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Evaluation Of Commonly Treated Maxillary Teeth With Preventive Resin Sealant Among Children With Mixed Dentition

Research Article

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Abstract

Introduction: Dental caries is a multifactorial disease which depends on various factors such as fermentable sugar, host factors, presence of cariogenic bacteria and other associated environmental factors. Application of Pit and fissure sealants is an integral part of comprehensive caries management approach. Their role in the field of caries prophylaxis is undisputed. A Pit and fissure sealant is a clear or an opaque plastic material which when applied to the deep pit and fissure of the posterior teeth can prevent caries.

Aim: To evaluate the most commonly treated maxillary teeth with preventive resin sealant among children with mixed dentition.

Materials And Methods: It was a retrospective study. Data required for the study was procured by reviewing patient records dating between June 2019 and March 2021. The required data was collected and analysed using SPSS software. Chi square test was done to find the value of p based on comparison with gender and tooth involved.

Results: Around 21.33% of children with 12 years of age had the maximum pit and fissure sealant. Among the cases records analysed, 54% were males and 46% were females within the age range of 6 to 12 years. The permanent left (34.94%) and right (36.12%) first molars treated with the preventive resin sealant were found to be the highest. Both male and female children were commonly treated with resin sealant in first permanent molars which was statistically significant (p value of 0.01).

Conclusion: Within the limits of the study, it can be concluded that pits and fissures sealant can be mostly used for mixed dentition which is 6-12 years of age especially both males and females. The common site to be employed in molars.

Keywords: Pedo Pits and Fissure Sealant; Mixed Dentition; Maxillary Teeth; Innovative Material.

Introduction

Dental caries is a multifactorial disease which depends on various factors such as fermentable sugar, host factors, presence of cariogenic bacteria and other associated environmental factors [1]. There have been various theories which proves the factors for caries formation plaque and dietary factors are interdependent on each other in the causation of dental caries. Host acts as a platform for the interaction of these factors. The main causative factor for the dental caries is streptococcus mutans [2]. Dental biofilm is an aggregate of microorganisms in which all the cells adhere to each other on to the surface [3]. This aggregate of cells is encapsulated in a self-producing organic matrix of polysaccharides, proteins and DNA. This biofilm enhances the cariogenicity of acid producing bacteria by protecting these bacteria from host defense [4]. These bacteria which colonize start to initiate caries thereby leading to the poor oral hygiene. Management for such conditions mainly depends on the extent, severity and stage of dental caries. In the case of lesion in the initial stage and remineralisation is possible, treatment options available are application of fluoride gel, varnishes, pits and fissure sealant. In the next condition where the caries involve the hard tissues but is asymptomatic with no pulpal involvement, caries would be managed through restoration.

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The most commonly used treatment option for a remineralisation condition is pits and fissure sealants [5]. These molars and premolars are said to be susceptible for the caries to occur. The occlusal surfaces are most commonly affected due to the reduced action of cleaning over that area [6]. As a result, bacteria and food residues gets settled leading to demineralisation and cavitation [7]. Application of pits and fissure sealants leads to the formation of the mechanical barrier that leads to the deprivation of nutrition for the underlying microbes and hence stops the progression of dental caries. The main mechanism behind sealing pits and fissure is simple. It contains fluoride which will inhibit demineralisation, supports in remineralisation and does not allow further accumulation of plaque [8]. Due to the unique morphology of pits and fissures and lack of mechanical tooth cleaning for these sites, they are considered to be the most susceptible sites to caries. Resin based sealants and glass ionomer sealants are commonly employed in the practice [9]. Sealing materials are designed in such a way that it would adhere to the tooth surface properly. GI sealants are composed of fluoro aluminosilicate glass powder and an aqueous based polyacrylic acid solution [10]. One major disadvantage of GI based sealants is that it has the ability to get fractured easily due to decreased capacity of withstanding the occlusal load [11].

Resin based sealants have various advantages like good durability while GI based sealants show fluoride releasing properties. Pits and fissure sealants give an intact barrier. Many studies suggest that patients are not under any risk after the application of these sealants. Retention is one of the most important features in pits and fissure sealants. The sealants which are applied before a carious lesion could develop especially in the case of the orthodontic appliance have been successful [12]. The studies reveal that a molar which does not contain sealant is 22 times more likely to develop caries than the molar which is sealed [13]. After one year, effectiveness was found to 83% on the application of pits and fissure sealant.

Numerous clinical trials on the caries preventive effect of fissure sealing, mostly in permanent teeth. Resin based fissure sealing in the molars irrespective of the dentin has reduced the caries effect. Recent study of Cochrane revealed decrease of caries in 3.7% and 29% of children after two and nine years, wherein fluoride varnish was compared with resin based sealants [14]. A clinical study with 360 children with the reduction in caries of 36% when all posterior teeth were sealed and 54% when all the posterior teeth were sealed [15]. Combination of resin based and GI based sealants are found to be more effective. Sealing both the molars and premolars at the initiation of caries could be effective rather than leaving the caries to develop until dentin or pulp. Our team has extensive knowledge and research experience that has translated into high quality publications [16-28, 29-35]. The aim of this study was to assess the maxillary teeth with preventive resin sealant among children with mixed dentition.

Materials and Methods

The study was conducted in a private university setting. A total of 5927 subjects were considered for this study. The main advantage of conducting the study in a university setting is that it aids as a single centre for multiple people from different localities at the same time. On the other hand, the disadvantage of the study is that it does not represent the general population. The inclusion criteria of this study considered that the subjects had to be children within the age group 6 to 12 who had treatment with preventive resin sealant in the maxillary arch were selected. Exclusion criteria includes mandibular arch, primary and permanent dentition. The subjects were chosen at random, inclusive of all genders to reduce and minimise sampling bias. A third examiner reviewed the case records of the collected data to confirm the validity of the data with post operative photographs. The collected data was then tabulated for statistical analysis using SPSS. Descriptive statistics and chi square tests were performed with the significance level at 5% ($p<0.05$). The independent variables of this study were gender and geographic background. The dependent variables were the age of the patient and maxillary teeth treated with pit and fissure sealant.

Results

In this study, based on the inclusion and exclusion criteria, dental treatment records of 5927 children were examined. Around 21.33% of children with 12 years of age had the maximum pit and fissure sealant (Figure 1). Among the cases records analysed, 54% were males and 46% were females within the age range of 6 to 12 years (Figure 2). The permanent left and right first molars treated with the preventive resin sealant were found to be the highest with 34.94% and 36.12% respectively (Figure 3). Both male and female children were commonly treated with resin sealant in first permanent molars which was statistically significant (p value of 0.01)(Figure 4).

Discussion

The study assesses the prevalence of the most commonly affected teeth in the maxillary arch. Premolars were treated very rarely since the number was less when compared to molars. Maximum PRR application procedures are carried out in the permanent dentition with a view to manage early stages of caries successfully. When compared to the previous studies, the present study has focused on caries control between 6-12 years.

Males have a higher percentage of sealants done when compared to females. In another study, 65% of males and 35% of females had the pits and fissure sealants procedure done. Most common affected tooth which is found to be the molars of both the quadrants. Other studies also reveal that molars are the most commonly affected teeth due to their morphology, the accumulation of the bacteria occurs at a faster rate. Hence, maintenance is very important especially for the molars and premolars, it could also be noticed that the number of teeth with deep pits and fissures was reducing as age increases due to the mechanical wear. Thus, pit and fissure sealants application is considered to be effective and should be implemented in childhood itself in order to prevent the caries spread. Most commonly used techniques in controlling caries in mixed dentition seem to be pedo pits and fissure sealant and preventive resin restoration and both are equally effective. Resin based sealants are found to be effective since it has a higher wear resistance [36]. When resin is incorporated into glass ionomer, it becomes resin modified glass ionomer [37]. The setting reaction of this material is based on the photoactivation of the resin component, then the acid reaction for the ionomer component. In general, the main advantage of glass ionomer cement based seal-

Figure 1. This pie chart represents the age of the children whose maxillary teeth are treated with preventive resin sealant. Most of the treated children are likely to be in the age of 12 years (21.33%), 19.62% were 11 years, 16.20% were 10 years, 14.32% of them were 9 years, 13.38% were 8 years, 11.35% were 7 years and finally 3.80% of them belonged to 6 years.

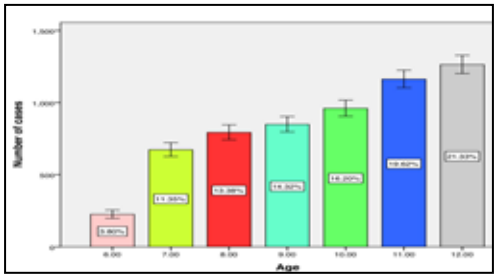


Figure 2. This pie chart represents the gender of the children whose maxillary teeth are treated with preventive resin sealant. Pink colour represents female and blue colour represents male. Nearly more than half of the study population who were treated with preventive resin sealant in their maxillary teeth were found to be 53.57% of males and 46.43% of females.

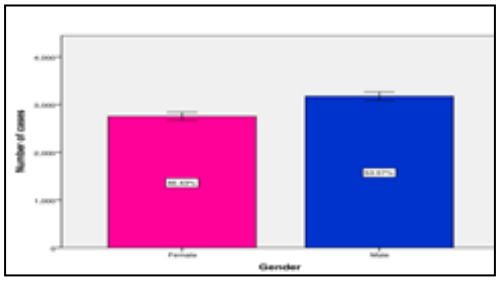


Figure 3. This pie chart represents the count of each tooth number of the maxillary arch treated with preventive resin sealant. The permanent left (yellow) and right (lavender) first molars treated with the preventive resin sealant were found to be the highest with 34.94% and 36.12% respectively. From the pie chart, we can interpret that the maxillary molars of both primary and permanent dentition and also the permanent premolars were commonly treated with the sealants.

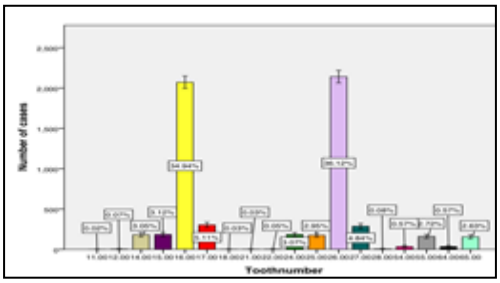
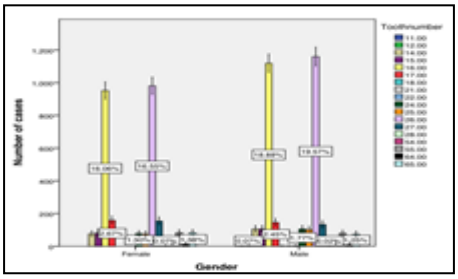


Figure 4. This bar chart represents the comparison of gender with the tooth treated with the sealants. X axis represents the gender and y axis represents the count of the teeth treated with sealant with regards to the tooth number. Permanent first molars were found to be highest. Higher percentage of males were treated than females with 18.88% for left first permanent molar (yellow) and 19.57% for right first permanent molar (lavender), whereas females have 16.06% for left first permanent molar (yellow) and 16.55% for right first permanent molar (lavender). Chi square test shows pearson chi square value of 31.497a and p value of 0.01 ($p<0.05$), hence statistically significant association was seen.



ant due to the continuous fluoride release. It is moisture friendly and easier to place and is not vulnerable to moisture. Hence, provisional sealant can be replaced with resin based sealant for enhanced properties.

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 pedo pits and fissure sealants. The future scope for this study involves the identification of that section of the population where prophylactic management is a necessity and create the need for pit and fissure sealants.

Conclusion

Within the limits of the study, it can be concluded that pits and fissures sealant can be mostly used for mixed dentition which is 6-12 years of age especially both males and females. The common

site to be employed in molars. However, the study has to be expanded beyond the university setting in order to establish the validity of the larger population. Hence, it was found that maxillary molars are commonly treated teeth for pits and fissure sealant for mixed dentition. It is high time, majority of the population realise the application of sealant inorder to maintain good oral hygiene.

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