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RATIONAL NUTRITION OF PREGNANT WOMEN IN THE PERIOD OF PRENATAL DEVELOPMENT OF THE FETUS

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Abstract
In prenatal development, several periods are conditionally distinguished, pre-implantation development, implantation, organogenesis and placentation, phegogenesis . Rational nutrition is one of the main conditions for a favorable course and outcome of pregnancy and the normal development of the fetus. During pregnancy, the woman's body's need for vitamins and minerals increases significantly, since all systems and organs of the expectant mother work in an enhanced mode to meet the needs of a developing child in utero. The recommended norms of physiological needs for basic nutrients and energy of women are presented.

Keywords : prenatal development of the fetus, rational nutrition, healthy food, nutrition for pregnant women, balanced diet..

Introduction

Prenatal development begins with fertilization. A fertilized egg carries all the genetic information necessary to create a new organism. The life span of a mature egg is approximately three days [1] . The life span of sperm that enter the woman's vagina during intercourse is also two to three days. Viable sperm, moving into the uterus, and from there - up the fallopian tubes and reaching the egg during the critical period, are able to fertilize it. If this does not happen, the egg continues to move along the fallopian tube towards the uterus, where it self-disintegrates .

In prenatal development (Table 1): pre-implantation development; implantation; organogenesis and placentation [2] .

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Table 1

Period	Terms of pregnancy	Period content
pre-implantation development	1st week	From a fertilized egg, a blastocyst is formed - a hollow, fluid-filled sphere of cells that form a few days after fertilization
Implantation	7-8th day	Immersion of the blastocyst in the lining of the uterus
Organogenesis and placentation	10th day - 3 months	The development of the organs of the embryo and its protective membranes (placenta, amnion)
Fegogenesis	3-9 months	Rapid growth of the fetus, tissue differentiation, development of organs and systems that are in their infancy, and the formation of new functional systems

Organogenesis and placentation Day 10 - 3 months Development of the organs of the embryo and its protective membranes (placenta, amnion)

Phegogenesis 3-9 months Rapid growth of the fetus, tissue differentiation, development of organs and systems that are in their infancy, and the formation of new functional systems

The period of pre-implantation development begins from the moment of fertilization of the egg and continues until the introduction of the blastocyst (a hollow, fluid-filled sphere of cells formed a few days after fertilization) into the uterine wall. One of the most characteristic signs of the pre-implantation period of development is the absence of a morphological connection between the embryo and the organs of the female reproductive system. However, this does not exclude the existence of a close functional relationship between the mother's body and the fetus. In particular, the role of the maternal organism in supplying the embryo with oxygen and various nutrients is very significant [3].

Implantation occurs approximately on the 7-8th day after fertilization. The mucous membrane of the uterus at the time of implantation contains all the substances necessary to nourish the embryo. After implantation is completed, the period of organogenesis and placentation begins in the development of the embryo , which ends approximately by the third month of intrauterine life. During this period, the embryo and its protective membranes develop rapidly (Table 2). From the outer layer of cells of the embryo, supporting structures are formed to nourish it and protect it from negative factors, and the development of various organs begins from the inner layer of cells. By the end of the period, the embryo acquires the features characteristic of a person, the rudiments of all the most important organs and systems are formed.

Table 2 The length and weight of the fetus depending on the duration of pregnancy[2]

Month (obstetric)	Fetus length (cm)	Fetus weight, g
•1	•1	•0.01
•2	•4	•1-2
•3	•9	•20-25
•4	•16	•120
•5	•25	•280-300
•6	•30	•600-680
•7	•35	•1000-1200
•8	•40	•1500-1600
•9	•45	•2400-2500
•10	•50	•3200-3400

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The supporting structures include the placenta, through which respiration, nutrition and excretion of fetal metabolic products take place. The placenta is formed partly from the cells of the uterine wall, and partly from the outer layer of cells of the embryo. It replaces the function of the lungs, digestive organs, kidneys, skin and other organs of the fetus. Metabolic processes in the placenta are very intense, especially in the early stages of development [5]. The placenta has two surfaces: maternal, adjacent to the wall of the uterus, and fetal, facing inward, into the amnion cavity. Amnion, or water shell, is a closed bag in which the fetus is located, surrounded by amniotic fluid, formed as a result of the secretion of the amnion epithelium. Excess water is removed through the pores of the amnion, while ensuring the constancy of their composition. They contain proteins, fats, lipids, carbohydrates, trace elements, which are mixed with fetal urine, scales of its epidermis and fluffy hair. As the fetus grows, a relative decrease in the amount of water occurs. Amniotic fluid creates conditions for the free development of the fetus and its movements, protects it from adverse external influences, participates in metabolism, protects the umbilical cord from compression between the body of the fetus and the wall of the uterus. The umbilical cord is a cord-like formation in which two arteries and one vein of the fetus pass, carrying blood from the fetus to the placenta and vice versa.

During the entire pregnancy, fresh and healthy food is very important for the unborn child, because everything that the mother eats somehow gets to the fetus. Proper nutrition during pregnancy[1], as well as heredity, is the basis for the birth of a healthy child.

Rational nutrition, along with other factors, is one of the main conditions for a favorable course and outcome of pregnancy, proper development of the fetus and the birth of a healthy child [4].

Unfortunately, there is still often an opinion that the child will receive all the necessary nutrients from the mother's body, regardless of the quality of her nutrition [3]. This is far from true. Another opinion is also wrong - the idea that a pregnant woman should receive excess nutrition, "eat for two." Nutrition of a pregnant woman should be not so much plentiful as complete.

It has been proven that the human embryo is most sensitive to various damaging factors during the first 3 months, that is, at the stage of embryonic development. A woman who is expecting a child should understand the full measure of responsibility that lies on her during this period.

Healthy food is the foundation of a healthy pregnancy[7]. Along with heredity, rational nutrition during pregnancy is one of the most important factors in laying the foundation for a healthy child's body. “Child health and infant mortality depend on what we fed and what we didn’t feed pregnant women,” the nutritionist noted. And this is true, because the time of pregnancy is the time of building a healthy and strong body of the child[6]. The mother's body provides the unborn baby through the placenta with everything necessary for growth and development - nutrients, vitamins and minerals that he needs throughout all months of pregnancy. Therefore, it is very important for a mother-baby couple to eat right. A pregnant woman needs to know not only what should be included in her diet, but also what she should categorically exclude, and this is especially important! After all, her body, which has been working all these months in an active mode, and most importantly, the embryo, are especially sensitive to food that does not correspond to a healthy lifestyle[6].

Rational nutrition is one of the main conditions for a favorable course and outcome of pregnancy and the normal development of the fetus. Food for a pregnant woman should be complete and consist of a variety of foods with a sufficient content of proteins, fats, carbohydrates, water, mineral salts and vitamins. The role of protein is especially great - the main building material for a growing fetus. The need for protein during pregnancy increases by up to 50%. Milk proteins

(milk, cottage cheese, cheese) are very valuable, which should be included daily in the diet of a pregnant woman. Of the fats, the fats of dairy products (butter, cream), which are easily absorbed by the body, are the most useful. From vegetable fats it is recommended to use sunflower oil. Lamb, beef or lard is more difficult to digest, so during pregnancy, especially in the second half, it should not be consumed. It is highly desirable to exclude sucrose from the diet (including in the composition of confectionery products), replacing it with glucose , fructose, honey and confectionery products made on their basis. The intake of energy must correspond to the costs of the body [3] . One of the most important indicators of the rational nutrition of pregnant women is the increase in their body weight, which is normally 8–10 kg during pregnancy (300–350 g per week in the second half of pregnancy) [1].

A pregnant woman should eat at least 4 times a day, if possible at the same hours [4]. Breakfast should be hearty and make up 30-35% of the daily diet. It must include a hot dish (porridge, pancakes), a salad of fresh or boiled vegetables, as well as tea, coffee or milk, an egg, cheese, butter. Lunch consists of 3 courses and makes up about 40% of the daily diet. The remaining 25% of the daily diet is for dinner, which should consist of light meals (scrambled eggs, porridge, cottage cheese and vegetable casseroles, salad). At 21-22 hours, it is desirable to additionally take yogurt, one-day kefir, compote, etc. [2].

Proper nutrition of a pregnant woman, adherence to her diet prevents the development of so-called toxicosis of pregnancy - special conditions that often occur during this period.

During pregnancy, the woman's body's need for vitamins and minerals increases significantly, since all systems and organs of the expectant mother work in an enhanced mode to meet the needs of a developing child in utero (Table 1).

Table 1. Recommended norms for physiological requirements for essential nutrients and energy in women of childbearing age[9]

Nutrients and energy value of the diet	Basic need of a woman aged 18–29	Additional requirement during pregnancy	Total during pregnancy
Energy, kcal	2200	350	2550
Proteins , g incl . animal origin, g	66 33	30 20	96 56
Fats, g	73	12	86
Carbohydrates, g	318	thirty	348
Minerals			
Calcium, mg	1000	300	1300
Phosphorus, mg	800	200	1000
Magnesium, mg	400	50	450
Iron, mg	18	15	33
Zinc, mg	12	3	15
Iodine, mcg	150	70	220
vitamins			
C, mg	90	10	100

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A, mcg retinol , equiv .	900	100	1000
E, mg	15	2	17
D, µg	10	2.5	12.5
V 1 , mg	1.5	0.2	1.7
B 2 , mg	1.8	0.2	2.0
B 6 , mg	2.0	0.3	2.3
PP, mg niacin, equiv .	20	2	22
Folate , mcg	400	200	600
B12, mcg	3	0.5	3.5

Even the most balanced diet cannot provide the body of a pregnant woman with the necessary amount of nutrients, so doctors strongly recommend taking multivitamin complexes for pregnant women.

Vitamins A , C, E and group B, as well as minerals, especially calcium and phosphorus, are of great importance for the proper development of pregnancy. These salts are essential for building the fetal skeleton and play an important role in the mother's metabolism.

There is also an increase in the need for iron salts contained in red blood cells (erythrocytes) and play an important role in the absorption of oxygen by the body. A lot of mineral salts are found in vegetables, fruits, meat, wholemeal bread, buckwheat, dairy products.

A varied diet provides a woman's body with the necessary amount of minerals [6].

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