

Role of Vitamin D Supplementation in Prevention of Recurrent Benign Paroxysmal Positional Vertigo

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ABSTRACT

Objective: to determine of vitamin D administration in preventing recurring benign paroxysmal positional vertigo events.

Study Design: Quasi experimental study.

Place and Duration of Study: Department of ENT, Combined Military Hospital, Rawalpindi Pakistan, from Jul 2021 to Jan 2022.

Methodology: Study was conducted on 80 patients who were diagnosed with recurrent benign paroxysmal vertigo. Patients were enrolled in two groups (Group A and B) by lottery method. Vitamin D supplements and canal repositioning manoeuvre were administered to patients in Group A, while just canal repositioning procedure was given to patients in Group B. Patients were told to follow up over six months. Vitamin D supplement consumption and BPPV attacks were tracked over 6-month follow up period.

Results: In follow-up period, most patients in Group A 24(60.0%) had no episodes of vertigo, whereas 10(25.0%) had single episode of vertigo. Furthermore, none of the patients experienced three episodes. Many patients in Group B 19(47.5%) developed one or more episodes. The difference between both groups was statistically significant ($p < 0.05$).

Conclusion: Low vitamin D levels are found in most individuals with benign paroxysmal positional vertigo events. Vitamin D supplementation significantly decreased the frequency and recurrence of benign paroxysmal positional vertigo events, according to the findings.

Keywords: Benign Paroxysmal Positional Vertigo, Nystagmus, Recurrence, Vitamin D Deficiency.

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INTRODUCTION

Benign Paroxysmal Positional Vertigo, also named as Symptomatic Nystagmus, is a transient acute condition and serious medical illness. BPPV follows displacement of otoconia from the utricle into the semicircular canal¹. An alteration in the head's position with respect to gravity causes this condition². The pathophysiology of BPPV has recently been connected to free-floating otoconia that arise from the utricle resected from the semi circular canals³, according to SEM micrographs. The particle repositioning technique (PRM) or canal repositioning manoeuvre (CRM) has been shown to be non-invasive and effective therapeutic approach in the past⁴. This approach was demonstrated to completely alleviate symptoms in 91.3% of patients after one or two treatment cycles, and it has been recommended internationally⁵. BPPV is the most common kind of vertigo, affecting 2.4 % of the population, mostly the elderly, and accounting for around 8% of patients suffering from moderate to severe dizziness or vertigo⁶.

Multiple studies have now discovered that vitamin D insufficiency is more common in BPPV patients than in the general population⁷. Low sunlight exposure and demineralization, which produces vertigo, are two possible reasons. There was significant difference in blood vitamin D levels between the controls and the patients in a recent study of 397 community residents with a previous history of dizziness, vertigo and imbalance⁸. Negative association was observed among serum vitamin D concentration and BPPV which shows no link with demineralization but its role in development of diseases is proven⁹. Initially a case control study on this topic showed that lowering of vitamin D in serum may cause BPPV and its recurrence with similar observation reported in a clinical trial¹⁰. This study aimed to determine the effect of vitamin D supplementation on recurrent Benign Paroxysmal Positional Vertigo attacks.

METHODOLOGY

The quasi-experimental study was conducted from July 2021 to January 2022 at the Department of ENT, Combined Military Hospital (CMH), Rawalpindi Pakistan, after receiving approval from the Hospital Board of Ethics (Ser no 253/03/22). Sample size was

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calculated using OpenEPI calculator using 2.4 % lifetime prevalence of Benign Paroxysmal Positional Vertigo in a population-based survey study¹¹.

Inclusion Criteria: Patients of either gender with positional vertigo episodes produced by laying in a spine posture or head turning over, with attacks lasting less than 1 minute and positional nystagmus on clinical examination and recurring after symptoms free interval of two weeks with successful treatment were included. Vitamin D levels were checked prior to start the study and those patients having vitamin D deficiency (<10ng/ml) and insufficiency (11-20 ng/ml) were included.

Exclusion Criteria: Patients with a history of head and neck trauma, surgery for any inner ear infection in month before the BPPV attack, pulmonary or haematological diseases, chronic renal failure, cardiovascular disease, gastrointestinal disease, and those taking supplemental vitamin D and calcium were all excluded.

Patients were divided into two groups, A and B and allocated by lottery method (Figure). The Group A, received extra vitamin D in addition to CRM, and Group B, received only CRM. Patients were monitored for a period of six months. Vitamin D deficiency was classified as deficiency if serum level was less than 10ng/ml, insufficiency when the concentration was between 11-20 ng/ml, and optimum levels when the concentration was more than 20 ng/ml. Vit D was administered to Group A as cholecalciferol in doses of 8000 IU/day for 15 days, 4000 IU/day for 15 days, and then 8000 IU¹² for three months as a single dosage per month. During this time, clinical assessments were repeated, and blood vitamin D levels were measured in both groups after 6 months. At the initial visit, patients were examined and re-evaluated after one month, two months, three months, and six months. During a 6-month follow-up period, BPPV episodes were documented in each group.

For data analysis, the Statistical package for social sciences (SPSS) version 23.0 was utilised. Age and the number of BPPV episodes were expressed as mean and SD. Categorical data was reported using frequency and percentages. To test the mean difference of the results between two groups, Student's t-test was used, with the *p* value ≤0.05 being statistically significant.

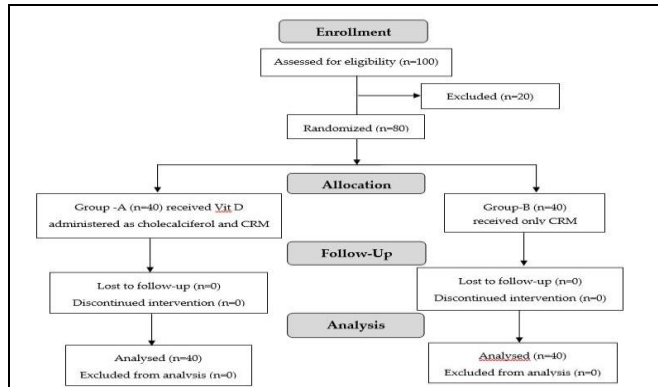


Figure: Patient Flow Diagram (n=80)

RESULTS

Our study included 80 individuals who had been diagnosed with recurrent BPPV with Vitamin D deficiency or insufficiency. All patients were allocated into two equal groups, with 40 receiving vitamin D and CRM (Group A) and 40 receiving only CRM (Group B). There were no significant differences between demographic factors and groups. After six months, Group A's average vitamin D level was significantly higher than Group B's. After and before vitamin D therapy, the average vitamin D level in Group A was 11.03±1.85 and 24.54±1.29, respectively. In Group B Vitamin D levels before and after study were 11.53±0.70 and 13.15±0.73 respectively (Table-I). Furthermore, after six months, the recurrence rate in Group A was significantly lower than in Group B. In 6-month follow-up period, most patients in Group A (24, 60.0%) had no episodes of vertigo, whereas Group B (10, 25.0%) had single episode of vertigo. Furthermore, none of the patients experienced three episodes. Most patients in Group B n=19 (47.5%) developed at least one episode at follow-up (Table-II.) The relationship between variables was studied and shows decrease in number of recurrent episodes of BPPV with use of vitamin D in Group A and significant differences of Vitamin D levels before and after study between two groups (Table-III)

Table-I: Demographic Data of the Study Groups (n=80)

	Mean±S.D	Minimum	Maximum
Age (Years)			
Group-A	44.32±5.35	35.40	54.00
Group-B	45.77±3.40	36.50	54.10
Vitamin D Level at 1st Visit (ng/mL)			
Group-A	11.03±1.85	7.11	14.90
Group-B	11.53±0.70	9.99	12.83
Vitamin D Level after 6th Months (ng/mL)			
Group-A	24.54±1.29	35.40	54.00
Group-B	13.15±0.73	11.20	14.56

Table-II: Frequency of Gender and Episodes of Benign Paroxysmal Positional Vertigo in Study Groups (n=80)

		Group A	Group B	Total
Gender	Male	27(67.5%)	19(47.5%)	46
	Female	13(32.5%)	21(52.5%)	34
		Group A	Group B	Total
Recurrent Episodes of Benign Paroxysmal Positional Vertigo	0	24(60.0%)	5(12.5%)	29
	1	10(25.0%)	19(47.5%)	29
	2	6(15.0%)	9(22.5%)	15
	3	0(0.0%)	7(17.5%)	7

Table-III: Vitamin D Levels Before and After the Study (n=80)

Vitamin D Levels (ng/mL)	p-value	Mean Difference	95% Confidence Interval of the Difference	
			Lower limit	Upper limit
Vitamin D Levels Before study	0.113	-0.500	-1.12091	0.12041
Vitamin D Levels After study	0.001	11.390	10.92295	11.85705

DISCUSSION

Our study aimed to determine the effect of vitamin D supplementation on recurrent Benign Paroxysmal Positional Vertigo attacks. In our sample, mean age of the patients was 44.32±6.55 years and more males than females. Some studies reported that deficiency of Vitamin D is more common in female gender than in males^{13,14} but this was not supported by our findings. The majority of idiopathic BPV patients had a vitamin D level of 23 ng/mL at their lower limit in the study according to Buki *et al.*¹⁵ BPPV episodes were experienced in four people in this study for years before they were tested, with up to six episodes each year. Patients who were administered vitamin D after having BPPV episodes did not have any further attacks over the following eight months. Yu *et al.*¹⁶ conducted a meta-analysis to investigate the difference between recurrent and non-recurring BPPV episodes and found that the vitamin D difference between the two groups was statistically significant. Vitamin D (11.6 ng/ml) blood levels were also shown to be lower in people with BPPV, according to Mohsin *et al.*¹⁷. According to the research, 9 people had 3-4 BPPV episodes every year for many years, with a frequency of 3-4 recurrences per year. For the following ten months, those with BPPV who received vitamin D medication had no episodes.

In a study of 100 patients with idiopathic BPPV, Jeong *et al.*¹⁸ found that blood 25 (OH) D levels were lower in patients with idiopathic BPPV than in the

control group, and that patients with BPPV had substantially more 25 (OH) D insufficiency (20 ng/mL) than the control group. According to Xiang *et al.*¹⁹ both vitamin D deficiency (25 OH D level below 10ng/ml) and insufficiency (25 OH D level 10–20 ng/ml) are responsible for BPPV, and low serum 25 (OH) D may play a role in BPPV aetiology.

In 2013 a study by Yamanaka *et al.* concluded that there was a strong association between BPPV and low vitamin D concentration in serum²⁰ and healthy subjects in the control group had higher levels of vitamin D in their serum which is similar to our results of both groups. They propose that blood Vitamin D levels remain above 30 ng/mL, and 30 minutes of daily sunlight exposure is required to prevent BPPV recurrence. However, in current study average vitamin D level in Group A was 24.54±2.44 after supplementation. In 2016, Talaat *et al.*²¹ did a study in which vitamin D tablets were given to people with semicircular canal BPPV and supplement D insufficiency for three months while in current study supplementation was given for four months and followed up after six months. Those who took vitamin D supplements had a much lower recurrence rate than those who did not. Abdelmaksoud *et al.*²² published a study in 2021 that found that the majority of BPPV patients in Egypt had low vitamin D levels, and that supplementing with vitamin D may significantly decrease the amount of BPPV episodes.

LIMITATION OF STUDY

While our groups were larger compared to previous studies and showed positive relationship with increase in Vitamin D levels and decrease in BPPV episodes. However, some limitations of this study were that we had no data regarding how rapidly vitamin D levels prevents recurrent BPPV episodes as we did not measure Vitamin D levels at each month at follow up due to affordability and limited resources. As a result, our findings may not be generalizable to the larger population.

CONCLUSION

Most individuals with Benign Paroxysmal Positional Vertigo episodes had insufficient vitamin D levels, according to our findings. Vitamin D supplementation significantly decreased the frequency and recurrence of Benign Paroxysmal Positional vertigo events.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MS, MAH: Conception, drafting the manuscript, approval of the final version to be published.

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AH, KON: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

KZM, SA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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