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Knowledge on Attitude and Barriers toward Silver Diamine Fluoride among Dental Practitioners in Tricity, India

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Abstract

Aim: To evaluate the dentist's knowledge, attitudes, and barriers towards silver diamine fluoride (SDF) in Tricity (Panchkula, Chandigarh, Mohali), India. **Materials and Methods:** A cross-sectional study was conducted using a self-administered online questionnaire among 422 dental practitioners in Tricity (Panchkula, Chandigarh, Mohali), India from 25th August 2021 to 10th September 2021. The outcome variable of the study were knowledge, attitude, and barriers toward Silver Diamine Fluoride. A pretested questionnaire on a 5-point Likert scale was used. **Results:** A total of 55% of respondents strongly agreed and agreed that SDF is a good treatment option for primary teeth that are not in the esthetic zone. The barrier to its usage is being not readily available commercially, with the highest score of 48%. **Conclusion:** Increased efforts in SDF education may lead to greater use of this innovative approach to the management of cavitated carious lesions. The most cited barrier to the use of SDF is tooth staining associated with arresting caries.

Keywords: Knowledge, Attitude, barrier, Silver di amine fluoride.

INTRODUCTION

Dental caries is one of the common diseases with a great impact on public health, social wellness, personal income, and the health care system [1]. It is perhaps the most common oral disease in the world, affecting 60-90% of school-going children and nearly all adults, often causing discomfort and pain [2]. Management of early childhood caries continues to be an enigma, as the nature of the problem is multifaceted, including unavailability of treatment, affordability, or behavioral issues [3].

Traditionally, dental caries is managed through prevention or treatment. Silver diamine fluoride (SDF) [4,5] is one of the recently used preventive and conservative methods to arrest caries. It was first discovered in Japan by Mizuho Nishino in 1970 [5]. The fluoride ions in SDF help create fluorapatite, a much more resistant enamel that can prevent demineralization in tooth structure. Application of SDF to the facial, lingual, and occlusal surfaces has shown to achieve the goal of preventing caries in several clinical trials [6,7]. On one hand, single use of SDF is unlikely to be enough for sustained results but on the other hand, annual and semi-annual reapplication has proven to be very effective. For elderly people who are highly anxious, young children as well as other patient groups, treatment with SDF may be a promising technique for the management of caries.

In cases like such, Silver diamine fluoride (SDF) is suggested to be a low-cost alternative for caries management. While several countries have researched the effect of SDF to arrest dental caries [6,7], it was in 2014 that SDF was cleared by the US Food and Drug Administration for commercial use [8].

Compared with no treatment, placebo, or fluoride varnish, SDF appears to effectively prevent dental caries in the entire primary dentition [9]. A review concluded that 30% and 38% SDF concentrations lead to increased caries reduction or had a higher capacity for arresting caries [10].

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As a conservative approach, SDF can prevent extensive repair, eliminate post-operative pulpal symptoms, and tooth weakening because of invasive methods used for caries removal. The pulp vitality can be preserved and the need for treatments like root canal or extraction can be avoided by application of SDF to the carious tooth. However, dentists may be hesitant to opt for SDF treatment because of its major disadvantage which manifests as a dark spot on an arrested carious lesion. Thus, affecting the esthetic outcome^[11].

Surveys regarding dentists' knowledge, attitude, and barriers toward SDF would increase the curiosity in this context and lead to increased use and a pragmatic approach. Hence, the study aimed to assess dentists', knowledge, attitudes, and barrier regarding SDF.

MATERIALS AND METHODS

A cross-sectional study was conducted during the COVID19 pandemic from August 25, 2021, to September 10, 2021, to assess knowledge, attitudes, and barriers related to silver diamine fluoride among Dentist of Tricity (Panchkula, Chandigarh, Mohali) in India. The ethical committee of Swami Devi Dyal Hospital and College of Dentistry, Barwala, Panchkula granted ethical certification before the commencement of the study. The study poses minimal risk of harm to subjects and does not involve any procedures that would normally require written consent outside of the research setting.

Due to the COVID19 pandemic, face-to-face collection of data was not performed. For data collection, the "Google Forms" link was distributed on social media platforms, WhatsApp Messenger, or sent by SMS and was collected using a semi-structured questionnaire, followed by convenience and snowball sampling methods. When the participants clicked the link, Demographic items were presented on the first page, knowledge items were presented on the second page, attitudes on the third page, and barriers to SDM were presented on the fourth page of the questionnaire. The study included dentists from Tricity(Panchkula, Mohali, and Chandigarh), a total of 480 participants, of which 15 dentists were part of the pilot study and were not included in the final analysis. Respondents were also asked for their opinion on the clarity of the questions and whether there was difficulty answering the question or whether there was ambiguity about the type of response requested. Chronbach's alpha of the questionnaire was deemed acceptable (0.84), with a response rate of 90%.

A Google survey form was prepared to collect socio-demographic details such as age, gender, and education level. To test the knowledge of silver

diamine fluoride in this study, a five-item measure was presented, for attitudes towards SDF a two-item measure, and for barriers eight items. These were answered on a five-point Likert scale (1 for strongly agree to 5 for strongly disagree).

The response from Google Forms includes answers to all questions posed by respondents when they submit the form. Data for all responses is available on the Answers tab and is stored manually in the response spreadsheet. Survey results are reported according to the CHERRIES guidelines for reporting E-survey results. Response spreadsheet data were processed using the SPSS v21.0 software package (SPSS Inc. Chicago, IL, U.S.A). Descriptive statistics such as mean, standard deviation, and proportion (% of subjects) were used.

RESULTS

A total of 422 (221 females and 201 males) undergraduate, general dentists, and specialists responded to the questionnaire, 45.50% of study subjects were 24-35 years old, 33.20% were 36-45 years and 31.30% were >45 years old. (Figure 1)

Table 1 represents the knowledge and practice of SDF on a 5-point scale. SDF is used to arrest Cavitated (63%) lesions and had the highest scores (agree and strongly agree combined), only 26% of respondents agreed that SDF should be used before all restorations in all patients.

Response to attitudes toward SDF is shown in Table 2. Approximately 55% of respondents agreed and strongly agreed that SDF is a good treatment option for primary dentition that are not in the esthetic zone. On the contrary, only 31% agreed that SDF can be done in the zone of esthetics. More than half of the participants, when asked about permanent teeth outside the esthetic zone, agreed and strongly agreed that SDF is a good treatment (57%). Very few respondents disagreed with the statements; that SDF is a good alternative treatment for children with behavioral problems (16%), medically fragile patients (15%), patients with severe dental anxiety (18%), and patients undergoing chemotherapy or radiation (16%), patients receiving bisphosphate (15%), and patients with microstomia (12%).

Regarding factors that make SDF a barrier to usage in patients are given in Table 3. The barrier to usage is due to SDF not being readily available commercially and having the highest score of 48%, followed by less Patient satisfaction and the anatomy of a tooth that cannot be restored (35% each).

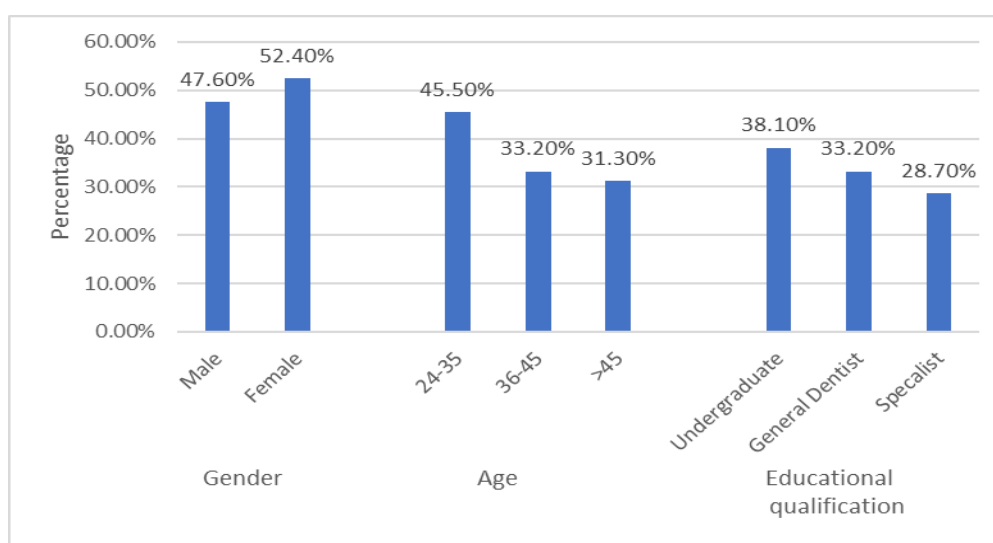


Figure 1: Characteristics of Study Participants

Table 1: Knowledge of Silver Diamine Fluoride (SDF)

Questions	Strongly agree	Agree	Neutral	Disagree	Strongly agree	Mean	S.D
SDF can be used to arrest the non-cavitated lesion	88(21%)	139(33%)	93(22%)	51(12%)	51(12%)	2.61	1.27
SDF can be used to arrest the cavitated lesion	110(26%)	156(37%)	84(20%)	51(12%)	21(5%)	2.32	1.13
It is not necessary to put a restoration after SDF is used to arrest cavitated lesions	68(16%)	156(37%)	84(20%)	93(22%)	21(5%)	2.62	1.13
SDF should be used before all restorations in all patients (routinely)	25(6%)	84(20%)	106(25%)	144(34%)	63(15%)	3.32	1.12
SDF should be used before placing all restorations in high caries risk patients	68(16%)	97(23%)	135(32%)	80(19%)	42(10%)	2.83	1.19
TOTAL	422						

Table 2: Dentists' Responses regarding Silver Diamine Fluoride (SDF) Considerations/Attitudes

Questions	Strongly agree	Agree	Neutral	Disagree	Strongly agree	Mean	S.D
SDF is a good treatment to be used to treat lesions which:							
Are not in the esthetic zone on primary teeth.	72(17%)	160(38%)	118(28%)	59(14%)	13(3%)	2.48	1.02
Are in the esthetic zone on primary teeth.	30(7%)	101(24%)	131(31%)	114(27%)	46(11%)	3.10	1.10
Are not in the esthetic zone on permanent teeth.	68(16%)	173(41%)	109(26%)	51(12%)	21(5%)	2.48	1.05
Are in the esthetic zone on permanent teeth.	17(4%)	63(15%)	118(28%)	144(34%)	80(19%)	3.49	1.08
SDF treatment is a good treatment alternative:							
For restorations in children with behavioral issues.	97(23%)	165(39%)	93(22%)	46(11%)	21(5%)	2.35	1.09
When a patient wants a composite restoration at a later time but cannot currently afford it.	42(10%)	144(34%)	118(28%)	97(23%)	21(5%)	2.78	1.06
When a patient wants an amalgam restoration at a later time but cannot currently afford it	38(9%)	131(31%)	131(31%)	63(22%)	29(7%)	2.86	1.07
When patients are medically fragile.	76(18%)	152(36%)	131(31%)	42(10%)	21(5%)	2.33	1.04
When patients cannot pay for restorations.	46(11%)	177(42%)	106(25%)	72(17%)	21(5%)	2.63	1.04
When patients have severe dental anxiety.	76(18%)	156(37%)	114(27%)	59(14%)	17(4%)	2.49	1.06
When patients are undergoing or have recently undergone radiation therapy or chemotherapy	72(17%)	160(38%)	122(29%)	51(12%)	17(4%)	2.48	1.03
When patients take bisphosphonate medications.	46(11%)	131(31%)	169(40%)	55(13%)	21(5%)	2.70	0.99
If patients would have to be put under general anesthesia for their dental treatment otherwise.	34(8%)	122(29%)	131(31%)	97(23%)	38(9%)	2.95	1.09
If patients would be unable to receive normal dental treatment and could also not be put under general anesthesia for treatment.	72(17%)	169(40%)	118(28%)	38(9%)	25(6%)	2.46	1.06
If patients with microstomia have difficult to access lesions that require treatment.	51(12%)	181(43%)	139(33%)	38(9%)	13(3%)	2.48	0.92
TOTAL	422						

Table 3: Barrier to the usage of SDF expressed as a percentage with a mean and standard deviation

Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	S.D
I am not using/ may not use SDF because: I don't have enough knowledge	51(12%)	76(18%)	126(30%)	114(27%)	55(13%)	3.10	1.20
I am not using/ may not use SDF because SDF because: I am not well trained in its use	46(11%)	68(16%)	152(36%)	101(24%)	55(13%)	3.12	1.16
I am not using/ may not use SDF because SDF because: Aesthetic is poor.	59(14%)	51(12%)	148(35%)	118(28%)	46(11%)	3.11	1.20
I am not using/ may not use SDF because SDF because: Patient satisfaction is less.	25(6%)	122(29%)	135(32%)	127(30%)	13(3%)	2.95	.97
I am not using/ may not use SDF because E SDF because: SDF does not have enough evidence for use.	38(9%)	55(13%)	126(30%)	131(31%)	72(17%)	3.34	1.17
I am not using/ may not use SDF because SDF because: SDF does not allow a restoration to be placed and hence anatomy cannot be restored.	25(6%)	122(29%)	135(32%)	127(30%)	13(3%)	3.19	1.07
I am not using/ may not use SDF because SDF because: Level of evidence behind SDF safety and efficacy is not sufficient.	21(5%)	80(19%)	160(38%)	126(30%)	34(8%)	3.17	.99
I am not using/ may not use SDF because SDF because: SDF is not readily available commercially	34(8%)	169(40%)	122(29%)	46(11%)	51(12%)	2.67	1.15
TOTAL	422						

DISCUSSION

According to American Dental Association guidelines, SDF materials are recommended to be used to prevent advanced carious lesions in the primary dentition. In addition, it prevents occlusal caries of permanent dentition [12]. Despite the established high level of evidence, only 63% of respondents responded that they agreed/ strongly agreed that SDF can be used to arrest carious lesions. The majority of respondents are against placing SDF before any restoration (49%) or are neutral (25%). Consistent with the findings of our study, the evidence for pre-restoration SDF placement to prevent secondary caries is still limited and further studies are needed [13,14].

In the present study, there were few concurring responses regarding the treatment of permanent teeth lesions in the esthetic region with SDF, similar to a study conducted in the United States [14]. This finding is plausible due to the permanent black discoloration after the application of SDF [15]. Chibinsky et al. in a systematic review found SDF to be 89% more effective than other alternatives or placebo in preventing dental caries in deciduous dentition [16]. Experts have found that 38% of the application of SDF is most reliable compared with no treatment (unfavorable control) or possibly a placebo on principal teeth to prevent caries.

In accordance with the American Academy of Paediatric Dentistry guidelines [15], this study found that the majority of the participants agreed that SDF is a good alternative treatment for people with behavioral or medical problems, frail patients, those with severe dental anxiety, and patients who are undergoing or have recently undergone radiation or chemotherapy, while only a few disagreed. The use of SDF in these patients was highlighted in studies by Nelson et al. [17] in 2016 and a case report [18] in 2018.

However, there are some limitations. Due to the pandemic, conducting face-to-face interviews with the participants was impossible. Thus, sampling bias results from the unintentional exclusion of dentists without Internet access. In addition, the data presented here are representative only of practitioners residing in Haryana, and

knowledge among dental health professionals may vary geographically, affecting the generalizability of the study. The use of SDF in dental settings will increase with the increase in knowledge, education, and understanding of SDF through their specialist development activities. Increased efforts in SDF education may lead to greater use of this innovative approach to the management of severe carious lesions, especially in children. The most cited barrier to the use of SDF is tooth staining associated with caries arrest. Overall, this reinforces the idea that awareness of SDF materials is needed for more implementation in the clinical practice of dentists, which would improve knowledge and attitudes towards the use of SDF among Indian dentists.

CONCLUSION

It is suggested that further studies performed with greater emphasis on larger samples include dentists from other disciplines and different regions of our country to provide generalized and conclusive results. Furthermore, this study not only sheds light on areas to be explored in future studies but also raises many questions including areas of educational experience and teaching practice which provides very useful information that can identify the source of gaps in current knowledge of dentistry.

Conflict of Interest

None declared.

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