

***Trace Elements and Oxidative Stress
Markers in Saliva of Subjects with Amalgam
Fillings***

A Thesis

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Abstract

Background:

Dental amalgam is the most frequently used restorative material, it is a mixture of mercury, copper, silver, tin, and some times zinc, palladium in smaller quantities.

Since amalgam is a mixture of metals in an electrolyte (saliva) that generate galvanic current that pump mercury and other metals into the gums and oral mucosa. Some component of amalgam fillings may represent a source of oxidative damage to oral tissues, therefore concerns have been voiced about the harmful effects of mercury that released from amalgam fillings.

Dental amalgam fillings interacts in a complex way with the environment in the oral cavity as they are subjected to chemical, biological, mechanical and thermal forces. These forces change the restoration's appearance and properties, causing metal ions, amalgam debris, non metallic corrosion products, and mercury released into the oral cavity.

Saliva posses a variety of defense mechanisms to protect oral cavity from oxidative attacks including uric acid, glutathione, etc.

Aims of the study:

To measure salivary oxidative stress marker malondialdehyde, antioxidants: uric acid and glutathione in subjects with amalgam fillings. To measure salivary trace elements concentrations (copper, zinc) in those subjects and compare them with subjects without amalgam fillings, and to study the oral manifestations in amalgam fillings bearers.

Subjects, materials and methods:

One hundred one individuals were enrolled in this study; fifty subjects were with amalgam fillings; fifty one were without amalgam fillings. They were between 20-50 years of age. After selection of the sample, a case sheet questionnaire was filled for each subject and the number of filled teeth and surfaces were recorded. Each subject was examined intra-orally to find any oral manifestation or reaction to amalgam fillings.

Whole unstimulated saliva was collected from each subject in sterilized disposable cups, saliva samples were used for biochemical analysis.

Results:

The results showed that the mean of salivary malondialdehyde in subjects with amalgam fillings was significantly higher than that in the control subjects. No significant differences has been found between salivary total glutathione and uric acid between subjects with amalgam fillings and subjects without amalgam fillings.

The results showed also that the mean of salivary copper and zinc was significantly higher in subjects with amalgam fillings than that in the control subjects.

Salivary copper was significantly higher in subjects with > 10 amalgam filled teeth.

No significant correlation has been found between salivary (malondialdehyde, uric acid) and the number of filled teeth, while significant negative linear correlation has been found between salivary total glutathione and the number of filled teeth.

For the trace elements, there was a high significant positive linear correlation between salivary copper concentrations and the number of filled teeth and filled surfaces, while no significant correlation has been found between salivary zinc and the number of filled teeth or filled surfaces.

Conclusions:

The restoration by amalgam fillings was associated with increase oxidative stress and decrease in salivary antioxidants (total glutathione, uric acid). This increase in oxidative stress may due to mercury release from amalgam fillings which represent a source of oxidative stress to oral tissues, while decrease in antioxidants due to it's depletion to avoid harmful effects of oxidative attacks on these tissues. The presence of amalgam fillings inside the mouth was associated with release of trace elements (copper, zinc) as a components of amalgam fillings into the saliva.