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Original Article

Assessment of Microleakage of Conventional Glass Ionomer Cement and resin Modified– GIC in Treatment of Permanent Posterior Teeth: A Comparative Study

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ABSTRACT

Background: Glass ionomer cement (GIC) was one of the first aesthetic restorative materials introduced in dental arena by Wilson and Kent in 1972. Today, the new generation of glass ionomers, sometimes called intermediate restorative materials, may be able to provide better esthetics, stronger bond and long-term results lasting years rather than months, largely due to smaller mean particles sizes which increase the viscosity of the material. Hence; we planned the present study to assess and compare the microleakage of conventional GIC and resin modified GIC. **Materials & methods:** The present study included assessment of 20 extracted posterior teeth. Conventional glass ionomer cement (type II, shofu, incJapan) and Resin modified glass ionomer cement (Shofu,inc,Japan) were included in the study. 10 Samples were then filled with conventional GIC, while the remaining 10 samples were resorted with resin modified GIC. The samples were then immersed in 1% methylene blue dye for 24 hours at room temperature. Microleakage was assessed under stereomicroscope and was graded from 0 to 4 with 0 indicating no Microleakage and 4 indicating maximum. All the results were analysed by SPSS software. **Results:** Mean Microleakage of conventional GIC was found to be 1.25 while mean Microleakage of the resin modified GIC was found to be 1.12. Non- significant results were obtained while comparing the mean Microleakage in between conventional GIC group and resin modified GIC group. **Conclusion:** None of the tested restorative materials was free from the Microleakage.

Key words: Glass Ionomer cement, Microleakage, Resin.

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INTRODUCTION

Over the past 50 years, many changes have occurred in restorative materials in development and on availability. Glass ionomer cement (GIC) was one of the first aesthetic restorative materials introduced in dental arena by Wilson and Kent in 1972. Its chemical bonding property with tooth makes it material of the choice in restorative dentistry, along with adhesion to moist tooth structures, anticariogenic properties, thermal compatibility and biocompatibility.The main components of GIC are glass, polyacid, tartaric acid, and water.[1- 3] Tartaric acid is an important component of the GIC, as it has significant influence on the working and setting time. Today, the new generation of glass ionomers, sometimes called intermediate restorative materials, may be able to provide better esthetics, stronger bond and long-term results lasting years rather than months, largely due to smaller mean particles sizes which increase the viscosity of the material.[4-6] Hence; we planned the present study to assess and compare the microleakage of conventional GIC and resin modified GIC.

MATERIALS & METHODS

The present study was conducted in the department of Conservative Dentistry and Endodontics and included assessment of 20 extracted posterior teeth. Conventional glass ionomer cement (type II, shofu, inc Japan) and Resin modified glass ionomer cement(Shofu, inc, Japan) were

included in the study. Surface debridement of all the teeth was performed with ultrasonic scalar and was stored in the normal saline at room temperature till further use. Window-like cavities of 2 mm axial depth, 5 mm occluso-gingival height, 3 mm bucco-lingual width were prepared on both the proximal surface of each tooth with a 245 carbide bur in a contra angle high-speed airotor with water spray. 10 Samples were then filled with conventional GIC, while the remaining 10 samples were resorted with resin modified GIC. The samples were then immersed in 1% methylene blue dye for 24 hours at room temperature.The samples were removed from the dye and thoroughly cleaned and rinsed in tap water until all the dye is removed from the sample surfaces. The specimens were mounted on self-curing acrylic blocks. Microleakage was assessed under stereomicroscope and was graded from 0 to 4 with 0 indicating no Microleakage and 4 indicating maximum. All the results were analysed by SPSS software and were assessed by SPSS software. Chi-square test was used for assessment level of significance.

RESULTS

Mean Microleakage of conventional GIC was found to be 1.25 while mean Microleakage of the resin modified GIC was found to be 1.12. Non- significant results were obtained while comparing the mean Microleakage in between conventional GIC group and resin modified GIC group.

Table 1: Mean Microleakage of samples of different study groups

Group	Mean Microleakage	P- value
Conventional GIC	1.25	0.55
Resin modified GIC	1.12	

DISCUSSION

In the present study, mean Microleakage of conventional GIC was found to be 1.25 while mean Microleakage of the resin modified GIC was found to be 1.12. Non- significant results were obtained while comparing the mean Microleakage in between conventional GIC group and resin modified GIC group. Esra Ülker, Nuray Günaydın, Ali Ihsan Erkan, Firdevs Kahvecioğlu, Mustafa Ülker (2017) in vitro study evaluated the microleakage of glass carbomer (Glass Fill, GCP Dental, Vianen, Netherlands), resin-modified glass ionomer (Fuji II LC, GC, Japan) and self adhering flowable composite (Vertise Flow, Kerr, USA) materials. Class V cavities were prepared in the occlusal margin of enamel and gingival margin of dentin on both buccal and lingual surfaces of 45 human molar teeth and restored with self-adhering materials according to manufacturers' directions (n=15). The specimens were immersed in 2% basic fuchsine dye at 37ºC for 24 hours. The teeth were sectioned into two pieces buccolingually in an occlusoapical direction and evaluated for microleakage using a stereo microscope (30×) and the degree of microleakage was evaluated using specific scoring criteria. When the self-adhering materials were compared, Glass Fill showed the highest leakage scores but was statistically different from only Vertise flow in the gingival surfaces ($p<0.05$). In the occlusal surfaces all tested selfadhering materials exhibited similar degrees of microleakage at the enamel margins ($p>0.05$). Glass Carbomer based self-adhering material showed more microleakage than resin based self adhering materials in the gingival surfaces, but in the occlusal surfaces all of the tested materials showed good performance.[7]

Asafarlal S. (2017) in their study compared and evaluated microleakage, surface roughness and hardness of three glass ionomer cements – Zirconomer, Fujii IX Extra GC and Ketac Molar. For microleakage evaluation, 150 extracted human maxillary permanent first premolars were randomly divided into five groups of 30 teeth each. Standardized class V cavity preparation was done on the buccal surface of all the groups except group 1. In group 2, cavity was prepared but left unrestored. Group 3, 4 and 5 were restored with Zirconomer, Fujii IX Extra GC and Ketac Molar respectively. All the five groups showed some amount of microleakage. Microleakage value of group 2 was greater followed by group 3, group 4, group 1 and group 5 respectively. Ketac Molar showed lower surface roughness value before & after polishing. Fujii IX Extra GC showed higher hardness followed by Ketac Molar and Zirconomer. No material was able to completely eliminate microleakage at cervical margin. Ketac Molar showed lower surface roughness before and after polishing. Fujii IX Extra GC showed high hardness among the materials tested.[8]

Rawan Albeshti, Saroash Shahid (2018) evaluated the microleakage of four direct restorative materials. Sixteen sound bovine incisors were chosen and randomly divided into four groups; Group I-Zirconomer, Group II-KetacTM Silver, Group III-FiltekTM Z500 (composite) and Group IV-Dispersalloy® (amalgam). Seven proximal (mesial & distal) cavities, for each material were prepared and restored. All restored samples were stored in 37oC distilled water for 24 hr and then subjected to thermo-cycling process at temperatures between 5-55oC. The samples were immersed in dye solution of 0.5% methylene blue for 24 hr. Each filled cavity was sectioned through the centre of restoration and then studied under a stereomicroscope to assess the marginal leakage. The highest mean score of leakage was recorded in Group II-KetacTM Silver followed by Group I-Zirconomer and Group III-FiltekTM Z500 (composite). The lowest mean score of dye penetration was verified in Group IV-Dispersalloy® (amalgam). Statistically, there were significant differences between Zirconomer and other groups of KetacTM Silver and amalgam, whereas the Zirconomer groups had no

significant differences with composites. All tested groups showed significant differences with amalgam restorations.[9]

CONCLUSION

Under the light of above obtained data, the authors conclude that none of the tested restorative materials was free from the Microleakage. However; further studies are recommended.

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