

# Effect of Scaling and Root Planning on Salivary 8-Hydroxydeoxyguanosine Levels: Periodontitis

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## Abstract

Periodontal disease is an inflammatory disorder in which tissue damage occurs through complex interactions between periodontal pathogens and components of the host defense mechanisms and oxidative stress is implicated in pathophysiology. Twelve subjects with periodontitis were selected and salivary samples were taken before treatment, after 3 weeks of treatment and after 10 weeks of the treatment for 8-OHdG levels (8-Hydroxydeoxyguanosine). Salivary levels of 8-OHdG were significantly decreased with scaling and root planning. Thus, measurement of 8-OHdG may prove to be useful in identifying periodontal disease and risk of tooth loss.

## INTRODUCTION

The human inflammatory 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. Antioxidant (AOX) enzymes such as superoxide dismutase and glutathione peroxidase provide protection within cells, whilst low molecular weight scavenging antioxidants and AOX vitamins are present in extra-cellular fluid. In addition, dietary derived components such as uric acid, non-protein thiols and glutathione also act as antioxidants<sub>1</sub>. Total antioxidant activity has been reported to be reduced in saliva of patients with periodontitis relative to that in non-periodontitis subjects<sub>2</sub>. Diagnosis of periodontal disease has been primarily based upon clinical and radiographic measures of periodontal tissue destruction. These parameters (clinical examination and radiographically) provide a measure of past destruction and are of limited use in early diagnosis<sub>3</sub>. Oxidative stress has been reported to be enhanced during periodontitis<sub>4,5</sub>. Oxidative stress can result in DNA damage causing oxidation marker 8-OHdG(8-hydroxy deoxyguanosine) to be excreted in body fluids. 8-OHdG is a marker of oxidative stress in chronic inflammatory disease. Also, few studies indicate that 8-OHdG in body fluids can act as a biomarker of oxidative stress<sub>6,7,8,9</sub>.

Hence, the present study was planned to determine the effect of scaling and root planning on the 8-OHdG in periodontitis.

## MATERIALS AND METHODS

The twelve patients of periodontitis, without any systemic disease, aged 30-35 years attending clinic of Dept. of Oral Diagnosis of Government Dental College associated with Pt. B.D. Sharma Post Graduate Institute of Medical Science, Rohtak (Haryana), India were selected after obtaining informed consent. Periodontitis patients had at least five sites showing probing depths greater than 5mm (Table 1). The clinical examination involved measurement of both probing depths (PD) and bleeding on probing (BOP) and saliva samples were taken at first appointment i.e. before treatment, 3 weeks and 10 weeks after treatment.

## Figure 1

Table 1: Clinical periodontal profile of patients

Parameters	
Number of patients	12
Age (in years)	32.3 ± 2.2
Alcoholic, smoker and any other systematic disease	Non
Probing depth (mm)	5.93 ± 0.08
Bleeding on probing (%)	41.3 ± 2.80
Average number of periodontal involved site	6.3 ± 1.2

During the examination, paraffin wax stimulated whole saliva was collected, and samples were stored at -20°C until analyzed. Saliva were centrifuged at 8000g for 9 minutes, and levels of 8-OHdG in supernatant were determined using a competitive ELISA kit (Bioxytech 8-OHdG-EIA kit

quantitative assay for 8-hydroxy –2-deoxyguanosine, USA, The determination range was 0.125 to 200 ng/ml).

Differences in 8-OHDG levels between groups at baseline were analyzed and differences in 8-OHDG level in saliva samples were analyzed using a student's t-test.

## OBSERVATIONS AND RESULTS:

Salivary 8-OHDG level significantly decreased with scaling and root planning (Table II,  $p < 0.01$ ). The normal salivary levels of 8-OHDG with healthy periodontium were  $1.68 \pm 0.20$  ng/ml.<sup>9</sup> The 8-OHDG levels decreased to normal values following treatment, but, remained higher than control values (Table II,  $p > 0.05$ ).

### Figure 2

Table 2: Changes in Salivary 8-OHDG levels (ng/ml) and clinical measurement [probing depth (PD), bleeding on probing (BOP)] in periodontitis patients (n=12) before the treatment (A), 3 weeks after treatment (scaling and root planning) (B) and 10 weeks after treatment (scaling and root planning) (C)

Parameters	Group A*	Group B**	Group C***
8-OHDG levels	$8.93 \pm 0.02$	$3.83 \pm 0.03$	$1.57 \pm 0.02$
PD (mm)	$5.93 \pm 0.03$	$5.03 \pm 0.03$	$4.23 \pm 0.07$
BOP (%)	$41.3 \pm 2.80$	$31.8 \pm 1.10$	$18.20 \pm 1.20$

$p < 0.01$  as compared to group A, group B and group C.

## DISCUSSION

Stimulated saliva contains a lower concentration of antioxidants, but, when flow rates are taken into account, antioxidant capacity is higher than in unstimulated saliva and stimulated saliva has been used in the analysis of antioxidants.<sup>7</sup> PMN has been observed to be in greater concentration at sites of gingival inflammation.<sup>8</sup> They postulated that  $O_2^-$  produced by PMN as part of the host immune response could cause host tissue oxidative damage if it were not matched by an increase in antioxidant concentration.<sup>9</sup> Number of studies have evaluated use of various host derived factors in saliva for diagnosis of periodontal disease.<sup>10,11,12,13</sup> Patients with periodontitis have been reported to have an increased 8-OHDG concentration compared with control, and following periodontal treatment, these levels declined and approached control values.<sup>10</sup>

In the present study, we see significantly decreased level of 8-OHDG with treatment i.e. scaling and root planning. Our results are comparable with those reported in the literature.<sup>13,14</sup>

Also, 8-OHDG levels decreased after treatment and there was improvement of periodontal status. But 8-OHDG levels after treatment remains slightly lower as compared to normal healthy (Table II). Since, saliva can be easily collected; measurement of salivary 8-OHDG levels may prove useful in identifying patients at risk of tooth loss. Moreover, a salivary analysis for periodontal diagnosis may prove a cost effective method for screening large populations and monitoring the disease. Further studies are required on large samples to determine the relationship between salivary 8-OHDG levels and periodontal disease.

## CORRESPONDENCE TO

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