

Knowledge Analysis of Pit and Fissure Sealants among the Dental Students of South India

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INTRODUCTION

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. These are basically the first line of defense against caries. The pit and fissure sealants are mostly fluorinated to perform better in caries prevention. Dental sealant programs typically target students in the second grade, when the first permanent molars have generally erupted, and in the sixth grade, when the second permanent molars have generally

erupted.^[1] Since 2000, the prevalence of dental sealants among 8-year-old children and 14-year-old adolescents has increased.^[2]

Pit and fissure caries account for approximately 80%–90% of all caries in the permanent posterior teeth and 44% in the primary teeth.^[3] Pit and fissure sealant acts on the susceptible teeth by micromechanically bonding to the tooth preventing access by cariogenic

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ABSTRACT

Aim: This study aimed to assess the level of knowledge and attitudes for pit and fissure sealants among undergraduate Indian dental students.

Materials and Methods: A modified questionnaire consisting of 24 items was distributed to 280 undergraduate dental students comprising males and females of different years at MNR Dental College, Sangareddy, India. Descriptive statistics and Chi-square/Fisher's exact tests were used for statistical analysis. The data were computationally tested using Statistical Package for the Social Sciences (SPSS) Version 20, IBM SPSS Statistics software for Windows, Armonk, NY, USA.

Results: With the response rate at 100%, most of the respondents, i.e., 70.4%, were females and the remaining 29.6% were male. Regarding the level of study, 20.8% were in 3rd year, 43.8% in the 4th year, and 16.8% were in 5th year (internship). The respondents showed a reasonable level of knowledge about sealants, mostly being good with the theoretical concepts of the sealants. On the other hand, respondents showed insufficient knowledge about sealants in the clinical practice.

Conclusion: Although a high proportion of undergraduate dental students showed adequate knowledge about dental sealants, there is a lag in putting that knowledge into work during the clinical practice. These findings suggest an urgent need of dental schools to include and/or update their curriculum regarding fissure sealants to reflect modern dental education that concentrates on evidence-based practice in pediatric dentistry and improve the dental health among the future generations by reducing the incidence of caries.

KEYWORDS: Dental students, knowledge, pit and fissure sealants, prevention

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bacteria to their source of nutrients, thus reducing the risk of caries in those susceptible pits and fissures.^[4]

Dental caries is among the most common of preventable childhood infections, and methods are currently available to cost-effectively reduce caries.^[5,6] The most effective method to reduce occlusal caries is pit and fissure sealants, and over the last 4 years, more than 11 guidelines and systematic reviews have recommended pit and fissure sealant use for at-risk populations.^[3,7-16] The caries prevalence is related to the form and depth of pits and fissure.^[17]

Sealants are effective in reducing occlusal caries incidence in the permanent first molars of children, with caries reduction of 76.3% at 4 years, when sealants were reapplied as needed. Caries reduction was 65% at 9 years from initial treatment, with no reapplication during the last 5 years.^[18] Dental sealants were introduced in the 1960s to help prevent dental caries in the pits and fissures of mainly the occlusal tooth surfaces.^[19] This study aimed to assess the level of knowledge, attitudes, and practices of placing the pit and fissure sealants among undergraduate dental students.

Along with resin-based sealants, other sealant materials are available; the main type consists of GIC (combination of silicate and polyacrylate cement system). GIC contains fluoride and is thought to prevent caries through fluoride release over a prolonged period. GIC may be used as the original chemically cured type or as the light-cured type, which is modified with resin, for example, for rapid initiation of the curing process. Novel materials called compomers, which were introduced in the 1990s to combine benefits of resins and those of GIC, have also been applied as sealants. Allergic reactions to sealant materials are possible but rare.^[20]

MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted using a self-administered questionnaire involving different levels of undergraduate dental students including male and female at MNR Dental College and Hospital, Sangareddy, India. These questionnaires were sent to 280 undergraduate dental students, selected randomly from MNR Dental College, Sangareddy, India. The study was conducted in full accordance with the declared ethical principles of the World Medical Association Declaration of Helsinki (2002). Before the commencement of the study, patient consent was taken and approval from the institutional review board was attained (IEC No.: ECR/269/Indt/TG/2016).

The survey was administered during December 2017 and the self-administered questionnaire was adapted from

pretested questionnaires that have been applied in similar studies.^[2,12] Before distributing the questionnaire, a pilot study was performed on a random sample of undergraduate dental students ($n = 20$), and the questionnaire was modified according to the feedback obtained.

The sample size was calculated based on the formula $n = za^2 pq/d^2$, where za is the normal standard variable value (2 for 94% confidence interval), P the prevalence, q the alternative prevalence, and d the permissible error in prevalence rate. The first section of the questionnaire sought demographic data of the participants including age, gender, qualification, and year of undergraduation. The second section included questions that focused on the dental students' knowledge and practices regarding fissure sealants. Qualitative data were presented as frequencies and percentages, and the outcomes were analyzed by Chi-square test.

RESULTS

A total of 280 questionnaires were distributed and collected, giving a response range of 100%. Of these, 83 (29.6%) were male and 197 (70.4%) were female. Regarding the level of study, 30.5% were in the 3rd year, 35% were in the 4th year, and 34.5% were in the 5th year (internship) [Table 1].

Most of the respondents thought that the effectiveness of dental sealants is supported by strong scientific evidence (91.2%). Furthermore, 85.75% were familiar with the technique of placing dental sealant and 90.6% ensured that they understand the instructions for placing sealants, with no statistically significant differences between male and female students. On the flipside, there was a significant difference between male and female students when they were asked whether sealant should only be used on newly erupted teeth, as 74.2% of male students compared to only 36.7% of females agreed with that opinion. Nearly similar results were reported about the expected adverse effects that might occur after using pit and fissure sealant (58.3% male, 31% female, and $P = 0.000$). Around 68.3% of the respondents agreed that resin sealants are more effective than glass ionomer sealant with not so significant difference between males and females.

Table 1: Demographic data of the subjects (n=280)

Variables	n (%)
Gender	
Male	83 (29.6)
Female	197 (70.4)
Year of undergraduate	
3 rd year	30.5
4 th year	35
5 th year (internship)	34.5

No statistically significant differences were reported between male and female respondents regarding the other items. The vast majority (89.4%) agreed that the most important aspect to the success of the treatment is the technique of application. 91.8% of the respondents accepted that proper etching is required for high adhesion of the sealant to the tooth surface. 75.1% thought that sealant is a preventive method and also has a restorative effect and can be used on incipient caries, and about 77.7% believed that sealing technique, when used alongside fluoride application, may reduce the rate of decay more significantly. This is summarized in Table 2.

Regarding fissure sealants' practices, only 12.1% of the students reported that they always avoid dental sealant for the possibility of sealing over caries. More than half of the

respondents (56.3%) recommended reapplication of sealant in case of partial or total sealant loss. Around 68.8% of the respondents reported that they always clean the tooth surface before the placement of fissure sealant, and 70.9% follow the manufacturer's instructions [Table 3].

DISCUSSION

This study evaluated the knowledge, attitudes, and practice of pit and fissure sealants among undergraduate dental students of MNR Dental College and Hospital, India. The importance of pit and fissure sealants is undermined in India, which has to be revisited with great interest and good efforts.

Although the students participated in this study showed good knowledge regarding the pit and fissure sealants in

Table 2: Knowledge, opinions, and attitudes regarding fissure sealant by gender

Questions	Gender		Total (%)	P
	Male (%)	Female (%)		
Do I think that the effectiveness of dental sealant is supported by strong scientific evidence?	93.5	88.9	91.2	NS
Am I familiar with the technique of placing dental sealant?	84.1	85.4	85.7	NS
Do I understand the instructions for placing sealants?	92.5	87.6	90.6	NS
Should the sealant only be used on newly erupted teeth?	74.2	36.7	59	0.000
Do the sealants wear out easily?	67.7	52.9	61.8	NS
Do pit and fissure sealants have an adverse effect?	58.3	31	47.2	0.000
Is the technique of application is the most important aspect of the success of the treatment?	84.6	94.3	89.4	NS
Are resin sealants more effective than glass ionomer sealant?	65.9	70.8	68.3	NS
Is applying proper acid etching to get high adhesion recommended?	89.1	94.5	91.8	NS
Do I think, the sealant is a preventive method, as well has a restorative effect, and can be used for incipient caries?	71.1	81.1	75.1	NS
Do this sealing technique, when used alongside fluoride application, may reduce the rate of decay more significantly?	73.3	84.3	77.7	NS

NS=Not significant

Table 3: Questions regarding fissure sealants practices

Questionnaire	Always (%)	Sometimes (%)	Rarely (%)	Never (%)
Do I sometimes avoid dental sealant for the possibility of sealing over caries?	12.1	35.3	37.5	15.2
In case of partial or total loss of sealant, would I recommend reapplication?	56.3	39.2	2.7	1.8
Is the most important factor for adhesion to occur in sealant placement is proper isolation?	69.3	28.4	1.8	0.4
Is the most important factor for adhesion to occur in sealant placement is proper acid etching?	67.3	30.9	1.3	0.4
Is the benefit of using sealant should be considered with regard to the patient's risk?	65.0	27.8	5.4	1.8
Do I clean the tooth surface before placement of fissure sealant?	68.8	25.8	3.6	1.8
Do I follow the manufacturer's instructions for placing light cure on tooth while putting sealant materials?	71.8	26.5	1.8	0
Do I apply bonding agent after acid etching on the occlusal surface?	56.4	28.4	4.1	11.0
Do I use a rubber dam at the time of placing fissure sealant?	30.7	40.6	26.8	1.8
Do I use conventional ways such as cotton rolls to isolate adjacent soft tissue while placing sealant?	60.6	34.5	3.5	1.4
Do I put an extra amount of sealant in pits and fissure to reach the maximum retention?	67.6	27.9	3.6	0.9
Do I repeat doing fissure sealant if a technical mishap has occurred?	53.6	38.3	6.8	1.4
Do I apply prophylaxis paste without fluoride before placing sealant?	49.1	34.5	9.1	7.3

the theoretical aspect, their clinical knowledge was not up to the mark, which is a serious issue. The knowledge gained during their undergraduate level should be put forth in a right direction to the clinical practice for the overall benefit of the patients.

The most surprising result of the study was that around 8.4% of the undergraduate dental students reported that they suffered from lack information about the fissure sealant, indicating that a considerable percentage of the students are unaware of fissure sealant importance in the dental field. This shows us the condition of dental students not just in one particular college but also a country in whole. This leads to the point that the students must be educated properly imbining them with evidence-based practice (EBP) in the pediatric dentistry and public health dentistry. In this era of modern dentistry, it is important to integrate the principles of evidence-based dental practice into the dental curriculum.^[16-18] In this study, around 8.8% of the students were concerned about insufficient evidence of fissure sealant effectiveness, a finding that underscores the importance of teaching EBP to dental students education courses.^[13] The students showed the understanding that the pit and fissure sealants have a scientific basis that they are quite effective. Most of the students even showed the familiarity with the sealant placement procedure. These findings are consistent with previous studies.^[2,12-14]

Over three-fourths of students (77.7%) preferred using sealant along with fluoride and strongly believed in their synergistic effects to reduce dental caries; a similar result was observed by Al-Maweri *et al.*^[21] Research has shown that using fluoride before sealant application may increase caries protection, without compromising properties of the sealant. In addition, the addition of fluoride to a sealant has been reported to be cariostatic to enamel area.^[4,19] In this study, we observed some significant differences between males and females where male students showed better knowledge and attitudes compared to their female counterparts whereas the females showed better practical knowledge compared to males. It is important here to mention that most of the students follow the manufacturer's instructions in using the light for curing the sealants, with none of them saying that they would not use the curing light. It should also be noted that less than half of the students say that they use rubber dam during the procedure. This can be attributed to the lack of motivation in the people of the developing countries to spend the money for the dental treatment and the lack of skill among the dental students to place the rubber dam. The usage of cotton rolls was filled up in this vacuum. This was in accordance with a previous study among Yemeni dental professionals

in which a high preference of cotton rolls over rubber dam was reported.^[22] It is worth mentioning here that a systematic review conducted by Beauchamp J *et al.*^[3] showed no scientific evidence for preference of rubber dam over cotton rolls. There is some controversy regarding resealing partially or totally missing sealant. While some studies reported very low caries experience under sealants, others reported the opposite.^[14,22] It is essential that the students are made aware that infusing silver nanoparticles improve the remineralization and decrease the demineralization of teeth, which could make the prognosis much better compared to the conventional resin sealants.^[23] Few students were very impressed with their work and used flowable composite resins in place of sealants, which can slightly increase the retention rate of sealants compared with conventional resin-based sealants.^[24] Furthermore, very fewer students are aware of new developments such as using lasers for etching. Er, Cr: YSGG laser etching is comparable to acid etching in terms of retention and patient acceptability.^[25]

In line with the findings among Spanish and Yemeni dental professionals, a considerable percentage of our students preferred reapplication of sealant in case of partial or complete loss, with more than half willing to apply always when the sealant is lost.^[12,21] On the contrary, another study found that a majority of dental professionals surveyed did not reapply sealants regardless of retention status.^[2] This shows us the level of consensus among the dental practitioners regarding the use of pit and fissure sealants.

It is well known that the pit and fissure anatomy of the posterior teeth especially is one of the major factors contributing to the formation of caries. Furthermore, the sealants must be placed in proper conditions like the tooth surface must be moisture-controlled.^[26] The techniques used in sealant application must be sound. Maintenance is essential and the reapplication of sealants, when required, is important to maximize the effectiveness of the treatment.^[26] Therefore, dental students and dental practitioners must have profound knowledge about the indications as well as contraindications of fissure sealant application. It should also be noted that sealants can continue to prevent caries even when they appear clinically to be partially or completely lost compared to preventive resin restoration.^[27] Thus, the sealants must be encouraged among the dental students and young dentists to reduce the caries formation in the future.

CONCLUSION

This study shows the true extent of knowledge among the students about the pit and fissure sealants in India. It proves that the students possess an acceptable level of theoretical

knowledge about the pit and fissure sealants. However, their levels of evidence-based knowledge about the appropriate application sealants were unsatisfactory. It could be seen from the results that there must be an improvement in the curriculum of the dental schools in India to include the pit and fissure sealants to be compulsory. The pit and fissure sealants are champions among the first line of defense against dental caries. The students must be updated always about the advancements in procedures and principles of fissure sealants. It might bring in a considerable amount of reduction in the incidence of caries in the future. The dental board must update the dental professionals continuously with the help of continuing dental education programs about the pit and fissure sealants so that they would replicate the same in their respective workplaces and improve the dental health of the nation.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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