Prevalence Of Benign Paroxysmal Positional Vertigo In Diabetic Patients

Qurat Ul In[1], Sadia Iftikhar[2]*, Khushboo Gulzar[3], Areej Mughal[4]

[1,2*,3,4]University Of Lahore Gujrat Campus

***Corresponding Author:** SADIA IFTIKHAR

ABSTRACT

Background: Benign paroxysmal positional vertigo (BPPV) is a common cause of vertigo. Benign paroxysmal positional vertigo, the most prevalent external vestibular end-organ condition, is characterized by sudden, short spinning sensation. One of the symptoms is a quick onset of an attack.

Objective: To investigate and determine the prevalence of benign paroxysmal positional vertigo (BPPV) in individuals diagnosed with diabetes mellitus.

Methodology: A descriptive cross-sectional study was conducted, involving a total of 381 individuals diagnosed with diabetes. Data were collected using non-probability convenient sampling technique. A proforma was used to acquire demographic data including name, age, height, weight. Their BMI (body mass index) was also calculated**.** The Dix-Hallpike technique and Supine Roll test was used to access PC and LC BPPV.

Results: Out of 381 total participants only 67 (17.6%) were and 314 (82.4%) were females. The Mean and Standard deviation of age of participants was 52.00 ± 12.99. Out of 381 participants only 30(7.86%) had BPPV while 351(92.14%) had no BPPV. Out of the diagnosed BPPV patients, vestibular evaluation showed an involvement of posterior semicircular canals in 26(6.82%) patients and horizontal canal in 4(1.04%) patients.

Conclusion: The current study concluded that there was a low prevalence of BPPV in diabetic patients. Based on this study, we summarize that there does not appear to be a connection between BPPV and diabetes.

Keywords: BPPV, Diabetes Mellitus, Dizziness, vertigo, BMI.

INTRODUCTION

The most common external vestibular end-organ disorder, known as benign paroxysmal positional vertigo (BPPV), is described by a sudden, short gyratory sensation. One of the symptoms is a quick onset of attack.[1] The position of head in relation to gravity can generate symptoms, which can range in severity from moderate vertigo to incapacitating episodes.[2] The diagnosis of BPPV is supported by short latency, brief duration, fatigability, and reversible nystagmus when standing up straight.[3]

BPPV (Benign Paroxysmal Positional Vertigo), a mechanical inner ear condition, develops when utricle debris becomes dislodged and enters one or more SCC. Gravitational head movement causes the otoconial debris to shift, which could push the endolymph and cupula out of place and induce pathological nystagmus.[4] BPPV generally affects the posterior SCC, following the involvement of anterior and lateral SCCs. Benign paroxysmal positional Vertigo results in subjective sensation of dizziness, which is experienced by some patients.[5]

In addition, it has been found that excessive blood sugar and insulin levels are risk factors for BPPV recurrence.[6] The episodes are frequently triggered by everyday actions, such as rolling over in bed, turning the head upwards to reach for something high or bends forward to knot his or her shoelaces. Patients with BPPV commonly experience episodic periods of vertigo that typically last less than 1 minute. [7]

Vertigo's most prevalent cause is benign paroxysmal positional Vertigo (BPPV). A latency of 5–10 seconds; paroxysmal in nature; rotary/torsional nystagmus; nystagmus has a duration of less than 1 minute; response may reverse when returned to the upright position.[8] The majority of BPPV instances are idiopathic (approximately 50-70%) in nature and most likely originate from macular degeneration. [9] BPPV had an overall lifetime prevalence of 2.4%, 1.6% for men, and 3.2% for women. [10]

BPPV appears to be more frequent in those with both type 1 and type 2 diabetes. In patients with diabetes, there is a significant reduction in the functioning of utricle and saccule compared to non-diabetics. [11] Variations in metabolism of glucose have related to high occurrence of inner ear maladies, which in turn are linked to the onset and recurrence of BPPV. Furthermore, diabetics have reduced capacity for recovering from minor shocks, like viral illnesses or minor injuries, making these insults more intense in this population. [12]

BPPV exhibits a distinct Paroxysmal positional nystagmus, which can be diagnosed using proper positional diagnostic tests and successfully treated with a set of therapeutic techniques. [13] The Dix Hallpike test is the primary diagnostic procedure for Posterior-canal BPPV, and it seeks to provoke labyrinthine symptoms or signs including vertigo, nausea, and/or nystagmus.[9]

METHODOLOGY

A cross-sectional study was carried out involving diabetic patients. Data were collected from City hospital, Aziz Bhatti hospital, Doctor hospital Gujrat, Pakistan. The study involves 381 diagnosed diabetic patients (67 men and 314 women, average age 52 years). Patients were selected according to inclusion and exclusion criteria. Gestational diabetes, Cervical spondylosis, Whiplash injury, prolapsed intervertebral disc patients were excluded from the study. Data collection was carried out using a non-convenient sampling technique from the general population of district Gujrat. The Dix-Hallpike technique was employed to access PC BPPV. The modified Dix Hallpike test had high sensitivity (95.5%) and a relatively high specificity (87.9%).[14] In this procedure Patients head will be oriented 45 degrees towards the ear to be tested, the patient will rapidly lay down with their head extending past the end of the bed, and their neck was positioned 20 degrees below the horizontal plane, maintaining the initial head rotation. A positive response was recorded if the rotational nystagmus (involuntary eye movement) was observed during this procedure.

The supine roll test (SRT) is regarded as the gold standard for identifying LC-BPPV.[15] During this test the patients head is tilted 90° to the right side and held in this position for 30 seconds or until any nystagmus subsides. The head is then reverted to the central position. Following this, the head is rotated 90° to the left side and held for 30 seconds or until the nystagmus disappears. Data were collected under the rules and regulations of ethical committee of University of Lahore.

RESULTS

The results were obtained after analyzing the data to investigate and determine the prevalence of benign paroxysmal positional vertigo (BPPV) in individuals diagnosed with diabetes mellitus using a non-probability convenient sampling technique. Total 381 diabetic patients were recruited for this study out of which 67 (17.6%) were men and 314 (82.4%) were women. Out of total 381 participants 40 (10.5) were married and 341 (89.5) were married. The Mean and Standard deviation of age of participants was 52.00 ± 12.99.

Demographic data			
		Frequency	**Percent**
age group of patients	**14-28**	**26**	**6.8**
	29-42	**59**	**15.4**
	43-56	**141**	**36.9**
	57-70	**134**	**35.1**
	71-84	**21**	**5.5**
	Total	**381**	**99.7**
gender of participants	**Male**	**67**	**17.6**
	female	**314**	**82.4**
	Total	**381**	**100**
marital status of participants	**Unmarried**	**40**	**10.5**
	Married	**341**	**89.5**
	Total	**381**	**100**

Table 1: Demographic data

DixHalpike_Test and gender of participants Crosstabulation					
		gender of participants		**Total**	**p-value**
		Male	**female**		
DixHalpike_Test	**Positive**	**3**	**23**	**26**	**0.00**
	Negative	**64**	**291**	**355**	
	Total	**67**	**314**	**381**	
SupineRoll_Test and gender of participants Crosstabulation					
		gender of participants		**Total**	**p-value**
		Male	**female**		
SupineRoll_Test	**Positive**	**0**	**4**	**4**	**0.46**
	Negative	**67**	**310**	**377**	
	Total	**67**	**314**	**381**	

Table 2: DixHalpike_Test, Supine roll test and gender of participants Crosstabulation

Out of total 381 participants, 3(0.79%) males show positive results while 64(16.80%) shows negative results, 23(6.04%) shows positive results while 291(76.38%) shows negative results for Dix Hallpike test and 4(1.05%) females displays positive results for Supine roll test.

DixHalpike_Test and marital status of participants Crosstabulation					
		marital status of participants		Total	p-value
		Unmarried	Married		
DixHalpike_Test	Positive	0	26	26	0.00
	Negative	40	315	355	
	Total	40	341	381	
SupineRoll_Test and marital status of participants Crosstabulation					
		marital status of participants		Total	p-value
		Unmarried	Married		
SupineRoll_Test	Positive	0	4	4	0.00
	Negative	40	337	377	
	Total	40	341	381	

Table 3: Dix Hallpike test, Supine roll test and marital status of participants Crosstabulation

Of all, 26(6.04%) patients show positive results for Dix Hallpike test which are married and only 4(1.05%) married patients show positive results for Supine Roll test.

BMI of participants and DixHalpike_Test Crosstabulation					
		DixHalpike_Test		Total	p-value
		Positive	Negative		
BMI of participants	Under weight > 18.5	4	30	34	0.66
	normal weight 18-24	10	142	152	
	Overweight 25-29	7	117	124	
	Obese < 30	5	66	71	
	Total	26	355	381	
BMI of participants Supine Roll Test Crosstabulation					
		SupineRoll_Test		Total	p-value
		Positive	Negative		
BMI of participants	Under weight > 18.5	1	33	34	0.66
	normal weight 18-24	1	151	152	
	Overweight 25-29	1	123	124	
	Obese < 30	1	70	71	
	Total	4	377	381	

Table 4: Dix Hallpike test, Supine roll test and BMI of participants Crosstabulation

In the underweight group, out of 34 patients, 4(1.05%) patients had positive Dix Hallpike test and 30(7.87%) had negative test. In normal weight group, out of 152 patients, 10(2.62%) had positive test results while 142(37.27%) had negative test results. In the overweight group, out of 124 patients, 7(1.84%) had positive test results while 117(30.71%) had negative test results. In the obese group, out of 71 patients, 5(1.31%) had positive test results while 66(17.32%) had negative test results for Dix Hallpike test.

In the underweight group, out of 34 patients, 1(0.26%) had positive Supine Roll test while 33(8.66%) had negative test results. In the normal weight group, out of 152 patients, 1(0.26%) had positive test results while 151(39.63%) had negative test results. In the overweight group, out of 124 patients, 1(0.26%) had positive test results while 123(32.28%) had negative test results. In the obese group, out of 71 patients, 1(0.26%) had positive test results while 70(18.37%) had negative test results for Supine Roll test.

DISCUSSION

The research was carried out to determine the prevalence of BPPV in diabetic patients of 381 in district of Gujrat Pakistan. The study's findings indicate that the prevalence of diabetic patients with BPPV (benign paroxysmal positional vertigo) is 30(7.86%) while 351 (92.14%) did not exhibit BPPV.

In a 2019 research study, the goal of this study was to see if there was a link between age, gender, and the afflicted ear in patients with benign paroxysmal positional vertigo (BPPV). Female participants over the age of 40 were shown to be more likely to have BPPV, according to the study. Furthermore, the right posterior semicircular canal was found to be involved in the majority of instances of BPPV.[9] Our study's findings advocated this trend, as out of the 30 BPPV patients we examined, 26 of them had involvement of the posterior canal. Moreover, the study concluded that a higher number of women are affected by BPPV when compared to men.

A previous study was conducted with the objective of determining the occurrence of benign paroxysmal positional vertigo and gender in an elderly population. 494 people made up the final sample, with a median age of 69 years. The study found the prevalence of 23.9% of BPPV of which 76% were women.[16] Besides this, a significant correlation between BPPV complaints and the female population was found. The study literature confirms that BPPV is more common in women with out of total 30 BPPV diagnosed patients, 27(90.00%) were females while only 3(10.00%) were males.

Another previous study was conducted to determine the presence of benign paroxysmal positional vertigo (BPPV) associated with feeding habits. In a group of 487 people, 117 had BPPV. Among the 117 elderly individuals with BPPV, 37 (31.62%) were identified as malnourished. 97 (26.21%) of the 370 people who did not have BPPV received incorrect feeding. In the overall population, this study did not find significant relationship between nutritional habits and BPPV ($p = 0.3064$).[17] While in our study 4(1.05%) diabetic patients who had received diagnosis of BPPV are underweight, 10(2.62%) are from normal weight, 7(1.84%) are from overweight group, 5(1.31%) from obese group. However, like the previous one, there was no significant relationship identified between nutritional habits, BMI and BPPV.

In one of the previous studies, 525 respondents were included, with 56.8% female and 43.3% male. 6.9% of the sample's respondents said they had received a BPPV diagnosis that was positive among them. Education level and a BPPV diagnosis were substantially related to knowledge of the condition's prevalence ($p<0.05$).[1] Our study's results align with these observations, as we found that participant awareness was generally low, and our findings demonstrated a connection between BPPV diagnosis and disease knowledge.

Our study is consistent with a previous 2017 study that aimed to determine whether patients with BPPV were more likely to experience recurrent episodes. In the initial BPPV attack, posterior canal is affected in 134 cases (59.8%).[18] Our study's findings further supported this trend, as out of the 30 BPPV patients we examined, 26 of them had involvement of the posterior canal.

CONCLUSION

The current study concluded low prevalence of BPPV in diabetic patients. Based on this study, we summarize that there does not appear to be a connection between BPPV and diabetes.

REFERENCES

1. Alotaibi SS, Alshbiny MT, Alsehali SA, et al. Knowledge and awareness of benign paroxysmal positional vertigo among Saudi population: a cross-sectional study. *International Journal of Medicine in Developing Countries* 2020; **1**.
2. You P, Instrum R, Parnes L. Benign paroxysmal positional vertigo. *Laryngoscope investigative otolaryngology* 2019; **4**(1): 116-23.
3. Yetiser S. Review of the pathology underlying benign paroxysmal positional vertigo. *Journal of International Medical Research* 2020; **48**(4): 0300060519892370.
4. Hawke LJ, Barr CJ, McLoughlin JV. The frequency and impact of undiagnosed benign paroxysmal positional vertigo in outpatients with high falls risk. *Age and ageing* 2021; **50**(6): 2025-30.
5. Jensen JK, Hougaard DD. Incidence of Benign Paroxysmal Positional Vertigo and Course of Treatment Following Mild Head Trauma—Is It Worth Looking For? *The Journal of International Advanced Otology* 2022; **18**(6): 513.
6. Zhu CT, Zhao XQ, Ju Y, Wang Y, Chen MM, Cui Y. Clinical characteristics and risk factors for the recurrence of benign paroxysmal positional vertigo. *Frontiers in neurology* 2019; **10**: 1190.
7. Bhattacharyya N, Gubbels SP, Schwartz SR, et al. Clinical practice guideline: benign paroxysmal positional vertigo (update). *Otolaryngology–Head and Neck Surgery* 2017; **156**(3_suppl): S1-S47.
8. Al-Asadi J, Al-Lami Q. Prevalence and risk factors of benign paroxysmal positional vertigo among patients with dizziness in Basrah, Iraq. *British Journal of Medicine and Medical Research* 2015; **7**(9): 754-61.
9. Ciorba A, Cogliandolo C, Bianchini C, et al. Clinical features of benign paroxysmal positional vertigo of the posterior semicircular canal. *SAGE Open Medicine* 2019; **7**: 2050312118822922.
10. Swain S, Behera IC, Sahu MC. Prevalence of Benign Paroxysmal Positional Vertigo: Our experiences at a tertiary care hospital of India. *Egyptian Journal of Ear, Nose, Throat and Allied Sciences* 2018; **19**(3): 87-92.
11. D'Silva LJ, Staecker H, Lin J, et al. Otolith dysfunction in persons with both diabetes and benign paroxysmal positional vertigo. *Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology* 2017; **38**(3): 379.
12. Sfakianaki I, Binos P, Karkos P, Dimas GG, Psillas G. Risk factors for recurrence of benign paroxysmal positional vertigo. A clinical review. *Journal of Clinical Medicine* 2021; **10**(19): 4372.

13. Balatsouras D, Koukoutsis G, Fassolis A, Moukos A, Apris A. Benign paroxysmal positional vertigo in the elderly: current insights. *Clinical interventions in aging* 2018: 2251-66.
14. Jeon E-J, Lee D-H, Park JM, Oh J-H, Seo J-H. The efficacy of a modified Dix-Hallpike test with a pillow under shoulders. *Journal of Vestibular Research* 2019; **29**(4): 197-203.
15. Yu J, Gu Y, Meng G, et al. Nystagmus parameters of supine roll test correlates with prognosis after repositioning maneuver in horizontal semicircular canal benign paroxysmal positional vertigo. *Frontiers in Neurology* 2021; **12**: 790430.
16. Moreira MD, Costa VdSP, Melo JJ, Marchiori LLdM. Prevalence and association of benign paroxysmal positional vertigo in the elderly. *Revista CEFAC* 2014; **16**: 1533-40.
17. Schultz AR, Neves-Souza RD, Costa VdSP, Meneses-Barriviera CL, Franco PPR, Marchiori LLdM. Is there a possible association between dietary habits and benign paroxysmal positional vertigo in the elderly? The importance of diet and counseling. *International archives of otorhinolaryngology* 2015; **19**: 293-7.
18. Kim H-J, Kim J-S. The patterns of recurrences in idiopathic benign paroxysmal positional vertigo and self-treatment evaluation. *Frontiers in neurology* 2017; **8**: 690.