

The Association between Low Serum Vitamin D level & Periodontal Diseases in Bangladeshi Population- An Observational Study

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Abstract:

Background: Bangladeshi population (20-45 age) presents early loss of tooth without any history of systemic disease. Low serum vitamin D level is one of the factors of early tooth loss. The aim of the study is to assess the significance of low or insufficient serum vitamin D level as a factor of early tooth loss in Bangladesh perspective.

Materials and Methods: An observational study was performed in dental unit of TMSS Medical College from January 2021 to December 2022 after ethical clearance of IRB of this institute. Total number of patients was 70 selected by non-random sampling (judgment sampling) who fulfilled the inclusion and exclusion criteria. We assessed the variable like gingivitis, periodontal pocket & tooth mobility clinically.

Introduction:

Periodontitis is an important global public health problem due to its high prevalence and because it is the main cause of tooth loss in subjects over 40 years. Periodontitis is a multifactorial infectious disease associated with bacterial dysbiosis that leads to the loss of tooth supporting tissues. This destruction of periodontal tissues is mediated by the host's inflammatory response through the release of proinflammatory cytokines and inflammatory mediators in response to bacterial infection¹

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The depth of the periodontal pocket & gingivitis was assessed by the periodontal probe & the mobility by using a blunt instrument & feel with the fingers before & after Vit D supplementation. Data were processed and analyzed using computer software SPSS version 26.0.

Results: Deficiency of low serum vit D level has significant effect on periodontal bone resorption and after correction of serum vit D level resulted clinical improvement on periodontal health.

Conclusion: Vitamin D deficiency may place subject at risk of developing chronic periodontitis.

Key Words: Serum Vit D, Periodontitis

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Vitamin D is a group of fat-soluble hormones which are necessary for calcium metabolism, immune regulation and has great anti-inflammatory effects with bone turnover². Vitamin D also plays a defensive role against a countless number of chronic diseases such as type I diabetes, rheumatoid arthritis, multiple sclerosis, heart disease, cancers and infectious diseases^{3,4}. A deficiency in vitamin D is associated with accelerated bone turnover, reduction in bone density, and increased risk of bone fractures². Bangladeshi population (20-45 age) presents early loss of tooth without any history of systemic disease. Low serum vitamin D level is one of the factors of early tooth loss. The aim of the study is to assess the significance of low or insufficient serum vitamin D level as a factor of early tooth loss in Bangladesh perspective.

Methodology:

An observational study was performed in Dental Unit of TMSS Medical College from January 2021 to December 2022 after ethical clearance of IRB of this institute. Total number of patients was 70 selected by non-random sampling (judgment sampling) who fulfilled the inclusion and exclusion criteria. We assessed the variable like gingivitis, periodontal pocket & tooth mobility clinically. The depth of the periodontal pocket & gingivitis was assessed by the periodontal probe & the mobility by

using a blunt instrument & feel with the fingers before & after Vit D supplementation. Data were processed and analyzed using computer software SPSS version 26.0.

The inclusion criteria were patients who were physically healthy and well oriented, age group- 20 to 45, non-smoker, no systemic disease related to tooth loss, good oral hygiene. The exclusion criteria were old are group, patients with systemic disease, poor oral hygiene.

Procedures preparing & organizing materials:

Literatures were collected from national and international journals from library and through internet searching. Semi-structured questionnaire was designed by the investigator.

Procedure of data collection:

All the consecutive patients who met the inclusion criteria attending the outpatient department of dental unit TMSS Medical College were referred by the attending doctor to the researchers. Then, among these patients those who gave consent to participate in the study were taken as the study participants until fulfillment of sample size.

Procedure of Data analysis of interpretation:

Data were processed and analyzed using computer software SPSS Version 26.0.

Ethics:

The study proposal was submitted to the ethical committee of the Institutional Review Board (I.R.B) of TMSS Medical College, Bogura,

Result:

According to the cut-offs value of serum vitamin D level in our country, they are divided into four categories. These are shown below in table 1.

Table-I

<i>Diagnostic cut-offs value of serum 25(OH)D:</i>	
Status of serum 25(OH)D	Reference levels of serum 25(OH)D in ng/ml
Deficiency	<20
Insufficiency	21-30
Sufficiency	>30
Toxicity	>100

According to table, safe level of serum vitamin D is >30 to 100 ng/ml.

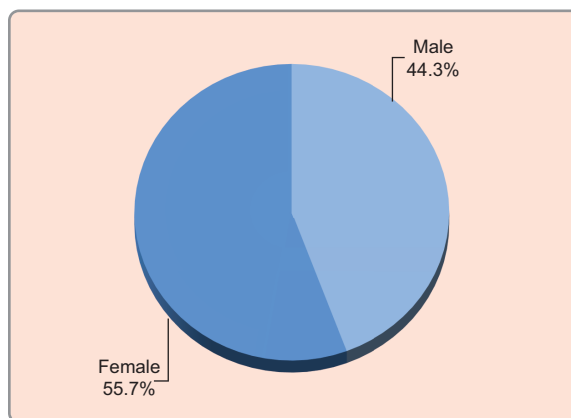


Figure 1: Sex distribution of the study subjects

The study included 70 subjects, with 31 (44.3%) being male and 39 (55.7%) being female. The male to female ratio was 1:1.3.

Table-II

<i>Age distribution of the study subjects:</i>		
Age group (years)	Frequency	Percentage
20-30	19	21.1
31-40	26	37.1
41-45	25	35.7
Total	70	100.0

The largest portion of the subjects, 37.1%, falls within the 31-40 age group, followed closely by the 41-45 age group, which makes up 35.7% of the total. Those aged 20-30 represent 21.1% of the study population.

Table-III

<i>Distribution of the study subjects by vitamin D level</i>		
Vitamin D level (ng/ml)	Frequency	Percentage
Sufficient (>30)	6	8.6
Insufficient (21-30)	27	38.6
Deficient (<20)	37	52.9
Total	70	100.0

A small percentage (8.6%) have sufficient Vitamin D levels (>30 ng/ml), while a larger group (38.6%) has insufficient levels (21-30 ng/ml).

The majority of subjects (52.9%) are categorized as having deficient Vitamin D levels (<20 ng/ml), indicating

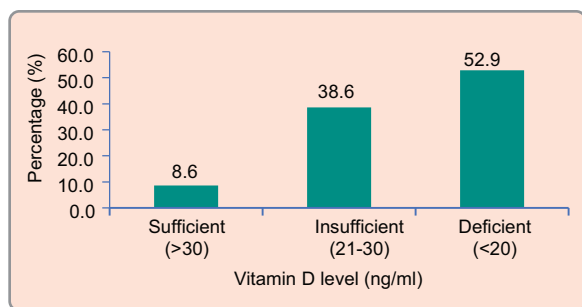


Figure-2: Bar diagram showing the vitamin D level among the patients

a notable prevalence of Vitamin D deficiency within the study population.

Table-IV

Association of vitamin D level with gender				
Gender	Vitamin D level			p-value
	Sufficient (>30) (n=6)	Insufficient (21-30) (n=27)	Deficient (<20) (n=37)	
Male	5(83.3%)	17(63.0%)	9(24.3%)	0.001 ^s
Female	1(16.7%)	10(37.0%)	28(75.7%)	
Total	6(100.0%)	27(100.0%)	37(100.0%)	

The table indicates a significant association between gender and Vitamin D level (p=0.001), with a higher percentage of males having sufficient levels of Vitamin D compared to females. The majority of females (75.7%) are categorized as having deficient Vitamin D levels, indicating a notable prevalence of Vitamin D deficiency within the female study population.

Table-V

Association of vitamin D level with age group				
Age group (years)	Vitamin D level			p-value
	Sufficient (>30) (n=6)	Insufficient (21-30) (n=27)	Deficient (<20) (n=37)	
20-30	4(66.7%)	10(37.0%)	5(13.5%)	<0.001 ^s
31-40	0(0.0%)	16(59.3%)	10(27.0%)	
41-45	2(33.3%)	1(3.7%)	22(59.5%)	
Total	6(100.0%)	27(100.0%)	37(100.0%)	

Table-5 shows the association of Vitamin D levels with age groups in a study population of 70 subjects. The table indicates a significant association between age group and Vitamin D level (p-value < 0.001s), with the highest percentage of subjects in the age group of 41-45 having deficient Vitamin D levels. The age group of 20-30 has the highest percentage of subjects with sufficient levels of Vitamin D, while the age group of 31-40 has the highest percentage of subjects with insufficient levels of Vitamin D.

Table-VII

Distribution of the study subjects by site (tooth mobility)

Site (tooth mobility)	Frequency	Percentage
Molar region (mandibular & Maxillary)	58	85.9
Molar region with anterior maxillary tooth	12	17.1
Total	70	100.0

Table-VII shows the distribution of the study subjects by site of tooth mobility. The majority of subjects (85.9%) had tooth mobility in the molar region (mandibular & maxillary), while a smaller percentage (17.1%) had tooth mobility in the molar region with an anterior maxillary tooth

Table-VIII

Outcome after 2 months of Vit-D supplementation 40000 IU capsule weekly followed by 2000 IU daily for 04 months

	Frequency	Percentage
Decrease tooth mobility & periodontal pocket depth	64	91.4
No improvement	6	8.6
Total	70	100.0

Table-VIII shows the outcome after 2 months of Vitamin D supplementation. The majority of subjects (91.4%) experienced a decrease in tooth mobility and periodontal pocket depth, while a small percentage (8.6%) showed no improvement.

Discussion:

This observational study analyzed the association between serum 25(OH) vitamin D levels & chronic

Table-VI

<i>The association between Vitamin D level with Periodontal Status</i>				
Vitamin D level status	Subjects N=70	Periodontal status		
		Gingivitis	Periodontal Pocket	Periodontitis
Sufficient	6	6	6	0
Insufficient	27	27	27	20
Deficient	37	37	37	35

periodontitis which were the greatest determining factors that influenced the periodontal health status.

According to recent study Bangladeshi population (20-45 age) presents early loss of tooth without any history of systemic disease. Lack of serum vitamin D level is one of the prompting factors of early tooth loss. The aim of this study was to assess the significance of low or insufficient serum vitamin D level as a factors of early tooth loss in Bangladeshi population.

As this is an observational study we assessed the variables like gingivitis, periodontal pocket & tooth mobility clinically. The depth of the periodontal pocket & gingivitis was assess by the periodontal probe & the mobility by using a blunt instrument & felt with the fingers before & after of Vit D supplementation.

During the last decades, several evidences showed the “perio-protective” effects of vitamin D for periodontal tissues, high-lighting a low serum vitamin D level such as a critical step for periodontal health, especially during chronic periodontitis¹⁶.

The present study showed that most of the study population were female that is (52.9%) and vit D deficient age group were 31-40 which is 37.1%.

This study also showed that out of 70 adult patients with generalized periodontal pocket and tooth mobility, deficient (<20 ng/ml) and insufficient (21-30 ng/ml) vit D level were 64 patients that is 91.4%. The common site of the tooth mobility & periodontal pocket is seen in molar region that is 85.9% & 17.1% patient shown generalized tooth mobility & periodontal pocket. The result of my study is similar to a study among Saudi population.

In our study, after giving vit D supplement (orally) 40000 IU weekly for 02 months & 2000 IU daily for 04 months, the tooth mobility & periodontal pocket decreased clinically in 91.4% patients. No improvement was seen in 8.6% patients.

In the present study, the number of teeth, gingivitis, periodontal pocket & tooth mobility was significantly

related to Vit D level. Our findings are consistent with those investigated the relationship between tooth mobility & Vit D level. Studies on a large cohort have shown that the presence of mild or severe attachment loss or gingival bleeding is associated with low serum vit D level.

The primary function of vit D has long been recognized as a key role in the regulation of serum calcium levels & regulate the alveolar bone growth & periodontal ligament hemostasis. Vit D was reported to possess specific anti-inflammatory, antimicrobial activity. It has been shown that vitamin D modulates the adaptive immune response by selective stimulation of the production of cytokines, T-helper lymphocytes, monocytes, and macrophages to release peptides, such as defensins and cathelicidin, that possess good anti-inflammatory effects on periodontal tissues. The anti-inflammatory action has been demonstrated to be one of the most protective effects of vitamin D, in a dose-de-pendent manner, against periodontal pathogenic bacteria¹⁴

Conclusion:

Vitamin D had a crucial role in the periodontal health of younger Bangladeshi men & female. Thus, maintaining an adequate vit D level seems decrease alveolar bone loss with good periodontal health.

Conflict of interest: We have no conflict of interest to declare.

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