

**Ministry of Higher Education
and Scientific Research
University of Baghdad
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Effect of Kappa Carrageenan on *Candida Albicans* Growth and Some Mechanical Properties of Heat Cured Acrylic Based Denture Soft Lining Material

A Thesis

Submitted to the Council of the College of Dentistry at the
University of Baghdad as Partial Fulfillment of the
Requirement for the Degree of Master of Science
in Prosthetic Dentistry

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B.D.S., M.Sc.

2019 A.D.

1441 A.H.

Abstract

Background: Microbial accumulation on the surface of the soft lining material is a serious problem and is associated with several factors; one of them is the continual and prolonged use of denture which can lead to chronic mucosal inflammation known as denture stomatitis. It's caused mainly by fungal growth, especially *Candida albicans*. Therefore, the effectiveness of incorporation of an antifungal drug to the soft lining material was necessary.

Aims of the Study: This study aims to evaluate the antifungal effect of adding kappa-carrageenan to the heat-cured acrylic base soft lining material at a various weight percentages against *C.albicans*. In addition, it aims to investigate the effect of incorporation kappa-carrageenan powder on the mechanical properties (hardness and peel bond strength) of the heat cure acrylic base soft lining material.

Materials and Methods: A pilot study was performed to decide the best concentration of kappa-carrageenan to be used with the heat-cured, acrylic-based soft liner. Five percentages of kappa-carrageenan powder by weight of the soft liner powder (0.5, 1, 1.5, 2, and 2.5 wt.%) were evaluated and compared with the control group (0 wt.%). The *C.albicans* adherence test was performed to assess the efficacy of kappa-carrageenan powder in preventing the adherence of *C.albicans*. The Results showed the 1.5 wt.% and 2 wt.% groups as having the best effect.

Kappa-carrageenan powder was initially mixed with the soft liner powder by using the amalgamator apparatus. Then, the mixture was added and mixed with the soft liner monomer according to manufacturer instructions. Ninety specimens were prepared and divided into three groups (thirty samples for each group) according to the test to be done (*C.albicans* adherence test, peel bond strength test and shore-A hardness test). To investigate if there is any chemical

reaction between kappa-carrageenan powder and the soft liner, fourier transforms infrared spectroscopy (FTIR) analysis was conducted. The scanning electron microscope (SEM) was used to investigate the distribution of kappa-carrageenan powder within the soft liner matrix

Results: For *C.albicans* adherence test; the incorporation of 1.5 wt.% and 2 wt.% of kappa-carrageenan powder caused a highly significant decrease in the mean values of the adhered *C.albicans* cells when compared to the control group ($P<0.01$). Shore-A hardness test showed a highly significant increase in the mean value of hardness after adding 1.5 wt.% and 2 wt.% of kappa-carrageenan powder in comparison to the control group ($P<0.01$). For the peel bond strength test, there was a non-significant reduction of peel bond strength test values for 1.5 wt% group ($P>0.05$) while there was a significant reduction for 2 wt% compared to the control group ($P<0.01$).

Conclusion: kappa-carrageenan powder was successfully incorporated into the heat-cured acrylic-based soft denture liner and was found to be a potent antifungal medicament against *C.albicans* adherence. It was concluded that 1.5 wt% of kappa-carrageenan was the most beneficial effects against fungi, with a minimal adverse effect on hardness and peel bond strength of the soft lining material.