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Comparative evaluation of microleakage around Yuseal and Fissurit F Pit and Fissure Sealants in permanent teeth: An in-vitro study

Dr. Bhagyashree Bhagwanrao Salunkhe
MDS, Paediatric & Preventive Dentistry, Reader, Department of Paediatric & Preventive Dentistry, Sinhgad Dental College and Hospital, Vadgaon Bk., Pune - 411041, Maharashtra, India
*Corresponding author email: b.salunkhe@rediffmail.com

Dr. Prasad Narayan Jathar
MDS, Paediatric & Preventive Dentistry, Reader, Department of Paediatric & Preventive Dentistry, Sinhgad Dental College and Hospital, Vadgaon Bk, Pune - 411041, Maharastra, India

Dr. Subodh Subhash Purohit
MDS, Oral & Maxillofacial Surgery, Dental Surgeon, Department of Oral & Maxillofacial Surgery, Government Dental College & Hospital, Nagpur

Dr. Devendrapratap Mrityunjay Singh
MDS, Paediatric & Preventive Dentistry, Dental Consultant

Dr. Aniket Rajaram Desai
MDS, Paediatric & Preventive Dentistry, Lecturer, Department of Paediatric & Preventive Dentistry, Sinhgad Dental College and hospital Vadgaon BK, Pune – 411041, Maharashtra, India

Dr. Pratima Rajendra Mokashi
MDS, Paediatric & Preventive Dentistry, Tutor, Department of Paediatric & Preventive Dentistry, Sinhgad dental college and hospital Vadgaon BK, Pune- 411041, Maharashtra, India

***Abstract*---**Background: Deep pits and fissures may cause food retention and lead to caries. For prevention of this, the fissures are sealed using sealants. For successful outcome, the ability of sealants to seal margins is important. The purpose of this in vitro study, is to compare microleakage of YuSeal and Fissurit F sealants. Aim and Objectives: To compare the microleakage around Yuseal and Fissurit F sealants in permanent teeth. 1) To assess degree of microleakage around Yuseal used as sealant. 2) To assess degree of microleakage

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around Fissurit F used as sealant. 3) To compare microleakage around Yuseal and Fissurit F used as sealant. Materials & Methods: 30 selected teeth were designated to groups A and B, with each group consisting of 15 samples. Nail lacquer was coated on all the surfaces except occlusal surface and teeth were inserted in acrylic. 37% phosphoric acid was applied on both the groups. Fissurit F and Yuseal was applied to the teeth in (group A) and (group B), respectively. For 24 hours, the teeth were kept in 1 % methylene blue dye at 37°C. Through the sealed fissures, the teeth were sectioned buccolingually. The sections were visualised under the stereomicroscope, to assess the degree of microleakage. The degrees of microleakage was assessed according to the criteria described by Ovrebo & Raadal. Results: Marginal leakage in the Yuseal group was noted as significantly higher. Conclusion: Fissurit F performed better. Clinical Significance: It helps practitioners have comparative knowledge of these two materials and be aware of the properties of the same, to choose one over the other as minimal literature is found regarding comparison of these two materials.

***Keywords*---**fissurit F, yuseal, microleakage, Pit, fissure sealant.

Introduction

Dental caries is the most common chronic childhood disease. Deep pits & fissures may cause food retention and are difficult to cleanse by routine brushing. It provides a favorable environment for the oral microbes to thrive and form acids from carbohydrates, which leads to demineralization of enamel. Occlusal surface caries is most common dental health problem. Premolars and molars are most susceptible to caries. The high vulnerability of these teeth to caries is because of the anatomy of their occlusal surface. Fluoride has been successful in preventing smooth surface caries. Pits and fissures receive minimal protection from caries by systemic or topical fluoride agents. This ineffectiveness of fluorides in pit and fissure caries may be attributed to the inaccessibility of base of pits and fissures to topical fluorides and enamel thickness.[1] Hence to protect the occlusal surface from pit and fissure caries effectively, sealing the fissures using pit & fissure sealants is advised.[2] For successful outcome, the marginal sealing ability of these materials is important.[3] Lack of good sealing causes passage of fluids, bacteria, molecules and ions through the tooth-material interface. It can prompt carious esion formation underneath the sealant. Considering this, the present study was designed to assess and compare the sealing abilities of these sealants available commercially.[4] Therefore, the aim of this in vitro study, is to compare the microleakage of Yuseal by Anabond Stedman and Fissurit F by Voco used as sealants.

Materials & Methodology

The sample of thirty permanent teeth were obtained from the patients requiring extractions of these for orthodontic reasons and periodontitis. Based on the

following inclusion and exclusion criteria teeth were selected for the study:

Inclusion Criteria

Teeth having occlusal surface intact.

Exclusion Criteria

- Teeth having developmental defect
- Teeth with occlusal surface having caries
- Teeth with gross destruction of crown structure due to trauma or caries.
- Teeth with attrition

Thirty selected permanent teeth were designated to groups A and B using random sampling method, with each group consisting of 15 samples. Scaling was performed on these 30 extracted teeth to remove local factors, were then disinfected with 2% hydrogen peroxide for ten minutes and stored in distilled water. All the surfaces except occlusal surface were coated with nail varnish and teeth will be embedded in acrylic. The etchant (37% phosphoric acid) was applied for 20 seconds on both the groups and was rinsed away thoroughly with water. It was then air-dried for 5 seconds. Fissurit F was applied to the teeth in group A, and Yuseal was applied to the teeth in group B directly from the syringe supplied by the manufacturer, as per instructions given by manufacturer. The materials were subjected to visible light for 30 seconds. The teeth were then placed for 24 hours in 1% methylene blue dye at 37°C.[5] [Figure1,2] Once, the teeth were removed from the dye, they were cleaned and sectioned buccolingually through the sealed fissures using a diamond disc mounted on a straight handpiece. These sections were visualized under the stereomicroscope with a magnification of 10 X to assess the presence and degree of microleakage.[6] [Figure 3]. The degrees of microleakage was evaluated according to the criteria given by Ovrebo & Raadal.[7] Data was subjected to statistical analysis, using Frequency analysis.

Criteria by Ovrebo & Raadal, 1990 Score 0 - No dye penetration
Score 1 - Dye penetration limited to the outer half of the sealant
Score 2 - Dye penetration limited to the inner half of the sealant
Score 3 - Dye penetration into the bottom of the fissure

Figure 1. Teeth sealed using Yuseal and Fissurit F

Figure 2. Teeth immersed in 1% methylene blue dye

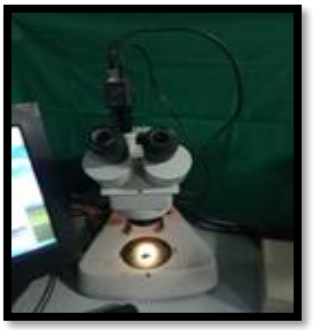


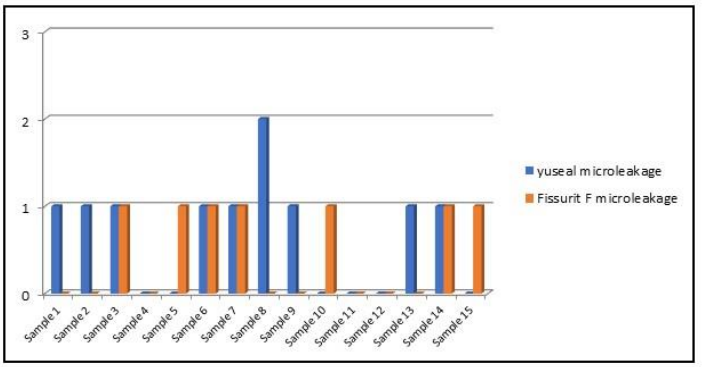
Figure 3. Stereomicroscope

Results

The number of samples from each of the groups A and B, showing scores of 0 [Figure 4a], 1 [Figure 4b] and 2 [Figure 4c] for the degree of dye penetration were counted and tabulated. [Table 1]. The microleakage scores for each sample from both the groups A and B is depicted. [Graph 1]. Based on these results, in Group A 40% samples had score 0, 53% samples had score 1 and 7% samples had score 2. None of the samples showed score 3. In Group B 53% samples had score 0 and 47% samples had score 1. None of the samples had score 2 and 3. The results appeared to show better performance, i.e., lesser microleakage/dye penetration scores with Fissurit F. Subjecting tabulated data to Frequency Analysis also gave the result that Fissurit F has better performance.

Table 1
Comparative scoring for microleakage around Yuseal and Fissurit F

Score	Criteria	Group A (Yuseal)	Group B (Fissurit F)
0	No dye penetration	6	8
1	Dye penetration limited to the outer half of the sealant material	8	7
2	Dye penetration limited to the inner half of the sealant material	1	0
3	Dye penetration into the bottom of the fissures	0	0



Graph 1

Graph 1. Comparative sealing efficacy of Yuseal and Fissurit F

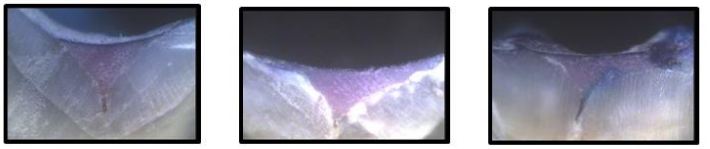


Figure 4 (a) - Section showing Score 0
Figure 4 (b) - Section showing Score 1
Figure 4 (c) - Section showing Score 2

Discussion

Pit and Fissure Sealants play vital role to prevent dental caries. Ideal requisites for sealants are retention, resistance to wear and biocompatibility. Optimal bonding of the sealant with tooth is also very important, because marginal leakage at the interface can lead to failure of the treatment.[8] In the present exploratory study, the marginal leakage using Fissurit F and Yuseal as Pit and Fissure Sealants (in vitro) was assessed and compared with each other. Fissurit F has been studied previously as a pit and fissure sealant and found to be effective. It bonds micromechanically to the tooth structure and has shown good retention rate.[9] It shows flouride release from 24-48 hours. Yuseal, is a comparatively newer material and no studies are reported about its performance. According to Anabond Stedman, Yuseal has chroma technology, flouride release upto 96 hours, 100% enamel wall adaptation, 0% toxicity as approved by FDA and minimal microleakage. Yuseal uses BisGMA-TEGDMA as polymer.

For the successful application of sealants, isolation is very critical in acid etch technique. There is reduced bond strength, if the enamel contaminated with saliva is not washed off thoroughly.[10] Saliva creates an organic film that penetrates into the enamel microporosities caused by acid etching, which interferes with the bonding of the material.[11] Their clinical limitation is in the difficulty of handling the resin sealant in a moist environment. Even after good moisture control during sealant application, contamination can occur. This contamination is the likely cause of sealant failure. Saliva contamination before application of sealant is the most common reason for failure. In present study, Yuseal and Fissurit F were compared on the basis of their marginal sealing abilities i.e. microleakage. However, to study the effectiveness of a sealant, other parameters such as retention, shear bond strength and its integrity must be taken into consideration. Inspite of its limitations, this in vitro study provides some data to encourage further research into the use of Yuseal as a Pit and Fissure Sealant in Paediatric & Preventive Dentistry.

Fissurit F does not have chroma technology and is tooth colored. Hence, difficult to identify on recall appointments. Yuseal is dark pink in color which changes hue to a lighter pink color on curing. Hence, it's better to judge the extent of material while placement and easier to recognize on recall appointments.[12] In terms of viscosity, Fissurit F is more viscous and results in more air entrapment while placement and requires additional effort for adaptation. Flow and adaptation is much better with Yuseal. Lesser viscosity of Yuseal might be because of lesser filler content, which leads to more polymerization shrinkage, hence more microleakage. In present study, there is statistically significant difference between microleakage around Fissurit F and Yuseal, with Fissurit F performing better. Hence, marginal sealing ability of Fissurit F is better than Yuseal is proved. With the studies reported and present study, Fissurit F may be successfully used as Pit and Fissure Sealant. Yuseal although with more microleakage but with other good properties like chroma technology, easy recognition on recall, prolonged fluoride release, better flow and easier and quicker adaptation can be used as an adjunct.

Clinical Significance

- Marginal sealing ability of Fissurit F is better than Yuseal when used as Pit and Fissure Sealant.
- Yuseal has been developed with chroma technology, prolonged fluoride release and better flow.
- This study has been devised to help practitioners have comparative knowledge of these two materials and be aware of the properties of the same, to choose one over the other as minimal literature is found regarding comparison of these two materials.

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