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IMPACTS OF MATERNAL OBESITY ON PREGNANCY OUTCOMES: A CASE CONTROL STUDY CONDUCTED IN NINEVEH PROVINCE

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ABSTRACT

Background: Obesity is a complicated noncommunicable disease caused by a combination of genetic, environmental, hormonal, behavioral, and socioeconomic variables. There are significant public health consequences associated with the high prevalence of obesity among women of reproductive age, especially with regard to the detrimental consequences on pregnancy outcomes. Additionally, it also puts a burden on healthcare systems, requiring more extensive prenatal care, C-sections, extended hospital stays, and in vitro fertilization (IVF). **Objectives:** To study the impacts of obesity on pregnancy outcome among sample of women lived in Nineveh province. **Methods:** This is a case control study was carried out from October 2023 to the end December 2024 in the Gyne-obstetric department at Al Hamdanyia and Mosul General Hospital in Nineveh province-Iraq. Women in this study were chosen using a non-probability, purposeful sampling technique. The study included 200 women, 100 of whom were obese (cases) and the other 100 were not (controls). All women who are scheduled (more than three prenatal appointments), primi and multigravida, having a singleton pregnancy, or a previous vaginal delivery, or having a fetus with cephalic presentation were included in the study. However, women having a history of medical conditions such as diabetes, hypertension, endocrine abnormalities, a history of intrauterine death, a history of congenital malformations, or a history of preterm birth were excluded. **Results:** The mean age of the study participants is 26.12 ± 5.39 years. It's evident that total number of intrapartum complications are statistically significant different between cases and controls (P value <0.001). Moreover; the mode of delivery is also statistically significant between the two groups, with more cases having cesarean section in comparison to controls (P value =0.034). Furthermore; statistically significant difference is found between cases and controls regarding their neonates' Apgar scores (P value = 0.043) and fetal birth weight (P value = 0.013). Lastly; there is statistically significant difference between cases and control (P value = 0.023) concerning postpartum complications with greater number of cases having postpartum hemorrhage, wound infection and need for blood transfusion. **Conclusion:** Pregnancy with obesity is a high-risk pregnancy that is linked to a number of problems for both the mother and the fetus. Compared to non-obese mothers, those with obesity were vulnerable to cesarean section, intrapartum and postpartum complications, in addition to that; their babies were heavier and had lower Apgar scores.

KEYWORDS: Intrapartum, Postpartum, Apgar score, Neonatal weight, Nineveh, Iraq.

1- INTRODUCTION

Obesity is a complicated noncommunicable disease caused by a combination of genetic, environmental, hormonal, behavioral, and socioeconomic variables.[1] It Obesity increases morbidity and mortality rates in impacted communities, posing serious risks.[2] The prevalence of obesity among women of reproductive age has dramatically increased over the last 20 years, indicating a major threat to public health in recent years.[3-4] Studies show that increased rates of gestational diabetes and macrosomia are caused by the rising prevalence of obesity.[5] As a result, the World Health Organization (WHO) has identified obesity as one of the biggest risks to human health. It defines obesity as an excessive buildup of body fat and further divides it into three classes based on rising body mass index (BMI)

levels: class I (BMI 30–34.9), class II (BMI 35–39.9), and class III (BMI $\geq$ 40).[6-8] During pregnancy, physiological changes lead to the optimal weight gain for women with a normal BMI between 11.5 and 16 kg.[9] Additionally, obesity is associated with the majority of chronic diseases, including cardiovascular disease, type 2 diabetes, and hypertension, all of which raise death rates.[10]

There are significant public health consequences associated with the high prevalence of obesity among women of reproductive age, especially with regard to the detrimental consequences on pregnancy outcomes.[11] Furthermore; Fetal growth is impacted by maternal obesity, and ultrasound is a useful tool for ruling out fetal growth problems in pregnant women who are obese.[12] In addition to having an impact on women and their offspring, it also puts a burden on healthcare systems, requiring more extensive prenatal care, C-sections, extended hospital stays, and in vitro fertilization (IVF).[13-14] The increased adipose tissues in obese pregnant women make sonography technically challenging, requiring numerous scans to detect any abnormalities in the fetal growth compared to non-obese pregnant women.[15] Obesity may worsen the visibility of important structures and cause a progressive decline in the quality of fetal scans.[16]

In Iraq, little study has been done to evaluate the impact of obesity on pregnancy outcomes, despite the seriousness of the problem. The aim of study is to study the impacts of obesity on pregnancy outcome among sample of women lived in Nineveh province.

2-PATIENTS AND METHODS
This is a case control study was carried out from October 2023 to the end December 2024 in the Gyne-obstetric department at Al Hamdanyia and Mosul General Hospital in Nineveh province-Iraq. Women in this study were chosen using a non-probability, purposeful sampling technique. The study included 200 women, 100 of whom were obese (cases) and the other 100 were not (controls). All women who are scheduled (more than three prenatal appointments), primi and multigravida, having a singleton pregnancy, or a previous vaginal delivery, or having a fetus with cephalic presentation were included in the study. However, women having a history of medical conditions such as diabetes, hypertension, endocrine abnormalities, a history of intrauterine death, a history of congenital malformations, or a history of preterm birth were excluded.

Statistically analysis done by using SPSS 30.0 software application. All categorical variables, such as parity status, mode of delivery, intrapartum complications, postpartum complications, fetal outcome, neonatal birth weight, and neonatal complications, were presented by frequencies and percentages; chi-square test was used to compare the above-mentioned categorical variables between obese and non-obese groups. While; Fisher's Exact test was used in conjunction with Pearson's Chi-square test to determine if any cell count was less than 5. Mean $\pm$ SD was used to display numerical response data, such as age and neonatal Apgar score. The means of these numerical response variables were compared between the obese and non-obese groups using the Students t-test (unpaired). A P value of <0.05 was considered as statistically significant.

3. RESULTS
The mean age of the study participants is 26.12 $\pm$ 5.39 years. It's evident that total number of intrapartum complications are statistically significant different between cases and controls (P value <0.001). Moreover; the mode of delivery is also statistically significant between the two groups, with more cases having cesarean section in comparison to controls (P value =0.034). On the other hand; no statistically significant difference between the cases and controls regarding the mean of ages and parity (P value >0.05). As shown in figure 3.1.

Table 3.1: Comparison between cases and controls regarding sociodemographic, intrapartum complication and mode of delivery.

Variable	Case	Controls	P -Value
Maternal age, mean ± standard deviation:	26.73 ± 5.77	25.54 ± 4.94	0.315
Parity:			
- Primiparous	53	61	0.569
- Multiparous	47	39	
Intrapartum complications:			
- Shoulder Dystocia	12	3	**<0.001**
- Non-progress of labor	11	2	
- Failed Instrument	3	1	
- Total	26	6	
Mode of delivery:			
- Vaginal delivery	73	91	**0.034**
- Cesarean section	27	9	

Table 3.2 shows comparison between cases and controls regarding their neonatal outcomes. Statistically significant difference is found between cases and controls regarding their neonates' Apgar scores (P value

= 0.043) and fetal birth weight (P value = 0.013). while no significant difference found between them with regard to numbers of alive, still birth and neonatal death (P value > 0.05).

Table 3.2: Comparison between cases and controls regarding their fetal outcomes.

Variable	Case	Controls	P -Value
Alive	92	98	0.191
Still birth	4	1	
Neonatal death	4	1	
Apgar score, mean ± standard deviation: At 1 minute At 5 minutes	7.02 ± 0.73 7.53 ± 0.76	7.78 ± 0.79 8.32 ± 0.71	**0.043**
Fetal birth weight: 2500-4000 More than 4000	87 13	98 2	**0.013**

Table 3.3 shows comparison between cases and controls regarding their postpartum complications. statistically significant difference between them (P value = 0.023) with a greater number of cases having postpartum hemorrhage, wound infection and need for blood transfusion.

Table 3.3: Comparison between cases and controls regarding their postpartum complications.

Variable	Case, number and percent	Controls, number and percent	P -Value
Postpartum hemorrhage	13	3	**0.023**
Wound infection	6	2	
Need for blood transfusion	7	3	

4. DISCUSSION

This study found a significant difference between cases with obesity and those with no obesity (controls) regarding intrapartum complications including shoulder dystocia followed by non-progress of labor and failed instrumental delivery. This is means obese lady needs special attention and proper preparation before and during delivery, similar results was found by Namiko Aleker et al.[17] Moreover; obese ladies found in the current study to have significantly more cesarean section in comparison with normal ladies, this is due to a greater intrapartum complications already occurred within this group such as shoulder dystocia and non-progress of labor in comparison to ladies with normal weight, comparative findings obtained by Simon C. Langley-Evans et al.[18]

On the other hand; this study found the neonates of obese ladies had a significant lower Apgar score at the first and fifth minutes and these neonates having significantly greater weight in comparison to the neonates of normal ladies, as there is an association between maternal obesity and fetal growth such as macrosomia and large-for-gestational-age infants. This result is going with Ayşe Daştan Yilmaz et al study findings.[19]

In the current study, patients with obesity found to had significantly higher number of postpartum complications in comparison to those with no obesity, including postpartum hemorrhage followed by need for blood transfusion and wound infection. This is due to the fact that obese ladies had a significantly larger and heavier pregnancy products in comparison to normal weight ladies. Which is consistent to Aleksandra Polic et al study finding.[20]

This study's strength is; the data (height and weight) was collected early in pregnancy, making it prospective with respect to pregnancy outcome characteristics. In this way, recall bias was prevented. Maternal obesity-related confounding variables, such as gestational diabetes and hypertension, were taken into account in this study (excluded). The study's limitations its somewhat small sample size.

5. CONCLUSION

Pregnancy with obesity is a high-risk pregnancy that is linked to a number of problems for both the mother and the fetus. Compared to non-obese mothers, those with obesity were vulnerable to cesarean section, intrapartum and postpartum complications, in addition to that; their babies were heavier and had lower Apgar scores.

Conflict of intertest
About this study, the authors disclose no conflicts of interest.

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