



**Original Research**

**Knowledge, awareness and attitude among dentists of North India regarding use of Silver Diamine Fluoride (SDF) in preventing dental caries**

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**ABSTRACT**

**AIM-** To evaluate the knowledge, awareness and attitude of the dentist from North India towards Silver Diamine Fluoride (SDF) use in preventing dental caries.

**MATERIALS AND METHODS-** An online survey was conducted among dentists of North India using online questionnaire to assess the knowledge, experience, and attitude of dentists regarding the use of SDF. 107 dentists participated in the online survey. Data obtained were analysed statistically.

**RESULTS-** Most participants revealed they were somewhat taught about SDF. 29 % of the participants agreed that SDF can be used as an alternative to the conventional method of caries removal. Nearly about 32.7 % of the participants do not know regarding the application protocol interval for SDF.

**CONCLUSION-** Knowledge about SDF among dental practitioners in North India was low to moderate. Increasing SDF knowledge among dentists may serve as an alternative for treating young patients who cannot co-operate with the traditional dental treatment.

**Keywords:** Dental Caries, Questionnaires, Silver Diamine Fluoride, Survey.

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## **INTRODUCTION**

Dental caries is one of the most common diseases in the world which is related to pain, problem in sleeping, eating, and drinking, which can have an effect on child's general health and growth.<sup>1</sup> According to National Oral Health Survey in India, dental caries in Indian population between 3 - 18 years of age was about 52% and that the prevalence of untreated tooth decay in children below six years was found to be 49.6 % in India as per the systematic review published in year 2018.<sup>2,3</sup>

Its prevalence is seen to be higher among under privileged communities.<sup>4</sup> This could be due to the lack of awareness in preventive oral health and low socioeconomic condition among these communities that ends up in negligence of oral health care.<sup>2</sup> Silver Diamine Fluoride (SDF) which is used to arrest dental caries in a non-invasive way has recently gained popularity.<sup>5</sup> It is an inexpensive treatment and can be of great help for socioeconomically under-privileged patient groups.<sup>1</sup>

SDF is a liquid which is topically applied by painting over the cavitated lesion without removing any infected soft dentin. It has been used to arrest carious lesions and treat tooth hypersensitivity.<sup>6</sup> SDF was approved by Food and Drug Administration (FDA) for market as a desensitizing agent as recent as August 2014 and in April 2015, the product became available in the United States.<sup>7</sup> It has been reported that using 38% SDF concentration helps in arresting and preventing carious lesions.<sup>4</sup>

As SDF is a non-invasive way of treating dental caries, it serves as an alternative for treating young children who cannot co-operate with the traditional dental treatment.<sup>6</sup> Also, the cost of SDF is low and equipment required on caries treatment is reduced when compared to conventional techniques.<sup>7</sup>

Considering public health, SDF is a significant tool in treating carious lesions in young uncooperative patients as it avoids discomfort and pain in children.<sup>4</sup> Thus, this study aims to evaluate the knowledge, awareness and attitude among dentists of north India regarding use of Silver Diamine Fluoride in preventing dental caries.

## **MATERIALS AND METHODS**

### **STUDY DESIGN AND SAMPLE**

An online cross-sectional study was conducted among general dentists, pediatric dentists and post graduates' students of North India in between January 2022- April 2022 where 107 subjects were selected based on convenience sampling technique participated in the survey.

### **SURVEY INSTRUMENT AND DATA COLLECTION**

A prevalidated and self-administered questionnaire was designed to evaluate the knowledge, awareness and attitude among dentists of North India towards Silver Diamine Fluoride (SDF). An online multiple-choice and fill-in response questionnaire format was created in Google Forms which was prepared based on previous studies.<sup>4, 5, 6</sup> The online form included two parts.

The first part included demographic details of the dental practitioner including age, gender, and level of education and second part of the form enclosed 12 questions to obtain knowledge and attitude of dentists towards silver diamine fluoride (SDF). The results obtained were statistically analysed.

## **RESULTS**

A total of 107 (27 males and 80 females) general dentists, pediatric dentists and post graduate students participated in this survey. Almost 97% of the study subjects were between 20-30 years, 3% were between 30-40 years, 0 were between 40-50 and >50 years (Table 1). The distribution of study samples according to level of education and specialization is shown in Table 1.

<b>1) Age</b>	20-30 years 104 (97%)	30-40 years 3 (2.8%)	40-50 years 0 0%	>50 years 0 0%
<b>2) Gender</b>	Male 27 25%	Female 80 75%		
<b>3) What is your education level</b>	BDS 53 49.5%	MDS 54 50.4%		
<b>4) Speciality</b>	Pediatric dentist 32 30%	Non- Pediatric dentists 49 45.7%	Not Applicable 26 24.2%	

**Table 1:** Demographic data <sup>4,5</sup>

<b>1) Heard about SDF application?</b>	Yes 84 78.5%	No 12 11.2%	Not Sure 11 10.2%	
<b>2) Were you educated about SDF in your dental college?</b>	Not at all 16 15%	Somewhat 65 60.7%	Very often 26 24.2%	
<b>3) Any CDE programme that you have attended about SDF?</b>	Yes 23 21.4%	No 84 78.5%		
<b>4) According to you, SDF is applied in?</b>	Anterior 7 6.5%	Posterior 23 21.4%	Both 76 71%	
<b>5) Do you think it can be used as an alternative to conventional restoration?</b>	Yes 31 29%	No 39 36.4%	Don't know 37 34.5%	

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<b>6) Do you know about the possible drawbacks of SDF</b>	Not at all 33 30.8%	Somewhat 49 45.7%	Very well 25 23.3%	
<b>7) What is the application interval protocol to be followed regarding SDF?</b>	A single application 10 9.3%	6 months re-application 57 53.2%	Annual reapplication 5 4.6%	Don't know 35 32.7%
<b>8) Is SDF a good treatment alternative for restorations in children with behavioural issues?</b>	Yes 58 54.2%	No 9 8.4%	Not sure 32 30%	Neutral 8 7.4%
<b>9) Can SDF be used as a treatment alternative when patients are medically fragile?</b>	Agree 42 39.2%	Disagree 15 14.01%	Neutral 50 47%	
<b>10) In severe dental anxiety patients, can SDF be used?</b>	Agree 56 52.3%	Disagree 9 8.4%	Neutral 42 39.25%	
<b>11) Do you agree that SDF is a good treatment option for primary teeth when the lesion is not in the esthetic zone?</b>	Agree 68 63.5%	Disagree 10 9.3%	Neutral 29 27.1%	
<b>12) What can be the possible barriers to the use of SDF?</b>	Inadequate knowledge 32 30%	Patient acceptance 48 45%	Doesnot restore and function 27 25.2%	

**Table 2:** Dentists knowledge regarding silver diamine fluoride (SDF) <sup>4, 5, 6</sup>

Knowledge, awareness and attitude among dentists towards Silver Diamine Fluoride (SDF) is demonstrated in Table 2. 11% of the participants said that they did not come to hear about SDF application in dentistry whereas 65% of the participants revealed they were somewhat taught about SDF and its application in dental school. 21% agreed that they attended didactic lectures/ discussions about SDF. When asked about the type of teeth SDF is used for, almost 71% agreed that it could be applied to both anterior as well as posterior teeth. Almost half of the participants agreed that it can be used as an alternative to the conventional method which is removing caries by dental drill followed by placement of restoration in children with behavioural issues, medically compromised patients and in patients with severe anxiety issues. About 63% of the participants have agreed that SDF is a good treatment option which can be used in non- esthetic zone. About 23% knew about the possible drawbacks of SDF which is black staining. The main barriers reported in the study to the use of SDF among those that did not use it was patient acceptance (49%) as it cause black staining, followed by inadequate knowledge (30%). Unfortunately, almost 33% of the participants said that they do not know regarding the application protocol interval for SDF, followed by 9% who said that it's a single application of SDF.

## **DISCUSSION**

SDF is a colourless, odourless solution of silver, fluoride and ammonium ions, the ammonia acting as a stabilising agent for the solution.<sup>8</sup> SDF looks just like water<sup>8</sup> and is topically applied by painting the cavitated lesion without eliminating any infected soft dentin.<sup>4</sup>

When placed on carious tooth tissue, SDF arrests carious lesion by dentinal tubule blockage, bacterial tissue death, remineralisation of demineralised tooth and inhibition of dentinal collagen degradation.<sup>8</sup> Regardless of antimicrobial effectiveness, silver contaminants have the effect of causing blackening of carious enamel and dentin which is an issue as it had an adverse impact on patient's acceptance.<sup>4</sup>

It is a known fact that each application of 38% SDF solution only consists of 0.2 mg fluoride, which is far under the probably toxic dosage of 5 mg/kg. The SDF panel of the American Academy of Pediatric Dentistry (AAPD) supports using 38% SDF in arresting the cavitated caries lesions of primary teeth.<sup>4</sup>

This survey revealed that knowledge about SDF among dental practitioners in India was low to moderate, but their attitude was positive despite low level of SDF education in respondents' predoctoral and graduate programs. However, while 78% of the respondents answered that they knew what SDF was used for in dentistry, some responses were inconsistent. Almost half of the respondents stated that they agreed that SDF can be used to arrest cavitated lesions in dentin. Similar responses were also found in a study conducted by Antonioni MB et al<sup>6</sup>. In a systematic evaluation of Chibinski et al., it was seen that SDF was far better than other alternative remedies or placebo by 89% in arresting dental caries in primary dentition.<sup>9</sup>

Nearly almost 50% of the participants in our study have agreed that the main barrier of treating dental caries with SDF is because of the permanent dark staining of the carious tooth. This can be because of the assumption by subjects who believe that individuals esthetic appearance matters.<sup>4</sup> A research conducted by Tesoriero in New York have revealed that most of the parents were more comfortable with SDF therapy on a posterior tooth, however, not on an anterior tooth due to esthetic reasons.<sup>10</sup>

In the present survey 52% of the dentist knew that SDF should be applied twice yearly, 9% recommended single application for SDF and almost 32% of the dentist didn't have any idea regarding the protocol to be followed for SDF application. Yee et al. in their study had discovered that single application of SDF over an interval of two years reduced arrested cavitated lesions, re-application was recommended with passing time. Thus, it was suggested that SDF must be applied twice yearly as it is far better than once annually.<sup>4</sup>

Limitations of study can be attributed to the smaller sample size and validation technique of the questionnaire used in previous study. Future research can be focused on larger sample size and use of randomized trails for assessment of SDF for prevention of caries in children.

## **CONCLUSION**

SDF application is an easy and cost-effective technique that can be used in un-cooperative children for prevention of Early Childhood Caries.<sup>4</sup> From the present survey, we can conclude that SDF is not commonly used among the respondent dentists in India to prevent dental caries, although their attitudes were overall positive, indicating their willingness to use SDF, but lack of knowledge was a barrier. So, this survey has created an awareness among the North Indian dentist regarding use of SDF, also the need for development and availability of courses/training about SDF is must, so that the clinicians have a better knowledge regarding its use.

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