



Comparison of flexural strength of two types of denture base resins- An *in vitro* study

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Abstract

Background: The present study was conducted for assessing and comparing flexural strength of two types of denture base resins.

Materials & methods: 100 acrylic specimens in all were created. Used were stainless steel dies. To complete the flasking process, dental plaster was applied to the metal dies. For the purpose of making room in the mould for the acrylic specimen, the stainless-steel dies were extracted. The following research groups were created by randomly selecting all of the specimens: Conventional denture base resins fall under Group 1, and glass reinforced denture base resins go under Group 2. The universal testing apparatus was used to determine the samples' flexural strength.

Results: Mean flexural strength of group 1 specimens was 118.6 MPa. Mean flexural strength of group 2 specimens was 156.3 MPa. While comparing the mean flexural strength between group 1 and group 2, significant results were obtained.

Conclusion: Glass reinforced denture base resins demonstrated higher flexural strength in comparison to conventional denture base resin.

Key words: Denture, Base, Resin.

INTRODUCTION

Polymethyl methacrylate (PMMA) remains the denture base material of choice, although being introduced in 1936.^{1,2} Several types of PMMA denture base resin available today are similar in composition but small variations lead to different physical properties and processing methods.³ Dentures made by light-activated demonstrate lower mechanical properties over heat-activated resins.⁴ The polymerization shrinkage of PMMA by ordinary compression molding method prompts inaccurate adaptation of the base material to the dental replacement bearing tissues, bringing about a poor border seal. To minimize the dimensional inaccuracies of the compression molding technique, Pryor (1942) developed the injection molding technique as an alternative. In 1970, Ivoclar company introduced a special resin for

injection molding.⁵ Hence; under the light of above mentioned data, the present study was conducted for assessing and comparing flexural strength in two types of denture base resins.

MATERIALS & METHODS

The goal of the current study was to evaluate and contrast the flexural strength of two different denture base resin types. 100 acrylic specimens in all were created. They produced stainless steel dies. These stainless steel dies were used to create 100 acrylic samples. To complete the flasking process, dental plaster was applied to the metal dies. For the purpose of making room in the mould for the acrylic specimen, the stainless steel dies were extracted. The following research groups were created by randomly selecting all of the specimens: Conventional denture base resins fall under Group 1, and glass reinforced denture base resins go under Group 2. To replicate oral circumstances, all 100 specimens were submerged in distilled water for 28 days at room temperature. The universal testing apparatus was used to determine the samples' flexural strength. The SPSS software was used to assess all the results, which were recorded in a Microsoft Excel spreadsheet.

RESULTS

Mean flexural strength of group 1 specimens was 118.6 MPa. Mean flexural strength of group 2 specimens was 156.3 MPa. While comparing the mean flexural strength between group 1 and group 2, significant results were obtained.

Table 1: Comparison of flexural strength (MPa)

Group	Mean	p- value
Group 1	118.6	0.000 (Significant)
Group 2	156.3	

DISCUSSION

Flexural strength (Fs) comprises three mechanical properties, namely compressive strength, tensile strength, and shear strength. Therefore, the Fs becomes a key factor to be analyzed for the success of a denture base. In the present study, Fs of the denture base resins produced through the CAD/CAM milled technique was significantly higher than the ones obtained through the compression molding technique and injection molding technique. The denture base was able to succeed simulation intraorally to high functional loads during parafunction and mastication when subjected to a 3-point bend test.^{6,7,8} The 3-point flexural test is commonly used for measuring flexural properties. The acrylic denture base resins should have at least 65 MPa Fs according to the ISO standards.⁹ Hence; under the light of above mentioned data, the present study was conducted for assessing and comparing flexural strength in two types of denture base resins. In this study, mean flexural strength of group 1 specimens was 118.6 MPa. Mean flexural strength of group 2 specimens was 156.3 MPa. While comparing the mean flexural strength between group 1 and group 2, significant results were obtained. Nandal et al. reviewed various advancements in the field of denture base resins and stated that the Fs, impact strength, and flexural modulus were observed to be significantly improved in CAD/CAM resin as compared to the conventional heat cure resins.¹⁰ Singh, R et al evaluated the Flexural Strength and Surface Roughness of Lucitone-FRS, Valplast (Flexible Denture Base Materials) and Trevalon (Heat Cure Denture Base Material). Three stainless steel master dies of dimension 65 × 20 × 3 mm were fabricated and were invested in standard metal denture flask. A total of 60 specimens were fabricated with 20 specimens of each type of denture base material. Fabrication of a Heat Cure Acrylic Denture Base Resin Specimen was Done Followed by Fabrication of Flexible Denture Base Resins Specimen. In the same manner, samples were fabricated for Lucitone-FRS, and

Valplast. These specimens were further divided into two subsets; containing 10 specimens each from each group. In one subset, Flexural Strength was Measured while in the other subset, Surface Roughness was measured. Flexural strength was found maximum in the VALPLAST and minimum in LUCITONE. Surface Roughness Test was done on total 10 samples of each material, i.e. Lucitone-FRS, Valplast and Trevalon. Results for Surface Roughness Test are Valplast has maximum Surface-Roughness followed by Trevalon and minimum in Lucitone-FRS on both polished and unpolished surface. Trevalon can be ideal in cross-arch stabilization cases and Valplast and Lucitone FRS can be successfully used in cases of small arch complete dentures and removable partial dentures. The selection of the right denture base material is imperative as it largely affects the overall clinical outcomes and comforts.¹¹

CONCLUSION

In comparison to traditional denture base resin, glass reinforced denture base resin showed greater flexural strength.

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