



Original Article

## Shifts in Parental Perception of Pediatric Patients Needing Dental Rehabilitation under General Anesthesia Post-Pandemic

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### ABSTRACT

The restrictions imposed over the past three years due to COVID-19 have significantly impacted access to dental care, particularly for procedures based on patient needs. One of the main challenges was the postponement of elective surgeries, which led to an increase in the number of pediatric dental cases requiring general anesthesia (GA). In specific situations, SDF has proven to be a highly effective approach to managing dental caries in children and has received approval from the American Academy of Pediatric Dentistry (AAPD). This study seeks to identify pediatric patients initially scheduled for treatment under GA who may be candidates for alternative treatment methods. In addition, it explores parental perspectives on the use of SDF as a substitute for GA to help address the growing demand for pediatric GA procedures following the COVID-19 pandemic. The findings suggest that the pandemic has placed immense pressure on the dentistry field, as the suspension of elective services had a detrimental effect on overall oral health. While teledentistry serves as a valuable tool for initial assessments and patient triage, it cannot completely replace in-person dental care.

**Keywords:** Parents perception, Dental caries, Prevention, Pediatric patients, Silver diamine fluoride

### Introduction

Dental caries, as defined by the World Health Organization (WHO), is a localized pathological condition influenced by external factors, leading to enamel demineralization and the deterioration of dental hard tissues, eventually forming cavities [1, 2]. Research from 2010 estimated that around 2.43 billion people, representing 35.3% of the global population, were affected by this condition [3].

In Saudi Arabia, the prevalence and severity of dental caries among children remain high, with approximately 80% experiencing it in their primary teeth and a reported DMFT mean of 5.0, reflecting a considerable disease burden [4, 5].

For more than four decades, silver-based topical agents such as silver nitrate and silver diamine fluoride (SDF) have been used in Japan to stop caries progression and reduce tooth hypersensitivity in both primary and permanent dentition [6, 7]. SDF is a clear liquid containing silver particles and a fluoride ion concentration of 38% (44,800 ppm). With a pH of 10, its composition includes 25% silver, 8% ammonia, 5% fluoride, and 62% water [8]. The U.S. Food and Drug Administration (FDA) has classified SDF as a class II medical device, authorizing its use for treating tooth sensitivity. Similar to fluoride varnish, its application must be performed by a dental professional [9].

SDF offers an efficient approach to managing dental caries, requiring minimal resources and a brief treatment duration. However, its precise mode of action remains unclear [7]. One hypothesis proposes that fluoride ions primarily interact with the tooth structure to promote remineralization, while silver ions exhibit antimicrobial

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properties similar to other heavy metals. Additionally, it is suggested that in an alkaline setting, SDF undergoes a



reaction with hydroxyapatite, producing key compounds such as silver phosphate and calcium fluoride (CaF<sub>2</sub>). The presence of CaF<sub>2</sub> ensures an adequate fluoride supply for the formation of fluorapatite, which demonstrates greater resistance to dissolution in acidic conditions compared to hydroxyapatite [7].

The most notable drawback of SDF is the black staining observed on demineralized and cavitated areas. To ensure informed decision-making, parents should be shown before-and-after images of teeth treated with SDF before providing consent [7].

Sedation and general anesthesia (GA) have been utilized in both medicine and dentistry since the 1840s [10]. In pediatric dentistry, dental rehabilitation under GA is a widely recognized treatment approach and has been identified as the leading reason for hospital admissions among children under the age of 5 years [11].

GA may be recommended for patients who are unable to cooperate due to medical or developmental conditions, or when the extent of treatment required surpasses their cognitive capacity. It is also a viable option for highly anxious children and adolescents who are unlikely to develop coping mechanisms over time, preventing dental pain and potential infections [12].

The availability of dental care tailored to patient needs became a significant challenge following the COVID-19 pandemic due to various regulations imposed over the past three years, including restrictions on elective procedures. One major consequence was the rise in the number of pediatric patients awaiting treatment under GA. In conclusion, the complexity of many treatment plans increased, shifting from basic restorative procedures to more advanced interventions such as pulpotomy, pulpectomy, or extractions [12].

While SDF is a highly effective approach for managing dental caries in children under specific circumstances and has received approval from the American Academy of Pediatric Dentistry (AAPD) [1], its widespread adoption has largely been limited to Asian countries over the past two decades. Integration into Western dental practices remains in the early phases of implementation [13].

This study aims to identify pediatric patients scheduled for GA who may be suitable for alternative treatment options. Additionally, it seeks to evaluate parental perspectives on the use of SDF as a potential substitute for GA to help address the growing backlog of pediatric GA cases following the COVID-19 pandemic.

## Materials and Methods

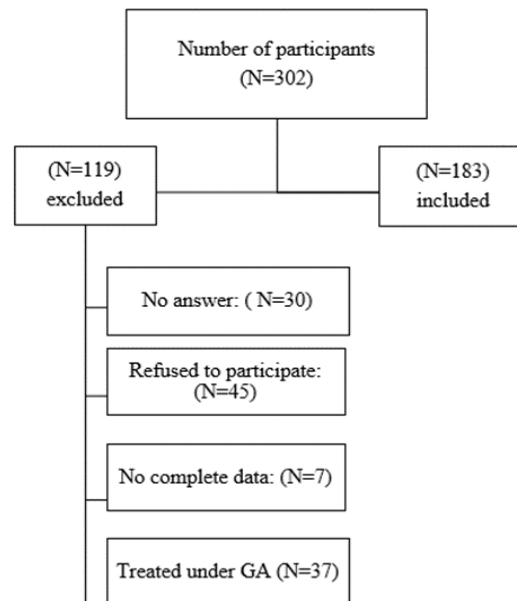
### *Sample size*

This descriptive cross-sectional study examines the perception of pediatric patients' parents regarding SDF as an alternative to the prolonged GA waiting list resulting from the COVID-19 pandemic. The study focuses on pediatric dental patients requiring full dental rehabilitation, ranging in age from birth to sixteen years, who were placed on the GA waiting list between September 1, 2021, and February 28, 2022.

Data collection was conducted through phone interviews, during which parents completed a questionnaire assessing the suitability of their child for SDF treatment and indicating their willingness to consider SDF if deemed appropriate. Patients identified as potential candidates were scheduled for a consultation with a pediatric dentist for further clinical evaluation.

A total of 302 patients between the ages of 2 and 15 years, who were on the GA waiting list during the specified period, were included in the study. However, 119 patients were excluded due to reasons such as refusal to participate, incomplete data, failure to respond after multiple contact attempts, or having already undergone treatment under GA.

Among the remaining participants, 183 children were determined to be eligible for SDF treatment based on the questionnaire responses. Subsequently, parents received an electronic PDF leaflet via WhatsApp, which provided detailed information about SDF along with a clinical image illustrating its effects on treated teeth (**Figure 1**).



**Figure 1.** Inclusion and exclusion criteria.

## Results and Discussion

### Demography

A total of 183 pediatric dental patients' parents ( $n = 183$ ) met the inclusion criteria for this study, with a nearly equal distribution between male and female participants. The majority of the patients were aged 5-7 years, comprising 53.0% of the sample, while 20.7% were between 8 and 10 years old (**Table 1**).

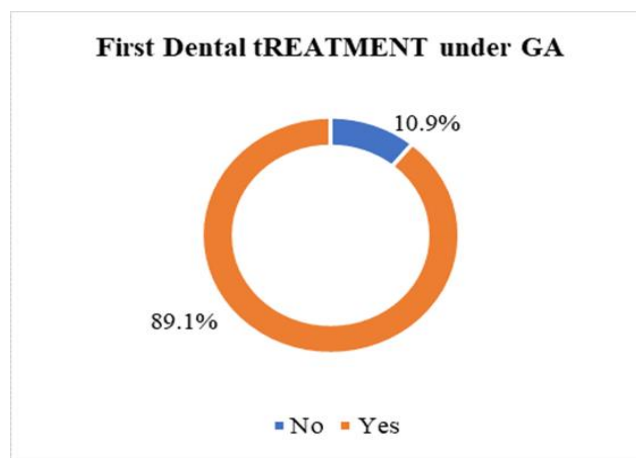
**Table 1.** Summary of demographic characteristics of the sample ( $n = 183$ )

Variable	Frequency (f)	Percent (%)
Child's gender		
Male	93	50.8
Female	90	49.2
Child's age (years)		
2-4	36	19.7
5-7	97	53.0
8-10	38	20.7
11-13	8	4.4
14-16	4	2.2
Variable	Frequency (f)	Percent (%)
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8-10	38	20.7
11-13	8	4.4
14-16	4	2.2

The findings revealed that 89.1% of parents indicated that it was their child's first experience with treatment under GA, whereas 10.9% reported that it was their second time (**Figure 2**). Additionally, 8.3% of the patients were classified as medically compromised (**Table 2**).

**Table 2.** Mann-Whitney U test for comparing mean ranks of parents' interest in SDF based on pediatric gender and Kruskal-Wallis test for age group (n = 183).

Variable	Patient's gender	N	Mean rank	Sum of ranks	Mann-Whitney U	P-value
Interest in alternative methods (LIKE SDF) to operation	Male	93	90.35	8403.0	4032.0	.620
	Female	90	93.70	8433.0		
	Total	183				
Variable	Patient's age (years)	N	Mean rank	Chi-square	Df	P-value
Interest in alternative methods (LIKE SDF) for operation	2-4	36	91.67	.665	4	.956
	5-7	97	93.45			
	8-10	38	87.12			
	11-13	8	96.75			
	14-16	4	96.75			
	Total	183				



**Figure 2.** Breakdown of the sample based on the number of dental GA (n = 183).

When parents inquired about their child's experience with pain, 102 respondents (55.7%) confirmed that their child had encountered pain. Additionally, 59.0% of parents acknowledged the presence of a dental abscess. Among those who reported a history of abscesses, a significant proportion (n = 30 (27.8%)) indicated that their child had experienced it more than 5 times.

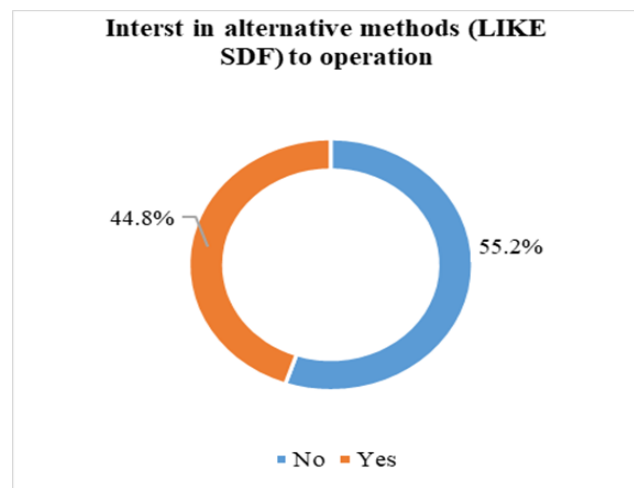
Regarding the use of pain management and antibiotics, 78.1% of parents reported administering painkillers to their children, whereas a smaller percentage, 39.1%, stated that antibiotics were used (**Table 3**).

**Table 3.** Categorization of pediatric patients based on dental health history and medical conditions.

Dental health history	Frequency (f)	Percent (%)
Had pain episodes (n = 183)		
Yes	102	55.7%
No	81	44.3%
Had dental abscesses (n = 183)		
Yes	108	59.0%
No	75	41.0%
Prevalence of dental abscesses (n = 108)		
1	25	23.1%
2	16	14.8%
3	22	20.4%
4	11	10.2%
5	4	3.7%

More than 5	30	27.8%
Use of dental pain-killer (n = 183)		
Yes	143	78.1%
No	40	21.9%
Use of dental antibiotics (n = 183)		
Yes	73	39.9%
No	110	60.1%
Children's medical conditions		
Down syndrome	2	1.1
Autism	5	2.7
Asthma	3	1.6
Diabetes mellitus	3	1.6
Heart disease	3	1.6
Other	12	7.7
No	155	84.7

Regarding parents' views on SDF, 44.8% (n = 82) expressed a positive initial response to the treatment, whereas 55.2% (n = 101) were not inclined to consider it (**Figure 3**).



**Figure 3.** Breakdown of the sample based on parents' interest in alternative treatment options (n = 183).

**Table 2** presents the results of the Mann-Whitney U test assessing the equality of mean ranks of parents' interest in SDF based on the child's gender, as well as the Kruskal-Wallis test for age. No significant correlation was found between parents' interest in SDF and either age or gender.

The COVID-19 pandemic has resulted in a significant backlog of patients awaiting dental treatment. Sadly, many children have endured prolonged periods of discomfort, infection, and pain while waiting for assessments and treatment to begin [13]. The pandemic has also limited in-person consultations, leading to a shift toward Teledentistry, which has the potential to either supplement or even partially replace the disrupted dental care system. Teledentistry utilizes information technology to offer remote dental care, advice, and education [14].

However, the integration of teledentistry into regular dental practice faces several challenges. These include a lack of awareness among patients, which is often influenced by age and educational background, concerns over the confidentiality and security of data, poor internet connectivity, and resistance to adopting new technologies. Additionally, ensuring that dentists receive proper training is essential. To facilitate broader adoption, providing patients with informed consent before treatment could be key to overcoming these barriers and promoting the use of teledentistry [15].

Among the 302 patients in the sample, 24.83% either declined to participate or did not respond after being contacted twice. The level of pain reported by parents in this study was notably high, with 27.8% of parents indicating their children had experienced dental abscesses, some of which occurred as frequently as five times. It

should be noted that these reported figures were not based on clinical diagnoses, but the impact of pain and abscesses on children's overall health is well-recognized, potentially affecting their sleep, eating habits, weight, and overall quality of life [16]. Chronic inflammation resulting from caries-related pulpitis and abscesses is known to hinder growth via metabolic pathways and reduce hemoglobin levels due to suppressed erythrocyte production [17, 18].

Dental treatment can have significant positive effects on children's psychological and social well-being. Studies have shown that parents observed positive social impacts in their children, including enhanced smiles, better school performance, and increased social engagement [19-21].

Caries progression in primary teeth is notably faster than in permanent teeth, compounded by the risks associated with children's sugar consumption. A recent study indicated an increased risk of caries during the pandemic, linked to higher intakes of fermentable sugars, frequent consumption of snacks, and poor oral hygiene practices [22].

Although the research team did not pursue further outcomes for these patients, this aspect was not central to the study's objectives. The extended waiting lists for dental GA likely contributed to parental frustration and an increased interest in alternative treatments, as reflected by 44.8% of parents. However, most parents expressed a preference against using SDF on anterior teeth due to aesthetic concerns, aligning with previous studies that reported lower acceptance of SDF treatment [23-25]. The rising demand for aesthetic solutions, such as Zirconia Crowns for children, may also influence the clinical acceptance of SDF in the future [26].

## Conclusion

The COVID-19 pandemic significantly increased the demand for dental services, with the suspension of elective treatments adversely affecting overall oral health. While teledentistry serves as a valuable tool for preliminary screenings and triage, it cannot substitute for in-person clinical dental care. Although dental professionals recognize SDF as a viable option, its aesthetic limitations remain a key drawback. Further investigation into this area is recommended.

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**Conflict of Interest:** None

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