

Salivary Lipid Peroxidation Product Malonaldehyde In Periodontal Diseases

B Rai

Citation

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Abstract

Free radical induced lipid peroxidation has been implicated in pathogenesis of several pathological disorders. Lipid peroxidation products malonaldehyde (MDA) was analyzed in 25 patients of periodontal disease and 30 healthy subject served as a control. Significantly elevated levels of MDA were observed in periodontitis as compared to controls ($p < 0.05$). These findings indicate a role of free radicals in its pathogenesis.

INTRODUCTION

Free radicals can be defined as molecules or molecular fragments with an unpaired electron which imparts certain characteristics to the free radicals such as reactivity.¹ Reactive free radicals are able to produce chemical modifications and to damage proteins, lipids, carbohydrates and nucleotides in the tissues.² Its known that free oxygen radicals are probably mediators for tissue damage in neoplastic disease.³ Reactive free radicals may damage cells by initiation of lipid peroxidation that causes profound alteration in the structural integrity and functions of cell membranes.² Free radical induced lipid peroxidation has been implicated in the pathogenesis of several pathological disorders including cancer. The concentration of lipid peroxidation product, Malondialdehyde (MDA), is most widely used.⁴ Saliva is a diagnostic tool for many oral and systemic disease.⁵ In this study, role of free radicals (salivary MDA) in the dental condition such as oral submucous fibrosis, candidiasis, dental caries, periodontal disease, leukoplakia and oral cancer has been explored.

MATERIALS AND METHODS

SUBJECTS

25 patients of periodontal disease, in age group 17-50 years attending Out Patient Department of Govt. Dental College associated with Pt. Bhagat Dayal Sharma Postgraduate Institute of Medical Science, Rohtak. All diagnostic test were evaluated for diagnosing particular disease. 50 (M:F, 25:25) normal healthy subject with age (15-60 years) observed as controls. Unstimulated whole saliva from

subjects was collected over ice and samples were centrifuged and frozen at -20°C until analysis. Lipid peroxidation products MDA were analyzed by thiobarbituric acid (TBA) reaction.⁶

RESULTS

Significantly high MDA levels were observed in periodontitis, as compared to control (table 1, $p < 0.05$).

Figure 1

Table 1: Salivary MDA levels of patients with oral sub-mucous fibrosis, candidiasis, dental caries leukoplakia, periodontal disease, oral cancer and control subjects (Mean \pm SD).

Subjects	Sex	Salivary MDA level (ng/ml)
Control group	M	3.48 ± 0.33
	F	3.28 ± 0.54
Periodontal disease	M	4.52 ± 0.46
	F	4.28 ± 0.32

$p < 0.05$ at all levels.

DISCUSSION AND CONCLUSION

Lipid peroxidation has been shown to cause a profound alteration in structural integrity and functions of cell membrane. A study in a baby hamster kidney cell line and its polyomavirus transformed malignant counterpart, reported high level of lipid peroxidation in transformed cells and low alpha tocoferol content, suggesting that the level of lipid peroxidation is increased in the malignant state, in precancerous condition, oral cancer and periodontal diseases.⁷

In the present study high MDA level were observed in periodontitis compared to controls (table 1, $p < 0.05$), indicating a role of free radical in pathogenesis of periodontal disease.

Elevated MDA level have been reported in oral leukoplakia, cancer and periodontitis.^{8,9} The body containing a number of protective antioxidant mechanisms, whose specific role is to remove harmful oxidants as they form, or to repair damage caused by reactive oxygen species.¹⁰

Recent medical and dental research is geared towards prevention of free radical mediated diseases by using specific antioxidants. Preliminary data indicates protective role of antioxidant supplementation in prevention of precancerous lesions and periodontal diseases.¹² Saliva being non-invasive and easy to collect can be used to assess MDA and antioxidant status of the patients with an oral lesion. Further studies on large scale should be performed to clarify the importance and role of antioxidant, vitamins in oral diseases.

CORRESPONDENCE TO

Dr. Balwant Rai S/o Sh. Ramsawroop Vill. Bhangu, Distt. Sirsa, P.O. Sahuwala I, E-mail :
drbalwantraissct@rediffmail.com Mobile No. :

091-9812185855

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Author Information

Balwant Rai, B.D.S.

Resident, Government Dental College, Pt. Bhagwat Dayal Sharma, Post Graduate Institute of Medical Science