

## Feto-Maternal Consequences of Obesity in Pregnancy

IRAM INAM<sup>1</sup>, GHIAS UL HASSAN<sup>2</sup>, NAGINA BIBI<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Gynae/Obs, Continental Medical College Lahore, Pakistan

<sup>2</sup>Assistant Professor, Department of Gastroenterology, PGMI/LGH Lahore, Pakistan

<sup>3</sup>Assistant Professor, Department of Gynae/Obs, Continental Medical College Lahore, Pakistan

Correspondence to: Iram Inam: Email: [ahnmalik@hotmail.com](mailto:ahnmalik@hotmail.com), Cell: 0322-5930030

### ABSTRACT

**Introduction:** Potential ill effects of obesity in pregnancy pose a challenge encompassing many comorbidities that threaten the life and require special attention. Pregnancy is the most crucial event for women surrounded with multiple complexities. Obesity during pregnancy leads to life threatening events for mother as well as fetus. Purpose of the present study was to identify the feto-maternal outcomes of obesity during pregnancy.

**Methodology:** An observational cross-section design was used. Non-probability convenient sampling was done to collect data from 170 women. Data related to predominated maternal problem during pregnancy and fetus birth was collected. Ethical considerations were followed. Data was analyzed through SPSS (version 24.0).

**Results:** Findings revealed multiple consequences of obesity on both mother and fetus. Obesity was considered as a mainstay of feto-maternal complications and findings revealed a significant association (p-value <0.05).

**Conclusion:** Obesity is a signal for many adverse feto-maternal outcomes during pregnancy that poses a challenge for both mother and fetus. It is concluded from this study that there is ample need to educate mothers regarding the hazardous consequences of obesity in pregnancy.

**Keywords:** Fetus, Maternal, Consequences, Obesity, Pregnancy

### INTRODUCTION

Obesity is the predominant concern for developing world nowadays. According to national survey report, more than half of Pakistani population is affected with obesity<sup>1</sup>. Also, obesity ratio is high in female than male. Risk of getting obese mount with age. Globally, rate of obesity is rising dramatically worsening the healthy life<sup>2</sup>. Pregnancy is the most crucial event for women surrounded with multiple complexities. Obesity during pregnancy leads to life threatening events for mother as well as fetus<sup>3</sup>. Obesity is linked with drastic changes and in pregnancy, woman is more vulnerable to develop emergency situations resulting in dangerous consequences for mother and fetus<sup>4</sup>.

Potential ill effects of obesity in pregnancy pose a challenge encompassing many comorbidities that threaten the life and require special attention. Obesity is a pandemic condition distressing the health of adults<sup>5</sup>. According to health survey reports, 1 in every 4 adults in Pakistan is infected with obesity<sup>6</sup>. Obese women are at risk of developing severe impairments like macrosomic babies, pregnancy induced hypertension, gestational diabetes, C-section delivery, Postpartum hemorrhage, maternal mortality etc. Obesity can be a cause of miscarriages because studies illustrate early miscarriages in obese women compared to normal women. Risk of abortions are 20% more in obese woman in first 6 weeks of pregnancy<sup>7</sup>.

Adverse effects of obesity are also evident in neonates like birth defects, abnormal glucose metabolism leading to either macrosomia or macrosomia, IUD, preterm babies etc. Macrosomic babies are at risk of having shoulder dystocia, abnormal APGAR score and birth injury<sup>8</sup>. So, all these incidents upsurge the risks for C-Section delivery. After delivery, obese women are at risk of getting wound infections, depression, and postpartum hemorrhage<sup>9</sup>. Low rate of breast feeding are noticeable in obese women during postpartum period. Maternal obesity is a leading factor for children obesity in later life. Cryptorchism, also thought as manifestation attributed to maternal obesity in male baby<sup>10</sup>.

Among congenital anomalies, neural tube defects like spina bifida are also linked with maternal obesity, as chances of getting spina bifida are increased with maternal weight. Results from previous studies provide ample evidence that the risk of heart defects and gut abnormalities in fetus increased with maternal obesity ascribed to gestational diabetes<sup>11</sup>. As, type II diabetes remain invisible in obese women and causes deteriorated defects affecting the fetus wellbeing. Folate deficiency in pregnancy contributes to neural tube defects and research provide suggestions that demands of folic acid are high in obese women

during pregnancy due to increased BMI<sup>12</sup>. Obesity also increases the risk of fetus mortality in perinatal period. In moderate overweight women, risk of perinatal mortality was found 2.5 times more than non-obese pregnant women<sup>13</sup>.

Metabolic demands are exacerbated in pregnancy due to abnormal glucose metabolism linked with obesity. These metabolic defects increase risk of maternal complications like pre-eclampsia, diabetes etc<sup>14</sup>. Pre-eclampsia is non-preventable risk factor in obese women. Studies substantiate the notion of pre-eclampsia risk 10.8% more in obese pregnant women. Children of hypertensive mothers had increased risk of abnormal blood pressure as mean systolic BP is high during infancy period till 6 year of age<sup>15</sup>.

Glucose intolerance during pregnancy leads to gestational diabetes in obese population. Insulin hyposensitivity and insufficient response in pregnancy are considered as causative factors of GDM leading to hyperglycemia. Also studies depicted that insulin sensitivity was decreased in obese pregnant women<sup>9</sup>. Clinical manifestations of metabolic syndrome boost up due to obesity during the period of pregnancy and result in proteinuria, dyslipidemia, hypertension and diabetes. Gestational hypertension and diabetes are ascribed as a risk factor for IUD and require close monitoring in pregnant obese women to avoid such emergencies<sup>16</sup>.

Beside antenatal problems, another major threat linked to obesity is cesarean delivery and accompanying complications. Previous studies suggest that risk of C-section deliveries was high in obese pregnant women. Results give evidence that 1% increase in women BMI raise the rate of C-Section by 7%<sup>17</sup>. Macrosomia is considered as an accountable reason for C-Section deliveries due to cephalo-pelvic disproportions<sup>12</sup>. Fetal distress also contributes to C-Section birth in obese women. Obesity in term results in amplified financial burden and prolonged hospital stay<sup>7</sup>. DVT risk is more prevalent in obese women compared to average weight women during postpartum<sup>3</sup>. Statistics depicted that obese women are at risk of stress incontinence, urinary urgency and UTI more often during pregnancy. Anemia is a common symptom of overweight in pregnancy. Endometritis is also common during postpartum period in obese women<sup>18</sup>.

Obesity results in many feto-maternal consequences during pregnancy. Obesity outcomes endanger the life of mother and fetus. There is need to explore the outputs of obesity related complexities during pregnancy for both mother as well as fetus. This study is undertaken to search the hidden facts linked with overweight pregnancies. Purpose of the present study was to identify the feto-maternal outcomes of obesity during pregnancy.

**METHODOLOGY**

An observational cross-section design was used to identify the feto-maternal outcomes of obesity during pregnancy. Study was conducted in a Public health organization. Non-probability convenient sampling was done to collect data from 170 women. Inclusion criteria was obese pregnant women who delivered in selected public health facility. Women with previous health disabilities were excluded. Obese women were categorized as obese I (30–34.9 kg/m<sup>2</sup>), obese II (35–39.9 kg/m<sup>2</sup>), and obese III/morbid obese (≥40 kg/m<sup>2</sup>) according to WHO classification<sup>19</sup>. Data related to predominated maternal problem during pregnancy and fetus birth was collected. Ethical considerations were followed and right of participants preserved. Informed consent was taken from all the participants. Data was analyzed through SPSS (version 24.0). Outcomes of the study were frequency of weight distribution, maternal complications and fetal consequences linked with obesity. Inferential statistics was used to calculate the P-value for identifying the association between obesity and feto-maternal outcomes.

Table#2. Association between obesity and Maternal outcomes.

Obesity Grade	PIH F (%)	GDM F (%)	C-section F (%)	Infections F (%)	p-value
Obese I	Yes 08 (15.6)	09 (17.6)	19(37.2)	16(31.3)	<0.05
	No 43 (84.4)	42 (82.3)	32(62.8)	35(68.7)	
Obese II	Yes 15(18.6)	13 (16.2)	21(26.2)	24(30)	<0.05
	No 65(81.4)	67 (83.7)	59(73.8)	56(70)	
Obese III	Yes 19(48.7)	17(43.6)	23(59)	25 (64.1)	<0.05
	No 20(51.3)	22(56.4)	16(41)	14 (35.9)	

PIH<sup>†</sup> Pregnancy induced hypertension, GDM<sup>†</sup> Gestational Diabetes mellitus.

Results depicted in above mentioned table clearly illustrate signification association between obesity and maternal complications. Incidence of PIH is 08 (15.6%) cases out of 51 obese I participants. Also, p-value of less than 0.05 show significant association. Similarly, risk of getting PIH is increased with increasing obesity grade [15(18.6%) in grade II obese & 19(48.7%) obese III participants]. So, a direct relationship is revealed. GDM is also evident in obese population. According to outcomes in table#2, cases of GDM were more 17(43.6%) in obese III, 09 (17.6) in obese I and 13 (16.2) in obese II

**RESULTS**

In this study, 170 women participated from a public sector. Distribution of participant according to weight and obesity criteria are depicted in table#1.

Table#1. Distribution of participants in different groups.

Obesity Grade	Weight (kg/m <sup>2</sup> )	Frequency(%age)
Obese I	30–34.9 kg/m <sup>2</sup>	51 (29.5)
Obese II	35–39.9 kg/m <sup>2</sup>	80 (47)
Obese III/Morbid obese	(≥40 kg/m <sup>2</sup> )	39 (23.4)

Findings show the fact that mostly participants belong to obese II grade as 80 (47%) evident in above table. Out of 170 participants, 51 (29.5%) were obese I and 39 (23.4%) from obese III grade.

participants. C-Section delivery rate also shows significant association with obesity as p-value is <0.05. In obese I participants, 19 out of 51 underwent through C-Section but rate was increased with obesity grade. Obese participants suffered with infections as number is high in grade III obesity. Also, p-value represents important association. In Obese I grade, 16(31.3%) participants were infected out of 51. 24(30%) study participants are infected out of total 80 participants in obese II grade but 25(64.1%) suffered infections in obese III participants.

Table#3. Association between obesity and Maternal outcomes.

Obesity Grade	Macrosomia F (%)	Perinatal Mortality F (%)	Neural Tube Defects F (%)	p-value
Obese I	Yes 03 (11.8)	02 (3.92)	01 (1.94)	<0.05
	No 48(89.2)	49(96.8)	50(98.06)	
Obese II	Yes 05(6.25)	03 (3.8)	02(2.5)	<0.05
	No 75(93.75)	67 (96.2)	78(97.5)	
Obese III	Yes 05 (15)	02(5.0)	01(2.5)	<0.05
	No 34(85)	37xc (95.0)	38 (97.5)	

Table#3 shows an association between obesity and fetus outcomes. Adverse outcomes like macrosomia, perinatal mortality and neural tube defects are present in the babies of obese mothers. In obese I participants, ratio of ill consequences is low than grade II and grade III obese participants. P-value speculate obvious relationship in above mentioned table. Perinatal mortality risk is more in obese III participants 02(5.0%).

**DISCUSSION**

In present study, findings revealed multiple consequences of obesity on both mother and fetus. In this study participants were categorized in 3 groups on basis of obesity.

According to the study purpose, a relationship was depicted between maternal outcomes and obesity. Significant p-value shows that a direct relationship exist between maternal outcomes and obesity (p-value<0.05). Other studies also suggest similar results and show significant association<sup>20</sup>.

In this study, obesity was considered as a mainstay of maternal complications like hypertension and findings revealed a significant association of obesity with PIH. During pregnancy, obesity accentuate the hypertension problem and 19(48.7) obese III participants were found to have PIH. Another study also depicted the notion of association between PIH and obesity<sup>21</sup>.

Findings of this study showed that obesity contributes towards diabetes during pregnancy. As, results showed that significant number of pregnant females suffered with GDM in all three groups (p-value<0.05). These findings are consistent with other studies that revealed a close association of GDM and obesity<sup>22</sup>.

Similarly other maternal outcomes evident in present study were rate of C-Section and infection risk associated with obesity. Results provide ample evidences that a significant association exists and obesity was a root cause for many maternal outcomes

during pregnancy. Other studies also identify role of obesity in causing emergencies for women in pregnancy<sup>23</sup>.

Present studies represented the role of obesity in adverse fetus outcomes. Obesity imparted in instigating macrosomia, perinatal mortality and neural tube defects. Results of the study were significant as p-value <0.05 emphasize the part of obesity in triggering adverse fetus consequences. Finding revealed a clear depiction of obesity and incidence of fetus macrosomia, 06(15%) cases were found in obese III category. The outcomes are persistent with other studies revealing hostile response of obesity during pregnancy<sup>24</sup>.

## CONCLUSION

Obesity is a signal for many adverse fetomaternal outcomes during pregnancy that pose a challenge for both mother and fetus. It is concluded from this study that there is ample need to educate mothers regarding the hazardous consequences of obesity in pregnancy. Obesity causes life threatening emergencies and endangers the life. Pre pregnancy weight loss suggestions should be mandated to all the women of child bearing age.

## REFERENCES

- Jain RS, Shirodkar SD. Associated comorbidities with obesity in pregnancy and its fetomaternal outcome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019 Jul 1;8(7):2785-92.
- Hanssens S, Marx-Deseure A, Lecoutre S, Butruille L, Fournel A, Knauf C, Besengez C, Breton C, Storme L, Deruelle P, Lesage J. Maternal obesity alters the apelinergic system at the fetomaternal interface. *Placenta*. 2016 Mar 1;39:41-4.
- Kanakannavar SS. Comparative study of fetomaternal outcome in overweight/obese and normal weight pregnancy.
- Hemalatha N. Maternal body mass index and fetomaternal outcome: a comparative study. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019 Mar 1;8(3):840-5.
- Al-Obaidly S, Al-Ibrahim A, Saleh N, Al-Belushi M, Al-Mansouri Z, Khenyab N. Third trimester ultrasound accuracy and delivery outcome in obese and morbid obese pregnant women. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2019 Apr 18;32(8):1275-9.
- Triunfo S. Obstetrical risks in obesity. In *Obesity 2016* (pp. 267-274). Springer, Cham.
- Arora C, Thadathil S, Rejani R, Sharma PA. Is first trimester body mass index of antenatal mothers associated with selected fetomaternal outcomes?. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019 Mar 1;8(3):1030-5.
- Dahake ST, Shaikh UA. Maternal early pregnancy body mass index and pregnancy outcomes among nulliparous women registered in tertiary care hospital and urban slum hospital of a metropolitan city. *Journal of Education and Health Promotion*. 2020;9.
- Hanif S, Zubair M, Shabir N, Zia MS. A Comparative Study of Maternal and Fetal Outcome in Obese and Non-Obese Pregnant Women. *Journal of the Society of Obstetrics and Gynaecologists of Pakistan*. 2020 Aug 13;10(2):96-101.
- Zehravi M, Maqbool M, Ara I. Correlation between obesity, gestational diabetes mellitus, and pregnancy outcomes: an overview. *International Journal of Adolescent Medicine and Health*. 2021 Jun 16.
- Vishnu Priya D. Pre labour Body Mass Index and Its relation to Length of labour, Mode of Delivery and Feto-maternal Complications (Doctoral dissertation, Tirunelveli Medical College, Tirunelveli).
- Gabory A, Chavatte-Palmer P, Vambergue A, Tarrade A. Impact of maternal obesity and diabetes on placental function. *Medicine Sciences: M/S*. 2016 Jan 1;32(1):66-73.
- Ameen SI, Khalid SI. Maternal Obesity and Adverse Pregnancy and Perinatal Outcomes. *Journal of Medical and Surgical Practice (JMSP)*. 2020 Jul;6(03).
- Papazian T, Abi Tayeh G, Sibai D, Hout H, Melki I, Rabbaa Khabbaz L. Impact of maternal body mass index and gestational weight gain on neonatal outcomes among healthy Middle-Eastern females. *PloS one*. 2017 Jul 17;12(7):e0181255.
- Ikeanyi EM, Onyiriuka AN. Effects of maternal obesity on fetal weight and obstetric outcomes in an African population. *Orient Journal of Medicine*. 2017 Sep 4;29(3-4):71-7.
- Patel K, Chaudhari M, Shah M. Effect of gestational weight gain on pregnancy outcome of Indian mothers. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2020 Apr 1;9(4):1681-6.
- Alamgir S, Rehman A, Riaz M. FETO-MATERNAL RISK FACTOR ASSOCIATED TO THE MODERATELY AND EXTREMELY OBESE PREGNANT WOMAN IN COMPARISON TO THE NORMAL WEIGHTED PREGNANT CASES (PRIMIGRAVIDA AND MULTIGRAVIDA CASES): A COMPARATIVE COHORT RESEARCH. *INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES*. 2018 May 1;5(5):4317-23.
- Arab H. Diabetes and Obesity in Pregnancy. *Donald School Textbook of Diabetic Pregnancy & Ultrasound*. 2018 Mar 31:134.
- NADEEM A, MEHMOOD R, YOUNUS S, UMER N, BATOOL K, MARYAM A. Maternal Obesity and its Association with Cesarean Section.
- Akram U, Khattak SN, Kalsoom O, Anwar A, Munir TA. IMPACT AND COMPARISON OF PREGNANCY INDUCED HYPERTENSION AND OBESITY ON FETAL AND MATERNAL OUTCOME. *PAFMJ*. 2019 Dec 19;69(6):1309-4.
- McIntyre HD, Dekker-Nitert M, Barrett HL, Callaway LK. Gestational diabetes mellitus, obesity, and pregnancy outcomes. In *Textbook of Diabetes and Pregnancy 2018* Apr 17 (pp. 246-252). CRC Press.
- Arshad R, Sheikh Z, Aamir K, Karim N, Asaad T. PREGNANCY CONSEQUENCES IN DIET CONTROLLED MILD GESTATIONAL HYPERGLYCEMIA.
- McGillick EV, Lock MC, Orgeig S, Morrison JL. Maternal obesity mediated predisposition to respiratory complications at birth and in later life: understanding the implications of the obesogenic intrauterine environment. *Paediatric respiratory reviews*. 2017 Jan 1;21:11-8.
- Tersigni C, Neri C, D'Ippolito S, Garofalo S, Martino C, Lanzone A, Scambia G, Di Simone N. Impact of maternal obesity on the risk of preterm delivery: Insights into pathogenic mechanisms. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2020 Sep 17:1-6.