

Fighting Stress with Root Canal

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Abstract: Oxidative stress is essentially an imbalance between the production of free radicals and the ability of the body to counteract or detoxify their harmful effects through neutralization by antioxidants. An increased production of oxidizing species related to reactive oral diseases, such as chronic apical periodontitis, could have systemic implications such as an increase in cardiovascular morbidity. Dental treatment may be carried out in order to reduce oxidative stress to get positive results and improve individual health.

Keywords: Oxidative stress (OxS), Apical periodontitis (AP), acute apical periodontitis (AAP), Root Canal Treatment (RCT)

1. Introduction

Stress now a days is a common finding irrespective of age, gender or profession. Depression, aging together with various systemic problems has association with production of free radicals within our system.

At low concentration free radicals play a vital role in the physiological regulation and cellular signalling processes but at high level can cause deleterious changes in the cell.

Oxidative stress (OxS) is defined as a "state in which oxidation exceeds the antioxidant systems in the body secondary to a loss of the balance between them."⁽¹⁾ Oxidative damage caused by free radicals induce the generation of superoxide radical, peroxynitrite and many more radicals that are the major cause how we age and also age related disorders like Alzheimer's, Parkinson's, neurodegenerative diseases and other related disorders.⁽²⁾

Association between Inflammatory conditions and oxidative Stress (Oxs)

Immense amount of literature supports association between inflammation and oxidative stress.^(3,4) Research has revealed the mechanism by which continued oxidative stress can lead to chronic inflammation, which in turn could mediate most chronic diseases including cancer, diabetes, cardiovascular, neurological and pulmonary diseases.⁽³⁾ Inflammatory process induces oxidative stress and reduces cellular antioxidant capacity. Overproduced free radicals react with cell membrane fatty acids and proteins impairing their function permanently. In addition, free radicals can lead to mutation and DNA damage that can be a predisposing factor for cancer and age-related disorders.⁽⁴⁾

Dental conditions and Oxidative Stress

Dental problems and caries are quite common. Apical periodontitis (AP) is an inflammatory disease affecting periradicular tissues and occurring from bacterial infection of dental pulp. It is the most frequent sequela of untreated dental caries and frequently results in tooth loss.⁽⁵⁾

Such situation calls for root canal therapy. Several studies have been carried out concerning the associations between OxS and AP.^(5,6) These studies have described the prooxidant status in apical lesions of AP patients⁽⁷⁾ and influence of endodontic treatment on systemic OxS.⁽⁸⁾

Chronic apical periodontitis are exposed to a condition of higher general oxidative stress compared to general population, and this is extremely dangerous for the general health: the condition of oxidative stress shows its primary action near the site where it is present the pathogenic *noxa*.⁽⁸⁾

Several scientific evidences show how the oxidative killing, carried out from neutrophils against pathogenic bacteria, is frequently the first stage of bone damage; especially in some dental pathologies, such as the acute apical periodontitis (AAP), the neutrophils obtained from peripheral blood of AAP subjects shown increased production of hydrogen peroxide and superoxide anion, which is instead normalized after surgical treatment.⁽⁹⁾

In a recent study, Inchingolo F et al (2014)⁶ concluded that the patients with chronic apical periodontitis exhibit significantly higher levels of oxidative stress than healthy patients. Proper root canal therapy in such patients tends to reduce levels of oxidative stress and return to normal by 90 days following treatment.

Subjects affected by chronic apical periodontitis are exposed to a condition of oxidative stress, which is extremely dangerous to general health. Moreover, one can infer from these findings that through proper endodontic therapy, a good oxidative balance can be restored, thereby avoiding the risk of contracting the above mentioned diseases.

Ahmadi-Motamayel F et al (2018)¹⁰ revealed oxidative stress marker were significantly higher in patient with caries compared to the healthy control group. Oxidative marker produced by dental caries, resulting in a decrease in antioxidant levels, causing disease progression. When bacteria are eliminated by Root Canal Treatment (RCT), the active inflammatory lesion gradually reduces in size, usually accompanied by bone regeneration.^(11,12)

2. Conclusion

Proper dental treatment and early intervention in form of root canal procedure can reduce systemic oxidative stress and can help improve overall general health of individual. Oxidative stress levels depend on one hand on the bacterial infection-related inflammation and on the other hand, the protective power of the antioxidative system. Eradicating

inflammation with root canal therapy can be help improving stress condition.

Further studies need to be carried out in order to highlight the influence of various dental procedures on patients oxidative stress level.

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