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Influence of Veneering Composite Composition on the Efficacy of Fiber-Reinforced Restorations (FRR)

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Clinical Relevance

This investigation assessed the influence of storage time, up to six months, on the flexural properties of four commercially available fiber-reinforced veneer composites. In addition, two experimental composites were used to assess the influence of varying filler loading and resin matrix chemistry on the efficacy of fiber reinforced composites. The results demonstrated that the chemical composition of veneer composites is a critical factor in terms of the degree of reinforcement.

SUMMARY

This study investigated the influence of fiber reinforcement on the flexural properties of four commercial (Artglass, Belleglass HP, Herculite XRV and Solidex) veneering composites (Series A) and two experimental composites (Series B&C). This study investigated how the composition of the veneering composites influenced the enhancement of strength and modulus produced by fiber reinforcement. The formulation of the experimental composites were varied by changing the filler load (Series B) or the resin matrix chemistry (Series C) to assess the effect these changes would have on the degree of reinforcement.

In Series A, the commercial veneering composites were reinforced by an Ultra-High-Molecular-Weight Polyethylene fiber (UHMW-PE/Connect) to evaluate flexural properties after 24 hours and six months. In Series B, experimental composites with the same organic matrix but with different filler loads (40% to 80% by weight) were also reinforced by Connect fiber to evaluate flexural properties. In Series C, experimental composites (Systems 1-4) with the same filler load (76.5% by weight) but with different organic matrix compositions were reinforced by Connect fiber to evaluate flexural properties. For Series B and C, flexural properties were evaluated after 24 hours water storage.

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All the samples were prepared in a mold 2 mm x 2 mm x 25 mm and stored in distilled water at *3Te* until they were ready for flexural testing in an Instron Universal Testing Machine using a crosshead speed of 1 mm1minute. The results showed no significant differences in the flexural strength (FS) between any of the commercial reinforced composites in Series A. The flexural modulus (FM) of the fiber-reinforced Belleglass HP group was significantly higher than for Artglass and Solidex. Water storage for six months had no significant *(p>O.05)* effect on the flexural strength of three of the four reinforced veneering composites. The flexural strength for Artglass was significantly reduced (p<O.05) by six-month water storage. In Series B, however, increasing the amount of filler loading improved the flexural modulus of the reinforced experimental composite but had no effect on its flexural strength. In Series C, changing the organic matrix formulation had no affect on flexural strength but affected the flexural modulus of the reinforced experimental composite.

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