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REVIEW ARTICLE

Effects of nutrition on oral health

Efectos de la nutrición en la salud oral

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ABSTRACT

Introduction: The relationship between nutrition and oral health has been recognized as an important factor in the prevention of oral diseases.
Objective: to identify the incidence of diet on dental health and nutritional strategies to improve it.
Methods: a review of the literature was carried out, for which information was accessed from different databases, which ensured that the most relevant and adequate information on the subject to be investigated was obtained, fulfilling the selection criteria.
Development: in low-income settings, inadequate nutrition continues to have a negative impact on the oral and cognitive health of its inhabitants. For this reason it is essential to adopt nutritional strategies that limit the consumption of foods rich in sugars and starches is important for improving dental health, and disseminating a healthy diet would greatly improve this problem.
Conclusions: considering that nearly half of the world's population suffers from oral diseases, and that inadequate nutrition negatively affects dental health, the need for resources for oral care is understandable. To this end, nutritional strategies that limit sugars and starches and promote calcium-rich foods are crucial.

Keywords: Health Assistance; Tooth Diseases; Diet, Food, And Nutrition; Disease Prevention; Oral Health.

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RESUMEN

Introducción: la relación entre la nutrición y la salud oral ha sido reconocida como un factor importante en la prevención de enfermedades bucales.
Objetivo: identificar la incidencia de la dieta en la salud dental y las estrategias nutricionales para mejorarla
Métodos: se realizó una revisión de la literatura, para lo cual se accedió a información de diferentes bases de datos, lo que garantizó la obtención de la información más relevante y adecuada del tema a investigar, cumpliéndose los criterios de selección.
Desarrollo: en entornos de bajos recursos, la nutrición inadecuada sigue teniendo un impacto negativo en la salud oral y cognitiva de sus habitantes. Por ello se hace imprescindible adoptar estrategias nutricionales que limiten el consumo de alimentos ricos en azúcares y almidones es importante para mejorar la salud dental, y difundiendo una dieta saludable, se mejoraría en gran medida este problema.
Conclusiones: teniendo en cuenta que cerca de la mitad de la población mundial sufre enfermedades bucales, y que una nutrición inadecuada afecta negativamente la salud dental, se comprende la necesidad de recursos para el cuidado oral. Para ello, estrategias nutricionales que limiten los azúcares y almidones y promuevan alimentos ricos en calcio son cruciales.

Palabras clave: Atención a la Salud; Enfermedades Dentales; Nutrición, Alimentación y Dieta; Prevención de Enfermedades; Salud Bucal.

INTRODUCTION

To maintain health, the human body requires daily nourishment in the form of carbohydrates, proteins and minerals. Poor nutrition can affect oral health, including dental caries, periodontal diseases, oral mucosal diseases and infectious diseases. Inadequate oral health can distort food choices and negatively impact food intake, leading to suboptimal nutritional status that can result in chronic systemic and stomatognathic diseases. Examining and treating oral health and nutritional problems is critical to improving health and quality of life.[1]

Dentists are in a unique position to provide oral hygiene education and key nutritional information related to oral health. Many patients may not be aware of the effects of diet and nutritional status on the development and maintenance of a healthy mouth and caries-free teeth. Collaboration between dietetics and oral health professionals is essential to identify, educate and treat nutrition-related oral health problems. These partnerships will foster improved levels of oral health care. Malnutrition can eloquently affect oral health and, in turn, poor oral health can lead to malnutrition. This correspondence, therefore, is based on good nutritional health promoting good oral health and vice versa.[2,3]

The World Health Organization (WHO) estimates that approximately half of all people suffer from oral diseases. Approximately 2.4 billion people have permanent cavities and 532 million children are also affected by primary caries. Oral health care is expensive and in high-income countries about 5 % of total health care costs are spent on oral health care. In other countries, the costs required are beyond capacity.[4] Dental caries is a disease related to several different factors. Factors such as a cariogenic diet, poor oral health, high counts of cariogenic bacteria, dental plaque, inadequate saliva flow, and lack of sufficient exposure to fluoride are among the environmental risk factors that cause caries.[5]

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The increase in dental caries in recent decades is due in part to excessive consumption of added sugars, which causes pain, infection, and cosmetic disfigurement, leading to premature tooth loss. Nutrition is crucial in preventing caries, as plaque bacteria metabolize fermentable carbohydrates, producing acids that demineralize enamel. Studies show that frequent consumption of sugar, especially between meals, is associated with higher rates of caries. Health care professionals should be well informed about dietary strategies to prevent this disease.[1,6,7]

Numerous socioeconomic and behavioral risk factors for caries have been identified, such as prolonged bottle feeding, frequent consumption of sugary snacks and drinks, inadequate tooth brushing, lack of fluoride and dental care, and low or high income. In many countries, a significant number of children require general anesthesia to treat caries in their primary teeth, which entails considerable costs and social consequences. Inadequate nutrition negatively impacts growth and cognitive development, especially in low-resource areas such as rural sub-Saharan Africa, creating a vicious cycle between poor nutrition and oral health. Early childhood caries is characterized by rapid lesions, inflammation and pain, mainly due to frequent consumption of fermentable carbohydrates and sugary foods, which generate an acidic environment in the mouth and demineralize the teeth.[8,9,10,11]

Studies have shown that impaired oral function in older adults affects feeding, swallowing, pronunciation and social life, and is associated with reduced food intake, nutritional deficiencies and increased risk of frailty and mortality. Exercises to improve oral function are effective, although the degree of improvement varies among individuals. In addition, dietary changes, such as increased consumption of soft drinks and decreased milk intake, are detrimental to oral health and lead to caries and enamel erosion due to their inherent acids and sugars.[12,13]

In view of the above, the present literature review was carried out with the aim of identifying the impact of diet on dental health and nutritional strategies to improve it.

METHODS

A review of the literature was carried out, for which information was accessed from different databases in which the effects of nutrition on oral health and nutritional strategies to improve it were objectively addressed by means of a literature review to obtain information on this problem. The PRISMA methodology was used,[14] which guaranteed obtaining the most relevant and adequate information on the subject to be investigated. Table 1 shows how information was selected for the review.

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Table 1. Selection of information to be included in the review.

SECTION	ELEMENTS
Eligibility Criteria	Inclusion criteria (original articles with results in human patients, including information on effects of nutrition on oral health and nutritional strategies to improve it, between 2012 and 2013, in English, Spanish or Portuguese language) and exclusion (articles without full access).
Sources of information	Three electronic databases were searched (MEDLINE through PubMed, LILACS and Elsevier).
Search Chains	Terms and Boolean operators as follows: (Nutrition) AND (prevention of dental diseases) AND (Diet and nutrition) OR (oral health) AND (Diet and Nutrition to Prevent Dental Problems.)".
Selection process	Including randomized or non-randomized controlled trials, cohort studies and case reports, reviews. In addition, article references were also manually checked to identify other potentially relevant literature. Unpublished articles were not sought.
Data collection process	Studies that met the following criteria were considered eligible: Letters, commentaries, editorials and practice guidelines, theses were excluded.
MeSH terms	Articles indexed in databases such as PubMed, Scielo, LILACS, Medline, Scimago, The Cochrane.
Data list	Nutrition, prevention of dental diseases, diet and nutrition, diet and nutrition to prevent dental problems.
Synthesis methods	Effects of nutrition on oral health

Figure 1 shows the flowchart of the process of selecting the sources of information used in the search performed.

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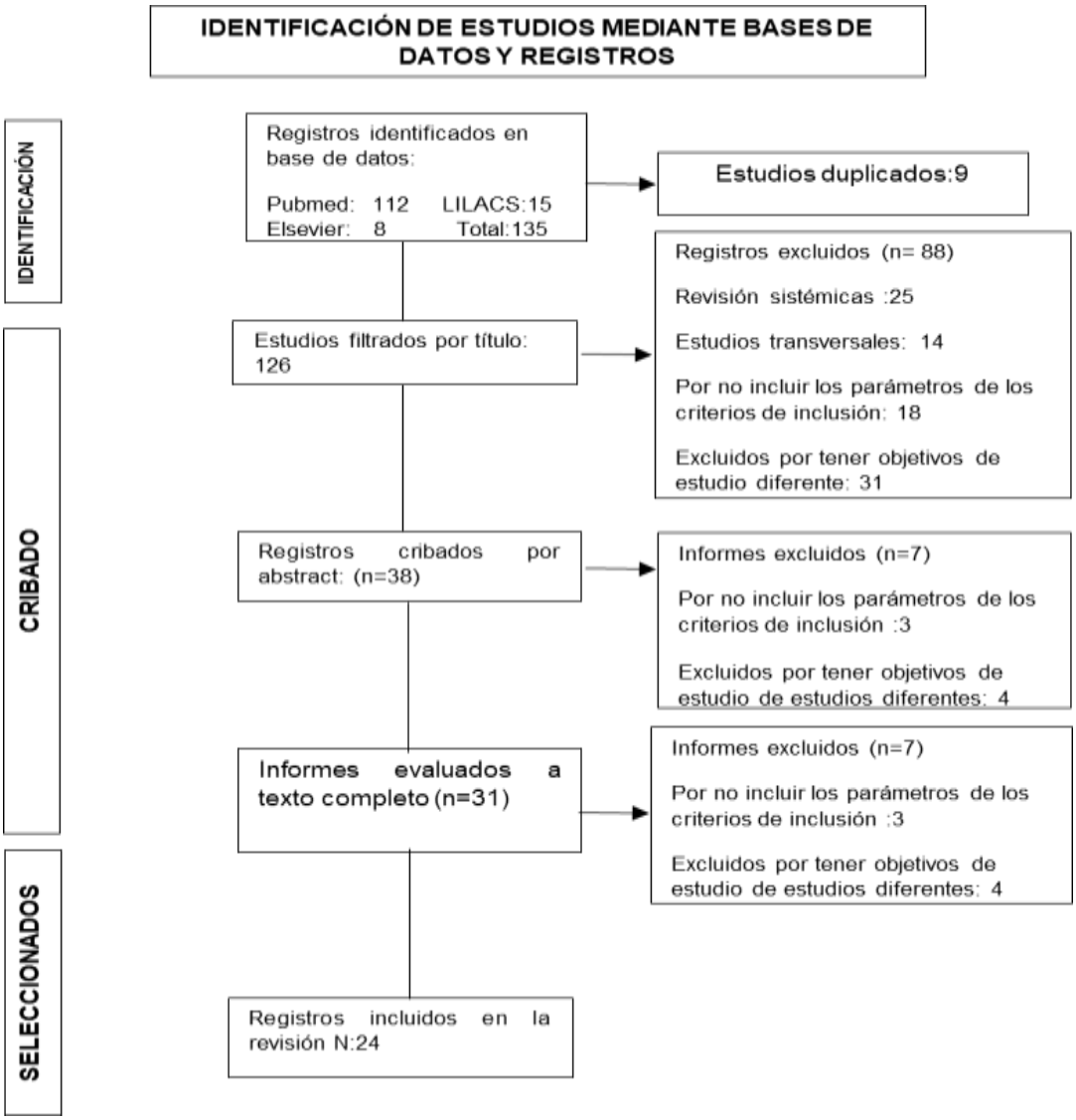

Fig. 1 Flow chart.

DEVELOPMENT

Inadequate nutrition continues to have a negative impact on growth and cognitive development in low-resource settings, including rural sub-Saharan Africa. A vicious cycle develops as poor nutrition leads to poor oral health, and poor oral health negatively impacts nutrition. Early childhood caries (ECC), or infant caries, is characterized by rapidly developing caries lesions, chronic inflammation, and oral pain. The main contributing factor to ECC is nutrition with frequent consumption of fermentable carbohydrates or highly processed sugary foods. Oral bacteria act on sugary or fermentable carbohydrate foods to produce an acidic environment, and this causes dissolution of the underlying dental minerals in the tooth, leading to dental caries.[15]

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In children in particular, there is a risk relationship between the presence of malnutrition and caries and the chronology of eruption. Malnutrition has an unfavorable influence on craniofacial growth and development and constitutes an adverse antecedent that can lead to various sequelae, among which are alterations in the quality and texture of certain tissues (bone, periodontal ligament and teeth), the pondoestatural deficit and a higher prevalence of gingivitis. Defects in tooth enamel secondary to excess/intoxication by vitamin D, fluorides or other minerals have been reported.[16]

People with dementia are also immersed in this problem often experience various nutrition-related problems. In the early stages, problems with memory and thoughts may affect planning, shopping and food preparation. As the disease progresses, eating and drinking may become more difficult. Dysphagia has been reported in 13-57 % of people with dementia. Sensory impairment, loss of appetite and the ability to eat are other common symptoms. Difficulties in communicating discomfort due to, for example, hunger, pain, fatigue, medications, and constipation can also adversely affect food and fluid intake.[17]

On the other hand, it is important to note that good nutrition is not only necessary for a healthy life, but also plays a key role in the development and protection of oral health. Nutrition is involved in craniofacial and oral mucosal development, has a decisive influence on the development of dental and periodontal diseases and is related to one third of cases of oral carcinogenesis. Diet determines the state of human health and influences the occurrence of oral diseases.[18]

The American Academy of Pediatric Dentistry suggests that dental care should begin in the prenatal period with early dietary and oral hygiene counseling. This research proposes measures for parents to teach good nutritional and dental care habits, including a diet appropriate for infant growth. It recommends a diet rich in vegetables, fruits and whole grains, low in saturated fats, controlling the use of sugars. Ongoing education of parents about the relationship between carbohydrates and caries is essential, as well as reading nutrition labels for better food selection.[19]

The evidence so far clearly shows an increased risk of dental caries in children breastfed for more than 12 months. Breastfeeding per se, and of prolonged duration, should not be discouraged as it has been shown to be beneficial for many health outcomes. However, health professionals should use current recommendations on breastfeeding, oral hygiene and feeding frequency to advise parents on the benefits of breastfeeding and proper oral hygiene, but at the same time also on the risk of increased frequency of any feeding, including breastfeeding after tooth eruption.[20]

Dental caries is a multifactorial disease resulting from the interaction of factors including cariogenic microorganisms, exposure to fermentable carbohydrates through inappropriate feeding practices, and a variety of social variables. Caries prevention strategies should begin with prenatal education of prospective parents, progress through the perinatal period, and continue with the mother and infant (Figure 2). Adequate dental treatment and oral hygiene measures during pregnancy can reduce or delay dental caries from infancy onward.[21]

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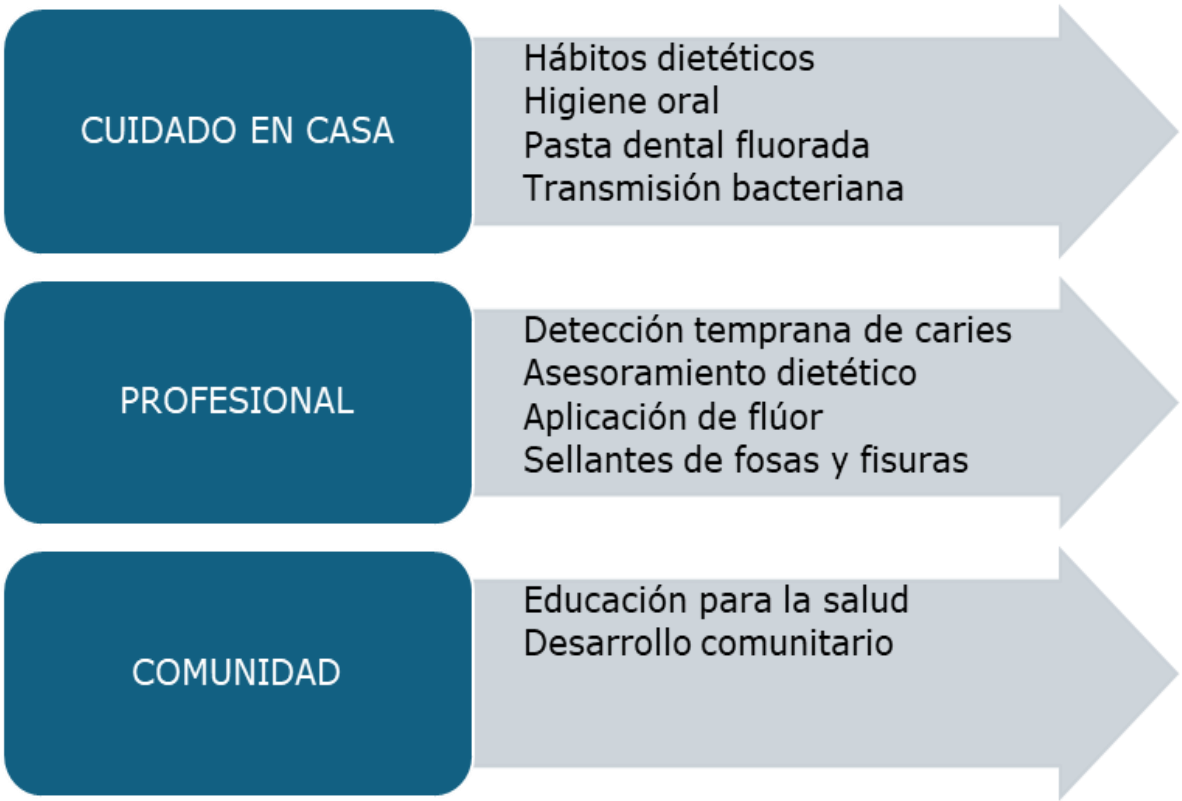

Fig. 2 Strategies for caries prevention at various levels.

In general, patients should be instructed to reduce the frequency and duration of fermentable carbohydrate consumption. This should be accompanied by substitution with healthy snacks and protective foods, such as nuts and cheese. Xylitol is considered to be one of the sweeteners with the greatest anticariogenic potential with multiple studies demonstrating its ability to reduce the Streptococcus mutans load in plaque and saliva.[22,23] The dietary parameters that may affect caries risk status are listed in Table 4.[24]

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Tabla 2. Dietary parameters that may affect caries risk status.

Fermentable carbohydrate dietary parameter	Effect on the risk of dental caries
Type	Simple sugars and fermentable carbohydrates (especially sucrose) have more potential to cause acid challenges. Breast milk is more cariogenic than cow's milk due to its lower amounts of minerals and high sugar content.
Frequency	Greater number of acid challenge episodes requiring more salivary buffering capacity.
Consistency	Sticky foods remain in the tooth structure for prolonged periods, resulting in greater demineralization and sustained acid challenges requiring greater buffering action. Sweetened liquids are more easily eliminated and are considered less cariogenic than sticky foods.
Amount	Has little effect if other factors are not significantly high.
Duration	Increased amount of time that oral pH is below critical pH levels, leading to further demineralization.
Sequence	Ending the meal with a protective food (e.g., cheese or nuts) will reduce the cariogenic potential of the meal. Nuts provide mechanical cleaning of tooth surfaces. Cheese can help neutralize acids and provides a source of calcium and phosphates.
Pattern	Eating frequent snacks with sugar-containing foods increases the risk of caries by increasing the frequency of acid challenges and requiring more buffering action. In addition, combining a highly cariogenic liquid with a sticky food with low cariogenicity enhances the cariogenic potential of the liquid.

DISCUSSION

To maintain optimal health, it is essential that the body receives daily carbohydrates, proteins, and minerals. The interrelationships between oral health, dietary practices, nutritional status, and overall health are complex and multifactorial. Poor nutrition can negatively impact oral health, leading to dental caries, periodontal disease, oral mucosal pathologies and infectious diseases. Impaired oral health can influence food choices and decrease adequate nutritional intake, which can lead to poor nutritional status and potential chronic systemic diseases. Identifying and treating oral health and nutritional problems is essential to improving overall health and quality of life.[19]

Collaboration between dietitians and dentists is crucial to identify, educate, and treat nutrition-related oral health problems. These partnerships improve dental care. Sucrose, a common dietary sugar, is highly cariogenic; frequent consumption of simple sugars increases caries risk. This article examines the role of sugar in dental caries, provides dietary guidelines for pregnant women, children, and adults, and emphasizes the importance of the interprofessional team in caries prevention through dietary education.[25]

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Organizations need national and global data on the epidemiology of common oral conditions for policy planning. The most common sugars in the diet include sucrose, glucose, fructose, lactose, and maltose, with sucrose being the most cariogenic. When evaluating the patient's diet, it is essential to distinguish between naturally occurring and added sugars. The theory of dietary frequency and caries risk is based on the balance between demineralization and remineralization of enamel. Reducing the frequency of carbohydrate intake is crucial for decreasing demineralization and promoting remineralization.[26]

Risk factors for ECC (early childhood caries) include microbiological, dietary and environmental factors. Although preventable, ECC is one of the most common childhood diseases, influenced by inadequate feeding practices, socioeconomic background, lack of parental education and limited access to dental care. Oral health is vital for nutrition, speech development and positive self-esteem in children. Reducing the frequency and duration of fermentable carbohydrate consumption is supported by studies showing their link to dental caries. Healthy snacks, such as nuts and cheese, provide nutrients beneficial to oral health, such as calcium and protein.[27,28] Xylitol, an anticariogenic sweetener, reduces the load of S. mutans in dental plaque and saliva, as this bacterium cannot metabolize it. However, it is important to consider the doses and frequency of xylitol consumption to avoid laxative effects. A comprehensive strategy combining carbohydrate reduction and the inclusion of protective foods is recommended to prevent caries and promote oral health.[29]

CONCLUSIONS

In conclusion, the literature review highlights the significant influence of nutrition on dental health. Inadequate nutrition impairs growth, cognitive development, and oral health, especially in low-resource settings. The inability of people with dementia to communicate discomfort exacerbates oral problems. WHO estimates that approximately half of the world's population suffers from oral diseases, underscoring the need for fundamental oral care resources, supported by professionals and the community. Diet plays a crucial role in dental health, as certain foods can induce dental caries through microorganisms that metabolize sugars and produce acids, eroding tooth enamel. Nutritional strategies that limit the consumption of sugars and starches and promote calcium-rich foods, along with the use of xylitol, are essential to improve dental health. It is vital to educate dental professionals and students about these preventive, diagnostic and treatment strategies to reduce the incidence of dental caries and protect overall oral health.

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