

## Original Research

### Impact of desensitizing agents retention of crown with luting agents

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#### ABSTRACT:

**Background:** To study the impact of desensitizing agents retention of crown with luting agents. **Materials & methods:** A total of 50 subjects were enrolled. Dentin desensitizers included none (control), a glutaraldehyde (GLU) based primer (Gluma desensitizer), casein phosphopeptide (CPP)-amorphous calcium phosphate (ACP) (GC Mousse), erbium, chromium: YSGG laser and Pro-Argin. Result was analysed using SPSS software. Statistical analysis was done with  $P < 0.05$ . **Results:** A total of 50 subjects were enrolled. The mean tensile stress was highest for ARG (4.21MPa), followed by CPP-ACP (4.04MPa). The mean tensile stress for GLU (3.69MPa) and LASER (3.28MPa). On comparing the control group, the mean tensile stress was 3.50 MPa. **Conclusion:** Pro-Argin and CPP-ACP showed the best retention.

**Keywords:** glass ionomer cement, retention, Gluma desensitizer.

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#### INTRODUCTION

Fixed prosthodontics has undergone revolutionary change from a technically oriented discipline to one requiring application of biological principles and evidence based dentistry. Fixed partial dentures can transform an unhealthy, unattractive dentition to a comfortable, functional occlusion with enhanced esthetics. <sup>1</sup>In a fixed partial denture, abutment teeth need to be prepared to receive restorations and to provide support and retention for replacing missing teeth. In order to achieve adequate retention, resistance and thickness of the restoring material, around 1.5–2 mm of tooth structure needs to be removed. <sup>2</sup> Preservation of natural tooth structure has always been the primary goal of the dental profession. In an attempt to provide functional, mechanically sound and esthetic restorations, attention to comfort during and after the procedure has often been overlooked. <sup>3</sup> Preparation of vital teeth results in millions of dentinal tubules being exposed. Dentin permeability may cause damage to the underlying pulpal cells. This leads to an increased possibility of postoperative dentin hypersensitivity. <sup>4</sup>In the process of tooth preparation to receive the crown, the loss of the tooth structure leads to the pain and sensitivity,

which is the most common complaint of patients either during tooth preparation or after the procedure. This is caused by dentin hypersensitivity, described as a sharp pain that lingers for some time. This pain is usually felt when intaking cold drinks or with the impact of the air or any other stimuli that lead to fluid movement in the dentinal tubules. <sup>5</sup> The preparation of the tooth and the luting cement are both key factors that may have an impact on the dental hypersensitivity. <sup>6</sup>

Most FPD patients experience pain or discomfort in the prepared tooth during and some time after the cementation of restoration, which may be due to dentin hypersensitivity. <sup>7</sup> To overcome this problem, desensitizing agents have been introduced. <sup>7</sup> However, a question raises that whether the application of desensitizer agents, such as GLUMA desensitizer, affects the retention of full-coverage crowns cemented with Rely-X U200 self-adhesive cements. Sailer et al., <sup>8</sup> in 2012, reported that application of GLUMA desensitizer enhanced the shear bond strength of cement. However, Jalandar et al. in 2012, reported that GLUMA desensitizer had no significant effect on the retention of crowns. <sup>7</sup> Hence, this study was

conducted to study the impact of desensitizing agents retention of crown with luting agents.

## MATERIALS & METHODS

A total of 50 subjects were enrolled. Fifty freshly extracted human premolars were subjected to standardized tooth preparation (20° total convergence, 4 mm axial height) with a computer numerically controlled machine. Dentin desensitizers included none (control), a glutaraldehyde (GLU) based primer (Gluma desensitizer), casein phosphopeptide (CPP)-amorphous calcium phosphate (ACP) (GC Mousse), erbium, chromium: YSGG laser and Pro-Argin. After desensitization, crowns were luted with glass ionomer cement and kept for 48 h at 37°C in 100% relative humidity. The samples were tested using a universal testing machine by applying a load at a crosshead speed of 0.5 mm/min. Result was analysed using SPSS software. Statistical analysis was done with  $P < 0.05$ .

## RESULTS

A total of 50 subjects were enrolled. The mean tensile stress was highest for ARG (4.21MPa), followed by CPP-ACP (4.04MPa). The mean tensile stress for GLU (3.69MPa) and LASER (3.28MPa). On comparing the control group, the mean tensile stress was 3.50 MPa.

**Table: mean tensile stress**

Groups	MPa
Control	3.50
ARG	4.21
GLU	3.69
CPP-ACP	4.04
LASER	3.28

## DISCUSSION

For prosthetic replacements and the reconstruction of lost crown structures, all-ceramic crowns have become popular for various reasons, such as increased acceptance by patients, esthetics, stability, and biocompatibility.<sup>9</sup> Various types of ceramics are available, including oxides and glass ceramics. These are usually luted to the prepared tooth with a resin cement, due to their ability to chemically adhere to the prepared tooth surface. These resin cements also chemically bond with the ceramic surfaces, thereby strongly holding both the tooth and the crown structure. Less microleakage has also been noted when using these types of cements.<sup>10</sup> Hence, this study was conducted to study the impact of desensitizing agents retention of crown with luting agents.

In the present study, a total of 50 subjects were enrolled. The mean tensile stress was highest for ARG (4.21MPa), followed by CPP-ACP (4.04MPa). A study by Chandavarkar SM et al studied fifty freshly extracted human premolars were subjected to standardized tooth preparation (20° total convergence, 4 mm axial height) with a computer numerically

controlled machine. Individual cast metal crowns were fabricated from a base metal alloy. Dentin desensitizers included none (control), a glutaraldehyde (GLU) based primer (Gluma desensitizer), casein phosphopeptide (CPP)-amorphous calcium phosphate (ACP) (GC Mousse), erbium, chromium: YSGG laser (Waterlase MD Turbo, Biolase) and Pro-Argin (Colgate Sensitive Pro-Relief desensitizing polishing paste). All dentin desensitizers showed significantly different values: Pro-Argin (4.10 Megapascals [Mpa]) < CPP-ACP (4.01 mpa) < GLU based primer (3.87 Mpa) < Virgin dentin (3.65 Mpa) < LASER (3.37 Mpa). On comparing the effect of prepared virgin dentin, GLU based primer, CPP-ACP, LASER and Pro-Argin on the retention of complete cast metal crowns luted with glass ionomer cement on prepared teeth, they concluded that Pro-Argin and CPP-ACP showed the best retention in this in vitro study.<sup>11</sup>

In the present study, the mean tensile stress for GLU (3.69MPa) and LASER (3.28MPa). On comparing the control group, the mean tensile stress was 3.50 MPa. Another study by Jalandar SS et al studied ninety freshly extracted human molars were prepared with flat occlusal surface, 6 degree taper and approximately 4 mm axial length. The prepared specimens were divided into 3 groups and each group is further divided into 3 subgroups. Desensitizing agents used were GC Tooth Mousse and GLUMA® desensitizer. Cementing agents used were zinc phosphate, glass ionomer and resin modified glass ionomer cement. Resin modified glass ionomer cement exhibited the highest retentive strength and all dentin treatments resulted in significantly different retentive values (In Kg.): GLUMA (49.02 ± 3.32) > Control (48.61 ± 3.54) > Tooth mousse (48.34 ± 2.94). Retentive strength for glass ionomer cement were GLUMA (41.14 ± 2.42) > Tooth mousse (40.32 ± 3.89) > Control (39.09 ± 2.80). For zinc phosphate cement the retentive strength were lowest GLUMA (27.92 ± 3.20) > Control (27.69 ± 3.39) > Tooth mousse (25.27 ± 4.60).<sup>7</sup> Aranha et al. evaluated the effect of several dentin desensitizers on microtensile bond strength of different adhesives. Application of GLUMA had no significant effect on microtensile bond strength, but other materials decreased the microtensile bond strength. They concluded that GLUMA effectively decreased dentin hypersensitivity.<sup>12</sup> Soeno et al., in 2001, evaluated the effect of three dentin desensitizers, namely GLUMA CPS, MS Coat, and Safordie, on dentin bond strength of PanaviaFluoro Cement and Super-Bond C&B. They concluded that GLUMA desensitizer had no effect on bond strength of cements to dentin.<sup>13</sup>

## CONCLUSION

Pro-Argin and CPP-ACP showed the best retention.

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