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Comparative evaluation of surface roughness and shear bond strength of composite resin to zirconia ceramic after different surface treatments: An in vitro study

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Abstract:

Context: Ceramics are used for indirect restorations because of enhanced aesthetics as compared to porcelain fused to metal restorations. The major problem faced with the ceramic restoration is chipping and fracture with time. So there is need to repair these restorations intraorally with composite resin for which surface treatment of ceramic surface is required to enhance bonding with composite.

Aims: 1. To evaluate the surface roughness of zirconia ceramic after different surface treatments.
2. To measure and compare the shear bond strength of the composite resin to zirconia ceramic after different surface treatments.
3. To assess which surface treatment is most effective.

Methods and Material: 30 sintered zirconia ceramic block specimens were randomly divided into 3 groups of 10 each based on the following surface treatments:

Group I: Control group without treatment

Group II: Air abrasion with Al₂O₃ particles (110 μm)

Group III: Er: YAG laser

Then the surface roughness was evaluated by profilometer. Composite resin in cylinder shape was built. All the specimens were tested to assess the shear bond strength by the Universal Testing Machine.

Statistical analysis used: One way ANOVA and Post Hoc Tukey

Results:

One way ANOVA revealed highly significant difference for surface roughness and shear bond strength between the groups. Post Hoc Tukey revealed statistically highly significant difference between all the groups for the surface roughness and for shear bond strength, the test revealed statistically highly significant difference between Group I and Group II, Group II and III and significant difference between the Group I and Group III.


Conclusions: 1. Maximum surface roughness of zirconia was observed in specimens treated with alumina particles followed by Er: YAG and control group.

2. Highest shear bond strength was found between zirconia and composite resin after treatment with alumina particles followed by control and Er: YAG group.

3. Laser did not have significant effect on shear bond strength between zirconia and composite resin.

4. For ceramic repair, zirconia surface should be treated with 110 μ m alumina particles to obtain maximum shear bond strength between zirconia and composite resin.

Key-words: zirconia ceramic, laser, abrasion, shear bond strength.

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