

ORIGINAL ARTICLE

Maternal and Fetal Outcome in Obese and Non-Obese Pregnant Women: A Single Centre Comparative Study

HINA KHAN¹, UZMA ZAMAN², MARYAM BIBI³, PALWASHA⁴¹Assistant professor Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu²Assistant Professor MTI Teaching Hospital DI Khan³Resident in Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu⁴Resident in Gynaecology Department, Khalifa Gulnawaz Teaching Hospital BannuCorrespondence to: Uzma Zaman, Email: Uzmamoiz786@gmail.com

ABSTRACT

Background: Obesity is a global health issue that presents significant problems for healthcare professionals managing pregnant women and newborns.

Aim: The aim of this study was to compare the maternal and fetal outcome in obese and non-obese pregnant women

Materials and Methods: The present comparative prospective study was conducted at the Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu from May 2023 to October 2023 after taking approval from the ethical committee of the institute. Pregnant women with a singleton pregnancy attending the hospital for their first trimester antenatal visit were enrolled in this study. The females were selected using a non-probability consecutive sampling procedure. Women with BMI 18.5 to 25 were placed in none obese group and those with BMI above 30 were placed in obese group. For the determination of sample size WHO sample size calculator was used. The required sample size was 210. The participants were equally divided in to group A and B. The group A included obese women and group B had non obese women. All selected women were monitored at least 4 times during the pregnancy period to measure prenatal and maternal health issues up to delivery and maternal outcomes were evaluated. SPSS version was used to analyze the collected data. Numerical data was expressed as mean and standard deviation categorical data was express as frequencies and percentages. The Chi-square test was used to examine the fetal-maternal outcomes of obese and non-obese women. P-values < 0.05 were considered significant.

Results: A total of 210 pregnant women were included in this study, which were equally divided in to obese and non-obese groups. The study found that women with a healthy weight had much better maternal outcomes than obese women. Obese women had high rate of preterm birth, cesarean section, preeclampsia, Gestational diabetes mellitus, hypertension and IUGR versus non-obese women. Fetal complications such as mean low birth weight, macrosomia, NICU admission and low Apgar scores at 1 and 5 minutes were most prevalent in the obese group as compare to non-obese group.

Conclusion: Our study concluded that maternal obesity is associated to poor pregnancy outcomes, including serious complications for both the mother and the fetus.

Keywords: obesity, comparative study, maternal and fetal outcomes

INTRODUCTION

The World Health Organization (2012) defines overweight and obesity as excessive or abnormal accumulation of fat that may result in negative health effects. Obesity has long been a source of concern for women due to cosmetic and lifestyle difficulties, but it is becoming clear that obesity is also a health issue. Obesity is becoming an issue in developing countries, despite the fact that it has received more attention in develop countries too.¹ According to the World Health Organization, a worldwide obesity pandemic is brewing.² Obesity is a major worldwide health issue that presents significant problems for healthcare workers, particularly those who manage pregnant women & neonates. Obesity is defined by India's National Family Health Survey as a body mass index of more above 30.0 kg/m.³ One of the most widely used parameter for determining obesity is the body mass index, which is calculated by dividing an individual's weight in kilograms by the height of the individual in meters squared. Adults are classified based on their BMI as underweight (BMI less than 18.5 kg/m²), normal weight (BMI 18.5 to 24.9 kg/m²), overweight (BMI 25.0-29.9 kg/m²), or obese (BMI ≥30.0 kg/m²). Obesity is divided into three levels: Class I (BMI 30.0 to 34.9 kg/m²), Class II (BMI 35.0 to 39.9 kg/m²), and Class III (BMI above 40.0 kg/m²).² Overweight and obesity are frequently associated with under nutrition in low-income countries.⁴⁻⁵ There has been limited research on the impact of maternal obesity on pregnancy and birth outcomes. Some writers have linked obesity to an increased risk of gestational diabetes along with macrosomia.⁶⁻⁷ Active weight control measures and lifestyle recommendations after delivery, together with frequent follow-up, are crucial for managing these women. An elevated risk of preeclampsia has also been seen.⁶ Preterm labor is common, most often due to early treatments for

preeclampsia. Obese women are more likely to experience intentional preterm labor, according to previous studies.⁷⁻⁸ Women with greater BMI are more likely to have induction of labor and cesarean section. Implementing strict anti-obesity measures in women can avert difficulties throughout their reproductive years.⁹ In Pakistan, there is a lack of research on Maternal and Fetal Outcome as a result of maternal obesity. Due to the dramatically increasing prevalence of obesity, this issue has become critical. Therefore this comparative study was conducted to explore the maternal and fetal outcome in obese and non-obese pregnant women.

MATERIALS AND METHODS

The present comparative prospective study was conducted at the Gynaecology Department, Khalifa Gulnawaz Teaching Hospital Bannu from May 2023 to October 2023 after taking approval from the ethical committee of the institute. Pregnant women with a singleton pregnancy attending the hospital for their first trimester antenatal visit were enrolled in this study while women with medical diseases like heart attack, hypertension, Scarred uterus, pre pregnant diabetes, and anemia and Placenta praevia were excluded from the study. All female participants in the study were brief told about the investigation, and informed written agreement was obtained. The females were selected using a non-probability consecutive sampling procedure. Women with BMI 18.5 to 25 were placed in none obese group and those with BMI above 30 were placed in obese group. For the determination of sample size WHO sample size calculator was used, by taking 90% power of test, 5% level of significance, population proportion (rate of cesarean section)44% in obese and 16% in none obese.⁹ The required sample size was 210. The participants were equally divided in to group A and B. The group A included obese women and group B had non obese women. All selected women were monitored at least 4 times during the pregnancy period to measure

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prenatal and maternal health issues up to delivery. For fetal outcome, congenital anomalies based on anomaly scan, birth weight, APGAR score, and NICU admission were recorded. In maternal complications, mode of delivery, preterm delivery, PPH, gestational diabetes, PIH, preeclampsia and eclampsia were noted and were recorded on a predesigned performa. SPSS version was used to analyze the collected data. Numerical data was expressed as mean and standard deviation. categorical data was express as frequencies and percentages. The Chi-square test was used to examine the fetomaternal outcomes of obese and non-obese women. P-values < 0.05 were considered significant.

RESULTS

A total of 210 pregnant women were included in this study, which were equally divided in to obese and non-obese groups. Educational status was likewise similar across the two groups. Among obese women, 23 (21.9%) were illiterate, 32 (30.5%) were in matriculation, 15 (14.3%) had intermediate education, while 35 (33.3%) were graduates. The similar values for non-obese women were 29 (27.6%), 21 (20 percent), 15 (14.3%), & 40 (38.1%), respectively. Obese women had a significantly higher mean BMI ($32.88 \pm 1.90 \text{ kg/m}^2$) compared to non-obese women (23.97 ± 1.07). Obese women had a higher mean age of 28.65 ± 3.29 years, compared to 28.82 ± 1.30 years for non-obese women. In the obese group, mean parity were 1.04 ± 0.94 , while in the non-obese group it was 2.79 ± 0.86 . The average gestational age was comparable in the groups (37.11 ± 1.64 vs. 36.87 ± 0.55 weeks. In

terms of booking status, 67 (63.8%) obese & 71 (67.6%) non-obese women were booked, whereas 38 (36.2%) and 34 (32.4%) were not booked as presented in table 1. The study found that women with a healthy weight had much better maternal outcomes than obese women. Preterm birth was recorded in 31 (29.5%) obese women versus 13 (12.4%) non-obese women, with a statistically significant difference. In terms of mode of delivery, non-obese women (83.8%) had more spontaneous vaginal deliveries than obese women (56.2%). Obese women (43.8%) were much more likely than non-obese women (16.2%) to have a cesarean section. There was a statistically significant difference in the incidence of IUGR in 15 (14.3%) obese and 4 (3.8%) non-obese mothers. Obese women were more likely to develop preeclampsia, with 32 (30.5%) cases compared to 15 (14.3%) non-obese women. The difference was statistically significant. Furthermore, eclampsia occurred in 23 (21.9%) obese women vs 8 (7.6%) non-obese women, suggesting a significant difference. Gestational diabetes mellitus (GDM) was also much more prevalent in obese women, affecting 29 (27.6%) vs 10 (9.5%) non-obese women. This is one of the main differences between the two groups. Although hypertension was more prevalent in obese women (21.9% vs. 10.5%), the difference was not statistically significant, according to the p-value provided in the original table (table 2). In terms of birth weight, low birth weight was reported in 32 (30.5%) newborns of obese mother's and 52 (49.5%) newborns of non-obese mothers. Normal birth weight was seen in 67 (63.8%) & 53 (50.5%),

Table 1 Demographic features of the study population

Characteristics	Obese group (n=105)		Non-Obese group (n=105)		p-value
	Frequency	Percentage	Frequency	Percentage	
Education level					
Illiterate	23	21.9%	29	27.6%	0.345
Under matric	32	30%	21	20%	
Intermediate	15	14.3%	15	14.3%	
Graduates	35	33.3%	40	38.1%	
Mean age of the participants in years					
Mean $\pm$ SD	28.67 ± 3.300	—	28.84 ± 1.316	—	0.625
Mean Parity distribution					
Mean $\pm$ SD	1.05 ± 0.951	—	2.80 ± 0.869	—	<0.001
Mean Body Mass Index (BMI)					
Mean $\pm$ SD	32.89 ± 1.917	—	23.98 ± 1.080	—	<0.001
Mean Gestational age					
Mean $\pm$ SD	37.11 ± 1.641	—	36.87 ± 0.546	—	0.157
Booking status					
Booked	67	63.8%	71	67.6%	0.561
Non-booked	38	36.2%	34	32.4%	

Table 2. Maternal outcome among the study population

Maternal outcome	Obese cases (n=105)		Non-obese controls (n=105)		p-value
	Frequency	Percentage	Frequency	Percentage	
Preeclampsia					
Yes	32	30.5%	15	14.3%	0.041*
No	73	69.5%	90	85.7%	
Eclampsia					
Yes	23	21.9%	8	7.6%	0.031*
No	82	78.1%	97	92.4%	
Gestational Diabetes Mellitus					
Yes	29	27.6%	10	9.5%	0.013*
No	76	72.4%	95	90.5%	
Hypertension					
Yes	23	21.9%	11	10.5%	0.122
No	82	78.1%	94	89.5%	
IUGR					
Yes	15	14.3%	4	3.8%	0.047*
No	90	85.7%	101	96.2%	
Preterm delivery					
Preterm	31	29.5%	13	12.4%	0.035*
Term	74	70.5%	92	87.6%	
Mode of delivery					
SVD	59	56.2%	88	83.8%	0.002*
Cesarean section	46	43.8%	17	16.2%	

Table 3. Fetal Outcomes Among the study participants

Features	Group A(Obese) (n=105)		Group B(Non-Obese) (n=105)		p-value
	Frequency	Percentage	Frequency	Percentage	
Mean birth weight (kg)	2.691 ± 0.520		2.424 ± 0.212		0.001*
Birth weight					
Low birth weight	32	30.5%	52	49.5%	0.049*
Normal birth weight	67	63.8%	53	50.5%	
Macrosomia	6	5.7%	0	0.0%	
APGAR score at 1 minute					
<7	38	36.2%	13	12.4%	0.004*
≥7	67	63.8%	92	87.6%	
APGAR score at 5 minutes					
<7	25	23.8%	10	9.5%	0.039*
≥7	80	76.2%	95	90.5%	
NICU admission					
Yes	59	56.2%	29	27.6%	0.002*
No	46	43.8%	76	72.4%	
* Difference is significant at 5% level of significance					

respectively. Infants of obese moms had a greater mean birth weight (2.691 ± 0.520 kg) compared to those of non-obese women (2.424 ± 0.212 kg). The difference was statistically important ($p=0.001$). NICU admission was much more common among neonates of obese women, with 59 (56.2%) versus 29 (27.6%) among non-obese moms. The difference was statistically noteworthy ($p = 0.002$). Six (5.7%) of the newborns in the obese group had macrosomia, whereas the non-obese group had no cases. The difference in birth weight categories was statistically notable ($p=0.049$). At 1 minute, 38 (36.2%) neonates delivered to obese moms had an Apgar score lower than 7, compared to 13 (12.4%) neonates born to non-obese females. The distinction was statistically important ($p=0.004$). At 5 minutes, 25 (23.8%) neonates in the obese group had an Apgar score of less than 7, compared to 10 (9.5%) in the non-obese group. The change was statistically significant ($p = 0.039$) as presented in table 3.

DISCUSSION

The risk of obesity is increased by a complex interplay of sex, social, environmental, and physiological variables.¹⁰ Women are more likely than males to be obese, which can be attributed to pregnancy-related weight gain, contraceptive pill use, estrogen-induced weight increase, lack of social contact, and physical activity.¹¹ Since 1980, global incidence of overweight and obesity has risen, with approximately one-third of the population categorized as overweight or obese.¹² Obesity during pregnancy is considered a high-risk factor, resulting in considerable fetal-maternal morbidity and death.¹³ Obese women are more likely to experience gestational diabetes, preeclampsia, cesarean section, spontaneous abortion, and unexplained stillbirth throughout their pregnancy.¹⁴ Furthermore, during pregnancy changes the fetus's metabolic programming, increasing the child's risk of cardiovascular disease, diabetes, and obesity. Overweight or obesity in the mother increases the risk of large-for-gestational-age (LGA) status, macrosomia, NICU hospitalization, poor Apgar score in the infant, and preterm delivery.¹⁵ It has also been shown that maternal obesity influences the onset of hyperinsulinemia & hypoglycemia in children during the initial few months of their lives. Additionally, the youngster is more likely to develop insulin resistance, hypertension, dyslipidemia, and aberrant body fat distribution over time. They are more likely to experience behavioral and neuropsychiatric issues. Maternally obese women had double the risk of preeclampsia and six times the risk of hypertension compared to pregnant women of normal weight.¹⁶

This study compares maternal and newborn outcomes for obese and non-obese pregnant women, recognizing the significance of pregnancy and neonatal health. The outcomes of this current study demonstrated that the maternal outcome was much better in non-obese women than in obese individuals. These findings are similar to the study conducted by Hanif et al, they

reported a higher frequency of several adverse maternal and obstetric outcomes.¹⁷ In our study eclampsia was higher in obese women (22%) as compared to non-obese women (7.6%). Numerous studies, such as the one by Robert JM et al., which revealed that risk of preeclampsia is three times higher in obese moms than in mothers of normal weight, support our study.¹⁸ The present study demonstrated a considerable Association of gestational diabetes with obesity, comparable to the findings of Takai et al. Bloomgarden et al. discovered a significantly higher The prevalence of gestational diabetes mellitus in the obese (41.3% vs. 26.1%) women as compared to women with normal weight.¹⁹⁻²⁰ Our study explored that hypertension was more prevalent in obese women Previous studies, such as Takai et al, have revealed that obese women had a much greater rate of hypertensive problems during pregnancy (42.0% vs. 24.7%).¹⁹ These findings support our study. Our study found a significant link between gestational diabetes and obesity, similar to Takai et al and Bloomgarden et al studies. Obese women had a significantly higher rate of gestational diabetes mellitus (41.3% vs. 26.1%) compared to normal-weight pregnant women.¹⁹⁻²⁰ This study found a substantially greater rate of intrauterine growth restriction and premature birth. Other studies have shown similar outcomes, such as 28.8% of newborns with IUGR among obese pregnant mothers.²¹ This study found a substantial correlation between csection rates and overweight or obesity. Other studies, such as one conducted in the USA, show that the rate of c-sections increases with maternal weight. Among obese and morbidly obese women, 40.8% and 56.6%, respectively, required cesarean birth.²²⁻²³ Obese women had a much greater risk of premature births than none obese, according to the current study. The study by Driul et al. indicated a substantial increase in preterm birth rates among obese individuals.²⁴ our results found that there was a substantially increased rate of low APGAR score (<7) at 1 minute and at 5 minutes in the obese group as compared to the none obese group. The necessity of admission to NICU was considerably increased in the obese mothers group with comparison to healthy women. These outcomes are in line with other studies like the study carried out by Shah et al, who revealed that newborn ICU needs was significantly higher in the obese group in comparison to normal mothers, due to a high rate of pregnancy-related issues that were present in babies born to obese mothers.¹³ Our study determined that maternal obesity can negatively impact pregnancy outcomes and cause considerable problems for both mother and fetus. Proper care of pregnant women with a higher BMI can reduce maternal and perinatal morbidity and death by raising awareness and improving access to medical services. To achieve a healthy mother and infant, it's important to make nutritional and lifestyle adjustments from a young age.

CONCLUSION

Our study concluded that maternal obesity is associated to poor pregnancy outcomes, including serious complications for both the mother and the fetus.

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