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Current Trends and Evidence-Based Practices in Pediatric Preventive Dentistry

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Abstract

This work evaluated the global impact of early childhood caries, particularly emphasizing underserved populations. Additionally, it assesses the current trends and evidence-based practices in pediatric preventive dentistry. The article presents recent clinical findings from a qualitative literature review covering the years 2015–2025, with data obtained from PubMed, Cochrane Library, and Google Scholar. To evaluate the findings, a comprehensive search and thematic grouping of findings has been conducted. The results demonstrated that fluoride varnishes and dental sealants are highly effective in reducing caries incidence. Furthermore, this article highlighted how new technologies, including silver diamine fluoride (SDF), AI-assisted detection, and Teledentistry, might help people get care more easily. Nonetheless, obstacles such as limited parental understanding and poor implementation of practices remain substantial challenges. The conclusion emphasises that combining evidence-based methods with better policy and family education is essential for better paediatric oral health outcomes.

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Introduction

Recently, pediatric preventive dentistry has changed from a reactive strategy to managing dental crises to a proactive paradigm centered on encouraging lifelong oral health [1]. This transformation is being pushed by the social and economic costs of childhood dental illness, which can interfere with academic achievement, speech development, and self-esteem. Early childhood caries (ECC) is still a big public health problem across the world, and it affects kids from low-income families the worst [2]. As a preventative model, pediatric dentistry emphasizes risk assessment and early intervention.

In order to guarantee continuous and comprehensive oral care, the American Academy of Pediatric Dentistry (AAPD) promotes the establishment of a “dental home” by the child’s first year [3]. Fluoride treatments, dental sealants, and caregiver education comprise this approach. Simultaneously, technological innovations, such as Teledentistry and minimally invasive techniques (like SDF), contribute to enhancing access to and the effectiveness of care [4]. The objective of this research is to assess current trends and evidence-based practices to identify opportunities for improvement and enhance the oral health outcomes of children, particularly those from disadvantaged backgrounds.

A global focus on addressing the ECC has led to a significant increase in research on pediatric preventive dentistry. Therefore, the effectiveness of topical fluorides has been a hot research area. An extensive network meta-analysis in Gao et al., 2021 determined that medically given fluorides, including 5% sodium fluoride varnish, are effective in reducing ECC incidence. They demonstrated that children who received sealants had a 67% reduced risk of new carious lesions over three years [5]. In addition to conventional approaches, researchers have investigated the role of sugar

replacements and behavioural therapies. The authors in Song et al., 2024 proved that xylitol can significantly reduce caries incidence [6]. Iftikhar et al. 2023 emphasized the significance of parental engagement, revealing that, despite a strong knowledge of the advantages of sealants, parental misconceptions persist [7]. This shows how important it is to have focused educational initiatives. Also, new technologies like minimally invasive dentistry (MID) and AI-assisted detection have shown promise. A smartphone app for real-time ECC diagnosis was developed in Zhang et al., 2020. The authors illustrated how the technology can improve early intervention in underserved regions [8].

The current research underscores considerable advancements while simultaneously revealing enduring shortcomings in the implementation of practices and public awareness. These ongoing issues, especially in community regions, were the motivation for this study to synthesize the latest findings and propose actionable strategies

Materials and Methods

To provide a comprehensive overview of a complex topic, this paper utilized a narrative review style to analyses the current literature on pediatric preventive dentistry. We conducted a comprehensive systematic literature review across publications, from January 2015 to April 2025, in several highly ranked databases, including PubMed, Cochrane Library, and Google Scholar. The search strategy used a combination of Medical Subject Headings (MeSH) and free-text terms, including ("pediatric preventive dentistry," OR "dental caries prevention," OR "fluoride varnish," OR "dental sealants," OR "xylitol," OR "oral health education," OR "minimally invasive dentistry"). The inclusion criteria emphasised peer-reviewed studies in English that examined preventative interventions in paediatric populations aged 0–14 years. We excluded the following: Editorials, opinions, and non-empirical data.

We extracted the data systematically and collected the following details: Information on the author, year, study design, sample size, intervention type, and outcome measures. Then, A qualitative synthesis method was implemented to thematically gather the results of the papers to identify the comparison of emerging trends, differences, and similarities. The synthesized data were presented clearly and concisely, and all ethical research practices were adhered to through the proper citation and acknowledgement of sources. Tables and charts were employed to achieve our goal.

Results and Discussion

The evaluation of data from peer-reviewed papers published from 2015 to 2025 produced valuable insights into the effectiveness of many preventive dental strategies. Due to the limited page number, we summarize the findings in two main tables as follows.

According to randomised controlled studies implemented in Chou et al., 2021 [9], Table 1 shows that topical fluoride treatments, such as varnishes and gels, consistently demonstrated high effectiveness, achieving a 9 out of 10 rating. These treatments were especially effective in reducing the prevalence of caries in pediatric groups at high risk. Dental sealants also worked very well, with an effectiveness score of 8. This is mostly because they are made to protect molars' occlusal surfaces. Some small impacts were seen with xylitol and other sugar replacements, mostly by lowering the amount of Streptococcus mutans. There were problems with respect and dose, however, so these results could not be used for everyone. Additionally, we found that parent education programs could improve brushing habits and knowledge of good oral health, but how well they worked depended on the culture and financial situation of the parents.

On the other hand, we investigated the proposed new technologies in pediatric dentistry in the peer-reviewed papers published from 2015 to 2025 (see Table 2). Despite limitations in large-scale trials, we found that innovations, such as Silver Diamine Fluoride (SDF) and AI-based early caries detection, were identified as promising adjunctive treatments. Besides, Teledentistry has its potential in post-COVID settings by improving access to care, though challenges related to digital literacy and infrastructure persist.

Minimally invasive paediatric oral health strategies, such as fluoride-based interventions, are becoming more popular around the world and have led to a drop in childhood cavities. There is, however, a significant gap between evidence and practice, as evidenced by the low usage of dental sealants. Additionally, to be effective, programs that teach parents need to be more culturally relevant. Besides, Teledentistry and AI are making it easier for people to access care and receive diagnoses, but their high costs and lack of regulations make them inaccessible to many. Finally, regional differences show that a multi-layered prevention strategy is needed, one that uses clinical, educational, and digital tools to make long-lasting changes.

Conclusions

In this narrative review, we evaluated the global effect of early childhood caries. We conducted a qualitative literature review covering the years 2015–2025, with data obtained from PubMed, Cochrane Library, and Google Scholar. The findings demonstrated that fluoride varnishes and dental sealants are highly effective in reducing caries incidence. Additionally, we highlighted how new technologies might help people get care more easily, such as silver diamine fluoride (SDF), AI-assisted detection, and Teledentistry. However, challenges like low parental awareness and limited access remain prevalent. The findings suggest that a comprehensive strategy integrating evidence-based techniques into routine pediatric care is essential for significantly improving children's oral health.

References

1. Han, S. Y., Chang, C. L., Wang, Y. L., Wang, C. S., Lee, W. J., Vo, T. T. T., ... & Lee, I. T. (2025). A narrative review on advancing pediatric oral health: comprehensive strategies for the prevention and management of dental challenges in children. Children, 12(3), 286. https://doi.org/10.3390/children12030286.

2. Maklennan, A., Borg-Bartolo, R., Wierichs, R. J., Esteves-Oliveira, M., & Campus, G. (2024). A systematic review and meta-analysis on early-childhood-caries global data. BMC Oral Health, 24(1), 835. https://doi.org/10.1186/s12903-024-04605-y.

3. Vishwanathaiah, S., Maganur, P. C., Albar, D. H., Albar, R. H., Jafer, M. A., Baeshen, S. A., ... & Manoharan, V. (2023). Knowledge and Role of Paediatricians/Paediatric Residents in Infant Oral Healthcare and Dental Home across Saudi Arabia: A Cross-Sectional Study. Children, 10(9), 1579. https://doi.org/10.3390/children10091579.

4. Muntean, A., Mzoughi, S. M., Pacurar, M., Candrea, S., Inchingolo, A. D., Inchingolo, A. M., ... & Bordea, I. R. (2024). Silver diamine fluoride in pediatric dentistry: effectiveness in preventing and arresting dental caries—a systematic review. Children, 11(4), 499. https://doi.org/10.3390/children11040499.

5. Gao, S. S., Zhang, S., Mei, M. L., Lo, E. C. M., & Chu, C. H. (2021). Topical fluoride to prevent early childhood caries: Systematic review with network meta-analysis. Journal of Dentistry, 115, 103849. https://doi.org/10.1016/j.jdent.2021.1038.

6. Song, Y., Li, Y., Zhang, Y., Wang, Y., & Liu, X. (2024). Sugar substitutes on caries prevention in permanent teeth among children and adolescents: a systematic review and meta-analysis. Journal of Dentistry, 138, 104540. https://doi.org/10.1016/j.jdent.2024.104540.

7. Iftikhar, A., Lal, A., Imran, A., Wasif, M., Ahmed, N., & Heboyan, A. (2023). Parental knowledge, attitude, and practices toward dental sealants as a preventive strategy for dental caries in children: A cross-sectional study. SAGE Open Medicine, 11, 2333794X231214090. https://doi.org/10.1177/2333794X231214090.

8. Zhang, Y., Liao, H., Xiao, J., Al Jallad, N., Ly-Mapes, O., & Luo, J. (2020). A smartphone-based system for real-time early childhood caries diagnosis. arXiv preprint arXiv:2008.07623. https://arxiv.org/abs/2008.07623.
9. Chou, W. (2021). Randomized controlled trials without data retention. arXiv preprint arXiv:2102.03316. https://doi.org/10.48550/arXiv.2102.03316.

Table 1. Efficacy of key interventions in Pediatric Preventive Dentistry.

Intervention	Description	Effectiveness Score (out of 10)	Key Findings
Topical Fluoride Applications (Varnishes and Gels)	Professional application of fluoride to tooth surfaces.	9	Always very effective, especially for people who are at high risk. Using fluoride varnish on a regular basis can cut the number of cavities by up to 40%.
Dental Sealants	A protective coating is applied to the chewing surfaces of molars.	8	Very effective; it stops about 81% of decay two years after it is applied. Over three years, they lowered the risk of new carious lesions by 67%.
Xylitol and Other Sugar Substitutes	Non-cariogenic substances are used to prevent caries.	Not specified, but described as "slight benefits"	Xylitol substantially diminishes caries incidence, exhibiting a moderate effect size (SMD: -0.50). Sorbitol also has a small but important effect (SMD: -0.10).
Parental Education	Interventions focused on improving caregiver oral hygiene knowledge and habits.	Not specified, but effectiveness described as "varied"	Better brushing habits and awareness can be beneficial, but their effectiveness largely depends on your socioeconomic status and cultural background. Most parents recognize the benefits of sealants for their children, yet some believe they are unnecessary.

Table 2. Emerging technologies and practices in Pediatric Preventive Dentistry.

Emerging Technology/Practice	Description	Role in Pediatric Dentistry	Adoption Challenges
Silver Diamine Fluoride (SDF)	A minimally invasive, antibacterial solution used to prevent dental cavities without drilling.	Heals early molar dentinal caries with less need for sedation and big repairs. It looks like it could be a useful addition for treating early carious lesions.	Large-scale trials are still limited.
AI-Assisted Detection	The use of artificial intelligence in diagnostic processes.	Improves the accuracy of finding early cavities and helps put high-risk cases at the top of the list. A smartphone app that uses deep learning can find early carious lesions with high accuracy.	Lack of regulatory standards and cost barriers limit adoption.
Teledentistry	Remote consultations, diagnosis, and monitoring.	Makes it easier for people to get care, especially in rural or underserved areas. It can be used for consultations to prevent problems and for advice for parents.	Challenges related to digital literacy and infrastructure persist.
Minimally Invasive Dentistry (MID)	The Hall Technique and SDF are two methods that keep teeth from losing their shape by removing only a small amount of tissue.	MID is a growing trend that puts a lot of emphasis on finding cavities early and stopping them from happening. The Hall Technique uses a crown to seal cavities without removing or preparing the tooth.	Adopting inconsistent practices remains a significant issue.