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REVIEW

Nutrition and periodontal diseases in preschool children

Nutrición y enfermedades periodontales en niños de preescolar

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ABSTRACT

Periodontal diseases affect not only adults but also preschool children, and are influenced by factors such as oral hygiene and nutritional habits. A literature review was conducted to analyze the relationship between nutrition and periodontal diseases in preschool children, the main dietary risk factors, the pathophysiological mechanisms involved, and intervention strategies. During the research process, the following methods were used: documentary analysis, systems approach, historical-logical analysis, analytical-synthetic analysis, and inductive-deductive analysis. A total of 25 international, national, and regional bibliographies were reviewed. Malnutrition, especially acute malnutrition, increases the risk of severe gingival inflammation, bacterial plaque, and bleeding gums, while a balanced diet rich in vitamins C, D, A, B complex, and minerals such as calcium, iron, and zinc strengthens periodontal health. Excess refined sugars and saturated fats promote bacterial biofilm formation and chronic inflammation. Deficiency in essential nutrients weakens oral tissues and increases susceptibility to infections. Nutrition plays a decisive role in the periodontal health of preschoolers. Poor nutrition significantly influences the development of early periodontal disease in preschool children, mainly through inflammatory mechanisms and immunological alterations. A balanced diet, rich in essential micronutrients and low in processed sugars, is key to preventing gingivitis and other periodontal conditions in preschool children.

Keywords: Nutrition; Periodontal Diseases; Preschool Children.

RESUMEN

Las enfermedades periodontales no solo afectan a adultos, sino también a niños en edad preescolar, siendo influenciadas por factores como la higiene bucal y los hábitos nutricionales. Se realizó una revisión bibliográfica con el objetivo de analizar la relación entre nutrición y enfermedades periodontales en niños de preescolar, los principales factores dietéticos de riesgo, los mecanismos fisiopatológicos involucrados y las estrategias de intervención. Durante el proceso de investigación se utilizaron los métodos análisis documental, enfoque de sistema, análisis histórico-lógico, analítico-sintético e inductivo-deductivo. Se revisaron un total de 25 bibliografías internacionales, nacionales y territoriales. La desnutrición, especialmente la aguda, incrementa el riesgo de inflamación gingival severa, placa bacteriana y sangrado de encías, mientras que una dieta equilibrada, rica en vitaminas C, D, A, complejo B y minerales como el calcio, hierro, y zinc, fortalece la salud periodontal. El exceso de azúcares refinados y grasas saturadas promueve la formación de biofilm bacteriano y la inflamación crónica. La deficiencia de nutrientes esenciales debilita los tejidos bucales y aumenta la susceptibilidad a infecciones. La nutrición juega un papel determinante en la salud periodontal de los preescolares. Una mala alimentación influye significativamente en el desarrollo de enfermedades periodontales tempranas en niños de preescolar, principalmente a través de mecanismos inflamatorios y alteraciones inmunológicas. Una dieta equilibrada, rica en micronutrientes esenciales y baja en azúcares procesados, es clave para prevenir gingivitis y otras afecciones periodontales en niños de preescolar.

Palabras clave: Nutrición; Enfermedades Periodontales; Niños de Preescolar.

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INTRODUCTION

Although commonly associated with adults, periodontal diseases also affect preschool children, with manifestations such as gingivitis and, in severe cases, aggressive periodontitis. These conditions are influenced by multiple factors, including oral hygiene and nutritional habits.[1]

Nutrition plays a fundamental role in oral health and is closely related to periodontal diseases in preschool children. Malnutrition, especially acute malnutrition, is associated with a higher prevalence of severe gingival inflammation, bleeding gums, bacterial plaque, and poor oral hygiene in young children, which increases the risk of periodontal diseases. Malnutrition affects craniofacial development, the integrity of the stomatognathic system, and tooth eruption, exacerbating gingivitis and other periodontal diseases.[2]

Specific vitamin deficiencies, such as vitamin C, a diet low in fiber and poor in fruits and vegetables, are also related to a higher prevalence of periodontal disease in schoolchildren, while diets rich in antioxidants and nutrients such as vitamins C and E can reduce gingival inflammation. Adequate nutritional status contributes to the prevention of periodontal disease in children, while malnutrition and poor diet increase the risk and severity of these conditions.[2]

Promoting healthy eating and oral hygiene education are key to improving periodontal health in this child population.[3] In turn, malnutrition (whether due to deficiency or excess) has been linked to an increased risk of caries and early periodontal disease.[4]

Despite this, there is a lack of awareness among legal guardians and educators about the impact of nutrition on the oral health of preschoolers, which hinders prevention.[5] The description of this global and national reality has been the subject of study and research to find a solution to the following problem: How does malnutrition increase the development of periodontal disease in preschool children?

The authors propose the following objective: to analyze the relationship between nutrition and periodontal disease in preschool children, the main dietary risk factors, and the pathophysiological mechanisms involved.

METHOD

A literature review on the subject was conducted in May and June 2025, using databases such as Scopus, Scielo, Dialnet, Redalyc, LILACS, and Google Scholar. A total of 25 bibliographies published in scientific journals or documents issued by international or national institutions or organizations conducting studies at the international, national, or regional level were reviewed.

Theoretical and empirical methods were used during the research process. The main methods used were documentary analysis, a systems approach, historical-logical analysis, analytical-synthetic analysis, and inductive-deductive analysis.

DEVELOPMENT

Excessive consumption of simple sugars (sucrose, fructose) promotes bacterial adhesion and biofilm formation, the main factor in the development of childhood gingivitis.[6] Studies show that children with a high intake of sweets and sugary drinks have higher rates of plaque and gingival bleeding.[7] A diet deficient in high-quality proteins (found in dairy products, eggs, and legumes) is associated with delayed tissue repair and increased susceptibility to oral infections.[8]

On the other hand, omega-3 fatty acids (fish, nuts) have an anti-inflammatory effect, reducing markers of gingival inflammation.[9] Essential nutrient deficiencies affect immune function and metabolic processes, promoting bacterial plaque formation and severe gingival inflammation, increasing the prevalence of periodontal diseases.[10]

Vitamin deficiency

Vitamin C

Deficiency affects collagen synthesis, weakening the connective tissue of the gums and increasing gingival bleeding. In blood vessels, it impairs capillary formation in periodontal tissue, reducing oxygenation and cell repair.[11]

Vitamin D

It is crucial for calcium absorption and alveolar bone mineralization. Its deficiency is associated with bone loss and an increased risk of periodontitis. It regulates the production of cathelicidins, antimicrobial peptides that protect against periodontal pathogens such as Porphyromonas gingivalis, helping the immune response.[12]

Vitamin A

Maintains the oral mucosal barrier, preventing bacterial invasion. Its deficiency causes enamel hypoplasia and alterations in the gingival epithelium. It stimulates salivary secretion, which is essential for removing debris and bacteria.[13] B complex (B2, B3, B12): Its deficiency is related to stomatitis and worsening of periodontal lesions.[14]

Clinical consequences

Increased plaque accumulation: Salivary alteration and weakened immune response facilitate bacterial adhesion, leading to increased accumulation of dental plaque.[15] Nutritional deficiencies amplify the inflammatory response, accelerating tissue destruction in early gingivitis and periodontitis.[16]

Effects of protein deficiencies

Protein deficiency reduces the buffering capacity of saliva, making it difficult to neutralize acid pH after food intake and promoting bacterial proliferation.[17] Proteins are essential for the formation of dental structures. Their deficiency affects the synthesis of dental

proteins, such as amelogenin, which are crucial for enamel mineralization.[18]

Effect of mineral deficiency

Calcium and phosphorus are essential for tooth mineralization; their insufficiency increases the risk of periodontal bone loss.[19] Iron and zinc deficiency causes iron deficiency anemia. This disease is common in preschoolers and is correlated with gingival pallor and increased susceptibility to infections.[20]

Impact of malnutrition

Underweight children have a higher prevalence of chronic gingivitis due to immunosuppression.[21] Malnutrition influences the onset of periodontal disease in young children mainly by affecting the development and integrity of oral tissues and the immune system.[22]

It causes alterations in craniofacial growth, bone, periodontal ligament, and teeth, which can lead to enamel hypoplasia, delayed tooth eruption, and increased susceptibility to diseases such as gingivitis and periodontitis.[22]

It is associated with poor oral hygiene and high levels of bacterial plaque, which contribute to the onset and severity of gingivitis in children. Chronic inflammation, exacerbated by diets low in nutrients and high in carbohydrates and saturated fats, can also accelerate the destruction of periodontal tissues.[22]

Childhood malnutrition is a biological risk factor that impairs oral health, facilitating the onset and progression of periodontal disease in young children. Improving nutritional status is key to preventing these conditions and promoting adequate periodontal health in childhood.[22]

Malnutrition negatively affects the development and function of periodontal tissue in preschool children in several ways:

It causes alterations in the growth and development of the stomatognathic system, including bone, periodontal ligament, and teeth, which deteriorates the quality and texture of these supporting tissues. It interferes with the formation of dental proteins, growth factors, dental calcification, and bone remodeling, delaying tooth eruption and affecting enamel integrity, which increases vulnerability to periodontal diseases. In addition, it can lead to malocclusions and dental malformations that affect the harmonious function of the masticatory system, complicating periodontal health.[23]

In summary, childhood malnutrition compromises both the structure and function of periodontal tissue, increasing the risk and severity of periodontal diseases in childhood. Childhood malnutrition is associated with several structural changes in the bone and periodontal ligament that affect their development and function.

Malnutrition alters the texture and quality of the alveolar bone and periodontal ligament, weakening these supporting tissues that are essential for dental stability. It can cause alveolar bone loss and incomplete calcification, compromising bone integrity and the ability to support teeth.[23]

Alterations in bone remodeling and periodontal ligament formation are observed, affecting their cushioning and tooth-fixing function. These alterations contribute to a greater predisposition to gingival inflammation, gingivitis, and periodontitis in malnourished children.[23]

In Cuba, gingivitis is the most common periodontal disease in children aged 5 to 6 years, with a high prevalence from childhood onwards, which tends to stabilize in older ages. A study in Santa Clara showed that approximately 57,5 % of children aged 5 to 6 years had chronic inflammatory periodontal disease, mainly mild gingivitis, with no cases of advanced periodontitis in that population.[24]

Associated risk factors include poor oral hygiene, microbial infection, mouth breathing, systemic diseases, and dental crowding. Therefore, prevention should include oral hygiene education and a balanced diet rich in fruits and vegetables to ensure adequate nutrition and periodontal health in young children in Cuba.[24]

Poor nutrition significantly influences the development of early periodontal disease in preschool children, mainly through inflammatory mechanisms and immune disorders. Studies show that diets rich in refined carbohydrates, saturated fats, and trans fats generate a chronic proinflammatory state, promoting the destruction of periodontal tissues. These foods increase the production of free radicals and reduce the body's antioxidant capacity, which unbalances the immune response and facilitates disease progression.[24]

In the Cuban context, where socioeconomic factors can limit access to nutritious foods, there is a higher prevalence of mild gingivitis in children, linked to nutritional disorders such as underweight or malnutrition. Although there are no specific data on advanced periodontitis in this group, the combination of poor oral hygiene and inadequate diet creates a scenario conducive to its development.[24]

Preventive recommendations

- Increase consumption of anti-inflammatory foods (omega-3, fruits, vegetables).
- Reduce intake of refined sugars and trans fats.
- Implement nutritional and oral health education programs in vulnerable communities.

Evidence suggests that improving nutritional quality in early stages could mitigate not only periodontal problems, but also other associated chronic diseases.

Eating habits that can reduce the onset of periodontal disease in preschool children include:[25]

- Reducing the consumption of sugars and saturated fats, as excess sugars alter the oral microbiota and promote inflammation and bacterial plaque formation.

- Consuming foods rich in fiber, which help improve glycemic control and have a preventive effect on periodontitis.
- Include polyunsaturated fatty acids (omega-3), found in oily fish such as salmon, sardines, and mackerel, which have a beneficial anti-inflammatory effect on the gums.
- Eat foods rich in vitamins A, C, and D, which are essential for the formation and maintenance of gum and bone tissue, such as citrus fruits, vegetables, dairy products, and eggs.
- Consume calcium and phosphorus through milk, yogurt, cheese, legumes, and nuts to strengthen teeth and bones.
- Include polyalcohols such as xylitol, found in strawberries and sugar-free gum, which inhibit bacterial adhesion and reduce dental plaque.
- Encourage the consumption of crunchy fruits and vegetables that stimulate saliva production and help clean teeth naturally.
- Avoid sugary foods before bedtime, as saliva decreases and facilitates the development of cavities and gingivitis.

CONCLUSIONS

Nutrition plays a decisive role in the periodontal health of preschoolers. Poor nutrition significantly influences the development of early periodontal disease in preschool children, mainly through inflammatory mechanisms and immune disorders. A balanced diet, rich in essential micronutrients and low in processed sugars, is key to preventing gingivitis and other periodontal conditions in preschoolers.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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