

Fracture resistance of fiber-reinforced vs. non-fiber-reinforced composite molar crowns.

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This study compared fracture resistance of fiber-reinforced and non-fiber-reinforced composite molar crowns under simulated oral stress conditions. Three groups of fiber-reinforced composite crowns were constructed using one polyethylene fiber (belleGlass/Connect) and two glass fiber reinforcement systems (Sculpture/FiberKor, Targis/Vectris). The non-fiber-reinforced crowns based on the facing material alone: Sculpture, Targis or belleGlass. Additionally, crowns were made of the non-reinforced composite Artglass. Each group consisted of eight crowns. All crowns were luted to human molars and exposed to thermal cycling and mechanical loading (6000 x 5 degrees C/55 degrees C; 1.2 x 10(6x)50 N; 1.66 Hz). The fracture resistance was measured using a Zwick universal testing machine. Results: The non-reinforced Artglass crowns demonstrated the highest fracture resistance, significantly higher than the resistance shown with belleGlass, belleGlass/Connect or Targis. Artglass showed an extremely wide distribution of values, however. No statistically significant differences were found between the reinforced and non-reinforced composite crowns of Vectris/Targis, FiberKor/Sculpture or Connect/belleGlass although the reinforced crowns showed a tendency towards higher values. The fracture resistance values scattered markedly more for the reinforced crowns, and their lowest fracture values also reached the level of the lowest non-reinforced crowns. The small distribution of fracture values for the non-reinforced crowns indicates that they will be less susceptible for manufacturing faults and more reliable under clinical conditions. Conclusions: Results of this study suggest that single molar composite crowns (tested in this study) do not benefit from fiber-reinforcement.

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