**Introduction**

One of the key functions of a dental restoration is to seal the exposed dentin from the oral environment, to prevent pulpal damage and further decay. Therefore, the microleakage at the tooth-restorative interface is a major concern influencing the clinical longevity of composite resin restorations. The integrity and durability of the marginal seal has always been of prime concern in the investigation of dental restorative materials performance.

The aims of this study was to compare the effect of self-etch, one-step, one-component adhesive system and etch and rinse adhesive system as well as the nanocomposite and microhybrid composite on the microleakage of class II composite restorations located in dentin.

**Materials and Methods**

Fifty-two upper permanent premolar teeth were used and two class II cavities (3 millimeter \((\text{mm})\) width x 1.5 mm depth) with gingival margins ended 1mm below CEJ were prepared and filled in each tooth. Two adhesive systems: self-etch, one-step, one-component adhesive system (G Bond, GC, Japan), etch and rinse adhesive system (Adper Single Bond 2, 3M ESPE, USA) and two composite materials: nanocomposite (Filtek Z350, 3M ESPE, USA), microhybrid composite (Filtek Z250, 3M ESPE, USA) were used and applied in this study according to the manufacturers instructions. The 104 cavities were divided randomly into four groups \((n=26)\). The first two groups were restored with Filtek Z350 (3M ESPE, USA) while the last two groups were restored with Filtek Z250 (3M ESPE, USA). All the cavities in group 1 and 3 were bonded with G Bond while the cavities in group 2 and 4 were bonded with Adper Single Bond 2.

The specimens were thermocycled between 5° to 55° C with 30 second dwell time for 500 cycles. The samples were then immersed in 0.5% Rhodamine B dye for 10 hours and sectioned longitudinally. Dye penetration at the gingival margin was quantified under confocal laser scanning microscopy/CLSM (Leica,TCS SP2) at 10x magnification. Data were analyzed using Two-Way ANOVA and results with \(p<0.05\) were considered statistically significant.

**Results and Discussion**

No significant difference \((p>0.05)\) in dye penetration was discovered between self-etch, one-step, one-component adhesive system (G Bond) and etch and rinse adhesive system (Adper Single Bond 2). No significant difference \((p>0.05)\) was also found in dye penetration between the composite materials used. No significant difference \((p>0.05)\) in dye penetration was observed on the gingival margin among all study groups. Self-etch, one-step, one-component adhesive system and nanocomposite restorative materials produced similar results to those of multi-step adhesive systems and microhybrid composites in microleakage of class II composite restorations.

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Fig. 1: CLSM images of dentinal tubules. A. Without Rhodamine B fluorescent dye.

Fig. 2: CLSM images of dentinal tubules. B. Stained with Rhodamine B fluorescent dye.

Fig. 3: CLSM images of dentinal tubules. C. Showing microleakage alone.

Fig. 4: CLSM images of dentinal tubules. D. Showing microleakage dye in interface with restoration.