UNIVERSAL JOURNAL OF MEDICAL AND NATURAL SCIENCES
ISSN 2992-8826
https://sr-journals.org/index.php/UJMANS

EDUCATIONAL DENTAL PROGRAMS IN CARIES PREVENTION AND GINGIVITIS IN PRESCHOOL CHILDREN: A REVIEW OF CURRENT DATA

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Annotation. The article provides an overview of current scientific data on the effectiveness of educational stomatological programs in the prevention of dental caries and gingivitis in preschool children (3-6 years old). The review analyzed the results of systematic reviews and meta-analyses, randomized controlled studies, cluster and population studies, as well as clinical recommendations and public health programs published in 2002-2025. It has been shown that isolated educational activities (lessons, demonstrations, game modules) primarily improve knowledge and short-term hygiene indicators (infestation indices), while a more stable reduction in caries growth is often achieved through the integration of education with regularly controlled tooth brushing with fluoride-containing paste (supervised toothbrushing) and/or professional fluoride prevention (fluoric acid) in preschool settings. Family-oriented behavioral technologies (anticipatory guidance, motivational interviewing) improve compliance and behavioral risk determinants, however, the clinical effect on caries varies and depends on the initial risk level, intensity of intervention, and teachers' involvement. A conclusion was made about the expediency of introducing combined preventive models into the practice of preschool educational institutions and the primary level of dental care.

Keywords: preschoolers: early childhood caries (ECC); dmft/dmfs; gingivitis; dental education; controlled cleaning; fluoroloke; prevention.

Аннотация. В статье представлен обзор современных научных данных, посвящённых эффективности просветительских стоматологических программ в профилактике кариеса зубов и гингивитов у детей дошкольного возраста (3–6 лет). В рамках обзора проанализированы результаты систематических обзоров и мета-анализов, рандомизированных контролируемых исследований, кластерных и популяционных исследований, а также клинических рекомендаций и программ общественного здравоохранения, опубликованных в 2002–2025 гг. Показано, что изолированные образовательные мероприятия (занятия, демонстрации, игровые модули) преимущественно улучшают знания и краткосрочные показатели гигиены (индексы налёта), тогда как более устойчивое снижение кариес-прироста чаще достигается при интеграции просвещения с регулярной контролируемой чисткой зубов фторсодержащей пастой (supervised toothbrushing) и/или профессиональной фторпрофилактикой (фторлак) в условиях дошкольных учреждений. Семейно-ориентированные поведенческие технологии (anticipatory guidance, мотивационное интервьюирование) улучшают комплаентность и поведенческие детерминанты риска, однако клинический эффект по кариесу варьирует и зависит от исходного уровня риска, интенсивности вмешательства и участия педагогов. Сделан вывод о целесообразности внедрения комбинированных профилактических моделей в практику дошкольных образовательных учреждений и первичного звена стоматологической помощи.

Ключевые слова: дошкольники; ранний детский кариес (ECC); dmft/dmfs; гингивит; стоматологическое просвещение; контролируемая чистка; фторлак; профилактика.

Annotatsiya. Maqolada maktabgacha yoshdagi (3-6 yosh) bolalarda tish kariyesi va gingivitning oldini olishda ma’rifiy stomatologik dasturlarning samaradorligiga bag‘ishlangan zamonaviy ilmiy ma’lumotlar sharhi keltirilgan. Sharh doirasida 2002-2025-yillarda chop etilgan tizimli sharhlar va meta-tahlillar, randomizatsiyalangan nazorat ostidagi tadqiqotlar, klaster va populyatsion tadqiqotlar, shuningdek, klinik tavsiyalar va jamoat salomatligi dasturlari natijalari tahlil qilingan. Izolyatsiyalangan ta’lim tadbirlari (mashg‘ulotlar, namoyishlar, o‘yin modullari) asosan bilimlarni va qisqa muddatli gigiyena ko‘rsatkichlarini (karash indekslari) yaxshilashi ko‘rsatilgan, kariyes o‘sishini yanada barqaror pasaytirishga ko‘pincha maktabgacha ta’lim muassasalarida ftorli pasta bilan tishlarni muntazam nazorat ostida tozalash (supervised toothbrushing) va/yoki professional ftor profilaktikasi (ftorlak) bilan ta’limni integratsiyalash orqali erishiladi. Oilaga yo‘naltirilgan xulq-atvor texnologiyalari (anticipatory guidance, motivatsion intervyu) komplayentlik va xulq-atvor xavf omillarini yaxshilaydi, ammo kariyes bo‘yicha klinik ta’sir turlicha bo‘lib, dastlabki xavf darajasiga, aralashuv intensivligiga va o‘qituvchilarning ishtirokiga bog‘liq. Maktabgacha ta’lim muassasalari va stomatologik yordamning birlamchi bo‘g‘ini amaliyotiga kombinatsiyalangan profilaktika modellarini joriy etish maqsadga muvofiq degan xulosaga kelingan.

Kalit so‘zlar: maktabgacha yoshdagi bolalar; erta bolalik kariyesi (ECC); dmft/dmfs; gingivit; stomatologik ma’rifat; nazorat ostida tozalash; ftorlak; profilaktika.

INTRODUCTION

Dental caries and inflammatory diseases of periodontal tissues in preschool children remain one of the most common and medical-social problems of modern dentistry. Early childhood caries (Early Childhood Caries, ECC) is associated with pain syndrome, disruption of nutrition and sleep, decrease in the quality of life of the child and family, increased need for dental treatment, and the risk of forming an unfavorable trajectory of dental health in subsequent age periods. From the perspective of public health, it is fundamentally important that most oral diseases are classified as preventable if timely and systematic preventive interventions are provided.

The pathogenesis of caries in children is determined by the interaction of the microbial bio-film community, the frequency of free sugars consumption, exposure time, and the state of enamel resistance. Modern preventative documents emphasize the leading role of modifiable behavioral factors: regularity and quality of hygiene, dietary habits, and adequate fluoride exposure. In preschool age, stable behavioral patterns are formed (frequency of teeth cleaning, choice of products and drinks, parents' attitude towards prevention), therefore prevention during this period is considered as a "window of opportunity" to reduce the risk of caries and inflammatory manifestations in periodontal tissues.

In world practice, educational stomatological programs (oral health education / oral health promotion) implemented in families and organized children's groups have become widespread. However, the research results are not uniform: educational interventions often demonstrate an improvement in knowledge and caries indices, but do not always ensure a stable decrease in caries intensity. The most pronounced clinical effects are described for combined programs that include practical components - controlled teeth cleaning with fluoride-containing paste in children's institutions and/or regular fluoride-containing plaster application, as well as systematic involvement of parents and educators.

The purpose of this review is to analyze current data on the clinical and behavioral effectiveness of educational dental programs in preschool children (3-6 years old) in the prevention of dental caries and gingivitis, as well as to determine the components of interventions associated with the most stable preventive effect.

MATERIALS AND METHODS

Research design: A literature review with data systematization (narrative review with structured search elements).

Data sources and search strategy: The search was conducted using PubMed/MEDLINE and PubMed Central (PMC), Cochrane Library, as well as official publications of WHO and professional associations (AAPD, EAPD, FDI) and Community Preventive Services Task Force resources. The search terms included combinations: preschool OR kindergarten; early childhood caries; gingivitis; oral health education; oral health promotion; supervised toothbrushing; fluoride varnish; motivational interviewing; anticipatory guidance.

Inclusion criteria: (1) children aged 3-6 years (or 0-6 years with analysis of preschool subgroups); (2) the presence of an educational/enlightenment component (training, motivation, pedagogical module, parent counseling); (3) assessment of clinical or hygienic outcomes: dmft/dmfs (analogue of CPU for milk teeth), caries indices (PI and analogues), gingivitis indices (GI and analogues), as well as behavioral outcomes; (4) design: systematic reviews/meta-analyses, RIA, cluster studies, quasi-experimental and population estimates of programs.

Exclusion criteria: research without description of intervention; work without clinical/hygienic indices; research focused exclusively on adolescents; publications not related to caries/gingivitis prevention.

Source selection: A corpus of 30 sources was formed for review (evidence core - clinical recommendations and systematic reviews; additionally, key RIs and population studies illustrating the effectiveness of programs in organized teams were included).

RESULTS

Educational programs implemented in the form of lessons, cleaning demonstrations, game modules, and handouts generally improve children's and parents' dental literacy and reduce caries rates in the short term. However, clinical outcomes for caries (dmft/dmfs) in a number of studies change less pronouncedly, which is explained by limited knowledge transfer to daily behavior, lack of regular monitoring, and the influence of external determinants (food habits, social conditions, access to fluorine).

The most convincing evidence for organized children's groups is related to programs for the controlled cleaning of teeth with fluoride-containing paste under the supervision of personnel. The effect is manifested in a decrease in caries growth with a sufficient duration of intervention (usually ≥12-24 months) and high regularity. Population assessments of programs (for example, at the regional/country level) also demonstrate a decrease in the prevalence of caries in 5-year-old children after such approaches have been scaled up in preschool institutions.

Systematic reviews and recommendations confirm that applying fluorine lacquer is an effective measure for the prevention of caries, including milk teeth. When fluorine is integrated into the programs of children's institutions or primary care, the clinical effect becomes more stable compared to educational measures alone, especially in groups with increased caries risk.

Family-oriented interventions are aimed at changing the behavior of parents/caregivers: sugar control, organizing a cleaning regime, forming a "dental home," and timely preventive visits. Motivational interviewing and anticipatory guidance improve several behavioral indicators and compliance, however, the clinical effect on caries varies between studies. The most likely reasons are differences in the intensity of intervention, the initial caries risk, access to fluorine, and the degree of involvement of the children's institution.

Mobile applications and gamified educational modules are considered as promising tools for increasing engagement and maintaining behavior, especially when feedback is available for parents. Existing RBIs demonstrate improvements in hygiene indicators and self-reporting behavioral outcomes, however, for final conclusions about the impact on dmft/dmfs, data accumulation with longer observation is required.

DISCUSSION

A summary analysis of the included sources confirms that educational interventions are necessary, but often insufficient, conditions for a stable decrease in caries growth in preschoolers.

The most frequent and reproducible effect of "enlightenment" is manifested in the improvement of knowledge, increased motivation, and a decrease in crime rates in the short term. The transition from knowledge to daily behavior is limited by family and environmental factors: eating habits (including the frequency of free sugar consumption), access to fluorine, the level of parental control, and the resources of the preschool institution.

Combined programs, which include a practical component of controlled tooth cleaning with fluoride paste, demonstrate a more stable clinical effect. This is explained by the high frequency of intervention and the decrease in the influence of individual compliance: the hygienic procedure becomes part of the organizational regime. Similarly, the addition of fluorolac enhances the effect on caries by increasing enamel resistance and compensating for the variability of household habits.

Behavioral technologies focused on parents (anticipatory guidance, motivational interviewing) improve compliance and behavioral risk determinants; however, the clinical effect on caries is ambiguous. It is likely that the greatest effectiveness is achieved under conditions of sufficient "dosage" of intervention (repeated contacts), combination with objective preventive measures (fluorine, cleaning control), and targeting of high-risk groups.

Practical conclusion for implementation in preschool institutions: the least effective model should include (1) age-appropriate education for children and teachers; (2) regular controlled cleaning with fluoride-containing paste; (3) Fluorolax for high-risk groups; (4) simple tools for involving parents (reminders, short consultations, digital support). Such a design ensures a balance between evidence-based effectiveness and feasibility in real healthcare and education systems.

CONCLUSION

Educational dental programs in preschool children have a positive impact on knowledge and oral hygiene indicators, however, maximum and more sustainable clinical effectiveness in terms of caries prevention is achieved when education is integrated with controlled tooth cleaning with fluoride-containing paste and/or professional fluoride prevention. Behavioral family-oriented technologies should be used as an amplifier of compliance and risk factor modification. The review data justify the implementation of combined preventive models in the practice of preschool educational institutions and the primary level of dental care.

REFERENCES

1. World Health Organization. Oral health: key facts. 2025.
2. World Health Organization. Sugars and dental caries. 2025.
3. World Health Organization. Guideline: Sugars intake for adults and children. Geneva: WHO; (NCBI Bookshelf).
4. Moynihan P., Kelly S. Effect on caries of restricting sugars intake: systematic review / evidence update.
5. American Academy of Pediatric Dentistry (AAPD). Policy on Early Childhood Caries (ECC): classifications, consequences, and preventive strategies. Updated edition.
6. AAPD. Fluoride Therapy. Best practices / guideline. Updated edition.
7. AAPD. Policy on Use of Fluoride. Updated edition.
8. European Academy of Paediatric Dentistry (EAPD). Guidelines on the use of fluoride in children.
9. EAPD. Policy document on fluoride in caries prevention.
10. Marinho V.C.C., et al. Fluoride varnishes for preventing dental caries. Cochrane Database Syst Rev.
11. Community Preventive Services Task Force (CPSTF). School-based fluoride varnish delivery programs.
12. Griffin S.O., et al. Effectiveness of school fluoride delivery programs. Am J Prev Med. 2025.
13. U.S. Preventive Services Task Force. Prevention of dental caries in children younger than 5 years: recommendation statement. 2021.
14. Macpherson L.M.D., et al. Evaluating the impact of a national supervised toothbrushing programme in Scotland. Community Dent Oral Epidemiol. 2013.
15. NHS Scotland. Childsmile Programme documentation.

16. Natapov L., et al. Two-year supervised toothbrushing programme and caries outcomes. 2021.
17. Curnow M.M., et al. A randomized controlled trial of supervised toothbrushing and caries prevention. 2002.
18.Stomatological status of preschool children in certain regions of the republic of Uzbekistan// A.N. Shahobiddinovich, T.J. Bahtiyorovich, M.S. Saidaloevich International scientific review, 102-106
19. Tavakoli M., et al. Effectiveness of school-based supervised toothbrushing: systematic review and meta-analysis. BMC Oral Health. 2025.
20. Bramantoro T., et al. School-based oral health promotion programmes: systematic review. PLOS ONE. 2021.
21. Madawana A., et al. Oral health interventions for children under 7 years: systematic review. 2024.
22. Khan N., et al. Risk factors for caries in children under 6 years: systematic review. 2024.
23. Kirthiga M., et al. Risk factors for early childhood caries: systematic review. 2019.
24. Xu X., et al. Risk factors for early childhood caries in preschool children. 2025.
25. Jiang E.M., et al. Parental education vs motivational interviewing vs risk assessment: RCT. 2020.
26. Arrow P., et al. Motivational interviewing and anticipatory guidance: randomized trial. 2023.
27. Batliner T., et al. Motivational interviewing caregivers and ECC outcomes: trial. 2018.
28. Henshaw M.M., et al. Cluster RCT motivational interviewing for caregivers. 2018.
29. Shirmohammadi A., et al. Smartphone-based oral health education app: RCT. 2022.
30. Chen Y., et al. Gamification in children's oral health: review. JMIR. 2025.
31. FDI World Dental Federation. Child Oral Health Fact Sheet. 2025.