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Evaluation of oxidative stress in saliva before and after endodontic treatment

[1]Dr.Tanu Mahajan, M.D.S., Department of Conservative Dentistry and Endodontics, ITS Dental College, Hospital & Research Centre, Greater Noida Delhi NCR

[2]Dr. Rohit Kochhar, B.D.S.,M.D.S. H.O.D., Department of conservative and endodontics, ITS Dental College, Hospital & Research Centre ,Greater Noida, Delhi NCR

[3]Dr. Manju Kumari, B.D.S. , M.D.S., Professor, Department of Conservative Dentistry and Endodontics, ITS Dental College, Hospital & Research Centre ,Greater Noida, Delhi NCR

Corresponding Author: Dr.Tanu Mahajan, M.D.S., Department of Conservative Dentistry and Endodontics, ITS Dental College, Hospital & Research Centre, Greater Noida Delhi NCR

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Abstract

Saliva is an interesting alternative diagnostic body fluid with several specific advantages over blood. These include non-invasive and easy collection and related possibility to do repeated sampling. Periodontitis, caries, oral precancer, and other local oral pathologies are associated with oxidative stress. Several markers of lipid peroxidation, protein oxidation and DNA damage induced by reactive oxygen species can be measured in saliva.

Figure 1

Keywords: ROS [reactive oxygen species], free radicals, oxidative stress, antioxidants.

Introduction

ROS include oxygen-derived free radicals and non-radicals. The former correspond to species that contain one or more unpaired electrons and are generally reactive with other species. They classically include superoxide (O−2) and hydroxyl anion (˙OH).

Antioxidants antagonize the effects of free radicals, and can be defined as "those substances which when present at low concentrations, compared to those of an oxidizable substrate, will significantly delay or inhibit oxidation of that substrate". They mainly include glutathione peroxidase, catalase and superoxide dismutase.

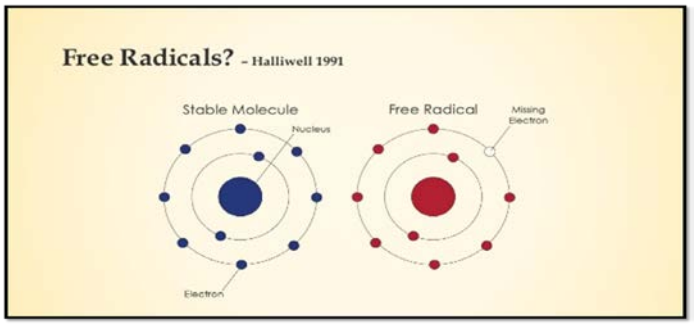


Figure 2

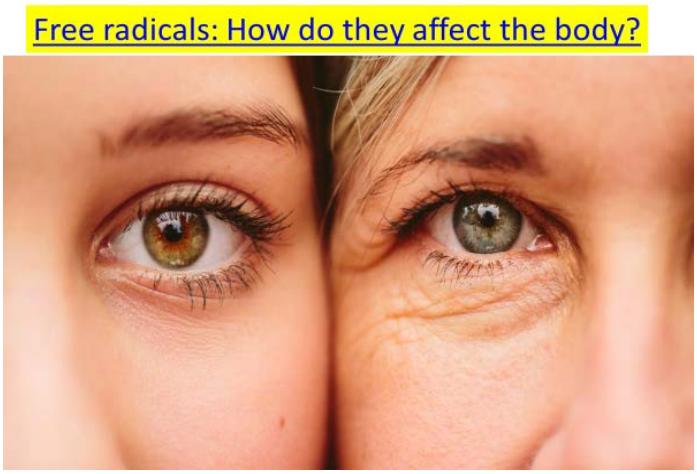


Figure 3

Aim of the study

The aim of the study is to evaluate and compare the oxidative stress level in saliva of patients with endodontic lesions before and after endodontic treatment (RCT).

Objective of the study

To evaluate oxidative stress of saliva in healthy subjects, to evaluate oxidative stress of saliva in patients with tooth having endodontic lesions before endodontic therapy and to evaluate oxidative stress of saliva in patient with tooth having endodontic lesions after endodontic therapy at 1 and 3 months and to compare the oxidative stress of saliva before and after endodontic therapy in patients with endodontic lesions.

Materials and methods

Source of Data: Patients reporting to the department of conservative dentistry and endodontics at I.T.S dental college and research, Greater Noida.

Methods of collection of data (including sampling procedures, if any)

Sampling size: 36 Sample Saliva

Sample collection: unstimulated saliva

Sample storage: -20 degree C

Armamentarium: Universal containers, Test tubes, Pipette, Air rotar ,Rubber dam, Normal saline, 3% Sodium Hypochlorite, H-files(#20), K files (#20-50), Paper points, Syringe, Apex locator, Centrifuge machine, ELISA kit (Cayman Chemical company; Item number 703102), NWLSS Malondialdehyde Assay(Northwest Life Science Specialities; Catalog number NWK-MD)

For control group in endodontically healthy subjects , age range from 18-50 years, who had atleast 20 teeth in mouth excluding third molars and showed no evidence of periodontal and endodontic disease.

Exclusion Criteria

Patient with the history of antibiotic treatment currently or in the last one month**,** Immunocompromised patients., Endo-perio lesions, Patients suffering from systemic diseases(diabetes, rheumatoid arthritis, chronic renal failure, HIV), Patients with oral cancer, Patients with obstructive sleep apnoea syndrome.

For assessment of oxidative stress level in experimental group

36 SUBJECTS were taken, including CONTROL GROUP (n=18) and EXPERIMENTAL GROUP(n=18)

The saliva samples is collected in universal container, centrifuged and Oxidative stress status is assessed by biomarker of malondialdehyde (MDA) in saliva and

activity of main antioxidant enzyme Glutathione Peroxidase (GPx)

MDA levels measured with NWLSS Malondialdehyde assay(Northwest Life Science Specialities, Catalog number NWK-MDA01)

Glutathione peroxidase(GPx) determined using a competitive ELISA kit (Cayman Chemical company, item numbers 703102]

Data obtained, statistics applied and results.

Figure 4

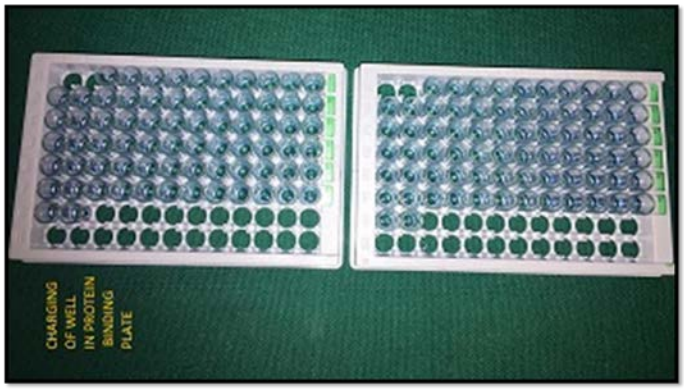


Figure 5

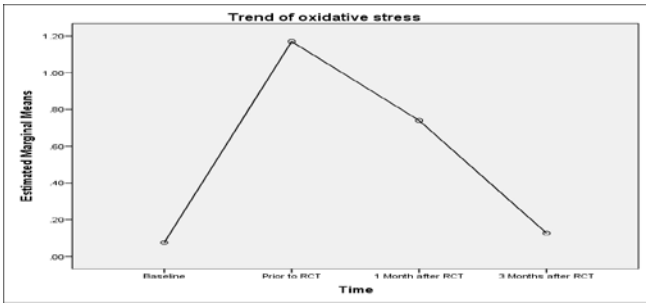
Figure 6

Figure 7

Results

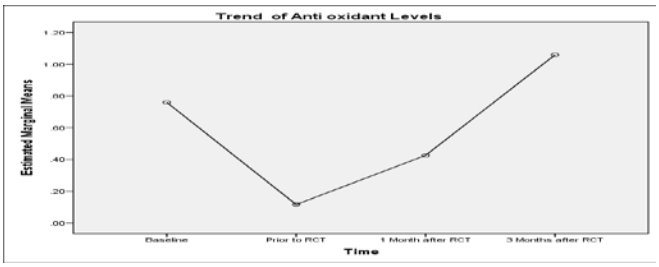
Descriptive Statistics

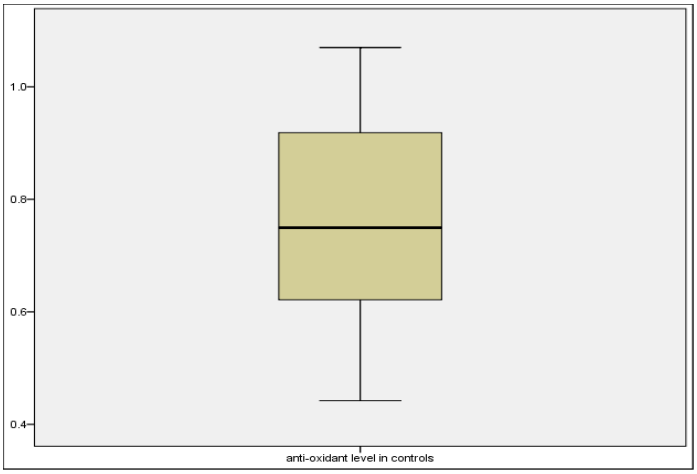
	Mean	Std. Deviation	N
oxidative stress in controls	.0754	.12466	18
oxidative stress prior to RCT	1.1698	.61729	18
oxidative stress 1 month after RCT	.7403	.24528	18
oxidative stress 3 months after RCT	.1271	.15525	18

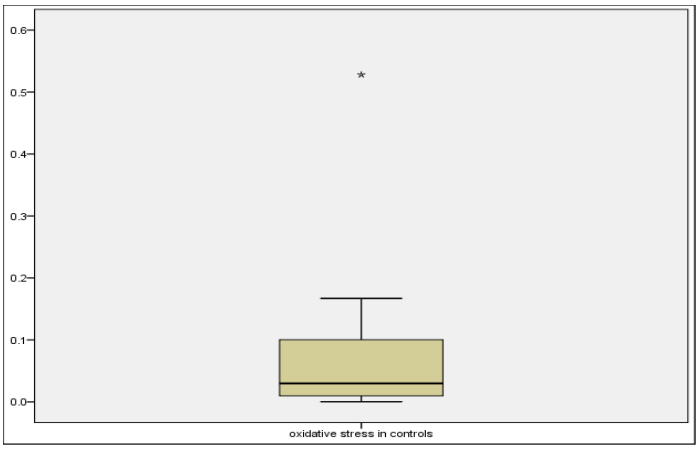


Descriptive Statistics

	Mean	Std. Deviation	N
anti-oxidant level in controls	.760194	.1904189	18
anti-oxidant levels prior to RCT	.115944	.1092408	18
anti-oxidant level 1month after RCT	.425994	.1728836	18
Anti-oxidant level 3 months after RCT	1.05958	.303335	18







Discussion

Oxidative stress represents a situation where there is an imbalance between the reactive oxygen species (ROS) and the availability and the activity of antioxidants.

This balance is disturbed by increased generation of free radicals or decreased antioxidant activity. It is very important to develop methods and find appropriate biomarkers that may be used to assess oxidative stress in vivo.

It is significant because appropriate measurement of such stress is necessary in identifying its role in lifestyle-related diseases.

Local effects of oxidative stress in apical lesions

During endodontic infection, ligation of Toll-like receptors (TLRs) on phagocytes' surface by bacterial motifs or dying cells (Chapple, 1997) triggers activation, phagocytosis, synthesis of ROS, activation of humoral and cellular responses, and production of inflammatory mediators, such as, cytokines and matrix metalloproteinases (MMPs**)**

Conclusion

Oxidative stress in saliva induces local periapical tissue injury and also contributes to systemic diseases, including atherosclerosis, arthritis and cancer(Akalin et al, 2007,2008)

Current epidemilogic evidence sustains that apical lesion associate with increased risk of cardiovascular diseases and specially atherogenesis in young adults, but the mechanisms are yet unclear(Paraskevas et al 2008).

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