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## VITAMIN D SUPPLEMENTATION IN TREATMENT OF BENIGN PAROXYSMAL POSITIONAL VERTIGO-IS IT BENEFICIAL ?

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### ABSTRACT

**INTRODUCTION:** Benign Paroxysmal Positional Vertigo is one the most common causes of vertigo which has pathophysiology of dislodgement of otoconial particles from the macula and gets accumulated in the semicircular canals. The formation of otoconial particles has been directly affected by Vitamin D as it affects the calcium and phosphate deposition in the bone. The hypocalcaemia associated with Vitamin D deficiency or insufficiency cause degeneration of otoconial particles. Studies have suggested a possible relationship with idiopathic BPPV and altered calcium homeostasis in the endolymph of inner ear.<sup>6</sup>

**METHODS:** In our study which was conducted between Jan 2020 to November 2020 we included all the patients with BPPV who also has Vitamin D deficiency and insufficiency. All the patients were diagnosed based on clinical features of BPPV along with levels of Vitamin D. All the patients were given Vitamin D supplementation for three months and were followed up. All the patients were evaluated by VVAS score and the severity and intensity of symptoms were noted and compared before and after Vitamin D supplementation.

**RESULTS:** In this study 50 patients were included out of which 56% were females and 44% of males. Female predominance was noted in this study. All the patients were in 36 years to 78 years of age. Maximum numbers were in the range of 51 to 70 years of age. The VVAS scores were noted with mean score was 7.4 with standard deviation of 1.2 before treatment and the VVAS score was 3.6 with standard deviation of 0.96. This showed that the severity and the intensity of the symptoms of BPPV reduced with Vitamin D supplementation along with Epleys maneuver.

**CONCLUSION:** Vitamin D supplementation in patients suffering from BPPV with Vitamin D insufficiency or deficiency resulted in an improvement in the symptomology of the patients as indicated by the comparable VVAS scores making Vitamin D Supplementation an important factor in the management of BPPV along with otoconial repositioning maneuver.

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**Introduction:**

Benign paroxysmal positional vertigo is the most common cause of vertigo<sup>1</sup>. It characterizes of short duration of vertigo, nausea and nystagmus which is positional and is associated with head position.<sup>2</sup>

The pathophysiology of benign paroxysmal positional vertigo is due to dislodgement of otoconia which is formed in the utricular macula and it gets accumulated in the semicircular canal.<sup>3</sup>

The otoconia is made up of the organic glycoprotein and outer peripheral zones containing inorganic minerals such as calcium carbonate with high levels of calcium.<sup>3</sup>

The formation of the otoconial particle in the vestibular system has been directly affected by Vitamin D as there is effect on the deposition of calcium and phosphate in the bone.<sup>4</sup>

The otoconia gradually and regularly undergoes degeneration with age and increased degeneration is seen in elderly.<sup>19,20</sup>

Certain co-morbidities in elderly patients accelerates the otoconial degeneration.<sup>18</sup>

Vitamin D, a steroidal hormone which is endogenously synthesized in response to ultra violet radiation of the skin, is a fat soluble vitamin.<sup>4</sup>

50% of the world population is affected by the deficiency of vitamin D<sup>5</sup>

Vitamin D in a normal human being is required in the range of 400 -800IU /day.

A toxicity of vitamin D can be caused if the vitamin D level is more than 40000IU.

This toxicity will cause hypercalcemia whereas hypocalcaemia associated with Vitamin D insufficiency or deficiency causes increased degeneration of otoconial particles.

Vitamin D increases the absorption of calcium from the intestine and the kidney.

Vitamin D involves in the distribution of calcium and phosphate. Several studies have suggested a possible relationship between idiopathic BPPV and altered calcium homeostasis in the endolymph of the inner ear<sup>6</sup>

**AIM & OBJECTIVES****AIMS:**

To determine the benefit of Vitamin D supplementation in the treatment of BPPV

**OBJECTIVE:**

- 1) To establish the Age and sex preponderance of BPPV with Vitamin D deficiency and with Vitamin D insufficiency.
- 2) To determine the Vitamin D levels in the BPPV patients.
- 3) To establish the relation between the Vitamin D levels and the VVAS score in BPPV.
- 4) To determine the improvement in the VVAS score after Vitamin D supplementation in BPPV.

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## **INCLUSION CRITERIA**

All the patients clinically diagnosed with BPPV.

## **EXCLUSION CRITERIA**

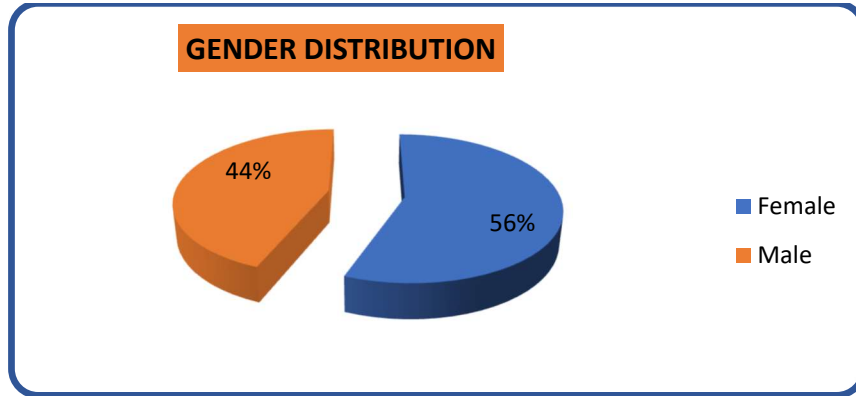
- (1) The patients who were not willing for maneuver and Vitamin D intake
- (2) Having secondary co-factors for BPPV, such as a history of head trauma, vestibular neuritis, Meniere's disease, migraines, ear surgery or sudden hearing loss, having a hip or lumbar spine fracture;
- (3) Malignant diseases, chronic renal, hepatic, stroke, cardiovascular or autoimmune diseases, gout, hypothyroidism or hyperthyroidism, the use of any drug, in particular allopurinol and/or diuretics, and a history of neurological diseases.
- 4) The patients used vitamin and/or calcium supplements, and patients with systemic diseases

## **METHODOLOGY**

The study was conducted from January 2020 to November 2020. In this prospective study patients presenting with vertigo visiting the ENT OPD of VMKV MCH, SALEM, INDIA were initially assessed, after proper history taking of all the patients presenting with vertigo and a thorough clinical examination including the Dix Hall pike test , and excluding the other causes of the vertigo, the patients clinically diagnosed as Benign paroxysmal positioning vertigo were sent for estimation of Vitamin D levels in the blood(25- hydroxy vitamine). Finally a total of 50 patients of BPPV were selected who were either Vitamin D insufficient or deficient .The patients were asked to rate their symptoms according to VVAS score .The intensity of vertigo was noted according to VVAS scale. All the patients were given Vitamin D supplementation along with the Epley's maneuver. The patients were followed up for a period of 3 months at regular intervals. The patients were asked about their symptoms after supplementation and the improvement was noted in the VVAS scoring. The intensity of the Vertigo was compared after the supplementation of Vitamin D.The data collected was analyzed to determine the effect of the vitamin D supplementation along with Epley's maneuver in the treatment of Benign paroxysmal positional vertigo.

## **RESULTS**

In this study conducted the total number of patients were 50 out of which 28 were females and 22 were males which makes 56% of females and 44 % of males with benign paroxysmal positional vertigo. Table 1 shows the sex distribution. Female predominance was seen in the study



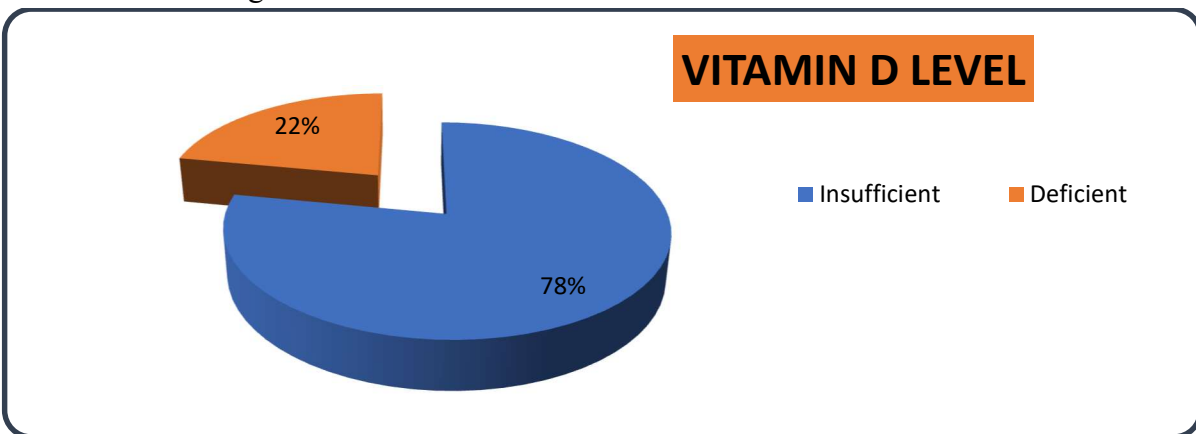
**FIGURE 1: GENDER WISE DISTRIBUTION**

Sex	Frequency	Percent
Female	28	56.0
Male	22	44.0
Total	50	100.0

**Table 1: Gender wise distribution**

Vitamin D levels of all the patients were checked and patients were classified as insufficient and deficient groups. This was done according to the serum 25hydroxy Vitamin D levels as follows:

- Deficient - <20 ng/ml
- Insufficient - 20-29 ng/ml



**FIGURE 2 VITAMIN D LEVEL**

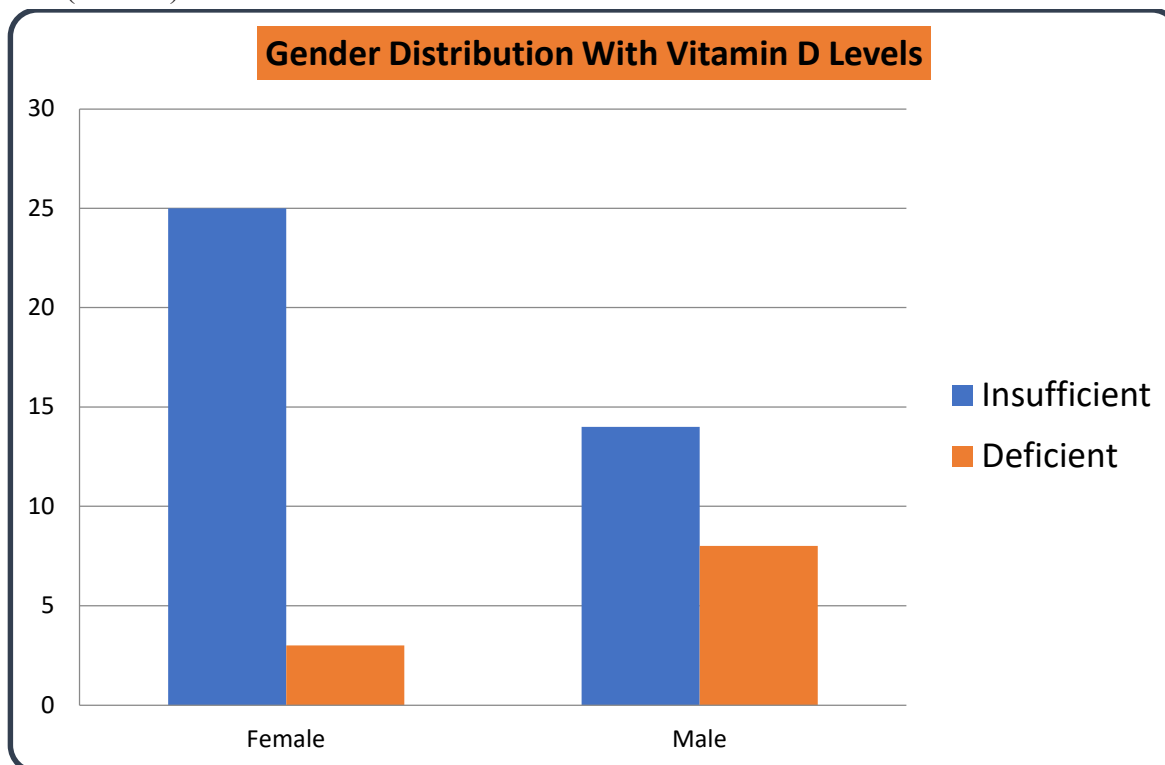
**Table 2: Vitamin D level**

Vitamin D level	Frequency	Percentage
Insufficient	39	78

Deficient	11	22
Total	50	100

In this study 39 (78%) patients were grouped in insufficient category and 11(22%) were grouped in deficient category. Table 2 shows the percentage of insufficient and deficient patients.

Out of 28 females 25 insufficient and 3 deficient, and out of 22 males 14 insufficient and 8 deficient.(table 3 )



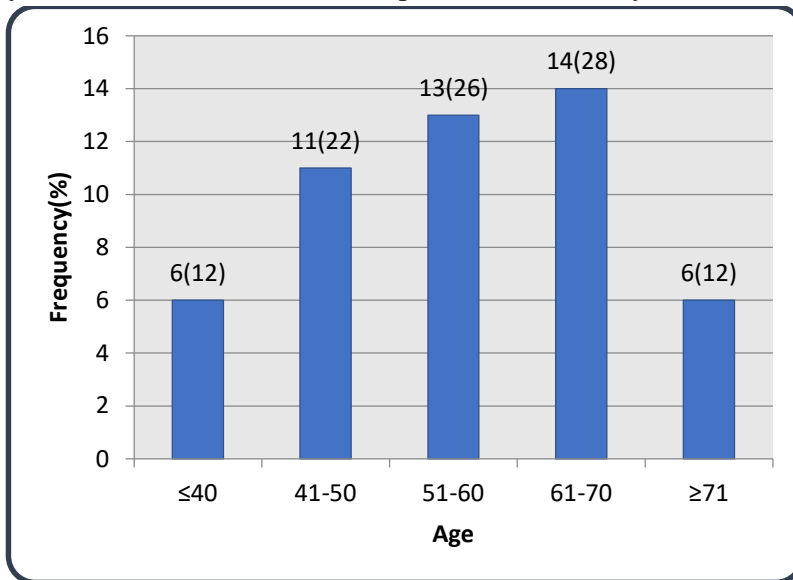
**FIGURE 3 GENDER DISTRIBUTION**

Table 3: Gender Wise Distribution With Vitamin D Level

Sex	VIT D LEVEL code		Total
	Insufficient	Deficient	
Female	25	3	28
Male	14	8	22
Total	39	11	50

The patients aged from 35 years to 76 years. The youngest being 35 years and oldest being 76 years. The age distribution with maximum participation was between 61 to 70 years. 13 patients were in the age group of 51 year to 60 years.

28% of patients were in the age group of 61-70 years and 26% in the age group of 51-60 years. Whereas only 12 % were below 40 years of age. Thus it showed that BPPV was more in the age group 61 to 70 years and twice more than the patients below 20 years.



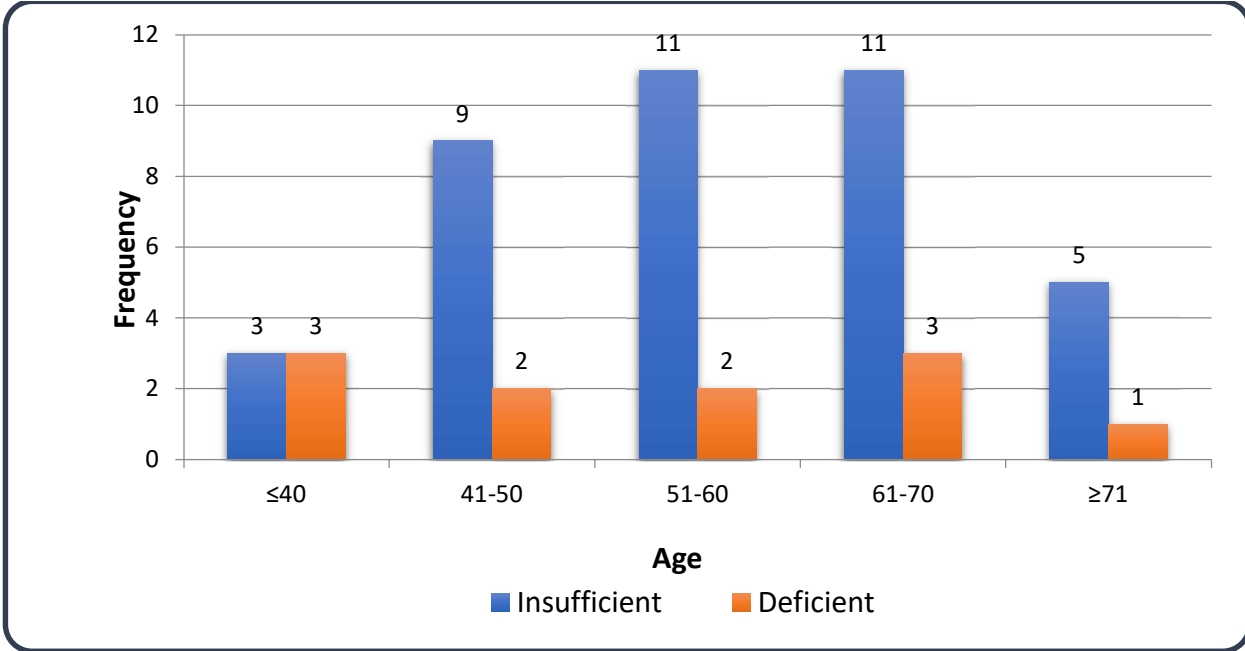
Age	Frequency	Percent
≤40	6	12.0
41-50	11	22.0
51-60	13	26.0
61-70	14	28.0
≥71	6	12.0
Total	50	100

**FIGURE 4: AGE PERCENTAGE**

A total of 14 (28%) patients aged from 61 to 70 years, out of which 11 were insufficient and 3 deficient. Table 4 shows the complete distribution of age.

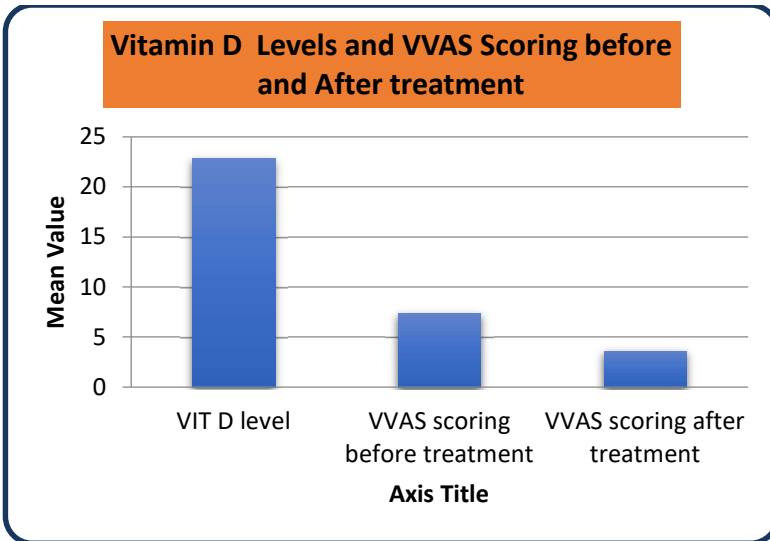
Age	VIT D LEVEL code		Total
	Insufficient	Deficient	
≤40	3	3	6
41-50	9	2	11
51-60	11	2	13
61-70	11	3	14
≥71	5	1	6
Total	39	11	50

Table 4



**FIGURE 5: VITAMIN D LEVELS WITH BPPV**

All the patients were assessed for the symptoms and were graded according to VVAS scoring. The mean VVAS scoring before the Vitamin D supplementation and Epley’s maneuver was 7.4 with Standard deviation of 3.584 and the VVAS scoring after Vitamin D supplementation for 3 months with Epleys maneuver the mean was 3.6 with standard deviation of 0.96.



**FIGURE 6: VITAMIN D LEVEL AND VVAS SCORING BEFORE AND AFTER TREATMENT**

	Mean	Std. Deviation
VIT D level	22.82	3.584
VVAS scoring before treatment	7.4	1.229
VVAS scoring after treatment	3.6	0.969

Table 6 : VVAS scoring before and after Vitamin D supplementation

According to Pearson Correlation with Vitamin D level , the VVAS scoring before treatment with Vitamin D level has negative correlation of -0.563 and P value of 0.0001

The relation of Vitamin D with VVAS scoring after treatment is less negative -0.098 as compared to VVAS before treatment.

Pearson Correlation with VIT D level

	Correlation coefficient (r)	P value
VVAS scoring before treatment	-.563	0.0001
VVAS scoring after treatment	-.098	.500

## DISCUSSION

Vertigo is a common symptom which causes hindrance in the activity and has a prevalence of about 30%. The balance of the body is maintained by involvement of multiple systems. With a proper and a detailed history followed by clinical examination 90% of cases can be diagnosed without any requirement of radiological or laboratory investigation.<sup>4</sup> This study was conducted to view the benefits of Vitamin D supplementation in the treatment of BPPV in the department of ENT, VMKVMCH, Salem. This study included 56% of females and 44% of males. BPPV is seen more in the elder population as compared to the younger population as vestibular degeneration is more in elderly.<sup>5</sup> In BPPV the vertigo lasts only for few seconds and is associated with the change in head position.<sup>4</sup> BPPV is the most common neuro otological disorder.<sup>9</sup> The Jeong et al had studied 100 patients of idiopathic BPPV , it also had 192 controls, in this study it was found that serum Vitamin D levels were lower in patients with BPPV as that in the controls.<sup>6</sup> Vitamin D is reported as a risk factor for BPPV in many other studies as well.<sup>7</sup> There are many factors which are included as the risk factor for BPPV, such as age, female gender, associated otological disease, the canal involved, number and quality of repositioning maneuver done, chronic disease and Vitamin D deficiency.<sup>17,18,19</sup> Out of these age being the most accurate one. In one of the study which had a review of 101 cases in which it was found that BPPV was more frequent in the postmenopausal female.<sup>8</sup> Similar finding was seen in our study , BPPV was found more frequent in females, out of total 50 participants 28 were females In the same study it was also noted that prevalence of BPPV was two times more in female than in males. The difference



among male and female is explained due to the difference in the hormones in the two genders.<sup>9</sup> . The number of participants with BPPV were more in the age of 60 to 70 years followed by 50 to 60 years. In the study carried out von Breven et al it was found that BPPV has seven times higher one year prevalence in the individuals with age of more than 60 years, than in younger individuals of 13 to 35 years of age.<sup>9</sup> In our study also the similar findings are noted, it is seen that the incidence of BPPV is more common in the elderly. It is assumed that the main reason for higher incidence in elderly is due to the age related degeneration of the vestibular system.<sup>10</sup>The main pathophysiology of BPPV is canalithiasis and cupulolithiasis.<sup>11</sup> Canalithiasis refers to displacement of otoconia from the gelatinous macula to the semicircular canals, whereas cupulolithiasis is the lodgment of otoconia in the cupula of the semi circular canal. In the current study it was found that the symptoms and the severity and intensity of vertigo in BPPV was reduced with supplementation of Vitamin D for three months. It was observed that the older patients with lower levels of Vitamin D had better improvement as compared to the lesser age group. This results is in agreement with the study of Taalat et al , which found that the recurrence of BPPV had a significant decrease on treatment with Vitamin D supplementation.<sup>12</sup> The study conducted by Belabuki et al evaluated the relation of Vitamin D supplementation and BPPV and was also established that vertigo improved after the Vitamin D supplementation.<sup>13</sup> A similar finding was present in the study of Sheikhzahad et al , with the supplementation of Vitamin D in BPPV patients with lower levels of Vitamin D provided additional advantage in reducing the duration of vertigo with Epleys maneuver. <sup>14</sup> In contrast to these there were other studies where it was established that there was no correlation between the Vitamin D supplementation with BPPV incidence and improvement of symptoms.<sup>15, 16</sup> There are studies which showed that the BPPV Recurrence changes along with the type of canal affected<sup>17,19</sup>, hence Vitamin D supplementation may be effective in limited conditions. In the current study the limitations are: effect of Vitamin D is not very clear and in these study all the patients of BPPV were included, including lateral canalithiasis, hence the Vitamin D effect varies. As there are many factors which play a role in the prognosis of BPPV , Vitamin D can be a major and effective factor which not only plays an important role in the occurrence of BPPV but also in reducing the severity and intensity of symptoms of BPPV with Vitamin D deficiency. Further studies in this regard may be undertaken to further outline the role of Vitamin D deficiency or insufficiency in the onset , progression and the severity and intensity of symptoms in BPPV, and a larger than the current case control study is required.

## CONCLUSION

The present study was aimed at evaluation of Vitamin D supplementation in the treatment of BPPV. In our study of 50 patients with Vitamin D insufficiency and deficiency with BPPV, we found that Vitamin D supplementation reduced the severity of the symptoms based on the improvement in VVAS scoring, making Vitamin D an important factor in the treatment of BPPV. Thus all the patients with BPPV should be assessed for serum Vitamin D levels and be supplemented with the same along with otoconia repositioning maneuver.

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