Effect of modified nanohydroxyapatite fillers addition on some properties of heat cured acrylic denture base materials

A Thesis

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Abstract

Statement of the problem:

Poly(methylmethacrylate) continues to be used as denture base materials because of its favorable characteristics, ease of processing, stability in the oral environment, ease in repair and superior esthetics**.** However, the material is not ideal in every aspect and has disadvantages such as insufficient surface hardness, and increase water sorption and poor impact resistance and the latter being the primary cause of fracture of denture base resins.

Aim of the study:

The purpose of this study was to evaluate the effect of addition of silanized nano- hydroxyapatite (HA) on impact strength, transverse strength, surface roughness ,surface hardness, water sorption and solubility of heat cured acrylic denture base material.

Materials and methods:

Hydroxyapatite nano particles were first silanized with γMPS (tri methacryloxypropyletrimethoxy silane coupling agent) then ultrasonicated with methylmethacrylate to disperse agglomerated nano particles and mixed with polymer.

2% by wt of hydroxyapatite nano particles was selected as the best concentration that added to the denture base material according to the pilot study.One hundred specimens were prepared by conventional water bath processing technique and divided to two groups: 50 specimens for control group 0% HA and 50 for experimental group 2% HA then each group was subdivided to five groups with 10 specimens for each test, impact strength,

transverse strength, surface hardness, surface roughness, water sorption and solubility.

Results:

Fourier transform Infra-red (FTIR) confirmed that γMPS reacted with the nanohydroxyapatite particals. Independent t test results showed high increase in impact strength and surface hardness after addition of 2% hydroxyapatite nano particles also showed decrease in water sorption whereas solubility was highly decreased. Surface roughness was highly increased as compared with control group but remained within the acceptable limit less than 2μm. Hydroxyapatite nanoparticles highly decreased the transverse strength value.

Conclusion:

γ MPS treated hydroxyapatite nanoparticles successfully enhanced dispersion and interfacial bonding with polymer matrix.

The addition of 2% hydroxyapatite nano particles considerably improved the impact strength, surface hardness and had positive effect on water sorption and solubility. Whereas the same concentration tend to highly decreased transverse strength and increase surface roughness.