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### RESEARCH ARTICLE

## AN VISUAL AID- A MEANS OF PARENT'S PERCEPTION AND CONSENT BEFORE USE OF SILVER DIAMINE FLUORIDE (SDF) ON CHILDREN

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#### Manuscript Info

#### Abstract

##### Manuscript History

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#### Introduction:-

Conventional management of carious lesion is performed by removing the decaying tissue surgically followed by pulp protection and the placement of a suitable restorative material. With the emergence of minimal invasive dentistry (MID), preservation of healthy tooth structure using noninvasive techniques has replaced the traditional approaches.

Dental treatment of young uncooperative children can be challenging and often a pediatric dentist must employ more advanced behavior management techniques including protective stabilization and/or sedation or general anesthesia to be able to perform the required treatment and arrest the lesion's progression<sup>1</sup>. Furthermore, dental caries was known to be managed through two main approaches: treatment, which includes drill and fill or preventive, which depends on early intervention of caries. Therefore, it is of great importance to identify caries lesions in children. Though not new, a metal ion based topical fluoride preparation—silver diamine fluoride (SDF) has attracted increased contemporary attention due to its efficacy in arresting the progression of dental caries.

It has been identified as a cost effective, easy, and simple topical cariostatic agent comprised of silver and fluoride, used in the management of caries and dentin hypersensitivity<sup>2</sup>. It works by forming a squamous layer on the exposed dentin and partially plugging the dentinal tubules.<sup>3</sup> The silver compounds arrest caries by interfering with the ability of the pathogens to form a biofilm on the SDF-treated surface. Also, it encourages remineralization, with the development of fluorapatite from the first hydroxyapatite crystals.<sup>3</sup>

When it comes to parental acceptance of any new technique or restorative material, esthetics is a prime concern. A recent review by Hu et al, in 2018 reported that most of the parents were satisfied with the cosmetic outcome of SDF. Children also found it comfortable and relatively pain-free procedure<sup>4</sup>. While most of the parents rejected such treatment for their children.<sup>5</sup>

To our knowledge, there are no previously published reports in the literature regarding parental perceptions or the acceptance before the use of SDF on the basis of its benefits or on the side effect of staining. In this study, we aimed to assess parental perceptions of SDF staining before its use and to determine whether parent's level of acceptability to SDF would change according to the location of the staining, the child's behavior, and demographic factors. Understanding parent's thoughts about SDF staining, the circumstances in which they would find it acceptable or

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unacceptable, and the factors that may affect their level of acceptance could aid clinicians in developing treatment plans that meet patients' and parents' needs and circumstances.

### Materials and Method:-

This descriptive cross-sectional study was carried out at Chhattishgarh Dental College and Research Institute Rajnandgaon, Chhattishgarh in 2019. We selected our sample from parents who were waiting with their children for their appointment.

### Inclusion criteria:

1. parents of children aged 7 years and younger attending pediatric dental clinics
2. parents must have had children who had caries experience
3. spoke English or Hindi
4. Agreed to participate in the survey.

The expected number of patients attending the pediatric department in a two-month period was estimated retrospectively to be 350 children, giving a sample size of 200 parents. We used a uniform consent statement to invite each parent to participate in our survey (English and Hindi language). Purposeful questionnaire was designed and used for collection of the required data. The following information were obtained from each participants: Age, sex, level of education, annual income, locality, their opinion about the staining as shown in the photographs after using SDF on the anterior and posterior primary teeth.

We conducted the questionnaire containing the introduction about SDF which include indications, benefits and risks of using SDF as well as photographs showing pre/post-operative anterior and posterior teeth treated with SDF<sup>6</sup>.(Fig 1&2)

We evaluated parent's acceptance to this treatment option by presenting standard photographs and the photographs showing carious teeth before the treatment and stained enamel as well as dentin in both anterior and posterior teeth after SDF treatment. The questionnaire was drafted with a 5-point Likert scale ranging from strongly agree, agree, neutral, disagree and strongly disagree. Later, they were asked if they would consider using SDF for their child's primary teeth.

**SHORT STUDY**

**What is Silver Diamine Fluoride (SDF)?**  
Silver Diamine Fluoride is a colorless antimicrobial liquid that can treat cavities in an easy, non-invasive, fast and painless manner.

**INDICATIONS:-**


- Our younger patients.
- Children with severe cavities everywhere in their mouth.
- Uncooperative or fearful children.
- Special needs patients.
- Elderly patients with severe decay and sensitivity

**BENEFITS:-**


- Helps stop tooth decay.
- Can help to relieve sensitivity.
- Non-invasive.
- Painless.
- Comfortable and fast.
- Patient will not need any local anesthetic and there is zero drilling of the tooth structure.

**RISK:-**

- All decayed areas will permanently stain black within a week of treatment.
- If SDF accidentally touches the skin or gums, a temporary brown or white stain may appear.



**Application Technique**



Duffin recommends that the application be repeated at two, four, eight and twelve weeks.

**Figure 1:** Information provided about Silver Diamine Fluoride procedure

**Statistical Analysis:**

The collected data were tabulated and statistically analyzed using Windows SPSS Software (version 18). Descriptive statistic was presented as frequency, percentage, mean and standard deviation. Chi square test was used to assess gender wise difference and t-test to assess geographic location difference in level of acceptability.



**Figure 2:-** Photographs showing pre/post-operative anterior and posterior teeth treated with SDF.

**Results:-**

In this study, a total of 200 parents completed the survey and provided their demographic information. All of the parents had at least one child who had experienced dental caries in the past, so they were familiar with the process of having teeth with caries restored.

Of the 200 participants, 58(26%) were males and 142 (74%) were females aged between 19 to 51 years. The great majority of the participants were in the age range of 21–30 years i.e., 150 (75%). When asked about the procedure of application of SDF, some parents(68% ) agreed and some parents (32%) strongly agreed that SDF application is an easy procedure. Whereas 57% parents strongly agreed that time taken for the SDF application is less and is cost effective.

When we asked their opinion about the staining shown in the photographs,(Fig 2) we found most of the parents are not accepting the staining (strongly disagree 82%) and in term of parental gender, we found that there was statistically significant difference in acceptance with discoloration of cavities after SDF placement with  $P = 0.001$  ( $P < 0.05$ ).(Table 1)

According to Figure 3, parents judged staining on the anterior teeth to be esthetically not acceptable (disagree 66%) whereas 71% accepted for posterior teeth. There was a statistically significant difference in acceptance ratings between male and female with SDF on posterior teeth in  $P = 0.001$  ( $P > 0.05$ ) by applying chi square test but however, there was no difference in acceptance ratings between male and female with SDF on anterior teeth in  $P = 0.754$  ( $P < 0.05$ ).

According to Figure 4, 66% of the parents strongly agree and showed acceptance of SDF to be used in uncooperative and special patient which was statistically significant in acceptance ratings between male and female with SDF on uncooperative and special patient with p value ( $P = 0.011$ ) ( $P > 0.05$ ).

In a more detailed analysis of SDF acceptability according to location that is parents of urban and rural areas (Fig 5), we found that there was significant difference in parental ratings of using SDF on the anterior teeth with  $P = 0.002$  ( $P < 0.05$ ) than on the posterior teeth with  $P = 0.095$  ( $P < 0.05$ ) (as shown in Table 2).

In our final analysis, 80.5% showed overall acceptance of SDF to be used for their children by their parents and found that there was no significant difference found among urban and rural ( $P = 0.539\%$ ) ( $P < 0.05$ ) as shown in Figure 6.

### Discussion:-

To our knowledge, the current descriptive cross-sectional study is the first of its kind where parental acceptance was assessed before its use on their children by means of visual aid. Visual aid will not only help the parents to know the procedure, brings about awareness and also can motivate the parents for preventive minimal intervention procedure. In all of the previously published studies, only the parental acceptance after the use of SDF procedure on their child's teeth was evaluated and compared between anterior and posterior teeth<sup>1,7</sup>. Parents would accept the SDF staining in the posterior teeth more than the anterior teeth similar to a study that was conducted in the United States<sup>8</sup>.

In our study, we received 200 parents participants conducted in department for two-month period. The questionnaire was drafted with a 5-point Likert scale ranging from strongly agree, agree, neutral, disagree and strongly disagree. The questionnaire divided the age groups into three different age groups (19–20, 21–30, 31–40); the most trending group was between 21-30 years old.

When we asked their opinion about the staining shown in the photographs which act as an visual aid before treatment, we found most of parents strongly disagreed to staining (82%). Parents judged staining on the anterior teeth to be esthetically not acceptable (disagree by 66%) than posterior teeth (agree 71%), because they are aware of other treatment options provided in primary health care, general hospitals, or private institutions that give better esthetic results. Most of the participants (74%) were females. Besides, there was statistically significant difference in acceptance with discoloration of cavities after SDF placement with  $P = 0.001$  ( $P < 0.05$ ).

In 2018 a study reported by Gordon, showed parental acceptance of the utilization of SDF on their children was higher among parents of uncooperative children or children who require more advanced behavior management<sup>9</sup>. This agrees with our findings, in which the acceptance of SDF treatment among parents of children with a history of uncooperative behavior regardless of the location and type of teeth. This showed that the parents in our study are willing to compromise their child's esthetic appearance if it means the child can receive treatment without the need for more advanced behavior management techniques. The same conclusion was reported by Clemens et al, and Crystal et al<sup>7,8</sup>

In a recent study by Clemens et al, in 2017, the parents' satisfaction was assessed immediately after the application of SDF, but in our study, the parents' acceptance was evaluated based on the standard pre-operative and post-operative procedural pictures which act as an aid to visualize the treatment outcome.

We highlight the importance of preventive, minimal intervention of SDF according to American Academy of Pediatric Dentistry Guidelines<sup>10</sup> in evaluating child and parental circumstances before introducing and providing SDF treatment, which also emphasizes the need of utilizing clear and effective informed consent with proper photos and description of the benefits and risk before providing such treatment. Given our results, SDF is a simple, easy, cost-effective, and well-accepted treatment for uncooperative patients regardless of the type and location of the teeth. Pediatric dentists should consider SDF as a highly recommended treatment option in uncooperative patients for caries management especially for primary and posterior teeth.

Questions	Gender		P value	
	Male	Female		
SDF application is an easy process	Strongly Agree	26	38	0.013
	Agree	32	104	
	Neutral			
	Disagree			
	Strongly			

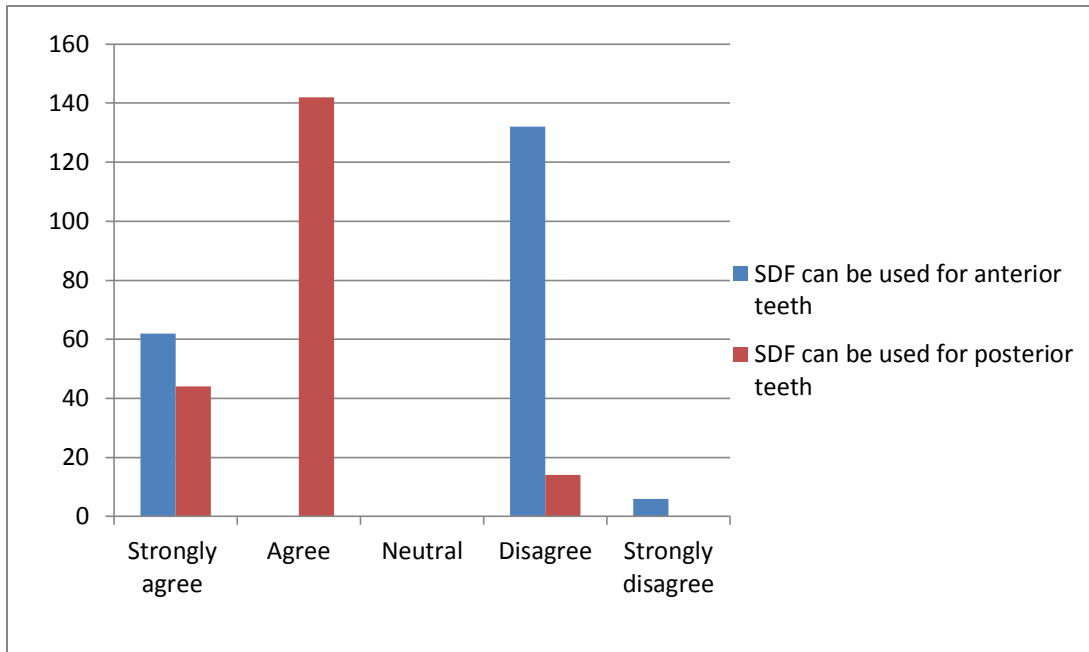
	Disagree			
Time taken for SDF application is less	Strongly Agree	36	78	0.355
	Agree	22	64	
	Neutral			
	Disagree			
	Strongly Disagree			
Cost effective	Strongly Agree	20	66	0.120
	Agree	38	76	
	Neutral			
	Disagree			
	Strongly Disagree			
I am comfortable with discoloration of cavities after SDF placement	Strongly Agree	2	0	0,001*
	Agree	6	0	
	Neutral			
	Disagree	10	18	
	Strongly Disagree	40	124	
SDF can be used for anterior teeth	Strongly Agree			
	Agree	20	42	0.754
	Neutral			
	Disagree	36	96	
	Strongly Disagree			
SDF can be used for posterior teeth	Strongly Agree	24	20	0.001*
	Agree	30	112	
	Neutral			
	Disagree	04	10	
	Strongly Disagree			
Anterior restoration with GIC or composite	Strongly Agree	6	12	0.117
	Agree	16	54	
	Neutral	16	20	
	Disagree	20	56	
	Strongly Disagree			
After restoration- color stability is 50%	Strongly Agree	2	6	0.871
	Agree	18	52	
	Neutral	22	48	
	Disagree	16	36	
	Strongly Disagree			
Can be used in cooperative patient	Strongly Agree	42	84	0.011*
	Agree	8	50	
	Neutral	4	4	
	Disagree	4	4	
	Strongly Disagree			
Can be used in uncooperative & special person	Strongly Agree	46	86	0.011*
	Agree	12	56	
	Neutral			
	Disagree			
	Strongly			

	Disagree			
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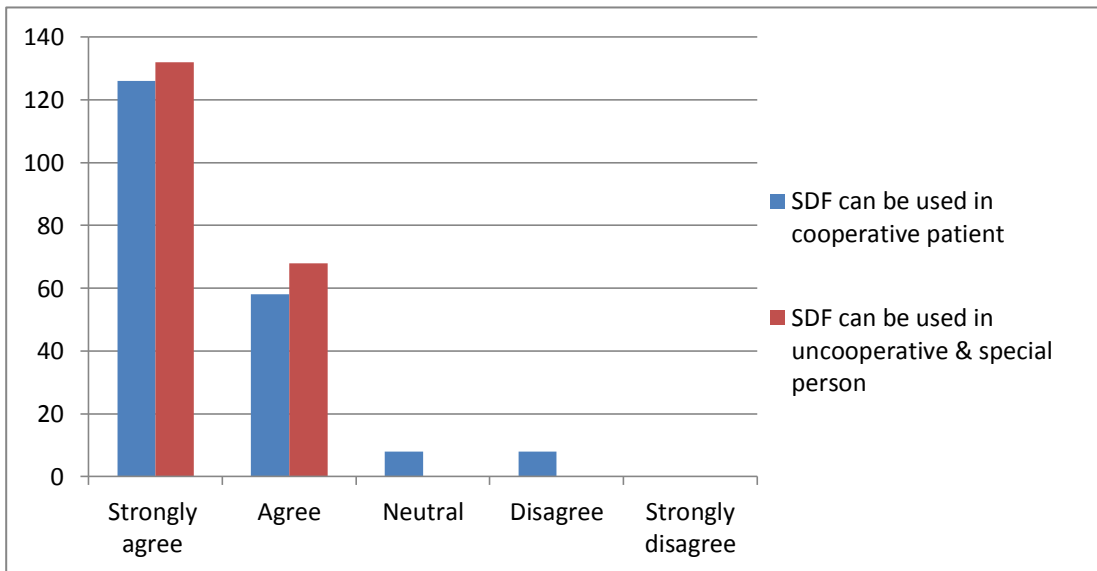
**Table 1:-** Questionnaire Results according to Gender Distribution.

**Table 2:-** level of acceptability of SDF according to locality.

Level of Acceptability	Mean	Std. Deviation		T value	P value
Anterior Teeth	Urban	2.8125	1.02431	3.214	0.002*
	Rural	2.3846	.86668		
Posterior Teeth	Urban	4.1667	.63021	1.680	0.095
	Rural	4.0000	.76696		



**Figure 3:-** Acceptance according to esthetics.



**Figure 4:-**Acceptance according to behavior of patient.

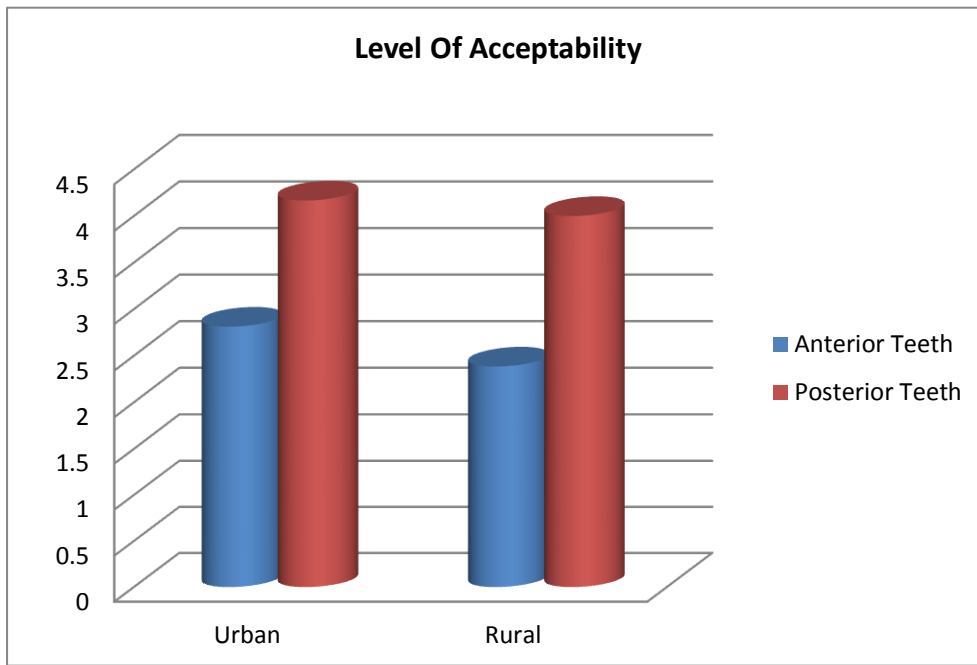


Figure 5:-Level of Acceptability according to locality.

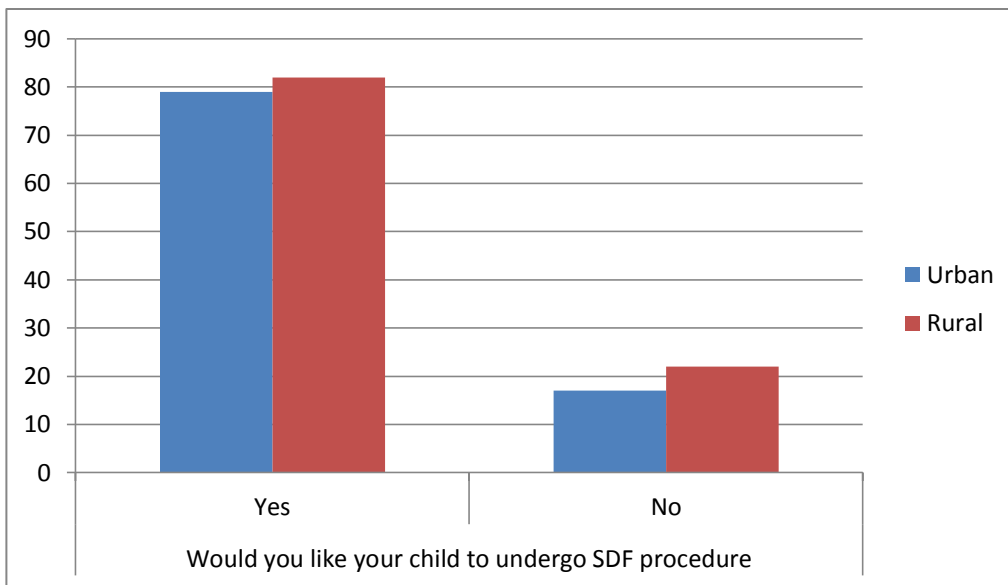


Figure 6:- Overall acceptance of SDF.

**Conclusion:-**

Parental acceptance of SDF has increased for primary and permanent posterior teeth compared to anterior teeth and for those children with a history of uncooperative behavior during previous dental treatment.

Although there are not many studies in the literature on SDF, we conducted this study to measure parental acceptance before the use of SDF on children which act as an visual aid by showing before and after SDF treatment photographs to the parents which motivated majority of parents to accept this type of treatment; undoubtedly, there is a difference in acceptance to the treatment between the anterior and posterior teeth.

Dentist should provide informed consent form which includes clear photographs showing expected staining, especially when treating anterior teeth.

**Acknowledgement:-**

We would like to show our gratitude to the parents who participated in this study and for sharing their pearls of wisdom with us during the course of this research. I thank all authors who contributed for this research.

**Conflict of interest:**

There is no conflict of interest in this work.

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