

A study of contraction shrinkage of composite resins and ormocers with various curing times

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I. Objectives

Since Bowen's introduction of dimethacrylates in the form of bis-GMA, no fundamental changes have occurred in the matrix of composite resin. A new form of the matrix, or ormocer has organic-inorganic compound polymers in dental filling materials. The greatest advantages obtained by implementing ormocers are reported as improved biocompatibility and reduced polymerization shrinkage. The purpose of this study was to compare the amount of contraction shrinkage of conventional composite resins and ormocers. Additionally, the time of each material when there is no further change of contraction shrinkage was analysed.

II. Material and Methods

Four brands of composite resins (P-60, Surefil, Z-250 and Denfil) and two brands of ormocers (Definite and Admira) were used. 20 seconds, 40 seconds and 60 seconds of curing times were given. Linear shrinkage of them were measured using a linometer for 80 seconds.

The values of linear shrinkage were transformed to volumetric shrinkage. The effect of material and curing time to volumetric contraction shrinkage at the time of 80 seconds was analysed by two-way ANOVA. The effect of time to volumetric contraction shrinkage was analysed by one-way ANOVA, and the time when there was no further change of the contraction shrinkage was analysed.

III. Results

1. P-60, Definite, Z-250 and Denfil had no further change of contraction shrinkage from the time of 20 seconds, and Surefil and Admira had no further change of contraction shrinkage from the time of 10 seconds.
2. Statistical analysis revealed volumetric shrinkage varied among material ($p < 0.05$). No significant difference of contraction shrinkage among different curing times was found, and there was no interaction between materials and curing times.
3. Definite and Admira which are ormocers showed the statistically same contraction shrinkage with those of Z-250 and P-60, which is higher than that of Surefil and lower than that of Denfil ($p < 0.05$).

IV. Conclusions

Ormocers had statistically same amount contraction shrinkage with Z-250 and P-60.