

Evaluation Of Commonly Treated Mandibular Teeth With Preventive Resin Restoration Among Children With Mixed Dentition

Research Article

Sarojini K¹, Vignesh Ravindran^{2*}

¹Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai- 77, India.

²Senior Lecturer, Department of Pediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai- 77, India.

Abstract

Background: Dental caries is recognised to be the most prevalent infectious disease globally. It affects all age groups and most commonly children between 6-12 year old involving both primary and permanent teeth. Apart from conventional measures for the management of dental caries, preventive measures involving sealing of the cavitated and non cavitated pits and fissures can be a feasible method for cost-effectiveness in the prevention of caries. Among the newer techniques with a long-term success rate for preventing caries are preventive resin restoration (PRR).

Aim: This study aims to evaluate the most commonly treated mandibular teeth with preventive resin restoration in children with mixed dentition.

Materials and Methods: This retrospective study was conducted in a university setting. Data were collected from 980 children between the ages of 6-12 years who underwent preventive resin restoration for primary or permanent teeth have been included in the study. The extracted data was tabulated in a spreadsheet (Excel 2017: Microsoft Office) and analysed using SPSS 23 version software (SPSS, Inc., Chicago). Descriptive statistics and chi-square tests were performed with the level of significance at 5% ($P < 0.05$).

Results: Most PRR was done in 6 years old male patients 14.88% followed by 10 years 10.23% and 8 years 9.30% female patients respectively. Both permanent mandibular first molars are highly treated with PRR in which permanent left mandibular first molar is more commonly treated for males 16.28% than females 15.35% and permanent right mandibular first molar is more commonly treated for females 16.28% than males 10.70%. This was found to be a statistically significant (P value = 0.029).

Conclusion: Within the limitations of our study it can be concluded that, preventive resin restoration is more commonly used for permanent right and left first molar region for caries prevention in both primary and permanent teeth in children between 6 - 12 years of age.

Keywords: Dental Caries; Mandibular Molars; Mixed Dentition; Preventive Resin Restoration; Innovative Method.

Introduction

Dental caries is recognised to be the most prevalent infectious disease globally [1]. It affects all age groups and most commonly children between 6-12 year old involving both primary and permanent teeth [2]. Dental caries is a multifactorial microbial infectious disease that is characterized by demineralization of the inorganic and destruction of the organic substance of the tooth resulting in cavitation [3]. The major key components in the aetiology of dental caries are;

a) cariogenic microorganisms, b) fermentable carbohydrates, c) a defenceless tooth and host and d) time. Oral health is invariably a part of general health and improvement of oral health in children for the prevention of dental caries is integral [4]. The associated factors to this change in the pattern of oral health might be dietary changes, improved oral hygiene habits, proper utilization of fluorides, and other professional measures along with the school-based preventive programs [5]. In addition, awareness and knowledge on maintaining oral

*Corresponding Author:

Vignesh Ravindran,
Senior Lecturer, Department of Pediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai- 77, India.
Tel: +91-9789934476
E-mail: vigneshr.sdc@saveetha.com

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health among children and parents will contribute a major role in preventing dental caries [6, 7]. Considering these factors, caries appears to be a preventable and controllable disease [8, 9]. The prevalence of caries in a population must be assessed at regular intervals to establish the spread and the necessity for preventive and restorative care.

Preventive dentistry employs procedures in the practice of dentistry and community health programmes that prevents the occurrence of oral diseases providing good oral health. Prevention at the initial level is a remarkable measure in dentistry, especially in the field of pediatric dentistry [10]. Since the utilization of preventive measures can prevent impending complications, dental professionals have a significant responsibility toward early screening providing preventive measures and treatment needs [11]. The significance of retaining the primary teeth in the oral cavity until physiological exfoliation occurs is necessary as they act as the space maintainer for permanent teeth and preserve the arch integrity. Mandibular molars are more susceptible to dental caries than maxillary molars which contribute to the early eruption and topographic anatomical configuration [12]. Early implementation of preventive dental care programs and clinical care management appear to be fundamental for all children to prevent costs for caries treatment.

An integral component of modern pediatric restorative dentistry is resin-based composite. They can be employed effectively for preventive resin restorations. As caries predominantly involves the occlusal surfaces of erupting molars and premolars and therefore accounts for almost 80-90% of pit and fissure caries in permanent teeth [13]. Apart from conventional measures for the management of dental caries, preventive measures involving sealing of the cavitated and non cavitated pits and fissures can be a feasible method for cost-effectiveness in the prevention of caries. Among the newer techniques with a long-term success rate for preventing caries are preventive resin restoration (PRR) [14]. A preventive resin restoration is a conservative and minimally invasive treatment that involves limited excavation to remove carious tissue, restoration of the excavated area with a composite resin, and application of a sealant over the surface of the restoration and remaining, sound, contiguous pits and fissures [15]. Preventive resin restoration is an alternative to the conventional technique in which, in addition to carious tissue, sound pits and fissures are prepared and an amalgam restoration is placed. A preventive resin restoration is suggested when the carious lesion in a pit or fissures, small and discrete. Hence it is used in premolars, primary molars and permanent molars. However, the placement of a resin is very technique sensitive, the poor placement techniques such as moisture contamination, improper sealing of all pits and fissures, inadequate etching, rinsing or drying, insufficient curing time which ultimately results in material wear as the reasons for failure [16]. Several studies have reported the success and minimal invasiveness of the preventive resin restoration as the treatment of choice for small, discrete lesions of the pits and fissures [17]. Our team has extensive knowledge and research experience that has translate into high quality publications [18-30, 31-37]. With this background, this study aims to evaluate the most commonly treated mandibular teeth with preventive resin restoration in children with mixed dentition.

Materials and Methods

This retrospective study was conducted in a university setting. A total of 535951 treatment records were assessed for the study. Simple random sampling was done to minimise the sampling bias. Data were collected from 980 children with mixed dentition who underwent preventive resin restoration for primary or permanent teeth based on the inclusion and exclusion criteria. The data collection and analysis was done by two examiners. The inclusion criteria were children between the ages of 6-12 years, children who underwent preventive resin restoration treatment for primary or permanent teeth and complete records of the patient and treatment done in the case sheet with photographic evidence. Exclusion criteria for the study were patients less than 6 and more than 12 years of age, incomplete case records and missing photographic proof of completed treatment. A third examiner reviewed the case records of the collected data to ascertain the validity of the data by ensuring the data with the post-operative photographs. The extracted data were tabulated in a spreadsheet (Excel 2017: Microsoft Office) and analysed using SPSS 23 version software (SPSS, Inc., Chicago). Descriptive statistics and chi-square tests were performed with the level of significance at 5% ($P < 0.05$).

Results and Discussion

In this study based on the inclusion and exclusion criteria around 980 dental treatment records were analyzed. Of which 52.56% were males and 47.44% were females. (Figure1) Most PRR was done in 6 years old male patients 14.88% followed by 10 years 10.23% and 8 years 9.30% female patients respectively (Figure 2). PRR is more commonly treated with permanent left first mandibular molars 31.63% and permanent right first mandibular molars 26.98% respectively (Figure 3). Both permanent mandibular first molars are highly treated with PRR in which permanent left mandibular first molar is more commonly treated for males 16.28% than females 15.35% and permanent right mandibular first molar is more commonly treated for females 16.28% than males 10.70% (Figure 4) Mandibular right quadrant is commonly treated for females 24.19% than males 21.4% respectively and the mandibular left quadrant is more commonly treated for males 31.16% than females 23.26% (Figure 5).

Dental caries persist as a major public health concern worldwide [38]. Recent studies have reported the prevalence of dental caries is high in children between the age of 6- 12 years [39]. Most previous researchers have evaluated risk factors for dental caries in the mixed dentition cross-sectionally. Since the dental caries process takes time to develop into clinically detectable lesions, risk factors for dental caries should be analyzed by assessing factors that arise before and during the time of clinical caries detection [40]. Caries predominantly affects the occlusal surfaces of erupting molars and premolars and thus resulting in approximately 80-90% of pit and fissure caries in permanent teeth [41]. Apart from traditional measures for the management of dental caries, preventive measures incorporating sealing of the cavitated and non cavitated pits and fissures can be a feasible method for cost-effectiveness the prevention and management of caries. Management and prevention of pits and fissure caries have become a complex issue in this modern dentistry [42]. Controversies go on with the promising and most suitable method for treating those pits and fissures with or without caries. Preventive resin restoration (PRR) has been established to be such an effective means of treating pits and fissure

Figure 1. This pie chart represents the gender of the patient who underwent PRR in mandibular teeth, 52.66% were males and 47.44% were females.

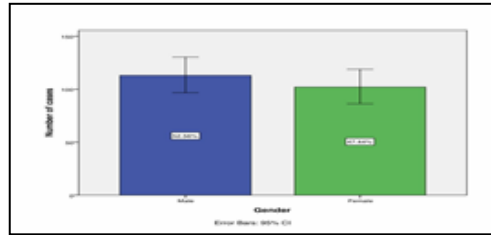


Figure 2. This bar graph represents the correlation between the age and the gender of the patient. The X-axis represents the age of the patient and the Y-axis represents the gender of the patient. Blue colour denotes male patients and green colour denotes female patients. It shows that most PRR was done in 6 years old male patients 14.88% followed by 10 years 10.23% and 8 years 9.30% female patients respectively. This was found to be a statistically significant P value = 0.049, $P < 0.05$.

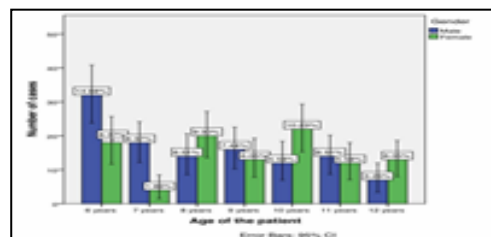


Figure 3. This bar chart shows the most commonly treated mandibular teeth with PRR in children with mixed dentition. It shows PRR is more commonly treated with permanent left first mandibular molars 31.63% and permanent right first mandibular molars 26.98% respectively.

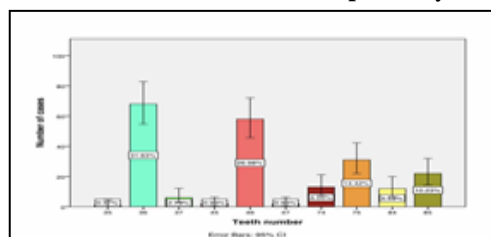


Figure 4. This bar graph shows the correlation between mandibular teeth treated with PRR and the gender of the patient. The X-axis represents the mandibular teeth treated with PRR and the Y-axis represents the gender of the patient. Blue colour denotes male patients and green colour denotes female patients. It indicates that both permanent mandibular first molars are highly treated with PRR in which permanent left mandibular first molar is more commonly treated for males 16.28% than females 15.35% and permanent right mandibular first molar is more commonly treated for females 16.28% than males 10.70%. This was found to be a statistically significant P value = 0.029, $P < 0.05$.

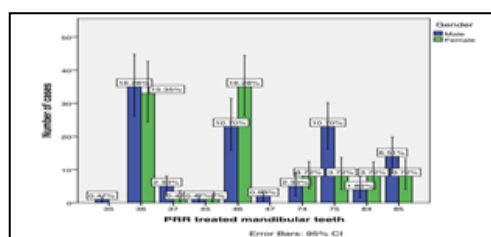
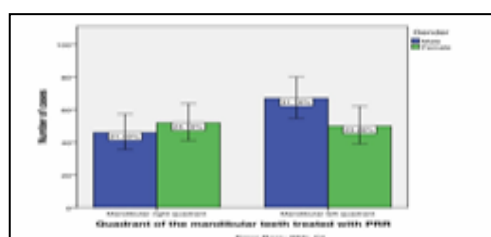


Figure 5. This bar graph shows the correlation between the quadrant of the mandibular teeth treated with PRR and the gender of the patient. The X-axis represents the quadrant of the mandibular teeth treated with PRR and the Y-axis represents the gender of the patient. Blue colour denotes male patients and green colour denotes female patients. It indicates that the mandibular right quadrant is commonly treated for females 24.19% than males 21.4% respectively and the mandibular left quadrant is more commonly treated for males 31.16% than females 23.26%. This was found to be a statistically insignificant P-value = 0.085, $P > 0.05$.



caries. Preventive resin restoration is a conservative and minimally invasive treatment that involves limited excavation to remove carious tissue, restoration of the excavated area with a composite resin, and application of a sealant over the surface of the restoration and remaining sound, contiguous pits and fissures [43].

In our studies, most PRR was done in 6 years old male patients 14.88% followed by 10 years 10.23% and 8 years 9.30% female patients respectively. A similar observation of higher caries prevalence among children with mixed dentition have been documented. The caries prevalence rate of about 63.20 % between 6-10 years has been observed in a previous study the higher occurrence of dental caries in preschool children may be associated with dietary changes [44]. Many studies have reported a significant association between the frequency of sugar intake and dental caries [45]. Our study observed the most commonly treated mandibular teeth with PRR in children with mixed dentition. It shows PRR is more commonly treated with permanent left first mandibular molars 31.63% and permanent right first mandibular molars 26.98% respectively. A similar study assessed and confirmed that occlusal fissures on the first and second molars contributed most significantly to caries frequency, from 52.7% to 66.3% [46]. Another study also observed that mandibular molars were most susceptible to caries. Earlier research has also shown that the most CARR was done in primary mandibular molars followed by permanent mandibular molars [47]. The higher caries susceptibility in the mandibular arch could be due to the fissure topography of molars. Studies stated that the reason for this phenomenon could be a combination of complicated surface morphology and difficult access for significant oral hygiene [48]. Soon after an eruption, a majority of the fissures of occlusal surfaces in molars show early signs of caries [49].

Our study indicated that both permanent mandibular first molars are highly treated with PRR in which permanent left mandibular first molar is more commonly treated for males 16.28% than females 15.35% and permanent right mandibular first molar is more commonly treated for females 16.28% than males 10.70%. Our study also reported that the mandibular right quadrant is commonly treated for females 24.19% than males 21.4% respectively and the mandibular left quadrant is more commonly treated for males 31.16% than females 23.26%. A previous study evaluated the caries prevalence and found that females (59.1%) showed a higher incidence of caries than males (40.9%)[50]. On the contrary, one study reported that gender and age do not affect the prevalence of caries on teeth sites [51]. Caries appear to be a preventable and controllable disease. The prevalence of caries in a population must be assessed at regular intervals to establish the spread and the necessity for preventive and restorative care.

There are few limitations for this study, such as minimum external validity and hence the validity can be extended by encompassing subjects of a wider range. The study is retrospective and does not record the success of PRR. The future scope for this study involves the identification of that section of the population where prophylactic management is a necessity and creates the need for PRR.

Conclusion

Within the limitations of our study, it can be concluded that pre-

ventive resin restoration is more commonly used for permanent right and left the first molar region for caries prevention in both primary and permanent teeth in children between 6 - 12 years of age. This could be related to the higher caries susceptibility in the mandibular arch due to the fissure topography of molars. In addition, more caries is experienced in younger age groups, and their incidence decreases as age increases. However this study has not evaluated the success rate, further research will focus on the success rate of PRR

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