

Role of Lab Parameters and Recurrence of Benign Paroxysmal Positional Vertigo (BPPV)

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Abstract

Background: The most prevalent peripheral vestibular condition, BPPV, is responsible for 17–42% of dizziness diagnoses in specialty clinics. It is defined as an abrupt, unusual feeling of motion and/or rotational vertigo that lasts less than a minute and is accompanied by the typical nystagmus. Numerous biochemical alterations in our bodies, such as a lack of vitamin D, can result in vestibular evoked myogenic potentials (VEMP) in the eyes and neck as well as dysfunction of the otolith organs. **Methodology:** A Longitudinal study was conducted in a tertiary care hospital in outpatient department of ENT. All the patients in the age group of 20 to 80 years with features of benign paroxysmal positional vertigo, involving posterior semi-circular canal, who attended the out-patient department were sample population. 70 participants were followed upto 6 months for recurrence of BPPV after manoeuvre and association with lab parameters were studied. **Results:** A total of 70 patients were considered for the study. Age group of participants ranged from 24-76 years with mean age of 53.1 ± 13.5 years. There was equal representation from both gender was observed. The mean TSH value among the study subjects were 4.6. The mean value of HbA1c among the patients who had recurrence of BPPV was 6.7, while the value among the study subjects were 6.2. **Conclusion:** there was an increased incidence of BPPV in subjects with serum vitamin D deficiency. Abnormal cholesterol and Blood sugar values did not show any association with recurrence of BPPV.

Keywords: BPPV, Recurrence, Epley's maneuverer, lab parameters.

Introduction

The most prevalent peripheral vestibular condition, BPPV, is responsible for 17–42% of dizziness diagnoses in specialty clinics. It is defined as an abrupt, unusual feeling of motion and/or rotational vertigo that lasts less than a minute and is accompanied by the typical nystagmus. Vertigo is brought on by otoliths that separate from the utricle and enter the semicircular canals in this condition [1]. Head positional shifts cause symptoms, which can vary from moderate dizziness to incapacitating episodes that may cause nausea or vomiting.

Meniere's disease, migraine, otologic and non-otologic surgery, trauma or viral infections, and extended bed rest can all be secondary causes of BPPV, which can be either primary or idiopathic (50–70%) [2]. In idiopathic cases, the patient's medical history does not reveal an apparent etiology of BPPV. Even if left untreated, the majority of BPPV episodes resolve on their own in two to six weeks [3]. In 50–70% of cases, however, a clinical resolution is more frequently achieved by performing one or more maneuvers [4]. BPPV frequently recurs later. Recurrent BPPV, according to Choi et al., is

when positional nystagmus returns at least two weeks after repositioning maneuvers are performed [5].

Numerous biochemical alterations in our bodies, such as a lack of vitamin D, can result in vestibular evoked myogenic potentials (VEMP) in the eyes and neck as well as dysfunction of the otolith organs. Additionally, it has been noted that people with recurrent BPPV symptoms had higher VEMP anomalies than people with non-recurrent BPPV symptoms [6]. The link between thyroid disease and inner ear dysfunction has been explained by the fact that abnormal thyroid function alters the expression of ion transporters like sodium iodide symporter (NIS) and pendrin 19, which are found in both the thyroid and the inner ear, changing the endolymphatic ionic composition of the labyrinth. It has been proposed that BPPV may be brought on by changes in the volume or composition of the vestibular labyrinth's endolymph [7].

The current study planned to assess relation of changes in lab parameters like Vitamin D levels, TSH, Total cholesterol and HbA1C levels with benign paroxysmal positional vertigo.

Methodology

A Longitudinal study was conducted in a tertiary care hospital in outpatient department of ENT. All the patients in the age group of 20 to 80 years with features of benign paroxysmal positional vertigo, involving posterior semi-circular canal, who attended the out-patient department were sample population. A convenient sampling method has been used for the study and patients diagnosed with posterior canal BPPV were included in the study. The study is conducted for a period of one and a half years from October 2020 to April 2022

Inclusion criteria

- Patients in the age group of 20 to 80 years
- Clinically diagnosed benign paroxysmal positional vertigo pertaining to the posterior semicircular canal
- Patients who were positive in Dix Hallpike manoeuvre which indicates posterior canal BPPV and
- Patients who were willing to give written informed consent to take part in the study

Exclusion criteria

- Patients who were taking treatment for malignancies, blood dyscrasias, trauma, bedridden patients, autoimmune disorders
- Patients lost to follow up.

Considering the study done by P M Picciotti et al.,^[8] proportion of patients with features of benign paroxysmal positional vertigo any one comorbidity as 19.8%≈20.0%, with 95% confidence interval absolute precision being 10.0%. 10% loss to follow up was added, final sample size was 68.

After obtaining written informed consent, the study subjects were selected based on the inclusion and exclusion criteria. A semi-structured questionnaire consisting of details on socio-demographic profile, clinical history and follow-up were used to collect the data.

The patients were tested with Dix-Hallpike's manoeuvre and those who tested positive were included in the study and the blood investigations for random blood sugar, serum TSH, serum vitamin D, total cholesterol/ lipid profile levels were sent.

Along with the therapeutic drug management, the repositioning procedure like Epley's manoeuvre, Semont's liberatory manoeuvre or Brandt-Daroff positional exercises were performed. Later the patients were assessed for reduction in the

symptoms immediately and at first, third and sixth month after the management during the follow up.

These are lab results considered for patient classification.

- Normal RBS - 70- 140 mg/dl
- HbA1c (Glycosylated Hemoglobin) in % - 4.0-6.5
 - Non diabetic adults ≥ 18 years < 5.7
 - Prediabetes (At Risk) 5.7-6.4
 - Diagnosing Diabetes ≥ 6.5
- Normal Total Cholesterol - < 200 mg/dl
- Normal TSH- 0.340-4.250 μ IU/ml
- Serum Vitamin D
 - Deficiency: Less than 20 ng/ml
 - Insufficiency: 20-29 ng/ml
 - Optimum level: 30-80 ng/ml

Results

A total of 70 patients were considered for the study. Age group of participants ranged from 24-76 years with mean age of 53.1 ± 13.5 years. There was equal representation from both gender was observed. Out of the 70 subjects with BPPV 37% subjects had pathology in the left ear, 54.3% subjects had pathology of the right ear and 8.6% subjects had pathology Bilaterally.

Among participants recurrence was observed among 15 cases. 40% of cases had HbA1c values ≥ 6.5 . Out of 70 patients 12 subjects (17.1%) had thyroid disorders and 5 subjects had recurrence. 35 subjects (50%) among the 70 patients had Vitamin D deficiency and 10 (66.7%) patients out of them presented with recurrence of BPPV. Out of the 70 subjects 13 subjects (18.6%) had elevated cholesterol levels and 3 of them presented with recurrence (Table 1).

The mean TSH value among the study subjects were 4.6. The mean value of HbA1c among the patients who had recurrence of BPPV was 6.7, while the value among the study subjects were 6.2. The mean value of TSH among the patients who had recurrence of BPPV was 4.6, while the value among the study subjects were 3.9. The mean value of Serum Vit D among the patients who had recurrence of BPPV was 20.4, while the value among the study subjects were 25.4. The mean value of Total cholesterol among the patients who had recurrence of BPPV was 166.1, while the value among the study subjects were 170 (Table 2).

Table 1: Recurrence of BPPV and lab parameters

Lab parameter		Recurrence		Total	P- value
		Yes	No		
HbA1C	4-6.5	9 (60%)	36 (65.5%)	45 (64.3%)	0.459
	≥ 6.5	6(40%)	19 (34.5%)	25 (35.7%)	
Serum Vit D	Low	10 (66.7%)	25 (45.5%)	35 (50%)	0.122
	Normal	5 (33.3%)	30 (54.5%)	35 (50%)	
TSH	< 0.34	0 (0%)	1 (1.8%)	1 (1.4%)	0.863
	0.34-4.25	10 (66.7%)	35 (63.6%)	45 (64.3%)	
	> 4.25	5 (33.3%)	19 (34.5%)	24 (34.3%)	
Total Cholesterol	Normal	12 (80%)	45 (81.8%)	57 (81.4%)	0.501
	High	3 (20%)	10 (18.2%)	13 (18.6%)	

Table 2: Mean values of lab parameters and recurrence of BPPV.

Variable	Recurrence	N	Mean	SD	Min.	Max.	P value*
HbA1c	Yes	15	6.7	1.705	4.3	11.2	0.156
	No	55	6.1	1.464	4.2	11.0	
	Total	70	6.2	1.528	4.2	11.2	
TSH	Yes	15	4.6	2.985	1.88	12.00	0.264
	No	55	3.8	2.467	0.079	11.00	
	Total	70	3.9	2.587	0.079	12.00	
Serum Vit D	Yes	15	20.4	11.267	7.7	40.0	0.117
	No	55	26.8	14.233	7.8	57.2	
	Total	70	25.4	13.826	7.7	57.2	
Total Cholesterol	Yes	15	166.1	42.394	102	266	0.693
	No	55	171.1	44.030	103	303	
	Total	70	170.0	43.430	102	303	

Discussion

Benign paroxysmal positional vertigo (BPPV) is one of the most common types of vestibular vertigo. Although canalith repositioning maneuver is an effective treatment for BPPV, nearly 50% of patients experienced at least one recurrence in 2 years after treatment. However, the underlying causes of BPPV remain unclear. In recent decades, many studies have investigated risk factors for the occurrence of BPPV, including female gender, serum vitamin D deficiency, osteoporosis, vascular risk factors, head trauma, and other potential risk factors.

It is a prospective study done among BPPV patients epley's manoeuvre was done and recurrences of BPPV was assessed after 3 month and 6 months. Lab parameters responsible for recurrence were analysed.

The proportion of subjects who had thyroid disorders in association with BPPV in our study was 17.1% and 26.7 % of them presented with recurrence. In a study conducted by Sreenivas V et.al, 9 % patients had hypothyroidism and 1% had hyperthyroidism [9]. Recurrence was not observed among those patients. Picciotti et al [1] in their study found that there is risk for recurrence in patients with thyroid disorders with odds ratio of 2.79 and p value of <0.0005.

The prevalence of vitamin D deficiency in patients diagnosed with BPPV in our study was 50%. The recurrence among patients with vitamin D deficiency (21.4%) was not statistically significant. Even though there are many studies which reports that vitamin D deficiency is a risk factor for recurrence in BPPV, in our study we couldn't find any correlation in the risk of recurrence.

Hyperlipidemia is a proven risk factor for vascular damage due to atherosclerosis. It causes arterial stiffness and arterial luminal narrowing. This will affect the blood flow in vestibular arteries and circulatory impairment. This can lead to labyrinthine ischemia and otolith instability [10].

It's a prospective study to assess lab parameters and recurrence of BPPV which is a strength of this study. However smaller sample size of the study was limitation of this study.

In conclusion there was an increased incidence of BPPV in subjects with serum vitamin D deficiency. Abnormal cholesterol and Blood sugar values did not show any association with recurrence of BPPV.

Declarations

Ethical Approval and Consent to participate

Ethical approval taken from institutional ethics committee and written consent taken prior to study from all participants.

Consent for publication

Not applicable

Availability of supporting data

Available on corresponding author upon a responsible request.

Competing interests

There are no competing interests

Funding Statement

Nil

Authors' contributions

All four authors have contributed in study design, data collection, analysis and article preparation.

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