

**Table-I: Median (IQR) of Quantitative Variables (n=87)**

Variables	Median (IQR)
Frequency of headache (monthly)	8 (2)
Duration of headache (in hours)	10 (9)
VAS score	7 (2)

**Table-II: Frequency of qualitative variables (n=87)**

Variables	Frequency (percentage)
Age group: 18 to 35 years 36 to 50 years 51 to 60 years	19 (21.8%) 64 (73.6%) 4 (4.6%)
Gender: Male Female	33 (37.9%) 54 (62.1%)
Severity of pain: Moderate to severe Very severe Worst pain	26 (29.9%) 57 (65.5%) 4 (4.6%)
Type of migraine: With aura Without aura	41 (47.1%) 46 (52.9%)
Presence of BPPV: Yes No	7 (8%) 80 (92%)
Side of BPPV: Left Right Both	2 (2.3%) 2 (2.3%) 3 (3.4%)
Canal affected in BPPV: Posterior Lateral Mixed	3 (3.4%) 2 (2.3%) 2 (2.3%)
Risk factors for BPPV: Recent trauma Recent fall Recent infection Motion sickness Vitamin D deficiency Exercise Prolonged rest Stress Insomnia	1 (1.2%) 0 (0%) 2 (2.3%) 3 (3.3%) 1 (1.2%) 0 (0%) 0 (0%) 0 (0%) 0 (0%) 0 (0%)

**Figure-III: Stratification of BPPV with respect to age, gender and severity of migraine (n=87)**

Variable	BPPV		Total	p value
	Yes	No		
<b>Age group:</b>				
18 to 35 years	2 (2.3%)	17 (19.5%)	19 (21.8%)	0.370
36 to 50 years	4 (4.6%)	60 (69%)	64 (73.6%)	
51 to 60 years	1 (1.1%)	3 (3.4%)	4 (4.6%)	
<b>Gender:</b>				
Male	3 (3.4%)	30 (34.5%)	33 (37.9%)	0.779
Female	4 (4.6%)	50 (57.5%)	54 (62.1%)	
<b>Severity of migraine:</b>				
Moderate to severe	1 (1.1%)	25 (28.7%)	16 (29.9%)	0.486
Very severe	6 (6.9%)	51 (58.6%)	57 (65.5%)	
Worst pain	0 (0%)	4 (4.6%)	4 (4.6%)	

**DISCUSSION:**

The current study findings revealed that in patients with chronic migraine, BPPV was present in 8% of the patients. The majority of the patients had BPPV on both sides, the most commonly affected canal was the posterior canal and motion sickness was the commonest risk factor. The presence of BPPV was found to be unrelated to age, gender and severity of migraine.

Vertigo and migraine are two of the most prevalent ailments in the general population<sup>14</sup>. Since Liveing first brought up the connection between migraine and vertigo in the 19th century, this association has been made<sup>15</sup>. Subsequently, Kayan and Hood found that patients with migraines experienced vertigo at a significantly higher rate than those with tension headaches<sup>16</sup>. About 20% to 30% of people in the general population suffer from vertigo and dizziness<sup>17</sup>. Vertigo or dizziness are common symptoms of migraines<sup>18</sup>. The most common cause of vertigo is BPPV<sup>19</sup>. Studies conducted in the past have shown an association between chronic migraine and BPPV<sup>20</sup>. Keeping this in view, our study was conducted to assess the frequency of BPPV in patients suffering from chronic migraine. In a study by Kim *et al.*, it was revealed that BPPV was present in 6% patients with chronic migraine<sup>11</sup>. Chu *et al.* revealed that in patients with chronic migraine, BPPV was present in 1.11% patients<sup>1</sup>. Faralli *et al.* revealed that the incidence of BPPV in migraine patients was 19.4%<sup>15</sup>. Teixido *et al.* revealed a higher prevalence of BPPV in migraine patients i.e. 35.5%<sup>13</sup>. Different studies have revealed variable rates of BPPV in patients with

migraine. The differences in the frequency of BPPV might be attributable to the geographical differences and genetic variations among different populations. Chronic migraine is associated with higher frequency of BPPV as shown by our results and those yielded by previous studies. Hence, while treating patients with chronic migraine, special attention should be given to the vestibular symptoms in order to establish correct diagnosis and give prompt treatment to the patients in order to improve quality of life and functionality.

**Conclusions:**

The current study concluded that in patients with chronic migraine, BPPV can be encountered and has a frequency of 8%. The current study findings proposed that all patients with chronic migraine must be screened for this pathology as it may be confused with the vestibular symptoms of migraine and thus can hinder the treatment. By picking BPPV earlier, appropriate treatment can be given to the patients and their functionality can be improved. Future studies must be carried out on a larger sample in order to validate the findings of the current study.

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## LIMITATIONS:

There were certain limitations of the study. Results of this study cannot be generalised because it was a single center study with a small sample size. Secondly, the frequency of BPPV was not assessed in patients with acute attack, so it can not be commented if this frequently occurs in acute episodes of migraine. Lastly, it was not assessed if the patients were on any treatment and thus the effect of treatment agents on the frequency of BPPV was not assessed.

**Conflict of interest:** None

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