

THE EFFECT OF TRACE ELEMENTS ON PREGNANCY AND CHILD DEVELOPMENT

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Annotation. During pregnancy, women undergo metabolic and physiological changes, and their needs are higher to support fetal growth and development. If the nutritional status of the expectant mother is unsatisfactory, some complications may occur for the mother and the newborn. In the second and third trimester of pregnancy, the fetus has a supply of nutrients that can be used after birth; thus, children in the first years of life experience accelerated growth, which is a proven response to an affordable diet. However, if such a scheme is not enough, there will be various disorders during development, including impaired brain function. Thus, despite many recently published papers on gestational nutrition, the mechanisms of absorption, distribution, and excretion of micronutrients are still unclear. Further clarification is needed to better understand the effects caused by a deficiency or excess of certain micronutrients. Thus, to illustrate the contribution of minerals during prenatal development and in children, iodine, selenium, iron, zinc, calcium, and magnesium were selected. Our study aimed to investigate the consequences associated with gestational deficiency of these minerals and their impact on the growth and development of children born to mothers with such deficiency.

Key words: trace element, iron, fetus, pregnancy.

MIKROELEMENTLARNING HOMILADORLIKKKA VA BOLANING O'SISHI RIVOJLANISHIGA TA'SIRI

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Annotatsiya. Homiladorlik paytida ayollarda metabolik va fiziologik o'zgarishlar yuz beradi va homila o'sishi va rivojlanishini qo'llab-quvvatlash uchun ularning ehtiyojlari yuqori bo'ladi. Agar kelajakdagi onaning ovqatlanish holati qoniqarsiz bo'lsa, ona va yangi tug'ilgan chaqaloqlarda ba'zi asoratlar paydo bo'lishi mumkin. Homiladorlikning ikkinchi va uchinchi trimestrlarida homila tug'ilgandan keyin ishlatilishi mumkin bo'lgan ozuqa moddalarini etkazib beradi; shunday qilib, chaqaloqlar hayotning birinchi yillarida tez o'sishni boshdan kechirishadi, bu ovqatlanish bilan bog'liq. Homiladorlik vaqtida mikroelementlarning so'rilishi, tarqalishi va chiqarilishi mexanizmlari hali ham noaniq. Ba'zi mikroelementlarning yetishmasligi yoki ortiqcha ta'siridan kelib chiqadigan oqibatlarni yaxshiroq tushunish uchun qo'shimcha tushuntirishlar zarur. Shunday qilib, prenatal rivojlanish davrida va bolalarda minerallarning hissasini tasvirlash uchun mis, ruh, temir, ferritin va vitB12 tanlangan. Bizning tadqiqotimiz

ushbu minerallarning homiladorlik yetishmovchiligi bilan bog'liq oqibatlarini va ularning bunday yetishmovchiligi bo'lgan onalardan tug'ilgan chaqaloqlarning o'sishi va rivojlanishiga ta'sirini o'rganishga qaratilgan.

Kalit so'zlar: mikroelement, temir, homila, homiladorlik.

ВЛИЯНИЕ МИКРОЭЛЕМЕНТОВ НА БЕРЕМЕННОСТЬ И РАЗВИТИЕ РЕБЕНКА

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Аннотация. Во время беременности у женщин происходят метаболические и физиологические изменения, и их потребности выше, чтобы поддерживать рост и развитие плода. Если состояние питания будущей матери неудовлетворительное, могут возникнуть некоторые осложнения у матери и новорожденного. Во втором и третьем триместре беременности у плода есть запас питательных веществ, которые можно использовать после рождения; таким образом, у детей в первые годы жизни наблюдается ускоренный рост, что является доказанной реакцией на доступный режим питания. Однако, если такой схемы недостаточно, во время развития будут различные нарушения, в том числе нарушения функции мозга. Таким образом, несмотря на множество недавно опубликованных работ о гестационном питании, все еще остаются неясными механизмы всасывания, распределения и выведения питательных микроэлементов. Необходимы дальнейшие разъяснения, чтобы лучше понять последствия, вызванные дефицитом или избытком некоторых питательных микроэлементов. Таким образом, чтобы проиллюстрировать вклад минералов во время пренатального развития и у детей, были выбраны медь, цинк, железо, ферритин, и Вит В12. Наше исследование было направлено на изучение последствий, связанных с гестационным дефицитом указанных минералов, и их влияния на рост и развитие детей, рожденных от матерей с таким дефицитом.

Ключевые слова: микроэлемент, железо, плод, беременность.

Purpose of the study. Many infections can negatively affect the development of the fetus. It is difficult to predict how serious the consequences will be, because each organism is individual. Some diseases can negatively affect the mother's body, while others can cause various anomalies in the child. Additional explanations are needed to better understand the consequences of a deficiency or excess of certain microelements. Thus, iron, copper, zinc, ferritin and cyanocobalamin were chosen to illustrate the contribution of minerals during prenatal development and in children. Our study aimed to study the consequences of these minerals associated with pregnancy deficiency and their impact on the growth and development of babies born to mothers with such deficiency. It is known that the nutrition of a pregnant woman affects not only the condition of her body, but also the full development and health of the unborn child, which is determined by the balance of nutrients, vitamins, microelements and depends on many

factors. The results of observations conducted in recent years indicate the prevalence of hidden forms of vitamin deficiency. According to many researchers, the physiological need of the human body for vitamins and microelements is associated with its adaptation to simple natural food and high energy expenditure. Vitamins are essential (essential) food substances. Vitamin molecules play almost the same role in all forms of life, have very high biological activity and are required by the body in very small quantities (from a few micrograms to tens of milligrams). Unlike other essential nutrients (essential amino acids, polyunsaturated fatty acids), vitamins are not building blocks or energy sources and are involved in metabolism mainly as biocatalysts and regulators of metabolic processes in the body. The biological role of trace elements should also be taken into account, since they, along with vitamins, participate in metabolic processes by activating enzymes, hormones, vitamins and a number of proteins. It has been established that many enzymes require the presence of trace elements to manifest their activity, otherwise they are completely inactive.

Materials and methods. Pregnancy and childbirth are periods of significant metabolic and physiological changes in women, such as weight gain, 60% of which are maternal and 40% placental and fetal. During pregnancy, nutritional needs are high; therefore, adequate nutrition is essential to ensure fetal growth and development. However, pregnancy in conditions of malnutrition can cause complications in both the mother and the newborn. Nutrition during pregnancy is monitored to check for deficiencies or excesses of macro and micronutrients, as they may be associated with complications during pregnancy and the health of the newborn. Evidence suggests that micronutrient deficiencies in the fetus have a variety of consequences. Indeed, the development of disease in adult life is a consequence of inadequate distribution of nutrients during intranatal life, pregnancy, and early childhood. Among the micronutrients, iron, copper, zinc, and vitamin B12 are the most common, since they generally stimulate growth and, in their absence, the risk of perinatal complications, infectious diseases, intellectual disabilities, and death increases. Despite the number of recently published studies on the prenatal diet, there are still many uncertainties about the mechanisms of absorption, distribution, and excretion of micronutrients. Further clarification is needed to better understand the consequences of deficiency or excess of certain micronutrients. Because we still see many newborns with low birth weight, problems with neuropsychomotor development, and hyperactivity disorder. It is necessary to continue studying these processes and to demonstrate the importance of adequate intake of micronutrients for the proper development of the child. Iron, copper, zinc, ferritin, and vitamin B12 were chosen to illustrate the contribution of minerals to prenatal and infant development. Our study aimed to investigate the effects of pregnancy deficiency of these minerals and their effects on the growth and development of the child.

Results and discussion. The second trimester of pregnancy — from about 13 to 27 weeks — brings relief for many women. The nausea and severe fatigue characteristic of the first trimester subside, appetite returns, and energy increases. For this reason, this period is often called the “golden period of pregnancy.” But it is at this time that it is necessary to pay more serious attention to nutrition: at this stage, the fetus begins to grow actively, organs and systems are formed, and not only the child, but also the mother’s body needs more nutrients. In the second trimester, the fetus grows rapidly and gains weight. Its bones, nervous system, and internal organs are formed. This requires more energy, protein, vitamins, and minerals from the mother’s

body. Blood volume increases, which increases the need for iron. In the second trimester, even with a good diet, some vitamins and minerals may need to be taken additionally. Especially if hemoglobin decreases - iron, for bones - calcium and vitamin D, as well as folic acid. But any supplements should be taken only after consulting a doctor - if vitamins exceed the norm, this can also harm the body. The development of immunity, which is the basis for the growth of the whole organism, occurs very intensively in early childhood and can continue until about 12 years of age. The intestines, which are directly connected to the digestive system, are also an important component of the immune system. It contains up to 70-80% of all immune cells in the body, and the intestinal microbiota, that is, the set of microorganisms that make up the complex ecosystem of the gastrointestinal tract, is of great importance in the process of developing immunity. The intestinal microbiota has many functions, and its beneficial bacteria stimulate the development of the immune system. The correct formation of the composition of the intestinal microbiota from birth is crucial for the proper functioning of the body, and this process, in turn, is influenced by many factors. Zinc deficiency is considered a public health problem, since nutritional deficiencies in the first years of life are associated with different etiologies: zinc deficiency is associated with a decrease in the concentration of zinc in breast milk after the first 6 months of breastfeeding or with a low intake of this mineral in complementary foods during breastfeeding. Zinc deficiency is associated with a decrease in food intake due to limited mobility, which leads to reduced energy requirements, dental problems and difficulty swallowing in the elderly, and other nutrient deficiencies.

Conclusion: Based on the results, we observed that mainly in the second and third trimesters of pregnancy, the fetus has nutrients that can be used after birth. At this stage, until the child is 3 years old, the growth and development of the brain and central nervous system occurs, so nutritional deficiencies are associated with many problems related to brain function, such as hyperactivity, attention deficit, autism, speech delay and memory problems. For the child to grow and develop properly, pregnancy planning should begin from conception. There are still many doubts about how some of these processes occur, because in addition to different concentrations depending on the separation, there are differences not only in nutritional deficiencies, but also in the interaction between nutrients and environmental, socio-cultural and socio-demographic factors (for example, blood, placenta, umbilical cord and urine).

Thus, taking into account all the factors presented, further research is needed, mainly on the transfer of nutrients between mother and child.

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