

AWARENESS AND ATTITUDE TOWARDS SILVER DIAMINE FLOURIDE TREATMENT AMONG PAKISTANI DENTAL PRACTITIONERS IN ISLAMABAD PRIVATE AND GOVERNMENT DENTAL HOSPITALS

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ABSTRACT

The current study investigated the awareness regarding silver diamine fluoride treatment and the attitude towards the utilization of treatment among Pakistani dental practitioners. To test the proposed objective, a cross-sectional study with purposive and convenient sampling technique was utilized. The data was collected during the time period of July 2022 and August 2022, using a validated and published questionnaire. A sample of (N = 350) was collected from private and government dental hospitals of Islamabad with participants having age range of 24-67 (M = 35.20, SD = 7.66). The participants were provided with the questionnaire after seeking their consent. The questionnaire enquired the participants' awareness regarding SDF treatment and their attitude towards its usage for dental carries. The dental practitioners from private and government hospitals of Islamabad provided their responses regarding the knowledge they had regarding SDF treatment and their consideration towards the treatment. The mean for knowledge and attitude of dental practitioner towards the treatment was 47.47 and 67.53 respectively. As majority of dental practitioners were greatly aware of SDF treatment, and majority of them agreed to the application of the treatment. This knowledge and attitude regarding the treatment was slightly higher in private dental hospitals as compared to government hospitals. The study provided significant results and held a thorough investigation while keeping in view the cost-effectiveness, ease of application and the non-esthetic prospect of the treatment.

Keywords: silver diamine fluoride, dental carries, tooth decay, attitude, awareness, dental hospitals

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INTRODUCTION

As the world is moving towards leading-edge innovations, the field of dentistry also has now evolved offering effective solutions and advanced technologies. Silver diamine fluoride is one such solution, which is now extensively being used across the world to prevent dental caries. The advancements in dental research served as an inspiration for the creation of silver diamine fluoride. It was first discovered in the 1960s as a byproduct of silver nitrate, which had been utilized for many years as an antibacterial agent. But it wasn't until the 1990s that its potential for dental applications was discovered, sparking a frenzy of scientific inquiry and additional research. SDF was first mostly utilized

in Japan and a few other Asian nations, where it became renowned owing to its efficiency and simplicity of usage. As awareness spread about its advantages, dental experts all over the world started using silver diamine fluoride in their treatment plans.¹

Being a clear liquid silver diamine fluoride has a composition of 38% fluoride ions and 25% silver ions with a pH of 10, further containing 8% ammonia and 62% water. The combination of silver and fluoride provides strengthening effect and helps in prevention and processing of dental caries. The solution is directly applied to the tooth. The contact allows diamine silver ion to react with the hydroxyapatite (the inorganic part forming tooth enamel).² The reaction forms silver phosphate and silver oxide. Silver phosphate is known for preventing antibacterial properties and phosphate further acts as a building block for teeth formation, while silver oxide stains the tooth lesions giving them darker or blackened color.^{3,4} Silver diamine fluoride further prevents collagenolytic enzymes from breaking down dentin organic matrix and acts as antibacterial

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by forming organometallic complexes and inhibiting DNA replication of the bacteria, thus silver diamine fluoride treatment remineralizes and inhibits the demineralization of dentin matrix thus preventing caries and lesions.⁵ The prevalence of dental caries and lesions has increased over the time. A study in Iran showed a 75.3% prevalence of dental caries across primary school children, similarly 94% prevalence of dental caries was found across children within the age group of 5-7 years in India.^{5,6} While another study showed 22.9% prevalence of dental caries across the children and adolescents of Nigeria.⁷ A meta-analysis conducted in Pakistan by Siddiqi and colleagues revealed a nationwide prevalence of dental caries of 56.62%. highlighting the want for efficient remedies and treatments⁸ A similar need for 3 effective treatments was exhibited by Qureshi and colleagues in the preformed a cross-sectional study yielding 51% of dental caries prevalence in Karachi.⁹ Thus, when surveyed regarding dental caries and the effective solutions literature pointed out the usage of silver diamine fluoride treatments. A cross sectional study by pawasha and colleagues in Lahore showing 78 % dentists prefer use of silver diamine fluoride.¹⁰ The ease of application and the low cost add to the potential benefits of silver diamine fluoride treatment thus being preferred extensively by dental practitioners. The blackening of teeth due to the silver oxide formed during the reaction is a potential drawback of the treatment; however, being considered one of the minimally invasive treatments, Silver diamine fluoride usage is relatively high across different countries. Thus, being a significant development in dental treatment, Silver Diamine Fluoride provides a non-invasive and economical way to fight tooth decay. Better preventive and treatment alternatives for oral health are now possible thanks to its scientific roots and subsequent global adoption. With these characteristics in mind, the current study explored the substantial developments brought by the application of silver diamine fluoride treatment in the field of dentistry in Pakistan. It further peaked into the promising future for the control and advection of dental decay if the dental community continues to adopt SDF. The current study investigates the knowledge of Silver diamine fluoride treatment across dental practitioners in Islamabad's private and dental hospitals while exploring attitudes towards its usage.

METHODOLOGY

Data was collected through convenient and purposive sampling method after permission by the ethical committee of Rawal Institute of health sciences from July 2022 to August 2022 A modified validated questionnaire by Antonioni and Inglehart was utilized.¹¹ The data was collected through purposive sampling during July 2022 and August 2022. Further questionnaire enquiring the demographics of the participants

was attached to attain information regarding the age, gender, professional development and employment status of the participants. A total of 400 questionnaires were distributed across dental practitioners of private and government teaching hospitals in Islamabad, however due to missing values and skewed responses, 50 questionnaires were discarded. Thus, a sample of (N = 350) collected through purposive sampling technique was taken from dental practitioners having age range of 24-67 (Mean = 35.20, Standard deviation = 7.66), practicing either in government or private hospitals. Further mainly dental consultants, demonstrators, house officers and postgraduate residents were targeted for data collection. The next part of questionnaire included the questions enquiring the knowledge of the practitioners regarding SDF treatment, and the last part of the questionnaire observed the attitude of practitioners towards SDF treatment. Data was analyzed to determine the descriptives of the study variables, using SPSS version 22, the descriptive statistics of the study items were obtained along with frequency and percentiles. In order to further analyze the association between higher knowledge of practitioners regarding SDF treatment with their attitude or consideration of the treatment, correlational analysis was performed. Moreover, in order to analyze the difference of knowledge and attitude towards SDF treatment across private and government hospitals, t-test analysis was performed.

RESULTS

The results illustrated that 350 dental practitioners provided their input regarding the awareness and attitude towards SDF treatment, the number of male dental practitioners was 207 (59.1%) higher as compared to female dental practitioners; 143 (40.9%).

Higher number of participants had an age range of 24-34 years, with most of them reporting that they practiced in government hospitals (191). Table 1 provides the frequency and percentage of the characteristics of the practitioners.

Furthermore, higher number of participants reportedly 191 (54.6%) were practicing in government hospitals, while 159 (45.4 %) reported they were practicing in private hospitals Most of the participants were postgraduate residents (frequency percentages= 185, 52.9%), while others were dental consultants (f = 75, 21.4%), house officers (f = 49, 14.0%), and dental demonstrators (f = 41, 11.7%). Further the dental practitioners reported that they received patients of all ages ranging from 5 years of age and onwards. While the greater proportion was of patients within the age range of 13-20 years. Table 2 Frequency and Percentage of Responses on Knowledge regarding Silver Diamine Fluoride Treatment (N = 350)

TABLE 1: FREQUENCIES AND PERCENTAGE OF CHARACTERISTICS OF DENTAL PRACTITIONERS (N = 350)

Variable	f (%)	Variables	f (%)
Age		Professional development	
24-34	108 (30.9)	Consultants	75 (21.4)
35-45	73 (20.9)	Demonstrators	41 (11.7)
46-56	99 (28.3)	House Officers	49 (14.0)
57-67	70 (20.0)	Postgraduate Residents	185 (52.9)
Gender		Age range of patients	
Male	143 (40.9)	5-12 years	116 (33.1)
Female	207 (59.1)	13-20 years	123 (35.1)
Employment		25 +	111 (31.7)
Private	159 (45.4)		
Government	191 (54.6)		

TABLE 2: PROVIDES THE FREQUENCY AND PERCENTAGES OF THE RESPONSES PROVIDED ON THE QUESTIONNAIRE ENQUIRING THE KNOWLEDGE OF PARTICIPANTS ON SDF TREATMENT

Items regarding Self-perceived general SDF knowledge	Nothing f (%)	Slightly aware f (%)	Somewhat aware f (%)	Moderate aware f (%)	A great deal f (%)
What SDF is used for in dentistry?	7 (2.0)	54 (15.4)	62 (17.7)	67 (19.1)	160 (45.7)
How SDF is used for treatment of tooth hypersensitivity?	10 (2.9)	85 (24.3)	49 (14.0)	38 (10.9)	160 (45.7)
How SDF is used to treat dental caries in pediatric patients?	3 (0.9)	61 (17.4)	69 (19.7)	48 (13.7)	169 (48.3)
How SDF is used to treat dental caries in adult patients?	5 (1.4)	61 (17.4)	65 (18.6)	60 (17.1)	159 (45.4)
The advantages SDF tx can have over traditional dental treatments?	9 (2.6)	65 (18.6)	50 (14.3)	61 (17.4)	165 (47.1)
The potential problems SDF usage can have?	18 (5.1)	61 (17.4)	63 (18.0)	63 (18.0)	145 (41.4)
Which, if any, codes SDF tx can be billed under?	15 (4.3)	59 (16.9)	73 (20.9)	54 (15.4)	149 (42.6)
Items regarding Cavitated lesion knowledge	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
SDF can be used to arrest cavitated lesions in enamel	4 (1.1)	7 (2.0)	85 (24.3)	116 (33.1)	138 (39.4)
SDF can be used to arrest cavitated lesions in dentin.	1 (0.3)	71 (20.3)	71 (20.3)	54 (15.4)	153 (43.7)
SDF can be used to arrest cavitated root caries	0 (0.0)	34 (9.7)	71 (20.0)	60 (17.1)	185 (52.9)
Infected soft dentin must be removed prior to applying SDF	5 (1.4)	13 (3.7)	63 (18.0)	123 (35.1)	146 (41.7)
SDF is a good tx for arresting caries when it is not possible to restore all lesions in one appointment	3 (0.9)	12 (3.4)	54 (15.4)	93 (26.6)	188 (53.7)

Items Regarding Non-cavitated lesion knowledge					
SDF can be used to arrest non-cavitated lesions in enamel.	9 (2.6)	127 (36.3)	53 (15.1)	148 (42.3)	13 (3.7)
SDF can be used to arrest non-cavitated root caries.	122 (34.9)	85 (24.3)	85 (24.3)	49 (14.0)	9 (2.6)
Items regarding SDF use prior to all restorative treatment					
SDF should be used prior to placing all restorations in all patients	126 (36.0)	26 (7.4)	103 (29.4)	70 (20.0)	25 (7.1)
SDF should be used prior to all restorations in at-risk patients	156 (44.6)	37 (10.6)	61 (17.4)	73 (20.9)	23 (6.6)

TABLE 3: FREQUENCY AND PERCENTAGES OF RESPONSES ON ATTITUDE OR CONSIDERATIONS QUESTIONNAIRE REGARDING SILVER DIAMINE FLUORIDE TREATMENT (N = 350)

Items regarding Patient-related indications for SDF usage	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
For restorations in children with behavioral issues	5 (1.4)	5 (1.4)	8 (2.3)	46 (13.1)	286 (81.7)
When patients are medically fragile (28.9)	5 (1.4) 224 (64.0)	14 (4.0)	6 (1.7)	101	
When patients have severe dental anxiety	8 (2.3)	7 (2.0)	10 (2.9)	86 (24.6)	239 (68.3)
When patients are undergoing or have recently undergone radiation therapy or chemotherapy	0 (0.0)	5 (1.4)	52 (14.3)	52 (14.9)	243 (69.4)
When patients take bisphosphonate medications	0 (0.0)	3 (0.9)	19 (5.4)	44 (12.6)	284 (81.1)
If patients would have to be put under general anesthesia for dental treatment otherwise	0 (0.0)	6 (1.7)	25 (7.1)	55 (15.7)	264 (75.4)
If patients would be unable to receive normal dental treatment and could also not be put under general anesthesia for treatment	7 (2.0)	10 (2.9)	12 (3.4)	49 (14.0)	272 (77.7)
If patients with microstomia have difficult to access lesions that require treatment	0 (0.0)	3 (0.9)	15 (4.3)	61 (17.5)	271 (77.4)
Items regarding Cost-related indications for SDF usage					
When a patient wants a composite restoration at a later time but cannot currently afford it.	0 (0.0)	4 (1.1)	32 (9.1)	43 (12.3)	271 (77.4)
When a patient wants an amalgam restoration at a later time but cannot currently afford it.	0 (0.0)	0 (0.0)	29 (8.3)	84 (24.0)	237 (67.7)
When patients cannot pay for restorations.	2 (0.6)	8 (2.3)	72 (20.6)	76 (21.7)	192 (54.9)
Items regarding Considerations to treatment not in esthetic zone					
Are not in the esthetic zone on primary teeth.	10 (2.9)	49 (14.0)	75 (21.4)	47 (13.4)	169 (48.3)

Are not in the esthetic zone on permanent teeth	0 (0.0)	0 (0.0)	15 (4.3)	84 (24.0)	251 (71.7)
Items regarding Considerations to treatment in esthetic zone					
Are in the esthetic zone on primary teeth	186 (53.1)	29 (8.3)	55 (15.7)	80 (22.9)	0 (0.0)
Are in the esthetic zone on permanent teeth.	186 (53.1)	12 (3.4)	84 (24.0)	64 (18.3)	4 (1.1)

TABLE 4: DIFFERENCES OF KNOWLEDGE AND CONSIDERATION OF SDF TREATMENT ACROSS EMPLOYMENT STATUS AND GENDER (N = 350)

Variable	Knowledge			Attitude		
	N	Mean	P-Value	N	Mean	P-Value
Gender						
Male	207	48.07		207	68.27	
Female	143	46.11	0.01	143	66.46	0.00
Employment Status						
Private	159	47.8		159	68.07	
Government	191	47.09	0.58	191	67.08	0.03

The results of table 1 provided that 45.7% of participants were well aware of the use of SDF in dentistry, they also showed their awareness regarding the utilization of SDF intooth hypersensitivity. 48.3% practitioners were greatly aware of SDF implementation on pediatric patients, when treated for dental carries, similarly 45.4 % reported their awareness in case of implementation on adults. Majority of practitioners (47.1%) reported that they acknowledge the advantage SDF treatment can provide when compared to traditional treatments. Further the practitioners also exhibited their awareness regarding the potential problems of SDF treatment (41.4%) and the codes SDF treatment can be billed under (42.6%). Majority of participants (72.5) agreed to the implementation of SDF when treating cavitated lesions in enamel, 58.8% agreed with SDF treatment when arresting cavitated lesions in dentin, followed by 52.9% exhibiting their strong agreement with SDF treatment for cavitated root caries. 41.7% dental practitioners agreed that the infected dentin must be removed prior to SDF treatment and 53.7% were in agreement to the application of SDF treatment in case of step wise treatment of lesions. However, when enquired regarding SDF treatment for non-cavitated lesions in enamel 36.3% disagreed to it, while 42.3 % showed their agreement. Similar responses were obtained while enquiring regarding arresting non-cavitated root carries with SDF treatment, as 34.9% practitioners showed their disagreement. Mirroring these results majority of practitioners disagreed when they were asked if SDF treatment can be applied prior to restoration in all patients (36.0%) and in-risk patients

(44.6%).

Results of Table 3 illustrated that 94.8% practitioners were in favor of SDF treatment in children with behavioral issues, and 92.9% in case of medically fragile patients. Following this, 92.9% practitioners provided their agreement with SDF treatment on patients suffering from dental anxiety, in case of patients who had undergone any radiation therapy the agreement rate was 84.3%, for patients taking bisphosphonate patients (93.7%), when patients had to be put under general anesthesia for dental treatment otherwise (91.1%), normal treatments (91.7%), and patients with microstomia condition having treatment difficulties (94.9%).

Keeping in view the cost related concerns of treatment, when enquired to practitioners they agreed to carry out the treatment in case of composite restoration (89.7) and amalgam restoration (91.7%) even if the patient will pay after the treatment.

However, 76.6 % agreed they will carry out their SDF treatment for patients in need even if the patient is unable to afford the costs of the procedure. Considering the effect of SDF treatment on physical appearance, 61.7% and 95.7% practitioners agreed the treatment being non-esthetic for both primary and permanent teeth.

After observing the Knowledge and awareness of the practitioners regarding SDF treatment, the association between Knowledge regarding the treatment and the attitude or consideration towards the treatment was

observed through correlation analysis. The results provided that there was significant association, exhibiting that the higher the knowledge a practitioner holds regarding the treatment, it is more likely for him/her to implement the treatment.

Further the difference of knowledge and attitude towards SDF treatment across private and dental hospitals of Islamabad, and genders was observed through t-test analysis.

The comparison of Private and government dental hospital practitioners exhibited the knowledge regarding the SDF treatment across both divisions. The table demonstrated that there was a significant difference in knowledge and attitude towards the treatment across male and female practitioners further the attitude towards the treatment also significantly different across private and government practitioners, however knowledge regarding the treatment was same.

DISCUSSION

While the field of dentistry is constantly evolving, with new inventions and preventive strategies for dental problems being introduced, however the prevalence of dental carries and lesions is still on rise. The effectiveness of SDF treatment for handling such spike of dental issues has been discussed thoroughly in international studies, however, studies regarding the treatment are still limited in Pakistan.^{11,12} The SDF treatment being one of the effective solutions for dental carries and lesions, has its drawback as one of the most discussed drawbacks of SDF treatment is the black stain left due to the silver oxide yielded after the reaction, which can cast non-aesthetic appearance of teeth^{10,13}. With this concern, the current study aimed to explore the knowledge withheld by dental practitioners regarding the SDF treatment. Further the study aimed to explore the preference of dental practitioners or their consideration of SDF treatment when treating dental carries or lesions. The study investigated either dental practitioners consider the non-esthetic effect of the treatment, or they considered the treatment due to its cost effectiveness and easy application. The results of the study provided that dental practitioners of private and government hospitals of Islamabad, were well aware of SDF treatment and knew its applications and side effects, they further provided their opinions regarding the cost-effectiveness and esthetic concerns of the treatment. Study participants reported that most of the patients they received had age range of 13, thus they agree that SDF treatment can be applied to child with behavioral issues, and patients with dental anxiety.^{13,14} The results of the study were in agreement with study by palwasha and colleagues as they concluded in their study that SDF treatment can be a better and effective solution for children with

behavioral issues and patients having conditions of dental anxiety, previously undergone radiation therapy, and taking bisphosphonate mediations. Similarly, investigation of knowledge and consideration towards the treatment across Saudi Arabia provided parallel results with practitioner agreeing to the effectiveness of the study, however pointing out the non-esthetic effect of the treatment.¹⁴ The study provides an insight into the awareness of SDF knowledge across hospitals of Islamabad and its effectiveness and consideration by dental practitioners, providing information to the dental researchers and giving them suggestion to add the knowledge regarding SDF into dental courses, thus advancing the field and moving towards more cost-effective strategies considering the economic conditions of the country and the benefit of patients^{11,14} The study faced limitations regarding data collection as due to the scenario of COVID-19 pandemic, although been controlled still held its impacts and limited the access to hospitals was difficult thus affecting the size of data. Thus, it is suggested to future studies to include patients' consideration towards the treatment given the cost effectiveness and esthetic prospects of the treatment.

CONCLUSION

The current study explored the knowledge of SDF treatment withheld by dental practitioners and their consideration of the treatment given different conditions. The responses yielded provided that dental practitioners of private and government hospitals of Islamabad were greatly aware of SDF treatment, its application, its side effects and other prospects. The mean for knowledge and attitude of dental practitioner towards the treatment was 47.47 and 67.53 respectively insinuating that SDF can prove to be a cost effective strategy to treat dental carries and lesions. Aiding to this, the easy application of the treatment and its effectiveness in curing the dental issues can have significant impact.

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