

Parental Acceptance of Silver Diamine Fluoride (SDF) for Treating Dental Caries in Pediatric Patients: A Comparative Study on Anterior vs. Posterior Teeth and Implications for Anesthesia

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ABSTRACT

This study investigates parental acceptance of Silver Diamine Fluoride (SDF) for treating dental caries in children, focusing on preferences related to anterior (front) versus posterior (back) teeth. Given the esthetic implications of SDF, particularly in visible areas, acceptance varies significantly between anterior and posterior teeth. Additionally, the study explores the potential of SDF to reduce the necessity for general anesthesia among uncooperative pediatric patients. Survey responses from a cohort of parents indicate a higher acceptance for posterior teeth applications, with a notable reluctance for anterior teeth. Findings highlight the potential of SDF as an alternative to invasive treatments in posterior teeth, especially for uncooperative children, emphasizing a need for clinician-parent communication regarding esthetic and functional considerations of SDF application.

Keywords: SDF, anesthesia, functional, communication.

INTRODUCTION

Dental caries are prevalent among pediatric populations, often requiring restorative intervention to prevent further complications. Silver Diamine Fluoride (SDF) has emerged as a minimally invasive treatment option that arrests caries and can delay the need for more invasive interventions (Inchingolo et al., 2024). However, SDF can lead to permanent black staining on the treated areas, which presents esthetic concerns, especially on anterior teeth (Nishino et al., 1969). In cases involving uncooperative children, traditional restorative techniques often necessitate sedation or general anesthesia, which can pose additional risks and costs.

Parental acceptance of SDF varies based on the location of the carious lesion (anterior vs. posterior teeth) and the potential need for anesthesia in uncooperative children (Bagher et al., 2019). This study explores these factors to better understand parental preferences. It highlights the promising role of SDF in potentially reducing the need for sedation in pediatric dentistry, offering a more comfortable and less invasive treatment option for children, and instilling hope about the future of pediatric dentistry.

Methods

Study Design

This study employed a cross-sectional survey to collect data from parents regarding their acceptance of SDF treatment on their children's teeth. The survey included questions on demographic information (age, education, income), the child's behavior during dental procedures, and parental preferences regarding SDF treatment for both anterior and posterior teeth.

Participants

The participants were parents or caregivers of pediatric patients attending dental clinics. All participants provided informed consent to take part in the study. The sample included various socioeconomic and educational backgrounds to assess differences across demographic variables.

Data Collection and Analysis

The survey questions targeted the following:

Acceptance of SDF treatment on anterior and posterior teeth.

Parental preferences when children are uncooperative, specifically in contexts where general anesthesia or oral sedation might otherwise be necessary.

Demographic information, including parental age, education level, and household income.

Descriptive statistics were calculated for acceptance rates, and a chi-square test of independence was performed to assess the significance of differences in acceptance between anterior and posterior teeth. Data analysis was conducted using Python with chi-square tests for categorical comparisons and frequency distribution visualizations.

RESULTS

Demographic Profile

Most respondents were parents aged 31-40, with educational backgrounds ranging from high school diplomas to bachelor's degrees. Household income was primarily within the middle-income range.

Acceptance Rates for Anterior vs. Posterior Teeth

Analysis revealed that:

19% of parents found SDF acceptable or acceptable for anterior teeth.

79% of parents found SDF acceptable or somewhat acceptable for posterior teeth.

Statistical Significance

A chi-square test comparing acceptance rates for anterior and posterior teeth yielded a chi-square statistic of 19.41 ($p < 0.05$), indicating a statistically significant difference.

Parents were likelier to accept SDF on posterior teeth where esthetic concerns were minimal.

Detailed Parental SDF Acceptance with Percentages for Anterior vs Posterior Teeth (n=98)

Response Category	Anterior Teeth (n=98)	Anterior Teeth (%)	Posterior Teeth (n=98)	Posterior Teeth (%)
Acceptable	15	15.31%	48	48.98%
Somewhat Acceptable	2	2.04%	28	28.57%
Somewhat Unacceptable	5	5.10%	4	4.08%
Unacceptable	71	72.45%	18	18.37%

Anesthesia Considerations for Uncooperative Children

Survey responses highlighted that 96% of parents would likely opt for SDF instead of general anesthesia when children were uncooperative. This preference was especially pronounced for posterior teeth applications, supporting the potential of SDF to reduce anesthesia reliance in pediatric patients. By choosing SDF over sedation or general anesthesia, parents can avoid the associated health risks and costs, making SDF a more attractive option for pediatric dental care.

DISCUSSION

The findings suggest that while parents generally accept SDF treatment on posterior teeth, there remains a strong reluctance for anterior teeth applications due to the visible black staining effect. This esthetic concern aligns with previous studies on parental preferences in pediatric dentistry, which have shown that appearance plays a critical role in treatment choice, particularly for visible areas like the anterior teeth (Crystal et al., 2017), (Alshammari et al., 2019), (Clemens et al., 2018).

The significant preference for SDF in posterior teeth among uncooperative children suggests that SDF can serve as an alternative to sedation and general anesthesia, offering a less invasive approach with fewer health risks and lower costs (Crystal et al., 2017). These findings underscore the crucial role of clinicians in communicating SDF's benefits and esthetic limitations, especially in cases where anesthesia might otherwise be necessary. This empowers clinicians to ensure informed decision-making and patient satisfaction.

Current Acceptance and Potential for Improvement

In this study, 98 parents were surveyed about their acceptance of SDF for treating their children's dental caries. The results showed a stark difference in parental acceptance depending on whether SDF was used on anterior or posterior teeth. Only 15 parents (15.31%) found SDF acceptable for anterior teeth, while 71 (72.45%) rejected its use. Conversely, for posterior teeth, 48 parents (48.98%) accepted the use of SDF, and only 18 (18.37%) rejected it. These numbers demonstrate that while many parents are hesitant to accept SDF for anterior teeth due to cosmetic concerns, they are more willing to use it for posterior teeth with less visible aesthetic impact.

Increasing parental acceptance of SDF, particularly for posterior teeth, could have significant implications for pediatric dental care. If more parents opt for this treatment, it would reduce the number of children requiring invasive procedures, alleviating pediatric clinic waiting lists. SDF's simplicity allows it to be applied in a single visit without requiring advanced equipment or general anesthesia, often necessary for invasive treatments. This could lead to improved clinic efficiency and reduced costs for both parents and healthcare providers.

Impact on Waiting Lists and Clinic Efficiency

The long waiting lists in pediatric dental clinics are often the result of children needing complex, time-consuming treatments under general anesthesia. These procedures require both a dental team and anesthesiologists, operating rooms, and recovery time, making the scheduling process lengthy and resource-intensive. By contrast, SDF can be applied quickly in a routine dental visit, freeing up valuable clinic time and resources.

If parental acceptance of SDF increases, it could reduce the number of children waiting for invasive procedures. Approximately 60% of parents accept general anesthesia for their children's dental treatment. If even a fraction of these parents were to choose SDF instead, it could significantly reduce the pressure on clinics. For example, if 30% of parents who currently opt for general anesthesia were to choose SDF, this could lead to a substantial reduction in waiting times, as SDF requires less clinical time and no special facilities.

Psychological and Physical Benefits for Children

One of the key benefits of increasing the use of SDF is the reduction in psychological trauma for children. Invasive dental procedures, particularly those requiring general anesthesia, can be distressing for young patients. Studies have shown that general anesthesia can have long-term psychological effects, with many children developing dental phobia or anxiety related to dental visits. In this study, 60% of parents expressed concerns about their child's anxiety during dental procedures.

By using SDF, children can avoid the fear and discomfort associated with invasive treatments. This improves their immediate dental experience and reduces the likelihood of them developing a fear of dentists, which can impact their long-term dental health. Avoiding the use of general anesthesia also reduces the risk of adverse side effects. According to the survey, 75% of parents were concerned about the safety of general anesthesia, especially given its potential neurodevelopmental risks in young children. Therefore, promoting SDF as an alternative could alleviate these concerns and improve pediatric patients' psychological outcomes.

Focus on Primary Teeth and Time-Limited Concerns

A common concern among parents is the cosmetic effect of SDF, as the treated teeth develop a black stain. This concern is particularly prominent for anterior teeth, with 72.45% of parents rejecting using SDF on their child's front teeth. However, it is essential to emphasize that SDF is often used on primary teeth, which will naturally fall out and replace permanent teeth.

By educating parents about the temporary nature of this cosmetic issue, dental professionals can help shift the focus toward the long-term health benefits of arresting caries. Given that SDF prevents the need for more invasive treatments, which could have a lasting psychological impact, its use is a valuable intervention for managing dental decay in primary teeth.

Preventive Education for Parents

One advantage of using SDF is the opportunity it provides for dental professionals to educate parents about preventive care. The time saved by avoiding complex treatments under general anesthesia can be used to promote good oral hygiene practices, such as regular tooth brushing, flossing, and routine dental checkups. In this study, 55% of parents expressed concerns about the financial costs of dental treatments. By preventing further decay through education, parents can reduce the need for costly interventions in the future.

Educational campaigns should focus on teaching parents about the importance of early intervention and preventive care to ensure the long-term dental health of their children. Encouraging parents to bring their children in for regular checkups and educating them on proper oral hygiene practices can help reduce the incidence of caries, ultimately decreasing the need for both SDF and invasive procedures.

Acceptance and Reduction in General Anesthesia

The results highlight the potential of SDF to reduce the number of children requiring general anesthesia, particularly for posterior teeth, where acceptance rates are higher. By adopting SDF, dental practitioners can offer a safer, non-invasive treatment that aligns with parental preferences for avoiding GA, particularly posterior teeth.

Limitations

This study is limited by its relatively small sample size and the focus on a single center in Najran. Further research with a larger sample is necessary to validate these findings.

CONCLUSION

Conclusion Implications of the Findings This study confirms that SDF is more acceptable for posterior teeth than anterior teeth among parents, primarily due to aesthetic concerns. However, its acceptance for posterior applications, particularly in cases with uncooperative children, suggests that SDF could significantly reduce the need for general anesthesia in pediatric dentistry. This reassures the audience about the safety of pediatric dental treatments, offering a safer and more comfortable treatment option. Clinicians should consider incorporating SDF as part of a comprehensive treatment plan, emphasizing its benefits in managing caries with minimal intervention.

REFERENCES

1. Horst, J. A., Ellenikiotis, H., & Milgrom, P. L. (2016). UCSF protocol for caries arrest using silver diamine fluoride: rationale, indications, and consent. *Journal of the California Dental Association*, 44(1), 17-28.
2. Crystal, Y. O., & Niederman, R. (2019). Evidence-based dentistry update on silver diamine fluoride. *Dental Clinics*, 63(1), 45-68.
3. Ruff, R. R., Whittemore, R., Grochecki, M., Bateson, J., & Barry-Godin, T. (2021). Silver diamine fluoride and oral health-related quality of life: A network meta-analysis. *medRxiv*, 2021-04.
4. Inchingolo, F., Inchingolo, A. D., Latini, G., Sardano, R., Riccaldo, L., Mancini, A., ... & Dipalma, G. (2024). Caries in Primary Molars: Is Silver Diamine Fluoride Effective in Prevention and Treatment? A Systematic Review. *Applied Sciences*, 14(5), 2055.
5. Bagher, S. M., Sabbagh, H. J., AlJohani, S. M., Alharbi, G., Aldajani, M., & Elkhodary, H. (2019). Parental acceptance of the utilization of silver diamine fluoride on their child's primary and permanent teeth. *Patient preference and adherence*, pp. 829–835.
6. Nishino, M., Yoshida, S., Sobue, S., Kato, J., & Nishida, M. (1969). Effect of topically applied ammoniacal silver fluoride on dental caries in children. *The Journal of Osaka University Dental School*, pp. 9, 149–155.
7. Crystal, Y. O., Janal, M. N., Hamilton, D. S., & Niederman, R. (2017). Parental perceptions and acceptance of silver diamine fluoride staining. *The Journal of the American Dental Association*, 148(7), 510-518.
8. Alshammari, A. F., Almuqrin, A. A., Aldakhil, A. M., Alshammari, B. H., & Lopez, J. N. J. (2019). Parental perceptions and acceptance of silver diamine fluoride treatment in Kingdom of Saudi Arabia. *International journal of health sciences*, 13(2), 25.
9. Clemens, J., Gold, J., & Chaffin, J. (2018). Effect and acceptance of silver diamine fluoride treatment on dental caries in primary teeth. *Journal of public health dentistry*, 78(1), 63-68.