



Assessment of Knowledge, Attitude and Practice Towards Silver Diamine Fluoride among Undergraduate Students

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ABSTRACT:

Background:

Silver diamine fluoride is effective, as it arrests nearly 80% of the treated lesions. It is efficient and can be applied with minimum training in less than 1 minute by health professionals in various health and community settings. It is patient-centered and meets the instant needs of a child in one treatment session as it is minimally invasive and painless.

Aim:

The aim of the study is to assess the knowledge, attitude and practice towards silver diamine fluoride among undergraduate students.

Methodology:

A self-validated questionnaire of 15 questions based on silver diamine fluoride is shared to dental students through e-mail. The obtained data were collected, descriptive analysis was done, tabulated and the results were interpreted using SPSS 26.0 software.

Results:

The study showed that 45.8% of participants were aware of silver diamine fluoride. Only 9.9% of participants had done fluoride application with silver diamine fluoride and only 42% is aware of silver diamine fluoride is not commonly used.

Conclusion:

The study concluded that the overall knowledge of the participants regarding the use of silver diamine fluoride is not adequate. Hence, the study suggested that expanded education about the proper use, application, and limitations of SDF is needed and it can be obtained by attending conferences, CDE programs, various lectures and seminars.

1. Introduction

Dental caries, a highly common and avoidable condition globally, affects between 69% to 79% of the population. Dental cavities can significantly impact both oral health-related quality of life and dental treatment outcomes. Untreated cavities in teeth can cause pain, difficulties with eating and drinking, and disruptions in sleep patterns. They also diminish confidence in smiling. Preschool children may experience increased school

absences, and hindered learning abilities, affecting their overall health and development.¹

Silver diamine fluoride (SDF) has emerged as a popular method for halting dental caries with minimal invasiveness. Its approach is distinctive, functioning on two fronts: silver ions combat bacterial activity and prevent the degradation of dentine collagen, while fluoride ions (at a concentration of 48,800 ppm) bolster remineralization. When combined within an alkaline



solution, these elements harmonize to uniquely promote the arrest and remineralization of carious lesions.²

Although SDF offers notable benefits, its primary drawback is the permanent black staining it causes on carious lesions. This aesthetic issue may result in reduced acceptance and satisfaction among parents, children, or dental professionals. Research indicated that parents are more likely to accept SDF treatment when it's applied to posterior rather than anterior teeth, especially among patients from lower socio-economic backgrounds, and when children require more advanced behaviour management techniques. Consequently, dental practitioners might refrain from proposing SDF treatment assuming that parents would reject it due to aesthetic concerns.³

The recent approval of SDF by the FDA in 2015 for use in the USA adds another layer of complexity to its adoption. Being a relatively new material, dental practitioners may have limited knowledge about it. For instance, a survey conducted among Brazilian dental practitioners highlighted a lack of knowledge as the primary barrier to the use of SDF. Similarly, in Saudi Arabia and the USA, studies have demonstrated a positive correlation between knowledge, attitude, and the utilization of SDF.⁴⁻⁶

2. Objectives

The aim of this research is to investigate the educational backgrounds, knowledge, and attitude of dentists about the professional use of SDF. More precisely, we aimed to ascertain whether exposure to SDF education during undergraduate studies correlates with a more favourable attitude towards SDF and higher levels of its clinical utilization.⁷

3. Methods

The development and validation of the questionnaire involved a rigorous process to ensure its reliability and validity. The study was approved by institutional review board (IRB) of faculty of dentistry under registration number (2023/irb-july-pedo01/apdch). The survey took place in august 2023 and opened for 5 months. Firstly, a thorough review of existing literature on silver diamine fluoride (SDF) was conducted to identify pertinent topics and questions. Additionally, input from experts in the

field of dentistry was sought to validate the content of the questionnaire.

The finalized questionnaire comprised structured 15 close ended questions covering a broad spectrum of SDF-related topics, including its mechanism of action, indications for use, contraindications, and clinical applications. These questions were designed to assess both theoretical knowledge and practical understanding of SDF among dental students. Dental undergraduate students (3rd, final year and interns) who were willing to participate in the study were involved. First and second year undergraduates excluded from study.

Subsequently, the questionnaire was distributed to dental students via email, accompanied by clear instructions for completion. Participants were assured of the confidentiality of their responses and were encouraged to provide honest and accurate answers.

Upon completion of data collection, the obtained responses were collected in Microsoft Excel sheet. Descriptive analysis using chi-square test was performed and p-value of less than 0.05 considered statistically significant. Descriptive statistics, such as frequencies and percentages, were used to summarize the participants' responses to each questionnaire item. The statistical analysis was performed using SPSS 26.0 software. It provided insights into the overall level of knowledge among dental students regarding SDF.

4. Results

A total of 131 respondents engaged with the survey, from a total of 200 participants who were contacted, yielding a response rate of 65.5%. Over half of the respondents, totalling 46%, exhibited recognition or knowledge regarding silver diamine fluoride (SDF). This suggested that a substantial portion of the surveyed individuals possessed some level of awareness or familiarity with SDF. (Table 1)

Table 1: percentage distribution regarding knowledge, attitude and practice of SDF

S. no	Questions	Respondents			
		Yes	No		
1	Are you aware of silver diamine	53.1 %	46.9 %		



	fluoride in dentistry?				
2	Have you done any fluoride applications with silver diamine fluoride?	Yes	No		
		89.9 %	10.1 %		
3	When do you prefer to use silver diamine fluoride?	Caries prevention	Pulp protection	Desensitizing agent	All of the above
		21.4%	7.1%	9.4%	59.1%
4	What is the contraindication for using silver diamine fluoride?	Xerostomia	Pulpal therapy	Severe ecc	All of the above
		26.4%	16.3%	10.9%	46.5%
5	How will you apply silver diamine fluoride?	Single application	Biannual application	Weekly application	No idea
		21.1%	32%	7.8%	39.1%
6	What is the pH of silver diamine	7	12	10	No idea
		23.3%	14%	24.8%	38%

	fluoride ?				
7	One drop of silver diamine fluoride treats how many surfaces?	4 surfaces	2 surfaces	5 surfaces	No idea
		24.6%	23.8%	10.3%	41.3%
8	Why silver diamine fluoride is not commonly used?	Does not arrest caries	Black staining	Irritates soft tissue	No idea
		6.2%	42.6%	24.8%	26.4%
9	What happens when silver diamine fluoride get contact with mucosa?	Pain	Irritation	Black stain	No idea
		3.9%	41.9%	24.8%	29.5%
10	What percentage of silver diamine fluoride used in dentistry?	12%	26%	38%	No idea
		25%	12.5%	14.8%	47.7%
11	What is the ppm of fluoride present in silver diamine	44,800 ppm	22,600 ppm	12,800 ppm	No idea
		22.5%	20.9%	17.8%	38.8%



	fluoride ?				
12	Which material do we use to overcome the staining property of silver diamine fluoride ?	Calcium phosphate	Potassium iodide	Silver phosphate	No idea
		23.6%	15.7%	23.6%	37%
13	How will you apply silver diamine fluoride ?	Circulation	Scrubbing motion	Back and froth motion	No idea
		14.1%	22.7%	25%	38.3%
14	What discomfort, the patient experience during silver diamine fluoride application?	Prolonged duration	Irritation	Unpleasant metallic taste	No idea
		8.7%	26%	37%	28.3%
15	How do you use silver diamine fluoride in the proximal areas?	Applicator tip	Dental floss	Cotton rolls	No idea
		31.3%	28.9%	8.6%	31.3%

Among total respondents, only 10% had applied and used SDF. Responses concerning permanent black discoloration on the tooth after treatment were perceived

as somewhat of a barrier or a significant barrier by 55.39% of participants. Over 40% of participants were unaware of the dosage required and treating surfaces with a single drop of SDF. More than 50% were aware of indications of SDF.

5. Discussion

Dental caries stands as one of the most prevalent and persistent oral conditions, inflicting significant discomfort and functional limitations. It leads to various complications, including severe pain, hindrances in chewing and nutrition intake, potential infections, and subsequent school or work absenteeism. Studies suggested that students experiencing dental pain are three times more likely to struggle academically, alongside difficulties in sleeping and the need for extensive and costly dental procedures, often requiring general anaesthesia.⁸

Hence, it is imperative to prioritize effective treatments that minimize trauma and invasiveness, such as fluoride-based interventions like water fluoridation, fluoride application, and fluoride-containing toothpaste. Silver diamine fluoride (SDF) application emerges as a promising approach, offering acceptability and satisfaction in managing carious lesions.⁹

As per the guidelines established by the American Dental Association (ADA), silver diamine fluoride (SDF) material is advised for the arrest of advanced cavitated lesions in primary teeth. Additionally, it is recommended for arresting occlusal carious lesions in permanent teeth.¹⁰

Previous studies have demonstrated varying levels of awareness and acceptance of SDF among dental students and professionals. Smith et al (2019) found that while a majority of dental students were aware of SDF, there were gaps in their knowledge regarding its indications, contraindications, and application techniques.¹¹ This suggested the need for targeted education and training programs to improve students' understanding of SDF and its clinical use.

Similarly, Lee et al (2020) reported mixed attitudes towards SDF among dental students, with some expressing concerns about its aesthetic effects and long-term safety. These findings highlight the importance of addressing misconceptions and providing evidence-



based information to promote the acceptance of SDF as a viable treatment option for dental caries.¹²

In contrast, studies such as Chen et al (2018) and Zhi et al (2019) found positive attitudes towards SDF among dental students, with a majority expressing willingness to use it in their future practice. These studies suggested a growing acceptance of SDF as an effective and minimally invasive treatment modality for caries management among dental students.^{13,14}

The limitation of the study was the small sample size which may restrict the generalizability of the findings to a broader population. Additional research with a broader scope, encompassing larger sample sizes and involving dentists from diverse sectors and regions, is warranted to yield more definitive and widely applicable conclusions. Furthermore, this study prompts inquiries and highlights avenues for exploration in future research. Specifically, investigating aspects such as educational background, teaching methodologies, and clinical experiences can offer valuable insights into identifying the root causes of gaps in the current knowledge among dentists.^{15,16}

6. Conclusion

The study successfully achieved its objective by evaluating the knowledge attitude and practice among undergraduates towards Silver Diamine Fluoride (SDF). The findings revealed that the overall knowledge of the participants regarding the use of silver diamine fluoride is not adequate. As highlighted earlier, SDF is an economical method for managing caries that requires minimal equipment and training. This research represents one of the initial efforts to comprehensively assess undergraduates understanding and views on SDF. Hence, the study suggests that expanded education about the proper use, application, and limitations of SDF is needed and it can be obtained by attending conferences, CDE programs, various lectures and seminars.

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