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The influence of different thickness and types of flowable composite base materials on compressive strength of composite restorations (In Vitro Study)

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ABSRACT

The mechanical properties especially compressive strength of restorative materials play a crucial role during mastication for clinical performance of materials in particular stress bearing areas at posterior regions. This *in vitro* study was conducted to evaluate the changes in the compressive strength of nanohybrid resin-based dental restorations placed with different thicknesses of flowable composites . Specimens in the control group and experimental groups were produced in cylindrical form by a Teflon mold with hole cavity dimensions(4 mm diameter and 6 mm depth) for testing compressive strength. The total composite specimens were 100, divided into ten groups of ten specimens each. **Part I**, included groups(A,B,C and D) according to the type of composite materials used in this study as following; **group (A)** composed from 6mm height of nanohybrid Z250-XT composite as a control group, **group (B)** composed from 6mm height of SDR flowable composite , **group (C)** composed from 6mm height of Vertise flow, **group(D)** composed from 6mm height of filtek bulkfill flowable. **Part II**, included groups (B1,B2,C1,C2,D1 and D2) according to the combination of the flowable composites with two thicknesses (2mm and 4mm) as a base and nanohybrid composite (Z250-XT) as a capping materials as following ; **group (B1)** composed of 4mm Z250-XT and 2mm SDR flowable composite, **group (B2)** composed of 2mm Z250-XT and 4mm SDR flowable composite, **group (C1)** composed of 4mm Z250-XT and 2mm Vertise flow ,**group (C2**) 2mm Z250-XT and 4mm Vertise flow , **group(D1)** composed of 4mm Z250-XT and 2mm filtek bulkfill flowable, **group(D2)** composed of 2mm Z250-XT and 4mm filtek bulkfill flowable. All groups of this study stored in distilled water

in an dark incubator at 37 °C for 24 hours. After this period of time, all specimens were tested by Instron testing machine (an axial compression test) for compressive strength at a cross head speed of 0.5 cm/min. Data were analyzed by ANOVA and LSD tests. The results of part I of this study showed that Z250-XT had the highest compressive strength while SDR^{TM} had the lower compressive strength. The difference between these two groups was statistically significant ($p<0.05$).The results of part II of this study showed that combination group composed from Vertise flow at 4mm thickness had the highest compressive strength while combination group composed from 2mm of SDR^{TM} had the lowest compressive strength. The difference between these two groups was statistically significant ($p<0.05$). According to this study, it is suggested to use the combination of Z250-XT at 2mm thickness and Vertise flow as base at 4mm thickness in posterior restorations .