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Original Research Article

Effect of maternal high body mass index on outcome of pregnancy in women with recurrent miscarriages

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ABSTRACT

Background: The epidemic of obesity is spreading worldwide and subsequently, rate of obesity during pregnancy has also increased. Maternal overweight and obesity are widely associated with adverse pregnancy outcomes. Recurrent miscarriage is an important reproductive health issue, because it affects many couples. So the present study is planned to study the relationship between maternal obesity and pregnancy outcome in women with recurrent miscarriages.

Materials and Methods: Observational Cross sectional study was conducted in a tertiary care hospital. 111 Postnatal women between 18 to 44 years of age with history of two or more miscarriages less than 20 weeks of gestation in previous pregnancy were included in the study. First trimester weight at the first visit (registration) was recorded, BMI was calculated & women were divided into obese and non obese groups. The outcome of present pregnancy was noted as Mode of delivery, Gestational diabetes mellitus, Pregnancy induced hypertension, Preterm delivery etc. Statistical tests were used to quantify the risk.

Results: Gestational diabetes (OR= 13.6) and pregnancy induced hypertension (OR=4.2) were significantly associated with obesity in women with recurrent miscarriages. [At 95% CI] The incidence of LSCS and preterm delivery was more in overweight and obese mothers, though not statistically significant.

Conclusions: Maternal obesity significantly contributes to poor prognosis for the mother and the baby during delivery. Hence the women of this group should be regarded as 'high risk' and counselling and the risk assessment should be done during ANC visits.

1. Introduction

Obesity is considered as an individual as well as public health issue, given its contribution to several chronic diseases. During last two decades, there has been an alarming rise in the incidence of obesity all over the world. India's prevalence of overweight and obesity among women has been increased to 23.4% in 2015-16 as compared to 14.5% in 2005-06.[1]

Due to rising prevalence of obesity, rate of obesity during pregnancy has also increased. Maternal overweight and obesity are widely associated with adverse pregnancy outcomes. An overweight pregnant woman is at risk for gestational diabetes and hypertensive disorders of pregnancy, and the risk gets still higher in women with increasing obesity. The risk of preeclampsia, preterm labor, stillbirth, cesarean deliveries is high in obese pregnant women and also, there is a higher incidence of anesthetic and postoperative complications in these deliveries. These women are more prone to develop overt diabetes and chronic hypertension in the future as well.[2] A case

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control study of women reported that repeated episodes of miscarriages were more common in the obese group compared to those with a normal BMI.[3]

According to the Royal College of Obstetrics and Gynaecology, a miscarriage can be defined as spontaneous loss of a pregnancy before gestational age of 20 weeks. Recurrent miscarriage is defined as the occurrence of two or more consecutive miscarriages and it occurs in 1-2% of fertile women.[4] Recurrent miscarriage is an important reproductive health issue, because it affects 2%–5% of couples.[5] The incidence of recurrent miscarriage varies widely between reports because of the differences in the definitions and criteria used, as well as the populations' characteristics.

Various etiologies have been identified over the years. Although a wide range of investigations are now available, the cause for more than 50% of the recurrent miscarriages remains unexplained, leading to frustration of the treating physician and is very distressing to the couple.[6] An association between obesity and miscarriage has been demonstrated in several studies.[3,7] Women who are overweight have 29% greater chance for miscarriage, obese women have 67% greater chance of miscarriage than normal weight women.[3] Women who remain pregnant after recurrent abortions are anxious about the outcome and also, the pregnancy is precious which needs special caution by the treating doctor. So. the present study is planned to study the relationship between maternal obesity and pregnancy outcome in women with recurrent miscarriages.

2. Materials and Methods

An observational cross sectional study was conducted in a tertiary Health Care Hospital during June to August 2018(2 months). Sample size is calculated considering 7.46%.[8] Prevalence of recurrent miscarriages in India among pregnant women of 18-45 years of age, i.e. P=7.46%, confidence level of 95%, with 7% margin of error and 95% confidence level and power of 80%, it comes to be 111. The women from postnatal ward admitted during June 2018 to August 2018, with history of two or more miscarriages less than 20 weeks of gestation in previous pregnancy and pregnancy registered within 12 weeks of gestation and having an MCPC (Mother & Child Protection Card) and were willing to give informed written consent were enrolled for the study. We excluded women with multiple gestation, pre-existing cases of Diabetes mellitus and Hypertension, underweight women as per BMI and those not willing to participate. Permission of Institute Ethical Committee (IEC) was take. A written informed consent was obtained from all participants. First trimester weight at the first visit (registration) was recorded from their MCPC card. Height was recorded. Maternal BMI was calculated as weight (in kg) divided by height (in meters) squared.

Mothers were classified as per WHO classification of BMI into following groups.[9] (Table 1) Outcome of present pregnancy was noted as Mode of delivery, Gestational diabetes mellitus, Pregnancy induced hypertension, Preterm delivery, Post-partum hemorrhage, NICU admissionsetc.

The data was entered into MS Excel spreadsheet. The data was further coded before analysis. The data was analysed by using EPI INFO software version 7. The data will be presented in suitable tabular and graphical format. Simple percentages were used to describe different variables. The Chi-square test and Fisher exact test were applied to assess the association with study variables. P values less than 0.05 were considered as statistically significant. Odds ratios (ORs) with 95% confidence intervals (CIs) were used to quantify the risk.

3. Results

When the relation between high maternal BMI and outcome of pregnancy were studied (Table 2), it was seen that high BMI was frequently associated with adverse outcome. Gestational diabetes was significantly associated with high maternal BMI (p=0.003) and was seen to be having 13.6 times (95% CI- 1.609-114.969) more chances of occurrence in such mothers. Similarly chances of antepartum [3.25 times (95% CI - 0.890 – 11.870)] as well as postpartum hemorrhages [3.4 times (95% CI - 0.299-38.698)] were more amongst obese and overweight mothers than non-obese, though statistically not significant. An overweight or obese mother with history of recurrent abortions had 4.2 times (1.43-12.27) more chances of developing Pregnancy induced hypertension as compared to non-obese mothers. Other outcomes like anaemia, IUGR and placenta previa were not significantly related

Out of 111 women enrolled in our study, 43(38.7%) women had normal vaginal delivery whereas Caesarean section was done in 68(61.3%) women.(Table 3) Mode of delivery and maternal BMI did not show significant association (p=0.91) in our findings.

In this study, it was seen that risk of low birth weight in the neonates was significantly [OR- 0.245(0.09-0.62)] less in overweight and obese women than non-obese ($p < 0.002$) whereas the results for preterm births and NICU admissions were not significant.(Table 3) Two stillbirths were documented in overweight and obese mothers and it's statistically significant (p value < 0.03).

4. Discussion

Maternal obesity has been reported as a risk factor for various antenatal, intra-natal, postpartum and neonatal complications.[3] This study includes 111 subjects, demonstrates effect of high body mass index on pregnancy outcome in women with recurrent miscarriages.

Table 1: Classification into groups according to BMI

Groups	Category	BMI (kg/m2)
Non Obese	Normal Weight	18.5 – 24.99
Overweight & Obese	Overweight	25 – 29.99
	Obese	≥ 30

Table 2: Relationship between pregnancy outcome in mother and maternal BMI

Pregnancy Outcome (Maternal outcome)	BMI		P value	OR (95% CI)
	Non obese Frequency (%) n=69(%)	Overweight & obese Frequency (%)n=42%		
Severe Anemia(n=16)	13(18.8)	3 (7.1)	0.089	0.33 (0.08-1.24)
Antepartum hemorrhage(n=11)	4 (5.8)	7 (16.7)	0.063	3.25(0.89 - 11.87)
Gestational Diabetes(n=8)	1 (1.5)	7 (16.7)	0.003	13.60 (1.60-114.96)
Pregnancy induced hypertension(n=18)	6 (8.7)	12 (28.6)	0.006	4.20 (1.43-12.27)
Postpartum hemorrhage (n=3)	1 (1.5)	2 (4.8)	0.184	3.40(0.29-38.69)
IUGR (n=8)	6 (8.7)	2(4.76)	0.437	0.52 (0.102.73)
Placenta Previa(n=7)	6 (8.7)	1 (2.4)	0.184	0.25 (0.03-2.20)

p value=0.013 *figures in the bracket indicate percentages

Table 3: Association between mode of delivery and maternal BMI

Mode of delivery		Non Obese Frequency(%) N=69	Overweight & Obese Frequency(%) N=42	Total N=111
Full term normal delivery(n=43)		27(39.1)	16(38.1)	43(38.7)
LSCS (n=68)	Elective	21(30.4)	14(33.3)	35(31.6)
	Emergency	21(30.4)	12(28.6)	33(29.7)

p = 0.91, OR=1.04(0.47-2.29) *figures in the bracket indicate percentages

Table 4: Association between fetal outcome and maternal BMI

Fetal Outcome	Non Obese Frequency (%) N=69	Overweight & Obese Frequency (%) N=42	P value	OR (95%CI)
Low Birth Weight	31 (44.9)	7 (16.7)	0.002	0.245(0.09-0.62)
Preterm	8 (11.6)	5 (11.9)	0.961	1.03(0.31- 3.38)
NICU admission	12 (17.4)	4 (9.5)	0.252	0.50 (0.15-1.66)
Stillbirths	0(0)	2 (100.0)	0.03**	*

*As observed valuein one cell is zero, risk could not be quantified.
**Fisher Exact Test applied.

We studied the relation between high maternal BMI and outcome of pregnancy (Table 2). It was seen that high BMI was frequently associated with adverse outcome. An overweight or obese mother with history of recurrent abortions had 4.20 (1.43-12.27)times more chances of developing pregnancy induced hypertension as compared to non-obese mothers (p=0.006). This is consistent with the findings in the literature.[2,10–12] In the present study, gestational diabetes was also significantly associated with high maternal BMI (p=0.003) and was seen to be having 13.6 times (95% CI- 1.609-114.969) more chances of occurrence in such mothers. It is well known that obesity is associated with profound metabolic and physiological changes. Adipokines released by adipose tissue results in increased inflammation, insulin resistance and oxidative stress. Obese individuals are leptin resistant and subsequent increase in leptin levels correlate with insulin resistance and hence diabetes. Leptin also has central actions such as to stimulate sympathetic outflow which increases blood pressure and leads to hypertension in obese individuals.[13] Pregnancy, being a physiologically stressful event for the mother, manifests these preexisting but not yet overt problems in the form of PIH and gestational diabetes. Another case control study done in obese women with recurrent abortions showed that the prevalence of gestational diabetes was significantly higher among the obese patients (4.5%; 95% CI 3.5±5.5) compared with the normal weight control group (0.4%; 95% CI 0.2±0.6).[3]

Similar association between maternal obesity and GDM is repeatedly seen in several studies.[10–19] Also, GDM is well known to be responsible for many obstetric complications such as macrosomia, LGA, preeclampsia, cesarean section & IUGR.[10,14–18] Hence it is feasible to reduce maternal BMI in the incipient stages and thus prevent obesity and subsequent GDM and its complications beforehand.

Other outcomes like severe anaemia, antepartum hemorrhage, postpartum hemorrhage, IUGR and placenta previa were not significantly related, most likely due to smaller sample size of the obese women group.

Out of 111 women enrolled in our study, 43(38.7%) had normal vaginal delivery whereas Caesarean section was done in 68(61.3%). Mode of delivery and maternal BMI did not show significant association (p=0.91) in our findings as compared to non-obese mothers (p=0.006). This is consistent with the findings in the literature.[2,10–12]In the present study, gestational diabetes was also significantly associated with high maternal BMI (p=0.003) and was seen to be having 13.6 times (95% CI- 1.609-114.969) more chances of occurrence in such mothers. It is well known that obesity is associated with profound metabolic and physiological changes. Adipokines released by adipose tissue results in increased inflammation, insulin resistance and oxidative stress. Obese individuals are leptin resistant and subsequent increase in leptin levels correlate with insulin resistance and hence diabetes. Leptin also has central actions such as to stimulate sympathetic outflow which increases blood pressure and leads to hypertension in obese individuals.[13] Pregnancy, being a physiologically stressful event for the mother, manifests these preexisting but not yet overt problems in the form of PIH and gestational diabetes.Another case control study done in obese women with recurrent abortions showed that the prevalence of gestational diabetes was significantly higher among the obese patients (4.5%; 95% CI 3.5±5.5) compared with the normal weight control group (0.4%; 95% CI 0.2±0.6).[3] Similar association between maternal obesity and GDM is repeatedly seen in several studies.[10–12,14–20] Also, GDM is well known to be responsible for many obstetric complications such as macrosomia, LGA, preeclampsia, cesarean section & IUGR.[10,14–18] Hence it is feasible to reduce maternal BMI in the incipient stages and thus prevent obesity and subsequent GDM and its complications beforehand.

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Out of 111 women enrolled in our study, 43(38.7%) had normal vaginal delivery whereas Caesarean section was done in 68(61.3%). Mode of delivery and maternal BMI did not show significant association (p=0.91) in our findings. Prathima P & S Anuchitra in their study document that 8.75% of obese mother were delivered by LSCS(p=0.01).[14] Most of the studies have shown a positive relation between Caesarean delivery and high BMI.[2,10,11,14–18] It is most likely due to foetal macrosomia associated with increased maternal BMI making vaginal delivery difficult.[21] Also, higher incidence of elective Caesarean section was seen in obese women with recurrent abortions since obstetricians prefer to reduce risks to mother as well fetus by resorting to elective LSCS in precious pregnancies. The other late post-partum complications such as wound infections or dehiscence, urinary tract infections, deep vein thrombosis and postpartum endometritis were not documented in this study since our study was limited to the time when the women were admitted in post natal ward and not thereafter.

In study done by P. Kalk, children from overweight/obese mothers exhibited a significantly increased risk of being admitted to a neonatal ICU.[21] Newborns of obese mothers are at increased risk of birth trauma due to prolonged labour, failure of induction, instrumental delivery or LSCS. This study fails to show such association.

There is dichotomy amongst the results from different studies seeking association between maternal obesity and low birth weight. A few studies show a positive correlation indicating increase in incidence of low birth weight with increasing obesity.[5] Fetal hypoglycemia leading to SGA is the postulated reason. Some other studies show negative correlation owing to better nutritional stores in over-nourished mother.[14,16] In present study, 31 low birth weight babies were attributed to non obese mothers' group whereas only 7 babies of obese mothers were low birth weight. Thus, it appears that the risk of low birth weight in the neonates was less in overweight and obese women than non-obese.

5. Conclusions

Maternal obesity significantly contributes to poor prognosis for the mother and the baby during delivery. This study shows significant association between maternal obesity and occurrence of Gestational diabetes mellitus and pregnancy induced hypertension. Overweight and obese pregnancy is associated with increased risk and hence the women of this group should be regarded as high risk. Obesity is a modifiable risk factor and so pre-conceptional counseling and creating awareness regarding health risks associated with overweight and obesity should be encouraged. 'Risk approach in MCH' is to be practiced by treating doctor. Since pregnancy is recognized to be ideal time for education and intervention, pregnant women should be strongly motivated to adopt a healthier lifestyle for the benefit of the fetus.

6. Ethical Approval

Permission of Institute Ethical Committee (IEC) was taken. All participants were informed about the objectives and their

right whether to choose to participate or not to participate in the study. A written informed consent was obtained from all participants. Full confidentiality of respondents' information was kept and information was used only for research purpose.

7. Source of Funding

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8. Conflict of Interest

Nil.

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