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Evaluation of effectiveness of Flowable composite as a pit and fissure sealants- A 12-month follow-up study.

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Abstract

Pit and fissure surfaces are at greater caries risk than smooth surfaces for both permanent and primary teeth. As sealants are primarily used to prevent tooth decay in pits and fissures, it can be assumed that they are most effective in populations in which smooth surface tooth decay is under control. Because the majority of tooth decay occurs on the occlusal surfaces, sealants are one of the most important measures available in the prevention of tooth decay. So the study aimed to compare the effectiveness of flowable composite as pit and fissure sealant.

Keywords*: Dental caries, Pit and fissure, Pit and fissure sealants, Flowable composite*

Introduction

Tooth surfaces with pits and fissures are particularly vulnerable to caries development. **[**1**]** Ripa et al. (1973) observed that although the occlusal surfaces represented only 12.5% of the total surfaces of the permanent dentition, they accounted for almost 50% of the caries in school children. This can be explained by the morphological complexity of these surfaces, which favours plaque accumulation to the extent that the enamel does not receive the same level of caries protection from fluoride as does smooth surface enamel. **[**2**]**

Dental sealants are preventive dental treatment where pit and fissure of primary or permanent molar and premolar are filled with plastic material. **[**3**]** Fissure sealant is a preventive treatment which prevents the early intervention of dental caries before it reaches to end-stage called as 'hole' or cavitation. Aim of pit and fissure sealant is to prevent developing caries which is achieved by blocking the surface and prevents bacteria from getting stuck to it. **[**4**]**

Dental sealants are resin or glass ionomer cement (GIC)-based flowable materials, which are applied to occlusal surfaces of the teeth as a preventive measure to prevent the teeth from developing caries, especially in children, and to those teeth which are more prone to dental caries. **[**5**]**

Today, there are multiple commercially available sealant materials, including resin-based sealants, such as urethane dimethacrylate or bisphenol A-glycidyl methacrylate monomers that are polymerized by means of either a chemical activation-initiation or a light activation system. Glass ionomer cements are another type of sealant material that have been widely recognized and used for their fluoride-release properties. **[**6,7**]**

A variety of factors plays an important role in the success and failure of sealant therapy such as microleakage at the sealant/tooth interface, wear, and abrasion resistance, the expertise of the clinician and most important is the cooperation of the patient. **[**8**]** In pediatric dentistry, maintaining isolation is the most difficult task to perform during the process of sealant therapy as due to lack of cooperation of the pediatric patient. Thus, inadequate isolation increases the risk of microleakage and subsequent treatment failure. Therefore, use of bonding agents such as self-etching and self-adhering systems has become popular due to the easier application and fewer working steps. **[**9**]** This study aimed to compare the effectiveness of flowable composite as pit and fissure sealant.

Methodology

The study was conducted in private dental clinic after obtaining parental consent. The present study 50 completely erupted caries free permanent mandibular first molar in 25 children of age 6-10 years were included in the study. Partially erupted teeth and teeth with cavitations or with any pathology were excluded from the study. All teeth were isolated with rubber dam and then divided into two equal groups:

Group I (Conventional Sealant):

The occlusal enamel surface of all specimens was etched using 37% phosphoric acid for 20s, and then etched surface was rinsed and air-dried for10 s. Bonding agent (Restorite Bond 5G) was applied on the occlusal fissures of previously etched surface (37% phosphoric acid) for 15 s using a microbrush. The occlusal surface of teeth was air-dried for 5s to evaporate the solvent and light cured for 20 s using light curing unit. PF seal (Prevest Denpro) sealant was then applied on the fissure and cured for 20 s according to manufacturer's instructions.

Group I (Flowable Composite as Sealant):

The fissures were etched using 37% for 20s then rinsed for 10s using air water spray of the three-way syringe and dried using oil-free compressed air with a hand pump air pressure syringe. Bonding agent (Restorite Bond 5G) was applied on the occlusal fissures of previously etched surface (37% phosphoric acid) for 15s using a microbrush. The occlusal surface of teeth was air-dried for 5s to evaporate the solvent and light cured for 20 s using light curing unit. Fusion Flo (Prevest Denpro) flowable composite as sealant was applied on the fissure and cured for 20 s according to manufacturer's instructions.

All teeth were clinically evaluated for retention after 6 months and 12 months of application. The retention rate was assessed based on the criteria proposed by Simonsen; **[**C: complete retention, P: Partial retention, M: Missing (no retention)**]**.

Result

The study was performed on 50 young permanent mandibular first molar teeth divided into two equal groups; Conventional pit and fissure group and flowable composite group. All patients were clinically evaluated for retention after 6, 12 months of application and retention was assessed based on Simonsen's criteria. Both groups shown complete retention after 6 months interval (Table no 1). On 12-month evaluation 4 teeth shown partial retention whereas 2 teeth so completely missing sealant in group I and all tooth of group II shown complete retention (Table no. 2). Intergroup comparison of both the

group at 6-month interval showed no statistically significant difference but a statistically significant difference was seen in 12-month interval with p< 0.05. (Table no 3, 4).

Table no 1: Retention at an interval of 6 months				
Groups	**N**	Retention at 3 months No. (%)		
		Complete	Partial	Missing
Group I	**25**	25 (100%)	0	0
Group II	**25**	25(100%)	0	0

Table no 2: Retention at an interval of 12 months				
Groups	**N**	Retention at 3 months No. (%)		
		Complete	Partial	Missing
Group I	**25**	19 (76%)	4 (16%)	2 (8%)
Group II	**25**	25 (100%)	0	0

Table no 3: Intergroup comparison for retention score at an interval of 6 months				
Groups	**N**	Mean	SD	P value
Group I	**25**	1.0000	0.0000	> 0.05
Group II	**25**	1.0000	0.0000	

Table no 4: Intergroup comparison for retention score at an interval of 12 months				
Groups	**N**	Mean	SD	P value
Group I	**25**	0.74	0.05	< 0.05
Group II	**25**	1.00	0.00	

Discussion

This comparative study was conducted to evaluate the efficacy of conventional fissure flowable composite as pit and fissure sealant in young permanent teeth. In present study it was observed that the flowable composite was superior to conventional pit and fissure sealants in terms of retention.

The study sample comprised of children between 6-10 years of age. Teeth chosen for sealant application were first permanent mandibular molars in each subject. Children of this age group were chosen as first permanent molars erupt by the age of six years and show high incidence of caries soon after eruption. First permanent molars were chosen as their occlusal surface is most frequently attacked by dental

caries.[10] Retention of sealants was evaluated using Simonsen's criteria after three and six months. Simonsen's criteria of sealant retention was used due to simplicity, convenience, good reliability and high validity.[11]

In present study it was observed that the flowable composite were superior to conventional pit and fissure sealant this could be attributed to elasticity, adaptation, and favourable handling characteristics of flowable composite with minimized polymerization shrinkage; this enhanced mechanical and physical properties of flowable composites and enabled their usage as sealant. Result of our study is in accordance to the study conducted by Singh C et al. (2019). [12]

Conclusion

It was observed from present study that the use of flowable composite as a fissure sealing material can increase the retention rate of sealants compared with conventional sealants.

References

1. Manton DJ, Messer LB. "Pit and fissure sealants: another major cornerstone in preventive dentistry". Aust Dent J 1995 Feb;40(1):22-9.

2. Ripa LW. "Occlusal sealing: rationale of the technique and historical review". J Am Soc Prev Dent 1973 Jan-Feb;3(1):32-9

3. "Dental Health Services Victoria". Retrieved 2014-03-23.

4. Featherstone J.B.D. Dental caries: "A dynamic disease process". Australian Dental Journal, 2008

5. Tomar SL, Reeves AF. "Changes in the oral health of US children and adolescents and dental public health infrastructure since the release of the healthy people 2010 objectives". Acad Pediatr 2009;9:388-95.

6. Pardi V, Sinhoreti MA, Pereira AC, Ambrosano GM, Meneghim Mde C. "In vitro evaluation of microleakage of different materials used as pit and fissure sealants". Braz Dent J 2006 May;17(1):49-52

7. Rani BSK, Viswambharapanicker S, Mattumathody S, Muralidharan A, Dinsha ARN, Saluja P. "Assessment of Shear Bond Strength and Marginal Sealing Ability of Pit and Fissure Sealants: An in vitro Study". J Contemp Dent Pract 2018;19(6):642-646.

8. Avinash J, Marya CM, Dhingra S, Gupta P, Kataria S, Meenu, et al. “Pit and fissure sealants: An unused caries prevention tool”. J Oral Health Community Dent 2010; 4:1-6.

9. Harsha PP, Dhruv KV. “Comparative Evaluation of Marginal Microleakage of Conventional Fissure Sealants and Self-adhering Flowable Composites as Fissure Sealant in Permanent Teeth - An In Vitro Study”. Int J Sci Stud 2017;5(2):36-40.

10. Bhushan U, Goswami M. “Evaluation of retention of pit and fissure sealants placed with and without air abrasion pretreatment in 6–8-year-old children - An in vivo study”. J Clin Exp Dent. 2017 Feb 1;9(2): e211-e217.

11. Simonsen RJ. “Retention and Effectiveness of Dental Sealant After 15 Years”. J Am Dent Assoc. 1991; 122:34–42

12. Singh C, Kaur K, Kapoor K. “Retention of pit and fissure sealant versus flowable composite: An in vivo one-year comparative evaluation”. J Indian Soc Pedod Prev Dent. 2019 Oct-Dec;37(4):372-377.