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Salivary Lipid Peroxidation Product Malonaldehyde in Various Dental Diseases

[1]Balwant Rai, [2]Simmi Kharb, [1]Rajnish Jain and [1]S.C. Anand

[1]Government Dental College, Pt. Bhagwat Dayal Sharma, Rohtak, Haryana, India
[2]Post Graduate Institute of Medical Science, Rohtak, Haryana, India

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 leukoplakia, 47 patients of oral submucous fibrosis, 21 patients of candidiasis, 67 patients of dental caries, 62 patients of oral cancer and 50 patients of healthy subject served as a control. Significantly elevated levels of MDA were observed in periodontitis, leukoplakia, oral submucous fibrosis and cancer as compared to controls ($p<0.05$). These findings indicate a role of free radicals in its pathogenesis.

Key words: Oral disease · MDA level · lipid peroxidation products

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, candidasis, dental caries, periodontal disease, leukoplakia and oral cancer has been explored.

MATERIALS AND METHODS

Subjects: Twenty five patient (M:F, 13:12) of leukoplakia, 47 (M:F, 16:21) of oral subucous fibrosis, 62 patients (M:F, 8:4) of oral cancer, 67 patients (M:F, 31:36) of dental caries and 21 patient (11:10, M:F) of candidasis 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 was analyzed by thiobarbituric acid (TBA) reaction [6].

RESULTS

Elevated salivary MDA levels were observed in patient with dental caries and candidiasis as compared with controls though the difference was not statistically significant (3.42 ± 0.22 (M) & 3.36 ± 1.42 (F), 3.45 ± 1.39 (M) & 3.29 ± 1.37 (F) v/s 3.38 ± 0.33 (M) & 3.24 ± 0.54 (F) ng mL^{-1}, respectively $p>0.05$). While significantly high MDA levels were observed in periodontitis, leukoplakia, oral submucous fibrosis and cancer (Table 1, $p<0.05$).

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

Subjects	Sex	Salivary MDA level (ng mL^{-1})
Control group	M	3.38 ± 0.33
	F	3.24 ± 0.54
Periodontal disease	M	4.22 ± 0.46
	F	4.48 ± 0.32
Leukoplakia	M	3.92 ± 0.33
	F	3.97 ± 0.27
Oral submucosis	M	4.15 ± 0.37
	F	4.07 ± 0.33
Oral cancer	M	5.23 ± 0.32
	F	4.97 ± 0.49

$p<0.05$ at all levels

Corresponding Author: Dr. Balwant Rai S/o Sh. Ramsawroop, Vill. Bhangu, Distt. Sirsa, P.O. Sahuwala I, ***Missing***

DISCUSSION AND CONCLUSIONS

Lipid peroxidation has been shown to cause a profound alteration in structural intergrity 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, leukoplakia, oral submucosis and cancer as compared to controls (Table 1, $p<0.05$), indicating a role of free radical in pathogensis of precancerous condition lesion, cancer and 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 medicated 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.

REFERENCES

1. Slater, F.T., 1984. Free radical mechanisms in tissue injury. Biochem. J., 333: 1-15.
2. De Zwart, L.L., J.H.N. Meerman and J.N.M. Commandeur *et al*., 1999. Biomarkers of free radical damage applications in experimental animals and humans. Free Radic. Biol. and Med., 26: 202-26.
3. Haliwell, B. and J.M.C. Gutteridge, 2002. Free radicals in biology and medicine, Oxford University Press Inc. New York, pp: 701-707.
4. Draper, H.H. and M. Haley, 1990. Malondialdehyde determination as index of lipid peroxidation. Methods Enzymol., 186: 421-31.
5. Mandel, I.D., 1989. The role of saliva in maintaining oral homeostasis. JADA., 119: 298-304.
6. Buege, J.A. and S.D. Aust, 1978. Microsomal lipid peroxidation. Methods Enzymol., 52: 302-310.
7. Goldring, C.E., C.A. Rice-Evans and R.H. Burdon, 1993. Alpha tocopherol uptake and its influence on cell proliferation and lipid peroxidation in transformed and nontransformed baby hamster kidney cells. Arch Biochem. Biophys., 303: 429.
8. Guven, Y., M. Unur, K. Bektas, E. Uslu, A. Belce, E. Demirez and S. Can, 2005. Salivary malondialdehyde levels in patients with oral leukoplakia. Tur. J. Med. Sci., 35: 329-32.
9. Panjamurthy, K., S. Manoharan and C.R. Ramachandran, 2005. Lipid peroxidation and antioxidant status in patients with periodontitis. Cell Mol. Biol. Lett., 10: 255-264.
10. Halliwell, B., 1996. Antioxidants in human health and disease. Ann. Rev. Nutr., 16: 33-50.
11. Moore, S., K.A.C. Calder, N.J. Miller and C.A. Rice-Evans, 1994. Antioxidant activity of saliva and periodontal disease. Free Radic. Res., 21: 417-425.