



PREGNANCY AND OBESITY

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Article history:	Abstract:
<p>Received: October 4th 2023 Accepted: November 4th 2023 Published: December 6th 2023</p>	<p>Obesity is one of the most socially significant chronic diseases, which has assumed epidemic proportions, while obesity in pregnant women is attracting increasing attention. Despite constant improvements in the system antenatal care and obstetric care, the number of pregnant women with obesity is constantly increasing, and therefore the relevance of this issue is of particular importance. The review highlights the main mechanisms for the development of obesity and hormonal disorders during pregnancy, the risks and complications associated with obesity during pregnancy. Measures outlined prevention of overweight before and during pregnancy. Key words: obesity, pregnancy, insulin resistance, gestational diabetes.</p>

Keywords: Obesity, preeclampsia, body mass index, metabolism

INTRODUCTION.

Obesity – is one of the most significant chronic diseases, which achieved the scale of epidemic (according data of WHO). Ever increasing pace of obesity all over the world, and high risk of morbidity and mortality associated with obesity made this disease one of the most actual problems of modern healthcare system, what is more attention of obesity in pregnant women become more and more problematic. Despite of permanent development of care system under antenatal healthcare and obstetrics? The number of pregnant women with obesity in economically developed countries is 15.5-26.9 % and this number is increasing day by day, so in that case actuality of this problem takes major place {9}.

Obesity of pregnant women is considered an independent risk factor for severe forms of gestosis (hypertension of pregnant women, pre-eclampsia and eclumlasia), which are the most frequent complications during pregnancy. The frequency of late gestosis, which is an increase in the level of arterial pressure above 140/90 mmHg. swelling and proteinuria, in obese women about three times higher than in women with normal body weight [3, 9]. The development of late gestosis in pregnant women is associated with metabolic changes: endothelial dysfunction and systemic inflammation, especially in women with abdominal obesity to pregnancy, as well as hemodynamic disorders roe half gestation. Gestosis-induced pregnancy increases the mother's risk of heart disease seven times in the future [6].

It is known that pregnancy in the third trimester is accompanied by physiological hypercoagulation as a result of the reduction of natural antithrombotic protection and the increased activation of antithrombotic mechs, which lead to an increase in

blood clotting factors, the level of TNFa, plasminogen and plasminogen activator inhibitor. In obese pregnant women due to insulin resistance, these changes are more pronounced, and the incidence of cardiovascular and thrombotic complications is increasing.

Elevated levels of TNF-a and the plasminogen activator inhibitor are known to be independent agents of thrombophilia and thrombosis development during timing [4]

Often during pregnancy for the first time diagnosed various carbohydrate metabolic disorders, including diabetes mellitus, which had previously been asymptomatic.

In a normal pregnancy in the first trimester, the sensitivity to insulin increases as a result of the effects of the placental complex itself or the lung weight loss in gestosis. Subsequently, as the gestation period increases, the production of insulin increases, the sensitivity of peripheral tissues to insulin decreases and physiological insulin resistance develops. These changes are due to the action of counter-insular hormones (placental lactogen, placental growth hormone), estrogen, progesterone and cortisol, which act on the right It is intended to provide the energy needs of the fetoplastary system by strengthening lipolysis and ketogenesis to provide the fetus with energy. After delivery, peripheral insulin sensitivity is restored to normal [6. 171}

The risk of gestational diabetes in the general population is 2-6 per cent, and if obesity occurs up to 17 per cent[9]. In turn, gestational diabetes increases the risk of SD2, which develops in more than one third of overweight women (30%) within 15 years of delivery [3, 6]. According to VO3, the diagnosis of gestational diabetes is established when the level of fasting glycemia increases in the plasma of venose blood > 7.0



mmol/l and two hours later on the background of oral glucose isolator test with 75 g-free aquatic glucose >7.8 mmol/l [3]. Based on a risk assessment and a detailed history of diabetes, only half of diabetes patients are diagnosed. According to the recommendations of the American Diabetes Association, oral glucose tolerance tests are mandatory for all women with risk factors for gestational diabetes 24-28 days after pregnancy, and if there is a gestational glucose tolerance test Oral Glucose Tolerance Oral Test for Diabetes Anamnesis during Previous Pregnancy is performed at 16-18 weeks. Risk factors for the development of gestational diabetes are: large-foetus pregnancy (>4,500 g) or stillbirths with a history, obesity in pregnancy (BMI > 30 kg/m²); multispecies; age over 30; SD2 in first-degree relatives (parents, siblings, children); rapid increase in body mass during the given pregnancy.

THE RESEARCH FINDINGS.

During the pregnancy is creating favorable conditions for development of adipose cellular tissue, biological meaning which is metabolic protection of future child. With the first days of pregnancy in the organism of women starts hormonal changings, like: increased synthesis of progesterone, chorionic gonadotropin, prolactin and placental lactogen, which stimulates deposition of fat in the body.

It is known that process of distribution of adipose tissue mainly determined by hormones of the genital glands and adrenal cortex, with androgens in estrogens in adipocytes playing an important role. Fat, mainly visceral, has high hormonal metabolic activity, contains a large number of adrenoreceptors, corticosteroid and androgenic receptors, and is able to accumulate various steroids such as testosterone, androstenedione, cortisol, due their solubility in lipids. The main synthesis of genital hormones proceeds in testis, while adipocytes are the place of extragonadal synthesis of estrogens form androgens with the way of aromatization and conversion androstenedione and testosterone to estrone, and it is turned into more active estrogen – estradiol. In obesity peripheric aromatization of androgens to estrogens is increasing, in the result of it metabolism of androgens and estrogens are violated. {2, 7}

The metabolism of estrogens in obesity changes due to a decrease in the formation of inactive metabolites of estradiol, especially 2-hydroxyestrogenes, and an increase in the amount of estron sulfate, as a result of which the ratio of active and inactive estrogens in favor of active and inactive estrogens a relative hyper-estrogenemia develops, which can lead to the

development of hyperplastic processes of endometrium and ovarian dysfunction.

The ratio of estrogens during pregnancy is mainly changed due to an increase in the production of estriol, which has low activity, but is done in very large quantities, in connection with which its action during pregnancy is significantly stronger than other estrogens.

The content of estradiol and esteron during pregnancy increases a hundred times, and estriola - a thousand times [6]. A greater number of estro- genes after 5-7 weeks of pregnancy is formed in the blue cytotrophoblasts of the placenta due to their synthesis from de-hydroepiandrosterone sulfate coming from the blood of the fetus. The main function of estrogen during pregnancy is to increase blood flow in the uterus by activating the synthesis of prostaglandins. The metabolism of androgens during obesity can be altered by increasing their free fractions (free testosterone) with the development of relative gi- perandrogeny, which is associated with a low concentration of globulin binding sexual steroids.

During pregnancy, both the production and inactivation of androgens increase due to an increase in the rate of their metabolic clearance, which leads to the maintenance of a normal ratio of levels of circulating androgens, However, 20-50% of obese pregnant women may experience significantly higher levels of androgens (testosterone, dehydroepiandrosterone, dehydrogeandrosterone-sulfate), and develop hyperandrogenic, which may lead to pregnancy failure [3].

Progesterone is also involved in the regulation of adipose tissue deposition, the content of which increases during pregnancy. Progesterone is known to compete with the glucocorticoids for their adipocyte receptors, thus preventing the lipolytic growth of glucocorticoids on the adipose tissue.

During pregnancy, the placenta produces hypo-fibrant-like hormones (chorionic gonadotropin and corticotropin, placental lactogen, adreno-corticotropic hormone), hypothalamoid hormones (gonadotropin, corticotropic and tyrotropic rili- zing-hormones, somatostatin) Adipocytic hormones such as leptin, resistine [11]. Placenta secretes a large number of cytokines (interleukin-1, interleukin-6, tumor necrosis factor), growth factors (insulin-like growth factor-1, epidermal growth factor, growth factors of platelets and fibroblasts, inhibitin and actin) and proteins specific to bereme necessary for the growth and development of the foetus, the immune relationship of the mother and the foetus, ensuring the continuation of pregnancy [6, 10].



It has now been proven that in pregnant women, leptin is synthesized not only by adipocytes, but also by placental trophoblasts in an amount no less than in-1 T and in-line tissue [16]. Placental leptin does not differ in structure and biological properties from fat tissue leptine and is a product of expression of the same gene (ob gene).

The content of leptine in the blood serum is directly correlated with the body weight, the level of human chorionic gonadotropin and the gestation period [16, 19]. The leptine level increases from 6-8 weeks, reaching a maximum in the second to second trimester of pregnancy, and decreases significantly after delivery [16]. The inverse correlation between the leptine content of the blood of the pregnant woman and the condition of the children at birth was also revealed. In the blood, taken from the umbilical cord of newborns, the level of leptin produced by the placenta, as well as the fatty tissue of the fetus, directly proportional to the weight of the body and fat of the newborn;

It is reduced due to mother's smoking, prematurity of fetus, low anthropometric indices of children born on time, and elevated for too large newborns [16]. It has been suggested that the main role of placental leptin is to participate in the regulation of the growth and development of the fetus, the stimulation of hematopoiesis and lymphopoiesis in the newborn. The leptin contained in the mother's chest can also be absorbed into the gastrointestinal tract and then into the newborn's blood, thus playing an additional role in the regulation of fetal growth [16].

There is evidence of grelin's role during pregnancy. Grelin is a polypeptide hormone secreted mainly by stomach mucous cells, which causes hunger and is a powerful stimulant of growth hormone secretion. Heat receptors are also known to be located in the placenta [13]. The grelin level increases with the gestation period, reaching the maximum by the middle | trimester [13].

The main role of ghrelin during pregnancy is to regulate the mother's appetite and increase energy consumption with food to feed the fetus. Grelin is also involved in the regulation of contraction of myometrium.

In 1990, the Institute of Medicine of the American Academy of Sciences issued the recommendations of the Standard for Total Body Mass Gain during Pregnancy, based on the values of the original Body Mass Index (BMI) currently in use (Table. 1) [15].

According to these recommendations, the higher the woman's starting weight, the smaller the increase should be during pregnancy. Thus, in pregnant women with normal body weight, the increase in weight per pregnancy should not exceed 16 kg, and in obese

women the increase in body weight should not exceed 7 kg [14].

The dynamics of the body mass set depends on the duration of the pregnancy. In the first weeks of pregnancy, there is usually no increase in body weight, moreover, there may be a decrease in the development of early toxicosis. From the 16th week of pregnancy a slight increase in body weight begins; from the 23rd to 24th the increase is about 200 g per week, and from the 29th it must not exceed 300-400 g [14].

Obesity during pregnancy is associated with the development of serious maternal and foetal complications.

Obesity-related complications are the most common for women with abdominal type of obesity (visceral), which in most cases is combined with hormonal and metabolic complex and is the most unfavorable in clinic and Outlook Aspects [18].

Gestational complications in women with obesity are reported in 45-85% of cases [6]. Overweight pregnant women have one and a half to two times higher incidence of obesity-related diseases compared to women with normal body weight, increased risk of pathological pregnancy, childbirth and postpartum period, The birth rate of children with congenital defects is increasing, leading to mortality and morbidity.

Risk of development of complications of gestational diabetes FOR mother and foetus depends on its compensation Inadequate compensation of gestational diabetes leads to hyperglycemia development in the foetus, which can cause heart defects in the first trimester of pregnancy, spinal column, gastrointestinal tract and spinal cord. In the second trimester of pregnancy in response to hyperglycemia develops hyperplasia and gi-perfunction of cells of the fetal pancreas with subsequent hyperinsulinemia in the fetus, which can lead to macrosoma, tendencies to severe and long-term hypoglycemia in the foetus and formation of malformations of the central nervous system.

Thus, maintaining a woman's normal blood glucose level during pregnancy, adequate compensation of gestational diabetes are among the most important conditions for favorable gestation:

Obesity increases the risk of various obstetric complications: risks of not attending (32.5 per cent), natural (10.8 per cent) and delayed (6.0 per cent) deliveries, birth abnormalities (30.1 per cent), birth injuries (45.7 per cent), and fetople disorders Intrauterine hypoxia of the foetus (60%) and fetal deficiency (10.8%), neonatal macrosoma (18.1%) [1, 9].

Any excesses in the diet during pregnancy, such as overeating or malnourishing, may have unintended



consequences. For example, malnutrition, especially in the second and third trimesters of fertility, affects fetal mass at birth. In addition, foetal malnutrition during the period of intrauterine development contributes to the formation of metabolism, programmed for possibly scarce nutrition in the future, those. Not adapted to excessive food intake and resulting in excess fat accumulation in the post-natal period.

As with a well-balanced diet, adaptive physiological mechanisms enable the needs of both the pregnant woman and the fetus to be met in macro- and micronutrients without additional correction. These mechanisms contribute to better absorption of nutrients. For example, hormonal changes characteristic of pregnancy (increased levels of estrogen, progesterone, insulin) stimulate anabolic processes. Higher levels of chemotherapy after meals, increased intake of iron and calcium in the intestine and more efficient nitrogen exchange, which contributes to saving nitrogen and protein [5, 8].

It is estimated that the increase in energy demand during pregnancy is around 85,000 kcal;

Of these, 41,000 kcal is deposited as fat and lean mass in the woman and fetus, 36,000 kcal is used for metabolic processes and only 8,000 kcal is used for the energy process of moving the heavier body and increasing the wasp. The average additional daily energy requirement for a pregnant woman is approximately 300 kcal [5, 8] when the 280-day period of pregnancy is recalculated. It is necessary to note that the trimester of pregnancy is characterized by different energy requirements and, as a result of reduced physical activity and stress, despite an increase in physiological need, ultimately the necessary recovery Energy consumption is rising only marginally. An indicator of adequate satisfaction of the energy requirement is the increase in the weight of the pregnant woman. With balanced nutrition, increased energy demand implies greater consumption of all macro- and micronutrients.

With a normal increase in body weight on a 9% basis, the increase is due to the protein mass of the tissues of the mother (uterus, placenta, breast) and the fetus [11,12,13]. Most protein accumulation occurs in the second half of pregnancy and is 6-7 grams per day [14]. The third trimester of pregnancy is due to reduced excretion of nitrogen with urine and intensive protein synthesis. At this time, the fetus accumulates about three grams of protein per day, and the average daily protein consumption in a woman increases to ten grams.

With regard to fats, there is an increased need only for long-chain omega-3 fatty acids, the sources of which

are seafood, nuts, rapeseed, olive oil, liver, egg yolk, soy products. At the same time, there is no need for additional protein and fat. The increase in the volume of blood plasma during pregnancy, the increase in kidney filtration, as well as the increase in race and the need for vitamins and minerals explains the decrease in their blood content. The main ones concern vitamins A, D, B6 and folic cyst, but this process is a normal adaptation of the organism to pregnancy, and in normal nutrition there is also no need for additional prescription of said vitamins[19,20].

Physical activity is important for pregnant women. Moderate physical activity (walking 30 minutes a day) reduces the risk of developing complications during posture, such as preeclampsia, gestational diabetes, etc. [15,16,17,18].

CONCLUSIONS.

The research findings suggest a significant correlation between obesity and the development of pre-eclampsia in pregnant women. The study also found that body mass index (BMI) is a reliable indicator of obesity and can be used to assess the risk of pre-eclampsia. Additionally, the research indicates that metabolic dysfunction may play a role in the pathogenesis of pre-eclampsia, as abnormalities in glucose and lipid metabolism were observed in women with the condition. These findings highlight the importance of addressing obesity and metabolic health in pregnant women to prevent pre-eclampsia and improve maternal and fetal outcomes.

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