

NUTRITIONAL RECOMMENDATION FOR PERINATAL, MOTHER AND INFANT ORAL HEALTH - LITERATURE REVIEW

ПРЕПОРАКИ ЗА ИСХРАНАТА СО ЦЕЛ ДОБРО ПЕРИНАТАЛНО, МАЈЧИНО И ИНФАНТИЛНО ОРАЛНО ЗДРАВЈЕ - ЛИТЕРАТУРЕН ПРЕГЛЕД

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Abstract

The diet affects the health of the mother, the pregnancy, and the development of the baby from the moment of conception. The availability of appropriate nutrients is crucial for the growth, development, maintenance and repair of oral and dental tissues. Pregnancy is a specific period of a woman's life, when the probability of changing certain habits and behaviors related to her health and the health of the unborn baby are high. Therefore, all health professionals who contact women who are planning pregnancy or pregnant women, as well as mothers of children, need to be provided with appropriate and unified information and education to preserve and optimize oral health as an integrated part of general health. These interventions can significantly change the trajectory of oral health for both the mother and her future child. For this purpose, nutritional protocols and guides for nutrition and perinatal oral health are essential, in which creating nutritionist should be included. **Key words:** guidance, perinatal oral health, early childhood caries.

Апстракт

Исхраната влијае на мајчиното здравје, на бременоста и развојот на бебето од моментот на зачнување. Достапноста на соодветни хранливи материи е од клучно значење за растот, развојот, одржувањето и репарација на оралните и денталните ткива. Бременоста е специфичен период од животот на жената, кога веројатноста за менувањето на одредени навики и однесувања поврзани со нејзиното здравје и здравјето на нероденото бебе се големи. Затоа потребно е сите здравствени професионалци со кои стапуваат во контакт жените кои планираат бременост или бремените жени, како и мајките на деца да им обезбедат соодветна и унифицирана информација и едукација за зачувување и оптимизирање на оралното здравје како интегрален дел од општото здравје. Овие интервенции може значително да ја променат траекторијата на оралното здравје и за жената и за нејзиното идно дете. За оваа цел потребни се протоколи и водичи наменети за сите здравствени професионалци, во чија изработка ќе бидат вклучени диететичари и нитриционисти. **Клучни зборови:** guidance, perinatal oral health, early childhood caries.

Introduction

The United Nations with the Global Strategy for the Health of Mothers, Children and Adolescents has a vision by 2030, for a world in which every woman, child, adolescent in every sense will realize their rights to physical and mental health and well-being, has social and economic opportunities and is able to participate fully in shaping prosperous and sustainable societies.¹ The Global Strategy has adopted an integrated and multi-sector approach, recognizing the factors that improve health, including nutrition, education, water, clean air, sanitation, hygiene and infrastructure, as essential to achieving the Sustainable

Development Goals by 2030¹. The U.S. government (U.S.) has been involved in supporting global Maternal and Child Health (MCH) efforts for more than 50 years and is the largest donor government to (MCH) activities in the world, to nutrition-related activities globally, projecting \$1.38 trillion for fiscal 2020. Therefore, in our search of PubMed and Google scholar literature, most of the guidelines and guides for oral health, nutrition, and perinatal period originated from the United States.

According to the WHO definition, maternal health is the health of the mother during pregnancy, childbirth and the postpartum period, child health means health from birth to adolescence with a focus on the period up to five

years of age, and newborn health is the period from birth to the 28th day of life. Maternal and child health care also means oral health care as an essential component of the overall health status of pregnant women, women of childbearing age² and children. Paglie L. in 2019 defines the perinatal period as the period from the beginning of pregnancy to two months after birth³. An old adage "one pregnancy - one tooth less" indicates that the connection between pregnancy and oral health has long been known. Science says the impact is in two directions. There are several scientific studies and hypotheses that there is a correlation between periodontal disease and adverse pregnancy outcomes such as preterm delivery, low birth weight babies and preeclampsia. Physiological changes that occur in the mouth during pregnancy, as well as lifestyle changes may lead to an increased risk of some dental conditions such as gingivitis gravidarum, with an increased risk of periodontal disease^{4,5,6}, benign gingival lesions (pyogenic granuloma, granuloma gravidarum or pregnancy epulis), tooth mobility, as well as an increased risk of erosion and caries⁷.

According to the WHO Regional Office for Europe, dental caries is the most common non-communicable disease (NCDs) disease on European soil. Because dental caries is a progressive cumulative long-term disease, the low level of caries in early childhood is something we need to aim for⁹. Early childhood caries is oral disease with the highest prevalence globally. It is defined as the presence of one or more carious, extracted (due to caries) or sealed deciduous tooth surfaces in a child aged 71 months or less¹⁰. Dental caries, despite its high prevalence, has a great potential for prevention because the whole pathogenetic process for the occurrence of this disease is well known. Four factors are involved: the host tooth, cariogenic bacteria, carbohydrates from the diet and time. Therefore, prevention programs include activities and interventions that are aimed at socio-behavioral risk factors, by changing nutrition and hygiene habits, by raising awareness of the importance of oral health in the individual. Practicing good oral hygiene, proper nutrition with adequate nutritional intake of micro and macronutrients, availability of occupational health care are essential to ensure that mother, child and adolescent achieve and maintain oral health at optimum¹¹. Prevention, diagnostics and restorations treatments are safe during pregnancy and are effective in improving and maintaining oral health⁶. The perinatal period is a critical time when the determinants of health and oral health are set, and thus an important time for intervention¹².

Having in mind that pregnancy is a specific period of a woman's life, when the likelihood of changing certain habits and behaviors related to her health and the health of the unborn baby, it is an ideal time to promote good oral

health and proper nutrition and hygiene as a factor. It is therefore necessary for all health professionals contacted by women planning a pregnancy or pregnant women as well as mothers of children to provide appropriate and unified information and education for the preservation and optimization of oral health¹³. These interventions can significantly change the trajectory of oral health for both the woman and her future child¹⁴. Oral health counseling can prevent or reduce the transmission of cariogenic bacteria from the mother to the child, thereby preventing or delaying the onset of early childhood caries (ECC), helping the mother to improve her own oral health⁴.

Important steps for a healthy pregnancy are a balanced diet, regular physical activity, taking vitamin and mineral supplements if recommended by a doctor, and avoiding alcohol, cigarettes, and other harmful substances³. Diet affects maternal health, pregnancy, and the development of the baby from the moment of conception, with a possible influence on the future growth of the newborn¹⁵. The availability of adequate nutrients is crucial for the growth, development, maintenance and repair of oral and dental tissues¹⁶. During gestation and lactation, and even during the pre-conception period, tooth development may be affected by deficiency of vitamins and minerals in the mother.

Folic acid reduces the likelihood of DNA damage during mitosis, a particularly important function during embryogenesis. Inadequate folic acid intake can therefore interfere with normal embryonic growth, causing neural tube defects. Maternal intake of folic acid and vitamin A during pregnancy implies the occurrence of unilateral cleft lip with or without cleft palate. One month before conception, during pregnancy and during lactation, the recommended daily intake of folic acid is 600 mcg.

Vitamin A, D and C deficiency affects embryonic development and mineralization of deciduous and permanent teeth. Children with vitamin D deficiency are at risk of developing hypomineralized enamel, with an increased chance of caries. Calcium deficiency is very common and often goes hand in hand with vitamin D and phosphate deficiency. According to the American Dietary Guidelines 2105-2020 (2015-2020 Dietary Guidelines for Americans), children aged 1-3 years should receive 700 mg of Calcium as a recommended dietary supplement (RDA), and children aged 4-8 years should take 1000 mg daily¹⁷. Vitamin C deficiency can trigger gingival inflammation and is a risk factor for periodontal disease if combined with poor oral hygiene.

Deficiency of **proteins** in pregnancy can lead to formation of smaller sublingual glands, which will result in reduced salivary secretion, and easier dental plaque adhesion. Decreased secretion of the parotid gland is triggered by a lack of vitamins A, D, zinc and iron.

Consumption of foods with a high percentage of sugars, sticky foods, leads to prevalence of the demineralization process, which if not treated, can progress to caries. It occurs in people with frequent sugar consumption. It takes approximately 30 minutes to lower the pH of saliva after sugar intake, so extra sugar intake in those 30 minutes is less harmful than the sugar intake again after more than half an hour¹⁸.

One of the determinants of the occurrence of EEC is mother's dietary habits, and food choices for her baby. Frequent daily bottle-feeding, night-prolonged bottle-feeding or breastfeeding after the 12th month, as well as consumption of dried fruit or fruit juices between meals, have been linked to EEC^{19,20,21,22}. In the UK, the "5 per day" campaign for the daily intake of fruits and vegetables, was misunderstood by the public that frequent consumption of dried fruits and fruit juices is a healthy habit, says Morgan MZ in 2011²³.

Between 2006 and 2016, guidelines and recommendations for oral health during pregnancy were developed by several organizations²⁴. Over the past three decades, federal US agencies and organizations have launched programs, advanced policies, produced resources, and provided education and training for health care workers and pregnant women aimed to raise awareness of the importance and safety of obtaining oral health care during pregnancy. Although the National Health Service (NHS) in the UK has promoted a strong campaign for healthy eating; however, the new food labels do not inform consumers about the impact of the food on teeth²⁵.

Material and method

The research was conducted at the Faculty of Dentistry, University Ss Cyril and Methodius in Skopje, in the period January-June 2020, by two independent researchers. The following keywords were entered on PubMed/Medline and Google Scholar: Guide, Recommendations, Nutrition, Infantile Oral Health, Perinatal Oral Health, Early Childhood Caries, Pregnancy. For the requirements of this paper, papers and guides for infantile oral health and oral health during pregnancy were analyzed, as well as nutritional recommendations for the same period, which were published after 2002.

Results

The United States, Canada, Australia, the United Kingdom, Scotland and the WHO are unique in their guidelines and recommendations for nutrition and good oral health:

1. Drink plenty of water. If you prefer bottled water, choose water that contains fluoride, packaged in

a glass bottle²⁶. Optimal concentration of fluoride in water is 0.07 ppm²⁷. According to the data obtained from the fluorine map of the Republic of Macedonia prepared by the Institute of Public Health and the Faculty of Dentistry, the concentration of fluoride in drinking water in our country is below 0.3 mg Fluoride per liter of water, which from a preventive point of view are insignificant amounts²⁸;

2. Eat a well-balanced diet that includes plenty of fresh vegetables and fruits, wholegrain bread preferably with sprouts, meat, fish, eggs, and other protein sources, low-fat dairy products, potatoes, rice, and limit the intake of sugar, salt and saturated fats; divide the plate into three parts - half of it should belong to fresh fruits and vegetables, 25 percent protein and 25 percent whole grains^{3,26};
3. If you have problems with nausea and vomiting, try to eat small amounts of healthy food divided into several meals. Do not brush your teeth immediately after vomiting; take a glass of water in which a tablespoon of baking soda has been dissolved²⁶;
4. To reduce the risk of birth defects, take 600 micrograms of folic acid every day during your pregnancy. Naturally found in: asparagus, broccoli and green leafy vegetables, such as lettuce and spinach, legumes (beans, peas, lentils), papaya, oranges, strawberries, and bananas; grain products enriched with folic acid (bread, cereals, corn, flour, pasta, white rice)^{3,6,13,26};
5. Have three healthy main meals a day, and if you opt for a dessert, consume it immediately after the main meal. Then, brush your teeth, or if you are not able to, take sugar-free chewing gum and chew for a few minutes to continue the secretion of saliva that will help in the physiological cleaning of the teeth^{6,13,29};
6. For healthy teeth, the choice of your snacks is important. If you have snacks, try to take healthy food with low sugar, i.e. vegetables, fruits, nuts, soup, smoothies, dairy products, seeds. It takes half an hour to an hour to return the neutral pH of the saliva after consuming something light and if we often consume sugars, the pH of the saliva is acidic for a long time which gives the possibility for demineralization of enamel and caries. Avoid hard and soft candies, chewing gum with sugar, cakes, chocolates, croissants, hazelnut and chocolate cream, chips and other sticky foods^{3,6,13,29,30};
7. Avoid sugary foods or drinks before bedtime. During the night, the secretion of saliva is

reduced, which normally washes the teeth, increases the acidity in the mouth and creates an optimal environment for the enamel to erode. Whatever your meal, never go to bed with unbrushed teeth. Brushing your teeth at night is more important than in the morning;

8. Medicines sometimes contain added sugars, like some syrups. Consult your doctor and ask for a sugar-free syrup²⁶;
9. Drink unsweetened juices, tea, coffee^{3,26,29}. Carbonated juices, energy drinks, conserved juices, contain a high percentage of sugars, which would lead to tooth erosion^{26,29};
10. Naturally squeezed juices also have an erosive effect, but the benefits of their consumption for the overall health are great. To reduce the erosive effect, drink them during the main meal or as a main meal if it is a smoothie. Drink them very cold, they should not be drunk slowly, and if you drink them with a straw, put it behind the front teeth, closer to the back of the mouth, in order to reduce the contact with the tooth surfaces. After drinking these juices, the teeth must not be washed in the next hour^{26,29};
11. Whenever you buy products, look at the nutrition chart of the product to see if there is a high, medium or low sugar level in the product. High sugar level is more than 15 grams per 100 grams of food, medium sugar level is 5-15 grams per 100 grams of food and low sugar level is below 5 grams per 100 grams of food^{26,29}. Choose a low level-sugar product³¹; Public health in England calculated that less than 5% for children aged 4-6 means no more than 19 grams per day of free carbohydrates³²;
12. Pay attention to micronutrients, i.e. the intake of vitamins and minerals. Iron deficiency during pregnancy and lactation is the most common nutritional deficiency³;
13. There are many components of food that have a protective effect on the teeth. These are the fluorides that we ingest through fluoridated water, calcium, phosphorus and casein ingested through milk, xylitol has antibacterial action and initiates the production of saliva, fresh raw fruits and vegetables through vitamin C, phosphates and phytates that each it takes longer to chew acts protectively through increased saliva secretion^{26,29,31};
14. Postpartum breastfeeding is the most natural and best way to feed a newborn. Exclusive breastfeeding without addition of water is recommended in the first 6 months, because breast milk provides all the fluids and nutrients necessary for

proper growth and development of the infant²⁶. Only those drugs or vitamins and minerals recommended by a pediatrician are added. There is evidence that breastfeeding has a positive effect on both the baby and the mother. Breastfed babies are less prone to abdominal, respiratory, urinary and ear infections, are less prone to allergies (eczema, asthma), type 2 diabetes and less prone to obesity later in life. Mothers, on the other hand, have lower risk of breast and ovarian cancer, and by consuming more calories for breastfeeding, they can easily regain their weight from before the pregnancy²⁹. The available evidence indicates that breastfeeding up to 12 months of age is associated with a decreased risk of dental caries and may offer protection when compared with infant formula feeding. However, some limited observational evidence suggests that once the primary teeth erupt, factors such as breastfeeding ad libitum, and nocturnal feeding may be associated with an increased risk of dental caries³³. American Academy for Pediatric Dentistry-AAPD (2021) in their manual for perinatal and infant oral health says that breastfeeding and baby bottle beyond 12 months, especially if frequent and/or nocturnal, are associated with ECC³⁴. The evidence on breastfeeding after one year is not straightforward because much of the research is observational and does not adjust for confounders such as dietary factors, oral hygiene practices and use of fluoride containing products. Further well-designed research is needed³⁵, especially meta-analyses³⁶. Differing from this attitude, according to WHO (2019) recommendations for ending childhood caries, the child should be breastfed until the end of the second year, but also longer, if the mother and child feel that way³⁷. At the end of the 6th month, solid foods and fluids are introduced, because there is not enough iron in breast milk³⁸. Solid food is in the form of porridge, it is introduced in a certain order, taking care to introduce one type of food at a time. At this age - the period when the first baby teeth sprout, the baby already shows interest in food and putting it in the mouth and chewing.

15. Formula fed infants are given water between meals for the first 6 months^{26,38}. The milk formula diet is with a bottle with a pacifier which is recommended to be used until the 12th month at the most, with the recommendation that after the 6th month the parents should start giving the milk in a cup³⁴. Breastfeeding or giving milk formula at night is not recommended, after 12 months

because milk lactose sticks to baby's teeth and in case of poor and improper oral hygiene and due to reduced saliva secretion at night, demineralization of enamel can easily occur.

Conclusion

Protocols, guidelines to proper nutrition are necessary to unify the information and education of mothers and children, by family doctors, gynecologists and dentists. It is extremely important in each country to have guidelines for health professionals that will be developed in collaboration with dietitians and nutritionists. A good and quality prevention program requires multi-sectoral cooperation and above all confidence in the power of prevention. In our country, since 2008, the National Strategy for Prevention of Oral Diseases in children aged 0-14 years has been implemented, which aims to reduce the DMFT index and eradicate caries as a highly preventable disease through several measures. One of the measures is education for proper nutrition. After ten years of implementation of the strategy, there is a significant decrease in the DMFT index among the young population. However, it is necessary to start preventive activities earlier, in the perinatal period, in order to achieve even better and faster results. Creating guidelines for nutrition and oral health and their distribution and availability to all primary health workers is one of the activities that could help eradication of ECC.

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