

Obesity in Pregnancy: Obstetrician's Obstacle

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Received: 2 May 2019 / Accepted: 2 May 2019 / Published online: 15 May 2019
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Abstract

Obesity in pregnancy is associated with several complications which today's obstetricians have to face often. Overcoming these obstacles is truly challenging. There is a steady rise in incidence of overweight or obese women at reproductive age group in India and as well as other countries. Recent advances in bariatric medicine as well bariatric surgery have led to increasing number of pregnancies in obese women. Since obesity is associated with adverse maternal and fetal outcome, it is considered as a high-risk pregnancy and such pregnancies need to be managed in maternity units which are well equipped with necessary infrastructure and availability of expert multidisciplinary faculty. This editorial will look into various challenges and difficulties faced by obstetricians and provide practical tips for managing obese pregnant women. We are introducing a new type of article "Invited Debate," with this issue. It deals with pros and cons of bariatric surgery. I sincerely hope that readers are benefitted from views and reviews presented in the invited debate as well as the editorial.

Keywords Obesity · Weight gain · BMI · Morbid obesity · Overweight · Pregnancy · High-risk pregnancy · GDM

Introduction

Twenty-first century has seen an epidemic of obesity and other lifestyle diseases that are interlinked and have similar metabolic consequences. During the same time span, we have witnessed a parallel remarkable progress in infertility management; as a result, we are seeing more and more obese women getting pregnant. In the USA, two-thirds of women of childbearing age are obese or overweight [1]. Prevalence in UK has also increased from 9–10% in the early 1990s to 16–19% in the 2000s [2]. In the Indian sub-continent, the prevalence of obese or overweight married women (15–49 years) rose from 11 to 15% in 2005–2006 as

per National family Health Survey (NFHS) 3 and further to 20.6% as per NFHS 4 [3].

In India, we come across both the nutritional extremes. Undernutrition is more prevalent in rural areas, whereas obesity is three times higher in urban area. It is believed that in severely undernourished women as well as in those with extreme degree of obesity, anovulation and amenorrhea are highly prevalent. It is perhaps a nature's way of suspending reproduction in nutritional extremes as nature finds this state metabolically unsuitable for procreation. However, using the advances in infertility, such women are also getting pregnant, giving us new challenges. Bariatric surgery has added issues in the management of such pregnant obese women.

In this editorial, we will look into various challenges and difficulties faced by obstetricians and provide practical tips, based on available recommendations.

Weight Gain During Pregnancy: Is Pregnancy a Cause of Obesity??

Fetus, amniotic fluid, placenta, uterine, and breast hypertrophy contribute significantly to overall weight gain of pregnancy. Fat deposition is only a minor contribution to weight gain. Many women do not attain pre-pregnancy weight after delivery. This is mainly because of high caloric food intake, and not due to pregnancy itself. Rarely women may lose

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weight during and after pregnancy due to malnourishment and hyperemesis.

Recommended weight gain for all BMI categories is given in Table 1.

Risks of Obesity and Medical Complications

Pregnant obese women face the same risks that are inherent to obesity, e.g., higher anesthetic complications, high operative morbidity, high medical complications, high rate of accidents, sleep apnea, psychological disturbances, and other social and familial issues. So these need to be addressed in all obese pregnant women. Obesity is associated with various medical complications which get further precipitated during pregnancy so obstetrician has to be aware and alert about possible complications like varices, cholecystolithiasis, thrombotic complications, anemia, urinary infections, intertriginous type of skin disease, exertional dyspnoea, bronchitis, hypoventilation, and breathlessness.

Antenatal Problems

Obesity has an adverse impact on maternal and perinatal outcome as it is more commonly associated with conditions like hypertension, pregnancy-induced hypertension, pedal edema, sleep apnea, hypoventilation, gestational diabetes (GDM), as well as type II diabetes. GDM is 3.76 times higher in obese women. Mission and colleagues reported a 0.82% rise in GDM with every 1 kg/m² rise of BMI and twofold rise in pregnancy-induced hypertension (PIH) with every 5–7 kg/m² rise of BMI [6]. While undernourishment and obesity are high-risk factors in pregnancy, obese women have statistically significant higher complications rate than underweight women [7].

The diversity of complications is exemplified by increased incidence of low-birth-weight babies and macrosomic babies, prematurity as well as post-maturity, and hypo- as well as hyperventilation. Fetal malformations are also common in these pregnancies. Hence, sonographic assessment is necessary around 18–22 weeks. The limitations of sonography in obesity must be appreciated as fetal

anatomy will remain poorly visualized on ultrasound in 10% to 20% obese patients [8].

The obstetrician has to face many obstacles because of obesity. Antenatal palpation, auscultation of fetal heart sounds, procedures like external cephalic version, amniocentesis, etc. become very difficult. Hence, it is necessary to rely on electronic fetal monitoring and sonography for diagnosis of many conditions like fetal distress, oligohydramnios, polyhydramnios, rupture uterus, malpresentations, etc. [8].

Progress of Labor

Obese women often have prolonged first and second stages of labor. Early maternal exhaustion and poor bearing down efforts lead to increased incidence of instrumental deliveries. Fundal pressure, practiced by some, can prove difficulty in obese women. Mechanical problems in head delivery may occur due to soft tissue obstruction, malpresentations, and macrosomia. Ultrasonography on labor table may be useful as it is very difficult to assess progress of labor clinically by palpation.

Difficulties at Cesarean Section

Technical problems in administration of spinal, general, and epidural analgesia and anesthesia are well known in obese pregnant women. Delivery of the baby is difficult as there is macrosomia, thick abdominal wall, malpresentations, and poor exposure. Poor exposure also makes suturing difficult.

Nursing care and positioning the patient require strength, and securing intravenous lines demands a lot of skill. Lack of access may necessitate central line. Drug dosages need to be adjusted as per body weight, as standard doses can be inadequate. Postoperative thrombotic complications loom large as the three high-risk factors like obesity, pregnancy and postoperative phase are at work simultaneously. Postpartum recovery to pre-pregnancy state becomes difficult.

Obese women have twice than normal LSCS rates. It is said that for every 10 kg rise in body weight there is 17% increase in LSCS rates. Elderly primi, short stature (height under 155 cm), very low-birth-weight baby, post-datism, failure of induction of labor, failure to progress,

Table 1 Recommendations for weight gain during pregnancy [4, 5]

Pre-pregnancy weight category	BMI	Total weight gain (lbs)	Weekly weight gain in second and third trimester (lbs)	Weekly weight gain post-bariatric surgery (lbs)
Underweight	< 18.5	28–40	1–1.3	.5
Normal weight	18.5–24.9	25–35	.8–1	.5
Overweight	25–29.9	15–25	.5–.7	.3
Obese classes I, II, III	> 30	11–20	.4–.6	.2

cephalopelvic disproportion, malpresentation like breech or occipitoposterior positions, abruptio placentae, fetal distress, and severe preeclampsia are common indications for cesarean section.

Third Stage of Labor and Puerperium

Postpartum hemorrhage is four times common in obese as compared to lean women. Lactation failure is also common in obese women. So it is important to prepare them for lactation right from antenatal period.

Role of Cholesterol, Leptin, and Other Adipokines in Pregnancy and Labor

Adipose tissue produces cytokines, chemokines, and adipokines. Leptin, kisspeptin, omentin-1, chemerin, ghrelin, visfatin, interleukin-6, resistin, tumor necrosis factor- α , and adiponectin belong to the adipokines [9]. Leptin, adiponectin, and kisspeptin are possibly responsible for diabetes mellitus and preeclampsia in obese pregnant women [10].

Myometrial contractility is affected by cytokines and inflammatory processes which brings about changes in pregnancy and gestational age [11].

Myometrial function during pregnancy is affected by metabolic complications associated with obesity. High levels of leptin and cholesterol in obese women interfere with progress of labor. Cholesterol is linked with interference in uterine contractility, whereas leptin interferes with both uterine contractility and cervical ripening and cervical dilatation. Decreased oxytocin receptors and connexin 43 connections between myocytes in obese women also contributes to dystocia, and postpartum hemorrhage.

Management of Obese Pregnant Women

Preconceptional Recommendations

It is recommended that pre-pregnancy BMI should be brought down to $< 30 \text{ kg/m}^2$ even though ideal would be $< 25 \text{ kg/m}^2$. A month prior to planning of pregnancy, 5 mg folic acid should be started on daily basis. Risk assessment of maternity units where patient would deliver should be carried out. Such centers should be equipped with special instruments and furniture, OT table, BP cuff and other devices, lateral transfer equipment and strong personnel, and staff attending the patients. Counseling is very important regarding weight gain, nutrition, fetal risks, malformations, and also information regarding risks of obesity in pregnancy is also necessary [5, 12].

Antenatal Management

Identify potential risks well in advance in antenatal phase. Assessment of the healthcare facility should be done regarding not only infrastructure but also regarding availability of expert multidisciplinary faculty. Expert and experienced anesthetist should be consulted in antenatal period near term, and one must ensure their availability for the delivery and operative intervention if necessary. Screening for deficiencies and diseases, like gestational diabetes and vitamin deficiencies, is recommended.

Thromboprophylaxis with low molecular weight heparin is an individualized decision. 150 mg aspirin should be started for all women with $\text{BMI} > 35 \text{ kg/m}^2$, multiple pregnancy and women above 40 years to prevent PIH [5].

Early hospitalization of patients showing early signs of PIH will help prevention of severe preeclampsia and other complications.

Ultrasonography around 18–22 weeks is recommended to rule out anomalies. Fetal echo cardiography is relevant as fetal cardiac anomalies are common in obese women especially those with very high BMI of 40 kg/m^2 and above. Quadruple markers NT screening and anomaly scan for all women are recommended in view of high rates of anomalies and advanced age of mother.

Expert nutritionist's care is required throughout the pregnancy, and caloric restriction up to 1200 kcal/day is recommended. Routine walking exercise in third trimester is recommended. One randomized controlled trial of 425 obese pregnant women compared pregnancy outcome in women under standard nutritional and physical activity advice with women receiving special care like physical activity of 11,000 step count daily or both dietary restrictions to 1200 to 1500 kcal/day and physical activity. They concluded that there was no rise in intrauterine growth retardation in women under special care. They found weight control was also better in women under special care [13]. Psychological support and preparation for successful lactation should be started from antenatal phase. Anti-obesity drugs are contraindicated during pregnancy.

Elective induction of labor at 40 weeks is recommended in obese pregnant women, in view of high rate of post-datism, GDM, and macrosomia [14, 15].

Management During Labor

A comfortable position with a left lateral tilt, adequate oxygenation, electronic fetal monitoring, use of ultrasonography on labor table, and use of forceps or vacuum to cut short second stage are few tips to minimize complications. Shoulder dystocia is common in macrosomic babies; hence, anticipating the same and keeping experienced obstetrician available will minimize the associated complications. Active

management of the third stage should be practiced routinely in view of high incidence of postpartum hemorrhage.

There is a high rate of cesarean deliveries in obese patients. A combined epidural spinal anesthesia with due risks is recommended due to prolonged operative time. Modification of surgical techniques, like using self-retaining retractors etc., achieving hemostasis promptly, steps taken for preventing wound infection like use of subcutaneous drainage, and individualized use of thromboprophylaxis are other interventions for cesarean section in obese pregnant women.

Post-bariatric Surgery Pregnancy: A Recent Challenge in Management

Pregnancy should be avoided for 12–18 months after bariatric surgery [5]. Between 1998 and 2005, the numbers of bariatric surgeries have increased by 800% [16]. Weight gain recommendations in pregnancies after bariatric surgery are given in Table 1.

Post-bariatric surgery, several complications may occur during pregnancy. Persistent vomiting, gastrointestinal bleeding, anemia, placental vascular disease, fetal neural tube defects, intrauterine growth retardation, and miscarriages are some of the anticipated complications [17].

Adolescents undergoing bariatric surgery need special counseling. Pregnancy rates after bariatric surgery are twice than the rate in the general adolescent population. Contraceptive counseling becomes important in adolescents and also in infertile women as pregnancy should be avoided for 12–18 months. Non-oral administration of hormonal contraception is recommended, when malabsorption is a real concern. Gastric bands may need some adjustment during pregnancy.

Alternative testing for gestational diabetes should be considered for those patients with a malabsorptive-type surgery. Intravenous glucose challenge test may be necessary. Evaluation for micronutrient deficiencies is recommended in early first trimester [18].

Delayed or slow release preparations are to be avoided. Post-bariatric surgery, pregnancy and deliveries should be under combined care by the bariatric surgeon, physician, and expert obstetrician in a higher center.

Cesarean delivery rates are higher after bariatric surgery, even though bariatric surgery is not an indication for cesarean deliveries.

Maternal and Fetal Outcome in Obesity in Pregnancy

Obstetric vital statistics is influenced by obesity. Confidential enquiries into maternal and child health (CEMACH) reported maternal mortality rate of 13.1 maternal deaths per 100 000 pregnancies, during 2000–2002. They reported that

there was a 50% higher maternal mortality rate among obese mothers than non-obese mothers [19].

Pre-conception BMI was linked to other comorbid conditions like gestational diabetes mellitus hypertensive disorders and higher cesarean delivery rate [20].

A 20% increase above the desired weight gain during pregnancy was associated with an increased risk of preeclampsia ($P < 0.001$) [21]. In a meta-analysis, the odds of cesarean delivery rates increased with increasing BMI category [20–22].

Greater maternal pre-conception BMI increases risk of adverse fetal outcomes such as spontaneous abortion, neural tube defects, macrosomia, spina bifida, heart defects and diaphragmatic hernias [23].

Bariatric surgery improves pregnancy outcomes. However, risk for congenital malformation is not reduced in women with high and very high BMI groups [24, 25].

Far-reaching Consequences of Obesity in Pregnancy

Insulin resistance and malnutrition of fetus in obese pregnant women may have long-term adverse effects on the baby through adulthood. Intrauterine environment does influence cardiovascular and metabolic disease patterns of the individuals later in life in adult stage [26, 27]. High maternal BMI has been shown to lead to obesity in children, as well as metabolic diseases later in adult stage [28].

High maternal BMI before pregnancy and excessive weight gain during pregnancy both independently contribute to obesity in midlife and later [29–31]. High caloric intake in obese pregnant women leads to more of central obesity as compared to normal weight women [32].

Hence, preventive care of obese pregnant women and prevention of excess weight gain during pregnancy in itself will reduce prevalence of obesity in midlife and beyond in women in general.

Conclusion

Obesity is a global challenge. Pregnancy after Bariatric surgery is even more challenging. Expert nutritionist's supervision following recommended exercise schedules, prevention, and control of metabolic diseases is essential. A well-planned pregnancy after reduction in weight to ideal BMI range, appropriate counseling, careful vigilance during pregnancy, and labor will go a long way to minimize and overcome anticipated obstetric obstacles and difficulties. Adhering to various guidelines will help optimizing the obstetric vital statistical indices and preventing the far-reaching consequences in midlife and beyond in obese pregnant women.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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