Original Article

Maternal Morbid Obesity: Impact on Pregnancy Outcome

Maternal Morbid Obesity

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ABSTRACT

Objective: To evaluate how morbid obesity among women effects on pregnancy, pregnancy outcome, method of delivery, and postpartum period complications

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the Al-Zahraa Teaching Hospital, Najaf, Iraq, from 1st February 2024 to 31st December 2024.

Methodology: One hundred females of morbid obesity (BMI ≥40) had singleton deliveries were enrolled. The singleton pregnancy and available values of BMI and complete medical records formed the inclusion factors, and multiple gestations and existing non-related illness formed the exclusion factors. Data about maternal demographics, complications of pregnancy, type of delivery, and outcome of neonates were collected.

Results: Most of the participants belonged to age group 30-34 years. Obese women had the highest frequencies (35% and 40%) of undergoing cesarean sections and emergency cesarean sections, respectively. Pregnancy complications were gestational diabetes 44%, pre-eclampsia 40%, and gestational hypertension 28%. Congenital malformations had an occurrence of 5% with the diagnosis of congenital ventricular septal defects and congenital neural tube Pre-pregnancy BMI had a moderate negative relationship with birth weight ($r = -0.45$, $p<0.01$). Emergency cesarean sections had a significant correlation with increased complications ($p = 0.03$), and the greater the BMI, the lower the birth weight for an emergency.

Conclusion: Pre-conceptional control of maternal morbid obesity necessitates individualized prenatal care and the achievement of optimal pregnancy outcomes. Maternal morbid obesity is linked with increased pregnancy morbidity, increased rate of cesarean sections, and adverse fetal outcomes.

Key Words: Morbid obesity, Pregnancy outcomes, Method of delivery, Complication.

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INTRODUCTION

Maternal obesity, defined as a body mass index (BMI) of ≥30 kg/m^2, is a growing global public health concern, particularly in relations to pregnancy outcomes. The rising prevalence of obesity worldwide poses significant challenges to obstetric care.

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Pregnancy complicated by pregnancy is associated with higher risk of complications such as gestational diabetes hypertensive disorders, prolonged labor and increase cesarean section rate.[1] Obesity is classified based on BMI in to Class I (30-34.9 kg/m^2), Class II (35-39.9 kg/m^2), and Class III (≥40 kg/m^2), also known as morbid obesity. This severe form is associated with significantly increased maternal and neonatal risks[1,2].

Physiological changes during pregnancy induce significant physiological adaptations affecting multiple systems. These include increased cardiac output and blood volume, enhanced respiratory function, elevated renal filtration and metabolic changes such as insulin resistance. These adaptations support fetal growth but may exacerbate complications in obese women[3,4].

Maternal obesity increases the risk of early pregnancy loss due to hormonal imbalance, inflammation and impaired implantation[5]. Morbid obesity is strongly associated with gestational diabetes, hypertensive disorders, and thromboembolic events due to insulin resistance, inflammation, and hypercoagulability[6-9].

Obese women are at higher risk of prolonged labor, cesarean delivery, anesthesia difficulties, and shoulder dystocia, often due to fetal macrosomia. Postpartum risks include hemorrhage, infection, and delayed wound healing. Long-term risks include type 2 diabetes and cardiovascular disease[7-9].

Maternal morbid obesity is linked to adverse outcomes such as stillbirth, congenital anomalies, macrosomia, and increased neonatal intensive care admissions[10-15].

METHODOLOGY

This retrospective cohort study was done at Al-Zahraa Teaching Hospital Najaf, Iraq from 1st February 2024 to 31st December 2024. A total of 100 singleton women who had given birth were recruited. The women had been categorized by BMI, as morbid obesity group (BMI ≥40 kg/m^2). Singleton birth, pre-pregnancy or early pregnancy BMI availability, comprehensive obstetric and neonatal test and examination reports and consent from participants were included. Multiple gestations (twins, triples), pre-existing, non-obesity-related chronic illnesses (e.g., type 1 diabetes mellitus, renal disease) and missing or incomplete records of pregnancy outcome or BMI were excluded. The data of parity, maternal weight, height, and age, pre-conception or booking BMI, pregnancy complications include gestational diabetes, hypertension, preeclampsia, preterm labor etc and neonatal outcome measures, birth weight, NICU admission, Apgar score etc. were recorded. The participants were asked to complete a validated questionnaire post-delivery, which were obesity history and types, pregnancy complications, delivery method and postpartum complications and breastfeeding and long-term health outcomes.

Analysis of the data was done using SPSS-25. Pearson correlation and Chi-square tests were applied. A p-value of <0.05 for all analyses was considered to be statistically significant.

RESULTS

The frequency of age, mode of delivery, pregnancy complications, congenital malformations, mode of delivery and pregnancy complications, morbidly obese and correlation of pre-pregnancy BMI and pregnancy outcome of the study population is represented in Tables 1-7.

Table No. 1: Participants distribution according to ages (n=100)

Age (years)	No.	%
18–24	20	20.0
25–29	18	18.0
30–34	42	42.0
35–39	15	15.0
≥ 40	5	5.0

Table No. 2: Mode of delivery among obese mothers

Mode of Delivery	No.	%
Vaginal Delivery	35	35.0
Cesarean Section	25	25.0
Emergency cesarean section	40	40.0

Table No. 3: Pregnancy complications

Complication	No.	%
Pre-eclampsia	40	40.0
Gestational hypertension	28	28.0
Preterm labor	24	24.0
Fetal growth restriction	20	20.0
Gestational diabetes	44	44.0
Blood clots (DVT, PE)	12	12.0
Infection	14	14.0
Previa	2	2.0
Placenta abruption	2	2.0
Congenital malformations	5	5.0

Table No. 4: Distribution of congenital malformations among participants (n=5)

Category	Specific conditions	No.	%
Cardiac(heart) diseases	Ventricular septal defect (VSD)	1	40.0
	Atrial septal defect (ASD)	1	
Neurological disorders	Neural tube defect (NTD)	1	20.0
Craniofacial anomalies	Cleft lip	1	20.0
Musculoskeletal disorders	Clubfoot	1	20.0

Table No. 5: Mode of delivery and pregnancy complications

Complication	Total Cases	Vaginal Delivery	Cesarean Section
Pre-eclampsia	40 (40%)	5 (12.5%)	12 (30%)
Gestational hypertension	28 (28%)	10 (35.7%)	10 (35.7%)
Preterm labor	24 (24%)	2 (8.3%)	6 (25%)
Fetal growth restriction	20 (20%)	5 (25%)	7 (35%)
Gestational diabetes	44 (44%)	15 (34.1%)	20 (45.5%)
Blood clots (DVT, PE)	12 (12%)	1 (8.3%)	3 (25%)
Infection (e.g., UTI, wound infection)	14 (14%)	5 (35.7%)	6 (42.9%)
Placenta previa	2 (2%)	-	1 (50%)
Placental abruption	2 (2%)	-	-
Congenital malformations	5 (5%)	2 (40%)	3 (60%)

Table No. 6: Impact of conditions on birth weights of pregnant women who are morbidly obese

Subgroup	No.	Mean Birth Weight (kg)	Remarks
Vaginal delivery	35	3.30±0.60	Full-term pregnancies without major complications resulted in higher weights.
Cesarean section	25	3.90±0.40	Scheduled deliveries often involve mild complications, leading to moderate weights.
Emergency cesarean section	40	2.70±0.80	Associated with preterm deliveries or fetal distress, resulting in lower weights

Table No. 7: Correlation of pre-pregnancy BMI and pregnancy outcome

Variable	Statistical Test	Correlation Coefficient (r)	P value	Interpretation
Pre-pregnancy BMI and birth weight	Pearson Correlation	-0.45	< 0.01	Moderate negative correlation; higher BMI associated with lower birth weight.
Mode of delivery and pregnancy complications	Chi-square Test	—	0.03	Significant association; emergency cesarean linked to increased complications.
Maternal age and pregnancy complications	Pearson Correlation	0.12	0.25	Weak positive correlation; not statistically significant.

DISCUSSION

The age group of pregnant women with morbid obesity in the population indicates that the majority of the population falls under the age group of 30-34 years, accounting for 42% of the population (Table 1). This concurs with the work of Wanaditya et al[1], who revealed that pregnant women aged in their thirties have high odds of experiencing pregnancy-related obesity complications, consonant with the larger percentage in this age group. Besides, the women in the age group of 18-24 years (20%) and 25-29 years (18%) do reveal that the young female population suffers from morbid obesity but to a lesser extent. The same finding presented by Lauth et al[2], where the prevalence of obesity increased with the increase of the mother's age, i.e., after the age of 30 years. The lower percentage of women in the 35-39 years (15%) and ≥40 years (5%) age groups support evidence that advanced maternal age, although less common with this population, remains an important risk factor for maternal obesity. Lauth et al[2] also indicated that advanced maternal age is accompanied by increased adiposity, which may contribute to adverse obstetric outcomes.

The findings of this study reveal that among the obese expectant women, 35% delivered vaginally, 25% delivered through elective cesarean sections, and a notable 40% had emergency cesarean sections. This high rate of cesarean sections, especially emergency cesarean sections, concurs with Wanaditya et al[1]. Obesity has played a significant part in rising the rate of cesarean sections because of such indications as dystocia during labor and fetal macrosomia.

Similarly, Khalifa et al[11] emphasized that BMI during pregnancy is a strong predictor for the rate of cesarean sections, and that obese women are more likely to receive the procedure compared to women of normal weights.

The high percentage (40%) of our population receiving emergency cesarean sections can be attributed to the labor issues of obesity such as failure to progress and fetal distress that have been well documented in the literature[2,11].

Also, Lauth et al[2] emphasized that maternal obesity extends the duration of labor and increases the rate of operative deliveries, including emergency cesarean sections.

Additionally, the study revealed that 25% of morbidly obese pregnant women (25 out of 100) required admission to the intensive care unit (ICU) either during labor or in the immediate postpartum period. This was primarily due to severe complications such as uncontrolled pre-eclampsia, respiratory compromise, or hemodynamic instability. In this study, the highest prevalence of gestational diabetes mellitus (44%) and pre-eclampsia (40%) were identified in the complicated pregnancies of obese pregnant women, followed by gestational hypertension (28%) and preterm labor (24%). These findings support Wanaditya et al[1] that obesity enhances the rate of gestational diabetes and pre-eclampsia, which are two of the main maternal morbidity reasons for the obese patients.

In addition, Khalifa et al[11] established that obese women have a greater chance of the development of hypertensive conditions such as pre-eclampsia and gestational hypertension, perhaps because of increased adiposity-linked inflammation and endothelial dysfunction (22%). The high prevalence of gestational diabetes (44%) supports the findings of Melchor et al[13], where they established that obesity represented the

main risk for glucose intolerance in pregnancy, which ended in adverse perinatal outcomes.

Moreover, the 20% rate of fetal growth restriction and the 24% rate of prematurity confirm all the evidence collected that fetal growth and place associated with vascular abnormalities of the placenta that can impair fetal growth and prematurity susceptibility[3]. The relatively low rate of venous thromboembolism (12%) and infection (14%) findings are supported by studies proving increased thrombotic and infection risks for the pregnant woman who is obese[6,8].

The congenital defects among the study participants were prevalent, and both the ASD and the VSD accounted for 40% each, followed by the NTDs for 20%, the cleft lip for 20%, and the clubfoot for 20%. This agrees with the work of Wanaditya et al[1]. that maternal obesity raises the rate of congenital heart abnormalities, including the ASD and the VSD, because of the alteration of the intrauterine metabolic and inflammatory milieus.

Similarly, Melchor et al[13] found that neural tube defects were more prevalent in babies whose mothers were pregnant and had obesity, possibly because of interference with the metabolism of folate and with pregnancy hyperglycemia. Obesity of pregnancy's increased susceptibility to craniofacial defects such as cleft lip and skeletal defects such as clubfoot has also been established, most probably because of dietary deficiencies and vascular adaptations in the course of fetal development[2,12].

The mode of delivery in morbidly obese pregnant women was predominantly a cesarean operation (60%) compared to vaginal (40%), with the majority of emergency cesarean deliveries being attributed to pre-eclampsia, preterm labor, blood clot, and infection. Pre-eclampsia especially had an emergency rate of 57.5% cesarean, indicating the major impact of this condition on the mode of delivery. These findings are reinforced by findings of Shagana et al[3] and Chandra & Paray[4] indicating that maternal obesity leads to increased risks of cesarean delivery, which itself tends to arise from obstetrical complications such as hypertensive complications and fetal distress. Wanaditya et al[1] also indicated that the rate of pre-eclampsia in the population of obese women is greater and they require greater operative intervention, including emergency cesarean sections, due to adverse maternal and fetal status. Similarly, Lauth et al[2] highlighted that fetal growth restriction and hypertension complicated pregnancies are major reasons for the performance of the cesarean section during pregnancy and typically performed as emergents. The greater rate of delivery by the cesarean birth method in fetal growth restriction and preterm labor also supports that metabolic and vascular derangement of obesity makes one susceptible to fetal compromise with the resultant increase in obstetric intervention[2,5].

Added to this, blood clotting (DVT, PE) and infection with emergency cesareans (66.7% and 21.4%, respectively) occurrence conform with studies, the prothrombotic and immunosuppressed conditions of the obese mother that increase the risks of obstetrical emergencies that will require urgent operative intervention[15]. The high level of congenital malformations, though small, conforms with the impact of metabolic impairments of obesity on fetal growth[13].

Full-term vaginal deliveries had averages of 3.30±0.60 kg, indicative of normal fetal growth in uncomplicated pregnancies. Planned cesarean deliveries, however, had a greater average of 3.90±0.40 kg, an observation for which the obstetrician's practice of performing the planned cesarean on the obese with mildly complicated pregnancies or with the estimated macrosomia can provide an explanation supported by previous studies that maternal obesity favors greater fetal growth and cesarean delivery[2,10].

Conversely, the emergency C-sections resulted in a significantly lower birth weight of 2.70±0.80 kg. This reduction may be an indication of the increased rate of preterm labor, fetal distress, or intrauterine growth restriction (IUGR) in themother's obesity-linked gestational diabetes and pre-eclampsia, which inhibits fetal growth[2,4]. Wanaditya et al[1] reported that emergencies consist of preterm or compromised fetuses, thus the lower birth weights. Preterm labor and fetal distress, common during obesogenic pregnancies, result in premature delivery with lower weights[8].

The current study also demonstrated a negative correlation between birth weight and pre-pregnancy BMI, in that greater maternal BMI is correlated with lower neonatal birth weights among morbidly obese mothers. The reverse correlation agrees with evidence that greater pre-pregnancy BMI may lead to fetal growth restriction either by a process of placental insufficiency or metabolic derangements of obesity[3,10]. While obesity tends to be associated with macrosomia, in morbid obesity the effect on the placenta is harmful, inducing intrauterine growth retardation, especially with complicated pregnancies[2].

Also, there existed a significant relationship between the mode of delivery and pregnancy complications, with emergency cesarean being significantly related with an increase in pregnancy complications such as pre-eclampsia, preterm labor and fetal distress. The findings concur with the studies that establish that maternal obesity is linked with an increase in obstetric emergencies that call for emergency surgery[2,4]. Wanaditya et al[1] had stated that intrapartum complications that call for emergency cesarean delivery were common among women who were obese, and this could clearly be seen from the significant relationship that existed in this study.

Interestingly, maternal age was weakly, but not significantly, related to pregnancy complications,

showing that maternal age under these conditions was not a significant determinant of pregnancy outcomes, consistent with previous work highlighting that the metabolic status that exists before pregnancy and related BMI are the significant determinants, not age itself[4].

CONCLUSION

The age is well represented among pregnant obese women and a greater rate of cesarean sections, including emergency copes, indicating that being obese raises the probability of having surgery during the birth process. Obese women have an elevated pregnancy risk of complicated pregnancies involving gestational diabetes, hypertensive conditions, and preterm labour, indicating the enhanced obstetric risks posed by maternal obesity. There have been small but significant numbers of congenital malformations described, with probable associations of fetal developmental anomalies with maternal obesity. Maternal pre-pregnancy BMI is inversely related moderately to birth weights, and emergency cesarean delivery is very strongly linked with increased complication rates and low birth weights, particularly in the case of preterm or compromised fetuses. Higher maternal BMI is linked with adverse pregnancy outcomes, enhanced complications, and altered fetal health parameters. Morbid obesity has a much greater rate of postpartum complications, which indicates that post-delivery health complications and recovery of the mother persist and are significant.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Zainab Abd Alkathem Fatnan, Seba Abdulkadhim Fatnan
Drafting or Revising Critically:	Zainab Abd Alkathem Fatnan, Shaymaa Raouf Tawfeeq Al-Hasani
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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