

Physical properties of a new denture lining material containing a fluoroalkyl methacrylate polymer

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Abstract

STATEMENT OF PROBLEM: A new fluoride-containing, methacrylate-based denture lining material has been introduced. Because of the fluoride content, this material is expected to demonstrate low water sorption and solubility and high stain resistance, but these attributes remain untested. PURPOSE: This study investigated a wide range of clinically relevant properties for a new fluoroalkyl methacrylate denture base liner product (Maxfit) and compared these properties with those of 3 other commercial products. MATERIAL AND METHODS: Four denture lining materials were tested: Maxfit, Kooliner, Tokuyama Rebase (fast set), and Denture Liner. Water sorption ($\mu\text{g}/\text{mm}^3$) and solubility ($\mu\text{g}/\text{mm}^3$) were tested according to International Organization for Standardization (ISO) Standard No. 1567. Stain resistance was evaluated by measuring color change (ΔE) after immersion in 2 solutions (coffee and turmeric solution). Microhardness was determined using Knoop indentation testing according to American National Standards Institute/American Dental Association Specification No. 17. Relined denture fit was evaluated by measuring the gap (mm) occurring between the relined denture base and the cast after polymerization. Shear bond strength (MPa) to denture base materials (polymethyl methacrylate, cobalt-chromium alloy, and titanium) was tested according to ISO Standard No. 11405. Data were statistically analyzed using nonparametric Kruskal-Wallis ($\alpha=.05$) and Mann-Whitney U tests combined with the Bonferroni correction ($\alpha=.008$). RESULTS: Maxfit showed the lowest water sorption and solubility (8.0 ± 0.1 , 0.5 ± 0.1 $\mu\text{g}/\text{mm}^3$, respectively). The color change from coffee immersion of Maxfit was significantly less than Tokuyama Rebase and Denture Liner, and significantly less than Tokuyama Rebase and Denture Liner in a turmeric solution ($P<.001$). Knoop hardness of Maxfit (8.66 ± 0.51) was higher than Kooliner and Tokuyama Rebase ($P<.001$). The relined denture fit using Maxfit was not different from other materials. Significantly higher shear bond strength to denture base resin was noted for Maxfit compared to Tokuyama Rebase and Denture Liner ($P<.008$). CONCLUSIONS: The new fluoroalkyl methacrylate-based denture liner (Maxfit) showed the lowest water sorption and solubility, and superior stain resistance. In

spite of the addition of the fluoride content, this product exhibited no deterioration in physical properties, such as surface hardness, fit of the relined denture, and shear bond strengths to denture base materials tested.