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Psychological and somatic aspects of obesity during pregnancy

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ABSTRACT

Obesity in pregnancy presents a significant challenge to modern medicine due to its association with numerous adverse maternal and fetal outcomes. Pre-pregnancy obesity increases the risk of metabolic complications such as gestational diabetes, hypertension, preterm birth, and fetal macrosomia. Beyond physical health, it also negatively impacts the mental well-being of pregnant women, complicating pregnancy and postpartum recovery. This review explores the complex interplay between obesity, somatic health, and psychological factors during the reproductive period. Emphasis is placed on the necessity of interdisciplinary and holistic care models, integrating medical, nutritional, and psychological support to improve outcomes. Early preventive interventions, including lifestyle education and systematic monitoring, are essential to reduce complications. Despite growing awareness, further research is needed to develop comprehensive, individualized care strategies addressing physical, mental, and social determinants of health. Investing in such approaches is critical to enhancing maternal and offspring health, reducing healthcare burdens, and advancing clinical practice in reproductive medicine.

Keywords: obesity, pregnancy, mental health, obstetric complications, perinatal depression, inflammation, insulin resistance, gestational diabetes, macrosomia, cesarean section

INTRODUCTION

Maternal obesity represents one of the most pressing challenges in contemporary medicine and health sciences, due to its association with a wide spectrum of complications during both the prenatal and postnatal periods. According to the World Health Organization (WHO), obesity is defined as a body mass index (BMI) ≥ 30 kg/m^2 [1]. In recent decades, there has been a marked increase in the prevalence of overweight and obesity among women of reproductive age, reflecting the global epidemic of metabolic disorders such as type 2 diabetes and metabolic syndrome [2]. It is estimated that in developed countries, up to one-third of pregnant women are affected by overweight or obesity [3].

A woman's nutritional status prior to conception is one of the key determinants of pregnancy outcomes, mode of delivery, and the health of both mother and child. Prepregnancy obesity

significantly increases the risk of obstetric complications, including gestational diabetes, pregnancy-induced hypertension, preeclampsia, preterm birth, fetal macrosomia, and the need for cesarean delivery [4,5]. Offspring born to mothers with obesity are at increased risk of developing overweight, metabolic disorders, and cardiovascular diseases later in life [6].

Risk factors for obesity during pregnancy include both genetic predispositions and environmental influences, such as poor dietary habits, lack of physical activity, and low health literacy, often associated with lower socioeconomic status [7]. Obesity also interferes with the physiological course of labor, increases the frequency of obstetric interventions such as cesarean section, and is associated with a higher risk of postoperative complications [8].

Growing attention is being paid to the psychological dimension of obesity during pregnancy. Women with excessive body weight are more susceptible to mental health disorders, including depression, anxiety disorders, and low self-esteem, which may worsen during pregnancy and the postpartum period [9]. Stigmatization, poor body image, and emotional distress can affect not only the pregnant woman's quality of life but also her relationship with the child and engagement in postpartum care [10]. Therefore, comprehensive care for pregnant women with obesity should address both medical and psychological aspects.

The aim of this paper is to present the impact of prepregnancy obesity on pregnancy and delivery outcomes, with particular emphasis on obstetric complications and maternal mental health. The pathophysiological mechanisms underlying these associations, key risk factors, and current preventive and therapeutic strategies will be analyzed, with a focus on improving long-term health outcomes for both mothers and their children.

PATHOPHYSIOLOGY OF OBESITY AND PREGNANCY

Obesity during pregnancy is associated with numerous metabolic, hormonal, and immunological disturbances that significantly impact maternal health and fetal development. One of the primary underlying mechanisms of these disturbances is insulin resistance - a condition characterized by reduced tissue sensitivity to insulin. Although insulin resistance physiologically increases in the second half of pregnancy, this effect is markedly amplified in women with overweight or obesity, contributing to a higher risk of hyperglycemia and the development of gestational diabetes [5]. Obesity also promotes dyslipidemia, hyperinsulinemia, and impaired glucose metabolism, all of which elevate the long-term risk of type 2 diabetes in both the mother and the offspring.

Excess maternal body weight is further associated with a state of chronic low-grade inflammation, which plays a pivotal role in the pathophysiology of pregnancy complications. Adipose tissue, functioning as an active endocrine organ, secretes numerous pro-inflammatory cytokines—such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6) - that exacerbate insulin resistance and may negatively affect placental function and vascularization [11,12].

In addition, women with obesity exhibit increased oxidative stress, resulting from excessive production of reactive oxygen species (ROS) and an imbalance between pro-oxidant and antioxidant mechanisms. Oxidative stress, in conjunction with inflammation, may impair trophoblast function and placental structure, potentially leading to placental insufficiency. These disturbances contribute to the development of pregnancy-related pathologies such as preeclampsia, intrauterine growth restriction (IUGR), and, in severe cases, miscarriage.

Obesity also affects the cardiovascular system, increasing the risk of hypertension and atherosclerotic changes, which impair efficient placental perfusion and may compromise fetal growth and development [13]. Moreover, hormonal imbalances resulting from excessive adipokine activity - such as leptin, adiponectin, and resistin - can disrupt the hypothalamic-pituitary-ovarian (HPO) axis, impair ovulatory function, and reduce fertility [14,15]. Leptin, whose levels are positively correlated with adipose tissue mass, plays a role in appetite regulation and reproductive function. Its overexpression may lead to neurohormonal dysfunction and adversely affect fetal development. Conversely, decreased adiponectin levels are associated with enhanced insulin resistance and promotion of inflammation, which can further complicate the course of pregnancy [15]. These disturbances may also impair embryo implantation and placental vascular development, thereby increasing the risk of miscarriage and perinatal complications.

A comprehensive understanding of the complex metabolic, hormonal, and immunological mechanisms associated with obesity in pregnancy is crucial for identifying high-risk populations and implementing effective, personalized therapeutic strategies. Such an approach may help reduce the incidence of perinatal complications and improve long-term health outcomes for both mother and child.

PREPREGNANCY OBESITY AND OBSTETRIC COMPLICATIONS

Obesity present before conception - defined as a body mass index (BMI) equal to or greater than 30 kg/m² - represents a significant risk factor for the normal course of pregnancy and delivery. Current epidemiological data indicate a growing prevalence of overweight and obesity among women of reproductive age, contributing to the increasing incidence of obesity-related obstetric complications [4].

The metabolic and hormonal disturbances associated with obesity can negatively affect the early stages of pregnancy by increasing the risk of miscarriage and impairing proper embryo implantation. In subsequent trimesters, obesity is more frequently associated with the development of gestational hypertension, preeclampsia, gestational diabetes mellitus (GDM), excessive fetal growth, and preterm birth [16,17].

Prepregnancy obesity significantly increases the risk of gestational diabetes due to both physiological insulin resistance in the second half of pregnancy and pathological insulin resistance driven by excessive adipose tissue. In women with severe obesity (BMI ≥ 40 kg/m²), the risk of developing hyperglycemia during pregnancy can be up to four times higher compared to women with a normal BMI [18]. Additionally, these women often exhibit greater difficulty in achieving glycemic control, despite dietary modifications or insulin therapy, which correlates with a higher rate of fetal complications.

Another major complication is pregnancy-induced hypertension, which occurs significantly more often in women with obesity than in those with a normal BMI. In this group, an increased prevalence of preeclampsia has been observed, a condition associated with serious maternal and fetal outcomes such as fetal growth restriction, preterm birth, and severe hypertensive disorders including eclampsia or HELLP syndrome [19,20]. The risk of preeclampsia is proportional to the degree of obesity - the higher the BMI, the greater the risk.

Prepregnancy obesity also affects labor, increasing the likelihood of obstetric interventions, including cesarean delivery. Elevated maternal weight is associated with a higher incidence of labor induction failure, operative delivery, and shoulder dystocia. Furthermore, obesity complicates analgesia management and fetal monitoring, increasing the risk of peripartum complications such as infection, hemorrhage, and thromboembolism [21,22,23].

Neonates born to women with obesity more frequently present with birthweights exceeding population norms (macrosomia), which increases the risk of birth trauma and metabolic disturbances such as neonatal hypoglycemia and hyperbilirubinemia. There is also growing evidence that offspring of obese mothers may be more susceptible to metabolic disorders later in life, possibly due to epigenetic changes initiated in utero [24,25].

Given these risks, increasing emphasis is placed on preventive interventions beginning at the preconception stage. Weight reduction before pregnancy, proper nutrition, physical activity, and health education can significantly improve pregnancy outcomes and reduce the incidence of complications. According to the American College of Obstetricians and Gynecologists (ACOG), women with a BMI above the normal range should be offered comprehensive interdisciplinary care even before pregnancy is planned [8].

Monitoring gestational weight gain in accordance with the Institute of Medicine (IOM) recommendations is also critical, as it can reduce the risk of hyperglycemia, hypertensive disorders, and delivery complications, even among women who are obese at baseline [26].

MENTAL HEALTH OF PREGNANT WOMEN WITH OBESITY

Obesity during pregnancy is associated not only with numerous somatic consequences but also with a deterioration in the mental health of pregnant women. Mood disorders, generalized anxiety, and low self-esteem are significantly more prevalent in this group compared to women with normal body weight. There is also an increased risk of developing perinatal depression, which can adversely affect the course of pregnancy and the health of the child [27].

Studies have shown that women with obesity are significantly more likely to experience depressive symptoms during pregnancy. A meta-analysis demonstrated that the risk of antenatal depression in women with above-normal BMI is nearly twice as high as in women with normal body weight [28]. This problem may worsen in the postpartum period, leading to postpartum depression, which negatively impacts maternal-infant bonding, infant feeding practices, and family relationships [29].

Psychological factors such as poor body image and low self-esteem play a crucial role in shaping the mental state of pregnant women. Women with excessive body weight often experience stigmatization due to their appearance, resulting in increased feelings of shame and guilt [30]. These emotions may lead to social withdrawal, isolation, and deepening emotional problems.

Higher levels of anxiety are also observed more frequently among obese women, particularly related to childbirth, the health of the baby, and potential complications. Elevated psychological stress can impair glycemic control in cases of gestational diabetes and reduce the effectiveness of medical interventions [31]. Mental disorders such as depression and anxiety are significantly correlated with the occurrence of somatic complications during pregnancy and may contribute to reduced adherence to medical recommendations, poor dietary habits, and physical inactivity - factors that increase health risks for both mother and child.

The literature also indicates that women with obesity are more susceptible to postpartum depression, which may be related to both biological and psychological risk factors. Biological factors include the chronic low-grade inflammation characteristic of obesity, associated with elevated levels of pro-inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α). These cytokines may affect the functioning of the hypothalamic-pituitary-adrenal (HPA) axis, leading to dysregulation of stress responses and mood modulation, thereby promoting depressive disorders [32, 33]. Research has also shown that obesity is associated with elevated levels of hsCRP and increased pro-inflammatory activity, which correlate with depressive symptoms in pregnant women [34]. Additionally, altered activity of adipokines, such as leptin and adiponectin, may affect the central nervous system and mechanisms responsible for mood regulation [35].

Severe postpartum depression can result in impaired emotional functioning, difficulties in infant care, and disrupted lactation. There is also a correlation between maternal depression and the child's emotional and cognitive development problems in later life.

Therefore, it is essential to provide adequate psychological and therapeutic support for women with obesity. Incorporating psychological consultations into perinatal care, conducting educational and preventive activities, and promoting a positive body image may positively influence the patients' mental well-being. An interdisciplinary approach involving physicians, midwives, dietitians, and psychologists is more effective in preventing both psychological and physical complications associated with obesity during pregnancy [36]. In the future, it seems necessary to implement more individualized mental health support programs that address not only somatic status but also the emotional needs of women during the perinatal period.

PRECONCEPTION CARE FOR WOMEN WITH OBESITY

Obesity in women of reproductive age is a significant public health concern, associated with an

increased risk of complications during pregnancy, childbirth, and the postpartum period, as well as adverse effects on the child's health. Therefore, the implementation of effective prevention strategies and comprehensive care prior to conception is of paramount importance. Care for women with obesity who are planning motherhood should be interdisciplinary and holistic in nature, focusing on both the physical and mental health of the patient.

The role of preconception prevention

The preconception period represents an optimal time to implement preventive interventions aimed at weight reduction, management of coexisting metabolic disorders (e.g., insulin resistance, hypertension), improvement of fertility, and reduction of pregnancy-related risks such as gestational diabetes, preeclampsia, or fetal macrosomia [4,37]. Even a modest weight loss (5–10% of initial body weight) can significantly improve reproductive outcomes as well as glucose and lipid metabolism [38]. International guidelines, including those of FIGO (International Federation of Gynecology and Obstetrics) and ACOG (American College of Obstetricians and Gynecologists), emphasize the importance of metabolic preparation for pregnancy and the need for systematic health monitoring [39,40].

Interdisciplinary medical care

Effective preconception care requires collaboration among multiple specialists. The primary care physician plays a key role in identifying patients with obesity, initiating diagnostic workup, and referring to appropriate specialists. The gynecologist should assess the reproductive organs, menstrual cycles, and possible ovulatory disorders, which often accompany overweight status and polycystic ovary syndrome (PCOS) [41]. The dietitian conducts a detailed nutritional assessment, develops an individualized dietary therapy plan tailored to the patient's needs, and monitors progress in weight reduction. The psychologist plays an important role in identifying emotional difficulties, eating disorders, as well as providing psychoeducation and motivation for lifestyle changes [42,43]. Integrated care enhances the effectiveness of interventions and supports the patient across somatic, psychological, and social dimensions.

Lifestyle Interventions and Psychoeducation

Lifestyle modification is the cornerstone of obesity prevention. Implementation of a balanced, normocaloric diet with a low glycemic index, increased physical activity (at least 150 minutes of moderate exercise per week), as well as improvement of sleep hygiene and stress reduction are recommended [44,45]. The effectiveness of interventions is enhanced when tailored to the

individual patient's capabilities and supported by health education. Psychoeducation should include information on the impact of obesity on maternal and fetal health, techniques for coping with stress, and strategies for long-term maintenance of healthy habits [46]. It is also important to counteract stigma and strengthen the woman's sense of self-efficacy.

The Importance of a Holistic Approach

A holistic approach to the care of women with obesity planning pregnancy involves consideration not only of somatic parameters but also of mental health, lifestyle factors, social determinants, and the patient's personal experiences. This perspective allows for more effective preparation of the body for pregnancy, supports the development of sustained motivation for lifestyle changes, and improves overall quality of life. Early implementation of comprehensive, individualized preconception care can significantly reduce the risk of pregnancy complications and provide better developmental conditions for the child from the moment of conception [47].

SUMMARY AND CONCLUSIONS

Pre-pregnancy obesity represents a significant health challenge, associated with substantial risks to both the physical and mental health of women of reproductive age. Numerous studies demonstrate that excessive body weight prior to conception increases the incidence of obstetric complications, including gestational diabetes mellitus, pregnancy-induced hypertension, preterm birth, and fetal macrosomia. Furthermore, it adversely affects the psychological well-being of pregnant women, which may further complicate pregnancy progression and the postpartum period [48, 49]. These complexities necessitate a multidisciplinary approach addressing metabolic, hormonal, and psychological factors in patient management.

Early preventive interventions, such as education on healthy lifestyle habits, balanced nutrition, and regular physical activity, are critical for reducing the risk of pregnancy-related complications. Interdisciplinary care, incorporating psychological support, dietary counseling, and medical management, can significantly enhance health outcomes and quality of life in obese women planning pregnancy. Systematic monitoring of metabolic and psychological parameters during the preconception period enables implementation of individualized therapeutic strategies that improve both maternal and neonatal prognosis [50].

Despite growing awareness of this issue, there remains an urgent need for further research aimed at developing effective, comprehensive, and tailored models of preconception and perinatal care. Emphasis should be placed on holistic programs addressing physical,

psychological, and social determinants of health. Only through such multidimensional interventions can the adverse consequences of obesity in the reproductive period be mitigated and the standard of care for this patient population be elevated [51, 52].

Pre-pregnancy obesity requires targeted clinical attention, coordinated systemic support, and integrated preventive and therapeutic efforts. Investment in comprehensive care models and health education is likely to yield sustainable benefits by decreasing the incidence of complications and improving health outcomes for both mothers and their offspring [53].

Disclosure

Author's Contribution

Conceptualization: Paulina Strzałkowska, Maciej Hobot, Wojciech Grabski

Formal analysis: Maciej Hobot

Investigation: Maciej Hobot, Wojciech Grabski

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Writing review and editing: Paulina Strzałkowska

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