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Review Article

Obesity in pregnant females- A review article

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ABSTRACT

Obesity is known as a prominent public health issue. It can be featured as an epidemic as it does no discrimination on the basis of age, gender, and socioeconomic status. Among pregnant females, incidence of obesity is getting increased and it is found to be linked with many complications that obstetricians are facing now-a-days. It also poses a huge confront to pregnant females as it is linked with unfavourable perinatal and maternal outcomes. Still, various studies revealed conflicting results between improvement in pregnancy outcome and lifestyle intervention. The objective of present review is to emphasize about complications, clinical significance and management of maternal obesity.

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1. Introduction

Obesity is defined as a condition of sweeping adiposity, in which there is an uncharacteristic rise in the content of fat in the body that negatively impact general health of a person.¹ Different anthropometric calculations are done to evaluate the state of obesity, like assessing waist-to-hip ratio, waist circumference, and body mass index (BMI).² BMI is found to be the most realistic measurement of obesity anthropometrically. Body mass index (BMI) is referred as a helpful method to assess level of obesity. It is an uncomplicated index that uses weight and height for classifying as underweight, overweight and obese adults. To categorise weight into four categories, cut-off of BMI are used. These categories are: underweight (< 18.5 kg/m²), normal (18.5 to 24.9 kg/m²), overweight (25 to 29.9 kg/m²), and obesity (>30 kg/m²).³

The use of BMI has several advantages in measuring obesity easily and grading the level of obesity in an individual. But beside advantages, there are few limitations of using BMI for measuring obesity. BMI can't assess the

adiposity associated with different tissues of body. But in an individual, for assessing health outcomes, this distribution is more important than measuring the absolute amount of adipose tissue. For eg. obesity affecting abdominal area is mainly link with insulin resistance, thus affecting morbidity and mortality in a subject as compared to the obesity affecting areas like thighs and hips. BMI is also not able to differentiate between fat and muscle mass. BMI also varies with populations belonging to different regions. Range of BMI is referred to be good for one population and bad for other. Thus, in many cases, waist circumference is another useful measure to assess the visceral adiposity, thus determining the associated health issues. The categorisation has been based mainly on the correlation between mortality and BMI, identifying the subjects at high level of risk. Obesity is further sub-classified into three categories: Class I (30 to 34.9 kg/m²), Class II (35 to 39.9 kg/m²), and Class III (\geq 40 kg/m²).³

The rate of prevalence of obesity is rapidly increasing in both developed as well as developing countries. Obesity has become a public health issue and is rising among different populations including females

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who are pregnant. Maternal obesity is now being referred as one of the most prevalent risk factor in obstetrics. It has become a major health issue, but still data about its prevalence is limited in developing countries. Obesity can cause increased chances of complications in pregnancy like venous thromboembolism, gestational diabetes mellitus and hypertension, induced labour, wound infections, miscarriage, anaesthetic complications, delivery of large-for-GA infants, preeclampsia, caesarean section, cardiometabolic diseases, issues with breastfeeding and increased rate of incidence of congenital defects. Children born to obese mothers are found to have a high risk of congenital anomalies, stillbirth, macrosomia, prematurity, and neonatal mortality. Obesity in intrauterine period is also linked with a developing risk of increasing obesity, leading to various metabolic ailments during childhood. Thus obesity in pregnant patients create various issues regarding management relating problems, increased rate of particular complications, and different surgical, medical, and technical challenges.⁴

Literature reveals that obesity is linked with raised rates of mortality and morbidity in perinatal and postnatal period. Besides raised risk of mortality, obesity also poses raised risks of stroke, coronary heart disease, respiratory problems, type 2 diabetes, tumors, and musculoskeletal disorders. The raised rate of prevalence of obesity among females of child-bearing age group and pregnant women is of main concern as condition of obesity in pregnancy causes supplementary risks for both mother and infant. Control of gestational weight gain; managing obesity and overweight in females of reproductive age helps to reduce multiple co-morbidities linked with pregnancy.⁵ Advancement in bariatric medicine and surgery leads to rising number of pregnancies in obese females. As obesity is linked with unfavourable foetal and maternal outcome, it is referred to as a high-risk pregnancy. Such pregnancies are required to be managed in maternity units that have proper facilities, equipments, infrastructure, and accessibility of skilled multidisciplinary specialists.⁶ This detailed review highlights the obesity linked complications, its clinical significance and management.

2. Discussion

2.1. Epidemiology

Recent studies have revealed that in UK, the rate of prevalence of obesity in pregnant females is around 20% and around 5% suffer from morbid or severe obesity.^{7,8} National Health and Nutrition Examination Survey in a ten-year analysis, found that in United Arab Emirates,⁹ around 40% of married females are obese, whereas in Denmark, it is around 3.1-7.8%.¹⁰ Fallatah AM et al.¹ conducted a study on pregnant females, who were subjected to deliveries between January 2013 to May 2018 at

King Abdulaziz University Hospital (KAUH), Jeddah, in Saudi Arabia, and found that about 25% females were obese. However, comparing obesity internationally is still a challenge because of the variations in design of study, and sample taken; so it is recommended to make precise, and direct comparisons.¹¹

2.2. Maternal complications

In pregnancy, obesity causes an increase in the risk for both fetal and maternal complications. In pregnant females, a new type of diabetes called Gestational diabetes (GDM) is observed as one of the most prevalent complications linked with obesity during pregnancy. It has been advocated that during pregnancy period, insulin resistance (which is controlled by secretion of placental diabetogenic hormones like corticotropin-releasing hormone, prolactin, growth hormone, and placental lactogen) got increased. In long-term, gestational diabetes mellitus (GDM) can also rise the risk of developing type 2 diabetes mellitus. It has been observed that females with ≥ 30 BMI are more susceptible to get gestational diabetes mellitus as compared to females who have a BMI of range 20.0–24.9.¹²

It has been observed that females having BMI of around 29.1 to 35.0 suffer from preeclampsia. The overall raised risk linked with increased BMI in prepregnancy period is shown to occur even after adjusting various confounding factors like chronic hypertension and maternal age. Besides BMI, waist circumference is also being used to observe risk of hypertension. It is observed to be linked with a raised risk of complication of hypertension. Females who are having non-pregnant waist circumference of more than 80 cm are usually linked with preeclampsia and pregnancy-induced hypertension.^{9,10}

Another serious risk in pregnant obese females is venous thromboembolism (VTE). It has been observed that obesity is linked to various co-morbidities (like pre-eclampsia and raised rate of surgical deliveries) and decreased mobility that increases the risk of thrombosis and VTE. A significant link is observed between risk of venous thromboembolism (VTE) and BMI. In non-pregnant females having BMI more than 30, risk of VTE is raised, because of increased coagulation factor VIII and IX levels. The rate of VTE is further increased when non-pregnant females are using oestrogen-containing hormones for contraception. Females having BMI of more than 25 and using hormonal contraceptive pills are observed to have a 10-times increased risk of VTE. Similar kind of interaction is seen in pregnant females when levels of oestrogen are increased.¹³

It has been observed that obesity is also linked with an increased incidence of intrapartum complications. Pregnant females with BMI more than 30 are more commonly having incidence of induced labour by receiving oxytocin. Thus, obesity in pregnant females can increase the chances

of complications during delivery and labour. Even after adjustment of probable confounders like use of oxytocin and induction of labour, the progression of labour is very slow. Obesity is the major risk factor leading to incompetent uterine activity during labour. Even for obese females, the rate of emergency caesarean section is much higher. In most of the deliveries happening in the first labour stage, generally fail to go into labour causing foetal distress. A positive link is observed between caesarean section and weight or maternal BMI.¹³ Pregnant females who are suffering from obesity have a raised risk of caesarean section delivery and dysfunctional labour.

This is linked with a raised need for anaesthesia and even related to increased risk of morbidity which is related to anaesthesia. An increased rate of epidural failure is observed in case of obese females during the intrapartum period. Under general anaesthesia, the risk of aspiration is increased because of raised gastric volume in pregnancy. Because of suboptimal laryngoscopic views, endotracheal intubation is difficult to carry and due to non-palpable bony landmarks, regional analgesia/anaesthesia is difficult to achieve. The chances of postoperative atelectasis and hypoxaemia are increased.¹⁴ Obesity is also linked with a raised risk of maternal mortality. This occurs because of pulmonary embolism and preeclampsia, leading to direct or indirect death.

During organogenesis, the chance of congenital anomalies and miscarriage got increased due to hyperglycemia. It has been stated that females with obesity revealed a raised incidence of miscarriage in first trimester. Obese females suffer from increased issues related to fertility mainly linked with disturbance in ovulation and polycystic ovarian syndrome. Such females usually need additional reproductive methods to attain pregnancy.¹⁴

2.3. Neonatal/Foetal complications

Obesity during pregnancy is also found to be linked with neonatal and foetal complications. It is not a single mechanism which is linked with the adverse results, being seen in pregnant females with maternal obesity, but other mechanisms like inflammation, raised insulin resistance, and oxidative stress are also found to be associated with obesity, leading to early dysfunction of placenta and foetus.¹⁵

The risk of stillbirth is doubled in obese females. In females with raised rate of BMI more than 30 had an increased rate of stillbirth. Studies have revealed that there is an increased rate of incidence of congenital anomalies like anorectal atresia, diaphragmatic hernia, omphalocele, hypospadias, spina bifida, limb reduction defects, and cardiac defects in pregnant obese females. Incidence of such anomalies might be linked to diabetes, insulin resistance, and particular nutritional deficiency.¹⁶

Another neonatal complication, Macrosomia or large for gestational age (LGA) is found linked with pregnant females having obesity. Females having BMI more than 30 shows more chances of fetal macrosomia which is defined as ≥ 4 kg of birthweight. This condition raises the chances for low Apgar score at one minute, shoulder dystocia, operative delivery, leads to poor outcomes of delivery, low umbilical arterial pH level, also increases risk of traumatic injuries to mother and infants and noteworthy injuries to infants including nerve palsies and fractures. Rather than maternal obesity, macrosomia is the major risk factor for shoulder dystocia.¹⁶

2.4. Intra-and post-partum complications

These complications occur at the delivery time and it happens to both infant and mother. It was found that chances of vaginal delivery are less in case of obese pregnant females.¹⁷

Females with obesity have raised chances of postpartum haemorrhage after delivery. Various researchers have shown a raised rate of incidence of infection of wound, genital tract and urinary tract. The risk of VTE considerably increases the chances of postpartum infection after vaginal and caesarean delivery. Obesity in pregnancy is associated with decreased rate of breastfeeding in relation to duration and initiation. The reasons can be physical like intricacy with proper positioning of baby, endocrine issues like decreased prolactin response to suckling and psychosocial issues.¹⁷

The rate of cesarean section increases in conditions like cephalopelvic disproportion, preeclampsia, failure in labor and fetal distress. In obese pregnant females, chances of infection and healing disability in wounds are raised, thus causing increase in morbidity linked with surgical interventions. Few authors found that effectiveness of epidural analgesia is also decreased, thus requiring its early administration. Children born to mothers who are obese are at raised risk of prolonged morbidity. It has been observed that children born to obese mothers suffer from metabolic syndrome, which is defined as occurrence of two or more components like hypertension, obesity, dyslipidaemia and glucose intolerance.¹⁸

2.5. Management of maternal obesity

Currently there is no particular evidence-based national guideline for managing obesity clinically in pregnancy. A committee opinion paper has been published by American College of Obstetricians and Gynaecologists (ACOG) on obesity in pregnancy that includes recommended interventions. Various guidelines are given on other issues of maternal care, including the knowledge about obesity in pregnant females. Different standard guidelines have been advised which are related to changes in lifestyle as a part of antenatal care. This includes having ample amount of water,

doing moderate exercise, and eating recommended five type of food servings. In pregnant females, growth of foetus is associated with a raised number of rapidly multiplying cells, leading to raised need for folate supplements. Folate deficiency in pregnant mothers is linked with congenital malformations in foetus. Supplementation using 400 µg of folic acid in the diet is recommended. Obesity in mothers has a raised risk of neural tube defects because of decreased levels of serum folate as compared to females who are not-obese and of child-bearing age. In obese females, higher doses of folic acid are required daily to decrease the rate of risk of neural tube defects.¹⁹

Besides these recommendations, proper hygienic food intake is advised, with cessation of smoking, drug and alcohol, and advocating folic acid supplements.²⁰ According to pre-pregnancy BMI, pregnant females are advised to keep check on their weight by discussing diet plan, physical activity and appropriate weight gain with health care providers.¹

Before conceiving, a weight loss of around 4.5kg helps in reduction of chances of getting gestational diabetes by 40% by modifying diet. Weight loss before pregnancy helps to reduce the chances of neural tube defects in foetus. For weight loss, bariatric surgery is a common treatment these years. Earlier there were concerns regarding raised risk of bad outcomes in perinatal period and surgical complications in females who have undergone bariatric surgery. But now recent studies reveal no such complications following bariatric surgery. In females who are subjected to bariatric surgery had reduced risks for maternal complications (like preeclampsia, gestational diabetes, and hypertension) as compared to obese females who are not subjected to surgery.

3. Conclusion

Obese pregnant females are often associated with various unfavourable maternal and fetal complications and outcomes. Thus, it is required to counsel pregnant women during their antenatal visits to maintain optimal weight, do the recommended physical activities and eat appropriate diet. Thus, to improve overall maternal and fetal outcomes, it is required to screen pregnant women and manage the obesity at earliest. Team of endocrinologists, dietician, physicians, and gynecologists helps to do the needful. From the present review, we recommend that females should get their weight normalized before getting pregnant. To achieve a good maternal and foetal health, changes in diet and lifestyle should be implemented throughout the pregnancy.

4. Conflict of Interest

None.

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