Abstract

**Background:** Tooth decay is usually treated by operating and non-operating way. However; the non-operative process is deemed as better as it is least invasive thus least mediating dentistry came into first. The theory of repeated cycles of restoration that attributed to Elderton attempts to combine the two methods i.e. non-surgical process going to union with restorative method for hygienic practical life. Application of fissure sealant and fluoride have been shown to play an important role in reducing tooth decay. This can be explained through converting the caries susceptible areas like pits and fissures into glazed surface which prohibit bacterial (microorganism) colonization and makes the tooth easy to clean.

**Materials and Methods:** In this review, online research has been used to get articles to current subject using scientific website such as PubMed, google scholar and dental medical books (with English language) at the last 50 years (1968-2018). For a literature review search keywords were used: pit and fissure sealant, fluoride protection, caries risk assessment, and evidence based recommendation for pit and fissure application.

**Results:** The study identified 450 articles from initial search criteria. After study and examine summary the search get rid of essay not connected to the insertion standard. Finally, 62 studies were included.

**Conclusion:** Sealant materials have the ability to be retained in the occlusal surfaces of teeth of children and adolescents, showing a potential effectiveness for caries prevention, their application having deep effects on the dental caries of all tooth surfaces.

**Keywords:** Fissure Sealant; Tooth Prevention; Fluoride; Tooth Re-Mineralization

Introduction

There have been persistent attempts at past decades by dentists to try to prevent tooth decay, especially among children. Methods used to achieve that goal involve such as prophylactic cooperation as early physical blockage of fissure with zinc phosphate cement, mechanical fissure enucleate, innovation odontotomy and chemical treatment with silver nitrate. These method are reviewed periodically by specialists in the field of preventive dentistry to determine the effectiveness of these method in prevention of tooth decay, especially in primary teeth [1-4].

**When did fissure sealant method born?**

Buonocore study was the first attempt to describe enamel bonding by acid etch in 1955 then bonding became modern technology and logical step in pit and fissure sealant to prohibit caries [5]. Thus, resin sealant methods were born [6] and remains as one of the most effective method to prevent one of wide-spread disease that affect humankind. Dental caries is the one mutual inveterate childhood illness.
Decay starts in children shortly after growing of milky teeth and uninterrupted raise at salient rate in their school age.

**When to make application to pit and fissure sealant?**

The food tends to stay and difficult to be reached by tooth brush bristles in routine teeth-brushing especially in deep pits and fissures. It supplies a suitable circumstances for oral microorganism to develop and transform carbohydrate to acid that lead to mineral loos of enamel [7]. The effective method to prohibit decay for pit and fissure can be achieved by efficient covering (sealing) of fissure that called fissure sealant. Sealant has been characterized as a flowable material that applied into pits and fissures of teeth that liable to decay and can bond in a micromechanical way to the occlusal surface of the tooth so that stopping entrance of bacteria responsible of caries to reach their nutritional supply [8]. When comparing the percentage of pit and fissure cavitation, it can be showed that in primary posterior teeth it represented 44% and in permanent posterior teeth it represented 80-90% [9,10]. Decay in pit and fissure that are liable to caries can be minimized through using the sealant. It have been shown that an improving incidence of 86% after 1year and 58% after 4years in a reduction (minimize) of caries activity when implementation the fissure sealant [11-12]. Prior to application of fissure sealant on tooth, it should define and recognize the expected risk of primary and permanent teeth then evaluate the expected good outcomes after fluoride implementation [13]. This can be achieved by professional practitioner that using different methods for indicating morphology of the tooth, diagnosis of clinical situation, history of decay, history of fluoride application and the hygiene condition of oral cavity. When tooth have highest risk caries liability, the implementation of sealant will give greatest good outcome. Rapid treatment using sealant material should take place especially with tooth of high caries susceptibility. On the other hand, there is no need for using sealant material in case of tooth of low risk to decay [13].

**Why fissure sealant act as preventive measure for deciduous teeth?**

Increasing of caries risk may take place due to abnormal patient habits, oral flora changing and in case of patient with abnormal medical or physical conditions. Teeth that have not previously been sealed will be the most beneficiary from application of sealant material [13,14]. With proper case diagnosis and evaluation, fissure sealant material can be applied on teeth revealed initial decay at area of pits and fissures [14]. Some clinical studies have concluded that decay become arrested and caries causative organisms were reduced after period from sealant application and also under sealed margins restorations [15-17]. Cross-sectional studies and questionnaires have revealed that dentists in pediatric field often preferred enameloplasty technique prior to the sealant application [18]. In vitro researches revealed that enameloplasty technique may improve sealant retention [19-22]. On the other hand, some in vivo researches concluded that enameloplasty technique has no effect regarding retention if applied prior placement of sealant material [23,24]. There are different varieties between primary and permanent teeth regarding enamel morphological design, physiological state, mineral content and crystal composition [25-28]. Primary teeth characterized by small enamel thickness and large prismatic layer thickness [26,27]. Also, deciduous teeth considered less resistance to tooth decay and more influenced by chemical effects like erosion. Biocompatibility and general behavior of deciduous teeth toward dental materials are quite different when compared to permanent teeth [29,30]. The most primary teeth affected by dental decay in age between six months to three years are the posterior teeth that represented 81.5% [31]. Due to fear from dentist, most children do not go to dental clinic. Only the pain from dental decay or other reasons may make the children visit to dental clinic compulsory. It has been proven unequivocally that primary teeth decay is closely related to caries that will takes place later to permanent teeth [32]. One clinical study concluded that occlusal surface of posterior teeth in children between age 2 and 3 years was born to teeth decay by 74.5%. This was explained by roughness nature of occlusal surface which was a major reason of food adhesion and found a good shelter for bacteria causing carious lesion [33]. The most advantage of sealant material is that it prevents food collection and adhesion to occlusal surface and also prevents the formation of environment that is favorable for growth of bacteria [34].

**Application of fissure sealant and their bonding mechanism on the tooth**

Controlling prevention of saliva from reaching water-sensitive dental material may be so difficult when dealing with children. Saliva contamination during application of sealant material in children is frequently expected. Consequently, the result will be undesirable if such a problem is not controlled. Sealants are hydrophilic in its nature so it is water-attractive material. The amount of water in tooth subtrate play an important role during sealant material application [35-38]. It was approved that there are varieties in the amount of water presented in both deciduous and permanent teeth that would affect bond strength of sealant material after application [39,40]. A study of Lemos LV, et al. on occlusal surface of posterior primary teeth has shown better bond strength of OptiBond FL than pit and fissure seal-
Factors affecting clinical success of pit and fissure sealant

The clinical success of fissure sealants is highly related to their appropriate application [47]. It is very important to say that to obtain the highest bond strength between sealant material and enamel substrate, it is necessary to maintain the proper drying of enamel surface prior to application of fissure sealant. Any contamination means only increasing of failure rate and de-bonding [48]. Adhesive agents have been used as mediating agents between the enamel surface and the filling. Adhesive systems can be classified into two groups in terms of clinical procedures: etch and rinse and self-etch adhesives. The first system includes phosphoric acid etching and primer/adhesive resin in one bottle, and the second system includes etching and priming solution in one bottle and an adhesive resin or an etch-prime-adhesive as an all-in-one procedure [49]. The published literature indicates that the use of dentin bonding agents before sealant application can be helpful for reducing micro-leakage and increasing the bond strength [48]. In contrast, some papers clarify that administration of a bonding agent before the application of pit and fissure sealants did not increase the bond strength [50]. An easy, rapid and realistic method of evaluating these applications is necessary. Similar results obtained under in vivo conditions by simulating the oral cavity conditions (thermal changes and chewing forces) in a laboratory environment to mimic the natural aging process. Studies investigating the use of adhesive systems prior to fissure sealant placement are still few in the literature, and the existing works have shown controversial results [51-55].

Effect of pit and fissure sealant on tooth and retention on primary and permanent tooth

Pit and fissure sealants have been considered an effective caries prevention material. Most studies regarding sealants type have described their effectiveness on the permanent dentition in the primary dentition [3,15]. Children aged 5 to 9 years are estimated to average 5.3 decayed or refilled surfaces (dfs) and 2.5k decayed or filled teeth (dfi). With children aged 5 having an average of 4.0 decayed or filled surfaces and 2.2 decayed or filled teeth [56]. This suggests that the majority of tooth decay occurs shortly after eruption. There is no enough information on the status of caries prevalence of the primary dentition of children younger than 5 years. Thus, data for caries susceptibility of the primary occlusal surfaces are not available for children with recently erupted primary molars. However, the 1979-80 National Institute for Dental Research (NIDR) survey showed that 54% of caries in the permanent dentition occurred on the occlusal surfaces and 29% occurred on bucco-lingual surfaces [56]. The National Preventive Dentistry Demonstration Program [57] showed that 54% of permanent teeth caries occurred on the occlusal surfaces and 35% occurred on bucco-lingual surfaces. Based on these data, 83% to 89% of caries in the permanent dentition of children aged 5 to 17 years occurs in tooth surfaces with pits and fissures. Although corresponding data for the primary dentition are not available, it may be inferred that the prevalence of caries by tooth surface for primary teeth with occlusal morphological structure similar to that of the permanent dentition approximates that of permanent teeth. If this inference is correct, then 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. When sealant application is coupled with the various methods of fluoride delivery, tooth decay can be almost eradicated in a target population. A recent study [32] showed that early caries can be arrested by the application of sealant over affected tooth surfaces. Thus, the placement of sealant over existing incipient carious lesions is not a
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.

Conclusion

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.

Bibliography


Pit and Fissure Sealants in Pediatric Dentistry


**Citation:** Amal Saleem Safar Alharthi and Ahmed Mohamed Elmarakby. "Pit and Fissure Sealants in Pediatric Dentistry". *EC Dental Science* 18.5 (2019): 872-878.
Pit and Fissure Sealants in Pediatric Dentistry


Volume 18 Issue 5 May 2019
©All rights reserved by Amal Saleem Safar Alharthi and Ahmed Mohamed Elmarakby.