

In Vitro Fatigue and Fracture Load of Monolithic Ceramic Crowns Supported by Hybrid Abutment

**Authors:** Noor NawaflehShareen ElshiyabAndreas ÖchsnerRoy George

**Abstract:** Objective: This study evaluated the performance of zirconia and lithium disilicate crowns supported by implants or cemented to epoxy resin dies. Methods: Eighty zirconia and lithium disilicate crowns each were prepared and assigned in four groups according to the crown material and supporting structure combinations (implant-supported zirconia, die-supported zirconia, implant-supported lithium disilicate, and die-supported lithium disilicate). Ten crowns in each group acted as control while the rest (n=10) underwent thermocycling and fatigue with 100 N loading force for 1.5 million cycles. Specimens were then loaded to fracture in a universal testing machine. Data were analysed using one-way ANOVA and Tukey multiple comparison test with a 95% level of significance. Results: No implants or crown failure occurred during fatigue. The mean fracture load values (control, fatigued) in newton were as follows: (4054, 3344) for implant-supported zirconia, (3783, 3477) for die-supported zirconia, (2506, 2207) for implant-supported lithium disilicate, and (2159, 1806) for die-supported lithium disilicate. Comparing the control with the corresponding fatigued subgroup showed a significantly higher fracture load mean of the control group in all cases. Zirconia showed a significantly higher fracture load mean than lithium disilicate ( $P=0.001$ ,  $P<0.001$ ). However, comparing crowns made from the same material according to the supporting structure showed no significant difference ( $P=0.923$ ,  $P=0.337$ ). Conclusion: Zirconia and lithium disilicate posterior crowns have adequate fatigue and fracture resistance required for posterior crowns. However, when heavy fatigue forces are expected, zirconia material is preferable over lithium disilicate. Zirconia and lithium disilicate implant-supported crowns cemented to hybrid abutments should have satisfactory clinical performance.