

Original Research Article

Effect of Lycopene Antioxidant Therapy as an Adjunct to Oral Prophylaxis in Chronic Gingivitis Patients

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Abstract: The aim of the present study was to assess gingival index at baseline and one month after oral prophylaxis with and without lycopene antioxidant therapy as an adjunct to oral prophylaxis. So a study was conducted among the patients having chronic gingivitis visiting dental clinic for oral prophylaxis. A total of 30 systemically healthy subjects between the age group 35-55 years showing the signs of gingivitis were examined. They were divided into 2 groups, Group 1 and Group 2. Each group having 15 subjects. The clinical parameter such as Oral hygiene Index-Simplified (OHI-S) and Gingival Index (GI) were measured at baseline and after one month of oral prophylaxis. In Group 1 only oral prophylaxis was done and in Group 2, oral prophylaxis was done along with antioxidant therapy, where an antioxidant lycopene was given once daily for one month. All the patients were recalled after 30 days to check the clinical parameters again. In group 1 the reduction in GI after treatment is 0.59 and group 2 is 0.87. The reduction in OHI-S after the treatment in Group 1 is 1.52 and Group 2 is 2.10. As the p value obtained from statistical analysis is significant, antioxidant lycopene could be used as an adjunct to oral prophylaxis and is effective in the patients with gingivitis. Antioxidant lycopene can be used as an adjunct to oral prophylaxis and is found to be effective in treatment of gingivitis.

Keywords: Periodontal disease, gingivitis, antioxidant lycopene, oral prophylaxis

INTRODUCTION

Periodontal disease is an infectious disease causing inflammation of gingiva, periodontal ligament, cementum and alveolar bone. Periodontal diseases are predominantly caused by gram negative bacteria present on tooth surface as a biofilm [1]. Dental plaque is a soft deposit formed on the tooth surface, which when mineralized, forms a hard deposit called calculus [2]. Oral microbial flora in health is loaded with gram positive organism and in diseased changes to anaerobic flora. Host immune cells like neutrophils and monocytes are released to act against these microorganisms. Inflamed periodontal tissue produces significant amount of pro-inflammatory cytokines, mainly IL-1, IL-6, PGE2, TNF- α , reactive oxygen species, proteins, host cells, ions, hormones and markers of oxidative stress and antioxidant. During phagocytosis, there is a non-mitochondrial oxygen

consumption, which may be 10 or 20 times that of resting consumption ultimately ends in generation of free radicals and reactive oxygen species (ROS), such as super oxide anion radicals, hydrogen peroxide, hydroxyl radicals and hypochlorous acid. ROS play crucial roles in normal physiological processes including response to growth factors, the immune response and apoptotic elimination of damaged cells [1].

Antioxidants are considered as emerging prophylactic and therapeutic agents. They scavenge free radicals like ROS and prevent the damage caused by them. When there is periodontal disease there is over production of free radicals, antioxidants are unable to counteract the free radicals leading to tissue destruction. Hence antioxidants are used as supplements to counteract the over production of free radicals in

periodontal disease [2]. Lycopene, a pigment that gives tomatoes red color is one of the most potent antioxidants among dietary carotenoids. Dietary intake of tomatoes and tomato products containing lycopene has been shown to be associated with a decreased risk of chronic diseases, like cancer and cardiovascular diseases.

Hence in this study efficacy of antioxidants as an adjunct to oral prophylaxis in the gingival disease was evaluated where GI and OHI S index were assessed before and after lycopene antioxidant therapy as an adjunct to oral prophylaxis.

SUBJECTS AND METHODS

A total of 30 subjects between the age group of 35-55 years were examined. They were divided into 2 groups. Each group having 15 subjects. In Group 1, 15 subjects were included who underwent oral prophylaxis alone. In Group 2, 15 subjects were included and oral prophylaxis was done along with antioxidant therapy. An antioxidant lycopene was given once daily for one month. Antioxidant lycopene capsules of 6 mg was given to the patients and was advised to take one capsule per day for 30 days and recalled after 30 days to check the clinical parameters.

Inclusion Criteria

- Good general health and age range between 35-55 years.
- With minimum 20 complement of teeth.
- Individuals with moderate gingivitis of gingival score between 1-2.

Exclusion Criteria

- Subjects with any systemic disease.
- Smokers and pan chewers.
- Pregnant and lactating women.
- Subjects on antibiotics, analgesics or antioxidants like Vit-C, Vit-E, β carotene.

Screening examination

A detail dental and medical history was recorded and Gingival Index score and Oral Hygiene Index score was measured at baseline and after one month for all subjects.

Methods

Gingival Index and Oral hygiene Index Simplified was measured for both groups at baseline. Debris and calculus level was checked using mouth mirror and straight probe whereas the gingival index was checked using the Williams graduated periodontal probe. Patients in both the groups underwent oral prophylaxis. Patients in Group 2 were given antioxidant lycopene once daily for one month. GI and OHI S index was recorded after treatment in both groups after one month. The data obtained was subjected to statistical analysis.

Statistical Analysis

Statistical analysis was done using Wilcoxon Sign Rank test and p<0.05 was considered statistically significant.

RESULTS

Lycopene antioxidant, used as an adjunct to oral prophylaxis is effective in the patients with gingivitis, as the p value obtained from statistical analysis is significant.

In Group 1 the mean value of gingival index before the oral prophylaxis was 1.11 which reduced to 0.53 after 1 month of oral prophylaxis. Also the mean value of OHI-S reduced from 3.04 to 1.52 after the treatment. In group 2 where lycopene was given for 1 month as an adjunct to oral prophylaxis, the gingival index score reduced from 1.00 to 0.14 and OHI-S from 2.57 to 0.47. The p value for both the groups is 0.001 which is statically significant (Table 1).

Table 1: Baseline and Post treatment score of Gingival Index and Oral hygiene Index -Simplified

Group			N	Mean (SD)	Median (Q1-Q3)	Range	Z	p-value
1.0	GI	Before	15	1.11 (0.46)	1.05 (0.88- 1.35)	0.28- 2	-3.41	0.001*
		After	15	0.53 (0.20)	0.6 (0.4- 0.7)	0.13- 0.8		
	OHI-S	Before	15	3.04 (1.21)	3.1 (2.6- 3.5)	0.6 - 6	-3.35	0.001*
		After	15	1.52 (0.53)	1.8 (1- 1.9)	0.65- 2.4		
2.0	GI	Before	15	1.00 (0.51)	1.05 (0.51- 1.13)	0.45- 2	-3.41	0.001*
		After	15	0.14 (0.13)	0.11 (0.03- 0.18)	0 - 0.4		
	OHI-S	Before	15	2.57 (1.35)	2.6 (1.76- 3)	0.7 - 5.32	-3.41	0.001*
		After	15	0.47 (0.41)	0.3 (0.2- 0.8)	0 - 1.3		

Wilcoxon sign rank test *p<0.05 statistically significant, P>0.05 Non significant, NS

When assessing intergroup reduction in GI and OHI-S score, there is more reduction in Group 2 when compared to Group 1. In group 1 the reduction in GI is 0.59 and group 2 is 0.87. The reduction in OHI-S in

group 1 is 1.52 and group 2 is 2.10. But the reduction seen in the clinical parameter is not statistically significant as the p value is more than 0.005 (Table 2).

Table 2: Intergroup reduction in GI and OHI-S score after treatment

		Group	N	Mean(SD)	Median(Q1-Q3)	Range	U statistic	p-value
Before	GI	1	15	1.11 (0.46)	1.05 (0.88- 1.35)	0.28- 2	95.50	.480
		2	15	1.00 (0.51)	1.05 (0.51- 1.13)	0.45- 2		
	OHI-S	1	15	3.04 (1.21)	3.1 (2.6- 3.5)	0.6 – 6	80.00	.176
		2	15	2.57 (1.35)	2.6 (1.76- 3)	0.7 - 5.32		
After	GI	1	15	0.53 (0.20)	0.6 (0.4- 0.7)	0.13- 0.8	12.50	<0.001*
		2	15	0.14 (0.13)	0.11 (0.03- 0.18)	0 - 0.4		
	OHI-S	1	15	1.52 (0.53)	1.8 (1- 1.9)	0.65- 2.4	16.00	<0.001*
		2	15	0.47 (0.41)	0.3 (0.2- 0.8)	0 - 1.3		
Change In GI And OHI-S	GI	1	15	0.59 (0.38)	0.5 (0.36- 0.68)	0.1- 1.4	69.00	0.07(NS)
		2	15	0.87 (0.51)	0.73 (0.48- 1)	0.1- 1.89		
	OHI-S	1	15	1.52 (1.07)	1.5 (0.95- 1.7)	(-) 0.4- 4.2	81.50	0.20(NS)
		2	15	2.10 (1.17)	1.8 (1.2- 2.8)	0.69- 4.82		

Wilcoxon sign rank test

*p<0.05 statistically significant

P>0.05 Non significant, NS

Figure 1 gives the range of GI score in both Group 1 and Group 2 before and after the treatment, which says that there is significant reduction in the GI

score in the Group 1 and in Group 2 (lycopen) patients.

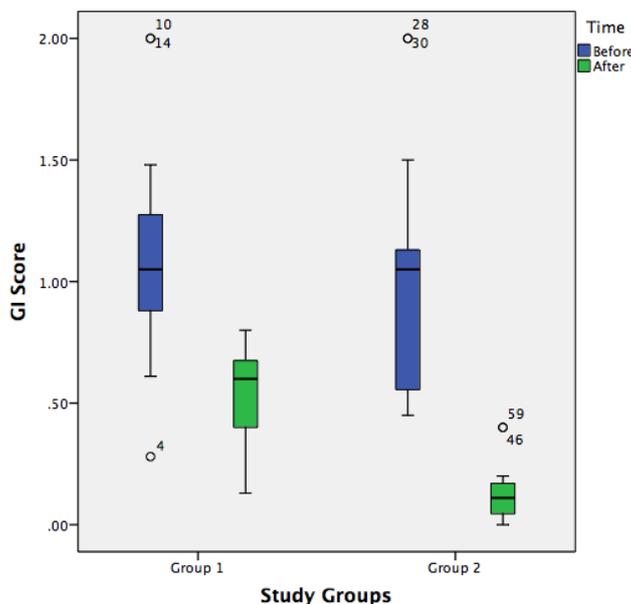


Fig-1: (Gingival Index Score): Before And After Treatment

Figure 2 gives the range of OHI-S score in both Group 1 and Group 2 before and after the treatment, which says that there is significant reduction

in the OHI-S score in the group1 patients and in Group 2 patients where lycopene was given.

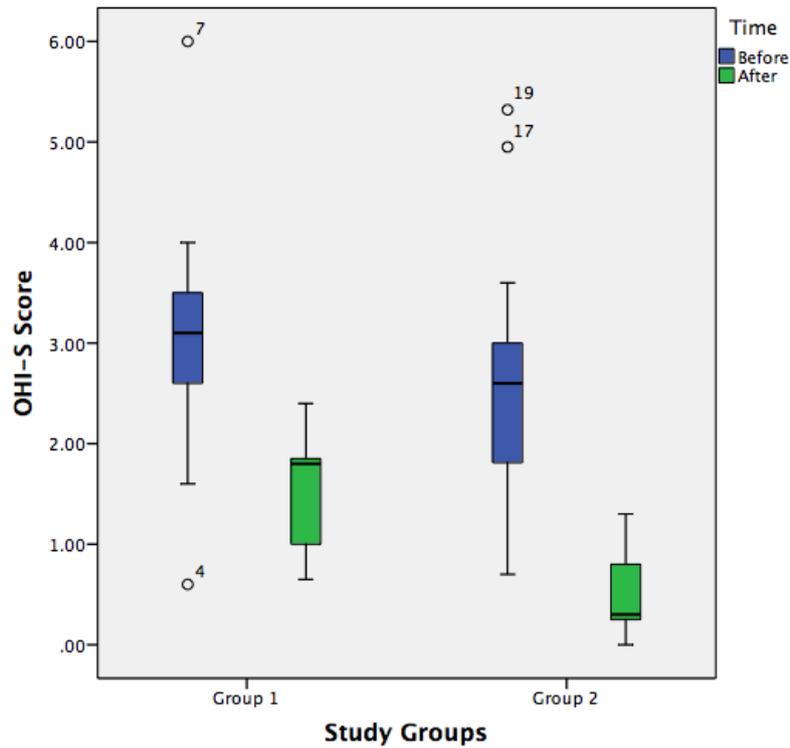


Fig-2: OHI-S Score:Before And After Treatment

Figure 3 and Figure 4 gives the intergroup reduction in the GI score and OHI S respectively. The change in the value is more in the Group 2 patients where lycopene was used in adjunct to oral prophylaxis

when compared with Group 1 where only non surgical periodontal therapy was done but was not statistically significant.

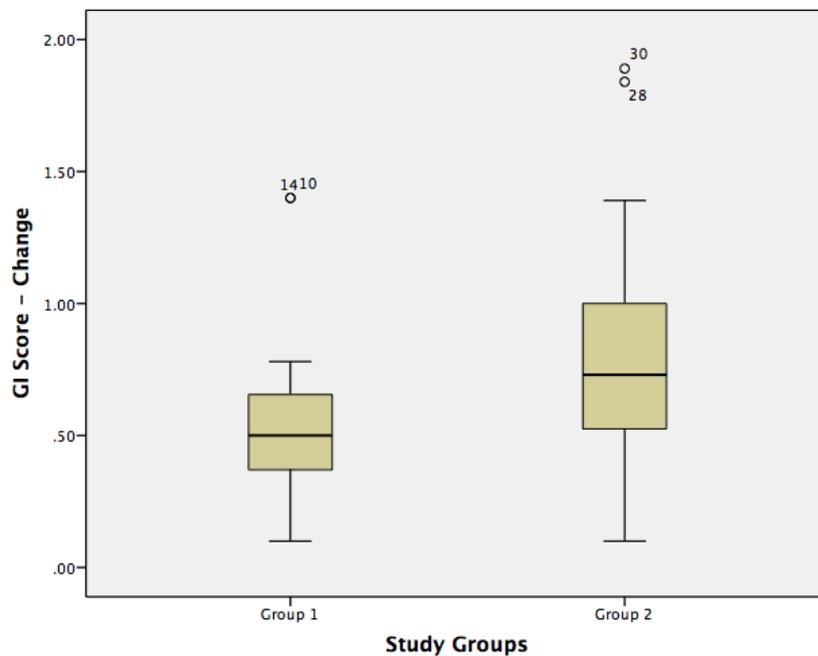


Fig-3: Change In Gingival Index Score After Treatment

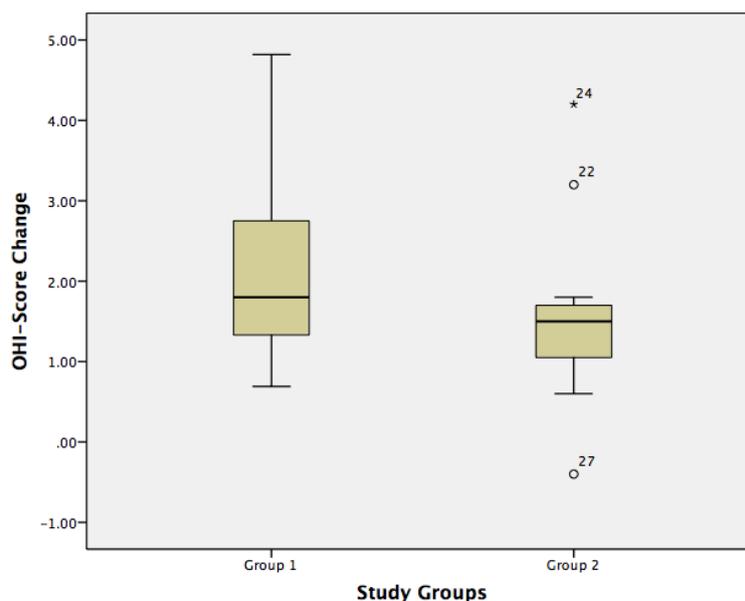


Fig-4: Change In OHI -S Score- After Treatment

Based on table 1 and 2, figure 1, 2, 3 and 4 we can say that use of antioxidant as an adjunct in the treatment of gingivitis is effective.

DISCUSSION

Oxidative stress lies at the heart of periodontal tissue damage that results from host microbial interactions, either as a direct result of excessive ROS activity, antioxidant deficiency and activation of transcription factors and the creation of pro inflammatory state. While a myriad of possible mechanisms leading to periodontal destruction exists, the influence of free radicals and antioxidants is of importance. Antioxidant defense system is very dynamic and responsive to any disturbance taking place in redox balance of body. Antioxidants can be up regulated and neutralizes free radical formation that could take place due to oxidative stress. Oxidative stress which enhances periodontal tissue damage can be controlled by antioxidant therapy. Hence, the deterioration of periodontal damage can be controlled by administering antioxidant therapy which also helps in the improvement of general health [4].

The Group 2 showed significant reduction in gingivitis when compared with the Group 1. The results seem to suggest that lycopene can be used as an adjunct to oral prophylaxis in control of gingivitis. Although the mean reduction in GI was higher in the Group 2 than in Group 1, there were no statistically significant differences between these two groups.

In our study the p value 0.001 is statistically significant for both gingival index and oral hygiene index. But inter group difference in periodontal parameters is not statistically significant. This result is different from the study done by Chandra *et al* [5] and Arora *et al* [3] as they concluded in their studies that

systemic lycopene and oral prophylaxis showed statistically significant reduction in gingival index, compared to placebo oral prophylaxis group. In both the studies, patients were followed up for 2 weeks in gingivitis patients and 2 months in chronic periodontitis patients, respectively.

Lycopene in itself does not seem to have an anti-plaque action with the group 1 showing a plaque reduction comparable to that of the group 2 but combined lycopene therapy and oral prophylaxis significantly reduced gingivitis, bleeding on probing and plaque accumulation.

Among the common carotenoids, lycopene stands as the most potent antioxidant, as demonstrated by invitro experimental systems [6]. The antioxidant potency of lycopene carotenoids is greater than alpha-tocopherol, α -carotene, β -cryptoxanthin, zeaxanthin, β -carotene and lutein [7].

There was reduction found on clinical examination of debris, calculus, bleeding on probing, inflammation change in the color of gingival in both the groups but marked reduction was found in the Group 2 where antioxidant was used as an adjunct to oral prophylaxis.

CONCLUSION

Antioxidant has been used as an adjunct to scaling and root planing and is found to be effective in treatment of gingivitis and periodontitis with marked reduction in the clinical parameters like calculus debris, bleeding on probing, inflammation, edema and change in color of the gingiva.

In our study there is reduction in GI and OHI-S score between the group receiving antioxidant in

adjunct to oral prophylaxis (Group 2) and oral prophylaxis alone (Group 1). There is more reduction of GI score in group 2 where antioxidant is used as adjunct when compared with group 1. But the p value was not statistically significant. There was reduction in GI score and OHI S score within both the groups after the treatment and p value was statistically significant. Hence, within the limitations of this study, it can be concluded that antioxidants could be used as an effective adjunct to oral prophylaxis. To further evaluate long-term effects of antioxidant therapy on periodontal inflammation, more expanded longitudinal studies are required

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