

**Effect of Ultrasonic Cinnamon Extract on the  
Microhardness and Microscopic Features of  
Artificial Root Caries, Compared to  
Fluoridated Agent**

**A Thesis**

**Submitted to the Council of the College of Dentistry of the  
University of Baghdad, in Partial Fulfillment of the  
Requirements for the Degree of Master of Science in  
Preventive Dentistry**

**By**

**Shaimaa Thabit Al-Baldawy**

**B.D.S.**

**Supervised by**

**Ass. Prof. Dr. Wesal A. Al-Obaidi**

**B.D.S., M. Sc.**

2009

1430

## *Abstract*

**Background:** Cinnamon has a long traditional in use. It has powerful antiseptic oil; as researches showed that viruses, bacteria and fungi cannot survive in the presence of cinnamon oil; also it has the ability to regulate the digestive process, therefore the scientists called it, the digestive system friend. Cinnamon has long been popular as a mouthwash and breath freshener, as well as for food flavoring. In addition to its medical benefits, it contains high nutritional values such as calcium, phosphorous, iron and others.

**Aims of the Study:** Test the effect of ultrasonic extract of cinnamon on the microhardness before and after artificially initiated carious lesion of the outer dentin-root surface; in addition to the examination of the microscopic changes. Cinnamon extract effect was compared with that of sodium fluoride, while de-ionized water was used as control.

**Materials and Methods:** The teeth sample consisted of 49 upper first premolars extracted from 11- 14 year old patients, referred from Orthodontic Department, College of Dentistry, Baghdad University. Teeth were randomly divided into two groups, A and B. Group A was consisted of 30 teeth were randomly divided to four study groups and one control group. After production of initial carious like lesion of outer dentin surface, the teeth were immersed, for four minutes, individually in 20ml of estimated solution from selected agents which were ultrasonic cinnamon extract (0.5%, 1% and 5%), sodium fluoride 0.05% and de-ionized water. Then each tooth was rinsed with de-ionized water for two minute and restored in the de-ionized water at 37°C for the next day. This procedure was repeated daily for one week. While Group B consisted of 18 teeth were randomly divided to three study groups, teeth immersed with cinnamon extract solutions (0.5%, 1% and 5%) before demineralization by pH cycling procedure. Teeth were subjected to Vicker's

microhardness test and microscopic examination before and after the pH cycle and following the treatment with the selected solutions.

**Results:** Group A results showed that ultrasonic cinnamon extract and sodium fluoride were successful in elevation of the microhardness values of demineralized dentin surface, this was statistically highly significant for cinnamon extract at (0.5% and 1%), and sodium fluoride 0.05%, but significant with 5% cinnamon extract concentration. However, none of the mentioned agents able to increase the microhardness to approximate the original values of sound dentin. In group B, there was also an elevation of the microhardness values from sound dentin, but statistically not significant. Cinnamon extract 0.5% concentration caused highest change, while cinnamon extract at 5% resulted in lowest change in the microhardness for both A and B groups.

Microscopic examination of dentin-root ground section under light microscope revealed that zone of remineralization in dentin was seen after treatment with all concentrations (0.5%, 1% and 5%) of ultrasonic cinnamon extract, and sodium fluoride, but it revealed more with 0.5% cinnamon extract concentration. The chemical analysis of cinnamon extracts components revealed that ultrasonic cinnamon extract contents a high value of calcium, phosphorous, iron, manganese and others, more than that in water extract; while there were no minerals in the oil cinnamon extract.

**Conclusions:** The three concentrations of ultrasonic cinnamon extract were effective in remineralization of the outer dentin-root surface for A and B groups; which was reflected by increase in dentin microhardness values.