
INTRODUCTION:

Glass-ionomer cements belong to the class of materials known as acid-base cements. They are based on the product of reaction of weak polymeric acids with powdered glasses of basic character. Setting occurs in concentrated solutions in water and the final structure contains a substantial amount of unreacted glass which acts as filler to reinforce the set cement.\textsuperscript{1-3} Glass-ionomers have various uses within dentistry. They are used as full restorative materials, especially in the primary dentition, and also as liners and bases, as fissure sealants and as bonding agents for orthodontic brackets. The glass used in glass carbomer contains strontium, and also high amounts of silicon, as well as a small amount of calcium.\textsuperscript{4}\textsuperscript{-7} It is relatively high in silicon compared with the glasses used in the well-established brands of conventional glass-ionomer Fuji IX and Ketac Molar, but it contains comparable amounts of aluminium, phosphorus and fluoride.\textsuperscript{8}

In the recent past, a variety of newer types of GICs such as light cured GIC, resin modified GIC (RMGIC), compomer, and nanofilled GIC has been introduced in the field of dentistry.\textsuperscript{9} Hence; we planned the present study to assess the micro-leakage in between conventional and compomer cements in deciduous teeth.

MATERIALS & METHODS

The present study was conducted in the department of paediatric dentistry of the dental institution and included assessment of micro-leakage in conventional and modified glass ionomer cement in deciduous teeth. Ethical approval was taken from institution ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of fifty non-carious freshly extracted deciduous molars were included in the present study. All the teeth were extracted from subjects due to orthodontic reasons. Thorough cleaning of all the specimens was done. All the specimens were randomly divided into two study groups as shown in Table 1.

Preparation of standard class V cavity was done on the buccal surfaces of all tooth specimens. The dimension of the preparation was 4x 2x 2 mm\textsuperscript{3}. Periodontal probe was used for the measurement of depth of the cavity. In groups A specimens, the restoration was done by GC Fuji II while in group B specimens, the restoration was done by

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Compoglass material. Thermocycling was done in all the specimens for 250 cycles at different temperatures.

### Table 1: Division of samples into study groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25</td>
<td>GC Fuji II</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>Compoglass</td>
</tr>
</tbody>
</table>

The apices of all the teeth were sealed with acrylic resin. Each tooth was covered with two coats of nail varnish. All the teeth were immersed in 0.5% methylene blue dye for 24 h. After removal from the dye solution, the teeth were allowed to dry. Sectioning of the tooth was done followed by scoring using criteria given previously in the literature by Khera and Chan as follows: 10

- Zero: No leakage,
- One: Dye penetrating is to the lesser than and up to one-half of the depth of the prepared cavity,
- Two: Dye penetrating is to more than one-half of the depth of the prepared cavity but not up to the junction of the axial and occlusal or gingival wall,
- Three: Dye penetrating up to the junction of the axial and occlusal or gingival wall but not including the axial wall, and
- Four: Dye penetration including the axial wall

All the results were compiled and analysed by SPSS software. Chi-square test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

### RESULTS

A total of 50 specimens were included in the present study and were divided into two study groups. Group A consisted of specimens in which GC Fuji II was used while group B included specimens in which Compoglass was used (Table 1). Table 2 shows distribution of scores in different study groups. Among group A specimens, 12 and 13 specimens showed micro-leakage score zero and one respectively. Among group B specimens, 11, 8 and 6 specimens showed micro-leakage score of 11, 8 and 6 respectively. We observed non-significant result on comparing the mean micro-leakage score in both the study groups.

### Table 2: Distribution of scores in different study groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number of specimens</th>
<th>Micro-leakage score (N)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25</td>
<td>Zero: 12, One: 13, Two: -</td>
<td>0.08</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>Zero: 11, One: 8, Two: 6</td>
<td>(NS)</td>
</tr>
</tbody>
</table>

NS: Non-Significant

### DISCUSSION

In the present study, we observed non-significant different in the mean micro-leakage score in between the two study groups (P-value < 0.05) (Table 2). Similar results were obtained in the past literature by different authors. Tolidis K et al evaluated microleakage around restorations in deciduous teeth made with composite resin, conventional glass-ionomer cement, resin-modified glass-ionomer cement and carbomer/fluoroapatite-enhanced glass-ionomer cement. A group of 40 primary upper canines, primary upper and lower molars was divided into 4 groups (n=10). Class I cavities were prepared by diamond cylindrical bur at high speed and were restored with a composite resin (Group 1), with a glass-ionomer cement (Group 2), with a resin-modified glass-ionomer cement (Group 3) and with a carbomer/fluoroapatite-enhanced glass-ionomer cement (Group 4). Hard tissue's bonding involved, in the case of composite resin a total etch bonding procedure, and in glass ionomers the use of their respective primers. Restorations were finished and polished. A 24-hour water storage was followed by thermocycling (1500 cycles, 5°C - 36°C - 55°C - 36°C with a dwell time of 15 seconds) and dye penetration test with immersion in 5% methylene blue for 24 hours. In order to assess the degree of microleakage longitudinal cuts were produced by means of a microtome at 0.5 mm and at 1 mm from the restoration margin, and photographs were taken with a stereomicroscope at 100X. Microleakage was classified according to the number of surfaces and the depth at which dye penetration was observed. Data were analysed with ANOVA and post-hoc analysis was performed with Bonferroni test (p<0.05). Statistical analysis exhibited no significant statistical difference between Group 2 and Group 3 (p>0.05). Statistical difference was exhibited between Group 3 and Group 4 (p<0.01), with Group 4 exhibiting lower microleakage values. Group 1 exhibited the lowest mean microleakage values and statistical difference in comparison with all groups. Group 4 exhibited the lowest microleakage values among the cements. Superior marginal integrity is achieved in restored primary teeth when composite resin is used. If the clinical case suggests the use of glass-ionomer cement, carbomer/fluoroapatite-enhanced glass-ionomer cement is preferred in terms of microleakage. 11

Toledano M et al evaluated the microleakage of Class V restorations made with resin-modified glass ionomers or a compomer. Thirty noncarious human molar teeth were used. Standardized kidney-shaped Class V cavity preparations were placed in the buccal and lingual surfaces at the cementoenamel junction. Teeth were randomly assigned to 3 experimental groups of 10 teeth each and restored as follows: group 1, Fuji II LC; group 2, Vitremer; and group 3, Dyract. In all cases, the manufacturers’ instructions were strictly followed. All materials were placed in a single increment. Unfinished restorations were immediately coated with the respective manufacturers’ sealer or varnish and this was either light cured for 20 seconds or allowed to air-dry. After 24 hours, teeth were finished to contour and to the cavosurface margins, coated with nail varnish except for 1 mm around the restoration margin, thermocycled (1000X, 5-55 degrees C) and placed in a solution of 2% basic fuchsin dye for 24 hours at room temperature. The staining along the tooth restoration interface was recorded. Kruskal-Wallis
1-way analysis of variance revealed significant differences among all restorative materials for the overall, occlusal, and gingival scores (P =.03, P =.01, P =.01, respectively). Occlusal and gingival scores for each matched pair of restorative materials using the Wilcoxon test showed statistically significant differences between Fuji II LC glass ionomer cement and Dyract composite, both for the occlusal (P =.005) and gingival (P =.005) margins and also as an overall evaluation (P =.01), with Fuji II LC showing the least dye penetration. Vitremer revealed dye penetration scores not significantly different from Fuji II LC glass ionomer cement or Dyract composite. Resin-modified glass ionomers showed less or similar microleakage than the polyacid-modified composite resin tested.12

CONCLUSION
Approximately equal amount of micro-leakage is exhibited by both the types of GIC used in the present study. However, future research is required for further advancement in the field of paediatric restorative dentistry.

REFERENCES

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