Original Article

Assessment of Outcome of Oral Supplementation of Vitamin D3 as an Adjunct to Scaling and Root Planing in Chronic Periodontitis Patients with Type II Diabetes Mellitus – A Randomized Controlled Clinical Trial

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ABSTRACT

Background: Both diabetes and periodontitis affect millions of people worldwide and Vitamin D insufficiency may create a conducive environment for the progression of diabetes and periodontal disease. The aim of the study was to assess the outcome of oral supplementation of Vitamin D3 in patients with Type 2Diabetes Mellitus with generalized chronic periodontitis, as an adjuvant toscaling and root planing. **Methodology:** A total of 92 patients, including 46 each in non-diabetic and diabetec group. Clinical parameters including Plaque Index (PI), Gingival Bleeding Index (GBI), Probing Pocket Depth (PPD), Clinical Attachment Level (CAL), levels of Vitamin D in serum, and Fasting Blood sugar were assessed at the baseline. SRP was finished for each participant in the trial. Following SRP, the first 25people in each group got 60,000 IU of oral vitamin D3 granules once a week for eight weeks, while the remaining 21 subjects from each group did not. At the conclusion of the 8th week following interventions, all the indicators were reviewed. **Results:** Following SRP and Vitamin D supplementation there was a measurably critical reduction in every one of the periodontal clinical indicators in both groups. In both groups, there was a statistically significant rise in serum vitamin D levels. **Conclusion:** In addition to SRP, vitamin D supplementation shows promise as a host immunomodulatory drug in the management of periodontitis, particularly in patients with diabetes mellitus.

KEYWORDS: *Diabetes, periodontitis, vitamin D*

INTRODUCTION

Periodontal infections are common inflammatory disorders caused by the bacteria inhabiting the biofilm of the dental plaque, affecting sizeable segments of the adult population. They cause tooth loss, alveolar bone loss, and loss of periodontal connective tissue connection.[1] Diabetes mellitus represents a group of pathological disorders characterized by aberrant glucose metabolism because of either the lack of insulin or insulin resistance. Diabetes' metabolic is known to be affected by inflammatory circumstances, and numerous overlapping pathologies exist, in which immune and metabolic processes are controlled by similar signaling networks.[2] Both diabetes and periodontitis affect millions of people worldwide, many of whom have both diseases concurrently.

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Several studies have shown shown that non-surgical periodontal treatment, in addition to the usual diabetes patient care methods, is linked to better glucose control in type 2 diabetic individuals.[3]

The potential to investigate the effects of adjunctive usage of host modulation treatment together with mechanical periodontal therapy has arisen because of the realization of the critical role of the host in the ethology of periodontitis and its response to therapy.[4]

Recent epidemiological research revealed a link between low serum 25(OH) D3 levels and a higher risk of developing type 2 diabetes.[5] Recent data have shown that individuals with diabetes and chronic periodontitis have reduced levels of Vitamin D in serum and its supplementation has improved the glycemic status and insulin sensitivity in patients with type 2 diabetes mellitus and also has improved the periodontal status in chronic periodontitis.[6,7]

The study's aim was to evaluate the effects of oral vitamin D3 supplementation given to type 2 diabetes mellitus patients with chronic periodontitis in addition to scaling and root planing (SRP).

Materials and Methods

According to the inclusion and exclusion criteria, 92 male patients in total were enrolled in the clinical research, including 46 in the non-diabetic (NDM) group and 46 in the diabetic group (DM). At baseline, clinical variables such as the PI, GBI, PPD, CAL, and serum vitamin D levels and fasting blood sugar levels were evaluated.

Every study subject got a periodontal examination clinical assessment before completing the SRP. The first 25 participants from each group received 60,000 IU of oral vitamin D3 granules once a week for 8 weeks after SRP, whereas the remaining 21 subjects from each group did not. At the conclusion of the 8th week following interventions, all the indicators were reviewed.

Statistical analysis

The t-test was utilized to look at baseline parameters, with repeated measures at 2 × 2. The ANOVA test was performed to determine the efficiency of vitamin D supplementation. One-way ANOVA test was applied to compare the mean values of fasting blood sugar in the diabetic group before and following interventions.

Results

There was a significant reduction in all the clinical parameters following SRP and following vitamin D intake in both the groups [Tables 1-3].

Table 1: Mean and SD of gingival bleeding sites by assessment and group following SRP and vitamin D supplementation

Assessment	Following SRP				Following vitamin D supplementation				*P*
	NDM		DM		NDM		DM		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Base Line	59.8	6.3	75.5	6.7	58.6	6.7	81.8	6.4	0.001
2nd month	48.2	9.2	65.9	7.05	32.4	9.1	61.7	6.4	

The levels of vitamin D in serum increased from 19.4 ng/ml to 19.6ng/ml in NDM group and from 15.7 ng/ml to 16.3 ng/ml in DM group following SRP [Table 4]. The serum vitamin D level increased from 19.22 to 49.6 ng/ml and from 15.9 to 40.5 ng/ml for NDM and DM, respectively, following vitamin D supplementation [Table 4].

Discussion

This prospective, randomized, single blind study enrolled 92 males in the age group of 35–60 years, comprising 46 non-diabetics and 46 moderately controlled forms of diabetic subjects with moderate to severe forms of chronic periodontitis but otherwise systemically healthy.

Although various therapeutic regimens are approved as supplementations, in our current study, vitamin D3 as 60,000 IU granules for 8 weeks was instituted to improve the vitamin D level in serum, which was according to research by Palomer *et al*.,[5] who assessed the effectiveness of vitamin D3 granules supplementation at 60,000 IU and concluded that vitamin D3 as weekly supplements for 8 weeks improved the deficiency status to normalcy.

A statistically significant reduction in plaque score, percentage of gingival bleeding sites, PPD, and significant gain in CAL at the end of the 2nd month following SRP was observed. Our results corroborated a study by Mohan *et al*.,[8] who assessed the efficacy of SRP in patients with type 2 diabetes mellitus and chronic periodontitis. In our study, SRP resulted in statistically significant improvement in all the periodontal clinical parameters. Similar studies performed by Cortelli *et al*.[9] also showed a significant improvement in periodontal clinical parameters following SRP.

In our current study, a statistically significant rise in the blood level of vitamin D was observed following SRP; probably, this might be because of reduced bacterial bio load which could have enhanced the re-uptake of vitamin D following SRP.

Table 2: Mean and SD of probing pocket depth by assessment and group following SRP and vitamin D supplementation

Assessment	Following SRP				Following vitamin D supplementation				*P*
	NDM		DM		NDM		DM		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Base Line	6.9	0.650	8.1	0.8	6.8	0.56	8.6	0.62	0.001
2nd month	5.8	0.70	6.8	0.79	3.9	0.55	6.2	0.81	

Table 3: Mean and SD of clinical attachment level by assessment and group following SRP and vitamin D supplementation

Assessment	Following SRP				Following vitamin D supplementation				*P*
	NDM		DM		NDM		DM		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Base Line	7.7	0.76	8.5	0.66	7.8	0.68	8.8	0.55	0.001
2nd month	6.4	0.69	6.9	0.72	4.02	0.56	6.02	0.61	

Table 4: Mean and SD of the levels of vitamin D in serum by assessment and group following SRP and vitamin D supplementation

Assessment	Following SRP				Following vitamin D supplementation				*P*
	NDM		DM		NDM		DM		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Base Line	19.4	1.8	15.75	2.05	19.22	2.8	15.9	2.1	0.001
2nd month	19.6	1.9	16.3	2.1	49.6	3.6	40.5	7.03	

A statistically significant improvement in the levels of vitamin D in serum were observed in both the groups following vitamin D supplementation, signifying that vitamin D supplementation was effective in increasing serum levels of vitamin D as compared to SRP alone-treated subjects. However, the improvement was more in NDM group than in DM group. The above observation was also in accordance with a study conducted by Sidhra *et al*.[10] citing that the vitamin D supplementation improved chronic vitamin D hypovitaminosis.

In our study, a statistically significant ($p < .0001$) improvement in glycemic control as assessed by FBS was observed following SRP in diabetic subjects with chronic periodontitis. This was in accordance by Sgolastra *et al*.,[11] where a similar metabolic control was observed in DM patients with CP.

Following vitamin D supplementation as an adjunct, a significant improvement in overall periodontal clinical parameters in both NDM and DM groups was observed. The above results were in accordance with a cohort study by Garcia M *et al*.,[12] who studied 1-year effects of calcium and vitamin D supplements in chronic periodontitis patients and observed a corresponding improvement in periodontal status.

Our findings were comparable to those of a study by Hiremath *et al*.[13] that examined the anti-inflammatory effects of vitamin D on gingivitis at various doses. Dietrich *et al*.[14] have proposed that vitamin D supplementation might be employed as an anti-inflammatory in reducing gingival inflammation.

Likewise, similar changes in PPD and CAL were observed with statistical significance. These findings were in accordance with studies performed by Alshouibi *et al*.,[15] who showed a significant improvement in PPD and CAL following vitamin D supplementation, thus establishing the biological role of vitamin D as a host modulatory and anti-inflammatory and thereby enhancing healing of wound which reflects clinically as reduction of PPD and gain in CAL.

Conclusion

In our current study, significant improvements were seen with both forms of interventions. When both interventions were compared, supplementing with vitamin D in addition to SRP provided profound changes in all clinical and biochemical parameters compared to subjects treated with SRP alone, with more improvement seen in NDM group, thus clinically establishing its pivotal role as an effective host modulating agent in treating DM subjects with chronic periodontitis.

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Conflicts of interest

There are no conflicts of interest.

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