


Original Research Article

Routine screening of Vitamin D status in patients with Aggressive Periodontitis - A cross sectional clinical study

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Abstract

Background: Periodontal diseases are characterized by the presence of bleeding, inflammation, sensitivity, discomfort, mobility and tooth loss. Plenty of studies supported the assumption that vitamin D deficiency might be a risk factor for periodontal diseases. Our study aimed to investigate the true association between serum vitamin D level and the presence of periodontal disease.

Materials and methods: The study evaluated 40 patients (age group 19-35 years) attending the outpatient department, Department of Periodontics and Implantology, Govt. Dental College and Hospital, Srinagar, equally divided into two groups (Group I and Group II) according to the inclusion criteria. Group I included generalized aggressive periodontitis patients while Group II included non periodontitis patients. Clinical parameters and serum 25-hydroxyvitamin D level were assessed.

Results: Serum vitamin D levels of periodontitis patients compared to non-periodontitis patients presented non statistically significant differences (p-value = 0.878).

Conclusion: Although the serum vitamin D level in aggressive periodontitis patients was lower than the healthy controls but the difference seemed to be statistically insignificant and hence it can be concluded that the serum vitamin D deficiency is not a risk factor for periodontitis.

Key words

Vitamin D, Generalized aggressive periodontitis, Healthy periodontium.

Introduction

Periodontal disease is a chronic disease with underlying bacterial etiology [1]. The bacterial etiology of periodontal disease is complex, with a variety of organisms responsible for the initiation and progression of the disease [2]. The rate of disease progression is regulated by the impact of local, systemic or environmental factors that influence the normal host–bacterial interaction. There are several factors affecting the host immunity in inflammatory conditions, which also includes deficiency of vitamin D and calcium. Vitamin D influences the expression of inflammation related cytokines and plays an important role in many chronic inflammatory diseases. The active metabolite of vitamin D, 1,25 dihydroxy vitamin D inhibit cytokine production thus helping vitamin D exhibit potential anti-inflammatory effect via modulation of immune cells and stimulated secretion of peptides through monocyte–macrophage lineage [3-8]. Thus, vitamin D deficiency results in increased inflammation and bone loss by the virtue of its immuno-modulatory effects. Polymorphisms of the vitamin D receptor gene are found to be associated with periodontitis, alveolar bone loss, clinical attachment loss and/or tooth loss supporting the potential role of vitamin D in periodontal health [9].

Although Vitamin D deficiency is linked to several infectious and inflammatory conditions, the results of the long term studying of the relationship between vitamin D level and periodontal diseases still remain diverse, especially its role in aggressive periodontitis (AgP) has not been well studied. Keeping in view the scarcity of research examining the relation between aggressive periodontitis (AgP) and vitamin D status, this study was taken into consideration.

Aim and objectives

The purpose of the present study was to evaluate the potential association between serum vitamin D and Aggressive periodontitis.

The aim of this cross-sectional study was:-

- To evaluate the levels of vitamin D in serum of periodontally healthy patients.
- To evaluate the levels of vitamin D in serum of generalized aggressive periodontitis patients.
- To determine if vitamin D deficiency is significantly associated with deteriorated periodontal status.

Materials and methods

The current study was designed as a cross-sectional study to analyze the distribution of serum vitamin D deficiency among both periodontally affected and periodontally healthy patients. The study evaluated 40 patients (age group 19-35 years) attending the outpatient department, Department of Periodontics and Implantology, Govt. Dental College and Hospital, Srinagar, equally divided into two groups (Group I and Group II) according to the inclusion criteria. Clinical parameters and serum 25-hydroxyvitamin D level were assessed. Prior to the initiation of the study, an informed consent was obtained from all the patients who agreed to participate voluntarily.

20 Patients with generalized aggressive periodontitis were allocated to the Test group (Group 1) while 20 non-periodontitis patients were allocated to the control group (Group II). Exclusion criteria included systemic disease, smoking, recent vitamin D and Calcium supplementation, bisphosphonate therapy, pregnant females, use of antibiotic or anti-inflammatory drugs within 6 months and previous periodontal surgery.

Patients are diagnosed to have generalized AgP when they present with the following: disease onset up to 35 years of age with at least 8 teeth affected (> 5 mm in CAL), at least 3 of which were not first molars or incisors, and amounts of microbial deposits inconsistent with the severity of the disease. Control subjects who show neither attachment loss nor a history of periodontitis and with no pocket depths of > 3mm at more than one site are classified as healthy controls.

Patients were given a thorough periodontal examination, including probing depth, clinical attachment level (AL), bleeding on probing (BOP), (Ainamo and Bay, 1975) and plaque index (PI). (Silness and Loe, 1964)

All blood samples were drawn in the morning from the antecubital vein (a large vessel for the insertion of peripheral intravenous catheters). The serum vitamin D is classified and defined as normal (30-100 ng/mL), mild (20-30 ng/mL), moderate (10-20 ng/mL), and severe (<10ng/ml) respectively. Liquid chromatography mass spectrometry was used to analyze the serum 25-hydroxy vitamin D (25 (OH) 2D) level in blood.

The study was approved by the Research Ethical Committee at Government Dental College, Srinagar. (No.:- ECC-GDC/0064, date:- 16/03/2022).

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean \pm SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented

by bar and pie diagrams. Student's independent t-test or Mann Whitney U-test, whichever feasible, was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables.

Results

Vitamin D level and age

The participants' age was categorized into 4 ranges; 20-24, 25-29, 30-34 and \geq 35years. The overall mean age of patients in Group I was 28.9 \pm 1.73 and in Group II was 29.4 \pm 1.89. No statistically significant differences between them was found (p value=0.389) as per **Table – 1** and **Graph - 1**.

Vitamin D level and gender

Out of 20, only seven (35%) were females and thirteen (65%) were males in Group I and nine (45%) were females and eleven (55%) were males in Group II. The distribution of male: female did not show a statistically significant difference (**Table – 2, Graph - 2**).

No significant interactions were observed with age and sex.

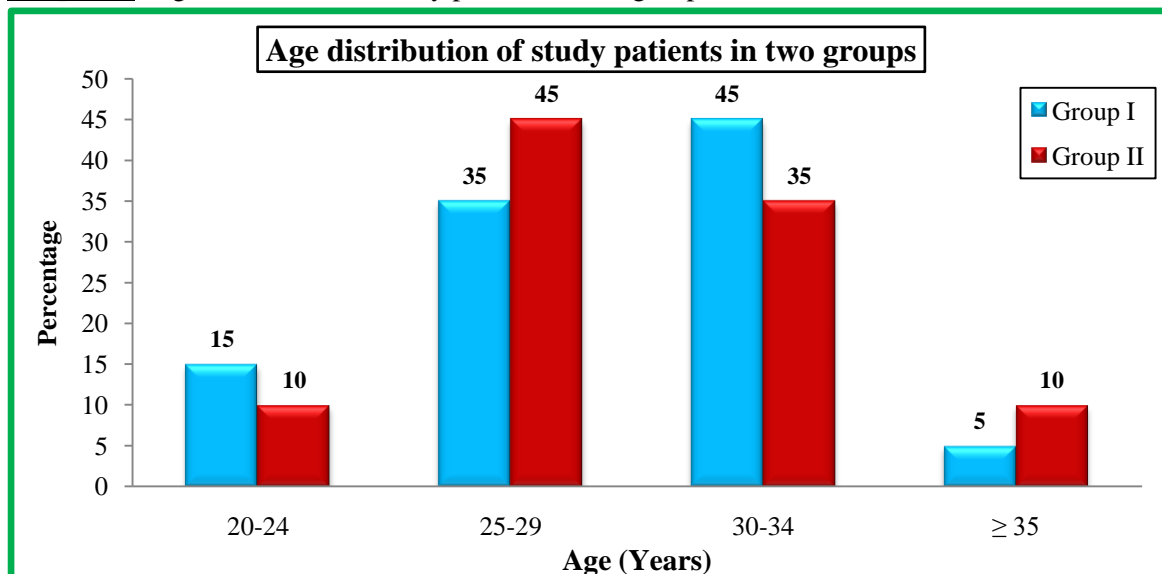
Table 1: Age distribution of study patients in two groups.

Age group (Years)	Group I		Group II		P-value
	No.	%age	No.	%age	
20-24	3	15	2	10	0.389
25-29	7	35	9	45	
30-34	9	45	7	35	
\geq 35	1	5	2	10	
Total	20	100	20	100	
Mean \pm SD (Range)	28.9 \pm 1.73 (20-35)		29.4 \pm 1.89 (21-36)		

Table - 2: Gender distribution of study patients in two groups.

Gender	Group I		Group II		P-value
	No.	%age	No.	%age	
Male	13	65	11	55	0.519
Female	7	35	9	45	
Total	20	100	20	100	

Graph – 1: Age distribution of study patients in two groups.



Graph – 2: Gender distribution of study patients in two groups.

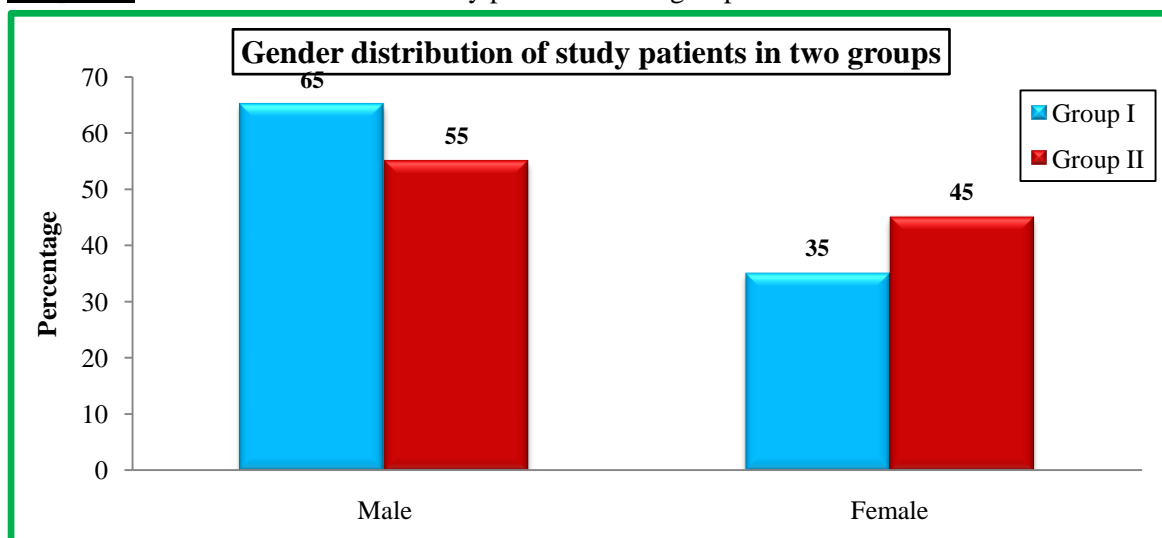


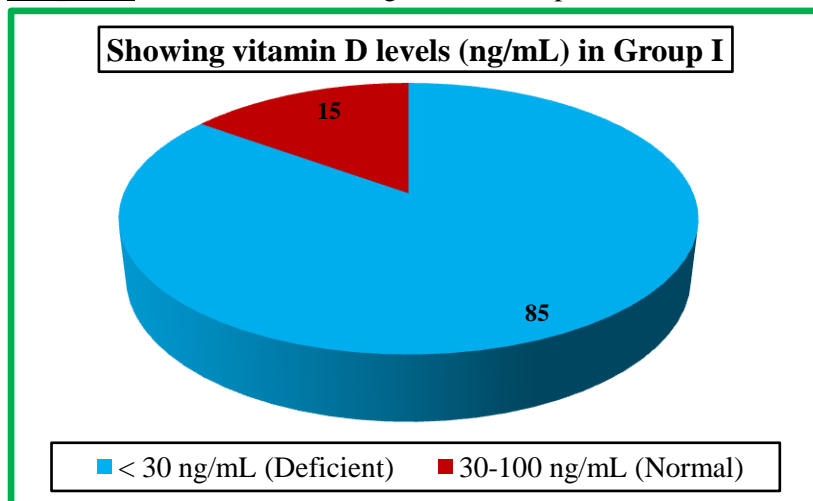
Table - 3: Vitamin D levels (ng/mL) in Group I.

Vitamin D levels (ng/mL)	Number	Percentage
< 30 ng/mL (Deficient)	17	85
30-100 ng/mL (Normal)	3	15
Total	20	100
Mean ± SD = 11.94±6.72		

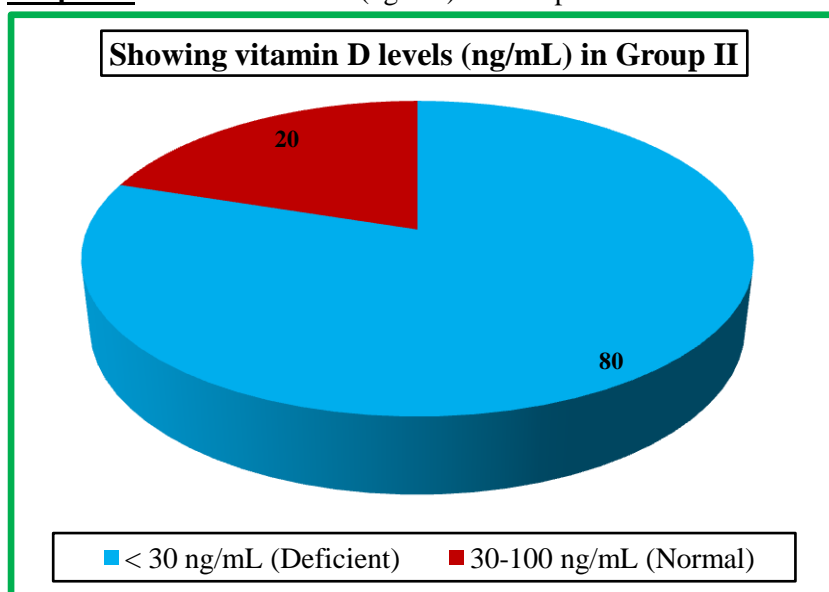
Table - 4: Vitamin D levels (ng/mL) in Group II.

Vitamin D levels (ng/mL)	Number	Percentage
< 30 ng/mL (Deficient)	16	80
30-100 ng/mL (Normal)	4	20
Total	20	100
Mean±SD=12.31±7.19		

Graph – 3: Vitamin D levels (ng/mL) in Group I.



Graph – 4: Vitamin D levels (ng/mL) in Group II.



Graph – 5: Association of vitamin D levels with periodontal status.

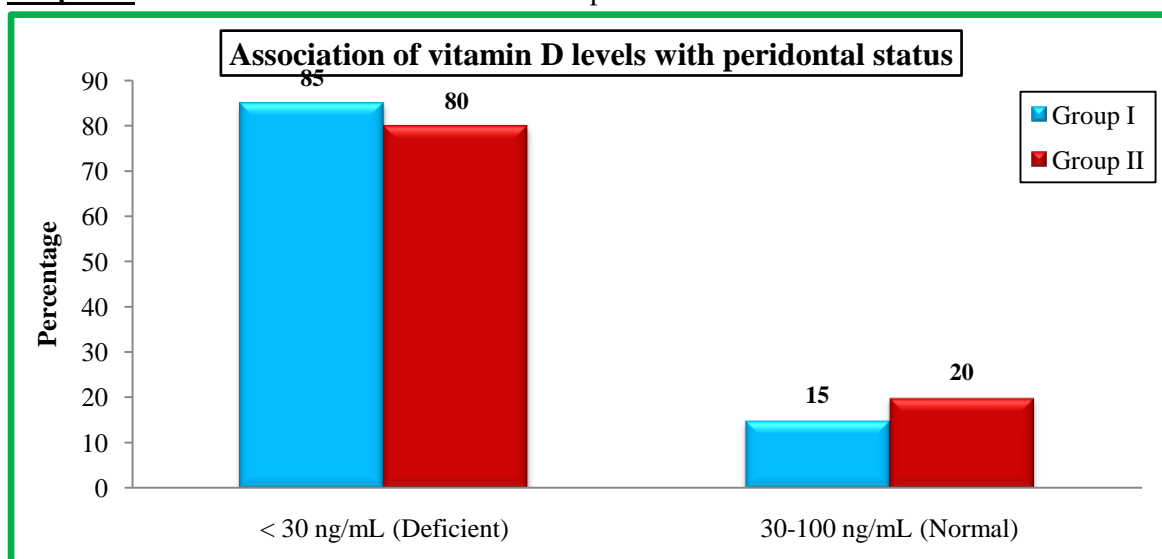


Table - 5: Association of vitamin D levels with periodontal status among study patients.

Vitamin D levels (ng/mL)	Group I		Group II		P-value
	No.	%age	No.	%age	
< 30 ng/mL (Deficient)	17	85	16	80	0.867
30-100 ng/mL (Normal)	3	15	4	20	
Total	20	100	20	100	
Mean±SD	11.94±6.72		12.31±7.19		

Vitamin D level and periodontal condition

Regarding the test group (Group I), only 3 patients (15%) reported normal level, 17 patients (85%) reported deficient vitamin D level (**Table – 3, Graph - 3**).

Among the non-periodontitis patients (Group II), only 4 patients (20%) reported normal vitamin D level whereas 80% (16 patients) reported deficiency (**Table – 4, Graph - 4**). Once it comes to association of vitamin D with periodontal condition among study patients, P value was 0.867, which was statistically non significant (**Table – 5, Graph - 5**).

Discussion

The role of vitamin D in the pathogenesis of chronic periodontal disease has received much attention over recent years. Epidemiologic studies demonstrated a link between serum vitamin D concentration and chronic periodontitis. Thomas Dietrich, Martha Nunn, Bess Dawson-Hughes, and Heike A Bischoff-Ferrari (2005) [10] evaluated the association between serum concentrations of 25-hydroxyvitamin D [25(OH)D] and gingival inflammation by analyzing data and they concluded that Vitamin D may reduce susceptibility to gingival inflammation through its anti-inflammatory effects. Gingivitis may be a useful clinical model to evaluate the anti-inflammatory effects of vitamin D. Emrah Anbarcioglu, Tugrul Kirtiloglu, et al. (2018) [11] evaluated the association between vitamin D concentration and periodontal disease, both aggressive periodontitis AgP and chronic (CP) periodontitis and results suggested that vitamin D deficiency may be a potential risk factor for AgP.

Given the high prevalence of vitamin D deficiency in AgP patients, routine screening for vitamin D status was advisable in these subjects. Anshuka A. Agrawala, Abhay P. Koltea, Rajashri A. Koltea, Suresh Charib, Madhur Guptab and Resham Pakhmodea (2019) [12] conducted a cross-sectional study to evaluate the levels of vitamin D and calcium in serum of periodontally healthy, chronic gingivitis and chronic periodontitis patients with and without T2DM and concluded that Vitamin D and calcium levels are inversely correlated with random blood sugar and glycated haemoglobin and also probing pocket depth and clinical attachment loss, thus contributing towards increase in periodontal disease severity. Yussif NM, Selim K (2021) [13] aimed to investigate if there is a true association between serum vitamin D level and the presence of periodontal disease. Conclusion so obtained was that the serum vitamin D deficiency is not a risk factor for periodontitis and their relationship is spurious.

From this study, no significant association between serum vitamin D level and the risk of periodontitis was found (as was evident from the following graphs). By analyzing the potential risk factors, it was found that gender, age as well as periodontal condition did not reveal an alteration of such association. Furthermore, periodontal condition showed no correlation with the serum level of vitamin D.

Conclusion

Based on our study results, we concluded the following. - Both groups presented vitamin D deficiency irrespective of the periodontal condition, so the Vitamin D deficiency could not

be considered as a risk factor for aggressive periodontitis.

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