ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 12 | December - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# COMPARATIVE EVALUATION OF THE BENEFITS OF ADJUNCTIVE USE OF LYCOPENE AND VITAMIN E IN NON-SURGICAL TREATMENT OF PERIODONTITIS : A RANDOMISED CLINICAL AND MICROBIOLOGICAL STUDY

Dental Science

**Shrutika B. Borade*** Post-Graduate Student, Dept Of Periodontology, Government Dental College And Hospital, Mumbai, Maharashtra State, India. *Corresponding Author

**Akshaya Banodkar** Associate Professor Dept of Periodontology, Government Dental College and Hospital, Mumbai, Maharashtra State, India.

**Rajesh Gaikwad** Professor and Head of Department, Dept of Periodontology, Government Dental College and Hospital, Mumbai, Maharashtra State, India.

## ABSTRACT

**BACKGROUND:** This study was aimed to compare and evaluate the benefits of adjunctive use of lycopene and vitamin E in the non-surgical treatment of periodontal diseases and effect of this treatment on the periodontal microflora. **METHODOLOGY:** Systemically healthy 30 chronic periodontitis patients were included in the study. periodontal examination was performed and BANA test score were obtained. patients were randomly divided into group-I, group-II and group-III. scaling and root planing was performed for all three groups. group-II and group-III were supplimented with lycopene (Lycostar) and Vit E(Evion 400mg)respectively for 1 month. PI, BOP, PPD, CAL and BANA test score were re-evaluated after 1 month. **RESULT:** Periodontal parameters and BANA test score were significantly reduced in both group-II and group-III as compared to group-I. **CONCLUSION:** Systemic administration of antioxidants improved periodontal healing and significantly reduced microbial load and can be used as an adjunct to non-surgical periodontal therapy.

## KEYWORDS

Lycopene,Vitamin E, BANA Test, Antioxidant, Chronic Periodontitis

## INTRODUCTION

Periodontal diseases, the most prevalent diseases throughout the world are predominantly caused by gram-negative, anaerobic bacteria present on the tooth root surfaces as a biofilm[1].

Inflamed periodontal tissue produces significant amounts of pro-inflammatory cytokines, mainly IL-1, IL-6, PGE2 and tumor necrosis factor alpha (TNF-α), reactive oxygen species enzymes, proteins, host cells, ions, hormones, and markers of oxidative stress and antioxidant[2].

Vitamin E- a fat soluble vitamin, best known for its antioxidant properties. The biological form of vitamin E is α-tocopherol. It is a fat soluble antioxidant, found mostly in nuts, seeds and vegetable oils[3].Vitamin E transfers phenolic hydrogen to the recipient free radical and gets converted into phenoxyl radical. However, phenoxyl radical is no longer an antioxidant and it must be recycled or repaired. Studies done by Goodson and Boules 1973, demonstrated that patients with periodontitis who rinsed their mouth with Vitamin E daily for 21 days experienced a significant decrease in GCF compared with unsupplemented control group. vitamin E might help in diabetics, control their blood glucose levels thereby it might help reduce the side effects of the disease including the development of periodontal disease. Dosage recommended:30-400 IU

An antioxidant is a molecule which inhibits oxidation reaction. Antioxidants terminate the chain reaction caused by free radicals of oxidation reaction , preventing cell damage or death of the cells.

Lycopene is a powerful antioxidant and a carotenoids synthesized in plants. The greatest known source of lycopene is tomatoes, which are widely employed in cooking[4]. The study that used systemically administered lycopene was developed by Chandra et al.,and they analysed its effect in treatment of gingivitis[5] and shows positive results. Moreover, several studies demonstrate the beneficial effects of the use of systemic administration of antioxidants in treatment of periodontal diseases. To our knowledge ,there are no studies which compared the benefits of systemically administered lycopene and vitamin E clinically and microbiologically in periodontal disease.
The main aim of our study was to evaluate the benefits of systemic administration of Lycopene and Vitamine E in the nonsurgical treatment of periodontal disease and the effect of this therapy on the microflora present in the periodontal pocket using BANA Test.

## MATERIALAND METHODS

This study was conducted on 60 patients between 21 -60 years of age having mild to moderate chronic periodontitis. subjects were selected from those attending the Department of Periodontics. Systemically healthy patients willing to participate in study, chronic periodontitis patients with probing pocket depth of 4-8 mm and patients who had not used antioxidants like vitamin C, Vitamin B etc. within last 3 months were included in this study.

Subjects with systemic diseases likely to affect wound healing, candidates who report long term steroidal therapy, subjects with a deleterious habit such as smoking, pan chewing, and alcohol consumption, patients on medications like antibiotics or antioxidants like vitamin C, vitamin E or β-carotenes within 3 months and pregnant and lactating mothers were excluded from this study.

The proposed study was approved by the ethical committee of the institution and clearance was obtained. An informed consent was obtained from each subject. Randomization was done by http:/www.randomizer.org,through a computer generated random list ,patients were divided into three groups-

**group I:** 20 patients were treated with scaling and root planing alone.
**group II:** 20 patients were treated with scaling and root planing along with systemic administration of lycopene ($LYCOSTAR_{New}$)once daily for 1 month.
**group III:** 20 patients were treated with scaling and root planing along with systemic administration of vitamin E (Evion 400mg) once daily for 1 month.

**The following clinical and microbiological parameters were recorded at baseline before SRP and 1 month post treatment**

1. Plaque index (PI)( Silness and Loe, 1964)
2. Gingival index (GI) (Loe and Silness, 1963)
3. Probing depth
4. Clinical attachment level
5. microbiological parameter- BANA test

Following the initial examination the patients were divided into three groups. Then the collection of BANA Test sample, baseline levels of clinical parameters[Fig.1A] and microbiological parameter[Fig.1B] were recorded, SRP was performed in all the patients using ultrasonic scalers.


**Figure 1A: Baseline measurements of clinical parameters.**

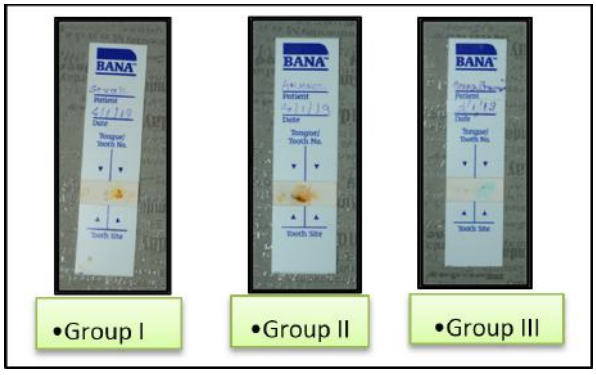



**Figure 1B: Baseline measurements of microbiological parameter.**

Group II and Group III patients were given lycopene (LYCOSTAR$_{New}$) and vitamin E (Evion 400mg) once daily for 1 month, respectively. The patients were recalled after 1 month to record the clinical parameters[Fig.2A] and microbiological parameters[Fig.2B].

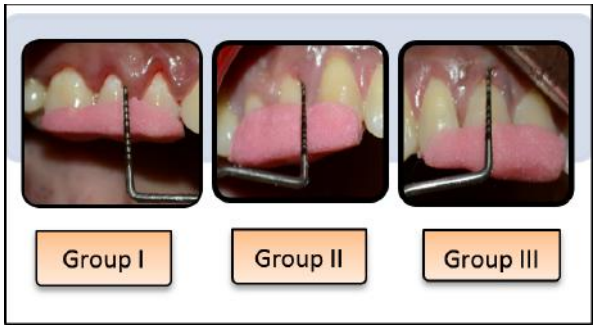



**Figure 2A: Measurements of clinical parameters after 1 month.**

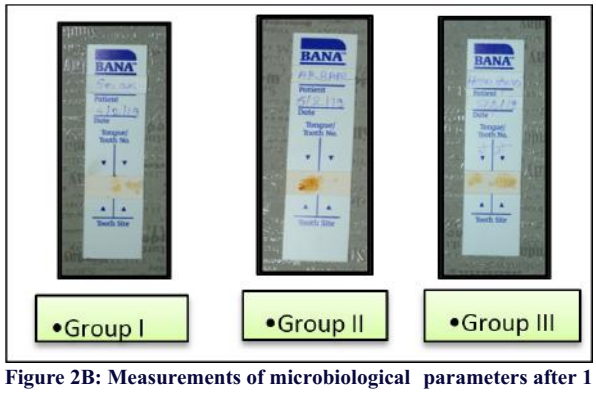



**Figure 2B: Measurements of microbiological parameters after 1 month.**

The methodology and schedule of assessment is presented in [Fig.3](Flow chart of study plan and visits).

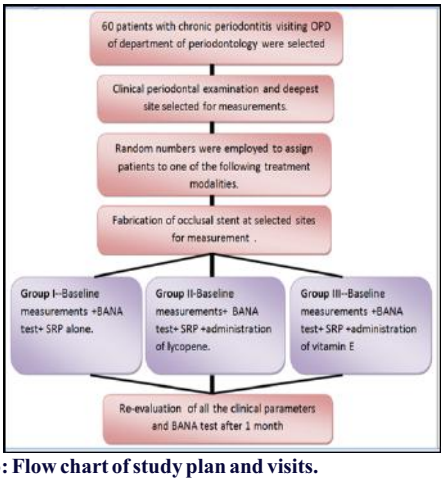


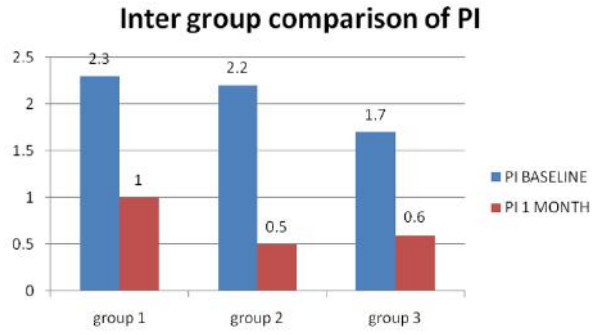

**Figure 3: Flow chart of study plan and visits.**

## RESULTS

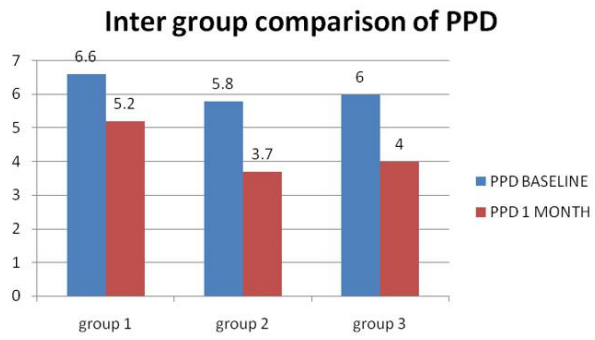
Data was subjected to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Inter group comparison (>2 groups) was done using Kruskall Wallis ANOVA followed by pair wise comparison using Mann Whitney U test. Intra group comparison was done using Wilcoxon Signed rank test (upto 2 observations).

On intra group comparison, it was observed that There was a statistically highly significant difference seen for the values between the time intervals ($p<0.01, 0.05$) for all variables PI, GI, PPD and CAL with higher values at baseline and lower values at 1M for all the three groups. The microbiological parameter shows statistically non significant difference for the frequencies between the groups ($p>0.05$).

Intergroup comparison showed that there was statistically significant reduction in PI[Graph 1A] and PPD [Graph 1B] in group II and group III as compared to group I.




**Graph-1A: intergroup comparison of PI at baseline and 1 month.**




**Graph-1B: intergroup comparison of PPD at baseline and 1 month.**

Group II shows slightly better results than group III but the difference was statistically non-significant. There was a statistically significant difference seen for the PI CHANGE between groups 2 vs group 3 [ Table-1]

**Table-1: Inter group Pair wise comparison of change.**

| | group | vs group | Mann-Whitney U value | Z value | p value |
|---|---|---|---|---|---|
| PI | 1 | 2 | 30.000 | -1.744 | 0.081# |
| | 1 | 3 | 41.500 | -0.801 | 0.423# |
| | 2 | 3 | 23.500 | -2.260 | 0.024* |
| GI | 1 | 2 | 29.000 | -1.842 | 0.066# |
| | 1 | 3 | 35.000 | -1.371 | 0.170# |
| | 2 | 3 | 42.500 | -0.640 | 0.522# |
| PPD | 1 | 2 | 28.500 | -1.766 | 0.077# |
| | 1 | 3 | 32.000 | -1.510 | 0.131# |
| | 2 | 3 | 48.000 | -0.159 | 0.874# |
| CAL | 1 | 2 | 38.500 | -0.952 | 0.341# |
| | 1 | 3 | 35.000 | -1.233 | 0.218# |
| | 2 | 3 | 46.000 | -0.320 | 0.749# |

## DISCUSSION

Periodontal diseases ,is a set of inflammatory conditions which have multifactorial etiology.One of the etiological factor is "Oxidative

stress",which is simply defined as "an imbalance between oxidants & antioxidants in favour of the oxidants, leading to a disruption of redox signaling & control and/or molecular damage"[6].When this balance between oxidants and antioxidant is disrupted it results in failure of gum tissue to overcome oxidative stress, maintain normal tissue and control the bacterial damage[6].Subgingival microbial flora present in the periodontal pockets is another important etiological factor for periodontal tissue destruction. These bacterial species result in the production of various cytokines and also causes an increase in number and activity of polymorphonucleocytes (PMNs). PMNs produce ROS superoxide via the respiratory burst mechanism. ROS have deleterious effects on tissue cells when produced in excess[7].To prevent the damaged caused by ROS , an additional supply of antioxidant is needed. Hence, Lycopene and Vitamine E possessing the antioxidant activity are used in this study.

In our study, the clinical parameters such as PI, GI, PPD and CAL scores were reduced from baseline to 1 month in all the three groups. In group 2 The mean GI and PPD was significantly reduced after 1 month compared to the group 1.This is in accordance with the study conducted by Chandra et al., in 2007[8]. Lycopene was also used in two studies as an adjunct to scaling and root planning[9,10].One of these studies showed that lycopene treated sites presented significantly higher levels of probing depth reduction and more clinical attachment gain when compared to sites treated with placebo gel, despite smoking habits[10].

In group 3, the mean GI and PPD was significantly reduced after 1 month in group 3 as compared to the group 1. This is in accordance with the study conducted by Singh et al., in 2014[11].The mean difference between group 2 and group 3 were small and statistically non-significant.

On comparison of BANA test scores, there was a statistically non significant difference seen for the frequencies between all the three groups after 1 month.

To our knowledge ,there are no studies which compared the effect of systemically administered antioxidants on the periodontal microflora. Previous studies done to evaluate efficacy of antioxidants in treatment of periodontal disease. This is the first study using systemically administered antioxidants to assess its effect on the microorganisms presents in periodontal pocket using BANA test.

## CONCLUSION

The present study suggest that the systemically administered Lycopene and vitamin E has potential to improve periodontal clinical parameters in chronic periodontitis patients. However, the effect of systemically administered antioxidant therapy on periodontal microflora requires further investigations. This is a short-term study for further detailed knowledge on this topic long-term studies are required.

## CONFLICTS OF INTEREST

There are no conflicts of interest.

## REFERENCES


1. Ciancio SG. (2003)," Periodontal medicine: Health policy implications." J Periodontol;7:1088-95.
2. Mathur A, Mathur L, Manohar B, Mathur H, Shankarapillai R, Shetty N, et al.(2013)," Antioxidant therapy as monotherapy or as an adjunct to treatment of periodontal diseases." J Indian Soc Periodontol;17:21-4.
3. Amaliya, Timmerman, M. F., Abbas, F., Loos, B. G., Van der Weijden, G. A., Van Winkelhoff, A. J., Winkel, E. G. & Van der Velden, U. (2007)," Java project on periodontal diseases: the relationship between vitamin C and the severity of periodontitis." Journal of Clinical Periodontology 34, 299–304
4. Painter FM.( 2003)," Lycopene: monograph." Alternative Medicine Review;8:336-342.
5. Chandra RV, Prabhuji ML, Roopa DA, Ravirajan S, Kishore HC.( 2007)," Efficacy of lycopene in the treatment of gingivitis: a randomised, placebo-controlled clinical trial." Oral Health Prev Dent;5(4):327–36.6.
6. S.Pooja.( 2016)," Antioxidants and its Role in Periodontitis - A Short Review." J. Pharm. Sci. & Res. Vol. 8(8), , 759-763.
7. Elavarasu S, Suthanthiran T, Thangavelu A, Alex S, Palanisamy VK, Kumar TS.( 2016)," Evaluation of superoxide dismutase levels in local drug delivery system containing 0.2% curcumin strip as an adjunct to scaling and root planing in chronic periodontitis: A clinical and biochemical study." J Pharm Bioall Sci;8:S48-52.
8. Chandra RV,Prabhaji ML,Roopa DA,Ravirajan S,Kishor HC.( 2007)," Efficacy of lycopene in the treatment of gingivitis: a randomised,placebo-controlled clinical trial." ORAL HEALTH Prev Dent:5(4):327-36.
9. Chandra RV, Srinivas G, Reddy AA, Reddy BH, Reddy C, Nagarajan S, et al.( 2013)," Locally delivered antioxidant gel as an adjunct to nonsurgical therapy improves measures of oxidative stress and periodontal disease." J Periodontal Implant Sci;43(3):121–9.
10. Chandra RV, Sandhya YP, Nagarajan S, Reddy BH, Naveen A, Murthy KR.( 2012)," Efficacy of lycopene as a locally delivered gel in the treatment of chronic periodontitis: smokers vs nonsmokers." Quintessence Int;43:401–11.
11. Dr Neha Singh., (2013),"Vitamin E Supplementation, Superoxide Dismutase Status and Outcome of Scaling and Root Planing in Chronic Periodontitis Patients: A Randomized Clinical Trial." Journal of Periodontology; DOI: 10.1902/jop.2013.120727.