

TREATMENT OF INITIAL DENTAL CARIES IN CHILDREN OF PRIMARY SCHOOL AGE

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Abstract

Initial dental caries remains one of the most prevalent chronic diseases among children of primary school age worldwide. At this stage, carious lesions are limited to the enamel and are potentially reversible if timely and appropriate preventive and therapeutic measures are applied. The modern concept of caries management in children emphasizes minimally invasive approaches, early diagnosis, and non-operative treatment strategies aimed at preserving tooth structure and enhancing natural remineralization processes. This article reviews contemporary methods for the treatment of initial dental caries in children of primary school age, including fluoride therapy, remineralizing agents, dietary counseling, oral hygiene education, and innovative preventive technologies. Special attention is paid to risk-based caries management, the role of parental involvement, and school-based preventive programs. The analysis demonstrates that early detection and comprehensive preventive treatment significantly reduce caries progression, improve oral health outcomes, and contribute to the long-term preservation of dental tissues in children.

Keywords: initial dental caries, primary school children, enamel demineralization, remineralization therapy, fluoride treatment, preventive dentistry

Introduction

Dental caries is a multifactorial disease characterized by the progressive demineralization of dental hard tissues under the influence of acids produced by bacterial metabolism of dietary carbohydrates. Despite significant advances in preventive dentistry, dental caries remains a major public health concern, particularly among children of primary school age. According to the World Health Organization, the prevalence of dental caries in children aged 6–12 years remains high in many countries, affecting both developed and developing regions.

The initial stage of dental caries, often referred to as “white spot lesions,” represents the earliest clinically detectable manifestation of the disease. At this stage, mineral loss occurs beneath the enamel surface without cavitation, making the process reversible if managed appropriately. This reversibility highlights the importance of early diagnosis and non-invasive treatment strategies.

Children of primary school age represent a particularly vulnerable group due to several factors, including insufficient oral hygiene skills, high consumption of fermentable carbohydrates, limited awareness of oral health, and dependence on parental supervision. Additionally, the enamel of newly erupted permanent teeth is less mineralized and more susceptible to acid attack, further increasing the risk of caries development.

Traditional restorative approaches, which focus on the mechanical removal of carious tissue and placement of fillings, are not always justified in cases of initial caries. Modern dentistry increasingly promotes a preventive and minimally invasive philosophy, emphasizing caries risk assessment, behavioral modification, and biological approaches to disease control. This paradigm shift is especially relevant in pediatric dentistry, where preserving natural tooth structure and preventing dental anxiety are critical considerations.

The aim of this article is to analyze contemporary methods for the treatment of initial dental caries in children of primary school age, highlighting evidence-based preventive and therapeutic strategies that can halt or reverse the disease process. By focusing on non-invasive interventions, this review underscores the importance of early detection, comprehensive prevention, and interdisciplinary cooperation in improving pediatric oral health outcomes.

Review of Literature / Current Approaches

Initial dental caries develops as a result of an imbalance between demineralization and remineralization processes occurring on the tooth surface. Frequent exposure to sugars leads to acid production by cariogenic bacteria such as *Streptococcus mutans* and *Lactobacillus* species. These acids lower the pH of dental plaque, causing mineral ions—primarily calcium and phosphate—to diffuse out of the enamel.

At the initial stage, the enamel surface remains intact, while subsurface demineralization results in a chalky white appearance. Without intervention, repeated acid attacks may lead to surface breakdown and cavitation. However, if the oral environment is modified to favor remineralization, mineral ions can be redeposited into the enamel, restoring its structure and function.

Diagnostic Methods for Initial Caries

Early diagnosis is essential for successful management of initial caries. Visual-tactile examination under good lighting, using standardized criteria such as the International Caries Detection and Assessment System (ICDAS), remains the primary diagnostic approach. White spot lesions are typically detected as opaque, matte areas on smooth surfaces, particularly along the gingival margin.

Adjunctive diagnostic tools include laser fluorescence devices, digital radiography, and transillumination techniques. While these methods can enhance detection sensitivity, their routine use in pediatric practice should be balanced against cost, radiation exposure, and child cooperation.

Non-Invasive Treatment Strategies

Fluoride Therapy

Fluoride remains the cornerstone of caries prevention and treatment. Topical fluoride applications enhance enamel remineralization by promoting the formation of fluorapatite, which is

more resistant to acid dissolution than hydroxyapatite. Fluoride also inhibits bacterial metabolism and reduces acid production.

In children of primary school age, fluoride therapy may include:

- Fluoridated toothpaste (1,000–1,450 ppm fluoride)

- Professional fluoride varnish applications

- Fluoride gels and mouth rinses in high-risk children

Numerous studies have demonstrated that regular fluoride varnish application significantly reduces the progression of initial carious lesions.

Remineralizing Agents

In addition to fluoride, calcium- and phosphate-based remineralizing agents have gained increasing attention. Products containing casein phosphopeptide–amorphous calcium phosphate (CPP-ACP) or bioactive glass release calcium and phosphate ions, facilitating enamel repair.

These agents are particularly useful in children with high caries risk, orthodontic appliances, or enamel hypomineralization. When used in combination with fluoride, remineralizing agents demonstrate a synergistic effect.

Oral Hygiene Education

Effective plaque control is fundamental to caries management. Children of primary school age often lack the manual dexterity required for optimal tooth brushing, making education and supervision essential. Oral hygiene instruction should be age-appropriate and include demonstrations, visual aids, and motivational techniques.

Parents play a critical role in reinforcing daily oral hygiene practices. Regular monitoring of brushing habits and the use of fluoridated toothpaste are key components of successful prevention.

Dietary Counseling

Dietary habits strongly influence caries development. Frequent consumption of sugary snacks and beverages increases the duration of acid exposure, accelerating enamel demineralization. Dietary counseling aims to reduce sugar intake frequency, promote balanced nutrition, and encourage consumption of protective foods such as dairy products.

School-based nutrition programs and parental education can significantly contribute to healthier dietary choices among children.

Preventive Programs and Risk-Based Management

Modern pediatric dentistry emphasizes individualized, risk-based caries management. Caries risk assessment tools consider factors such as past caries experience, oral hygiene status, dietary habits, fluoride exposure, and socioeconomic conditions.

Children identified as high-risk require more intensive preventive measures, including frequent professional fluoride applications and closer monitoring. School-based preventive

programs, such as regular dental screenings and fluoride varnish campaigns, have proven effective in reducing caries prevalence at the population level.

Conclusion

The treatment of initial dental caries in children of primary school age should be based on early detection, accurate risk assessment, and the application of non-invasive, preventive strategies. At the initial stage, carious lesions are reversible, making timely intervention crucial for preserving tooth structure and preventing disease progression.

Fluoride therapy, remineralizing agents, oral hygiene education, and dietary counseling form the foundation of effective caries management. The integration of these approaches, combined with active parental involvement and school-based preventive programs, significantly improves oral health outcomes in children.

A shift from traditional restorative dentistry toward a preventive and minimally invasive model is particularly important in pediatric practice. By focusing on biological and behavioral factors, dental professionals can reduce the burden of dental caries, promote lifelong oral health habits, and enhance the overall quality of life for children.

Future research should continue to explore innovative preventive technologies and strategies for improving early caries detection and management, particularly in underserved populations.

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