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# Original ARTICLE

## Assessment and comparison of serum vitamin D levels in clinically healthy individuals and chronic periodontitis patients

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**ABSTRACT**
**Background:** Vitamin D plays a crucial role in bone maintenance and immunity; there can be a biologic rationale to suspect that Vitamin D deficiency could negatively affect the periodontium. **Material and method:** 100 patients were enrolled in this study which was divided into two groups of 50 each: Group 1: 50 patients with clinical and radiographic diagnosis of chronic periodontitis, Group 2: 50 clinically healthy. All demographic data of these patients was obtained. Blood samples of the patients were collected. These samples were sent to laboratory for biochemical analysis of serum vitamin D levels. SPSS software was used for statistical analysis. **Results:** Out of 100 patients 33 patients were less than 40 years old and 67 patients were above 40 years of age. Males were more affected in the periodontal health with 30 out of 50 patients in the periodontitis group being males. It was observed in this study that the rural population was more affected with periodontitis with 33 out of 50 patients having a rural background. Mean serum Vitamin D levels among the patients of the periodontitis group were found to be 20.31ng/ ml. Mean serum Vitamin D levels among the subjects of the control group were found to be 21.49ng/ml. The standard deviation of the periodontitis group and the control group came out to be ±11.52 and ±10.87 respectively. **Conclusion:** There was little difference between the serum Vitamin D levels of healthy subjects and patients with chronic periodontitis.
**Key words:** Vitamin D, chronic periodontitis

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## INTRODUCTION

Chronic periodontitis is a multifactorial disease primarily caused by dental plaque microorganisms with modifying effects from other local and systemic factors. It results from the immunoinflammatory response to chronic infection, which leads to the destruction of periodontal tissues. Host susceptibility plays an important role in the initiation and progression of periodontitis[1].Vitamin D plays a role in maintaining the homeostasis of various biological systems including the neuromuscular, skeletal, cutaneous, cardiovascular, and immune systems. In addition, vitamin D has tumour suppressing, anti-inflammatory, and antibacterial properties[2-4].

While there is no doubt about the essential role of vitamin D in maintaining bone and calcium homeostasis, its role in other biological systems is less well-defined[5]. Cross-sectional observational studies show that vitamin D deficiency may be associated with increased risk of chronic periodontitis [6] ,and that supplementation with vitamin D alone, or with vitamin D together with calcium may help to maintain periodontal health, may increase mineral density of the jaws, and may inhibit inflammatory alveolar bone resorption [7].

A diagnosis of vitamin D deficiency is made through serum analysis of 25(OH) D level. The normal range of serum 25(OH) D level is 20–74 ng/ ml [8]. Few studies have investigated the association between Vitamin D status, assessed with a blood biomarker, and periodontal disease. The purpose of this study was to assess and compare the serum vitamin D levels in clinically healthy individuals and chronic periodontitis patients.

## MATERIAL AND METHOD

The purpose of this study was to assess and compare the serum vitamin D levels in clinically healthy individuals and chronic periodontitis patients. In all 100 patients were enrolled in this study. These patients were divided into two groups of 50 each:

- Group 1: 50 patients with clinical and radiographic diagnosis of chronic periodontitis
- Group 2: 50 clinically healthy

The patients were also informed about the purpose of the study. Written consent was obtained. All demographic data of these patients was obtained. Detailed clinical examination was carried out and subsequent data was recorded. Radiographic records were also obtained to evaluate the extent and severity of periodontal disease. Patients with systemic diseases an immune-compromised status were excluded from the study. Pregnant females were also excluded from this study. Blood samples of the patients were collected. These samples were sent to laboratory for biochemical analysis of serum vitamin D levels. Entire data was recorded in the Microsoft excel sheets. SPSS software was used for statistical analysis. Chi square test and student T test were use to compare the variables. P-value of less than0.05was considered significant.

## RESULTS

The purpose of this study was to assess and compare the serum Vitamin D levels in clinically healthy individuals and chronic periodontitis patients. From the data collected it was seen that out of 100 patients 33 patients were less than 40 years old and 67 patients were above 40 years of age. Out of the 50 patients in the periodontitis group 36 patients were above 40 years of age and only 14 were below 40 years of age. Males were more affected in the periodontal health with 30 out of 50 patients in the periodontitis group being males (table 1).

**Table 1:** Demographic and clinical data

| Variable | | Number | |
|---|---|---|---|
| | | Periodontitis group | Control group |
| **Age :** | **Less than 40** | 14 | 19 |
| | **More than 40** | 36 | 31 |
| **Gender:** | **Male** | 30 | 22 |
| | **Female** | 20 | 28 |
| **Residence :** | **Urban** | 17 | 29 |
| | **Rural** | 33 | 21 |

It was observed in this study that the rural population was more affected with periodontitis with 33 out of 50 patients having a rural background. Remaining 17 patients were from an urban background. In the control group 29 patients were from urban and 21 were from rural background (table 1). In the current study, mean serum Vitamin D levels among the patients of the periodontitis group were found to be 20.31ng/ ml. Mean serum Vitamin D levels among the subjects of the control group were found to be 21.49ng/ml. The standard deviation of the periodontitis group and the control group came out to be ±11.52 and ±10.87 respectively. While comparing statistically, it was seen that mean serum Vitamin D levels among the patients with chronic periodontitis group was not significantly lower in comparison to the control group (table 2).

**Table 2:** Comparison of serum vitamin D levels

| Groups | Mean serum Vitamin D levels (ng/ ml) | SD |
|---|---|---|
| **Periodontitis group** | 20.31 | 11.52 |
| **Control group** | 21.49 | 10.87 |
| **p- value** | 0.69 | |

*: Significant

## DISCUSSION

The relationship between periodontitis and systemic diseases has been recognized due to the fact that periodontal pathogens might affect distant sites and organs and thus affect an overall health [9] .Vitamin D plays a crucial role in bone maintenance and immunity, there can be a biologic rationale to suspect that Vitamin D deficiency could negatively affect the periodontium. It is hypothesized that vitamin D status could modify the risk for periodontal disease[10]. Vitamin D has potential anti-inflammatory effect and its active metabolite, 1, 25 dihydroxyvitamin D inhibit cytokine production. Vitamin D deficiency results in bone loss and increased inflammation through its immunomodulatory effects [11]. Recent data suggested that Vitamin D deficiency may play a role both in periodontal disease and DM[12] The purpose of this study was to assess and compare the serum Vitamin D levels in clinically healthy individuals and chronic periodontitis patients. From the data collected it was seen that out of 100 patients 33 patients were less than 40 years old and 67 patients were above 40 years of age. Out of the 50 patients in the periodontitis group 36 patients were above 40 years of age and only 14 were below 40 years of age. Males were more affected in the periodontal health with 30 out of 50 patients in the periodontitis group being males (table 1). Vishakha Sarang Patil et al evaluated the presence of VDRs in periodontal ligament (PDL) tissue and assess their response to serum Vitamin D3 levels in chronic periodontic patients. A total of 19 chronic periodontitis patients were enrolled in the study and tested for serum 25(OH)D3 levels. Deficient patients were supplemented with Vitamin D3. PDL tissue of these patients was isolated after tooth extraction before and after supplementation of Vitamin D3 and analyzed for the presence of VDR in PDL tissue by using enzyme-linked immunosorbent assay. All the chronic periodontitis patients were found to be deficient in Vitamin D3. The mean serum 25(OH)D3 level before supplementation was 13.96 ng/mL which significantly increased to 35.12 ng/mL after supplementation of Vitamin D3 for 6 weeks. VDR analysis determined mean VDR conc. in PDL tissue to be -1.443 ng/mL, which increased to 2.38 ng/mL after supplementation. A concentration dependent correlation was seen between serum 25(OH)D3 levels and VDR conc. in PDL tissue after supplementation. The study determined Vitamin D Receptors (VDR) in PDL tissue after supplementation of Vitamin D. Thus in addition to the standard treatment modalities, Vitamin D3 supplementation would be an important factor for generation of adequate immune response[13].

It was observed in this study that the rural population was more affected with periodontitis with 33 out of 50 patients having a rural background. Remaining 17 patients were from an urban background. In the control group 29 patients were from urban and 21 were from rural background (table 1). Bhargava A et al conducted a study to investigate any relationship between periodontitis and vitamin D. Material and method:The clinico-biochemical relationship study was carried out in 168 subjects with Chronic Periodontitis. Plaque Index (PI), Gingival Index

(GI), Probing Pocket Depth (PPD), Clinical Attachment Level (CAL) are correlated with serum level of Vitamin D. Results:Statistically significant relationship between serum 25(OH) D level and periodontal parameters namely GI, PPD and CAL were observed.No relationship between 25(OH) D levels and PI was observed.This study also revealed overall low levels of serum Vitamin D in patients with chronic periodontitis but the levels of Vitamin D did not decrease with the increase in the severity of periodontitis. Conclusion:A statistically significant relationship between serum 25(OH) D level and periodontal parameters namely GI, PPD and CAL were observed. No relationship between 25(OH) D levels and PI was observed[14].

In the current study, mean serum Vitamin D levels among the patients of the periodontitis group were found to be 20.31ng/ ml. Mean serum Vitamin D levels among the subjects of the control group were found to be 21.49ng/ml. The standard deviation of the periodontitis group and the control group came out to be ±11.52 and ±10.87 respectively. While comparing statistically, it was seen that mean serum Vitamin D levels among the patients with chronic periodontitis group was not significantly lower in comparison to the control group (table 2). Rajashree Dasari et al evaluated the association between serum levels of 25-hydroxyvitamin D [25(OH)D] and 1,25(OH) $_2$ D and periodontal disease risk and also the effect of low serum levels on periodontal surgical outcomes in periodontitis patients. A total of 51 chronic periodontitis patients and 33 periodontally healthy subjects were included in the study. The serum levels of both 25(OH)D and 1,25(OH) $_2$ D were determined. Parameters, such as plaque index, bleeding on probing (BOP), clinical attachment level (CAL), and pocket depth (PD), were measured at baseline, 6 weeks, and 6 months to assess the periodontal status. The data were analyzed using chi-square test, independent sample t-test, repeated measures analysis of variance (ANOVA) with post hoc Bonferroni test. There was statistically significant association between serum 1,25(OH) $_2$ D level and periodontal health status (12.73 ± 4.19 vs. 20.36 ± 5.50). The subjects with chronic periodontitis showed low serum levels of 1,25(OH) $_2$ D, and individuals with severe deficiency have shown less clinical attachment gain and PD reduction when compared with minimal deficiency patients after the surgery. Analysis of these data suggest that low serum 1,25(OH) $_2$ D level seem to be associated with chronic periodontitis and 1,25(OH)2D deficiency negatively affects the periodontal surgical treatment outcome[15].

## CONCLUSION

From the above study the author concluded that there was little difference between the serum Vitamin D levels of healthy subjects and patients with chronic periodontitis. Further studies are recommended.

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