

Investigating the Role of Vitamin D Supplementation in Enhancing Periodontal Treatment Outcomes

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ABSTRACT

Background: A common health problem, periodontal disease, causes inflammation and harm to the tissues that surround and support the teeth. Vitamin D insufficiency and the severity of periodontal disease may be related, according to new research. The purpose of this research is to find out whether taking vitamin D supplements improves the results of periodontal therapy.

Materials and methods: One hundred people with a history of chronic periodontitis participated in a randomized controlled experiment. Vitamin D supplementation (1000 IU/day) and standard periodontal therapy were given to participants at random, or conventional periodontal therapy alone was given to the control group. At both the beginning and end of the 6-month treatment period, researchers assessed periodontal markers such as probing pocket depth (PPD) and clinical attachment level (CAL). Furthermore, vitamin D blood levels were measured both before and after the intervention.

Results: A statistically significant difference was seen between the treatment group and the control group in terms of mean CAL (3.3 mm vs 4.8 mm) and PPD (5.2 mm vs 3.8 mm), respectively, at the conclusion of the trial. A considerable improvement in vitamin D serum levels (from 20 to 30 ng/mL) was seen in the treatment group, suggesting that supplementation was adhered to. When compared to the experimental group, the control group's blood vitamin D levels changed very little.

Conclusion: It has been found that using vitamin D supplements in addition to traditional periodontal therapy can improve the effects of the treatment. Vitamin D may be useful as an adjuvant to periodontal therapy, as it significantly reduces PPD and CAL. In order to refine supplementation procedures and better understand the processes behind this association, more study is needed.

Keywords: Clinical trial, Periodontal disease, Periodontal therapy, Supplementation, Vitamin D.

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INTRODUCTION

Gingivitis and periodontitis are forms of periodontal disease, which is a common oral health problem that causes inflammation and eventual loss of tooth-supporting tissue.¹ Estimates show that around half of the adult population worldwide suffers from periodontal disease in some form, making it a major public health problem internationally.² In addition to causing tooth loss if not addressed, periodontal disease has been linked to other systemic illnesses such as diabetes and cardiovascular disease.^{3,4}

Bone metabolism and calcium homeostasis are two areas where vitamin D shines as a fat-soluble secosteroid hormone.⁵ New data has emerged in the last several years that may link vitamin D insufficiency to an increased risk of periodontal disease and its severity.^{6,7} Several periodontal cells, including immune cells and gingival epithelial cells, express vitamin D receptors, suggesting that vitamin D may have a function in regulating immune response and inflammation.^{8,9}

The precise processes underpinning the association between vitamin D level and periodontal health are still not fully understood, despite the increasing amount of research indicating a connection. Additionally, vitamin D supplementation's possible therapeutic function in periodontal therapy results is yet unclear. Consequently, the purpose of this research is to find out how much better periodontal treatment results are when vitamin D supplements are added to regular periodontal therapy.

This study aims to shed light on the possible advantages of vitamin D supplementation in the management of periodontal disease using a randomized controlled trial methodology. This

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research has the potential to improve periodontal treatment results and decrease the public health burden of periodontal disease by shedding light on the function of vitamin D in periodontal health and leading to the development of new adjunctive medicines.

MATERIALS AND METHODS

Study Design

In order to determine if vitamin D supplementation improves periodontal treatment results, this study used a randomized

controlled trial design. The Institutional Review Board gave its blessing to the experiment after it followed the guidelines laid out in the Declaration of Helsinki.¹⁰ Before being enrolled, all subjects gave their written informed permission.

Participants

A dental clinic at Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Sangli, India, was used to recruit 100 individuals with a persistent periodontitis diagnosis. The study’s inclusion criteria were a minimum blood vitamin D level of less than 30 ng/mL, a diagnosis of chronic periodontitis affecting at least 20 of the subjects’ natural teeth, and an age range of 18–65 years. Inclusion criteria included not having taken vitamin D supplements or had periodontal treatment in the past 6 months, being pregnant or nursing, or having a systemic disease that affects vitamin D metabolism.

Randomization and Intervention

One group received conventional periodontal therapy in addition to vitamin D supplementation (1000 IU/day), whereas the other group received normal periodontal therapy alone. Participants were randomly allocated to either group. Allocations were kept secret in sealed opaque envelopes, and computer-generated random numbers were used for randomization.

Periodontal Therapy

Skilled dental hygienists executed the conventional periodontal treatment on all subjects, which included scaling and root planning. Starting at baseline and continuing every 3 months for the length of the trial, participants were scheduled for treatment sessions.

Vitamin D Supplementation

Throughout the course of the research, individuals assigned to the therapy group took 1000 IU of vitamin D daily orally. Supplement compliance was tracked by self-reported intake records and frequent follow-up appointments.

Outcome Measures

Both before and after 6 months of treatment, researchers measured periodontal markers including probing pocket depth (PPD) and clinical attachment level (CAL). At six different locations on each tooth, a calibrated periodontal probe was used to assess PPD and CAL. Vitamin D status variations were also tracked by measuring blood 25-hydroxyvitamin D [25(OH)D] levels at baseline and endpoint.

Statistical Analysis

The data’s distribution dictated the statistical tests used, which might be either parametric or non-parametric. Pre- and posttreatment improvements in CAL and PPD were the main outcomes. A shift in serum 25(OH)D levels was one of the secondary outcomes. A significance level of $p < 0.05$ was used.

RESULTS

Participant Characteristics

Table 1 provides a brief overview of the demographics and health status of the control and treatment groups at the outset. When comparing the groups according to age, gender, or periodontal characteristics at baseline, no significant differences were found.

Table 1: Baseline characteristics of participants

Characteristic	Treatment group (n = 50)	Control group (n = 50)
Age (years)	45.2 ± 6.3	44.8 ± 7.1
Gender (Male/Female)	27/23	25/25
PPD (mm)	5.2 ± 0.4	5.3 ± 0.5
CAL (mm)	4.7 ± 0.6	4.8 ± 0.7
Serum 25(OH)D (ng/mL)	20.1 ± 3.2	19.8 ± 2.9

Table 2: Changes in periodontal parameters

Parameter	Treatment group (n = 50)	Control group (n = 50)
PPD at baseline (mm)	5.2 ± 0.4	5.3 ± 0.5
PPD at 6 months (mm)	3.8 ± 0.3	4.6 ± 0.4
Change in PPD (mm)	-1.4 ± 0.5*	-0.7 ± 0.4
CAL at baseline (mm)	4.7 ± 0.6	4.8 ± 0.7
CAL at 6 months (mm)	3.3 ± 0.4	4.2 ± 0.5
Change in CAL (mm)	-1.4 ± 0.6*	-0.6 ± 0.3

*Significant difference compared to baseline within the group ($p < 0.05$)

Table 3: Changes in serum 25(OH)D levels

Group	Baseline (ng/mL)	6 months (ng/mL)	Change (ng/mL)
Treatment group	20.1 ± 3.2	30.5 ± 4.1	10.4 ± 3.9*
Control group	19.8 ± 2.9	20.2 ± 3.0	0.4 ± 0.8

*Significant difference compared to baseline within the treatment group ($p < 0.05$)

Periodontal Treatment Outcomes

Table 2 presents the changes in periodontal parameters (PPD and CAL) from baseline to 6 months posttreatment in both the treatment and control groups.

Serum 25(OH)D Levels

Table 3 displays the changes in serum 25-hydroxyvitamin D [25(OH)D] levels from baseline to 6 months posttreatment in both groups.

Vitamin D supplementation in addition to conventional periodontal therapy resulted in statistically significant improvements in periodontal health, as measured by reduced PPD and CAL in the treatment group as compared to the control group. Vitamin D supplementation was further confirmed by the fact that the treatment group’s serum 25(OH)D levels increased significantly. Based on these results, vitamin D supplementation may have a positive role in improving the results of periodontal therapy.

DISCUSSION

This study’s results provide more evidence that vitamin D supplementation, in addition to conventional periodontal therapy, may improve treatment results. Clinical attachment level and PPD were both significantly reduced in the treatment group as compared to the control group. Vitamin D supplementation compliance was also shown by the fact that blood 25-hydroxyvitamin D [25(OH)D] levels increased significantly in the treatment group.

Previous study has suggested a possible link between vitamin D level and periodontal health.^{1,2} The observed decreases in PPD and CAL in the therapy group are consistent with this idea. Vitamin D may have a role in regulating inflammation and immunological response in the periodontium, as it is expressed in many periodontium cells, including immune cells and gingival epithelial cells.³ In addition, vitamin D can help reduce inflammation and speed up the healing process, which could lead to better periodontal tissue integrity.^{4,5}

The fact that the treatment group's serum 25(OH)D levels increased shows that taking vitamin D supplements helps people get the most out of their vitamin D. A higher risk of periodontal disease has been linked to low blood 25(OH)D levels in previous research.^{6,7} So, taking a vitamin D supplement might assist with periodontal disease by addressing deficits from the inside out.

Having said that, several caveats should be noted regarding this investigation. To begin, it's possible that the results can only be applied to a certain population due to the limited sample size. To validate these findings, more research with bigger samples are necessary. In addition, the follow-up period was just six months long, so future research should examine whether or whether the periodontal health benefits are sustainable.

CONCLUSION

To sum up, this study offers some early evidence that vitamin D administration may improve the results of periodontal therapy. Vitamin D may be useful as an auxiliary tool in the treatment of periodontal disease since it reduces inflammatory reactions and speeds up the healing process. The beneficial benefits of vitamin D supplementation on periodontal health need to be further studied, preferably in bigger and longer-term clinical studies.

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