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Medical And Social Significance Of Obesity In Obstetric Practice

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Abstract: The prevalence of overweight and obesity among women of reproductive age has increased significantly over recent decades and is now recognized as a global public health problem. Obesity during the pre-pregnancy period and gestation is associated with a wide range of obstetric, metabolic, and cardiovascular complications that adversely affect maternal and fetal outcomes. Excess adipose tissue contributes to insulin resistance, chronic low-grade inflammation, endothelial dysfunction, and hormonal imbalance, which increase the risk of miscarriage, gestational diabetes mellitus, hypertensive disorders of pregnancy, preeclampsia, thromboembolic events, and operative delivery. In addition, maternal obesity alters fetal metabolic programming through dysregulation of glucose, lipid, insulin, and leptin metabolism, leading to fetal macrosomia and an increased risk of obesity and metabolic syndrome in offspring later in life. Despite advances in antenatal care, the incidence of pregnancy complications associated with obesity remains high. Current evidence highlights the importance of preconception counseling, weight management, and multidisciplinary monitoring throughout pregnancy to reduce perinatal morbidity and mortality. Further studies focusing on metabolic and endothelial changes in overweight pregnant women are required to optimize preventive and therapeutic strategies.

Keywords: Maternal obesity; Overweight; Pregnancy complications; Metabolic programming; Gestational diabetes mellitus; Preeclampsia; Cardiovascular risk; Fetal macrosomia; Body mass index (BMI); Perinatal outcomes.

1. Introduction: The increase in the incidence of diseases associated with excess nutrition in recent decades is one of the most significant problems in socially and economically progressive countries. The increasingly widespread problem of overweight and obesity worldwide is recognized as a global pandemic [1, 2, 4]. The dominance of obesity as a major risk factor for the development of cardiovascular pathology over the past two decades has been observed in all age groups and patient groups, including women of reproductive age. [8, 10] The high significance of this problem from an obstetric perspective is associated with the increasing number of pregnant women with overweight and obesity, despite the increasing improvement of antenatal care and obstetric assistance [1, 5, 6]. In economically and socially progressive countries, the prevalence of obesity among pregnant women ranges from 15.5% to 26.9% and continues to rise. Therefore, the problem of obesity in the pre-pregnancy period, as well as during pregnancy, is one of the most pressing worldwide [5, 7].

The prevalence of obesity among women of childbearing age, according to various authors, ranges from 1.8% to 25.3% [1,2, 7]. During pregnancy, statistical data on obesity in different countries over the past decade vary between 15% and 38% of cases. Moreover, among multiparous women, the rate is double that [5, 6, 7]. However, over the past few years, there has been a trend towards increasing obesity rates among women of childbearing age in the pre-pregnancy period [7, 9].

In economically and socially progressive countries, obesity in women of childbearing age is one of the most important and pressing issues. The risk of developing serious complications such as miscarriage, preeclampsia, eclampsia, and gestational diabetes mellitus increases sharply in the presence of obesity. [10, 11] These complications are certainly increased by the development of excess adipose tissue and decreased insulin sensitivity due to the risk of unfavorable programming of fetal metabolism [7, 10]. Obesity and overnutrition during gestation increase glucose and insulin levels in the fetus, subsequently increasing leptin production and its secretion by fetal adipocytes, which contributes to an even greater increase in the amount of glucose, insulin, and leptin, modulates the metabolic response of hypothalamic neurons, and leads to the development of fetal and neonatal macrosomia and programs the growth of body mass index (BMI) in the offspring [5,6]. The lipid imbalance characteristic of obesity contributes to further progression in the metabolic programming of the fetus and newborn.

Obesity remains a pressing medical and social problem. According to epidemiological data, in 2014, over 1.9 billion adults over 18 were overweight. Of these, 600 million were obese [3,6].

Obesity rates in pregnant women in Western Europe and the United States range from 6 to 28%, while in Russia they reach 25% [3, 5, 8]. Adversely affecting the functioning of the body's vital systems, obesity increases the risk of pathological pregnancy, childbirth, and the postpartum period and remains a significant factor in perinatal morbidity and mortality [9,10].

The incidence of maternal obesity, diagnosed in accordance with WHO recommendations as a body mass index (BMI) (the ratio of weight in kilograms to the square of height in meters) equal to or exceeding 30 kg/m2, varies in different countries from 1.8% to 25.3%, increasing annually (Guelinckx I. et al, 2008). Obesity during pregnancy increases the risk of complications both in early pregnancy (spontaneous abortions, infectious diseases, gestational diabetes) and later (gestational hypertension, preeclampsia, thromboembolism, premature birth). Maternal obesity is associated with the development of fetal abnormalities, such as neural tube defects, heart defects, etc. [4,6,10]. Moreover, according to Chen M., the Apgar score in children born to obese mothers is lower in the population. The risk of developing metabolic syndrome and obesity in these children is also higher [4, 6].

Overweight (pre-obesity), in which the BMI is in the range of 25-29.9 kg/m2, is somewhat more common in women of reproductive age than in obesity. However, its effect on the course and outcome of gestation has not been reliably studied [4,5].

It is known that obese women during pregnancy have elevated blood triglyceride, insulin, leptin, and glucose levels compared to normal-weight pregnant women [1,7]. Despite this, studies on the comprehensive analysis of metabolic status in overweight pregnant women are insufficient, and the data are contradictory.

An increased risk of cardiovascular disorders has been demonstrated in obese women during pregnancy due to metabolic and inflammatory disorders [5, 6]. This is associated with impaired endothelial function. In patients with gestational obesity, both endothelium-dependent and endothelium-independent vasodilation are reduced, and levels of inflammatory markers (C-reactive protein, interleukin-6) and endothelial

activation (sICAM-1) in the blood's fluid component are elevated [2, 4, 8]. Data on these indicators among patients with excess weight during gestation are insufficient.

During gestation, favorable conditions are created for the development of subcutaneous fat, the primary biological purpose of which is the metabolic protection of the fetus. From the moment of conception, hormonal changes occur in the pregnant woman's body: increased production of progesterone, human chorionic gonadotropin, prolactin, and placental lactogen stimulates the deposition of adipose tissue in the body [5, 6].

It has been proven that the distribution of adipose tissue is regulated by steroid hormones, as well as hormones of the adrenal cortex. The main role is assigned to the conversion of androgens to estrogens in adipocytes. Adipose tissue, mainly visceral, has high hormonal-metabolic activity, contains many adrenergic receptors, corticosteroid and androgen receptors, and also has the ability to accumulate various steroid hormones due to their ability to dissolve in lipids - testosterone, androstenedione, cortisol [10, 11]. The main production of sex hormones, as is known, occurs in the ovaries, while adipocytes are considered the source of extragonadal synthesis of estrogens from androgens through aromatization due to aromatases and the conversion of androstenedione and testosterone into estrone, then its conversion to estradiol - the most active estrogen [5, 7]. Increased peripheral aromatization of androgens to estrogens, which occurs in obesity, leads to disruption of androgen and estrogen metabolism [1, 2, 4].

A positive energy balance—a predominance of energy intake from food over energy expenditure—plays the greatest role in the development of obesity, although multiple hormonal and enzymatic changes in pregnant women contribute to the deposition of adipose tissue. The main cause of energy imbalance is undoubtedly alimentary and constitutional factors, as well as a sedentary lifestyle [2,8,9].

Based on the baseline body mass index (BMI) values currently in use, the Institute of Medicine of the American Academy of Sciences has issued recommendations regarding optimal weight gain standards during gestation [6,7].

According to these recommendations, the greater the patient's initial body weight, the less this indicator increases during gestation. Moreover, pregnant women with normal body weight should not exceed 16 kg in weight gain throughout pregnancy, while obese pregnant women should not exceed 7 kg [4,6,7].

A woman's weight gain during pregnancy depends on the gestational age. Weight gain in the first trimester of pregnancy is usually not observed. A woman's weight may often decrease with the development of early toxicosis. However, starting from the 16th week of gestation, a slight weight gain is observed; from the 23rd to 24th week, weight gain is approximately 200 g per week. By the 29th week, weight gain should not exceed 300-400 g [9].

The most common complication of gestation in obese pregnant women is miscarriage [5,8,35,47]. It should be taken into account that excess body weight is also a risk factor for miscarriage due to the developing hyperandrogenism and hyperinsulinemia. Miscarriage and spontaneous abortion in obese women occur in the range of 25-37%. The incidence of premature birth and post-term pregnancy is also increased in obese women. Due to the incomplete formation of the labor dominant in obese women, by the end of pregnancy, 10-15% of pregnant women experience a tendency towards post-term pregnancy and the development of weak labor. The severity of the development of labor anomalies is directly related to the degree of obesity, which contributes to an increase in the rates of cesarean section. [49,58]. Sometimes the rationale for operative delivery may be determined by cephalopelvic disproportion, due to frequent fetal macrosomia in obese pregnant women. The incidence of macrosomia in obese women ranges from 20% to 44% [4, 9]. Surgical delivery due to complicated labor in obese women is observed two to four times more often than in pregnant women of normal weight. At the same time, cesarean section in obese pregnant women is associated with the risk of various thrombotic complications and poor healing of postoperative wounds [1,3, 8].

The presence of various complications during pregnancy and childbirth negatively impacts not only the mother's well-being but also that of the fetus. The incidence of complications such as neonatal asphyxia, congenital fetal anomalies, intrauterine death, fetal malformations, birth injuries, and early neonatal death is significantly higher in obese women [5,8].

Nevertheless, overweight and obesity are not contraindications to pregnancy, despite the risk of obstetric complications during gestation. A thorough preconception examination, monitoring by an obstetrician-gynecologist, endocrinologist, and nutritionist, as well as ongoing monitoring of body weight, blood pressure, and carbohydrate metabolism

throughout pregnancy, are essential for a favorable pregnancy outcome in obese women [7, 9].

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