



Research Article

ISSN: 2581-3218
IJDR 2018; 3(3): 63-65
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Total anti-oxidant capacity of saliva in chronic periodontitis patients: A biochemical study

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Abstract

Background: Periodontitis is an infectious disease of the oral cavity involving the inflammation of the sustaining tissues of teeth. Anti-oxidant has an important role in protection of host against inflammation and infection. Hence, this study evaluated the salivary total anti-oxidant capacity in chronic periodontitis patients and healthy patients. **Methods:** A total of 40 patients were divided into 2 groups. Group 1 (healthy) consisted of 20 individuals with healthy gingiva of probing depth ≤ 3 mm, GI ≤ 1 , PI ≤ 1 and CAL=0 and Group 2 (chronic periodontitis) consisted of 20 individuals who had signs of clinical inflammation and a diagnosis of CP with PPD ≥ 5 mm, GI > 1 , PI > 1 and CAL ≥ 3 mm. Whole saliva were collected and samples were analyzed for total anti-oxidant capacity (TAOC). The results were analyzed by student t test and Mann-Whitney analysis. **Results:** The result revealed that the total anti-oxidant capacity of saliva in the healthy group had significantly higher levels than periodontitis group. **Conclusion:** The level of total anti-oxidant capacity was lower in the saliva of chronic periodontitis patients, which results in early diagnosis and treatment of periodontitis.

Keywords: Total anti-oxidant capacity, Periodontitis, Saliva.

INTRODUCTION

Periodontitis is an infectious condition caused by periodontal pathogens, which affect the composition and integrity of periodontal structure and cause destruction of cells and connective tissue matrix.^[1,2]

Saliva is one of the most complex, versatile, and valuable source for clinical information as it contains biomarkers which is responsible for maintaining the health of oral cavity. It is easily available and collection of saliva is non invasive which is used to evaluate various biomarkers associated with periodontal disease.^[3,4]

Oxidative stress is produced by discrepancy between reactive oxygen species and the antioxidant protection of organism which might contribute to the host tissue destruction^[5] and pathogenesis of pathogenic disease such as periodontitis.^[6] The mechanism of anti-oxidant has a specific role to remove or repair the damage caused by harmful oxidants like reactive oxygen species.^[7] When the antioxidants level in the body get decreased, the ability of periodontal tissue appears to be compromised.^[8] There is increasing evidence that oxidative stress is correlated with severity of periodontal disease.^[9]

Therefore, this study evaluated the salivary total anti-oxidant capacity in chronic periodontitis patients and healthy patients.

MATERIALS AND METHODS

This case-control, cross-sectional study included 20 healthy patients and 20 chronic periodontitis patients aged between 25 and 50 years recruited from April 2017 to October 2017 in the Department of Periodontology after obtaining ethical approval from the institutional review board of the college. Written informed consent was taken from all the participants before the start of the study.

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Participants were categorized into two groups based on the Gingival index(GI), Plaque index (PI), pocket probing depths (PPD) and clinical attachment level (CAL).

- Group 1 (healthy) consisted of 20 individuals with healthy gingiva of probing depth ≤ 3 mm, GI ≤ 1 , PI ≤ 1 and CAL=0.
- Group 2 (chronic periodontitis) consisted of 20 individuals who had signs of clinical inflammation, and a diagnosis of CP with PPD ≥ 5 mm, GI > 1 , PI > 1 and CAL ≥ 3 mm.

Exclusion criteria

(1) cigarette smoking or tobacco use and alcoholism; (2) systemic diseases such as diabetes mellitus, hypertension, and rheumatoid arthritis; (3) pregnancy; (4) systemic bacterial, viral, or fungal infection; (5) history of antibiotic therapy or use of anti-inflammatory medications during the past 6 months; (6) periodontal therapy during the past 2 years; and (7) patients with aggressive periodontitis.

Sample collection

Participants were instructed not to eat, drink, chew gum, or brush teeth for at least 90 min before sampling. Unstimulated saliva was collected between 11:00 am and 13:00 pm for 5 min (one spit per minute). The sample were stored at -70°C until the experiment. Total salivary anti-oxidants level were estimated by using a spectrophotometer.^[9] This method uses the FRAP (Ferric Reducing Ability of Plasma) technique. In this method the ability of saliva was assessed in reducing ferric ions into ferrous ion in the presence of 2,4,6-tripyridyl-s-triazine (TPTZ). This results in the production of a blue complex Fe-TPTZ with a maximum absorption wave length of 593 nm and measures Total Anti-oxidant capacity.

DATA ANALYSIS

The data were analysed using SPSS software version 21 (SPSS Inc., Chicago, IL, USA). Student t-test and Mann–Whitney test were used to compare the total anti-oxidant capacity between the two groups. $P < 0.05$ was considered statistically significant.

RESULTS

The mean values of the clinical and biochemical parameters were expressed as mean \pm SD (Table 1). The mean of total anti-oxidant capacity in the Saliva were $394.23 \pm 70.89 \mu\text{M}$ for group 1 and $212.32 \pm 43.52 \mu\text{M}$ for group 2 (Graph 1).

Intergroup comparisons of the clinical and biochemical parameters are summarized in Table 2. A significant difference in TAOC in the saliva was found when group 1 was compared with group 2 ($P < 0.0001$). Statistically significant differences were observed when comparison of gingival index, plaque index and pocket probing depth scores were made within groups 1 and 2.

Table 1: Values (mean \pm SD) of TAOC, PPD, CAL, GI, PI in both Groups

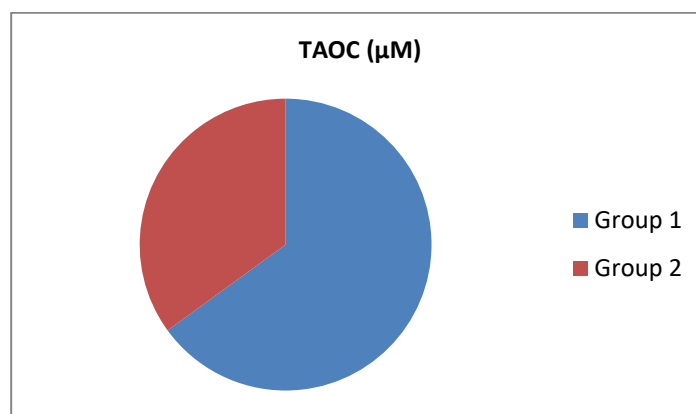
Variable	Group 1	Group 2
TAOC(μM)	394.23 ± 70.89	212.32 ± 43.52
PPD	1.47 ± 0.57	6.80 ± 1.21
CAL	0	4.13 ± 1.31
GI	0.28 ± 0.25	2.32 ± 0.49
PI	0.22 ± 0.19	2.13 ± 0.41

‡ TAOC- Total anti-oxidant capacity, PPD – Pocket probing depth; CAL– clinical attachment level; GI – Gingival index; PI – Plaque index; SD - Standard deviation

Table 2: Consolidated Pairwise Comparison (p value) Among the Groups ($p < 0.05$)

Variable	Mean difference (95% CI)	t	p
TAOC	181.910 (219.56-144.25)	9.780	$< 0.0001^*$
PPD	-5.330 (-5.92--4.72)	-17.821	$< 0.0001^*$
CAL	--	--	--
GI	-2.040 (-2.28--1.79)	-16.585	$< 0.0001^*$
PI	-1.910 (-2.11--1.70)	-18.90	$< 0.0001^*$

*Statistically significant at $P < 0.05$; p – Probability; Independent sample t-test; CI - Confidence interval, TAOC- Total anti-oxidant capacity, PPD – Pocket probing depth; CAL– clinical attachment level; GI – Gingival index; PI – Plaque index



Graph 1: Bar diagram shows the comparison of the salivary TAOC level in both groups

DISCUSSION

The potential role of saliva in the diagnosis of oral and systemic health is evident in researches. Salivary biomarkers could be used to screen periodontal health status and disease progression.^[10] The results of the present study revealed that the subjects in the healthy group had significantly higher levels of salivary total anti-oxidant capacity than periodontitis group. Comparatively higher levels of antioxidants were observed in the healthy group indicates that the oxidant related stress in the body is effectively balanced by the antioxidants. The study is similar to Diab-Ladki et al.,^[9] Sculley and Langley-Evans^[11] Mashayekhi et al,^[12] Guentsch et al^[13] and Punj et al^[14] who evaluated total antioxidant activity of saliva in periodontitis patients. Periodontal tissues get damaged due to ROS production and to maintain that balance the normal level of antioxidants decreases.

Patients in group 1 and group 2 showed statistically significant difference when the GI, PI and PPD were compared. A mean probing depth of 6.80 ± 1.21 mm and a GI score of 2.32 ± 0.49 mm in group 2 established the presence of an active inflammatory component along with a destructive component to the prevalent periodontal disease.

CONCLUSION

In the current study, level of total anti-oxidant capacity was lower in the saliva of chronic periodontitis patients, which shows the necessity of early diagnosis and treatment of periodontitis. TAOC may be used as an inflammatory marker for periodontal disease. The limitation of this study was that we did not have information about the level of TAOC after treatment of periodontitis. Further long-term and interventional studies with larger sample sizes are required to assess the efficacy of for early detection of periodontal disease and prevention of its progression.

Conflict of Interest

None.

REFERENCES

1. Bowen WH. Nature of plaque. *Oral Sci Rev* 1976;9:3-21.
2. Nguyen CM, Kim JW, Quan VH, Nguyen BH, Tran SD. Periodontal associations in cardiovascular diseases: The latest evidence and understanding. *J Oral Biol craniofac Res* 2015;5:203-6.
3. Devanoorkar A, Kathariya R, Guttiganur N, Gopalakrishnan D, Bagchi P. Resistin: A potential biomarker for periodontitis influenced diabetes mellitus and diabetes induced periodontitis. *Dis. Markers* 2014;2014:930206.
4. Giannobile WV, Beikler T, Kinney JS, Ramseier CA, Morelli T, Wong DT. Saliva as a diagnostic tool for periodontal disease: current state and future directions. *Periodontol 2000* 2009;50:52-64.
5. ChappleL, Matthews JB. The role of reactive oxygen and antioxidant species in periodontal tissue destruction. *Periodontol 2000* 2007;43:160-232.
6. Toker H, Akpinar A, Aydin H, Poyraz O. Influence of smoking on interleukin-1beta level, oxidant status and antioxidant status in gingival crevicular fluid from chronic periodontitis patients before and after periodontal treatment. *J Periodontal Res* 2012;47:572-7.
7. Waddington R, Moseley R, Embery G. Periodontal Disease Mechanisms: Reactive oxygen species: a potential role in the pathogenesis of periodontal diseases. *Oral Diseases* 2000;6:138-51.
8. Battino M, Bullon P, Wilson M, Newman H. Oxidative injury and inflammatory periodontal diseases: the challenge of antioxidants to free radicals and reactive oxygen species. *Crit Rev Oral Biol Med* 1999;10:458-76.
9. Diab-Ladki R, Pellat B, Chahine R. Decrease in the total antioxidant activity of saliva in patients with periodontal diseases. *Clinical Oral Investigations* 2003;7:103-7.
10. Dawes C. physiological factors affecting salivary flow rate, oral sugar clearance and the sensation of dry mouth in man. *J Dent Res* 1987;66:648-53
11. Sculley DV, Langley-Evans SC. Periodontal disease is associated with lower antioxidant capacity in whole saliva and evidence of increased protein oxidation. *Clinical Science* 2003;105:167-72.
12. Mashayekhi F, Aghahoseini F, Rezaie A, Zamani MJ, Khorasani R , Abdollahi M. Alteration of cyclic nucleotides levels and oxidative stress in saliva of human subjects with periodontitis. *J Contemp Dent Pract* 2005;6:46-53.
13. Guentsch A, Preshaw PM, Bremer-Streck S, Klinger G, Glockmann E, and Sigusch BW. Lipid peroxidation and antioxidant activity in saliva of periodontitis patients : effect of smoking and periodontal treatment. *Clin Oral Investig* 2008;12:345-52
14. Punj A, Shenoy S, Kumari NS, Pampani P. Estimation of Antioxidant Levels in Saliva and Serum of Chronic Periodontitis Patients with and without Ischemic Heart Disease. *Int J Dent* 2017;2017:1965697.