

## Evaluation of effectiveness of desensitizing agents on the retention of crowns cemented with luting agents

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### Abstract

**Background:**The present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents.**Materials & methods:**20 freshly extracted mandibular molar teeth were selected. Storing of the tooth specimens in the normal saline was done followed by thorough cleaning. All the specimens were divided into two study groups as follows: Group 1: Glass ionomer cement (Control), and Group 2: Glass ionomer cement (GC Tooth Mousse desensitizer). Crowns were fabricated and were subjected under universal force testing machine. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.**Results:**Among the group 1, mean tensile bond strength was 45.9 Kg while in the group 2, mean tensile strength was 44.2 Kg respectively. While comparing statistically, non-significant results were obtained.**Conclusion:**Application of desensitizing agents might be designated during fabrication of crowns as it will not affect the retentive ability of the luting cements.

**Key words:** Luting agent, Desensitizing agent, Crown

### INTRODUCTION

During conventional tooth preparation, approximately 1.2 to 1.5 mm of tooth structure is removed to ensure appropriate crown contours and adequate occlusal clearance. After preparation, 23,000-35,000/mm<sup>2</sup> dentinal tubulus, 1 to 2 mm from the pulp and 19,000 mm<sup>2</sup> dentinal tubules subjacent to the amelodentinal junction are exposed and may cause dentinal hypersensitivity. Brannström's hydrodynamic theory can explain the dentinal hypersensitivity. This theory suggests that chemical, thermal, or osmotic stimuli cause the fluid within the tubules to flow inward or outward, creating a mechanical disturbance which can excite nerve fibers in the pulp and induce pain.<sup>1-3</sup>

Retention is an important factor in determining the success and clinical service of FPDs. Optimal retention for extra-coronal restorations depends on the morphology of the prepared tooth and factors such as the degree of taper, the prepared surface area, roughness of the internal surfaces of crown, retentive grooves, texture of the treated surfaces, and the type of cement.<sup>4</sup> Inadequate retention can lead to microleakage through the cement, development of

secondary caries beneath the crown, cement washout beneath the crown, chipping and fracture of the crown, and the crown's eventual failure.<sup>4-6</sup> The foremost goal of any clinician is providing the patient with a restoration which preserves the longevity and pulpal vitality of natural abutments of fixed partial dentures and regaining the lost function. Dental cement used to attach indirect restorations to prepared teeth is called a luting agent. The choice of the optimal luting agent can be confusing, even for the most experienced clinician.<sup>5-7</sup> Hence; the present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents.

## **MATERIALS & METHODS**

The present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents. 20 freshly extracted mandibular molar teeth were selected. Storing of the tooth specimens in the normal saline was done followed by thorough cleaning. This was followed by storing of the specimens in distilled water. All the specimens were embedded in a metal mold partially filled with auto-polymerizing acrylic resin. Uniform taper was obtained by the design of a clamp which was able to secure a high-speed air-rotor hand piece. Before the application of desensitizing agents and cementation, the axial surface area of each prepared tooth was determined. The surface area of the preparation was measured by adapting a lead foil closely along the axial surface of the prepared teeth cut where the end overlapped and the length of the foil is measured. All the specimens were divided into two study groups as follows: Group 1: Glass ionomer cement (Control), and Group 2: Glass ionomer cement (GC Tooth Mousse desensitizer). This was followed by pouring of the specimens in Type IV die stone. After one hour, dies were recovered. Die hardener was applied on the finish line area to prevent abrasion by waxing instruments during the fabrication of the wax pattern. Adaptation of the margins was done followed by maintenance of wax coping. In the group 2, a generous layer of GC Tooth Mousse was applied on the prepared tooth surfaces using an applicator tip and left it undisturbed for a minimum of 3 minutes. Crowns were fabricated and were subjected under universal force testing machine. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

## **RESULTS**

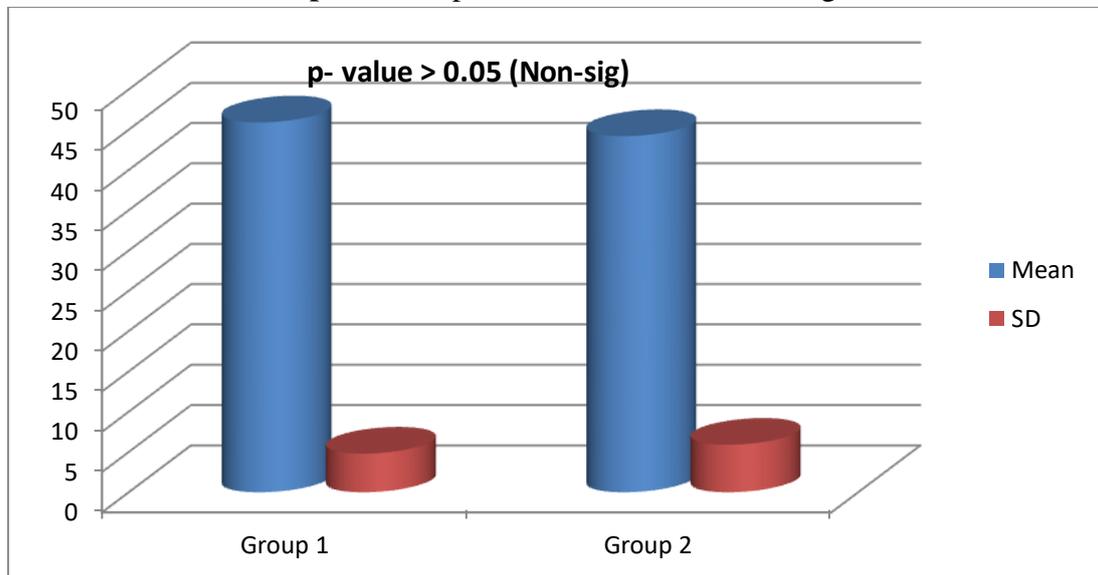
A total of 20 freshly extracted molar were enrolled and were broadly divided into two study groups; Group 1: Glass ionomer cement (Control), and Group 2: Glass ionomer cement (GC Tooth Mousse desensitizer). Among the group 1, mean tensile bond strength was 45.9 Kg while in the group 2, mean tensile strength was 44.2 Kg respectively. While comparing statistically, non-significant results were obtained.

## **DISCUSSION**

A luting agent's primary function is to fill the void at restoration-tooth interface and mechanically lock the restoration in place to prevent its dislodgement during mastication. Depending on the expected longevity of the restoration, a luting agent may be considered to

be definitive (long term) or provisional (short term)<sup>6-9</sup> Hence; the present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents.

**Graph 1: Comparison of mean tensile strength**



A total of 20 freshly extracted molar were enrolled and were broadly divided into two study groups; Group 1: Glass ionomer cement (Control), and Group 2: Glass ionomer cement (GC Tooth Mousse desensitizer). Among the group 1, mean tensile bond strength was 45.9 Kg while in the group 2, mean tensile strength was 44.2 Kg respectively. Pilo R et al examined the retention of laser-sintered cobalt-chromium (Co-Cr)-based crowns after dentin pretreatment with desensitizing paste containing 8% arginine and calcium carbonate (DP-ACC). Forty lower first molars were prepared using a standardized protocol. The Co-Cr crowns were produced using selective laser melting. The teeth were either pretreated with the desensitizing paste or not pretreated. After one week, each group was cemented with glass ionomer cement (GIC) or zinc phosphate cement (ZPC). Surface areas of the teeth were measured before cementation. After aging, a universal testing machine was used to test the retentive strength of the cemented crown-tooth assemblies. The debonded surfaces of the teeth and crowns were examined at 2.7× magnification. Pretreating the dentin surfaces with the desensitizing paste before cementation with GIC or ZPC did not affect the retention of the Co-Cr crowns. The retention of the GIC group ( $6.04 \pm 1.10$  MPa) was significantly higher than that of the ZPC group ( $2.75 \pm 1.25$  MPa). The predominant failure mode for the ZPC and the nontreated GIC group was adhesive cement-dentin failure; for the treated GIC group, it was adhesive cement-crown failure. The desensitizing paste can be safely used to reduce post-cementation sensitivity without reducing the retentive strength of Co-Cr crowns cemented with GIC or ZPC.<sup>10</sup>

In the present study, while comparing statistically, non-significant results were obtained. Kumar S et al analyzed freshly extracted 48 maxillary first premolars and divided them into

two groups, an untreated the control group and a desensitizing laser-treated group, which were exposed to Erbium, Chromium: Yttrium, Selenium, Gallium, Garnet laser at 0.5 W potency for 15 s. Each of the above two groups were again randomly divided into two subgroups, on to which full veneer metal crowns, which were custom fabricated were luted using glass-ionomer and resin luting cements, respectively. Tensile bond strength of the luting cements was evaluated with the help of a Universal Testing Machine. The tensile bond strength of crowns luted on desensitizing laser treated specimens using self-adhesive resin cement showed a marginal increase in bond strength though it was not statistically significant. The self-adhesive resin cements could be recommended as the luting agent of choice for desensitizing laser treated abutment teeth, as it showed better bond strength.<sup>11</sup>

## CONCLUSION

From the above results, the authors concluded that Application of desensitizing agents might be designated during fabrication of crowns as it will not affect the retentive ability of the luting cements.

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