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EFFECT OF SOAKING AND SIMULATED MECHANICAL CLEANING OF CONVENTIONAL HEAT CURED PMMA ACRYLIC RESIN AND PRE POLYMERISED CAD CAM MILLED ACRYLIC RESIN USED FOR DENTURE BASE FABRICATION - AN IN VITRO STUDY

By

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ABSTRACT

Title: An in vitro study on the effect of simulated mechanical cleaning of conventional heat cured PMMA acrylic resin and pre-polymerised CAD CAM acrylic resin used for denture base fabrication

Background: In order to maintain hygiene of removable prostheses, various chemical and mechanical methods are used, mechanical methods being more popular for minimizing biofilm formation. The porous nature of conventional heat cured PMMA acrylic resin can result in bacterial colonization on the denture base leading to denture stomatitis, angular cheilitis, candidiasis in immunocompromised patients and other associated problems. CAD CAM milled acrylic resin blocks are pre-polymerized, have less surface porosity and better surface finish. The application of computer-aided design computer-aided manufacturing (CAD CAM) technology in the fabrication of complete dentures, offers numerous advantages like optimum fit and lack of shrinkage during milling as the blocks are pre-polymerized. Additionally, the porosity and surface roughness of CAD CAM resins is less compared to conventionally processed resins. Mechanical cleaning of dentures can cause wear of denture base materials. This study was done to check if surface of pre polymerised CAD CAM milled acrylic resin blocks showed any change in terms of surface hardness, surface roughness and colour stability over long term simulated usage.

Objectives: To compare the properties of surface hardness, surface roughness and colour stability of conventional heat cured PMMA denture base resin and CAD CAM pre polymerized resins

Methodology: A total 68 samples of dimension 63mm length, 10mm width and 33mm thickness were fabricated, 34 using conventional PMMA acrylic resin and 34

pre polymerized CAD CAM milled PMMA resins. A tungsten carbide bur was used to trim the samples, and finished using 100 grit fine sandpaper. Baseline values of all the samples was recorded for surface hardness, surface roughness and colour stability. The samples were immersed in artificial saliva for 30 days and were subjected to simulated mechanical cleaning with upto 40000 strokes. All the samples were tested for surface roughness, surface hardness and colour stability. The surface roughness (Ra - μm) was analysed with contact profilometer, the surface hardness was tested using Vicker's Microhardness tester, colour stability measurement was recorded using a light spectrophotometer at baseline and after immersion and simulated mechanical brushing

Results: The samples showed statistically significant difference in surface roughness, surface hardness and colour stability between all the subgroups in each group. Comparison between subgroups showed significant change in conventional PMMA acrylic resin samples when compared to pre polymerised CAD CAM acrylic resin. A comparison between conventional PMMA acrylic resin and CAD CAM pre polymerised acrylic resin showed that CAD CAM pre polymerised acrylic resin has superior physical property in terms of surface roughness, surface hardness and better colour stability after immersion and simulated mechanical brushing.

Conclusion: It can be concluded that pre polymerised CAD-CAM milled PMMA resin used for denture fabrication improves denture quality by streamlining clinical and laboratory procedures and offering better physical properties. Further clinical studies are essential for validation of these claims.

Keywords: CAD CAM PMMA, Conventional PMMA, acrylic resin, surface roughness, surface hardness, colour stability

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