



# **Choice of Restorative Material by Dentists for Class I Caries in Second Mandibular Primary Molar in 3-6 Year Children Visiting a University Dental Hospital “A Retrospective Study**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

Dental caries has long been a frequent and costly disease in the world, with paediatric caries being the most common infectious disease. Caries risk is higher in children who live in rural areas, are impoverished, or have inadequate access to dental care. Restorative treatment should be based on the findings of an appropriate clinical examination and should ideally be part of a comprehensive treatment plan that takes into account the dentition's developmental status, caries risk assessment, the patient's oral hygiene, parental compliance and likelihood of timely recall, and the patient's willingness to cooperate for treatment. Glass-ionomers, resin ionomers, resin ionomer products, and enhanced resin-based composite systems have all been developed, and they are all having a significant impact on restoration of primary teeth. The study's goal was to evaluate paedodontists' restoration choices in youngsters in Chennai. The current study was conducted in a university dental hospital in Chennai and was a retrospective observational study. The data of Pediatrics patients from June 1, 2019 to March 31, 2021 was examined. There were 1448 patients aged 3-6 years with class 1 caries in their second mandibular teeth. The next step was to tabulate the data in Excel. The data was analysed with SPSS software, and the Chi square test was used to compare groups.

*Keywords: Dental caries; glass ionomer cement; innovative technique; composite restoration.*

## 1. INTRODUCTION

Dental caries has long been a frequent and costly disease in the world, with paediatric caries being the most common infectious disease. In both primary and mixed dentitions, the illness is becoming increasingly isolated in certain teeth and tooth morphology types, with pits and fissures being the most commonly decaying areas. Pizzo and colleagues, [1].

Glass-ionomers, resin ionomers, resin ionomer products, and better resin-based composite systems have all been created, and they are having a significant impact on primary tooth restoration, particularly the treatment of proximal and anterior cavities. The main benefit of these new materials is that they require less retention form, which is especially significant in primary teeth to preserve the relatively thin enamel that may help avoid caries invasion of dentin later on. Anderson, [2].

Over the last 60 years, there have been many improvements in the development and availability of dental restorative materials for paediatric patients. Guelmann and Mjör [3] Guelmann and Mjör, [3] Guelmann and Mjör, Amalgam has been utilised in restorative dentistry for almost 120 years and is still widely used. 1936, [4]. Many dental schools still teach it as the preferred material for Class I and II restorations; it is also the best direct restorative option for bigger restorations or when used to treat interproximal carious lesions Kilpatrick and Neumann, [5].

Composite resins are the most attractive cosmetic materials because of their outstanding physical and mechanical properties.

Burke and colleagues Burke et al., [6]. Compomers are polyacid modified composite resins that include a small amount of glass ionomer cement incorporated into them (GIC). These materials are easier to work with, more durable, and more attractive than GICs. GICs, on the other hand, have a higher fluoride release, better physical qualities, and biocompatibility than composites, but they have less aesthetic properties. Dodes et al., [7]. When compared to amalgam, resin modified glass ionomers and compomers restorations have a similar durability, however regular glass ionomer restorations have a much lower lifespan. Qvist and colleagues, [8]. Dentists have recently shifted their focus away from amalgams and toward cosmetic restorations. Pediatric dentists primarily employed resin-based materials for primary teeth Class I and II restorations, whereas SSCs were the preferred material when three or more surfaces were involved. However, amalgam was the most prevalent material utilised by Californian paediatric dentists for Class II restorations. Pair, Udin and Tanbonliong, [9]. The usage of composites has expanded in Japan, according to Fukuyama et al. [10] owing to patients' aesthetic aspirations. Tooth-colored restorations are currently preferred by more parents and children over amalgam restorations. Peretz and Ram [11].

Primary teeth are critical for a child's growth, and to maintain these teeth functional for as long as

possible, every effort should be made. Dental caries will grow if left untreated, resulting in pain and infection, resulting in unnecessary suffering and missed school days Gift, [12]. Untreated caries levels are linked to physicochemical results, according to research Alkarimi et al., [13]. Untreated caries has also been demonstrated to have a major impact on children's and their families' oral wellbeing quality of life Fernandes et al., [14]. Dental restorations are used to help control the caries progression of the disease by restoring tooth structure integrity, reducing discomfort in deep dentin lesions, and restoring tooth structure integrity. As a result, oral health providers must make informed selections about the sort of restorative material to use when treating children with caries. This is a difficult option to make, because significant advancements in dental restorative materials have extended the market in the last ten years.

This research aims to determine, analyse, and comprehend dentists' preferred restorative material for class 1 caries in Mandibular second molars among children aged 3-6 years old visiting Saveetha dental college and hospital.

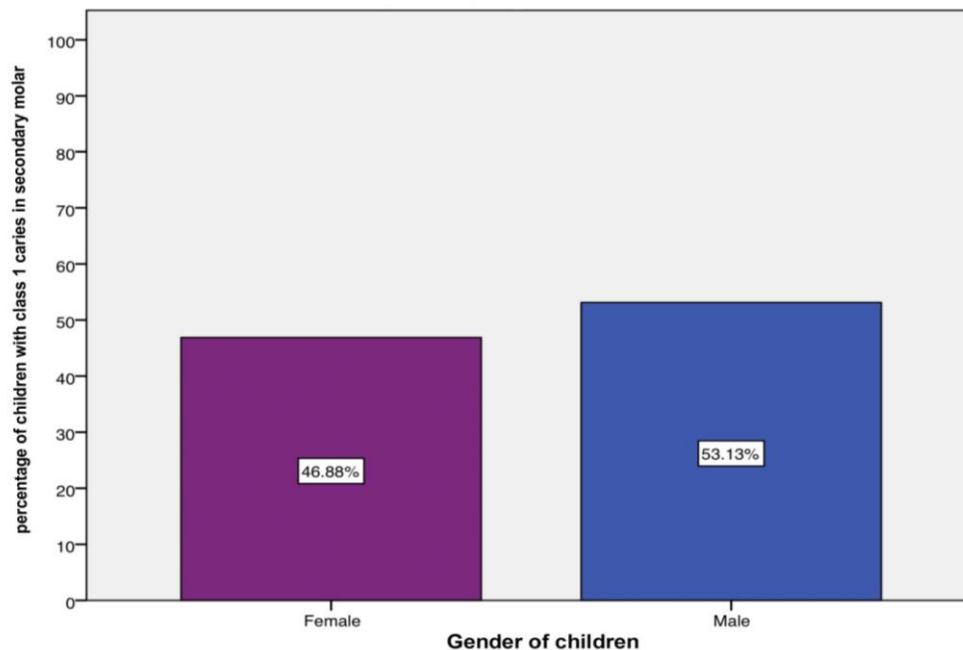
## 2. MATERIALS AND METHODS

The records of patients who visited Saveetha Dental College and Hospital between June 1,

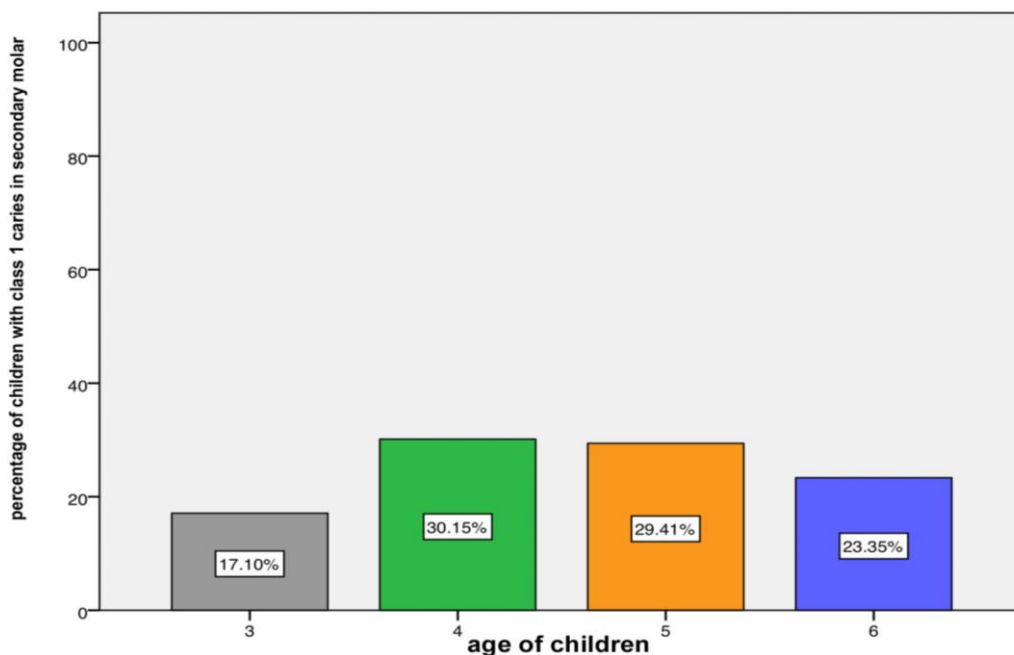
2019 and March 31, 2021 were analysed in this retrospective analysis. The institutional review board/ SDC/SIHEC/DIASDATA/0619-0320 provided ethical approval. Patients ranging in age from 3-6 years old were enrolled in the study. The study sample consisted of both male and female participants, the majority of whom were South Indians. A total of 1448 paediatric kids aged 3-6 years who visited a university hospital were included in the study. The study included 1448 juvenile patients, 544 of whom were identified with class 1 caries in their second mandibular molars in the hospital database. The necessary information, such as age, gender, and restoration type, was recorded. Incomplete patient records were omitted from the study. Data was entered into Microsoft Excel and then exported to the statistical package for social science for Windows (SPSS), where it was analyzed statistically. The chi square test is used to compare groups.

## 3. RESULTS AND DISCUSSION

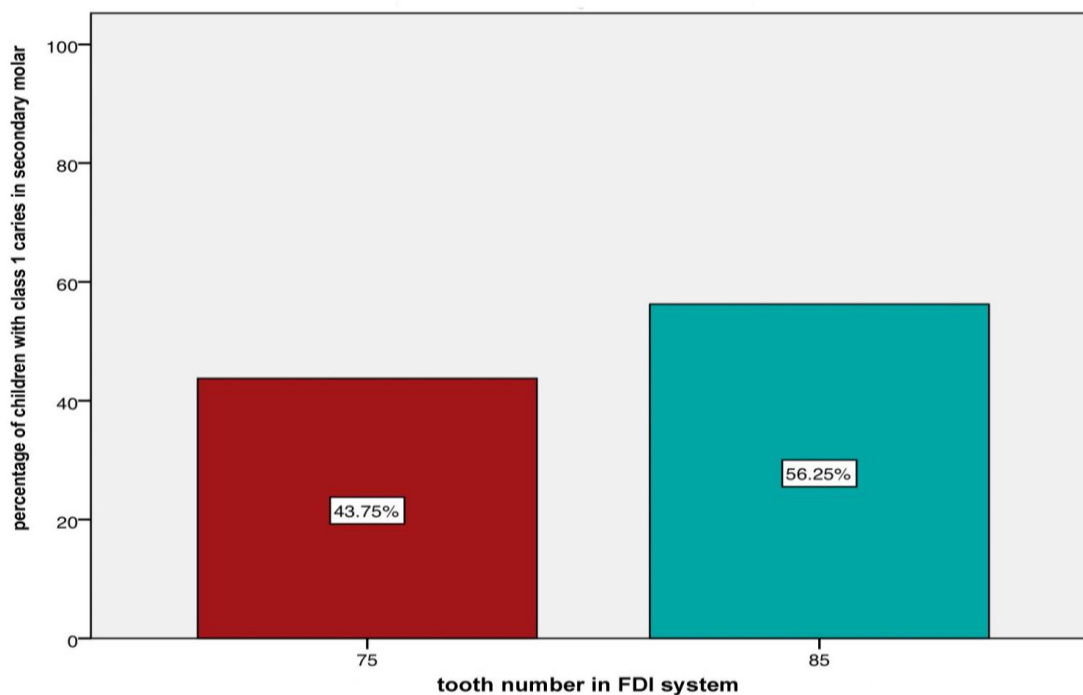
A total of 544 patients were included in the study, with 46.8% of females and 53.1 percent of males. 17.1 percent of patients are children under the age of three, 30.15 percent are children under the age of four, 29.41 percent are children under the age of five, and 23.35 percent are children under the age of six.



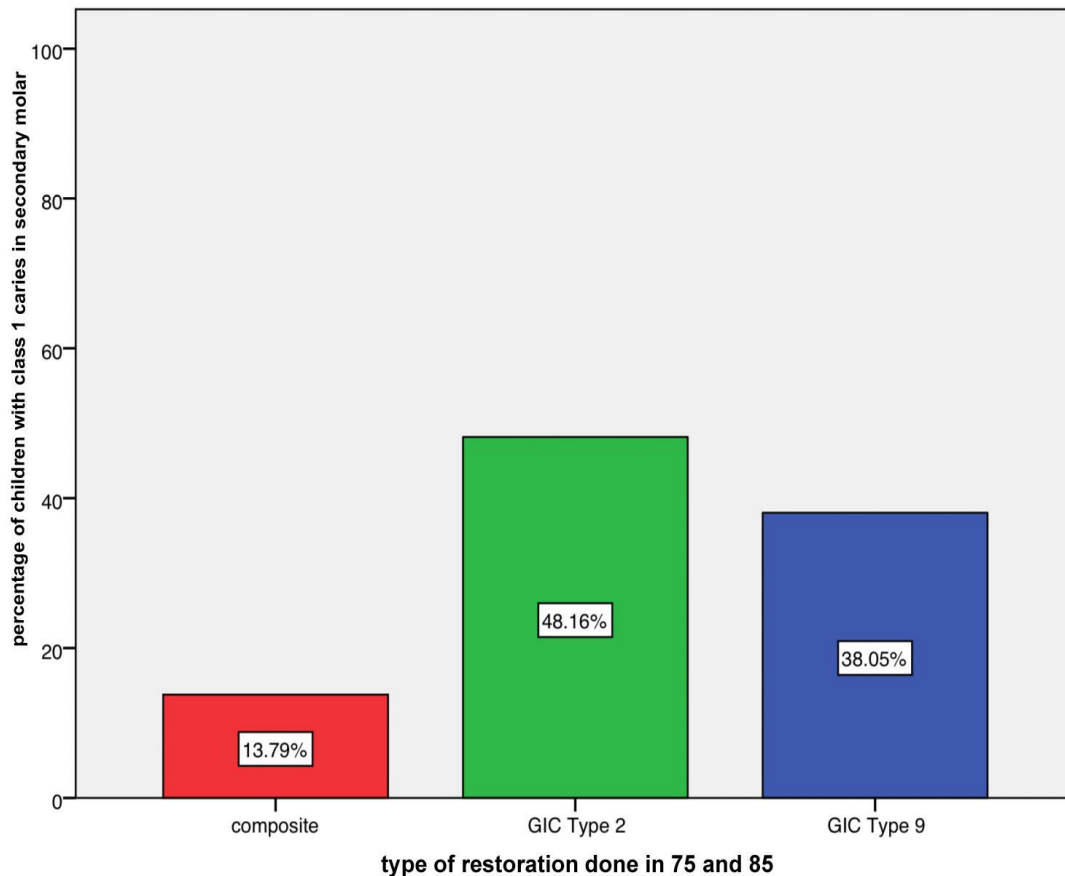
**Graph 1. Bar chart shows gender distribution of children in the sample population. Purple denotes the female population and Blue represents the male population. 46.8% of the children were girls and 53.1% of the children were boys**



**Graph 2. Bar chart showing age distribution of children in sample population. Grey denotes the children of age 3, green denotes the children of age 4, orange denotes the children of age 5 and blue denotes the children of age 6. 17.1% are patients of age 3, 30.15% are patients of age 4, 29.41% of patients are of age 5 and 23.35% of patients are of age 6**



**Graph 3. Bar chart showing the distribution of Class I caries in mandibular primary second molars in the sample population. Red denotes the children who had class 1 caries in 75 and blue denotes the children who had class 1 caries in 85. 43.75% have class 1 caries in 75 and 56.25% have class 1 caries in 85**



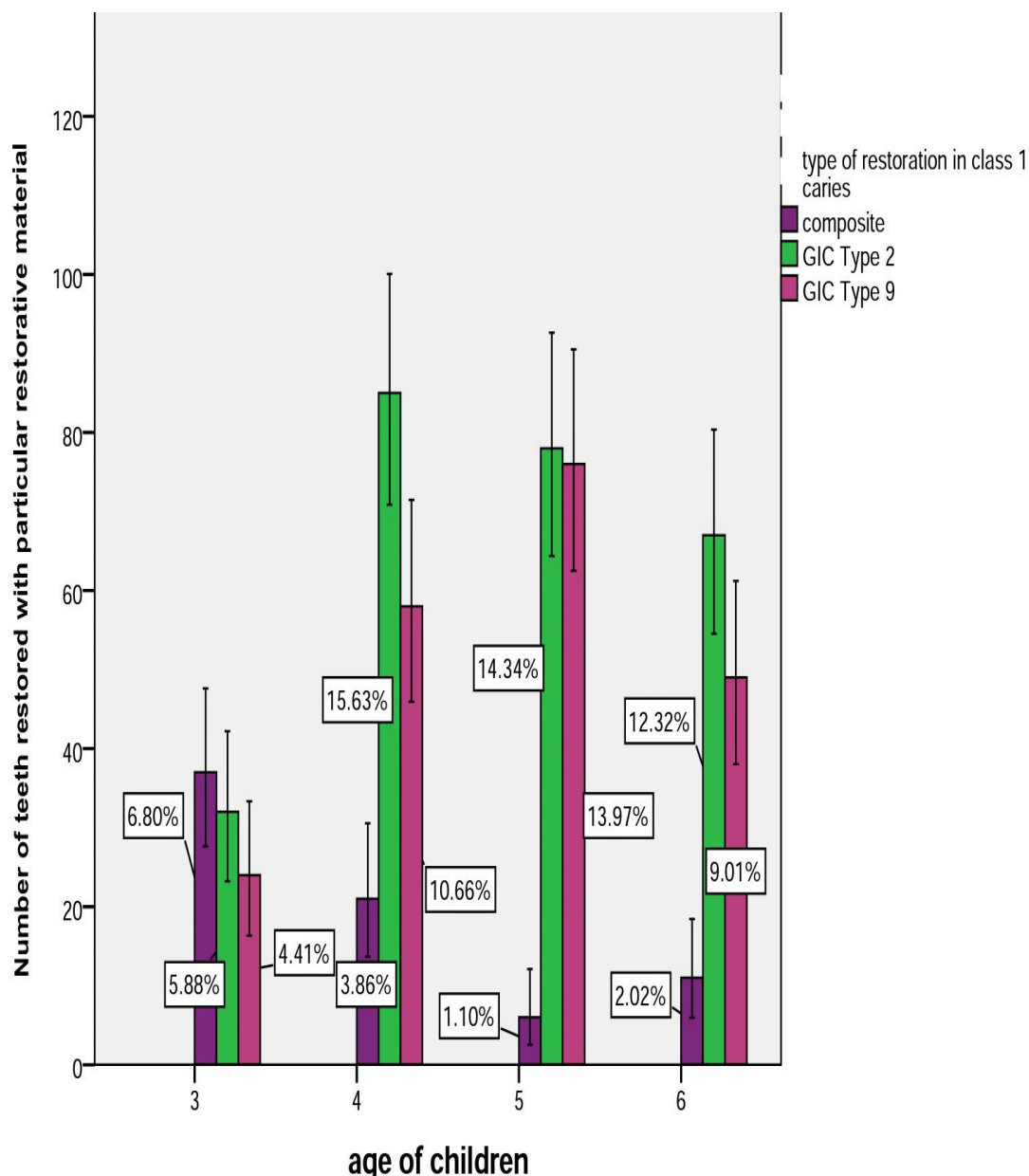
**Graph 4. Bar chart showing the distribution on the type of restoration used in the sample population. Red denotes the composite type of restoration who had class 1 caries, Green denotes GIC type 2 type of restoration who had class 1 caries and Blue denotes GIC type 9 type of restoration among children who had class 1 caries. Composite restoration has been used in 13.79% of the children, GIC type 2 restoration has been used in 56.8% of the children and GIC type 9 has been used in 38.05% of the children**

Amalgam, conventional glass-ionomer cement, resin-modified glass-ionomer cement, high-viscous glass-ionomer cement, compomer, and resin composite are examples of traditional restorative materials used for primary tooth repair. Despite the fact that amalgam was once thought to be the standard method in restorative dentistry, it is no longer recognised to be such. Mickenautsch, Yengopal, and Banerjee, [15] its use has decreased because to concerns about mercury poisoning and the greater removal of healthy tissue during cavity preparation [16]. As a result, adhesive-quality restorative materials have grown in popularity, as they match with the minimally invasive dentistry is a concept that aims to provide optimal handling and functional performance while also addressing the cosmetic needs of patients. Despite the fact that placing restorations is a common treatment method in

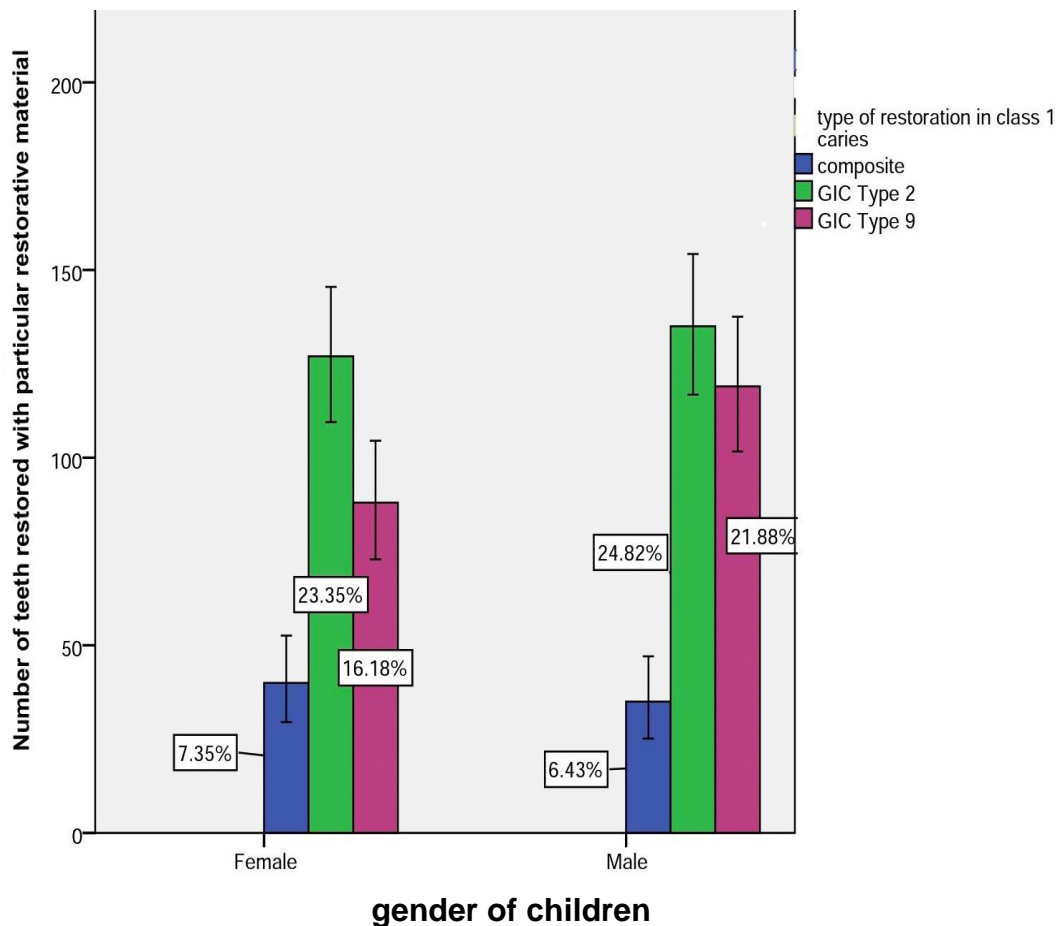
clinical practise, there is a scarcity of scientific evidence to determine which filling material is appropriate for treating caries in the primary dentition. In the systematic review, there where three different samples comparing the types of materials that were considered [17] conducted a foregoing systematic review and meta-analysis of network to assess the performance of a variety of typical restorative materials used in posterior primary teeth. Standard GIC restorations in primary molars had a higher failure rate than restorations that comprised of alternative restorative materials. GIC had flaws in previous iterations, including as limited wear resistance and flexibility strength. Due to the brittle quality of this cement, modifications to its previous composition were made to improvise its physical properties, and these modifications are now accessible in the RMGIC or HVGIC [18]. There

was no evidence that CP, RMGIC, AMG, or RC were superior as restorative therapies [19]. Choosing one of these resources for therapeutic purposes will be dependent on professional expertise, individuality, and the patient's wishes.

Aesthetic criteria, a gentle approach, caries activity, substrate type, and the cavity to be treated should all be taken into account when choosing a restorative material. Lenzi and colleagues [20].



**Graph 5.** Bar chart showing the association between the type of restoration at different ages of children. c. Purple denotes composite restoration, green denotes GIC type 2 restoration and pink denotes GIC type 9 restoration and in class 1 caries of Mandibular second molars of children aged between 3 and 6. X axis denotes the age of children with clustered charts that denote the type of restoration done in each age group and the Y axis denote the percentage of children with class 1 caries in the second molar. Chi square test was done and the association was found to be significant (p value =0.028, <0.05 statistically significant) showing that there was a difference in the choice of restorative material at different ages. The most preferred material for restoration at age of 3 years was found to be composite and at other ages was found to be Type 2 GIC



**Graph 6. Bar chart showing the association between the type of restoration in gender of children. Blue denotes composite restoration, green denotes GIC type 2 restoration and pink denotes GIC type 9 restoration and in class 1 caries of Mandibular second molars of children aged between 3 and 6. X axis denotes the gender of children with clustered charts that denote the type of restoration done in each age group and the Y axis denote the percentage of children with class 1 caries in the second molar. The correlation was shown to be not significant ( $p$  value =0.211, 0.05 statistically non significant) using the Chi square test. although there was a difference in the choice of restorative material in both genders. The most preferred material for restoration for male children was found to be Type 2 GIC and composite restoration while for female children, Type 2 GIC was more significant**

Restorative dentistry certainly aids in the restoration of function and aesthetics, as well as assisting the patient/family in biofilm control because illness healing is linked to the regulation of etiological factors, it cannot be credited purely to restoration. Hence, in the oral cavity, restorations are subjected to a range of stresses that cause interfacial degradation, limiting their longevity. Restoration failures demand replacement, which necessitates further tooth structure removal, repeating the restorative cycle. Patient-related factors including risk of tooth caries and socioeconomic considerations can affect the longevity of restorative materials.

#### 4. CONCLUSION

Thus in this study it was determined that the most preferred material for class restoration of class 1 caries at age of 3 years was found to be composite and at other ages was found to be Type 2 GIC and there is statistically significant Type 2 GIC predominance of about 48.16% ( $p=0.028$ ) and mostly Type 2 GIC was the choice of restoration for both male and female children who had class 1 caries in Mandibular secondary molars.

Our team has a wealth of research and knowledge that has resulted in high-quality

publications Subramanyam et al. [21] Ramadurai et al. [22] Ramakrishnan et al. [23] Jeevanandan and Thomas [24] Princeton et al. [25] Saravanakumar et al. [26] Wei et al. [27] Gothandam et al. [28] Su et al. [29] Mathew et al. [30] Sekar et al. [31] Velusamy et al. [32] Aldhuwayhi et al. [33] Sekar et al. [34] Bai et al. [35] Sekar [36] Sekar et al. [37] Duraisamy et al. [38] Parimelazhagan et al. [39] Syed et al. [40,41].

### CLINICAL SIGNIFICANCE

This study served as a beneficial tool for the identification of choice of restoration for class 1 caries in Mandibular molars. The data derived from the study is of high clinical value for evidence based practice and also can be used for implementation of correct preventive strategies and imparting awareness among dentists as well as the general population.

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### CONSENT

It is not applicable.

### ETHICAL CLEARANCE

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320).

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### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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