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EFFECTIVENESS OF FISSURE SEALANTS IN REDUCING EARLY CHILDHOOD CARIES INCIDENCE AMONG PAKISTANI POPULATION. A COMPARATIVE STUDY

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Abstract

Introduction: Early childhood caries affects children and their oral tissues. The methods applicable for the prevention of early childhood caries at a global level are still a long way ahead. Children who display early ECC symptoms, have inadequate dental hygiene, receive minimal fluoride treatment, and are frequently exposed to sugary snacks and beverages are considered high-risk.

Objective: The study aims to assess the effectiveness of fissure sealants in reducing childhood caries incidence among the Pakistani population.

Material and Methods: This comparative study was conducted in one of the Hospitals in Pakistan from June 2022 to December 2022. Almost 120 children belonging to age group 2-5 years were randomly selected for the evaluation procedure. Data was analyzed by using SPSS 23.0.

Results: The results of the study revealed that group of children belonging to the age group 2 to 5 years, the retention rate was 100% after two months, 100% after four months, 88% after six months, 96% after eight months, and 94% after ten months.

Conclusion: The study proved that fissure sealants are effective in reducing early childhood caries.

Keywords: Early childhood caries, Fissure sealants, Preventive Dentistry

Introduction

Early childhood caries is a major global public health issue [1]. Even though it is preventable, unfortunately, many children from all around the world, including Pakistan, suffer from this high-incidence chronic disease [2]. Hence it is a complex and multifactorial disease. According to the American Academy of Pediatric Dentistry, early childhood caries is defined as "The presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth" in a child under the age of six [3]. Early childhood caries usually initiates early and progresses swiftly in a child's life, especially in those who are more likely to get dental caries. Dental pain and loss can negatively affect mastication and phonetics, which are reflected in preschoolers' overall health-related quality of life [4]. Furthermore, in young children it becomes difficult to treat; in certain situations, sedation or general anesthesia is required for dental treatment, which can be costly, time-consuming, and problematic [3]. Risk factors for early childhood dental caries include low socioeconomic level, poor diet high in sugar, lack of parental awareness of oral health, overnight bottle-feeding, and limited access to dental care facilities [4]. Moreover, it is associated with plaque buildup which causes serious challenges in maintaining adequate dental hygiene due to overcrowding, different tooth shapes, or misalignment [5]. Risk factors for early childhood caries have also been identified, including physical disability, decreased salivary flow, crowding from extra teeth, cleft lip or palate, and medical diseases or syndromes linked to enamel hypoplasia [6]. A study conducted in China found that 40.1% (n = 269) of children had severe early childhood caries. The mean DMFT (decayed, missing, and filled permanent teeth) was 7.72, and caries were left untreated in over 99% of cases. The study also revealed that increased age and lower socioeconomic status were significantly correlated with higher early childhood caries prevalence [7]. Early childhood caries is more likely to develop in the distinct structure of fissures that create ideal environments for bacteria to thrive, making oral hygiene practices more difficult and leading to plaque accumulation [8]. To prevent early childhood caries in these specific areas, it is recommended to use fissure sealant as a protective barrier against plaque buildup. This sealant acts as a physical barrier, especially in deep and narrow pits and fissures [9]. Additionally, fissure sealants are commonly used as a primary preventive strategy in dentistry [10]. A literature review has revealed that different strategies have been adopted in different countries of the world such as awareness regarding dental education, school oral health programs, salt, water fluoridation, and fissure sealants with outstanding success [11]. To minimize the incidence of early childhood caries, it is essential to investigate the effectiveness of fissure sealants in reducing early childhood caries. The purpose of this study is to provide insight into the real early childhood caries situation among the population of Pakistan. The findings obtained here would likely be useful in implementing the usage of fissure sealants to prevent early childhood caries among the population of Pakistan.

Objectives

The study aims to assess the effectiveness of fissure sealants in reducing childhood caries incidence among the Pakistani population.

Material and methods

This comparative study was conducted in one of the Hospitals in Pakistan from June 2022 to December 2022. Approximately 120 children were randomly selected from the hospital. The inclusive criteria of the study included any primary tooth of a child belonging to the age group 2-5 years, or younger that has one or more decayed (non-cavitated or cavitated), missing (due to caries), or filled tooth surfaces and those children whose parents were unwilling to participate were excluded from the study.

Data collection

A structured questionnaire was used to collect the data from the parents of the children suffering from early childhood caries regarding their socio-demographic details and oral care-seeking behavior. The

questionnaire consisted of open-ended questions so that all the participants could express their views. Required probes were used to detect early childhood caries among the children. The parents were informed regarding the aim and objective of the study. The parents were ensured regarding the confidentiality of the data. informed assent was filled from the parents and they were also informed that they could refuse to participate in the study during the study.

Statistical analysis

Data was collected and analyzed using IBM SPSS 23.0.

Results

The analysis of the 120 children belonging to the 2-5 years age group was done. The 200 teeth among 120 children were randomly selected out of which 61 were maxillary incisors, 40 were mandibular incisors, 51 were maxillary incisors and 48 were mandibular incisors as shown in Table 1.

Table 1 Selection of teeth (n=120)

Sample teeth	Number of teeth	Age group
200	Maxillary incisors=61 Mandibular incisors=40 Maxillary molars=51 Mandibular molars=48	2-5 years

Table 2 Fissure Sealants Retention Rate among (2-5 years) children

Time duration	Number of children	Number of teeth	Sealant Retention Rate
Baseline survey	80	141	141 (100%)
1st month	73	131	131 (100%)
2nd month	54	91	91 (100%)
4th month	71	110	110 (100%)
6th month	62	80	71 (88%)
8th month	67	82	79 (96%)
10th month	63	71	67 (94%)

Table 3 Comparison between Treated and Control group

	Treated Group			Control Group		
Duration	**Teeth Examined**	**Carious Tooth**	**Retention rate of fissure Sealants**	**Teeth Examined**	**Carious Tooth**	**Retention rate of fissure Sealants**
Baseline	141	0	100%	141	0	100%
1st Month	131	0	100%	131	0	100%
2nd Month	91	0	100%	91	0	100%
4th Month	110	0	100%	110	0	100%
6th Month	80	2	97%	80	16	80%
8th Month	82	9	89%	82	21	74%
10th Month	71	8	88%	71	24	66%

Table 4 Sample t-paired Test

Age Group	Groups	Mean	Standard Deviation	Significance
2-5 years	Treated Group	93.23	4.12	0.041
	Control Group	81.32	18.09	

Discussion

In the study, the effectiveness of fissure sealants in reducing early childhood caries has been analyzed. Pit and fissure sealants are effective in preventing oral healthcare strategies, effectively reducing the occurrence and advancement of early childhood caries. Hence, fissure sealants are applied to the pits

and fissures of the teeth, creating a protective barrier against harmful bacteria and acids. They are particularly effective in children and adolescents, who may have difficulty maintaining proper oral hygiene and are at a higher risk for developing cavities [12]. By preventing decay in these vulnerable areas, sealants can help preserve the natural structure of the teeth and avoid the need for more extensive dental procedures in the future [13]. Overall, pit and fissure sealants are a valuable tool in promoting good oral health and preventing dental problems before they arise. The surface characteristics of these sealants, such as viscosity and tension, play a crucial role in their ability to penetrate [13]. By applying sealants, the colonization of germs in the area is prevented, and the penetration of fermentable food waste in the pits and cracks is inhibited [14]. The fissure sealant's success is determined by the material qualities, the practitioner's attention to isolation, and the proper application of the material on the fissure [15]. According to a recently published systematic study by the American Dental Association and the American Academy of Pediatric Dentistry (2016), sealants are safe and effective in preventing or stopping the advancement of tooth decay, in contrast to fluoride varnish therapy [16]. The effectiveness of preventive measures decreases when parents of young children do not cooperate or demonstrate an understanding of the risks. Deep pits and crevices pose a greater challenge for the sealing substance to penetrate [17]. As the viscosity of the material increases, it becomes more difficult to penetrate pits and fractures, resulting in reduced retention. Additionally, the material's performance impacts the thermal expansion coefficient, polymerization shrinkage, and surface tension [18]. The current research suggests that sealing primary teeth with fissure sealants is a highly effective method for preventing early childhood caries. There are some limitations to this research that need to be addressed. Firstly, a larger sample size of children should have been included in the study. Additionally, the period of the study should have been extended. Another limitation to consider is the age range of the children involved in the study, which was limited to those between the ages of 2 and 5 years. We strongly advocate for the use of pit and fissure sealants as a beneficial treatment. The primary recommendations state that sealing pits and fissures of primary teeth is a safe and effective method to protect and preserve the teeth. Therefore, dentists should be encouraged to apply fissure sealants. Our findings lead us to the conclusion that sealant treatment reduces and prevents Early childhood caries.

Conclusions

The study has concluded that the effectiveness of fissure sealant applications in reducing early childhood caries cannot be neglected. It's critical to keep in mind that several variables affect their retention, and that success will rise when the proper conditions are met.

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