

**Ministry of Higher Education
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College of Dentistry**



**Comparison of Some Properties of Heat Cured Soft
Denture Liner after the Addition of Polyamide Nylon-6
Micro Particles**

A Thesis

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Abstract

Background: The denture resilient liners play a major role in prosthetic dentistry due to its viscoelastic properties as it can absorb shocks to minimize and distribute pressure on the denture bearing tissue. Generally, the long term soft liner material of denture base need to be replaced every 6–12 months due to the deterioration of soft lining materials as a result of the exposure to oral environmental conditions. Recently, researches has been focused on enhancing soft liner properties through incorporating various types of fillers into a polymeric matrix in order to develop a new type of materials that withstand oral condition and maintain material flexibility .

Aims of the study: The research aims to evaluate the effect of addition of different weight concentration of polyamide Nylon-6 micro particles (average size 15-20 μm) on some mechanical and physical properties of acrylic based heat cured soft denture liner (Peel bond strength, tensile strength , wettability, shore A hardness, surface roughness and surface porosity).

Materials and methods: A pilot study was conducted by adding Polyamide Nylon-6 micro particles to the acrylic based heat cure soft liner in a concentrations of 1%, 3%, 5% by weights, in addition to 0% for control group, the results of the pilot study show that there were an increase in the mean values of both tensile strength and shore A hardness of the soft liner, when compared with the control group. The main study include two hundred and forty specimens which divided into six groups according to the tests conducted, 40 specimens for each test. Each group was then subdivided into

four subgroups according to concentration of polyamide Nylon -6 (0%, 1%,2%,3% by wt.) with 10 specimens for each (n=10).

To investigate the chemical interaction between polyamide particle and soft line, Fourier transform infrared spectroscopy analysis was conducted and reported the absence of any chemical reaction between the polyamide Nylon -6 and soft liner. Scanning electron microscope results show slight agglomeration of the fillers within the soft liner matrix, while X-ray diffraction analysis indicates that there were physical reactions of the polyamide Nylon -6 fillers within the soft liner matrix.

Results: The tensile and peel bond strength mean value were significantly increased after the addition of polyamide Nylon -6 with higher value for 1% by weight, also there was non-significant elevation in wettability property . While mean values of the surface roughness and porosity significantly increased and seemed concentration dependent. At the same time, the surface hardness test revealed non-significant raise in their values ,increase in surface hardness directly proportioned with the concentration of polyamide Nylon -6.

Conclusion: The addition of 1% by weight polyamide Nylon-6 micro filler improved tensile and peel bond strength of soft lining materials with higher mean values as compared with control and other experimental groups, also enhanced the wettability property of soft liner. On other hand, this concentration showed minimal adverse effect on hardness, surface roughness and surface porosity of soft lining material than other concentrations.