

Effect Of Calcium Supplementation As An Adjunct To Scaling And Root Planing In The Treatment Of Chronic Periodontitis

Research Article

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Abstract

Background: Periodontal diseases are one of the most common diseases in the oral cavity. It has long been recognized that patients in periodontal maintenance programs taking calcium supplementation had better periodontal health compared to patients not taking supplementation.

Aim: To evaluate the effect of calcium supplementation as an adjunct to scaling and root planing in the treatment of chronic periodontitis.

Materials and Methods: The study was performed as a randomised controlled trial. A total of 22 patients were selected randomly, comprising two groups, 11 in each, with generalised chronic periodontitis. Both the groups underwent scaling and root planing. The first group was asked to take a placebo and the second group was advised calcium supplements for 3 weeks. The pocket depth and gingival index scores were calculated after scaling and root planing (baseline). Then subsequently after 3 weeks, the pocket depth and gingival index were re assessed. Data was analyzed using SPSS software, Version 23. Unpaired t-test was done to compare the difference in pocket depth and gingival index between the two groups.

Results: The group 1 was found to have a mean gingival index value of 2.89 ± 0.02 at baseline and 2.20 ± 0.01 after 3 weeks. The gingival index was measured to be 2.92 ± 0.03 at baseline in group 2 and post 3 weeks the gingival index value reported to be 1.50 ± 0.03 . The difference in gingival index scores between both the groups was found to be statistically significant ($p=0.002$). The mean pocket depth of the individuals who underwent only scaling and root planing were found to have a score of 5 ± 0.05 at baseline and 3 ± 0.01 post 3 weeks. In group 2 the pocket depth was measured to be 4 ± 0.02 at baseline and 2 ± 0.03 post 3 weeks. The difference in pocket depth between both the groups was statistically significant, ($p=0.000$).

Conclusion: The present study reveals that the calcium supplementation given as an adjunct to scaling and root planing was more effective compared to scaling and root planing alone in the management of chronic periodontitis.

Keywords: Calcium; Chronic Periodontitis; Pocket Depth; Scaling and Root Planing; Innovative Technique.

Introduction

Periodontitis is an inflammatory disease of the supporting tissues of the teeth caused by a group of specific microorganisms. If it is left untreated, it leads to the destruction of both soft tissues and hard tissues resulting in increased pocket depth, clinical attachment loss, recession, mobility, bone loss, pathologic migration of the teeth and tooth loss [1-7]. It is a multifactorial disease. Even though plaque is the primary etiology, the disease is aggravated by a variety of risk factors including age, systemic diseases, gender,

genetic factors, smoking, stress, hormones[8-11].

Periodontitis is one of the most common diseases in the oral cavity. In the management of periodontitis, scaling and root planing is one of the most effective methods. To help in faster healing of the periodontitis many adjuncts such as herbal agents, therapeutic agents like tetracycline, minocycline and other antibiotics. These adjuncts aid in the destruction of microorganisms and help in speedy recovery of periodontium to its normal state [3, 12-16].

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Calcium is thought to be potentially influencing risk of periodontal disease through three mechanisms: maintenance of oral bone health, anti-inflammatory activity and antimicrobial activity [17]. Vitamin D is essential for consumption of calcium from the gut and re-absorption of calcium from kidneys and bone formation in order to maintain adequate plasma calcium concentrations for calcium homeostasis, bone mineralisation and immunity [18]. There is biologic surmise that multiple actions of calcium are potentially appealing for the management of chronic periodontitis, whose pathogenesis is based on bacterial driven inflammation [19, 20]. It is speculated that the status of calcium could modify the risk of periodontitis by preventing alveolar bone loss or by mediation of the host's immune response to infection [21, 22]. Thus, there is evidence pointing to the potential role of calcium intake on dental health; however, there are controversies regarding the role of calcium supplementation in chronic periodontitis and its management [23, 24]. Definition regarding the use of optimum levels of calcium for maintenance of bone health has been a matter of debate [25-27].

Our team has extensive knowledge and research experience that has translate into high quality publications [28-47]. Literature evidence reveals only minimal studies have assessed the management of chronic periodontitis with calcium supplementation [48-53]. Therefore, the aim of this article was to assess the effect of calcium supplementation as an adjunct to scaling and root planing in the management of chronic periodontitis among the patients reported to Saveetha Dental College and Hospitals, Chennai.

Materials and Methods

Study Population:

The present randomized clinical trial was carried out from June 2020 to December 2020 in the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai, India. A total of 22 patients with generalised chronic periodontitis were enrolled. The ethical clearance was obtained from the Institutional Ethical Committee and a written informed consent was obtained from all the study participants.

Inclusion Criteria:

Patients who were systemically healthy, presence of at least 20 teeth, probing depth of 4-5 mm, presence of bleeding on probing (BOP) in at least 30% of the sites were included in the study.

Exclusion Criteria:

Smokers, pregnant or lactating mothers, patients under long term medications, systemically compromised patients were excluded from the study.

Study Design:

The sample size was taken to be 22, with 11 participants in each group Group 1, [Scaling and root planing plus placebo], Group 2, [Scaling and root planing plus calcium supplementation]. Participants were assigned to the groups by a person not involved in the study. All the subjects were assigned into group 1 and group 2 via the simple lottery method. The participants in group 1 were asked

to take the placebo for three weeks and group 2 were instructed to take the Calcium supplementation for three weeks.

Clinical Parameters:

- Loe and Silness Gingival Index (GI)
- Pocket Depth

Before recording the clinical parameters, thorough scaling and root planing was done using ultrasonic scalers. Both the parameters were then recorded (baseline). Then the respective groups were asked to intake placebo and Calcium supplements (500mg/day) for 3 weeks and the same index and pocket depth was recorded post 3 weeks.

Statistical Analysis:

The data was analyzed using Statistical Package for Social Sciences (SPSS Software, Version 23.0). Descriptive and inferential statistics were done for data summarization and presentation. Unpaired t-test was used to compare the mean values of pocket depth and gingival index between the groups. The analysed data were interpreted as graphs and tabulations.

Results

In the present study 22 periodontitis patients were enrolled. 11 patients were enrolled in group 1 (scaling and root planing), while the remaining 11 patients were enrolled in group 2 (scaling, root planing and Calcium supplements). The study was carried out as a randomized clinical trial. The pocket depth and gingival index of both the groups were compared at baseline and after 3 weeks.

It was observed that there was a significant reduction in the pocket depth and gingival index scores of both the groups post 3 weeks. The group in which only scaling and root planing was done was found to have a mean gingival index value of 2.89 ± 0.02 at baseline and 2.20 ± 0.01 after 3 weeks. The gingival index was measured to be 2.92 ± 0.03 at baseline in the group which took Calcium supplements in adjunct to scaling and root planing and post 3 weeks the gingival index value reported to be 1.50 ± 0.03 . The difference in gingival index scores between both the groups was found to be statistically significant ($p=0.002$). [Fig1, Table.1].

The mean pocket depth of the individuals who underwent only scaling and root planing were found to have a score of 5 ± 0.05 at baseline and 3 ± 0.01 post 3 weeks. However in the group which used the Calcium supplements as adjunct to scaling and root planing the pocket depth was measured to be 4 ± 0.02 at baseline and 2 ± 0.03 post 3 weeks. The difference in pocket depth between both the groups was statistically significant, ($p=0.000$). [Fig2, Table.1].

Discussion

The present study assessed the effect of calcium supplementation as an adjunct to scaling and root planing in the treatment of chronic periodontitis.

In the present study, all the clinical parameters assessed in both groups showed that both interventions were effective in restoring periodontal health.

Table 1. Comparison of mean gingival index score and pocket depth between the study groups using unpaired t-test.

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									lower	upper
GINGIVAL INDEX	Equal variances assumed	11.075	0.002	1.669	42	0.103	0.336	0.201	0.07	0.743
	Equal variances not assumed			1.669					35.127	0.104
POCKET DEPTH	Equal variances assumed	24.518	0	2.689	42	0.01	1	0.372	0.249	1.751
	Equal variances not assumed			2.689					31.03	0.011

Figure 1. Comparison of difference between scaling and root planing alone versus scaling and root planing with Calcium supplementation in terms of gingival index scores. X-axis depicts the modality of treatment adopted in the study: scaling and root planing, scaling root planing with calcium supplement. The Y-axis depicts the mean gingival index value. Blue bar depicts the preoperative gingival index scores; green bar depicts the postoperative gingival index scores. The reduction in gingival index score was higher in the group which had taken Calcium supplements as adjunct compared to the group in which only scaling and root planing was done. The difference was found to be statistically significant with the p value of 0.002 (unpaired t-test).

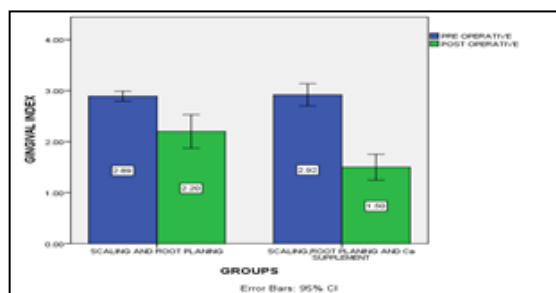
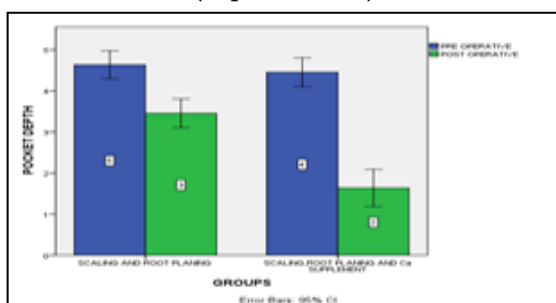


Figure 2. Comparison of difference between scaling and root planing alone versus scaling and root planing with Calcium supplementation in terms of pocket depth. X-axis depicts the modality of treatment adopted in the study: scaling and root planing, scaling root planing with calcium supplement. The Y-axis depicts the mean pocket depth. Blue bar depicts the preoperative pocket depth measured, green bar depicts the postoperative pocket depth measured. The reduction in pocket depth in the group which had taken calcium supplements as adjunct was higher to that compared to the group in which only scaling and root planing was done. The difference was found to be statistically significant with the p value of 0.000 (unpaired t-test).



However, when compared with patients who received scaling and root planing alone, patients who received calcium supplementation along with scaling and root planing showed drastic improvement in terms of probing pocket depth and gingival index.

Garcia *et al.*, [48] conducted a study to assess the effects of vitamin D and calcium supplementation on chronic periodontitis. In that study, it was observed calcium and vitamin D have positive effects on periodontal health. Similar results were obtained in the present study. But the difference is that in the previous study, higher doses of calcium supplementation were given for a longer time period.

The study of Hiremath *et al.*, [49] evaluated the anti-inflammatory effect of calcium on gingivitis at various doses which revealed that there was a dose-dependent anti-inflammatory effect of calcium on gingivitis and concluded that calcium was a safe and effective anti-inflammatory agent in doses 500 mg. But in their study, clinical parameters like gingival index, oral hygiene index simplified, plaque index were considered. But in this study, we have included subjects with generalized chronic periodontitis and analysed the effect of calcium on gingival and periodontal parameters. However, improvement in gingival health was similar to the previous study.

Milley *et al.*, [50] conducted a cross-sectional study and assessed the influence of vitamin D and calcium supplementation on chronic periodontitis and observed that there was better periodontal health after taking calcium and vitamin D supplementation. In their study, clinical parameters like probing depth, bleeding on probing, gingival index, furcation involvement, attachment loss and alveolar crest height were considered. But in the present study, gingival index and probing pocket depth alone were taken and proved that calcium supplementation gives a better periodontal health.

Keiko Tanaka *et al.*, [51] investigated the relationship between calcium intake and the prevalence of periodontal disease and concluded that higher calcium intake may be inversely associated with the prevalence of periodontal disease. Hildebolt *et al.*, [52] studied the effect of vitamin D and/or calcium supplementation on periodontitis and concluded that calcium supplementation and vitamin D have a beneficial effect on clinical parameters of periodontitis as a complementary therapy. The results of the present study were in agreement with the previous studies.

Even though we found that calcium supplementation along with scaling and root planing significantly reduces the clinical parameters like gingival index and probing pocket depth, when compared to scaling to root planing alone, these results cannot be generalised since this study was conducted among a small population with short term follow-up. Therefore, more randomized controlled clinical trials with long term follow-up are warranted to confirm this finding.

Conclusion

The present study reveals that the calcium supplementation given as an adjunct to scaling and root planing was more effective compared to scaling and root planing alone in the management of chronic periodontitis.

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