

**Comparison of three types of fiber-reinforced composite molar crowns on their fracture resistance and marginal adaptation.**

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Three types of fiber-reinforced composite (FRC) molar crowns were tested on their fracture resistance and marginal adaptation under simulated oral stress conditions. Two glass fiber systems, one processed with a vacuum/pressure system, the other by manual fiber adaptation, and a polyethylene fiber system were evaluated. Every group consisted of 12 crowns. All crowns were luted adhesively on human molars and exposed to thermal cycling and mechanical loading (TCML: 6000 x 5 degrees C/55 degrees C; 1.2 x 10(6) x 50N; 1.66Hz). The marginal adaptation was evaluated through dye-penetration and analyzed semi-quantitatively with a scanning electron microscope. The fracture resistance was measured using a Zwick universal testing machine. The highest fracture resistance was observed on the glass-fiber systems (FibreKor/Sculpture 1875N +/- 596; Vectris/Targis 1726 +/- 542), though statistically, the polyethylene system (belleGlass/Connect 1388 +/- 620) was not significantly weaker. All systems exceeded the fracture resistance required to withstand the maximum masticatory forces expected in the molar region. The marginal adaptation generally had a tendency towards larger gaps after TCML. The crown/composite-cement bond deteriorated significantly after TCML with the manual fiber adaptation and the polyethylene fiber system. The cement/tooth bond strength depended on which composite-cement/dentin-adhesive system was used. **CONCLUSION:** The fracture resistance of molar crowns made of glass-fiber reinforced composite was higher than those of polyethylene fiber-reinforced composite crowns. However, there was no statistically significant difference. The marginal adaptation seems to depend on the fiber systems and composite-cement/dentin adhesive system used.

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