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OBESITY AND ITS COMPLICATIONS IN PREGNANCY-A REVIEW PAPER

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INTRODUCTION

World Health Organization estimates Obesity, the silent epidemic worldwide has reached a stage where approximately 2.3 billion adults will be overweight and more than 700 million adults will be obese by 2015.[1] According to the National Family Health Survey (NFHS) in India, the percentage of ever-married women aged 15-49 years who are overweight or obese increased from 11% in NFHS- 2 in 1998-1999 to 15% in NFHS-3 in 2005-06. Obesity is increasing, both in the general population and in women of reproductive age. Obesity in pregnant women increases the risks of maternal and perinatal complications. WHO has defined the criteria of overweight as BMI>25 kg/m2 and that for obesity as BMI>30 kg/m2.[2] The increasing prevalence of obesity worldwide has prompted the WHO to designate obesity as one of the most important public health threats in the world. The four states in South India also being the predominantly rice eating population have a high incidence in obesity among women.[3] Several studies in India have reiterated the fact that vaginal delivery, postpartum infection, post-delivery deep vein thrombosis obesity in pregnancy puts the mother and the fetus at the risk of several complications such as gestational diabetes mellitus, pregnancy induced hypertension, preeclampsia, preterm labour, dysfunctional labour, caesarean section, instrumental delivery. Neonates of obese women were mostly large for gestational age, macrosomic and they had high incidences of birth injuries, shoulder dystocia, premature deliveries, late fetal deaths and congenital malformations particularly spina bifida, cleft lip, cleft palate and heart defect.[4] This purpose of this study is to find out the incidence of the pregnancy complications due to maternal obesity and to assess the neonatal outcome and obstetric outcome and to educate treating clinicians regarding the importance of pre-conceptional counseling regarding obesity

and related issues. The results of this study will enable to highlight a problem that is a modifiable risk factor for several conditions in pregnancy and also a long term risk factor for cardiovascular diseases and for diabetes mellitus.

METHODS

The data on the prevalence of women obesity and complications in pregnancy were viewed. According to the WHO, an adult is classified as being overweight if the Body Mass Index (BMI) is more than or equal to 25 kg/m2 and obese if the BMI is more than or equal to 30 kg/m.2, For the literature review, we performed an exploratory search for the relevant search terms. A PubMed and other Journals search was performed using the key words "obesity," "overweight," "body mass index" (BMI), "women's health," "Pregnancy ", "Complications in Pregnancy "and the condition reviewed. The most recent evidence-based articles were included in the review.

RESULTS

Complications Caused by Obesity in Pregnancy: Being obese during pregnancy increases the risk of various pregnancy complications including

- The risk of miscarriage, stillbirth and recurrent miscarriage
- Gestational diabetes
- A pregnancy complication characterized by high blood pressure and signs of damage to another organ system, often the kidneys (preeclampsia)
- Cardiac dysfunction
- Sleep apnea
- A difficult vaginal delivery
- The need for a C-section and the risk of C-section complications, such as wound infections.

Gestational Diabetes

This is a condition when diabetes is first diagnosed during pregnancy either in early or in later phase, the degree of glucose intolerance may be at any level.[5] Also a woman who has gestational diabetes has a greater risk of having diabetes in future as do their children also. Obese woman are screened for gestational diabetes early in pregnancy and may also be screened later in pregnancy as the case may be. Approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 cases annually worldwide. The

prevalence may range from 1 to 14% of all pregnancies, depending on the population studied and the diagnostic tests employed.

A prospective cohort study undertaken in the department of Obstetrics & Gynaecology in JIPMER, Pondicherry in which two exposure groups of pregnant women: one with BMI < 25 and second with BMI > 25 were matched for gestational age and parity. 99 women were taken in first group fulfilling the inclusion criteria in BMI <25 i.e. non-obese group and one hundred women were enrolled in BMI ≥25 as obese in the second group. Thirty six women were lost to follow up and were excluded. Obese women were further subdivided as follows • 81 patients with BMI between 25-34.9 Kg/m2 (obese) • 19 patients with BMI ≥ 35 Kg/m2 (morbidly obese) The mean age (23.49 ± 3.9 in non-obese and 24.86 ± 3.9 in obese) and parity in both the groups was similar. The overall incidence of gestational diabetes (GDM) among the study subjects was 11.5% and GDM increased with increase in BMI (P < 0.05). The incidence of GDM among morbidly obese (26%) and obese group (17%) was significantly higher with an OR of 8.5 and 5 respectively when compared with normal group (Table 1) **(5A).**

Table 1: Obesity, GDM and hypertensive disorders

Groups	GDM present	OR (95% CI)
<25 kg/m2	4 (4.05%)	Reference
25-34.9 kg/m2	14 (17.29%)	5 (1.564-15.75)
≥35 kg/m2	5 (26.92%)	8.5 (2.63-35.44)

One another retrospective study which was conducted in Cheluvamba Hospital Mysore from September 2014 to September 2015, samples were selected randomly and the information needed for the study was taken from the medical records of the hospital. Overall 56 women were included which were later divided in three classes according to their BMI in the study, 37 women were included in class I, 13 women in class II whereas 6 were included in class III, the BMI range were taken as

I. Class I BMI: 30-34.9
II. Class II BMI: 35-39.9
III. Class III BMI >40

The incidence of Gestational Diabetes Mellitus (7.6%, 5.4%) are more in class II compared to class I (5B).

Infertility

Infertility is the inability of a couple to achieve pregnancy within 12 months of unprotected intercourse.[6] Infertility is worldwide problem affecting people of all communities, though the cause and magnitude may vary with geographical location and socioeconomic status. It is estimated that globally 60-80 million couples suffer from infertility every year, of which between15-20 millions are in India alone.[7] Considering the current population statistics of India this would extrapolate to a humongous burden to the society. Infertility is not merely a health problem; it is also a matter of social injustice and inequality.[8] Infertility is the medical problem, but childlessness is the couple's problem. Approximately one-third of the cases of infertility affecting couples are primarily attributable to the woman, one-third to the man, one third to an interaction between the two and 20% of those remaining unexplained.[9] However, it appears that the woman is consistently held responsible for a couple's infertility, and she is often punished psychologically and socially as a consequence.[10] In any society where child bearing defines a woman's identity and motherhood of great social significance, infertility leaves unhealed scars traumatizing the women socially and emotionally. Numerous medical conditions can contribute to infertility. In fact, most cases of infertility are due to other medical conditions. These disorders can damage the fallopian tubes, interfere with ovulation, or cause hormonal complications. Some of the main medical conditions associated with infertility are Polycystic ovaries syndrome (PCOS) is usually a hereditary problem and accounts for up to 90% of cases of an ovulation.[11] PCOS is associated with insulin resistance and it has directly correlated with obesity.[12] Obesity affects fertility throughout a woman's life. The impact of obesity and Polycystic Ovary Syndrome (PCOS) on reproductive function can be attributed to multiple endocrine mechanisms. Abdominal obesity is associated with an increase in circulating insulin levels. This result in increased functional androgen levels (caused by suppression of sex hormone–binding globulin synthesis and increased ovarian androgen production). Chronic elevation of circulating estrogen is caused by aromatization in peripheral adipose tissue. The resulting hyperandrogenism and menstrual cycle abnormalities are clinically manifested in part by anovulatory cycles and subfertility. Additionally, leptin inhibits ovarian follicular development and steroidogenesis and thus may contribute to reproduction difficulties in obese women.[13] The impact of obesity on reproduction starts at a young age. Obese girls frequently experience the onset of puberty at a younger age than their normal-weight peers.[14] Between the late 1960s and 1990, during a time of increasing prevalence of childhood obesity, the median age of menarche decreased by approximately 3 months in white girls and 5.5 months in black girls in the United States.[14]

Hypertensive Disorders (GHT & Pre-eclampsia)

In prospective cohort study undertaken in the department of Obstetrics & Gynecology in JIPMER, Pondicherry mentioned above reveled that, the overall incidence of hypertensive disorders was 38% and it was significantly associated with increasing BMI. The Odds Ratio (OR) for the hypertensive disorders among the study subjects in morbidly obese and obese in comparison with normal BMI subjects was 13.9 and 3.6 respectively. The incidence of gestational hypertension (GHT) and pre-eclampsia/eclampsia among study subjects is 28.4% and 18% and it is significantly higher in obese compared to normal subjects (Table 2).

Table 2: Gestational hypertension and pre-eclampsia in different groups

BMI category	GHT (%) a	OR (95% CI)	PE/Eclampsia(%)b	OR (95% CI)	Total
<25 kg/m2	15 (16.1%)		6 (7.14%)		99
25-34.9 kg/m2	24 (36.9%)	2.36 (1.14-4.88)	16 (28.1%)	5.07 (1.84-13.95)	81
≥35 kg/m2	10 (71.4%)	6.22 (2.12-17.87)	5 (55.55%)	16.25 (3.43-76.07)	19
Total	49 (28.4%)		27 (18%)		199

In another study conducted in Cheluvamba Hospital Mysore from September 2014 to September 2015 by Prameela H. J. et al. the Pre-eclampsia cases were found as 27% in BMI: 30-34.9, 69.2% in BMI: 35-39.9 and 83.3% in BMI: >40 **(5B).** So the overall incidence of Pre-eclampsia were found as 42.8% in obese cases which is consistent with the study conducted by Dasagupta et al were the incidence of hypertensive disorders is 38% (1). In a study conducted by Kabiru et al showed the incidence of hypertensive disorders in obese women as 35.4%.[15]

LSCS Complications

Dasgupta et al. found in their study (Table 3) that obesity was a significant risk factor for both elective and emergency c-sections with odds increased manifold with morbid obesity. Fyfe et al.[16] reported significant risk of prelabour c-sections (p = 0.02) as well as increased rates of caesarean delivery in first stage (OR: 2.89) among obese. They reported similar rates of second stage c-sections among both obese and non-obese. Rode et al.[17] had demonstrated a fivefold increase in odds of instrumental deliveries among obese similar to this study.

Table 3: LSCS in BMI groups.

Groups	Elective LSCS(%) x	OR (95% C I)	Emergency LSCS(%) y	OR (95% C I)	Total
<25 kg/m2	1 (1.3%)		12 (13.6%)		13
25-34.9 kg/m2	4 (7%)	5.74 (0.62-52.8)	18 (29.5%)	2.65 (1.16-6.02)	22
≥35 kg/m2	5 (50%)	76 (7.4-781.5)	6 (54.5%)	7.6 (2.02-28.86)	11
Total	10		36		46

Prameela H. J. et al. in their study found that in n=56 women which were included in the study 17 out of 37 (45.9%) in BMI range of 30-34.9, 6 out of 13 (46.1%) in BMI: 35-39.9 and 4 out of 6 (66.6%) in BMI: >40 women were underwent for c-section, means total 27 out of 56 i.e. 48.2% suffered from this complication.

Miscarriage or Stillbirth

Praween Agrawal et al. in its study states that Obese women age 15−29 are more than twice as likely to have experienced a miscarriage or stillbirth as those with a normal BMI (OR=2.10; 95%CI: 1.02, 4.29).[18]

The reasons behind an increased risk of miscarriage amid overweight or obese women have been debated. It has been suggested that this is due to impaired folliculogenesis and poor oocyte quality in obese women. A cohort study was done considering this view which concluded that uterine receptivity was unimpaired in women with increased BMI when hormonal support and embryo quality were standardized.[19]

DISCUSSION

Overweight and obesity during pregnancy result in increased maternal and fetal morbidity in relation to BMI. An increase in pre-pregnancy body mass index by 10% is associated with an about 10% increase in the risk of gestational diabetes/pre-eclampsia. The reduction of fertility associated with obesity cannot be fully attributed to abnormalities of the menstrual cycle. A baby born from the mother having gestational diabetes has a high probability for diabetes in future also the mother have. The most suitable time for pregnancy is up to 29 years of age. Obese women have twice the chances of miscarriage. Chances of C- Section caesarean is also much high in the case of obese women. Obesity affects fertility in a high manner. The impact of obesity and Polycystic Ovary Syndrome (PCOS) on reproductive function can be attributed to multiple endocrine mechanisms.

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