



Knowledge and awareness of fluoride benefits among parents of pediatric patients: A questionnaire-based survey

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Abstract

Aim: To assess parental awareness, knowledge, and concerns about dental caries, fluoride, and silver diamine fluoride (SDF) among parents of children attending a pediatric and preventive dentistry department.

Materials and methods: A cross-sectional online survey using Google Forms was conducted among 60 parents of children visiting the department. The questionnaire assessed caries-related experiences, general and specific fluoride knowledge, and concerns about fluoride safety. Data were analyzed using descriptive statistics

Results: 74.1% reported discoloration/decay in their child's teeth and 64.8% reported night feeding; nearly half reported a family history of similar lesions. General awareness of fluoride benefits was high (75.9%) and 53.7% had heard of fluoride varnish, but only 37.0% knew that early caries can be reversed with fluoride and of the recommended toothpaste amount, and 29.6% knew about SDF. Most (85.2%) were concerned about fluoride safety.

Conclusion: Parents have good general fluoride awareness but inadequate specific knowledge and safety concerns. Structured, age-specific counseling by pediatric dentists on caries risk, fluoride use, and SDF is needed to improve preventive care and children's oral health outcomes.

Keywords: Fluoride awareness, parental knowledge, early childhood caries

Introduction

Dental caries remains one of the most prevalent oral diseases affecting both children and adults worldwide. It is defined as structural damage to the tooth caused by plaque bacteria, which ferment carbohydrates into acid when oral hygiene is inadequate. This acidic environment leads to demineralization of the tooth structure.

Fluoride, derived from the element fluorine, plays a critical role in caries prevention. It occurs naturally in water and is commonly added to toothpaste and public water supplies through fluoridation programs. In addition to home-use products, fluoride is professionally applied in dental offices as gels, foams, or varnishes. Among these, sodium fluoride varnish (22,600 ppm) is one of the most widely used formulations.

Fluoride promotes enamel remineralization and provides protection against dental caries. It can be applied by dentists and physicians to infants and young children at intervals of 3, 6, or 12 months, depending on their caries risk.

The American Academy of Pediatric Dentistry (AAPD) recommends fluoride varnish for high-risk infants, starting from the eruption of primary teeth. Professionally applied topical fluoride varnish is simple, quick (1–4 minutes), and effective. Post-application instructions include refraining from eating or drinking

for at least 2 hours and avoiding toothbrushing on the day of application to maximize fluoride retention. Evidence indicates that fluoride varnish can reduce caries development by 18–63%. Despite its proven efficacy, parental awareness regarding fluoride application remains variable. Understanding parents' knowledge, attitudes, and perceptions toward fluoride application and early childhood caries is essential for developing targeted educational interventions. This

study aims to assess parental awareness of fluoride application and its relationship with early childhood caries through a questionnaire-based survey.

Materials and Methods

Study Design and Setting

This was a descriptive online questionnaire-based cross-sectional survey conducted in the Department of Pediatric and Preventive Dentistry, KVG Dental College & Hospital Sullia from 10 May to 20 May 2026. The survey was administered using a structured Google Forms questionnaire distributed to parents of children attending the department during the study period.

Study Population and Sampling

The study population comprised parents or primary caregivers of children who reported to the Department of Pediatric and Preventive Dentistry for dental care within the specified 10-day period. A total of 60 parents were invited to participate using a consecutive sampling method, and all 60 completed the questionnaire, yielding a response rate of 100%.

Inclusion criteria were parents of children within age range, 3–14 years who attended the department during the study period and provided informed consent. Exclusion criteria included parents who were unable to read/understand the survey language, declined to participate, or had previously completed the questionnaire.

A validated questionnaire in English language was given electronically through assigned tablets. An informed consent was obtained electronically prior to the start of the questionnaire stating their participation was voluntary and the information provided would be confidential. The parents were chosen randomly and one parent for each house-hold

with a child aged 3–14years were eligible to participate in the study. In this study, the age range of the parents was between 18 and 40 years and the age range of the children was from between 3 years till 14 years of age.

The survey included 52% females and 48% of the male population to avoid any bias among the genders. The questionnaire included 14 items to assess the demographic data, general knowledge and awareness of fluoride and fluoride varnishes.

Responses were coded and the data were revealed as frequency distribution and percentages comparing between gender and degree of parents' education.

Statistical Analysis

Data from the Google Form responses were exported to a spreadsheet and then imported into SPSS software for analysis. Descriptive statistics were used to summarize the data; categorical variables were presented as frequencies and percentages, and continuous variables as mean and standard deviation.

Associations between categorical variables were assessed using the chi-square test (or Fisher's exact test when expected cell counts were small). A p-value < 0.05 was considered statistically significant

Results

Variable	n (%)
Noticed discoloration/decay in child's teeth: Yes	40 (74.1)
Noticed discoloration/decay in child's teeth: No	14 (25.9)
History of night feeding: Yes	35 (64.8)
History of night feeding: No	19 (35.2)
Family history of similar discoloration/cavitations: Yes	26 (48.1)
Family history of similar discoloration/cavitations: No	28 (51.9)
Know caries can be reversed by fluoride early: Yes	20 (37.0)
Know caries can be reversed by fluoride early: No	34 (63.0)
Variable	n (%)
Aware of fluoride benefit in children's dental health: Yes	41 (75.9)
Aware of fluoride benefit in children's dental health: No	13 (24.1)
Heard about fluoride varnish: Yes	29 (53.7)
Heard about fluoride varnish: No	25 (46.3)
Child uses same toothpaste as parent: Yes	39 (72.2)
Child uses same toothpaste as parent: No	15 (27.8)
Aware child toothpaste contains fluoride: Yes	24 (44.4)
Aware child toothpaste contains fluoride: No	30 (55.6)
Knows proper fluoride toothpaste use: Yes	35 (64.8)
Knows proper fluoride toothpaste use: No	19 (35.2)
Knows recommended fluoride toothpaste amount: Yes	20 (37.0)
Knows recommended fluoride toothpaste amount: No	34 (63.0)
Knows about SDF and anticariogenic action: Yes	16 (29.6)
Knows about SDF and anticariogenic action: No	38 (70.4)
Concerned about fluoride safety: Yes	46 (85.2)
Concerned about fluoride safety: No	8 (14.8)

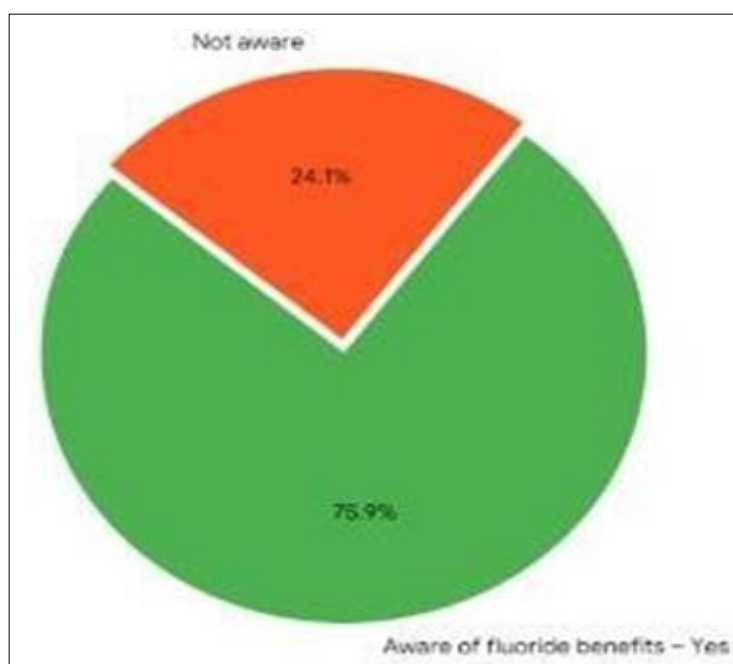


Fig 1: Parental awareness of fluoride

Among the respondents, 74.1% reported noticing discoloration or decay in their child's teeth, and 64.8% reported a history of night feeding. Nearly half of the respondents reported a family history of similar discoloration or cavitations.

Awareness of fluoride benefits in children's dental health was high (75.9%), while 53.7% had heard about fluoride varnish. However, knowledge was limited regarding the

reversal of early caries by fluoride (37.0%), the recommended amount of fluoride toothpaste for age (37.0%), and SDF and its anticariogenic action (29.6%).

Most respondents were concerned about the safety of fluoride application for their child (85.2%). The respondents showed better general awareness of fluoride, but specific preventive knowledge, especially about SDF and fluoride toothpaste use, was inadequate.

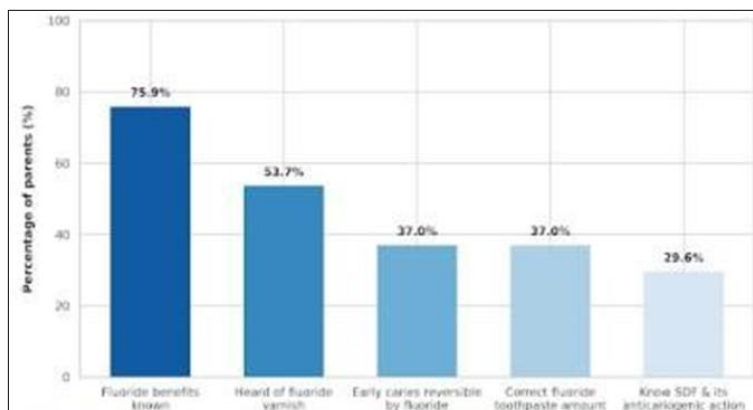


Fig 2: Distribution of general and specific fluoride-related knowledge among parents

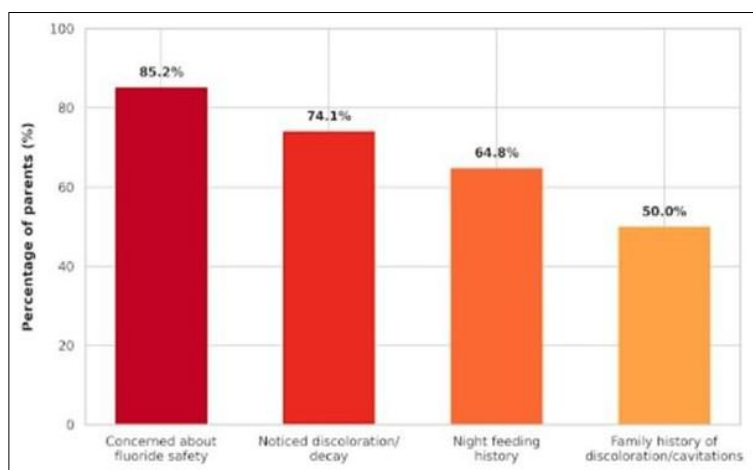


Fig 3: Distribution of general and specific fluoride-related knowledge among parents

Discussion

This study evaluated parents' awareness of dental caries, fluoride, and silver diamine fluoride (SDF) in a clinical population attending a pediatric and preventive dentistry department. The main finding was a mismatch between relatively high general awareness of fluoride and limited specific preventive knowledge, especially regarding age-appropriate fluoride toothpaste use, the potential for fluoride-mediated reversal of early lesions, and the role of SDF in minimally invasive caries management.

Caries Experience, Feeding Patterns, and Family Background

A substantial proportion of parents (74.1%) reported noticing discoloration or decay in their child's teeth, and 64.8% reported a history of night feeding. This combination indicates that parents are aware of visible disease but may not fully appreciate the caries risk associated with prolonged or nocturnal feeding practices. Nearly half of the respondents reported a family history of similar discoloration or cavitations, suggesting that caries-related behaviors and perceptions may cluster within families.

These observations are consistent with the established multifactorial model of early childhood caries, in which familial habits and caregiving patterns strongly influence children's risk.

From a clinical standpoint, these findings support the need to integrate specific counseling on feeding behaviors when managing children with early signs of caries. Parents who already recognize discoloration or cavitation in their child's teeth may be particularly receptive to explanations that link night feeding and other dietary patterns with the clinical changes they observe.

General awareness versus specific fluoride knowledge
Most respondents acknowledged the benefits of fluoride for children's dental health (75.9%), and just over half (53.7%) had heard of fluoride varnish. This suggests that broad messages about fluoride and professional preventive applications are reaching many parents, likely through dental professionals or public health communication. However, when questions required more detailed knowledge, striking gaps emerged. Only 37.0% of parents were aware that early carious lesions can be reversed or arrested using fluoride, and the same proportion knew the

recommended amount of fluoride toothpaste appropriate for their child's age.

Awareness of SDF and its anticariogenic effect was even lower (29.6%).

This pattern indicates that messages about fluoride often remain at a "headline" level ("fluoride is good for teeth") without translating into practical, age-specific instructions (e.g. smear vs pea-sized toothpaste amounts) or understanding of non-invasive treatment options. In contemporary pediatric dentistry, where minimally invasive and non-operative caries management strategies are emphasized, such knowledge is crucial. Without it, parents may underutilize or misuse fluoride, limiting the effectiveness of preventive programs.

Safety Concerns and Acceptance of Fluoride and SDF

An important finding was that 85.2% of parents expressed concern about the safety of fluoride application for their child. This high level of concern, in the presence of relatively good general awareness, points to an underlying anxiety or mistrust that could hinder acceptance of professionally applied fluoride products and SDF. Media reports, fragmented online information, or incomplete counseling may contribute to this apprehension.

For pediatric dentists, this represents both a challenge and an opportunity. Chairside interactions should address safety explicitly, including explanation of recommended doses, systemic versus topical exposure, and the safety margins of professionally used agents. In the case of SDF, which is less familiar to many parents and associated with visible staining, acceptance is likely to depend on clear communication about its mechanism, indications, advantages (non-invasive, behavior-friendly), and limitations. Tailored educational materials, including visual aids and simple analogies, may help parents balance perceived risks with benefits.

Clinical implications

The overall pattern of results suggests three key priorities for clinical practice:

- First, counseling should more directly link parents' observed signs (discoloration, cavitation) with modifiable risk factors such as night feeding, dietary sugar exposure, and inadequate fluoride use.
- Second, preventive education must move from general statements about fluoride toward concrete, age-appropriate guidance on toothpaste amount, brushing supervision, and the possibility of arresting or reversing early lesions.
- Third, communication about SDF and other minimally invasive options should be incorporated into routine discussions with parents of high-risk or uncooperative children, with explicit attention to safety and esthetic issues.

By systematically addressing these points, pediatric dentists can help convert general awareness into informed, preventive behaviors and improve acceptance of evidence-based non-invasive treatments.

Strengths, Limitations, and Future Directions

A strength of this study is that it captures parental perceptions directly within a clinical setting, focusing on a population already engaged with dental services. The online questionnaire allowed standardized data collection and

facilitated participation. However, the single-center design and modest sample size ($n = 60$) limit the generalizability of the findings. The cross-sectional nature of the survey also precludes causal inference, and reliance on self-reported information may introduce recall and social desirability bias.

Future research could include larger, multi-center samples and explore associations between parental knowledge, safety concerns, and actual preventive behaviors or caries outcomes. Interventional studies assessing structured counseling modules, digital educational tools, or community-based programs on fluoride and SDF could help identify effective strategies for improving both understanding and uptake of preventive measures.

Within these limitations, the present study indicates that parents attending a pediatric and preventive dentistry department have good general awareness of fluoride but insufficient specific preventive knowledge regarding fluoride toothpaste use, early caries reversal, and SDF. High levels of concern about fluoride safety highlight the need for clear, targeted, and reassurance-oriented communication to support informed decision-making and optimize caries prevention in children.

Conclusion

This study showed that parents attending a pediatric and preventive dentistry department were generally aware of fluoride and its overall benefits for children's dental health, and many could recognize visible signs of dental disease in their children. However, caries-related risk factors such as night feeding were common, and nearly half of the respondents reported a family history of similar discolorations or cavitations, indicating a substantial caries burden within families.

Despite reasonably high general awareness of fluoride, specific preventive knowledge was limited. Only about one-third of parents knew that early caries lesions can be reversed with fluoride or were aware of the recommended amount of fluoride toothpaste for their child's age, and fewer than one-third were familiar with silver diamine fluoride (SDF) and its anticariogenic action. At the same time, a large majority expressed concern about the safety of fluoride application in their children.

These findings highlight a clear gap between broad awareness and detailed, practical understanding of fluoride-based preventive strategies and SDF. Pediatric dentists should therefore prioritize structured, age-specific counseling that addresses caries risk behaviors, explains the rationale and safety of fluoride and SDF, and emphasizes the potential for minimally invasive management of early caries. Strengthening parental knowledge in these areas is likely to improve acceptance and appropriate use of evidence-based preventive measures, thereby contributing to better oral health outcomes in children.

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