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The effect of irradiation mode on degree of cure, shrinkage and microleakage of composite resin restoration.

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The aims of this study are (1) to investigate the relation of irradiation mode, polymerization shrinkage and degree of cure of composite resin and (2) its effect on microleakage of class V restorations.

VIP (BISCO Dental Products, Schaumburg, IL, USA) and Optilux 501 (Demetron/Kerr, Danbury, CT, USA) curing lights were used for curing Z-250 composite resin following irradiation mode: VIP 200mW, VIP 400mW, VIP 600mW, pulse-delay(200mW 3 sec, 5min wait, 600mW 30 sec), Optilux C mode, Optilux R mode. Microhardness (FM 7, Future-Tech Co., Tokyo, Japan) and degree of conversion (IFS 120 HR, Bruker, Karlsruhe, Germany) were measured separately at 5, 10, 20, 40, 60 sec and shrinkage were measured by Linometer (R&B, Taejeon, Korea) continuously from 0 to 60sec. ANOVA and Duncan's multiple range test were used for statistical analysis of microhardness, FT-IR and shrinkage results at each time, and chi-square test were used for leakage test.

The results were as follows: (1) as light intensity was increased, degree of conversion and microhardness were increased, but also shrinkage of composite resin increased gradually except Optilux C mode. (2) When same energy density was irradiated on the composite resin, low intensity light showed less shrinkage. (3) Optilux R group showed less marginal leakage in dentin. (4) Curing with 200mW was not enough to cure the 2mm bottom surface of resin.

In conclusion, irradiation mode can affect the composite shrinkage and microleakage of restorations, the clinician should consider it for successful restorative treatment.