

## A Randomized Controlled Trial Looked at the Effect of Vitamin C Supplementation and Non-surgical Periodontal Therapy on total Antioxidant Capacity in Patients with Chronic Generalized Periodontitis

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### Abstract

Inflammation of the supporting tissues of the periodontium is known as periodontal inflammation. The microbial element can cause disease which is polymicrobial in beginning and causes dysbiosis and change in oxidative pressure with compromised cell reinforcement limit. The goal of this study was to find out how vitamin C supplementation and nonsurgical periodontal therapy (NSPT) affected the total antioxidant capacity of patients with chronic periodontitis.

**Keywords:** Antioxidant; Oxidative pressure; Dental cleanings; Periodontitis; C vitamin

### Introduction

The systemic association, complex disease progression, and host immune response may make periodontitis a disease for early diagnosis and intervention [1]. However, in developing countries, where people lack awareness, preference given to systemic health rather than oral health, and financial constraints make it difficult to halt the disease process, education of individuals regarding association of systemic health and oral health diseases like periodontitis gives patients an idea and renders importance of periodontal health. Subgingival biofilm plays an important role in disease progression. The release of free radicals that cause tissue damage is known as oxidative damage, and the role that antioxidants play in periodontal disease cannot be overstated. Although deficiency of a micronutrient affects overall immunity, its individual impact on oral health is difficult to analyze because antioxidants work in concert rather than as individuals. Measuring individual species will be costly and time-consuming, and the sum of the individual antioxidant concentrations will not yield the total antioxidant capacity (TAOC) as uncharacterized antioxidant exists in nature and their biological significance may be unknown. Assessment of TAOC provides us with an overall antioxidant capacity of an individual in various biological fluids. The antioxidant there is a positive association between periodontal health and vitamin C, despite clinical improvements being seen in many studies, but statistically significant difference of vitamin C supplementation in periodontal health remains doubtful [2]. This study evaluated the effect of nonsurgical periodontal therapy (NSPT) and Vitamin C supplementation on TAOC in patients with chronic generalized periodontitis. Scavenging antioxidants include bilirubin, reduced glutathione, vitamin A, vitamin C, and several thiols

### Materials and Procedures

Over the course of two years 70 patients with chronic periodontitis (ChP) and 35 periodontally healthy subjects between the ages of 35 and 55 with no systemic disease were recruited from the department of periodontology for this parallel arm single-blind prospective randomised controlled clinical trial. Composed informed assent were gotten from every one of the members. The study was registered with the Clinical Trial Registry-India (CTRI) under the trial number after receiving institutional ethics committee approval.

The study included ChP patients with probing depths (PD) greater than 5 mm in two or more non-adjacent quadrants, bleeding on

probing greater than 10%, and radiographic bone loss greater than 30% of the root length [3]. This study recruited patients with Stage II Grade B periodontitis based on the most recent classification. Excluded from the study were subjects who had taken antimicrobial medications in the previous three months, were pregnant or lactating, used any vitamin supplements or mouthwashes, or taken anti-inflammatory medications in the previous three months. In the healthy control group, there was no loss of attachment, bleeding on probing was less than 10%, and there was no radiographic evidence of alveolar bone loss.

### Sample size determination

The primary outcome of the study served as the basis for determining the sample size. The allocation ratio was 1:1, the power of the study, and the two-tailed unpaired t-test had an effect size. There were subjects in the calculated sample, with subjects in each group. The expected attrition rate of resulted in a final sample size of subjects, with subjects in each group. After the dropouts in each gathering, subjects were evaluated.

### Measurement of clinical parameters

The subjects were instructed on how to collect baseline blood and saliva samples following a night of fasting. After that, a mouth mirror and a Florida probe were used to assess the plaque index (PI), gingival indexes (GI), clinical attachment level (CAL), probing depth (PD), and sulcular bleeding index (SBI).

All teeth present including third molars were tested at six destinations for every tooth. A single examiner (SN) took all clinical measurements. The intra-examiner reliability was anywhere. The ChP group was randomly divided into two groups using a computer-based

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method, the Prism 4.0 software package.

### Measurement of total antioxidant capacity

The ferric reducing ability of plasma (FRAP) assay, which was adapted for use with a microplate reader, was used to measure total antioxidant capacity in serum and saliva for the control group only at baseline and for the ChP1 and ChP2 groups at baseline, 3 months, and 6 months [4]. In order to prevent saliva from being contaminated with blood, saliva was collected prior to the clinical examination because bleeding during probing could result in saliva contamination. Anyway still there was plausible of blood defilement as at some point patients with periodontitis could have blood sullied spit itself from exceptionally aggravated destinations. The upside of FRAP measure is it is extremely delicate to tainting with hemoglobin and any spit test with blood pollution can be distinguished by this examine.

### Measurable examination

Measurable program was completed through SPSS Factual Programming Bundle. The data were found to have a normal distribution when tested using the Kolmogorov-Smirnov test. For serum and spit complete cancer prevention agent limit estimation the information was non-typical dispersed thus non-parametric test was finished. The Chi-square test was used to determine the age and sex differences between the study groups. Repeated measure ANOVA was used to examine differences between groups in clinical parameters, while one-way ANOVA was used to examine differences between groups. The Mann-Whitney U test was used to look for differences in serum and salivary TAOC levels between groups. The TAOC intragroup differences in serum and saliva were measured using the Wilcoxon test. The relationship between serum TAOC levels and clinical parameters was evaluated using the Spearman rank correlation test.

### Result and Discussion

Oxidative stress is a major factor in the pathogenesis of periodontitis. The reactive oxygen species (ROS) that cause damage to the host tissue and an imbalance in the levels of oxidants and antioxidants are two examples. This highlights the possibility of an antioxidant intervention to restore periodontal health. Vitamin C is a powerful antioxidant, and an odds ratio [OR] of indicates a link between low vitamin C levels and the risk of periodontitis. CI: We hypothesized that an inverse association exists between serum and salivary TAOC levels and chronic periodontitis, and that Vitamin C intake will restore the TAOC levels and periodontal health.<sup>20</sup> However, the role of vitamin C as an antioxidant in periodontitis remains unclear [5]. The mechanism of periodontal destruction that results in oxidative stress serves as the basis for this hypothesis. Polymorphonuclear neutrophil (PMN) hyperactivity has been shown to release ROS, which initiates the host-immune response in periodontitis. This alters both local and systemic antioxidant activity found a positive correlation between serum TAOC levels and periodontitis, pointing to the possibility of supplements raising TAOC levels and reducing periodontal inflammation. showed decline level of salivary TAOC levels (40%) was related with periodontitis. suggested that non-enzymatic antioxidants like catalase, superoxide dismutase, and glutathione peroxidase are linked to periodontitis. Additionally, salivary TAOC levels decreased during periodontitis and increased to following NSPT. These findings provided us with the justification for using antioxidant supplements in addition to conventional periodontal therapy.

There is an expanded pattern in estimating all out oxidant status or oxidative pressure of various particles and involving it as biomarkers

in distinguishing periodontitis. On the other hand, the antioxidant (Vitamin C) supplement was the focus of our investigation, which examined its potential role in decreasing periodontal inflammation and increasing TAOC levels [6].

Sulaiman and co assessed plasma TAOC levels in ChP patients with 2000 mg everyday supplementation of L-ascorbic acid for quite some time and found that lower levels of plasma TAOC was essentially connected with ChP for example contrasted with 625-88.7 mmTeq in sound controls and NSPT decreased the oxidative stress.<sup>26</sup> The outcome is as per our review, showing lower levels of TAOC in serum and spit and after periodontal treatment increment levels of TAOC was acquired. In addition, no additional benefits were observed in group ChP2 when 500 mg of vitamin C were taken daily for three months [7]. Administered colossal doses of 1500 mg of vitamin C daily for 90 days, and the subjects were subjected to experimental gingivitis for four weeks. No factual importance was acquired on conditions of clinical boundaries - plaque list, gingival file, draining record between the exploratory and fake treatment group. Our outcomes go against, concentrate by Staudte et al. Grapefruit consumption for two weeks resulted in a significant decrease in the sulcular bleeding index but there were no changes in the plaque index or probing depth. This could be because the study only lasted a short amount of time and vitamin C supplementation caused short-term changes. Leggott et al. showed decline level of gingival draining destinations with L-ascorbic acid supplementation. This may be expected the distinction in concentrate on plan as this study had momentary L-ascorbic acid exhausted and replenished conditions and little example size.

Sustenance based examinations ought to be deciphered mindfully, as the measurements of enhancements shifts in various investigations [8]. It is challenging to carry out in-depth dose-response studies. Additionally, in preliminary based examinations in some cases it's hard to recreate comparable outcomes which we get in vitro or in creature based investigations. This could be true for Vitamin C's antioxidant capacity; it could have a weak antioxidant in vivo with little or no physiological function, or it could act in specific locations. In the current review, L-ascorbic acid was consumed 500 mg once everyday, this dose depended on reabsorption immersion levels and edge portion for discharge i.e. at dosages 500 mg or more, the whole retained portion is discharged. The plasma totally immerses at portions of 400 mg and higher, creating a consistent plasma concentration.

We found a critical improvement in intragroup examination of PI, GI, SBI, PD, CAL at 90 days post treatment in both ChP1 and ChP2 gathering. Raghuvendra and others Similar results were found with vitamin C supplementation in the Indian population, which had no effect on clinical parameters like PI, PD, or CAL reduction except for the gingival bleeding index. However, the current study found that the ChP2 group did not experience any significant changes in the gingival index at any follow-up interval. This could be because of the change in vitamin C dosage and duration, which could have a big effect on clinical indices like the gingival index. Raghuvendra and co [9]. In another study vitamin C tablets were taken three times daily for two months, while in the current study, 500 mg of vitamin C was taken once daily for three months. This dosage was determined based on the vitamin C's peak plasma concentration. found that regular use of a dentifrice containing Vitamin C and antioxidant properties reduced gingival inflammation. In the current study, both serum and salivary TAOC levels were lower in chronic periodontitis patients than in healthy controls. This outcome is like concentrate. which showed foundational and neighborhood cell reinforcement limit decreased in periodontitis. No impact of NSPT on

serum and salivary TAOC levels were seen post 3 months treatment and intergroup correlation showed no genuinely critical outcomes result was comparable to this one. study on plasma TAOC levels in which there were no significant changes in plasma TAOC levels after one month of therapy [10]. This could be because the TAOC evaluation was only done for a short amount of time in the study.

The effect of diet on cell reinforcement limit and periodontal files in periodontitis and found fundamentally expanded plasma TAOC yet no massive changes were displayed on periodontal records post 3 and a half year of dietary intervention. They had a development of 2 months span which again is a brief period for assessment of impacts of a cell reinforcement on TAOC levels. Nonetheless, they observed that L-ascorbic acid admission was around 50 mg day higher in the dietary mediation bunch contrasted with the benchmark group. According to systematic review, administration of antioxidants has no clear effect on oxidative stress. The result may be affected by factors like the quantity of antioxidants administered, the duration of administration, or the design of the study measured total antioxidant capacity in periodontal disease assessment in biological fluids like serum, plasma, saliva, and gingival crevicular fluid (GCF) showed a significant decrease in total oxidant status (TOS) in ChP patients compared to baseline post periodontal therapy [11]. Choosing which liquid to be thought about for TAOC levels estimation relies upon different variables like simplicity of assortment, patient assent, clinical abilities and accessibility of estimating gadgets and reagents and strategy for TAOC estimation. There are no convincing outcomes on a specific organic liquid delivering precise TAOC levels when contrasted with other. In the current review serum and salivary TAOC levels were estimated as a fundamental and neighborhood marker delegate separately. compared GCF and both stimulated and non-stimulated saliva with TOS in patients with periodontitis. Saliva collection can be done with or without stimulation and is quicker, easier, and requires less equipment than GCF collection. They expressed that no relationships exists between the two biomarkers. The parotid gland, which produces stimulated saliva and is the most significant source of free radicals of all salivary glands, had the highest mean TOS values in stimulated saliva. recommended that patient choice is a basic boundary impacting salivary degrees of TAOC, restricting its utilization TAOC measurement. In any case, which natural liquid GCF, spit, serum or plasma is a superior reflector of periodontal cell reinforcement status stay uncertain.

In the current review, TAOC levels were taken as they address the general cell reinforcement levels of a person, as it is combined of all cell reinforcement levels, rather than computing individual cancer prevention agents which would be costly and time-consuming [12]. We utilized the FRAP strategy to work out the TAOC levels as it is delicate to blood and any defilement of tests can be disposed.

## Conclusion

This study showed that NSPT decreased periodontal irritation

and worked on clinical boundaries, but no massive change was seen in TAOC levels of serum or spit in ChP 2 gathering with L-ascorbic acid supplementation. Further, the review reasons that L-ascorbic acid supplementation had no huge extra advantages as far as either clinical boundaries or TAOC levels. By and by, levels of L-ascorbic acid in different liquids like GCF might toss light in its potential cell reinforcement movement.

## Acknowledgement

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## Conflict of Interest

None

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