



Original Research

Preference of restorative materials for class II caries among dentists in mandibular first primary molars among preschool children– A retrospective study

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ABSTRACT

Background: Dental caries is an infectious microbiologic disease of the teeth that dissolves and destroy calcified tissue locally especially the proximal surface of posterior teeth in young children.

Aim: To find out the preference of the restorative material selection for children aged 4 to 6 years of age

Materials and methods: A total of 47 children aged 4-6 years visiting the hospital were assessed retrospectively and clinical findings were assessed, analyzed between June 2019 to March 2020. The data was then entered and tabulated in Microsoft Excel. The data was analyzed with the help of SPSS software 2024.

Results: In this study, we observed that glass ionomer cement was the most used restorative material in 4 to 6 years old children however composite restorative material was the most used restorative material in 5 years old. The prevalence of class II caries was observed to be higher in 6-year-old children.

Conclusion: Within the limitations of the study, glass ionomer cement was the most used restorative material in 1st primary mandibular molar in 4 to 6-year-old children

Keywords: *Restoration, Mandibular molar, Children*

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INTRODUCTION

Childhood dental caries is the most common ailment. In the end, this illness causes pain and abnormalities in the structure of the teeth.¹ Both affluent and underdeveloped nations frequently see dental caries.² This condition can harm current teeth and create eruptive teeth, among other problems, if left untreated. It starts to develop at a very young age. Early childhood caries can have unfavourable consequences such as malnourishment, sleeplessness, maladaptive behavior, unsightly appearance, and speech abnormalities.³

The family eventually suffers social and financial problems as a result of this. In affluent and developing nations alike, dental caries in school-age children is still a major issue. Cavity may be a frequent infectious condition in which carbohydrates are metabolized by acid-producing bacteria called Mutans Streptococci that reside in the oral tissues. Caries is caused by the acid, which gradually demineralizes the tooth structure. Consuming sugary foods and drinks can have a significant effect on a person's risk of developing dental caries as an adult and in youth.⁴

Consumption excessive quantities of sugar raises the amount of Mutans Streptococci in the mouth, which subsequently raises the risk of tooth deterioration.⁵ According to a 2018 study by Ganesh et al.⁶, the prevalence rate of early childhood caries in India was 49.6%; the highest percentage was found in Andhra Pradesh (63%) and the lowest rate was recorded in Sikkim (41.92%). In all states, the frequency was less than 40%. There were 158.79 million children in the 0–6 age range according to the 2011 research. In India, early childhood caries affects 79.4 million people. Compared to females, boys (4–6 years old) were more prone to tooth decay.⁷

Primary molars are more susceptible to caries than other teeth because of the way their occlusal structure causes food to collect in their pits and fissures. Because of a higher pulp to crown ratio in youngsters, caries typically involve pulp. The pulp of permanent teeth has a larger crown ratio, which causes pulpal involvement to occur later. Histopathologically, the disintegration of the marginal ridge in primary teeth typically reveals pulpal alterations.

For primary teeth, the best restorative material option should be selected among the many options available. Addressing Class II caries in deciduous molars is crucial because it preserves natural space, facilitates good mastication, and avoids discrepancies in arch length.

Moreover, it is most challenging to restore first molars with Class II lesions due to their broad contact area, high pulp horns, which cause a shallow cavity, difficulty placing the matrix band, less retentive cavity due to decreased enamel dentine thickness, which increases secondary caries, and child cooperation during treatment. As a result, treating a class II lesion in a youngster becomes difficult. For pediatric patients, restorative dental materials are accessible with a variety of innovations and advancements. Amalgam was the gold standard material for dental restorations for more than 120 years.

In addition to amalgam, alternative restoration materials that are accessible include composite resins, stainless steel crowns (SSCs), enhanced GIC, and resin-modified glass ionomer cement (RMGIC). In contrast to amalgam, cosmetic and tooth-coloured restorations are becoming more and more popular among dentists. As of right now, the literature on juvenile dentistry lacks appropriate recommendations for clinician preference for appropriate material selection in a variety of clinical scenarios. Dentists find it difficult to choose materials due to advancements and improvements in dental technology. There are numerous materials and treatment options available; usually, considerations pertaining to the patient and the tooth dictate which option is best in each situation.

The dentist's own training and expertise may also have an impact on the course of therapy. The current study sought to comprehend the dentists' selection of restorative materials in class II caries in first mandibular primary molars in children visiting a university hospital in Chennai between the ages of 4-6.

MATERIALS & METHODS:

Inclusion criteria:

- Children undergone class 2 restoration in primary molars
- Complete data records of patients available in the data-retrieving system

Exclusion criteria:

- Carious teeth with pulpal involvement
- Craze teeth / Fractured teeth
- Congenital defects
- Previously restored teeth
- Broken restored teeth

Sample size estimation:

Sample size calculation was performed using G*Power Version 3.1.9.4. 47 retrospective data were selected using an alpha (α) level of 0.05 with a confidence interval (CI) of 95%. The minimum estimated sample size was 45 samples.

Sample preparation

This retrospective study examined the data records of patients from 01 June 2019 to 31st January 2021 who visited a Private Dental College and Hospital. Ethical Approval was taken from the Institutional Review Board. The study population included patients with ages ranging between 4-6 years. The study sample included both male and female gender, predominantly South Indians.

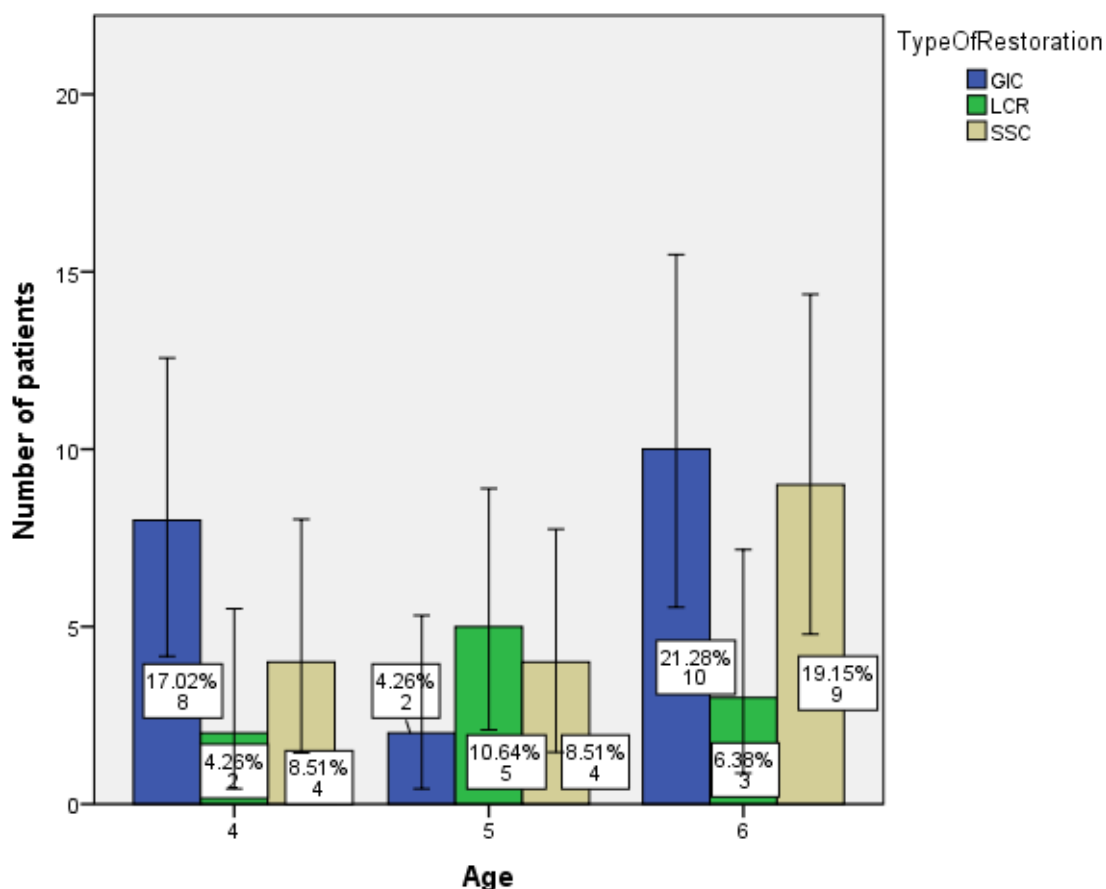
The study population included 1448 pediatric patients aged 4-6 years who visited university hospital. Sample size included 170 pediatric patients with class II caries in 1st mandibular molar in which 47 patients in the hospital database were diagnosed with class II caries in 1st mandibular primary molar restored with glass ionomer cement, light-cured composite and stainless steel restorations. The necessary data such as age, gender, type of restoration was recorded. Incomplete patient records were excluded. Data was recorded in Microsoft Excel and exported to the statistical package of Social Science for windows (SPSS) and subjected to statistical analysis. Chi-square tests are used for comparison of groups.

Statistical analysis

Data was expressed as Mean \pm Standard deviation, Chi square test was done to assess the significance of the difference. P Value $<$ 0.05 was considered to be statistically significant at a 95% confidence interval. SPSS®24 (IBM Corp. NY, USA) and MS Excel® (Microsoft Corp. USA) were used for calculation purposes.

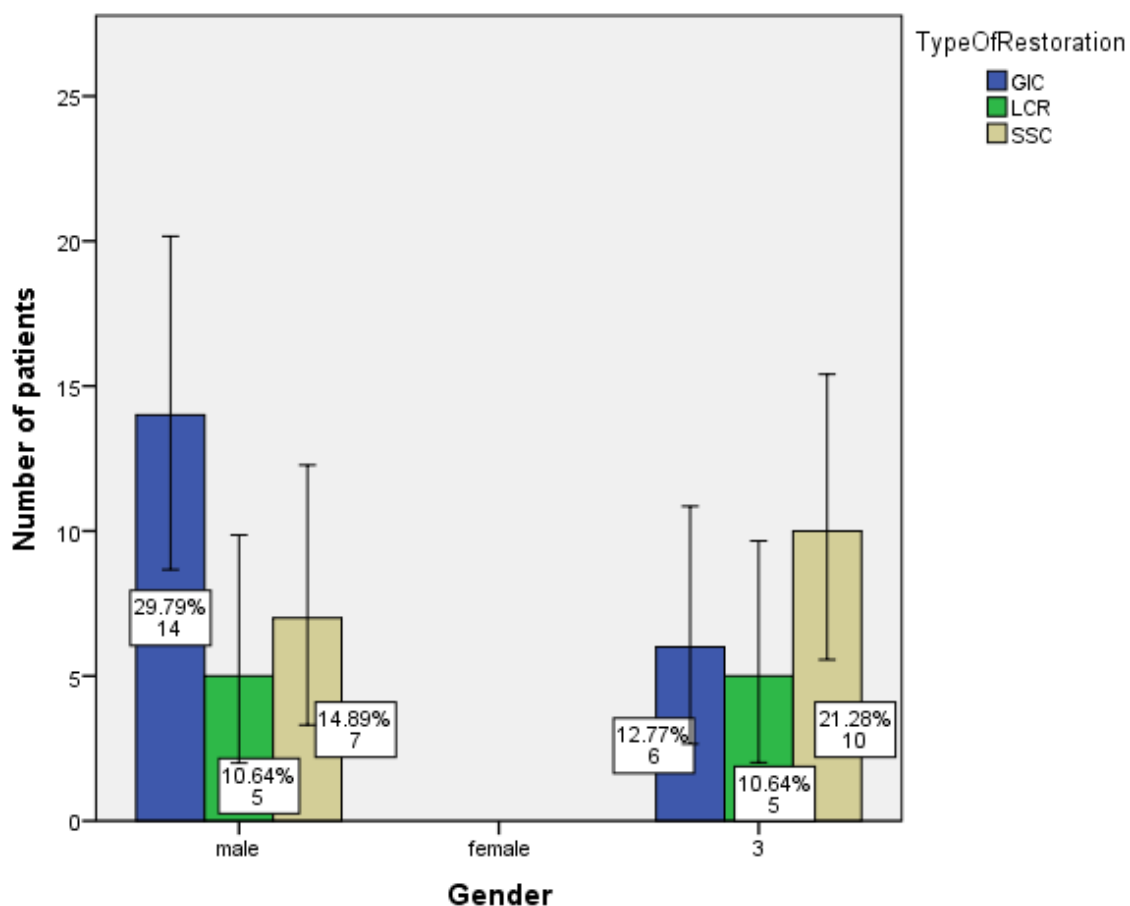
RESULTS

Glass ionomer cement was the most used restorative material in 4 and 6 years old children however light cured composite was the most used restorative material in 5 years old. Chi square test was done and the association was found to be not significant. (P value was =0.374, $p > 0.05$) hence showing there was no significant difference in the choice of restorative material at different ages. Glass ionomer cement is most popular among 4-year-old children about 17.02% followed by stainless steel crown about 8.51% and light cured composite 4.26%. Light cured composite was the most used among 5-year-old children about 10.64% followed by stainless steel crown about 8.51% and glass ionomer cement about 6.38%. Glass ionomer cement most used among 6-year-old children about 21.28% followed by stainless steel crown about 19.15% and light cured composite about 6.38%.



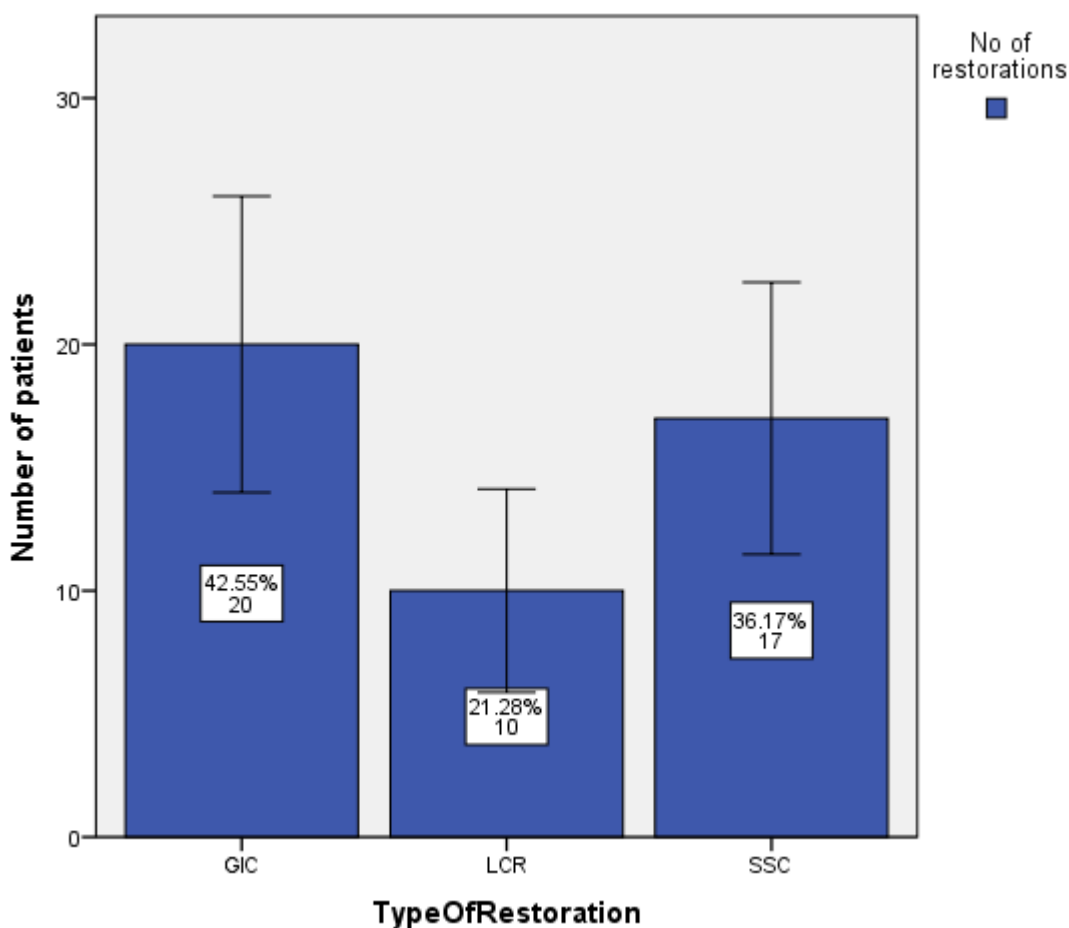
GRAPH 1-Bar chart depicting the association between age and type of restoration done; X axis shows the age of children and Y axis shows the type of restoration done. Blue colour denotes GIC restoration, green colour denotes LCR restoration and light brown colour denotes SSC restoration done

Glass ionomer cement was the most used restoration in males and stainless-steel crown was the most used restoration in females. A chi-square test was done and the association was found to be not significant. (P value was =0.262, $P > 0.05$ statistically not significant). Among male children glass ionomer cement was done in 29.79% children, stainless steel crown seen in 14.89% children and light cured composite in 10.64% of cases). Among female children stainless steel crown was done in 21.28% children, glass ionomer cement in 12.77% children and light cured composite in 10.64% of cases



GRAPH 2-Bar chart depicting association between the type of restoration done and gender where X axis shows the number of patients in both gender (Male and female) and Y axis shows the type of restoration done in patients. Blue colour denotes GIC restoration, green colour denotes LCR restoration and light brown colour denotes SSC restoration.

Among the dentists for restoring class 2 caries lesion in primary mandibular teeth glass ionomer cement was preferred by 42.55% dentists followed by stainless steel crown among 36.17% dentist and light cured composite among 21.28% dentist.



GRAPH 3 - Bar chart depicting the type of restoration which was most preferred by the dentists in children visiting private dental hospital. X axis represents the type of restoration used in patients and Y axis represents the number of restorations. GIC was the choice of restoration by the dentist followed by SSC and LCR.

DISCUSSION

Children's tooth decay, or caries, is still a major public health concern in both industrialized and developing nations worldwide. Early childhood caries, also known as ECC, is the most prevalent type of cavity in children and affects the baby teeth, also known as milk or primary teeth.⁸ Baby teeth serve as natural space maintainers and hold an area for permanent teeth, hence primary teeth are important to a child's development. Early tooth loss and decay can reduce the amount of space available for permanent teeth, which can cause the permanent teeth to shift and produce orthodontic issues for the child.⁹ Therefore, one of the most important treatment options for the control of caries in children is restorations (fillings) for ECC or cavities within the primary dentition.¹⁰ Over the past ten years, there has been an exponential increase in the number of new restorative materials available on the dentistry market for use in primary teeth.

According to this study, children between 4 and 6 were most likely to use GIC as a restorative material, whereas children aged 5 were more likely to use LCR (Shown in graph 1). Glass ionomer cement has good thermal expansion and contraction characteristics, and is biocompatible, sticky, and fluoride leaching.^{11,12} Nevertheless, compared to amalgam restorations, these restorations in primary dentitions are far more likely to require replacement because they are brittle, radiolucent, and prone to erosion and wear.^{13,14,15} Glass ionomer cement was the most widely used option for treating severe primary tooth caries, according to a Wuollet et al. survey.¹⁶ Patient cooperation is a major factor in treatment selections, which is why glass ionomer cement was the therapy of choice for many. Dentists who were more concerned with controlling moisture and child behavior tended to use glass ionomer cement. Because glass ionomer cement adheres to dentine, it may be the better choice when a disobedient youngster could jeopardize moisture management and cavity preparation. However, clinical investigations suggest that unless the teeth are scheduled to exfoliate within two years, typical glass ionomer cement is inappropriate due to its poor long-term performance in load-bearing restorations.^{14,15,17}

According to this research, the most popular restoration among male children was glass ionomer cement, whereas the most popular repair for female children was a stainless-steel crown. GIC was the most often selected treatment, followed by SSC and LCR (As shown in graph 3). Glass ionomer cement was selected as the most often used tooth-colored material in a different investigation by Messer et al. The benefits of glass ionomer cement are wear resistance, fracture toughness, command set, and simplicity of handling. Glass ionomer cement has an acid-base curing reaction.¹⁸ For primary teeth, GIC may therefore be the best course of action. SSC, on the other hand, was the recommended material of choice for cavitated proximal lesions in research by Khurana et al.¹ SSCs were selected due to their ease of placement, particularly in cases when the patient presents challenging behavior, the caries risk is high, a pulpotomy was necessary, or the tooth had circumferential caries.¹⁹ Because of their distinct form, SSCs are frequently more accepted than Class II lesions in severely carious lesions in deciduous molars.

Large carious lesions typically result in overextension of the proximal cavities due to the narrow buccolingual dimensions and extensive interproximal contacts found in primary molars. Because of the unsupported enamel at the buccal and lingual edges, there is an increased risk of restoration failure due to inadequate marginal seal, recurrent caries, and open margins caused by occlusion or mastication. SSC demonstrated superior durability and longevity compared to all other restorative materials.¹⁹ For primary molars with proximal lesions and teeth with severe caries, SSCs are the preferred material.¹⁹ Patients with enamel dentin abnormalities and high caries risk should also consider SSCs. Composite resin is technique-sensitive, necessitating strict moisture control and cautious case selection. Polymerization shrinkage might occur, making subsequent caries potentially difficult to identify, which is why it was the

least chosen choice of treatment.²⁰ Additionally, composite resin's mechanical qualities could not be as good as those of other restorative materials, which would explain why clinical durability seems to be shorter.²¹ The clinical effectiveness of restorative materials depends on the restorative materials' capacity to firmly attach to the dentinal surface and endure the different dislodging forces that the mouth cavity comprises. It appears that dentists' top choice for Class II restoration material was GIC. However, the child's behavior and moisture control have a major role in the repair option. Because our study was conducted in a single center with participants from the South Indian community, one of its limitations was its inability to be extrapolated to other populations. As a result, the study contributes to the body of knowledge and provides information that can be used for both clinical and broader population investigations in the future.

CONCLUSION

Within the parameters of the study, we found that, for class II restorations in primary mandibular molars in the age range of 4-6 years, dentists most frequently used GIC, followed by SSC and LCR. However, it was noted that there was no statistically significant difference ($p>0.05$) in the restorative materials chosen according to gender or age.

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Nil

CONFLICTS OF INTEREST

There are no conflicts of interest

ABBREVIATIONS

1. **GIC:** Glass ionomer cement
2. **SSC:** Stainless steel crown
3. **LCR:** Light cured composite

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