

# Knowledge and use of Silver Diamine Fluoride (SDF) by dentists in Lahore: A cross-sectional study

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## ABSTRACT

**Background:** Silver Diamine Fluoride (SDF) has emerged as a promising alternative to the traditional caries management concept of 'drill and fill'. It offers a conservative, inexpensive, painless and simple way to stop caries progression.

**Aim:** To assess the knowledge and use of Silver Diamine Fluoride among dental practitioners in Lahore.

**Methodology:** A cross-sectional study was conducted after getting institutional ethical approval. A pre-validated questionnaire was used to collect data from 186 dental practitioners. Data was analyzed using SPSS V 25.

**Results:** Among the participants, 101(54.3) were females and 83(44.6%) were males. 30.6% and 47.8% of the participants strongly agreed and agreed to the use of SDF to arrest cavitated lesions. Regarding the barriers in SDF usage, permanent black discoloration was chosen by 70.4%, concern over patient satisfaction by 55.7% and the fact that SDF not restoring tooth anatomy if it is not followed by a restoration by 40.3% of the participants. 72.6% of the participants reported that they have never used SDF, 20.2% sometimes and 7.2% often use SDF. 55.9% of the participants expected an increase in future usage of SDF.

**Conclusion:** Dentists have a fair knowledge about the use of SDF and its application in clinical practice. However, there is disparity in its use among the dental practitioners due to the black discoloration and concern over parental acceptance.

**Keywords:** Minimally invasive; Silver Diamine Fluoride; Caries arrest

## INTRODUCTION

Early childhood caries is ranked the highest among the global burden of diseases<sup>1</sup>. If left untreated it can advance to a more rampant form and greatly affect the patient's quality of life, nutritional status and growth<sup>2</sup>. As it is a major concern in public health, new caries management strategies are being considered to alleviate the strain on the health system. Silver Diamine Fluoride (SDF) has emerged as a promising alternative to the traditional caries management concept of 'drill and fill'. Unlike conventional restorative methods, it does not require any surgical tooth preparation and is cheaper than other treatment options<sup>3</sup>. It offers a conservative, inexpensive, painless and simple way to stop caries progression<sup>4,5</sup>. 38% SDF contains 44,800 ppm of Fluoride. It arrests caries by means of the antibacterial properties of silver ion which causes bacterial cell wall destruction, inhibition of bacterial DNA replication and disruption of the molecular pathways responsible for bacterial survival. It also inhibits demineralization by preventing collagen degradation and promoting remineralization through fluoride<sup>6</sup>. Fluoride released increases the microhardness by making fluorapatite crystals inhibiting metalloproteinases and dentine collagen degradation<sup>7</sup>. The alkaline solution of SDF also prevents collagen breakdown therefore provides a synergistic effect. SDF was approved by FDA for treating dental hypersensitivity in 2014 and it is being off-label uses to arrest carious lesions since then. In 2017, American Academy of Pediatric Dentistry (AAPD) endorsed the usage of SDF to arrest cavitated carious lesions in primary teeth<sup>8</sup>. American Dental Association (ADA) also recommended the use of SDF to arrest advanced carious lesions in primary and permanent teeth<sup>9</sup>. SDF is currently being employed in the comprehensive management of dental caries. SDF offers a non-invasive and inexpensive management of caries in children, elderly and patients with special healthcare needs<sup>10</sup>. SDF has also become eminent in the context of reducing or delaying dental treatment under general anesthesia in non-cooperative pediatric patients<sup>11</sup>. It has also proven to be a cost-effective strategy in community-based programs. A recent systematic review by Slayton et al<sup>12</sup> concluded that SDF is effective in arresting caries and encourages the dental practitioners for its use because of its proven efficacy and safety.

As there is a paradigm shift towards minimally invasive dentistry, SDF has proven to be an invaluable treatment modality. The current study was conducted to assess the knowledge and use of Silver Diamine Fluoride among dental practitioners in Lahore.

## METHODOLOGY

A cross-sectional study was conducted after getting approval from the Ethical Review Board of University College of Dentistry, The University of Lahore. A pre-validated questionnaire with some modification was used to assess the knowledge and use of SDF by the dentists after getting permission by the author. It had three sections: demographic details, questions to assess the knowledge of SDF, questions regarding the usage and barriers in the usage of SDF in their practice. Data was collected from 186 Lahore-based dentists. Both general dentists and specialists were included irrespective of their affiliation with private or public sector. Data was analyzed using SPSS 25. Descriptive statistics for each item in the questionnaire were calculated. Chi-square test was applied to compare various demographic variables with the knowledge and use based items. P-value of  $\leq 0.05$  was considered statistically significant.

## RESULTS

Among the participants, 54.3 (n=101) were females and 44.6% (83) were males. 51.1% (95) were general dentists, 34.9% (65) were specialists and 14% (26) were post-graduate trainees. 65.6% (122) had  $\leq 5$  years, 23.1% (43) had 6-10 years' and 11.3% (21) had  $> 10$  years clinical experience.

Regarding the barriers in SDF usage, permanent black discoloration was chosen by 70.4%, concern over patient satisfaction by 55.7% and the fact that SDF not restoring tooth anatomy if it is not followed by a restoration by 40.3% of the participants. On the other hand, decreased discomfort of the procedure (71.5%), the level of evidence behind SDF efficacy and safety (51.6%) and cost of SDF (30.1%) were selected as the appealing factors in the use of SDF. 72.6% of the participants reported that they have never used SDF, 20.2% sometimes and 7.2% often use SDF. 55.9% of the participants expected an increase in the future usage of SDF. Figure 1 depicts the clinical use of SDF as reported by the participants.

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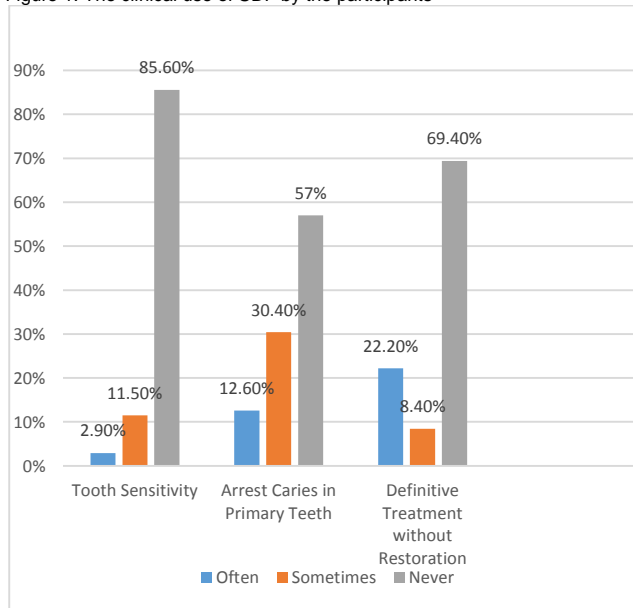
Table 1: Responses regarding the knowledge of SDF

How much do you agree/disagree with the following statements?	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
SDF can be used to arrest non-cavitated lesions.	27.4% (51)	45.7% (85)	12.9% (24)	9.7% (18)	4.3% (8)
SDF can be used to arrest cavitated lesions.	30.6% (57)	47.8 (89)	17.2% (32)	2.7% (5)	1.6% (3)
If SDF is used to arrest cavitated lesions, it is then not necessary to place a restoration to prevent future caries activity.	17.7% (33)	43.5 (81)	22.6 (42)	12.9 (24)	3.2 (6)
SDF should be used prior to placing all restorations in high-risk patients.	13.4 (25)	31.7 (59)	24.2 (45)	15.6 (29)	15.1 (28)

Table 2: Responses regarding the application of SDF

SDF is a good treatment to be used to treat caries in:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Esthetic zone in primary teeth.	10.8 (20)	28.5% (53)	18.8% (35)	15.1% (28)	26.9% (50)
Non-esthetic zone in primary teeth.					
Children with behavioral issues.	36.0% (67)	40.9% (76)	14.0% (26)	3.8% (7)	5.4% (10)
Patients who cannot pay for restorations.	30.6% (57)	41.9% (78)	19.9% (37)	4.8% (9)	2.7% (5)
Patients who have severe dental anxiety.	33.3% (62)	43.5% (81)	16.1% (30)	3.8% (7)	3.2% (6)
Patients who are undergoing or have recently undergone radiation therapy/chemotherapy.	26.9% (50)	45.2% (84)	21.5% (40)	2.2% (4)	4.3% (8)
Patients who could also not be put under general anesthesia for treatment due to some reason.	29.0% (5)	49.5% (92)	16.7% (31)	1.6% (3)	3.2% (6)

Figure 1: The clinical use of SDF by the participants



**DISCUSSION**

SDF has emerged as an alternative caries management option when definitive comprehensive dental treatment cannot be done in young children or those with special healthcare needs. A meta-analysis of the clinical trials to study efficacy of SDF in arresting caries reported an overall 81% arrest of active carious lesions<sup>14</sup>. Chibinski and colleagues conducted a study in 2017 and reported that the caries arrest at 12 months using SDF was 66% higher

(41%–91%) in comparison with other active materials, but it was 154% higher (67%–85%) than by no treatment<sup>15</sup>.

The results of our study show that dentists have a fair knowledge about SDF and its clinical use in dental practice. Majority of the dentists agreed to its use in children with behavior issues, patients with dental anxiety, financial constraints or those undergoing radio or chemotherapy. However, when the use of SDF in their clinical practice was probed, a very limited use was reported with as much as 72.6% of the dentists never using SDF. The results are consistent with a study conducted in Brazil which reported a low use of SDF by only 12% practitioners<sup>16</sup>.

main barriers to the use of SDF as reported by the participants were black discoloration (70.4%) and concern over patient satisfaction (55.7%). Tooth discoloration is a major disadvantage of SDF and is often cited as the main reason by the dentists in recommending it as a treatment option<sup>17</sup>. A KAP study also reported tooth discoloration (90.7%) and limited knowledge of the parents (58.3%) and their consent (64.8%) to be a major obstacle in the use of SDF<sup>16</sup>. Due to these reasons, the use of SDF in posterior teeth has shown better parental acceptance compared to its use in anterior teeth<sup>18,19</sup>.

The cost-effectiveness of SDF makes it an advantageous treatment option in patients with financial constraints therefore it may be presented as an alternate treatment option to the conventional more invasive methods<sup>20</sup>.

**CONCLUSION**

Dentists have a fair knowledge about the use of SDF and its application in clinical practice. However, there is disparity in its use among the dental practitioners due to the inherent disadvantage of permanent black discoloration. Dentists also have reservations regarding its acceptance by the patients and/or parents which accounts for its low usage.

Dentists should be updated about the novel approaches in caries management. SDF should be presented as an alternate treatment option to arrest caries in patients where conventional restorations cannot be placed because of any reason.

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**Conflict of Interest:** None

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