

**Effect of Small Cardamom Extracts on
Mutans Streptococci and Candida Albicans,
in comparison to Chlorohexidine gluconate
and De-ionized water
(vitro and in vivo study)**

A thesis
Submitted to the College of Dentistry
Baghdad University
In Partial Fulfillment of the Requirements for
The Degree of Master of Science
In
Preventive Dentistry

By
Ghada Abdul Salam Ibrahim
B.D.S.

Supervised by
Prof. Dr. Wesal Ali Al - Obaidi
B.D.S., M. Sc.

Abstract

Background: Small cardamom (*Elettaria cardamomum* Maton) is the queen of spices, belonging to the family Zingiberaceae. The major use of small cardamom on world wide is for domestic culinary purpose and in medicine. Small cardamom has antibacterial, antifungal, anticancer, antioxidant and also has gastroprotective effect. It is used for treating many diseases.

Aim of study: to test the effect of small cardamom extracts on mutans streptococci and *Candida albicans* in comparison to 0.2% chlorohexidine gluconate and de-ionized water .

Materials and Methods: Mutans streptococci and *Candida albicans* were isolated, purified and diagnosed according to morphological characteristic and biochemical test. Dried fruits of small cardamom were extracted by using water and alcohol. In this study, *in vitro* and *in vivo* experiments were conducted. In *in vitro* experiments, saliva was collected from ten volunteers (College students 18-22 years). Agar well technique was used to study the sensitivities of mutans streptococci to different concentrations of small cardamom extracts and other control agents, also the effects of small cardamom extracts on viable counts, adherence of mutans streptococci were studied. *In vivo* experiments, the effect of control agents and small cardamom as a mouth rinses was tested on the saliva of group of volunteers to determine the level of mutans streptococci and *Candida albicans*. Also the salivary flow rate and pH were measured. The present study also involved laboratory analysis of small cardamom include: Preliminary qualitative analysis of small cardamom, determination of essential oil constituents of cardamom and determination of chemical elements of cardamom.

Result: Sensitivities of mutans streptococci to different concentrations of both water and alcohol extracts of small cardamom *in vitro* were tested according to

agar well diffusion technique. Both cardamom extracts were effective in inhibition of mutans streptococci, but still weaker than chlorhexidine gluconate 0.2%. The effects of 10%, 15%, and 20% of both water and alcohol extracts of small cardamom were tested on the viability counts of mutans streptococci *in vitro*. Highly significant reduction in the counts of bacteria were reported of both cardamom extracts and CHX in comparison to control without agents after 24 hr. Both cardamom extracts less effective than CHX. All the concentration of water and alcohol cardamom mouth washes tested was not effective in prevention the adherence of bacteria on teeth surface *in vitro*, while CHX was effective in prevention the adherence of bacteria. 10 % aqueous cardamom extracts had a highly significant antimicrobial activity against mutans streptococci *in vivo* as it can reduce the viable count of the bacteria in comparison to de-ionized water after 15 min after rinsing and following times. But still CHX is more effective than the other agents in reduction the counts of Mutans streptococci. 30 % aqueous cardamom extracts had a significant antifungal activity *in vivo* against *Candida albicans* as it can reduce the viable count of the *Candida* in comparison to de-ionized water after 30 min after rinsing and following times. But still CHX is more effective than the other agents in reduction the counts of *Candida albicans*.

Salivary flow rates and pH *in vivo* were increasing immediately for both cardamom extracts and continue to increase for half an hour after rinsing until they become close to the base line after 1 hour. Chlorhexidine gluconate 0.2% stimulated the highest increase in salivary flow rates and pH.

Conclusion: Cardamom extracts were effective against mutans streptococci and *Candida albicans*, but still less than CHX.