FIBER-REINFORCED FIXED DENTAL PROSTHESES: PONTIC OF VARIOUS MATERIALS AND THICKNESSES

OBJECTIVES: The aim of this study was to evaluate the load-bearing capacity of fiber-reinforced composite (FRC) fixed dental prostheses (FDP), with pontics of various materials and thicknesses.

METHODS: Inlay preparations for retaining FDP were made onto the lower second premolar and second molar of a polymer phantom model. We then replaced the lower left first molar using an inlay retained FRC FDP. Subsequently, seventy-two FDPs with FRC frameworks (everStick C&B, StickTech-GC) were fabricated. Three different pontic materials were used: glass ceramic, polymer denture tooth, and light curing resin composite. One inlay preparation model with the FRC framework was scanned and digitized by a CEREC device. Then the external contour of the polymer denture tooth was also scanned by CEREC to be replicated for the ceramic pontic.

The FDPs were divided into three categories based on the occlusal thickness of the pontics (2.5mm, 3.2mm and 4.0mm). The vertical positioning of the framework varied respectively. Each pontic material category had three groups (n=8/group). In Group-1, pontics were fabricated conventionally with composite resin (G-ænial, GC) with one additional transversal fiber reinforcement. In Group-2, the pontics were polymer denture teeth (Heraus-Kulzer). Group-3 had an IPS-Empress CAD pontic (Ivoclar Vivadent) milled by CEREC. Each FDP was statically loaded from the pontic until the initial (IF) and final failure (FF). Initial fracture was recorded from the load-deflection graph.

RESULTS**:** Results (in N) are listed below.

GROUP	2.5mm IF	2.5mm FF	3.2mm IF	3.2mm FF	4.0mm IF	4.0mm FF
Composite pontic	612	832	794	1021	853	996
Polymer denture tooth pontic	537	1025	593	1871	1248	1590
Glass ceramic pontic	716	725	708	708	1331	1667

ANOVA showed that there were statistical differences between the materials and occlusal thicknesses ($p<0.001$). Non-linear regression analysis demonstrated the highest correlation between thickness of the pontic and IF and FF values with ceramic pontics (R Square: 0.880, $p<0.001$).

CONCLUSION**:** By increasing the occlusal thickness of the pontic, the load-bearing capacity of the FRC FDP can be increased. The highest load bearing capacity was obtained with 4 mm thick ceramic pontics.