

## ORIGINAL ARTICLE

**THE PREVALENCE OF BENIGN PAROXYSMAL POSITIONAL VERTIGO AND ITS ASSOCIATION WITH QUALITY OF LIFE**Mehwish Raza<sup>1</sup>, Nosheen Manzoor<sup>2</sup>, Maria Sarfraz<sup>3</sup>, Sanila Ghaffar<sup>4</sup>, Rimsha<sup>5</sup>, Nimra<sup>6</sup>, Bisma Ahmad<sup>7</sup>**ABSTRACT**

**Introduction:** Benign Paroxysmal Positional Vertigo (BPPV) is an inner ear mechanical disorder caused by dislodged otoconial debris from the utricle entering one or more semicircular canals.

**Material & Methods:** A cross-sectional survey was conducted in UMT Lahore. 219 participants were included in the study through convenient sampling determined asymptomatic healthy adults aged 18-40 years, including those at high risk of falling. Individuals with conditions that hinder BPPV diagnosis or those with existing vestibular or musculoskeletal disorders were excluded. Data was collected through a structured questionnaire. Participants were recruited from University of Management and Technology, School of Health Sciences campus students and workers, with informed consent obtained prior to data collection. Data was analyzed using SPSS version 22.

**Results:** The mean age of the 219 participants was 23.06 years (SD = 4.63). Female participants significantly outnumbered males, with 82.2% (180 individuals) being female and 17.8% (39 individuals) male. Regarding symptoms, 43.4% of the participants reported feeling dizzy, while 56.6% did not. The prevalence of BPPV, assessed using the Dix-Hallpike maneuver, was found to be 13.2%, while 86.8% tested negative for BPPV. Despite vertigo symptoms being present in a notable portion of participants, the statistical analysis did not reveal a significant association between vertigo test results and quality of life scores, as indicated by a p-value of 0.414.

**Conclusion:** BPPV is most likely the most prevalent cause of vestibular vertigo, accounting for 20 to 30% of cases diagnosed in specialized clinics. This study aims to highlight the importance of early diagnosis and intervention for BPPV, particularly in individuals with low quality of life, to improve overall well-being and reduce psychological distress.

**Keywords:** Aging, Anxiety Disorders, Comorbidities, Dizziness, Postural Balance.

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**INTRODUCTION**

Benign Paroxysmal Positional Vertigo (BPPV) is a common inner ear disorder characterized by the displacement of otoconial debris into the semicircular canals, leading to episodes of vertigo triggered by head movements. The major symptom of BPPV is repetitive positional vertigo, which is an illusionary impression of motion caused by moving the head relative to gravity.<sup>1-3</sup> Despite being a benign condition, BPPV significantly impacts an individual's quality of life due to the recurrent nature of symptoms and associated psychological concerns.<sup>4</sup> The prevalence of BPPV varies among different populations, with posterior semicircular canal involvement being the most common subtype.<sup>5</sup> Vestibular disorders, including BPPV, often manifest with symptoms such as dizziness, vertigo, and unsteadiness, further affecting an individual's daily functioning and emotional well-being. The direction of the nystagmus is directly related to semicircular canal being stimulated because of the direct nerve connection of each canal to 2 separate eye muscles.<sup>6</sup> However, the extent to which undiagnosed BPPV contributes to the overall burden of vestibular disorders and its relationship with quality of life remains unclear.<sup>7</sup> Vestibular disorders are problems of the vestibular system that cause physical impairment and poor quality of life. The most prevalent symptoms of these illnesses are dizziness, vertigo, and unsteadiness.<sup>8</sup>

BPPV's major symptom is repetitive positional vertigo, which is an illusionary impression of motion when the head is shifted relative to gravity.<sup>9</sup> Other factors associated with quality of life disturbance in BPPV patients included persistent anxiety about avoiding falls during physical activities, greater discomfort on buildings and elevated attitudes, and oscillopsia during daily activities while travelling.<sup>10</sup>

By investigating the prevalence of undiagnosed BPPV and its association with quality of life in asymptomatic young healthy individuals.<sup>11</sup> In contrast to younger individuals with BPPV, older adults suffering from the same condition complain of less

rotatory vertigo and more often of nonspecific unsteadiness or dizziness.<sup>12</sup> Understanding the prevalence and impact of BPPV in this population is crucial for early detection, intervention, and prevention of long-term complications.<sup>13</sup> By examining the relationship between BPPV and quality of life, this study seeks to provide valuable insights into the management and care of individuals affected by this prevalent vestibular disorder. Dislodged otoconia may adhere to the cupula (cupulolithiasis) or more commonly is free floating (canalithiasis) in the canal as evidenced by intraoperative findings.

In 2021, a study was conducted to identify high-risk groups for symptom recurrence by examining the relationship between comorbidities such as benign paroxysmal positional vertigo (BPPV) and conditions such as hypertension, diabetes, thyroid disorders, hearing loss, hyperlipidemia, and vitamin D deficiency.<sup>14</sup> approximately 45.1% of patients with BPPV exhibited symptoms of hypertension, and they were also more prone to being hypertensive. BPPV and its recurrence have been associated to an increased risk of type 2 diabetes. As a result, in addition to repositioning procedures, patients with BPPV should be evaluated and treated for these comorbidities.<sup>15</sup> In 2022, a study was done with the goal of examining risk factors for residual vertigo (RD) in middle-aged and older people who had successfully treated benign paroxysmal positional vertigo (BPPV). 181 BPPV patients were included after a successful canalith repositioning maneuver (CRM) treatment. All patients were divided into two groups: the middle-aged (aged 45-59 years, n = 101) and the older (aged 60 and up, n = 80). Clinical variables included age, gender, the number of maneuvers, the involved canal, the affected side, RD, comorbidities, the dizzy handicap questionnaire score, and the 7-item scale score for generalized anxiety disorder. The older group had a significantly higher incidence of RD than the middle-aged group (p = 0.033) were independently related with RD in middle-aged and older adults.

Following effective BPPV therapy, older people had a higher incidence of RD.<sup>13</sup> This study aims to address the research gap that while the impact of Benign Paroxysmal Positional Vertigo (BPPV) on quality of life has been acknowledged, the prevalence of undiagnosed BPPV in individuals with low quality of life remains unexplored. Further investigation is needed to understand how undiagnosed BPPV affects various demographic groups and to develop targeted interventions to improve their quality of life.

### **MATERIAL AND METHODS**

The sample size of 219 participants was calculated through the WHO sample size calculator, considering factors like anticipated BPPV prevalence, desired precision, and confidence level. Participants were selected via convenient sampling, focusing on asymptomatic young healthy adult's age range from 18 to 40 and those at high risk of falling. Individuals with certain medical conditions like back pain, vestibular illnesses, musculoskeletal diseases, paralysis, or stroke were excluded. And the study was conducted in a variety of settings including universities, community centers, and public health facilities.

Data was collected through a structured questionnaire. The Dix-Hall pike maneuver and Spin Roll Test were performed to assess vertigo symptoms. The questionnaire covers demographic information, medical history, vertigo episodes, triggers, duration, severity, and validated scales assessing quality of life. The risk of bias and the methodological quality of all included articles were examined.<sup>16</sup>

A comprehensive literature review was conducted to gather relevant information on BPPV prevalence and its impact on quality of life.<sup>17</sup> Primary data was collected through the structured questionnaire, administered after obtaining informed consent from participants recruited from various settings.

Data was analyzed using SPSS version 22, employing descriptive statistics for summarizing demographic information, BPPV prevalence, and quality of life scores. Inferential statistics such as chi-square

testing and regression analysis was used to explore the relationship between BPPV and quality of life. Poor outcomes were defined as any remaining vertigo, dizziness, unsteadiness, and/or suboptimal changes in objective assessments despite adequate repositioning maneuvers and BPPV resolution.<sup>18</sup>

The study adheres to ethical standards, ensuring Participant rights and privacy protection. Informed consent was obtained, and participants were made aware of the study's objectives and potential risks, with the option to withdraw without consequences.<sup>19</sup>

### **RESULTS**

A total of 219 participants were recruited for this trial. There were 39 (17.8%) male and 180 (82.2 %) female population. This gender distribution indicates a significant imbalance, with females being the predominant group in the sample. The mean age of the participants was  $23.06 \pm 4.62$  (mean  $\pm$  sd) years. The participants were relatively young, with the majority falling close to the mean age of 23 years, and a moderate variability in age within the sample.

The majority of participants did not report feeling dizzy 124 (56.6%) or like their surroundings were spinning (65.3%). Roughly a third of participants reported feeling dizzy (43.4%) or like they were floating/off-balance (31.5%). A significant portion experienced nausea when moving their head (23.3%), while a smaller proportion reported repeated episodes of dizziness/vertigo (40.2%). About half of the participants experienced dizziness when lying down or turning their head over on a bed (50.2%). The Dix-Hall pike maneuver and Spin Roll Test were performed to assess vertigo symptoms. A minority of participants had a positive result in these tests, indicating the presence of vertigo symptoms (Dix-Hall pike: 13.2%, Spin Roll Test: 11.9%). The Spin Roll Test results show that 11.9% of participants tested positive, indicating a presence of symptoms related to the test, while 88.1% tested negative.

Table 1. Association of BPPV with QOL

Spin Roll Test * Total Score QOL		Total Score QOL			Total	P Value
		mild	moderate	severe		
Spin Roll Test	Positive	Count	15	9	2	26
		% within Spin Roll Test	57.7%	34.6%	7.7%	100.0%
	Negative	% within Total Score QOL	100.0%	90.0%	100.0%	96.3%
		Count	0	1	0	1
		% within Spin Roll Test	0.0%	100.0%	0.0%	100.0%
		% within Total Score QOL	0.0%	10.0%	0.0%	3.7%

For the Spin Roll Test, the majority of the participants with mild and moderate Total Score QOL were positive on the Spin Roll Test. While most participants with mild and severe QOL scores tested positive on the Spin

Roll Test, the p-value of 0.414 suggests that there is no meaningful statistical relationship between the Spin Roll Test results and participants' QOL scores.

Table 2. Dix hall pike chi square tests

Dix hall pike Maneuver * Total Score QOL Cross tabulation		Total Score QOL			P Value	
		mild	moderate	severe		
Dix hall pike Maneuver	Positive	Count	15	10	2	0.414
		% within Dix Hall pike Maneuver	55.6%	37.0%	7.4%	
		% within Total Score QOL	100.0%	100.0%	100.0%	
		% of Total	55.6%	37.0%	7.4%	

The table showed the results of the Dix Hall Pike Maneuver and how it relates to the participants' Quality of Life (QOL) scores, categorized as mild, moderate, or severe. All 27 participants tested positive in the Dix Hall Pike Maneuver. 15 participants (55.6%) had mild QOL scores. 10 participants (37.0%) had moderate QOL scores. 2 participants (7.4%) had severe QOL scores.

In terms of distribution within QOL categories, 100% of participants in each QOL group (mild, moderate, and severe) had a positive result in the Dix Hall Pike Maneuver. This means that the maneuver did not show variation across different levels of QOL in this sample, as all participants tested positive regardless of their QOL scores.

The p-value is 0.414, which indicates there is no statistically significant relationship between the Dix Hall Pike Maneuver results and QOL scores. The lack of negative results and the uniform positive test outcomes suggest that this maneuver may not differentiate well between different levels of QOL in this particular sample.

The study showed a significant prevalence of vertigo symptoms among participants, with various degrees of impact on their quality of life. There's a need for further investigation

into the relationship between vertigo symptoms and quality of life, considering potential confounding factors. Interventions aimed at managing vertigo symptoms could potentially improve participants' quality of life, especially for those experiencing severe symptoms. Strategies to address missing data in quality-of-life assessments should be implemented to ensure comprehensive data analysis and interpretation.

**DISCUSSION**

The current study aims to determine the prevalence and association between vertigo symptoms, quality of life, and other related characteristics in a group of 219 participants. The data analysis revealed important information about the prevalence of vertigo symptoms, the distribution of quality of life scores, and probable associations between various variables. The vast majority of participants (82.2%) were female, with only 17.8% male. Previous research concentrated on the older population. According to reports, the elderly population of BPPV was 23.9%. (Moreira, Costa et al. 2014)

The study found that 43.4% of subjects felt dizzy, and 34.7% felt as though their surroundings were whirling around them. Furthermore, 23.3% of participants felt sick

when moving their heads, and 31.5% felt like they were floating or off-balance, like to being at sea. These data emphasize the sample population's high prevalence of vertigo-related symptoms. Older adults exhibited higher incidence of RD after successful treatment for BPPV. Age, moderate to severe dizziness, and moderate to severe anxiety were independent risk factors of RD in middle-aged and older adults.<sup>13</sup>

The study investigated possible links between vertigo symptoms and quality of life scores using the Spin Roll Test and the Dix-Hallpike Maneuver. Surprisingly, the Chi-Square test findings revealed no significant relationship between the outcomes of these vertigo evaluation tests and the levels of quality of life (mild, moderate, or severe). Increased awareness of BPPV in pediatric patients may reduce delays in identification and treatment.<sup>20</sup> This shows that the presence of vertigo symptoms, as judged by these tests, does not directly correlate with the participants' overall quality of life. Previous studies employed The Dizziness Handicap Inventory (DHI) median score of 55.5 (a score greater than 60 implies a risk of falling). Seventy-five percent of employees were on 50-100% sick leave. Eighty-one percent had experienced head or neck injuries. Nineteen percent have no recollection of any trauma. Nautical vertigo and dizziness (81%) was considerably more common in our population than rotatory vertigo (20%) discomfort was indicated as a primary symptom by the majority of patients (87%): neck discomfort (87%), headache (75%), and generalized pain (40%). The most often reported symptoms were fatigue (85%), visual abnormalities (84%), and impaired concentration ability (81%). Unexpected observations during otolith repositioning maneuvers included involuntary movements of the limbs, face, neck, or torso (12%). (Kerrigan, Costigan et al. 2013). Hormonal factors or differences in health-seeking behavior might explain the disproportionate incidence of BPPV and other vestibular disorders in women.<sup>21</sup> The current study's lack of significant association between

vertigo test results and quality of life could be due to the relatively young and asymptomatic nature of the sample. This contrasts with older populations, where BPPV, anxiety, and physical comorbidities strongly affect quality of life post-diagnosis.<sup>22</sup>

### **Recommendations**

The study indicates the need for more research and assessment to better understand the relationship between vertigo symptoms and quality of life. Future studies could clarify the intricate connections between vertigo symptoms, quality of life, and other associated characteristics by using bigger, more diverse samples and longitudinal designs. Specific issues which should be considered in the elderly are the relation to falls, difficulties in obtaining an accurate history, and some difficulty in performing the diagnostic and therapeutic maneuvers, which should be executed with slower movements and cautiously to avoid any vascular or orthopedic complications. Understanding these connections can help create tailored interventions that improve the general health and wellbeing of those who suffer from vestibular problems.

### **CONCLUSION**

This study concluded that there is no prevalence of BPPV symptoms in asymptomatic young adult population and its association is less significant. It also provides valuable insights into the prevalence of dizziness and vertigo symptoms among the participants and their impacts on quality of life. To evaluate whether absence of hearing loss on pure-tone audiometry (PTA) is reliable as a diagnostic test for predicting benign paroxysmal positional vertigo (BPPV) in adult patients with vertigo.

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