

KNOWLEDGE, ATTITUDES, AND PRACTICES OF PEDIATRIC DENTISTS TOWARDS SILVER DI AMINE FLUORIDE

Baian Yasser Azzawi¹, Renad Abushanab¹, Rana Nadeem¹, Dalia Almotairi¹, Manal Alghtani¹, Othman Wali², Shanthi Vanka^{3*}, Amit Vanka³

¹Ibn Sina National College for Medical Studies, Jeddah, KSA.

²Vice dean of dentistry program, Ibn Sina National College for Medical Studies, Jeddah, KSA.

³Department of Preventive Dental Sciences, Ibn Sina National College for Medical Studies, Jeddah, KSA. shanthiamit@rediffmail.com

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ABSTRACT

Silver diamine fluoride (SDF) is topically applied to treat tooth hypersensitivity (label indication). Considerable literature exists on the safety of SDF as used to treat cavitated lesions. While the evidence supporting the use of SDF is overwhelming, to the best of our knowledge, dentists' usage is not commensurate. Learning experiences of the dentist, commercial availability, and type of clinical practice, are some of the factors that may have a bearing on the adoption of SDF in clinical practice. The aim of the study was to assess Knowledge, Attitudes, and Practices of Pediatric dentists in Saudi Arabia regarding SDF. Analytical, cross sectional. A pretested questionnaire consisting of multiple-choice questions with 5-point Likert scale, was used to conduct a survey.

55% of respondents had used/were using SDF. Medically compromised followed by children with behavioural issues and anxiety were the most common indications for using SDF. Similarly, Cavitated (65%) lesions in non-aesthetic zone of primary teeth (62%) had the highest scores. Significant positive correlation between was observed between; SDF usage and knowledge on how to use SDF. Most of the respondents wanted SDF to be introduced into the undergraduate curriculum. The use of SDF had a positive correlation on knowledge, probably implying that educating pediatric dentists at various stages may increase the use of SDF.

Key words: Knowledge, Attitude, Silver di amine fluoride, Practices, Jeddah.

Introduction

The severity of dental caries in children continues to be high, with 80% national prevalence and a decayed missing filled teeth (dmft) score of 5.0 in kingdom of Saudi Arabia [1-5]. Management of early childhood caries continues to be an enigma, due to the multifaceted nature of the problem, including unavailability of treatment, affordability, or behavioural issues [6]. Silver diamine fluoride (SDF) has been suggested as a low cost alternative for caries management in such cases. While several countries have conducted research on the effect of SDF to arrest dental caries [7, 8], it was in 2014 that SDF was cleared by the US Food and Drug administration for commercial use [9].

SDF is topically applied to treat tooth hypersensitivity (label indication). Nevertheless, research on efficacy of SDF in adults supports its effectiveness in root caries prevention and arrest as well as remineralisation of deep occlusal lesions.

Considerable literature exists on the safety of SDF as used to treat cavitated lesions. SDF has been claimed to be an alternative to patients who are unable to receive traditional treatments, in particular for children where dental care may need to be performed under general anaesthesia. Compared with no treatment, placebo or fluoride varnish, SDF appears to effectively prevent dental caries in the entire primary dentition [10]. A review concluded that 30% and 38% SDF

concentrations lead to increased caries reduction or higher capacity for arresting caries has been observed [11].

Clinically, caries can be arrested by applying SDF to the lesion without removing any infected soft dentin [12]. The mechanism of how SDF leads to caries arrest, is not completely understood. The possible mode of action could be related to its antibacterial effect, remineralization potential and inhibition of organic matrix degradation [11]. Decreased lesion depth has been observed [13] coupled with a slowing down of lesion progression [14]. SDF application leads to the formation of an insoluble precipitate of Ag₃PO₄ [15] and significantly reduces streptococcus mutans and lactobacillus acidophilus counts [16].

While the evidence supporting the use of SDF is overwhelming, to the best of our knowledge, dentists' usage is not commensurate. Learning experiences of the dentist, commercial availability, and type of clinical practice, are some of the factors that may have a bearing on the adoption of SDF in clinical practice. Thus, the aim of the study was to assess Knowledge, Attitudes, and Practices, of Pediatric dentists in Saudi Arabia regarding SDF.

Materials and Methods

The adopted study design was descriptive cross-sectional. Ethical approval was exempted for the survey by the ethical

committee. The survey was conducted amongst pediatric dentists in academic positions, clinical practitioners or both. A convenience sample, targeting at least 10% of the assumed upper limit of population of 400 pediatric dentists, was calculated to be 40 and survey was distributed to 100 practitioners and Faculties. The questions were designed to collect data on knowledge and practices of Pediatric dentists with respect to SDF. Multiple choice questions and questions with 5-point Likert scale were used to collect data in the form of a pretested questionnaire. The link for survey was created on google forms and distributed through emails and social media. Four weeks after the initial round, reminders were sent and the data collection was completed after 2 months. Response to the survey, was considered as implicit consent. The data was tabulated and Statistical analysis was performed using IBM SPSS version 23. Pearson’s correlation was used to evaluate the relationships between the indices. $p < 0.05$ was considered to be statistically significant.

Results and Discussion

Responses were tabulated in Microsoft Excel and were expressed as mean and standard deviation. Cronbach’s alpha inter-item consistency coefficient was overall 0.82. Out of the total 58 complete responses received, 72.4 % respondents were females and 27.6% were males. The

demographic data and percentage of pediatric dentists who have used/are using SDF (**Table 1**), has been expressed in terms of number of respondents and percentages. **Table 2a** shows the perceived knowledge on usage, advantages over traditional treatment and potential problems for usage on a 5-point scale (great deal to nothing at all). The responses for a great deal and quite a bit combined ranged from 55% to 68%.

Table 2b represents knowledge on general indications of SDF on a 5 point scale (strongly agree to strongly disagree). The highest scores (strongly agree and agree combined) were for medically compromised children (74%) followed by behavioural issues and anxiety (73%). **Table 2c** Represents knowledge on specific indications and practice of SDF. Cavitated (65%) lesions in non-aesthetic zone of primary teeth (62%) were the highest scores (strongly agree and agree combined). **Table 2d** shows reasons for pediatric dentists are not using/ may not use SDF. Barrier to usage due to SDF not being readily available commercially had the highest scores (49%). Factor analysis for 5 indices prepared by combining questions and the question: Have you used/currently use SDF in your clinical practice? Significant positive correlation between; (a) Usage of SDF (A) and: knowledge on how to use SDF, and (b) perceived knowledge and use in primary/permanent, aesthetic/non-aesthetic zone (**Table 3**).

Table 1. Demographic Data Including Gender, Age, Qualification, and whether Pediatric Dentists Have Used SDF in Clinical Practice.

Demographic Data		Number	Percentage
Gender	Female	42	72.4%
	Male	16	27.6%
Age	25-29	21	36.2%
	30-35	17	29.3%
	36-40	4	6.9%
	41-45	11	19%
	46-50	3	5.2 %
	Above 51	2	3.4 %
	Board	34	56.9%
Qualification	Masters	16	27.6 %
	PhD	9	15.5%
	Yes	33	56.9%
Have you used/currently use SDF in your clinical practice?	No	25	43.1%

Table 2a. Perceived Knowledge on Usage, Advantages over Traditional Treatment and Potential Problems for Usage on a 5-Point Scale

	A Great Deal 1	Quite a bit 2	Some what 3	Very little 4	Nothing at all 5	Mean	STD error
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How much do you know regarding:	What SDF is used for in dentistry.	22% (13)	38% (22)	22% (13)	10% (6)	7% (4)	2.414	.1517
	How SDF is used to treat dental caries in pediatric patient	33% (19)	38% (22)	17% (10)	5% (3)	7% (4)	2.155	.1512
	The advantages SDF treatment can have over traditional treatment	33% (19)	35% (20)	17% (10)	5% (3)	10% (6)	2.259	.1660
	Potential problems SDF usage can have	24% (14)	31% (18)	31% (18)	7% (4)	7% (4)	2.414	.1497

percentages may not be 100% in all cases due to rounding

Table 2b. Knowledge on General Indications of SDF on a 5-point Scale

	Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5	Mean	STD error	
SDF treatment is a good treatment alternative	For restorations in children with behaviour issues and dental anxiety	40% (23)	33% (19)	19% (11)	5% (3)	3% (2)	2.000	.1391
	For medically compromised child	43% (25)	31% (18)	14% (8)	3% (2)	9% (5)	2.034	.1612
	When a parent cannot pay for his/her child's treatment	31% (18)	21% (12)	36% (21)	7% (4)	5% (3)	2.345	.1507
	When patients would have to be treated under general anaesthesia for their dental treatment	28% (16)	26% (15)	26% (15)	15% (9)	5% (3)	2.448	.1578

Table 2c. Knowledge on Specific Indications and Practice of SDF

	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	MEAN	STD ERROR
SDF can be used to arrest the non cavitated lesion	22% (13)	29% (17)	24% (14)	14% (8)	10% (6)	2.603	.1667
SDF can be used to arrest the cavitated lesion	29% (17)	36% (21)	21% (12)	10% (6)	3% (2)	2.224	.1435
It is not necessary to put a restoration after SDF is used to arrest cavitated lesions	14% (8)	35% (20)	24% (14)	19% (11)	9% (5)	2.741	.1547
SDF should be used prior to all restorations in all patients (routinely)	7% (4)	19% (11)	26% (15)	33% (19)	16% (9)	3.310	.1520
SDF should be used before placing all restorations in high caries risk patients	17% (10)	21% (12)	35% (20)	19% (11)	9% (5)	2.810	.1564
SDF is a good treatment to be used to treat lesions that: Are not in the aesthetic zone in primary teeth?	17% (10)	45% (26)	24% (14)	12% (7)	2% (1)	2.362	.1271
SDF is a good treatment to be used to treat lesions that: Are in the aesthetic zone in primary teeth?	5% (3)	38% (22)	28% (16)	21% (12)	9% (5)	2.463	.134
SDF is a good treatment to be used to treat lesions that: Are not in the aesthetic zone in the permanent teeth?	10% (6)	36% (21)	40% (23)	10% (6)	4% (2)	2.603	.1228
SDF is a good treatment to be used to treat lesions that: Are in the aesthetic zone in the permanent teeth?	12% (7)	24% (14)	21% (12)	24% (14)	19% (11)	3.138	.1730

Table 2d. Barrier to Usage of SDF Expressed as Percentage with Mean and Standard Error

	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	MEAN	STD ERROR
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I am not using/ may not use SDF because : I don't have enough knowledge	12% (7)	19% (11)	31% (18)	26% (15)	12% (7)	3.069	.1572
I am not using/ may not use SDF because SDF because: I am not well trained in its use	10% (6)	17% (10)	35% (20)	24% (14)	14% (8)	3.138	.1545
I am not using/ may not use SDF because SDF because: Aesthetic is poor.	14% (8)	14% (8)	33% (19)	27% (16)	12% (7)	3.025	.1477
I am not using/ may not use SDF because SDF because: Patient satisfaction is less.	7% (4)	28% (16)	33% (19)	29% (17)	3% (2)	2.948	.1311
I am not using/ may not use SDF because E SDF because: SDF does not have enough evidence for use.	9% (5)	10% (6)	33% (19)	33% (19)	16% (9)	3.362	.1490
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.	5% (3)	21% (12)	31% (18)	29% (17)	14% (8)	3.259	.1446
I am not using/ may not use SDF because SDF because: Level of evidence behind SDF safety and efficacy is not sufficient.	5% (3)	17% (10)	40% (23)	29% (17)	9% (5)	3.190	.1312
I am not using/ may not use SDF because SDF because: Insurance does not cover SDF.	9% (5)	16% (9)	22% (13)	41% (24)	12% (7)	3.328	.1504
I am not using/ may not use SDF because SDF because: SDF is not readily available commercially	7% (4)	42% (25)	28% (16)	14% (8)	9% (5)	2.741	.1403

Table 3. Correlations of 5 Indices Prepared by Combining Questions and the Question: Have You Used/Currently Use SDF in your Clinical Practice?.

Indices Created by Clubbing Questions	A	B	C	D	E	F
A: Have you used/currently use SDF in your clinical practice?	1.000	.210	.025	-.056	-.162	-.117
B: Perceived Knowledge	.210	1.000	.581*	.152	.050	-.128
C: Knowledge on General Indications to Use SDF	.025	.581*	1.000	.344*	.116	-.034
D: Practice of SDF	-.056	.152	.344*	1.000	.422*	.321*
E: Use in Primary/Permanent, Aesthetic/Non-aesthetic Zone	-.162	.050	.116	.422*	1.000	.191
F: Barriers to Usage	-.117	-.128	-.034	.321*	.191	1.000

To the best of our knowledge, this survey is the first of its kind in Saudi Arabia. Thus, even though the convenience sampling technique utilized in the current survey has inherent limitations, the data from this study will provide a baseline for further research on the status of SDF in the country. Moreover, though not strictly random, the survey was circulated to several teaching institutions and hospitals across the country thus ensuring that a larger cross-section of the pediatric dentists in the country can be surveyed.

More than 55% of the respondents acknowledge to either having used or are currently using SDF. The percentage is significantly higher than reported in the general population of dentists [17]. A previous study reported that about 25% were using SDF at the time of the study, with expectation that a larger population of dentists will use it in the future [18]. The current status of SDF use in Saudi Arabia can be considered to be similar since a significant number of pediatric dentists surveyed have never used SDF.

Respondents perceived knowledge regarding SDF use in dentistry was more than 60%. (wherein a great deal and quite a bit were combined). However, on the question of its usage in pediatric patients, the responses were higher (70%) which are comparable to the levels to those reported in literature from the (77%) [18] though it was conducted in the general dentist population. The difference in the percentage of pediatric dentists with perceived knowledge and those actually using SDF, would seem to indicate that certain factors might be preventing them from incorporating SDF into their practice/teaching.

The highest polled opinions for the situations where pediatric dentists preferred the use of SDF was for: use in a medically compromised child and children with behavior issues and anxiety. The findings are consistent with previous studies [15, 17]. Management under general anesthesia is considered by most to be a last resort and any alternatives would be more acceptable to most. Moreover, even parents felt that SDF treatment was more acceptable than the

advanced behavior management methods [19]. Inability to pay for the treatment was rated neutral by most respondents in contrast to agreement by respondents from previous studies [18]. The respondents in our survey were a mix of academicians and practitioners working in both private and government hospitals and institutions. Government hospitals, government and private educational institutions may offer treatment free of cost or at hugely subsidized rates, probably explaining the neutral stance. On the other hand, private practitioners may consider payment as an important factor for choosing SDF.

The responses for use of SDF before restoration either routinely or in high risk patients threw up mixed results with a large number of pediatric dentists undecided on the issue. Most of the literature has reported on the effectiveness of SDF in arresting the carious lesion.

However, evidence for the “preventive-centered caries management” effect of SDF for management of non-cavitated lesions or prevention of new lesions is limited at best [20].

Amongst the indications, highest response was for primary teeth in non-aesthetic zone and least for the permanent teeth in aesthetic zone. Apart from the fact that all the respondents were pediatric dentists, studies have also suggested that the preventive capability of SDF is much higher in primary teeth [21]. Besides, the age group where behavioral issues may prevent restorative work under local anesthesia lies between 3-5 wherein the dentition is exclusively primary. Paradoxically, studies also report that caries in the anterior teeth have a much higher chance of getting arrested than posterior primary teeth and any surface in the permanent dentition [22].

Pediatric dentists believed that the training for the use of SDF must be introduced in the dental curriculum at undergraduate level. A previous study reported that increased professional education leads to more knowledge, positive attitudes and increased chances of SDF use [18]. Moreover, SDF may provide general dentists with limited experience in advanced behavior management techniques, an excellent opportunity to manage caries in uncooperative children.

Conclusion

The use of SDF had a positive correlation on knowledge, probably implying that educating pediatric dentists at various stages may increase SDF use. The surveyed pediatric dentists concurred on the use of SDF in cavitated lesions, but were ambiguous regarding its role in preventive management of caries. Many respondents also believe that SDF must be introduced in undergraduate curriculum in order to afford newer graduates as alternative in management of caries.

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