CED/NOF-IADR
2024 Oral Health
Research Congress
12 — 14 Sept 2024
Geneva, Switzerland

0410

Fiber-Reinforced Direct Extensive Composite Restorations in Premolar and Molar Teeth

V. Oksanen, L. Lassila, S. Garoushi, J. Bijelic-Donova, P. Vallittu
University of Turku, Turku, Finland

Objectives The aim was to assess the influence of incorporating micro- and millimeter-scale short-fiber composite (SFC) on the fracture behavior of large direct restorations. Additionally, the study investigated the effect of tooth size on the loading performance of restorations.

Methods A total of 120 premolars and molars were used to create MOD cavities with missing lingual walls. Four different groups of direct composite restorations were made (n=15/group). The first group restored with flowable conventional composite (Gaenial Universal Injectable, GC) without fiber reinforcement. The second group (bilayered-structured) made of micrometer-scale SFC-core (everX Flow, GC) with a surface layer (1 mm) of conventional composite (Gaenial Injectable). The third group made of plain SFC (everX Flow) without any surface coverage. The forth group (hybrid) made of mixing both micro- and millimeter-scale SFCs (everX Flow and everX Posterior) without any surface coverage. Following the fabrication of these restorations, specimens were stored in water for 12 months and then underwent quasi-static loading until fracture. The fracture mode was subsequently evaluated using optical microscopy and SEM. Two-way analysis of variance (ANOVA) was used to statistically examine the data, and it was followed by the Tukey HSD test (α=.05).

Results Restorations in premolars exhibited statistically significant lower fracture-resistance values than those in molars, except for the plain SFC group ($p<0.05$). The application of SFC as core or plain restorative material demonstrated superior performance in fracture-resistance compared to non-fiber reinforced restorations (Group 1). ANOVA analysis revealed that molar restorations made from a mixture of everX Flow and Posterior (Group 4) displayed significantly higher fracture-resistance values (2280 ±375 N) ($p<0.05$) compared to all other tested groups.

Conclusions The volume of SFC used in large MOD cavities significantly impacts the loading performance of direct composite restorations