

Research Article

## Assessment of parental perceptions and acceptance of silver diamine fluoride staining among the children with dental caries experience in a Town in South India – A cross-sectional study

Elango Akshitha<sup>1</sup>, Shavi R. Girish<sup>1</sup>, Shanmugam Shankar<sup>1</sup>, Gunasekaran Lalithambigai<sup>1</sup>, Smith John<sup>1</sup>

<sup>1</sup>Department of Public Health Dentistry, Vivekanandha Dental College for Women, Namakkal, Tamil Nadu, India.



**\*Corresponding author:**

Elango Akshitha,  
Department of Public Health  
Dentistry, Vivekanandha Dental  
College for Women, Namakkal,  
Tamil Nadu, India.

[e.akshitha@gmail.com](mailto:e.akshitha@gmail.com)

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### ABSTRACT

**Objectives:** The aim of the study was to assess the parental perceptions of silver diamine fluoride (SDF) dental staining using a pre-tested questionnaire and SDF treatment photographs.

**Materials and Methods:** In this cross-sectional study, 300 parents of pre-school children with previous dental cavity experience were randomly selected to obtain data. Univariate analysis of the association of variables and the acceptability of SDF based on the treatment was conducted using the Mann-Whitney U test,  $P < 0.05$  was considered statistically significant. SDF treated photographs of anterior and posterior teeth were displayed and their understanding of the ease of application and dental staining was obtained using a pretested, self-structured, and closed-ended questionnaire by face-to-face interview method.

**Results:** After interviewing 163 mothers and 137 fathers, 62.4% of participants acknowledged SDF staining on the posterior teeth to be satisfactory, but only 28.7% of parents made this equivalent judgment about anterior teeth ( $P < 0.005$ ). In the absence of their child having behavioral barriers to conventional restorations, 60.3% of parents reported that they were likely to settle on SDF to treat their child's posterior teeth, but only 21% of participants were likely to settle on SDF to treat their child's anterior teeth. The level of acknowledgment of the parents increased with the children's behavioral barriers.

**Conclusion:** Although staining on anterior teeth was undesirable, most parents opted for this cavity management over advanced behavioral techniques. Therefore, the proper understanding of parental perceptions is important while choosing SDF for treating dental caries.

**Keywords:** Silver diamine fluoride, Dental esthetics, Dental caries, Parental perceptions

### INTRODUCTION

Dental caries is one of the significant public health issues that impact individuals of different age groups which is characterized by progressive demineralization and degradation of organic tooth structure.<sup>[1-4]</sup> This is caused by a dynamic interaction between dietary sugars and bacterial acidic metabolic by-products.<sup>[5]</sup> Environmental factors such as dental care availability, socio-economic groupings, and attitudes toward oral hygiene and tooth loss influence the extent of the decay.<sup>[6]</sup> The current method of restoration of teeth with dental caries involves cavity preparation by removing the infected tooth material and restorations done with invasive procedures that

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bring anxiety and are highly time-consuming.<sup>[7]</sup> One of the advanced therapeutic materials is silver diamine fluoride (SDF), used for the prevention and management of caries. Teeth treated with SDF are usually coal-black in appearance and have a smooth and hardened surface.<sup>[8,9]</sup>

Hence, this research aimed to determine how parents of the children who had undergone treatment for dental caries acknowledge the SDF staining using SDF treated photographs and a pre-tested questionnaire.

## MATERIALS AND METHODS

In this descriptive and cross-sectional questionnaire study, a total of 300 parents who were present during their child's previous dental caries treatment procedure were recruited. The sample size was calculated to be 300 using G power software while the power of the study was kept to be 80%. The number of schools with pre-schoolers 3–5 years of age was obtained from the Block Educational Officer. Simple random sampling was done for the recruitment of participants by generating a table of random numbers. One private and two government schools were selected randomly until the necessary sample size was achieved.

The translated questionnaire in vernacular language, to be regulated in government schools, was tested for reliability with a kappa statistic value of 0.8. The pre-tested, self-structured, and closed-ended questionnaire consisted of sociodemographics of the various domains that assessed their previous dental caries experience and parental acceptance of SDF as restorative material on the anterior and posterior teeth of their ward, by face-to-face interview method. The questionnaire also had demonstrated good internal (intra-observer) reliability with Cronbach's alpha ranging from 0.82 to 0.91.

After obtaining approval from the Local Ethics Committee of Vivekanandha Dental College for Women with the reference number VDCW/IEC/197/2019, the purpose of the study was explained and informed consent was obtained from the participants by the first investigator. The socioeconomic status (SES) was calculated using the modified Kuppusamy scale by Consumer Price Index because it can be used in both urban and peri-urban communities and is based on the education and occupation of the head of the family and monthly income of the family.<sup>[10]</sup>

Parents were given information about SDF's general characteristics before being asked to fill out a questionnaire about their sociodemographics, prior dental caries history, and acceptance of SDF. Parents were asked to review their approval of SDF after seeing a color photograph of SDF-treated anterior and posterior teeth.

The inclusion criteria were the parents of preschool children who were present during their child's dental treatment and

who provided consent for participation in the study were recruited. All of them had a minimum of one kid who had undergone restoration of carious teeth in the past because they were conversant in the method of getting teeth with tooth decay treated.

Data obtained were analyzed using version 25.0 of the Statistical Package for the Social Science software (SPSS) program (SPSS Inc., Chicago, USA). Mann–Whitney U test was used to determine the association between the variables of the population and the acceptability of SDF based on the treatment. The value of  $P < 0.05$  was considered to be statistically significant.

## RESULTS

Of 300 parents, the majority (80.7%) are young adults (18–37 years) and the mean age was  $23.15 \pm 6.29$ . Among the participants, the female gender 163 (54.3%) and Hindus 200 (66.7%) were more in number. Most of the study participants were graduates (37.0%), belonging to the lower-middle socioeconomic status 45.7% with one child 51.3% are higher in number [Table 1].

When the parental acceptance regarding the usage of SDF utilization was questioned, more than half of the parents 62.4% judged SDF staining on the posterior teeth to be esthetically acceptable, but only 28.7% of parents made this

**Table 1:** Demographic characteristics of parents responding to the survey ( $n=300$ ).

Variable	Options	n (%)
Sex	Male	137 (45.7)
	Female	163 (54.3)
Age	18–27 years	72 (24.0)
	28–37 years	170 (56.7)
	38–47 years	58 (19.3)
Religion	Hindu	200 (66.7)
	Christian	67 (22.3)
	Muslim	33 (11.0)
Level of education	Illiterate	8 (2.7)
	Primary school	10 (3.3)
	Middle school certificate	21 (7.0)
	High school certificate	108 (36.0)
	Intermediate or diploma	27 (9.0)
	Graduate	111 (37.0)
Socioeconomic status	Profession or honors	15 (5.0)
	Lower	15 (5.0)
	Upper lower	102 (34.0)
	Lower middle	137 (45.7)
	Upper middle	41 (13.7)
Number of children in the family	Upper	5 (1.7)
	1	154 (51.3)
	2	136 (45.3)
	3	10 (3.3)

same judgment about anterior teeth. In the absence of their child having behavioral barriers to conventional restorations, 60.3% of parents reported that they were likely to settle on SDF to treat their child's posterior teeth, but only 21% of participants were likely to settle on SDF to treat their child's anterior teeth [Table 2].

When the number of children with behavioral issues grew, so did the parents' willingness to accept them [Figure 1].

The location and type of teeth significantly influenced the parental acknowledgment of SDF treatment. Univariate analysis was performed based on the child's behavior during dental treatment which indicates that the mean acceptability

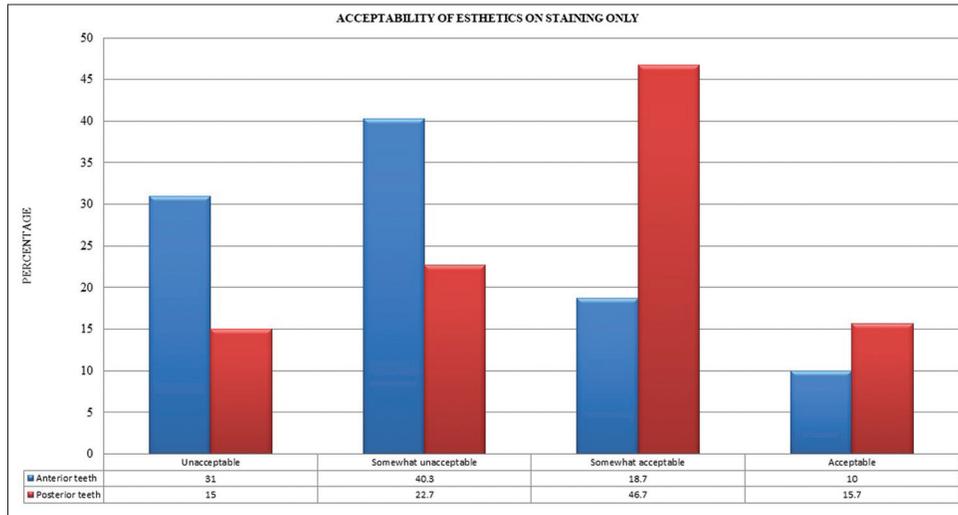


Figure 1: Percentage of acceptability based on staining only.

Table 2: Acceptance of SDF treatment based on the child's behavior and tooth location.

Variables	Options	Anterior teeth n (%)	Posterior teeth n (%)
Cooperative	Unacceptable	104 (34.7)	51 (17.0)
	Somewhat unacceptable	133 (44.3)	68 (22.7)
	Somewhat acceptable	42 (14.0)	119 (39.8)
	Acceptable	21 (7.0)	62 (20.5)
Upset	Unacceptable	97 (32.3)	47 (15.7)
	Somewhat unacceptable	124 (41.3)	80 (26.7)
	Somewhat acceptable	51 (17.1)	119 (39.7)
	Acceptable	28 (9.3)	54 (17.9)
Cried	Unacceptable	94 (31.3)	41 (13.7)
	Somewhat unacceptable	114 (38.0)	73 (24.2)
	Somewhat acceptable	60 (20.0)	126 (42.1)
	Acceptable	32 (10.7)	60 (20.0)
Kicked or screamed	Unacceptable	78 (26.0)	39 (13.0)
	Somewhat unacceptable	108 (36.0)	66 (21.9)
	Somewhat acceptable	74 (24.7)	129 (43.1)
	Acceptable	40 (13.3)	66 (22.0)
Sedation needed	Unacceptable	70 (22.3)	32 (10.7)
	Somewhat unacceptable	93 (31.0)	62 (20.7)
	Somewhat acceptable	100 (33.4)	138 (45.9)
	Acceptable	47 (15.7)	68 (22.7)
GA needed	Unacceptable	42 (14.0)	23 (7.7)
	Somewhat unacceptable	70 (23.4)	47 (15.7)
	Somewhat acceptable	114 (37.9)	154 (51.3)
	Acceptable	74 (24.7)	76 (25.3)

SDF: Silver diamine fluoride, GA: General anesthesia, n: Number, %: Percentage

score was significantly high for posterior teeth when the child was cooperative ( $P \leq 0.003$ ), upset ( $P \leq 0.002$ ), cried ( $P \leq 0.001$ ), kicked/screamed ( $P \leq 0.000$ ), in need of sedation ( $P \leq 0.000$ ), and GA ( $P \leq 0.001$ ). SDF staining on the posterior teeth was significantly acknowledged by the parents when compared to their child's anterior teeth ( $P < 0.001$ ) [Table 3].

Furthermore, the child's cooperation has a huge impact on parental approval. Regardless of the type and location of the teeth, parents of children who had previously shown uncooperative behavior during dental care were slightly more supportive of SDF treatment than parents of cooperative children.

## DISCUSSION

The approval of SDF use on their child's primary tooth region was tested in this research and the results were compared between anterior and posterior teeth positions. Parents were much more tolerant of the staining associated with SDF treatment on their child's primary anterior teeth than the staining on their child's posterior teeth. This is in line with new research findings by Monse *et al.*,<sup>[11]</sup> who suggest that the majority of parents tolerated posterior teeth staining better than the anterior teeth.<sup>[12,13]</sup>

Parents with uncooperative children or children who need more specialized behavior modifications are more supportive of the use of SDF on their children, according to a recent study conducted by Gordon in 2018.<sup>[14]</sup> This is consistent with our results, which show that parental acceptance of the SDF application is high in children who had a history of uncooperative behavior during previous dental care improved dramatically as compared to parents of cooperative children, regardless of the location, and the particular type of teeth. This shows that the parents of our study are willing to give up their child's esthetic image in exchange for the treatment rather than using more extensive behavior modification techniques. This is in sequence with what Clemens *et al.*, Crystal *et al.*, and Bagher *et al.* have stated in the related literature.<sup>[15-17]</sup>

The questionnaire was administered in both Spanish and English, either online or on paper, in the previous studies.<sup>[15,17]</sup> In our research, parents had been interviewed by a qualified dental professional who discussed all the benefits and drawbacks of using SDF. To maintain continuity, each of the parents was given the same photographs. In 2017 research by Clemens *et al.*, respondents' satisfaction was measured shortly after the introduction of SDF, and a large number of the participants accepted the ease of SDF application, and also their acknowledgment of the staining associated with the SDF procedure.<sup>[17]</sup>

Our analysis has certain limitations, for example, the parents were asked about their child's behavior during prior dental care without getting the behavior assessed by a qualified dentist. Parents were often only given photographs of patients before and during therapy. None of the parents who participated had a child who had been treated with SDF.

Their judgment and choice of such services may have been influenced by a lack of such experience. To provide more definitive and generalized results, experiments with wider populations, including parents of children who had undergone SDF care, are needed. When the discomfort caused by SDF treatment was compared with resin incorporation in the treatment of initial carious lesions, SDF treatment was found to be slightly less painful and more appropriate.<sup>[18]</sup>

Our findings feature the significance of following the American Academy of Pediatric Dentistry Guidelines<sup>[17]</sup> in assessing kid and parental conditions before introducing and giving SDF treatment, which likewise underlines the need of using clear and compelling educated consent with appropriate photographs and portrayal of the benefits and hindrances before giving such treatment. SDF is an easy, efficient, cost-effective, and also well-accepted treatment for uncooperative patients, regardless of tooth type or location, according to our findings. SDF should be considered as a strongly suggested treatment choice for caries treatment in less cooperative patients, especially for primary posterior teeth.

## Limitations and recommendations

Further research is needed to have a broader understanding of these values and the decision-making factors related to the parental acceptability of SDF.

## CONCLUSION

Parents acknowledged the SDF staining in posterior teeth, which are less visible regions, and as a result, also when gasping, kicking, or screaming increased as a barrier to the treatment. Many parents agreed to SDF care to prevent

**Table 3:** Mean acceptability according to the behavior for SDF treatment.

Variable	Mean acceptability score $\pm$ SD		P-value
	Anterior teeth	Posterior teeth	
Cooperative	1.93 $\pm$ 0.87	2.64 $\pm$ 0.99	0.003*
Upset	2.03 $\pm$ 0.93	2.60 $\pm$ 0.96	0.002*
Cried	2.10 $\pm$ 0.97	2.68 $\pm$ 0.95	0.001*
Kicked/screamed	2.25 $\pm$ 0.99	2.74 $\pm$ 0.95	0.000*
Sedation	2.40 $\pm$ 1.01	2.86 $\pm$ 0.92	0.000*
GA required	2.73 $\pm$ 0.99	2.81 $\pm$ 0.91	0.001*

SDF: Silver diamine fluoride, GA: General anesthesia, \*Statistically significant

sedation or general anesthesia as a treatment option. Socioeconomic factors moderated the SDF acceptance over the location of tooth and treatment difficulty. SDF is also indicated for individuals with multiple and difficult-to-treat carious lesions with no pulpal involvement and those who have limited access to dental care.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

- American Academy on Pediatric Dentistry. Behavior guidance for the pediatric dental patient. *Pediatr Dent* 2016;40:254-67.
- Wright JT, White A. Silver diamine fluoride: Changing the caries management paradigm and potential societal impact. *N C Med J* 2017;78:394-7.
- Duangthip D, Chu CH, Lo EC. A randomized clinical trial on arresting dentine caries in preschool children by topical fluorides 18 month results. *J Dent* 2016;44:57-63.
- Dos Santos VE Jr., de Vasconcelos FM, Ribeiro AG, Rosenblatt A. Paradigm shift in the effective treatment of caries in schoolchildren at risk. *Int Dent J* 2012;62:47-51.
- Horst JA, Ellenikotis H, Milgrom PL. UCSF protocol for caries arrest using silver diamine fluoride: Rationale, indications, and consent. *J Calif Dent Assoc* 2016;44:16-28.
- Sanders A. Social Determinants of Oral Health: Conditions Linked to Socioeconomic Inequalities in Oral Health in the Australian Population. Adelaide: Australian Institute of Health and Welfare; 2007.
- Zhi QH, Lo EC, Lin HC. Randomized clinical trial on the effectiveness of silver diamine fluoride and glass ionomer in arresting dentine caries in preschool children. *J Dent* 2012;40:962-7.
- Chu CH, Lee AH, Zheng L, Mei ML, Chan GC. Arresting rampant dental caries with silver diamine fluoride in a young teenager suffering from chronic oral graft versus host disease post-bone marrow transplantation: A case report. *BMC Res Notes* 2014;7:3.
- Roberts A, Bradley J, Merkley S, Pachal T, Gopal JV, Sharma D. Does potassium iodide application following silver diamine fluoride reduce staining of the tooth? A systematic review. *Aust Dent J* 2020;65:109-17.
- Saleem SM, Jan SS. Modified Kuppaswamy socioeconomic scale updated for the year 2021. *Indian J Forensic Community Med* 2021;8:1-3.
- Monse B, Heinrich-Weltzien R, Mulder J, Holmgren C, van Palenstein Helderman WH. Caries preventive efficacy of silver diamine fluoride (SDF) and ART sealants in a school-based daily fluoride toothbrushing program in the Philippines. *BMC Oral Health* 2012;12:52.
- American Academy of Pediatric Dentistry. Behavior Guidance for the Pediatric Dental Patient. The Reference Manual of Pediatric Dentistry. Chicago, Ill: American Academy of Pediatric Dentistry; 2020. p. 292-310.
- Primus C. Potassium iodide. The solution to silver diamine fluoride discoloration? *Adv Dent Oral Health* 2017;5:1-6.
- Gordon NB. Silver diamine fluoride staining is acceptable for posterior primary teeth and is preferred over advanced pharmacologic behavior management by many parents. *Evid Based Dent Pract* 2018;18:1894-7.
- Crystal YO, Janal MN, Hamilton DS, Niederman R. Parental perceptions and acceptance of silver diamine fluoride staining. *J Am Dent Assoc* 2017;148:510-8.
- Bagher SM, Sabbagh HJ, AlJohani SM, Alharbi G, Aldajani M, Elkhodary H. Parental acceptance of the utilization of silver diamine fluoride on their child's primary and permanent teeth. *Patient Prefer Adherence* 2019;13:829-35.
- Clemens J, Gold J, Chaffin J. Effect and acceptance of silver diamine fluoride treatment on dental caries in primary teeth. *J Public Health Dent* 2017;7:191.
- Alshammari AF, Almuqrin AA, Aldakhil AM, Alshammari BH, Lopez JN. Parental perceptions and acceptance of silver diamine fluoride treatment in Kingdom of Saudi Arabia. *Int J Health Sci* 2019;13:25-9.

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