

Effect of Obesity on Fetomaternal Outcome

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Abstract

Introduction: Obesity related diseases include diabetes, heart disease, hypertension, stroke, and osteoarthritis. Obesity, as such, is a major obstacle for a woman to conceive, & obese women, who become pregnant—are predisposed to various serious pregnancy related complications, with deleterious effect on foetal growth. Long-term maternal and fetal effects cause significantly increased morbidity and mortality rates. Prevalence of obesity is found to be 28 percent in men and 33 percent in women. (Ogden, 2012). Obesity increases with age.

Aim: To assess the influence & significance of obesity and its effect on fetomaternal outcome.

Objective: The obesity is evaluated prospectively in last trimester and its effect on fetomaternal outcome is observed.

Material and method

This prospective study was conducted in the obstetrics and gynaecology department of Dhiraj General Hospital, SBKS medical college in Vadodara, Gujarat. 150 pregnant Indian females were selected out of which 50 females with BMI (>30 kg/m²) as case and 100 females with normal BMI (18.5 to 24.9) were taken as control. Patients were admitted through OPD and emergency. BMI using the formula BMI= weight (kg)/height (m²) was calculated. The data were collected regarding complications during pregnancy and labor by the attending doctors & recorded on a structured Proforma.

Conclusion

Obesity is modifiable and preventable problem. Preconception Counseling and awareness regarding exercise and healthy, nutritious diet should be done. Pregnant women with high BMI is considered as high risk

pregnancy. Screening for hypertension and DM must be performed before conceiving and in first antenatal visit.

Keywords: Obesity, Fetomaternal Outcome, Pre conceptional counseling, Height, Weight.

Introduction

Excessive weight is a major health problem in the other affluent societies across the world, including India. For a number of years, obesity was said to be epidemic. The adverse health aspects of obesity are staggering. Obesity related diseases include diabetes, heart disease, hypertension, stroke, and osteoarthritis. Obesity, as such, is a major obstacle for a woman to conceive, & obese women, who become pregnant—are predisposed to various serious pregnancy related complications with deleterious effect on foetal growth. Long-term maternal and fetal effects cause significantly increased morbidity and mortality rates. Prevalence of obesity is found to be 28 percent in men and 33 percent in women. (Ogden, 2012). Obesity increases with age, as well as with ethnic minority, and almost 60 percent of black women were obese as per study in 2010.

BMI is calculated as weight in kilograms divided by the square of the height in meters (kg/m^2). As per , The National Institutes of Health (2000) classifies adults according to BMI into 4 classes. Obesity is further divided into: class 1 (30 to $34.9 \text{ kg}/\text{m}^2$); class 2 (35 to $39.9 \text{ kg}/\text{m}^2$); and class 3 ($\geq 40 \text{ kg}/\text{m}^2$).

Increased pre-pregnancy weight was a factor most strongly associated with unexplained infertility, to start with & increased fetal loss, after conception, even after adjusting for maternal age and excluding women with diabetes and hypertensive disorders (Huang, 2000; Nohr, 2005; Ovesen, 2011). India is facing the double burden of these complication with underweight and under nutrition

on one side and rapid upsurge in obesity and overweight on other side.

Obese women unequivocally have reproductive disadvantages. As such they are the common candidates for un-explained infertility, to start with, with a poor response to treatment. When such a woman conceives, as American College of Obstetricians and Gynecologists(2013) suggest, Maternal obesity correlates well with an increased risk of chronic hypertension and diabetes prior to pregnancy and adverse pregnancy outcomes including preeclampsia, gestational diabetes, fetal macrosomia, Cesarean deliveries, postpartum endometritis and a prolonged hospital stay. ^(1, 2)

The perinatal problems that have been identified with maternal obesity and pregnancy, include an increased risk of neural tube defects, birth asphyxia, birth trauma and neonatal hypoglycemia ⁽³⁻⁴⁾ Finally, infants and later, adults of obese mothers have correspondingly increased rates of obesity, morbidity, & mortality, obesity (Reynolds, 2013).

In a study of 2080 obese women, there was no advantage to weight gain $> 12 \text{ kg}$ and was associated with adverse outcome (Vesco, 2011). However, Chu and coworkers (2009) reported in the United States in 2004 to 2005 that 40 percent of normal-weight and 60 percent of overweight women gained excessive weight during pregnancy.

Henriksen (2008) searched the Cochrane Database and reported that the rapid increase in the prevalence of large infants was due to maternal obesity and type 2 diabetes. The influence of increasing maternal obesity is overwhelming, and its association with diabetes is well known. Research revealed that, amongst infants born weighing $> 5000 \text{ g}$, more than 15 percent mothers were found to be diabetic. Neonates with a birth weight of at least 4500 g required a cesarean delivery, escalating C.S.

rates more than 50 percent,(Das, 2009; Gyurkovits, 2011; Weissmann-Brenner, 2012).

The rate of shoulder dystocia reported has been as high as 17 percent for neonates with birth weights of 4500 g,& that increased to 23 percent for neonates with birth weights of 5000 g (Stotland, 2004). This justifies increase the rate of C.S. additionally, fetal skeletons before 18 weeks of gestation are insufficiently radiopaque and may be poorly seen because there are no available current methods to estimate excessive fetal size accurately, macrosomia cannot be definitively diagnosed until delivery.

Rates of postpartum hemorrhage, perineal laceration, and maternal infection, which are related complications, are also increased in mothers delivering overgrown foetuses. Rasmussen and coworkers (2008) performed a meta-analysis and found 1.2, 1.7, and 3.1-fold increased risks for neural-tube defects in overweight, obese, and severely obese women, respectively

The increasing rate of maternal obesity provides a major challenge to obstetric practice. Maternal obesity can result in negative outcomes for both women and fetuses. The maternal risks during pregnancy include gestational diabetes and preeclampsia. The fetus is at risk for stillbirth and congenital anomalies. Obesity in pregnancy can also affect health later in life for both mother and child. For women, these risks include heart disease and hypertension. Children have a risk of future obesity, and heart disease. Women and their offspring are at increased risk for diabetes. Obstetrician-gynecologists are well positioned to prevent and treat this epidemic.

Aims and objectives

Aim: To assess the influence & significance of raised obesity and its effect on fetomaternal outcome.

Objective: The obesity is evaluated prospectively in last trimester and its effect on fetomaternal outcome is observed.

We have considered obesity as the only parameter as influencing factor and its impact upon pregnancy and obstetric outcome.

Material and method

This prospective study was conducted in the obstetrics and gynaecology department of Dhiraj General Hospital ,SBKS medical college in Vadodara, Gujarat. 150 pregnant Indian females were selected out of which 50 females with BMI (>30kg/m²) were taken as case and 100 females with normal BMI (18.5 -24.9 kg/m²) were taken as control. Patients were admitted through OPD and emergency.

Height and weight were measured by the on duty nursing staff using standard techniques. Height was recorded using a measuring tape, with the individual standing straight next to the wall with the heels, buttocks, shoulders and occiput touching the wall. Weight was measured using normal weighing machine with the individual wearing light clothes and no shoes.

The data were used to calculate Quetelet index or the BMI using the formula BMI= weight (kg)/height (m²). The data were collected regarding complications during pregnancy and labor by the attending doctors & recorded on a structured Proforma.

Selection of patients

Inclusion criteria

- Only those patients who were willing to participate in the study were included.
- Women in the reproductive age group with singleton pregnancy without any pre- existing medical illness
- Sample size is of 50 patients under study & 100 as control group with normal weight.

Exclusion criteria

- All patients unwilling to participate were excluded from this study.
- Presence of other risk factors like previous Cesarean Section or pre-existing medical and / or obstetric complications.
- Multiple pregnancy e.g. twins, triplets.
- Underweight or overweight

Result

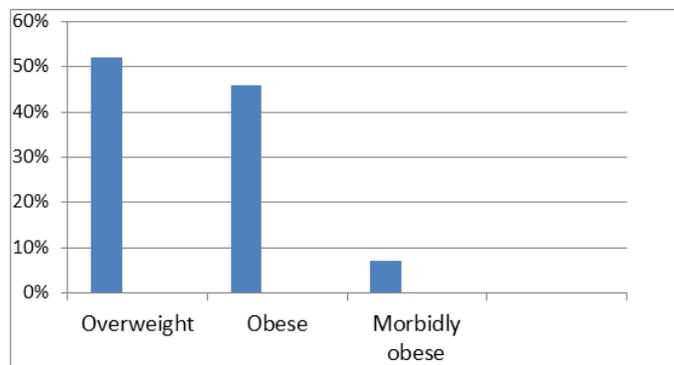
In our study of 150 pregnant females, 100 were normal (control), 50 obese women were compared for obstetric behaviour and pregnancy outcome and statistically analysed.

Antepartum variables: prolonged pregnancy (<0.05), severe PIH (<0.05), gestational DM (<0.05) are strongly associated with obesity, whereas abortion (>0.05), oligohydramnios (>0.05), UTI (>0.05) and abruption (>0.05) are less likely to be associated with obesity.

Postpartum variables: PPH (<0.05), pyrexia (<0.05), prolonged hospital stay (<0.05) and lactational dysfunction (<0.05), endometritis, are strongly associated with obesity, whereas UTI (>0.05), thrombophlebitis (>0.05) are less likely to be associated with obesity.

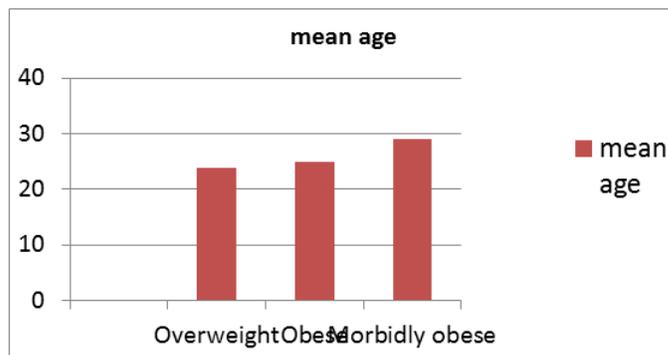
Neonatal outcome: post term (<0.05) and LGA (<0.05) are strongly associated with obesity, whereas stillbirth (>0.05), birth asphyxia (>0.05), RDS (>0.05) and baby died within 24hr (>0.05) are more likely to be associated with normal weight.

Graph 1: shows frequency of weight distribution among pregnant female patients in the study; Overweight; 26/50(52%), obese; 23/50(46%) & morbidly obese; 3/50(6%).

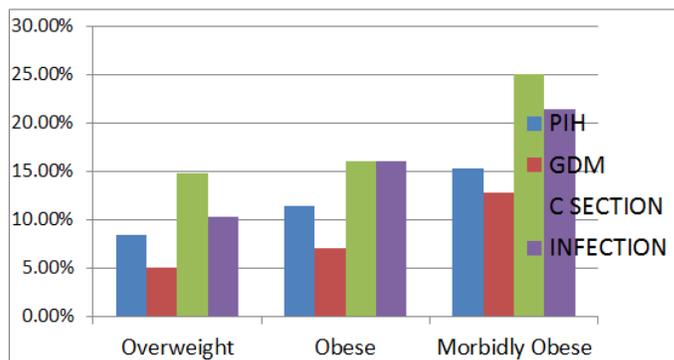


Graph (1). Frequency of weight distribution in pregnant females.

Graph 2: Shows there was no significant difference (p-value>0.05) in age when different groups were compared as shown in Graph (2).

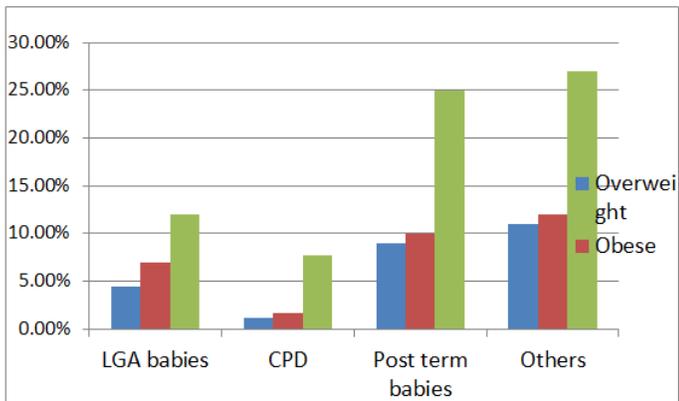


All maternal complications increased in frequency directly in proportion to the increase in BMI as depicted in Graph (3) below.



Graph (3). Distribution of Maternal complications of Obesity.

In our study group, all fetal complications increased in direct proportion to the increase in BMI as is evident from Graph 4.

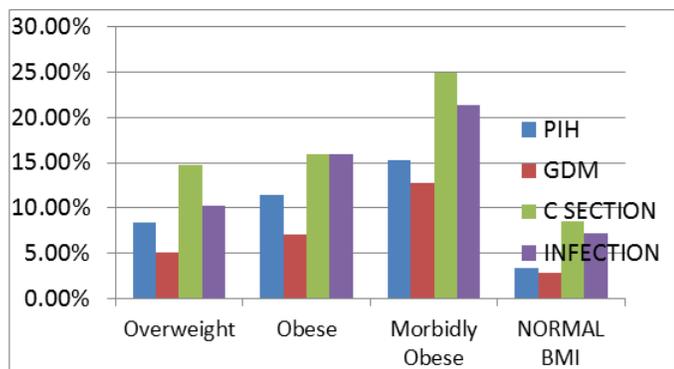


Graph (4). V Fetal complications among different groups.

Table 1

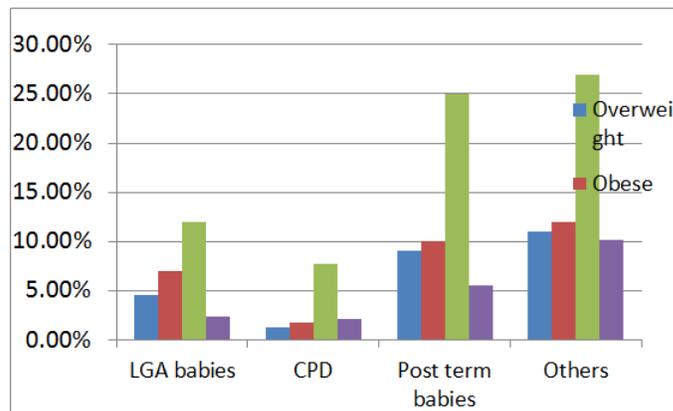
Incidence of complications	Normal BMI	Raised BMI(overall)
Maternal		
PIH	2-6%	11-15%
Caesarean section (various indications)	4-8%	15-18%
GDM	2-3%	11-13%
Infections	5-8%(thrombophlebitis)	10-16%(endometritis)
Fetal		
LGA babies	1-2%	5-12%
CPD	2-3%	4-5%
Post term babies	5-8%	12-18%

All maternal complications increased in frequency directly in proportion to the increase in BMI is compared with normal BMI pregnant females(Control) in Graph (5) below.



Graph (5). Distribution of Maternal complications of Obesity in comparison with Normal BMI.

Fetal complications increased in direct proportion to the increase in BMI compared with normal BMI pregnant females(Control) is depicted in Graph 6.



Graph (6). Comparison of Fetal complications in raised and Normal BMI.

Discussion

Regarding maternal complications in pregnancy, results of our study, coincide with many studies conducted earlier. The major maternal complications mentioned, in literature, to be associated with obesity during pregnancy, include hypertensive disease (chronic hypertension and preeclampsia),diabetes (pre gestational and gestational), respiratory disorders (asthma and sleep apnea),thromboembolic disease, cesarean section and infections.(wound infections and endometritis).(13)

The frequency of PIH and gestational diabetes remained significantly high in overweight and obese groups when compared with normal. Results of one study show that obese pregnant women have much higher rates of pregnancy specific disorders such as preeclampsia and gestational diabetes(14). Overall, the literature suggests that obese pregnant women have a 14-25% incidence of pre-eclampsia and a 6-14% incidence of gestational diabetes. Results of our study show much higher rates of cesarean section in obese women as compared to those

with normal weight (15-25% versus 4.8%). Most studies reported increased cesarean section rates mainly due to macrosomia with rates in obese women greater than 30%. (13,14).

The infectious complications, most consistently associated with obesity, are postoperative wound infections and endometritis (14) Prophylactic antibiotics are, therefore, indicated to prevent post operative wound infection after cesarean section in obese women.

Results of our study are at par with other studies, as far as fetal complications of obesity are concerned. In our study, frequency of LGA babies remained significantly high in obese (07%), and morbidly obese (12%). Maternal obesity and excessive weight gain during pregnancy, are both, independently associated with macrosomia and LGA (>90th percentile) neonates.(4, 14) Obese women are at increased risk of shoulder dystocia at delivery if they have a macrosomic fetus.(8).

In our study the frequency of cephalopelvic disproportion (CPD) remained high in overweight, obese and morbidly obese females .

In our study, there was significantly higher incidence of prolonged pregnancy ($p < 0.05$), severe preeclampsia ($p < 0.05$), gestational diabetes ($p < 0.05$) in obese and overweight women, whereas abortion ($p > 0.05$), oligohydramnios ($p > 0.05$), UTI ($p > 0.05$), abruptio placentae ($p > 0.05$) were blissfully, & surprisingly absent in patients with raised BMI. There were significantly higher rates of caesarean sections (<0.05). These results are consistent with many previous reports [12,13]

Conclusion and prevention

Obesity is modifiable and preventable problem.

Preconception Counselling and awareness regarding exercise and healthy, nutritious diet should be done. Pregnant women with high BMI is considered as high risk

pregnancy. Screening for hypertension and DM must be performed before conceiving and in first antenatal visit.

The incidence of maternal obesity and its comorbid conditions (diabetes, cardiovascular disease) continues to increase at an alarming rate, with major public health implications. Not only does maternal obesity affect the woman, but it also impacts the health of the child, leading to increased childhood obesity and diabetes. Despite improvements in our understanding of this Endocrinopathy, there are still many barriers to the clinical care for such women. Obstetrician-gynecologists are in a key position to prevent and treat this epidemic.

Possible Methods of Prevention

Obesity is modifiable and preventable problem, and so, all other aftermaths, also can be averted, if weight can be effectively controlled, before pregnancy.

Weight gain during pregnancy is un-avoidable, rather essential & desirable to some extent, but this increase can be, & should be regulated & controlled, if weight increment related problems are to be averted.

This can be achieved by practicing the suggestions mentioned in the charts, on the subsequent slides.

Table 2

Adjustments to Routine Prenatal Care in Obese Pregnant Women	
Risk Factor	Recommended Care
Increased risk of neural tube defect	<ul style="list-style-type: none"> • Preconception folic acid supplementation (4 mg daily ideally 3 months prior to pregnancy through the first trimester) • Maternal serum AFP (15-20 weeks) • Detailed fetal anatomy survey (18-20 weeks)
Increased risk of hypertensive disorders of pregnancy, including preeclampsia	<ul style="list-style-type: none"> • Baseline 24-hour urinalysis in second trimester • Baseline liver and renal function tests in second trimester • Blood pressure and urine dip for protein at each prenatal visit • There is no effective way to prevent preeclampsia
Increased risk of gestational diabetes (GDM)	<ul style="list-style-type: none"> • Consider early screening with 1-hour nonfasting 50-g glucose load test (GLT) at 16-20 weeks. If positive, check a definitive 3-hour 100-g glucose tolerance test (GTT) to confirm the diagnosis of GDM. If negative, repeated GLT at the usual gestational age of 24-28 weeks
Increased risk of unexplained stillbirth	<ul style="list-style-type: none"> • Consider weekly antepartum fetal testing with NST and/or BPP beginning at 36 weeks, especially in women with a BMI ≥ 40 kg/m² (although this has not been shown to definitively improve perinatal outcome)
Increased risk of anesthesia complications	<ul style="list-style-type: none"> • ACOG recommends a prelabor or early intrapartum anesthesia consultation for all women with a BMI ≥ 40 kg/m² • Consider early epidural placement in labor • Recheck epidural placement if the patient is transferred to the operative room for cesarean delivery because of increased risk of migration of the epidural catheter
Failure to lose weight after delivery is associated with subsequent adverse maternal health problems, including complications of future pregnancies	<ul style="list-style-type: none"> • Continue nutrition counseling and exercise program after delivery • Consider consulting a weight loss specialist to optimize postpartum weight loss before attempting another pregnancy • If complicated by GDM, check 2-hour 75-g GTT at or after 6-week postpartum visit

ACOG, The American College of Obstetricians and Gynecologists; AFP, α -fetoprotein; BMI, body mass index; BPP, biophysical profile; NST, non-stress test.

Table 3

Recommendations Before, During, and After Surgery in Obese Pregnant Women
<ul style="list-style-type: none"> • Consider preoperative cardiac evaluation, especially if the patient has diabetes or chronic hypertension. This should include a baseline electrocardiogram and, if abnormal, an echocardiogram and cardiology consultation. • Give preoperative broad-spectrum antibiotics 20-30 minutes before the skin incision to reduce the risk of postpartum endometritis and wound infection. • Consider using a large operating table (especially if the patient is > 300 lb) and having additional personnel in the delivery room. • Because of the increased risk of intrapartum blood loss, consider having additional blood products available in the operating room. • If indicated, tape the pannus out of the surgical field to facilitate visualization and avoid a through-and-through skin incision. • Close the subcutaneous layer. There is extensive evidence that seroma formation and postoperative wound disruption can be decreased in obese women (defined as adipose layer > 2 cm) if the subcutaneous tissues are closed using layers of running sutures. • Avoid subcuticular skin closure to allow serous fluids from the subcutaneous fat to drain out of the incision rather than accumulate in the subcutaneous layer. • Place pneumatic compression stockings on the lower extremities of all obese parturients prior to and during surgery as prophylaxis against deep vein thrombosis (DVT). • The compression stockings should remain in place until the patient is fully ambulatory. Additional prophylaxis against DVT with prophylactic low-molecular-weight heparin should be considered in women with a body mass index \geq 40 kg/m². • Begin early ambulation to prevent DVT formation. • Consider delaying removal of staples or sutures for a full week to allow the skin to heal completely.

Table shows Pre, Intra and Post-operative DO's & DON'T's in Obese pregnant women.

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