Some mechanical properties of a highly cross-linked, microwave-polymerized, injection-molded denture base polymer

Type: Article

Abstract:

Purpose: The impact strength and the flexural properties of denture base materials are of importance in predicting their clinical performance upon sudden loading. This study compares the impact and transverse strengths and the flexural modulus of three denture base polymers. Materials and Methods: The investigation included a relatively new microwave-polymerized polyurethane-based denture material processed by an injection-molding technique, a conventional microwave-polymerized denture material, and a heat-polymerized compression-molded poly(methyl methacrylate) (PMMA) denture material. Impact strength was determined using a Charpy-type impact tester. The transverse strength and the flexural modulus were assessed with a three-point bending test. The results were subjected to statistical analysis using a one-way analysis of variance and the Scheffe test for comparison. Results: The impact strength of the microwave-polymerized injection-molded polymer was 6.3 kJ/m(2), while its flexural strength was 66.2 MPa. These values were lower than those shown by the two compression-molded PMMA-based polymers. The differences were statistically significant. The flexural modulus of the new denture material was 2,832 MPa, which was higher than the conventional heat-polymerized polymer but was comparable to the other microwave-polymerized PMMA-based polymer. The difference in the flexural modulus was statistically significant. Conclusion: In terms of the impact and flexural strengths, the new microwave-polymerized, injection-molded, polyurethane-based polymer offered no advantage over the existing heat- and microwave-polymerized PMMA-based denture base polymers. However, it has a rigidity comparable to that of the m microwave-polymerized PMMA polymer.

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