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Review
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Does gestational nutrition affect the oral health of the new-born? An integrative review

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Highlights

- The study aimed to investigate the association between gestational nutrition and the new-born oral health.
- Gestational nutrition can affect oral health outcomes, acting as a protecting factor against pathologies such as defects in enamel development, cleft palate and risk of childhood caries.
- Pediatric dentists should advise pregnant women regarding the effects of its nutrition on the child's oral health.

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Abstract

Maternal nutrition and diet directly impact the development of the foetus. Thus, nutritional deficits, as well as maternal overweight or low weight, directly reflect the health of the new-born. Furthermore, maternal nutrition may be linked to the individual's oral health outcome. Maternal nutrition is linked to the process of odontogenesis and the development of taste preferences in the child. Thus, the present study aimed to investigate the association between maternal nutrition and the infant's oral health. An active search was performed in the following databases: PubMed, Scielo, Lilacs (Bireme), Web of Science, and Scopus, using the keywords "Breast Feeding", "Nutrition" and "New-born", associated with "Paediatric Dentistry". Exclusion criteria based on time and document type were used to conduct the searches. A total of 634 studies underwent the filtering and selection process, resulting in 5 studies included in this review. Due to the small number of studies found, the development of new studies in the field of dentistry addressing the subject is suggested. Furthermore, it was observed that maternal nutrition influences the oral health of the baby, acting as a protective factor against oral pathologies.

Keywords: Child; Maternal Nutrition; Nutrition; Oral Health; Pediatric Dentistry

INTRODUCTION

Nutrition is conceptualized as a biological process in which organisms obtain nutrients that, when absorbed by the body, interact in the health/disease process. Diet refers to the set of food substances that establishes the nutritional behaviour of living beings. The combination of nutrition and diet promotes the balance of all vital functions of an individual under normal conditions.[1]

Particularly during the gestational period, nutrition and diet play an important role, functioning directly in the growth and development of the foetus.[2,3] In addition, they contribute to a number of events, providing fundamental biological reserves for delivery and in the postpartum period, ensuring substrates for the lactation period while favouring adequate weight gain according to the pregestational nutritional status.[2,3]

It should be noted that in the reproductive period, pregnant women have a window of opportunity to offer their offspring conditions to prevent diseases and chronic diseases, acting as a modifiable factor of prevention.[4] On the other hand, nutritional disorders from preconception and during the gestational period negatively affect foetal development.[5,6] Low maternal weight and inadequacy of nutrients lead to low weight, overweight or even obesity of the baby, classic conditions present in gestational diabetes and hypertensive syndromes, with consequent harm to the general health of the mother/new-born binomial.[5,6]

Regarding oral health, even in intrauterine life, the nutrition of the pregnant woman is determinant in the process of odontogenesis. Calcium, phosphate and vitamins A, C, and D are essential in the formation of dental structure, and the deficiency of these nutrients can cause developmental disorders of the enamel, such as hypomineralization, hypoplasia and hypocalcifications.[7–9]

It is also recognized that in the intrauterine period, the foetus begins the perception of flavours, which perpetuates during breastfeeding. This event is possible due to the development of the sensory, gustatory and olfactory systems and the combination of tastants present in the amniotic fluid and breast milk from the mother's diet. Thus, pregnant women who adopt a diet predominantly consisting of carbohydrates and sugar in particular may influence the baby's food preference, establishing an early risk of developing caries.[9,10]

For all the possible influences between gestational nutrition and new-born oral health. Also, as a form to inform the pediatric dentistry about this and summarize the information regarding this matter. It is convenient to draw attention to this topic and seek, through the present integrative literature review, a possible association between the nutrition and diet of pregnant women and the oral health of their children.

METHODS

Study design

The present study is an integrative review[11], thus consisting of the active search, interpretation and synthesis of scientific findings in the literature in a specific time frame. The subject addressed in this study was the relationship between maternal nutrition during pregnancy and oral health in early childhood. For this, the steps recommended by Hermont (et al.)[11], were followed, namely, identification of the topic, formulation of the guiding question, establishment of the inclusion and exclusion criteria of the articles, registration of data found in the articles, analysis and interpretation of the results and summary of contents.

Search strategies

The study was conducted through an active search of articles found in three databases: PubMed,

Scielo and Lilacs (Bireme), Web of Science, and Scopus. To perform the search, health descriptors (Decs.) were selected and combined with the central descriptor "Paediatric Dentistry" through the Boolean operators "and" and "or". The descriptors used in combination with "Paediatric Dentistry" were "Breast Feeding", "Nutrition" and "New-born".

To locate the state of the art contained in the paediatric dentistry literature, search filters were used, namely, exclusion of books, monographs and theses. In addition, the time frame was also added to the filters, and only studies published in the last 10 years (2012-2022) were considered.

Eligibility criteria for articles

The articles found were subjected to three reading stages, each stage judging the connection of the article found with the guiding question of this integrative review. Thus, the following were gradually read: title, abstract and full text; at each stage, articles that were not related to the subject of the present study were excluded. The studies were read independently and critically. In cases of disagreement between the authors, they were resolved by consensus, and as a last resort, the supervisor was contacted to reduce bias.

Selection of publications and data extraction

The studies obtained in the active search were computed in an Excel spreadsheet using the duplicate selection tool present in the program itself, and repeated studies were removed. Subsequently, the studies were subjected to the inclusion criteria with a gradual reading starting at the title and ending with the reading in full. At the end of the selection process, the papers were read and judged according to the information and topics contained in each paper.

RESULTS

The total result of the active search, with filtering and selection of studies (Figure 1). A total of 634 studies were found, of which 7 were duplicates, being derived from the search in different databases with the same keywords. After the exclusion of duplicate studies, 627 articles remained, each of which was judged initially by the title and, later, the abstract. The reading of the title and abstract followed the inclusion criteria, considering the relevance of the study to the topic. At this stage, 613 articles were excluded due to lack of relevance to the present study, resulting in 14 articles for full reading, and 5 articles were included in the review (Table 1).

The scarcity of scientific knowledge available on the subject studied was noted, especially when it was considered that the active search was performed in 5 different databases, expanding access to diverse content while showing the sharp decline in articles found until the end, when the articles relevant to this study were identified.

Figure 1. Flowchart representing selection and filtering of scientific articles

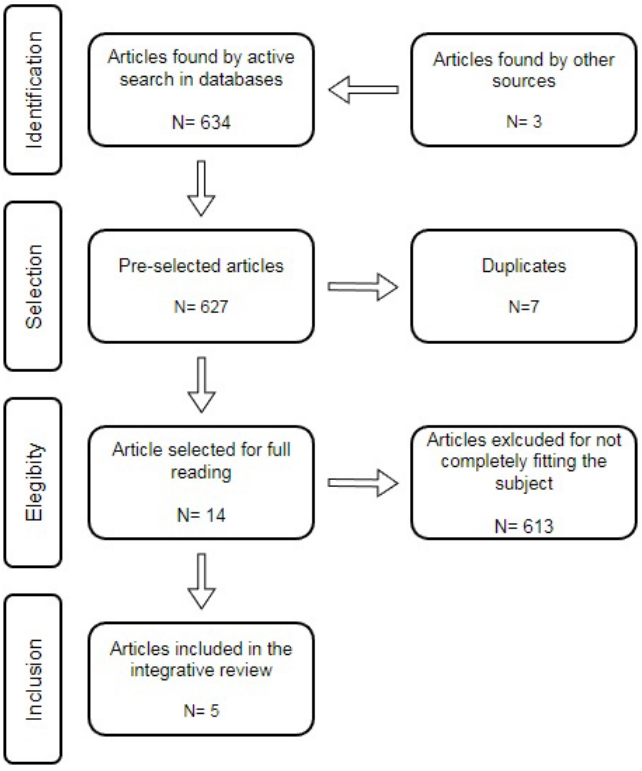

Table 2. Articles included in the review

Author Year	Title	Journal Country	Purpose	Methodology	Conclusion
Ustun B. 2022	Flavour sensing in utero and emerging discriminative behaviours in the human foetus.	Association for Psychological Science United States	To investigate the influence of the pregnant woman's diet on the baby's taste perception during the foetal period	Longitudinal Study	Exposure to flavour during pregnancy can lead the baby to prefer certain flavours postnatally.
Tanaka et al. 2012	Dairy products and calcium intake during pregnancy and dental caries in children.	Nutrition Journal Japan	To study the association between the consumption of daily products containing calcium during pregnancy and the risk of caries in childhood	Study of Cohort	High cheese intake during pregnancy may reduce the risk of childhood tooth decay
Ha et al. 2022	Group-based trajectories of maternal intake of sugar-sweetened beverage and offspring oral health from a prospective birth cohort study.	Journal of Dentistry Netherlands	To investigate the relationship between the consumption of sugar-sweetened beverages during pregnancy and dental caries in five-year-old children.	Study of Cohort	The consumption of sugar-sweetened beverages during pregnancy and the postnatal period influence the oral health of the child. It is important to create a low-sugar environment in early childhood.
Jahanbin et al. 2018	Maternal folic acid supplementation and the risk of oral clefts in offspring.	The Journal of Craniofacial Surgery Iran	To study the efficacy of folic acid supplementation during pregnancy in preventing the development of cleft palate with or without cleft lip.	Review Systematics	Maternal supplementation with folic acid reduces the risk of developing cleft palate with or without cleft lip.
Constanza et al. 2021	Associations Between Prenatal, Perinatal, and Early Childhood Vitamin D Status and Risk of Dental Caries at 6 Years	The Journal of Nutrition Netherlands	Investigate the supplementation with serum 25-hydroxyvitamin D at three different times: prenatal, perinatal, and early childhood. And, its relation to risk of dental caries.	Longitudinal Study	Weak association between the supplementation with serum 25-hydroxyvitamin D and the risk of dental caries.

DISCUSSION

Considering the studies presented in this integrative review, out of 634 articles, only 5 presented an interface with the guiding question of the research. These results express, in themselves, the lack of research on this subject, and there is a remarkable need for investigations that can produce knowledge on the subject and apply it. The dissemination of this knowledge will certainly provide dental surgeons with support for making educational and preventive decisions and enable public managers in the creation of public policies focused on the subject.

It should be noted that among the selected articles, a recent longitudinal study presented strong scientific evidence that the diet of the pregnant woman directly impacts the baby's taste perception while still in the intrauterine phase.[10] Two other included studies were more directly related to dentistry, highlighting the association between consumption of products with calcium in their composition and caries lesions[8] and consumption of sugary drinks and carious processes.[12] Such studies clearly show this association, considering that both have high levels of evidence, especially with cohort study methodologies.[8,12]

On the other hand, Jahanbin et al.[13] demonstrated the efficacy of dietary supplementation with folic acid during pregnancy in the possible prevention of the development of cleft lip and palate, which confirms the importance of nutrition during pregnancy for the oral health of the baby. Thus, it is recognized that during the gestational period, the mother/foetus binomial undergoes numerous physiological and metabolic transformations mediated by the diet of the pregnant woman and consequently influences the developing child.[14] That said, nutritional counselling is a positive factor in the health of pregnant women and especially qualifies the outcome in maternal and child health, translating into health promotion in the first years of the child's life.[15]

Regarding the problems of the baby's oral health when associated with the nutritional conditions of the pregnant woman, developmental enamel disorders (DDE) and caries lesions are the most common. Knowledge of the biological bases of odontogenesis is essential to understand the relationships among diet, nutrition of pregnant women and EDD. Calcium, phosphate and vitamins A, C and D are essential nutrients for tooth formation, which begins in the intrauterine phase.[16,17]

Longitudinal studies have revealed that nutritional deficiencies during the pre-, peri- and postnatal periods compromise the mineralization of the teeth and contribute to the appearance of EDD, represented by enamel hypoplasia, when the deficiency occurs at the beginning of organic matrix formation; if the nutritional deficiency occurs in the dental maturation phase, enamel hypomineralization or hypocalcification develops.[16,18]

When discussing nutrition and diet, it is relevant to state that free sugars play a preponderant role in the development of caries lesions. Longitudinal and cohort studies indicate that excessive sugar consumption during early childhood contributes to an increased caries rate. As a result, public policy-makers do not recommend offering sugar to children under two years of age, given that this period is determinant in the acquisition of food preferences and that doing so can be perpetuated throughout the individual's life cycle.[9,12]

In fact, the food preferences of children are influenced early by the mother's diet, still in the intrauterine phase, through amniotic fluid.[10] The first olfactory receptors and gustatory cells begin their formation around the eighth week of gestation and are functionally mature around the seventeenth week. The maternal diet may affect the intrauterine sensory environment, shaping taste.[19]

Thus, the future acceptance of the child's taste may be linked to this effect of memory or familiarity with the food to which the foetus was exposed.[10]

In continuity with the gustatory stimuli to which the baby is subjected, exclusive breastfeeding becomes the substitute for amniotic fluid. In addition, breast milk is the vehicle for the taste and smell sensations that the pregnant woman transmits to the new-born through diet and nutrition. This fact reaffirms and influences the infant's food preferences.[20]

In this sense, the perception that these facts may be related to the course of dental caries, it is important to warn the pregnant woman that a diet predominantly containing carbohydrates may transmit to the new-born a preference for this type of food due to gustatory memory, which is a predisposing factor to the development of carious lesions.[21]

It is important to note that no specific instruments were adopted to assess the quality of the studies included in this integrative review because, in addition to a small number of articles, the methodological designs and objectives are not uniform, which can be considered a limitation of this study. However, all selected articles presented methodological rigor and relevance on the subject, which justifies their selection. In summary, the relevance of the results recorded in this integrative review should be highlighted, which was possibly a pioneer in describing the broad association between pregnant women's nutrition and the oral health of the new-born. The stimulus for research on the subject opens up new perspectives and a better understanding of the resources and processes aimed at the health of the mother/child binomial. A permanent search to reduce the vulnerabilities of oral health, especially during the gestational period, certainly privileges the quality of life of the mother and the new-born for an entire life cycle.

CONCLUSIONS

Despite the limited number of specific studies on the subject, it is possible to infer that diet and nutrition during pregnancy are associated with the oral health of the new-born, acting as a protective factor against the occurrence of various oral and dental pathologies.

There is also a need for multiple and independent studies to address the oral health outcomes of new-borns and emphasize food and nutrition education actions in the field of dentistry.

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Declarations

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