

Short Communication

## DETERMINATION OF SALIVARY URIC ACID LEVELS IN PERIODONTITIS AND HEALTH: A CASE CONTROL STUDY

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### Abstract:

The aim of this case-control study was to determine whether periodontitis was associated with impaired salivary antioxidant uric acid level. Sixty patients attending a routine dental check-up at department of periodontics AB Shetty memorial institute of dental science were recruited for the study. Thirty patients with periodontitis (case) and 30 patients with healthy periodontium (control) were included in the study. Periodontitis was defined as clinical attachment loss (CAL)  $\geq 3$ mm in 30% of total sites examined (AAP-1999). CAL was measured from cemento-enamel junction to the base of pocket depth in mm using William's graduated probe. The teeth that was examined are (Ramfjord index teeth) 16, 21, 24,36,41,44. 1-2ml saliva was collected from patient in sterile glass vial and send for estimation of uric acid immediately. The uric acid level was measured in spectrophotometer. The result was statistically analyzed by student's t test. The mean value of uric acid level in periodontitis was 4.449mg/dl. The mean value of uric acid level in healthy patient was 4.878mg/dl. The study concluded that the level of uric acid in periodontitis patients was comparatively less than the normal patients. However, this difference was not statistically significant ( $p > 0.05$ )

**Key words:** antioxidants, uric acid, periodontitis, saliva

### Introduction:

Periodontal disease is an inflammatory disease affecting periodontium including loss of connective tissue and bone. Periodontal diseases are amongst the most common chronic diseases to affect adults. Antioxidants are present in all body fluids and tissues and protecting against endogenously formed free radicals, usually produced by leakage of electron transport system.<sup>1</sup>

Free radicals are normally neutralized by efficient systems in the body that include the antioxidant enzymes (super oxide dismutase, catalase, and glutathione peroxidase) and

the nutrient-derived antioxidant small molecules (vitamin E, vitamin C, carotenes, flavonoids, glutathione, and uric acid). In healthy individuals, a delicate balance exists between

free radicals and antioxidants. Urate is the predominant salivary antioxidant, with albumin and ascorbate providing minor contributions.<sup>1,2</sup>

It was suggested in previous studies that estimation of the uric acid concentration in saliva might be a better index of uric acid production in the body than the uric acid concentration in blood or urine. Total antioxidant activity has been reported to be reduced in saliva of patient with periodontitis (periodontal disease) relative to that in non periodontitis.<sup>1,3</sup>

Scully DV (2003), in a cohort study, concluded that periodontal disease is associated with reduced salivary antioxidant status and increased oxidative damage within the oral cavity.<sup>4</sup> Kaufman (2000) conducted to examine salivary constituents as potential diagnostic tests for periodontal disease. The study concludes that saliva is a fluid that is readily available and contains locally-produced microbial and host response mediators, as well as systemic (serum) markers that may prove to be an aid in the

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diagnosis of periodontal disease.<sup>5</sup>

Another study by Liskman and others (2007) was designed to assess levels of various antioxidants in saliva to identify differences between the saliva of patients with healthy peri-implant tissues and patients with peri-implant disease, and to examine whether the whole saliva of those with peri-implant disease conditions might have lower levels of antioxidants than that of healthy individuals. Total antioxidant status (TAS) of saliva and concentration of uric acid and ascorbate, which are the main salivary antioxidants, are significantly decreased in patients with peri-implant disease<sup>6</sup>. We proposed to assess the levels of uric acid in the saliva of patients with periodontitis and healthy periodontium.

#### Materials and Methods :

A total of 60 patients were recruited from the out-patient Department of the Periodontics wing of AB Shetty Memorial Institute of Dental Sciences, Mangalore, of which 30 were patients with periodontitis and 30 were matched controls with healthy periodontium. Inclusion criteria were, patients aged above thirty, those who gave informed consent; patients with systemic diseases like diabetes mellitus, hypertension, blood disorders were excluded. Also patients who received antibiotics and dental treatment in the past six months were excluded. Design of the study was case control. Informed consent was taken. Ethical clearance was obtained from Institutional Human Ethics Committee of Nitte University to which the hospital was affiliated for the above study.

Periodontitis was defined as clinical attachment loss (CAL)  $\geq 3$ mm in 30% of total sites examined (AAP-1999). Clinical attachment loss was measured from cemento-enamel junction to the base of pocket depth in mm using William's graduated probe. The teeth that was examined are (Ramfjord index teeth) 16, 21, 24,36,41,44. The sites examined on each tooth are mesiobuccal, mid-buccal, distobuccal and lingual. One to 2ml of saliva was collected from patient in sterile glass vial and send for estimation of uric acid immediately.

Estimation of uric acid in saliva was done by standard kit (Agappe Diagnostics®, India Ltd), which contains buffer reagent and color reagent. Statistical analysis was done by student's t test.

#### Results:

A total of 60 saliva samples were analysed. Fig 1 depicts the study profile. The mean value of uric acid level in periodontitis was  $4.449 \pm 2.658$  mg/dl (mean  $\pm$  s.d.). The mean value of uric acid level in healthy patient was  $4.878 \pm 4.012$  mg/dl (mean  $\pm$  s.d.). The difference between the mean urate levels among the study groups is shown in Figure 2. The study concluded that the level of uric acid in periodontitis patients is comparatively less than the normal patients. However, the p value is more than 0.05 ( $p > 0.05$ ).

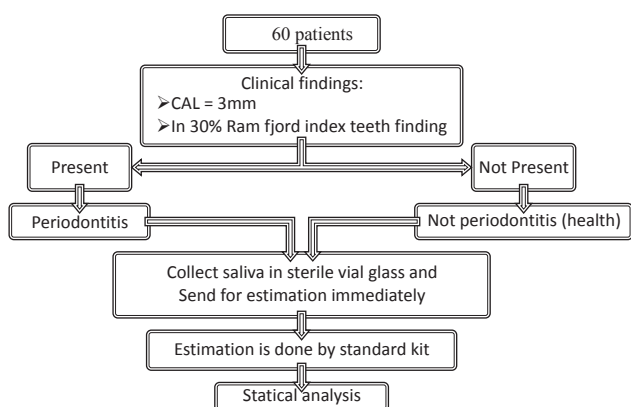
#### Discussion :

The study was conducted to assess the uric acid level in periodontitis and healthy patients. The obtained results concluded that the level of uric acid in periodontitis patients comparatively less than non periodontitis patients. However, this difference was statistically insignificant. The findings of the present study are consistent with the previous work of. Sculley et al. previous study have reported that salivary antioxidant activity in periodontitis is reduced relative to that in non periodontitis.<sup>3,4</sup> Antioxidants are present in all body fluids and tissues and protecting against endogenously formed free radicals. Free radicals are normally neutralized by efficient systems in the body that include the antioxidant enzymes (super oxide dismutase, catalase, and glutathione peroxidase) and the nutrient-derived antioxidant small molecules (vitamin E, vitamin C, carotenes, flavonoids, glutathione, and uric acid).<sup>2</sup> In healthy individuals, a delicate balance exists between free radicals and antioxidants.<sup>10</sup>

There is increasing evidence that oxidative stress is an important contributing factor in the pathogenesis of periodontal disease.<sup>3</sup> Oxidative stress in periodontitis expressed by elevated concentration of reactive oxygen species and accompanied by suppressed antioxidant

activity in saliva and blood, may accelerate lesion formation in periodontal tissues. Though the sample size was small, our study highlighted that the periodontitis patient had decreased antioxidant uric acid level in saliva compare to healthy patients. Hence, further research studies are required using larger sample ,and considering other risk factors of periodontal disease.

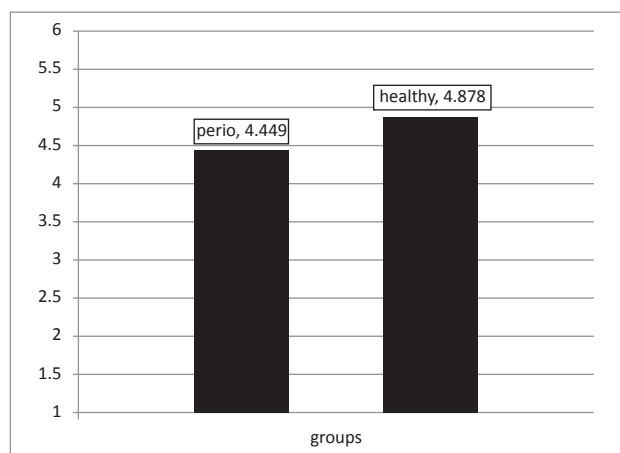
Figure. 1 Study Profile



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Figure 2. Mean uric acid levels in patients with periodontitis and healthy periodontium.



**References**

1. Sculley DV, Langley-Evans SC. Salivary antioxidants and periodontal disease status. Proc Nutr Soc 2002; 6: 137-143.
2. Sardesai VM. Role of antioxidants in health maintenance. Nutr Clin Pract 1995 Feb;10(1):19- 25.
3. Rai B, Jain R, Anand S, Kharb S. Total salivary glutathione levels: Periodontitis in smokers and non-smokers. The internet journal of Laboratory Medicine. 2009 Volume 3 Number 2.
4. Sculley DV, Langley-Evans SC. Periodontal disease is associated with lower antioxidant capacity in whole saliva and evidence of increased protein oxidation. Clin Sci. 2003; 105(2):167-72.
5. Kaufman E.; Lamster IB. Analysis of saliva for periodontal diagnosis: J. Clin. Periodontol. 27, Number 7, July 2000, pp. 453-465(13).
6. Liskmann S, Vihalemm T, Salum O, Zilmer K, Fischer K, Zilmer M.Characterization of the antioxidant profile of human saliva in peri-implant health and disease. Clin Oral Implants Res. 2007 Feb; 18(1):27-33.
7. Su H, Gornitsky M, Velly AM, Yu H, Benarroch M, Schipper HM. Salivary DNA, Lipid and Protein Oxidation in Non-smokers with Periodontal Disease. Free Radic Biol Med. 2009 Apr 1;46(7):914-21.
8. Brock GR, Butterworth CJ, Matthews JB, Chapple IL. Local and systemic total antioxidant capacity in periodontitis and health. J Clin Periodontol. 2004 Jul; 31(7):515-21.
9. Wilton JM, Curtis MA, Gillett IR, Griffiths GS, Maiden MF, Sterne JA, Wilson DT, Johnson NW. Detection of high-risk groups and individuals for periodontal diseases: laboratory markers from analysis of saliva. J. Clin. Periodontol. 1989 Sep;16(8):475-83.
10. Moore S, Calder KA, Miller NJ, Rice-Evans CA. Antioxidant activity of saliva and periodontal disease. Free Radic Res 1994 Nov-Dec;21(6):417-25.