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RESEARCH ARTICLE

FLUORIDE RELEASING AND COLOURCHANGING PIT AND FISSURE SEALANTS – a review.

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Abstract

Aim- to review about the colour changing and fluoride releasing pit and fissure sealants.

Background- dental caries is the most important and the most common intra oral disease that is seen both in children and adults. This being the era of preventive dentistry, the main aim of the dentist is to prevent the teeth from any carious involvement. Earlier, two main methods prophylactic restoration and prophylactic odontotomy were used in the management of pit and fissure caries. It is even possible to establish a caries free dentition in childhood with the increasing advancements in pit and fissure sealants. This article mainly aims to review the recent advancements in pit and fissure sealants like color changing sealants, fluoride releasing sealants and resin based sealants.

Reason- to understand more about the colour changing and fluoride releasing pit and fissure sealants.

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Introduction:-

Dental sealants are preventive dental treatment where pit and fissure of primary or permanent molar and premolar are filled with material thereby preventing caries [1]. Aim of pit and fissure sealant is to prevent developing caries which is achieved by blocking the surface and prevents bacteria from getting attached to it [2]. Deep pits and fissures favor food retention and are difficult to clean by routine brushing. It provides a favorable environment for the oral microorganisms to thrive and convert the carbohydrates to acids, leading to demineralization of the enamel. [3]

Previously, during the early 1920s two main procedures were done for the management of pit and fissure caries, they are prophylactic restoration and prophylactic odontotomy. Which was later followed by Kline and Knutson who discovered treatment of pit and fissure caries with ammoniacal silver nitrate and Bowen RL et al who discovered Bis-GMA (Bisphenol A - Glycidyl Methacrylate) a resin sealant material. Thus, resin sealant methods were born [4].

Sealants are the most effective clinical technique to prevent pit and fissure caries. The cost effectiveness of sealants, naturally, is based upon sealant retention. While the rates of sealant retention on occlusal surfaces are relatively high at five years, [5-8] sealant retention for buccal and lingual pits and fissures of molars is considerably lower [9].

A recent, significant development with resin based sealants is the development of moisture-tolerant chemistry. In the past, isolation and exclusion of moisture with resin-based sealants was required. A moisture tolerant, resin-based sealant does not require an additional bonding agent [10-12].

Discussion:-

Indications and Contraindications of Pit and Fissure sealants

The main indications of application of pit and fissure sealants are deep retentive pit and fissures and stained pit and fissures. Patients which have a very poor plaque control and patients undergoing orthodontic treatment. Other indications of application are no evidence of proximal caries[13].

The contraindications are mainly partially erupted teeth without any adequate moisture control and in teeth where isolation is not possible[14].

Generations of pit and fissure sealants

FIRST GENERATION	UV cured pit and fissure sealants
SECOND GENERATION	Chemically cured pit and fissure sealants
THIRD GENERATION	Visible light cured pit and fissure sealants
FOURTH GENERATION	Fluoride releasing sealants

Fluoride releasing pit and fissure sealants:-

The primary approach in prevention of dental caries comprises of use of pit and fissure sealants. Fluoride from the sealants reduces demineralization and enhances remineralization, thus helping to the prevent initiation and progression of caries[15]. Fluoride releasing sealants are commonly used in dental treatment as a primary preventive measure against caries[16]. The focus of most sealant studies is the occlusal surface of permanent teeth. Permanent molars have been selected as teeth most at risk for occlusal caries and thus, the teeth that most benefit from sealants. This perspective comes from population data. It reflects the realities of “normal” tooth anatomy and thus average susceptibility to caries. It does not account for individual differences among patients and among teeth[17].

Fluoride is incorporated into resins by two ways-

the first utilizes a soluble fluoride salt which, after application, dissolves releasing fluoride ions, which may compromise the integrity of the resin[18]. This method has been questioned, because fluoride release resulting from the dissolution of a soluble salt might weaken the sealant and thereby might reduce its usefulness as a preventive agent[19]. The other system uses an organic fluoride that is subsequently released by an exchange with other ions in the system[20]. In this method (anion exchange systems), fluoride constitutes only a small amount of the total structure, and is replaced rather than lost. Thus, there should not be any significant decrease in the strength of the sealant[19]. The addition of fluoride to pit and fissure sealants was considered more than 25 years ago[20,21] but did not prove that they reduce caries as they were poorly retained on the tooth surface.

The properties of a fluoride containing sealant that the conventional sealants did not have are better retention rates when compared to the conventional, constant fluoride release for a prolonged period of time and the ability to function as a reservoir of fluoride ion for enamel and to promote fluorapatite formation in enamel[22].

Colour Changing Sealants:-

In March of 1977, the first colored sealant (3M's Concise White Sealant) was introduced to the market. The advantages to a color as long as it is esthetically acceptable. It is easier to see the sealant during application, and it is much retention. Faster and easier to assess with a white sealant than with a clear sealant at later time intervals.[23] While a Helioclear material, which changes color from clear to green when exposed to a visible light has some clinical utility, particularly on subsequent follow-up examinations when clear sealant is very hard to see, it is hard to understand any benefit to dentist or patient of the Clinpro material that changes color from pink to white on polymerization. The combined identification error rate for opaque resin was only 1%, while for clear resin it was 23%. Significant differences were also found in the accuracy with which the 3 dentists identified each type of resin. The most common error was to identify the presence of clear resin on an untreated tooth.[24] This study raises questions about the accuracy of studies done with clear resin.

Conclusion:-

Of all the surfaces of the tooth pit and fissures are very much susceptible to caries and hence pit and fissure sealants help mainly to prevent caries and also are cost effective. Fluorides in the pit and fissure sealants reduce enamel solubility and stimulate remineralization thereby reversing the course of caries in the early stages itself.

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