

**COLOR STAINING, SURFACE ROUGHNESS AND THE EFFECT OF DENTURE
CLEANSERS ON POLYAMIDE DENTURE BASE MATERIAL – A REVIEW**

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ABSTRACT

Polymethyl methacrylate (PMMA) has been the most popular material used for denture fabrication since its introduction in 1937. Polyamide resin was proposed as a denture base material in the 1950s. They display greater flexibility and low cytotoxicity when compared to PMMA. The purpose of this article is to review the surface roughness, color stainability and effect of denture cleansers on the polyamide denture base materials.

KEYWORDS: Color, denture cleanser, nylon, polymethyl methacrylate.

INTRODUCTION

Polyamide resin was proposed as a denture base material in the 1950s.^[1] Nylon is the generic name for certain types of thermoplastic polymers belonging to the class known as polyamide.

Staining of acrylic resins can lead to poor aesthetics. A denture base polymer should have a smooth and glassy surface which are capable of matching the natural appearance of soft tissues and should be translucent for the best aesthetic effect. Color and translucency should be maintained during processing, and acrylic resins should not change color in clinical use.^[2] Color change of prosthodontic materials may result in patient dissatisfaction and additional expense for replacement.^[3]

Rough surfaces may cause discoloration of denture base material and may also contribute to biofilm formation. Maintenance of good oral hygiene is important and the immersion of prosthesis in a disinfecting solution for an appropriate time is a convenient method to prevent contamination.

Denture cleansers are used to provide adequate denture plaque control, prevent halitosis, remove discoloration caused by foods and drinks, eliminate *Candida albicans*

and other microorganisms, to dissolve calculus and prevent denture-induced stomatitis.^[4-6]

This is a literature review on the colour stainability, surface roughness and the effect of denture cleansers on polyamide denture base material.

Color Staining

The instrument used for measuring the color stability is called the spectrophotometer. The polyamides showed staining when immersed in beverages such as coffee, red wine, and cola. The staining effect of red wine and coffee were within the clinically accepted levels.^[7]

It was found that the staining increased with the increase of the immersion period. In such cases, the polyamides showed severe staining while the PMMA was at clinically accepted levels.^[8]

The polyamides also exhibited color changes and a decrease in shine after irradiation with UV light and thermocycling. However, the changes were within the clinically accepted levels.^[9]

Surface Roughness

The surface roughness can be measured with a profilometer. The clinically accepted standard is 0.2µm.

The polyamide specimens produced a rougher surface than PMMA, both before and after the polishing process (lathe with pumice followed by high shine polish). However, the polishing technique provided the polyamide with a surface, well within the clinically acceptable standard.^[10]

The polyamides did not exhibit significant differences in surface roughness when compared with PMMA after immersion in beverages such as coffee and red wine.^[8] The surface roughness of the PMMA resins was significantly lower than that of Polyamide resins before and after thermocycling.^[11]

The polyamide flexible resins showed a lower mean surface roughness value when compared with 3D-printed resin because polymerization of thermoplastic resin at high pressure lowered its monomer contents, which in turn decreased its porosity due to monomer evaporation.^[12]

Effect of Denture Cleansers

The effect of the daily use of enzymatic cleanser on *Candida albicans* biofilms on polyamide and polymethyl methacrylate resins were evaluated using scanning electron microscope. Polyamide resin presented more viable cells of *Candida albicans*.^[6] Although enzymatic cleansing significantly reduced viable cells, daily use did not maintain this reduction.^[13]

Polyamides exhibited lower gloss, color change, and an increase in surface roughness with the use of denture cleansers. Color difference and surface roughness increased significantly as the immersion time increased.^[14,16]

In 2015, Shah VR et al evaluated the flexural strength of flexible denture base materials (Valplast) and Polymethyl methacrylate (PMMA) denture base material (Meliodent) after immersing them in three different denture cleansers with acidic (Valclean), basic (Clinsodent) and neutral (Polident) pH and distilled water. It was concluded that Polident and Valclean can be safely used as denture cleansers for both nylon and acrylic resin denture base materials as far as color stability and flexural strength both were concerned while Clinsodent should be used with caution.^[15]

CONCLUSION

The physical properties such as surface roughness, color staining and the effect of denture cleansers on polyamides were briefly discussed in this review article. These materials showed some degree of staining in different beverages and during thermocycling. It was found that polyamides have rougher surface than other resin materials, and it causes more bacterial and fungal colonization. The use of denture cleansers also caused changes in color, reduced gloss, increased surface roughness and presented more viable cells of *Candida Albicans*.

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