Ministry of Higher Education

and Scientific Research

University of Diyala

College of Medicine

"Obesity and Its Association with Type of Delivery in Iraq"

Submitted to the Council of the College of Medicine, Diyala University, Department of Obstetrics and gynecology In Partial Fulfillment of Requirements for the Bachelor Degree in medicine and general surgery.

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2024-2025

(بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ)

﴿يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكم والَّذِينَ أُوتُوا العِلْمَ دَرَجاتٍ واللَّهُ بِما تَعْمَلُونَ خَبِيرٌ﴾

[المجادلة ١١]

Dedication

This study is wholeheartedly dedicated to:

- My family for their constant financial, emotional, spiritual, and moral support. Their encouragement and strength have been crucial during times of doubt.
- I also want to acknowledge Prof. Dr. Inaam Faisal Mohammed
- whose support motivated me to finish this work. I are profoundly thankful to Almighty God for granting us good health and for providing guidance, strength, mental clarity, protection, and skills. My sincere gratitude extends to all.

Acknowledgement

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SUPERVISOR CERTIFICATIONS

I certify that the preparation of this research titled (***Obesity and Its Association with Type of Delivery in Iraq***) and conducted by the students (Yousef Salem Sobhi) was conducted under my supervision, College of Medicine, Diyala University, which is part of the requirements for obtaining a bachelor's degree in medicine.

Name of supervisor: Dr. Inaam Faisal Mohammed

Academic degree: Professor

Signature:

Date:

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List of abbreviation

Abbreviation	Meaning
BMI	Body mass index

Abstract

Background: Childbirth is a deep and strong human experience and the way they deliver, either vaginally or through caesarean section, will probably have an effect on mothers feelings. Obesity is evaluated by body mass index (BMI), which is the relative weight of the body in kg and square height in meters

Objectives: To assess the Obesity and Its Association with Type of Delivery in Albatool hospital teaching , diyala , Iraq.

Patients and methods: cross-sectional study was conducted at Al-Batool Teaching Hospital for Gynecology and Obstetrics in Diyala Province, Iraq, from October 15, 2024, to January 20, 2025 . The data was collected using paper-based questionnaires covering demographics, height and weight (to calculate BMI), mode of delivery, obstetric history, maternal health conditions, and lifestyle factors among 60 postpartum women. Postpartum women with complete data were included, while those missing data or with severe medical conditions were excluded. Ethics approval was ensured through confidentiality. Data were analyzed using Microsoft Excel 2013 and SPSS Statistics v.21, where cross-tabulations and Chi-square tests were used to determine associations between obesity and delivery type.

Results: In our study, maternal obesity was significantly associated with an increased rate of cesarean deliveries (31.67% vs. 33.3% in normal BMI, P = 0.021). Obese mothers had a higher prevalence of neonatal birth weight >4 kg (20.31% vs. 4.69% in normal BMI, P = 0.347), though this was not statistically significant. Preeclampsia (31.67% vs. 23.33%, P = 0.291) and gestational diabetes (26.67% vs. 14.29%, P = 0.482) were more frequent in obese mothers but did not reach statistical significance. Preterm labor was also more common in obese mothers (18.33% vs. 5%, P = 0.093). No significant association was found between

maternal BMI and infection rates (P = 0.063) or postpartum weight retention (P = 0.653).

Conclusion : Among mothers with normal BMI, maternal obesity was associated with a higher rate of cesarean deliveries, and a higher prevalence of neonatal birth weights > 4 kg as well as pregnancy complications such as preeclampsia, gestational diabetes, and preterm labor. Although maternal BMI did correlate with mode of delivery (statistical significance P = 0.021), other complications such as infections and hypertensive disorders did not statistically correlate.

Introduction

Childbirth is a deep and strong human experience and the way they deliver, either vaginally or through caesarean section, will probably have an effect on mothers feelings[1]. Obesity is evaluated by body mass index (BMI), which is the relative weight of the body in kg and square height in meters [2].

BMI is commonly employed to define the obesity severity and to provide guidance for gestational weight gain [3]. During the last two decades, obesity has become a significant public health issue worldwide [4]. The prevalence of obesity is increasing overall and so is the number of overweight or obese women of reproductive age [5]. It is an epidemic not just in developed but developing countries as well. Another emerging issue is nationally in both general population and women of reproductive age, obesity [6].

There is now considerable evidence that obese pregnant women are at increased risk of a number of maternal and fetal complications of pregnancy, including pre-eclampsia, caesarean section intrauterine death [7,8]. Obesity is a major problem for the health of women in several ways. In fact, being overweight or obese carries an increased relative risk of diabetes, hypertension and coronary artery disease in women. Obesity is associated with low back pain and knee osteoarthritis in women [9].

Obesity also has an adverse effect on contraception and fertility. Maternal obesity is associated with increased rates of cesarean delivery. Maternal obesity also exerts negative influences on pregnancy outcome (e.g., increased neonatal mortality, malformations). The rate of cesarean births has increased exponentially over the last 10 years, with more than 50% cesarean births in some parts of the world, in the absence of any evidence of an increase in obstetric emergencies [10].

This marked increase in primary elective cesarean delivery, especially in the absence of established medical indications, has raised discussion and controversy in the medical community and has led to interest and publicity [11].

Obesity is a global health problem, the prevalence of excess weight (overweight and obese) among women is 55.5%, and 29.8% of adult women are classified as obese. While the difficulties associated with obesity, e.g. diabetes, hypertension, thrombo-embolism and coronary heart disease, have been thoroughly described in the non-pregnant population, the condition itself possesses particular hazards in the ante-, intra- and postpartum periods of the pregnant mother [12].

Intrapartum period is of special concern. Proactive interventions are best to deal with complications like slow progress in labour and increased caesarean section rates. This is the reason that some sources recommend all morbidly obese women be referred for an assessment of the pregnancy and a birth plan developed by an anaesthetist and a specialist obstetrician [12,13].

Aim of study

To assess the Obesity and Its Association with Type of Delivery in Albatool hospital teaching , diyala , Iraq

Patients and methods

Study Design: This is a cross-sectional study conducted in Diyala Province, Iraq, at Al-Batool Teaching Hospital to investigate the relationship between maternal obesity and the way of delivery.

Sampling Technique: This study was conducted on 60 female participants (30 were BMI 18 to 25 and 30 were above 25) who have delivered. Data from October 15, 2024, to January 20, 2025.

Data Collection: Information was collected using paper-based questionnaires containing questions regarding BMI classification (18-25, Above 25), delivery type (vaginal/cesarean), and uterine incisions (previous cesarean section, maternal health issues, prolonged labor, fetal distress). Questions also included obstetric history, including gravida, parity, abortion and gestational age at delivery; as well as maternal health conditions such as gestational diabetes, preeclampsia, premature labor, and infections. In addition, lifestyle factors such as diet, physical activity, smoking and alcohol use and breastfeeding practices were evaluated. The questionnaires were given to postpartum women who completed it voluntarily.

Inclusion Criteria: Women who gave birth during the study period, live in Iraq, have BMI, mode of birth and relevant obstetric history data available, and who agreed to participate and provide complete answers to the questionnaire.

Exclusion Criteria: Women without full or missing crucial data concerning BMI or mode of delivery, pregnant women that have yet to deliver, women with severe medical issues that can affect pregnancy outcomes (i.e. severe chronic disease), and those who did not consent/cooperated with the survey.

Ethical Approval: In the research, we avoided using the names of participants and other sensitive data belonging to them.

Statistical Analysis: Data were organized and analyzed by using Microsoft Excel 2013 and SPSS Statistics v.21. Descriptive statistics (cross-tabulations and Chi-square tests) were used to examine associations between maternal obesity and type of delivery.

Result

Table 1: The study included a total of 60 participants, with the majority (71.7%) aged between 18–30 years (n=43), while 28.3% (n=17) were in the 31–42 years age group, yielding a mean age of 27.28 years. The participants had an average gravida of 3.32, an average parity of 2.83, and an average abortion rate of 0.47. Regarding maternal BMI, half of the participants (50%) were classified as healthy (n=30), while the remaining half (50%) were classified as obese (n=30).

Table 1: Demographic and Obstetric Characteristics of the Study Population

Variable		Frequency	Percent	Mean
Age group	18-30	43	71.7	27.28
	31-42	17	28.3	
	Total	60	100.0	
gravida		60	100.0	3.32
para		60	100.0	2.83
abortion		60	100.0	.47
BMI of mother	Healthy	30	50.0	N/A
	Obesity	30	50.0	
	Total	60	100.0	

Table 2: The distribution of delivery types among mothers with normal BMI and obesity was analyzed. Among women with normal BMI, 66.7% underwent vaginal delivery (n=10, 16.7%) or cesarean delivery (n=20, 33.3%). Similarly, among obese mothers, 68% underwent cesarean delivery (n=19, 31.67%) or vaginal delivery (n=11, 18.33%). The statistical analysis revealed a significant association between maternal BMI and the type of delivery, with a P-value of 0.021, indicating a higher likelihood of cesarean delivery in obese mothers.

Table 2: Association Between Maternal BMI and Type of Delivery

Type of delivary		**Bmi of mother**		**P value**
		Normal	**Obesity**	
Caesarean delivery	**Count**	20	19	0.021
	% of Total	33.3%	31.67%	
Vaginal delivery	**Count**	10	11	
	% of Total	16.7%	18.33%	
Total	**Count**	30	30	
	% of Total	50.0 %	50.0 %	

Table 3: The distribution of cesarean section (CS) indications among mothers with normal BMI and obesity was examined. Fetal distress was more frequent in obese mothers (n=7, 17.5%) compared to those with normal BMI (n=2, 5%). Cephalopelvic disproportion was equally observed in both groups (n=3, 7.5%). Previous cesarean section was a reason for CS in 15% of both normal-weight and obese mothers (n=6 each). Prolonged labor was more common in normal-weight mothers (n=9, 22.5%) than in obese mothers (n=3, 7.5%). The statistical analysis revealed no significant association between BMI and the indication for CS (P-value = 0.386).

Table 3: Reasons for Cesarean Section in Relation to Maternal BMI

Reason of cs		Bmi of mother		P value
		Normal	Obese	
Fetal distress	Count	2	7	0.386
	% of Total	5.0%	17.5%	
Cephalopelvic disproportion	Count	3	3	
	% of Total	7.5 %	7.5%	
Previous caesarean section	Count	6	6	
	% of Total	15 %	15%	
Prolonged labour	Count	9	3	
	% of Total	22.5%	7.5%	
Total	Count	20	19	
	% of Total	50.0%	50.0%	

Table 4: The distribution of neonatal birth weight was analyzed in relation to maternal BMI. Among mothers with normal BMI (18–25), the majority of newborns (34.38%) weighed between 2.5–4 kg (n=22), while 7.81% (n=5) had a birth weight of less than 2.5 kg, and 4.69% (n=3) weighed more than 4 kg. In contrast, among mothers with BMI above 25, 15.63% (n=10) of newborns weighed 2.5–4 kg, while 10.94% (n=7) had a birth weight of less than 2.5 kg, and a higher proportion (20.31% , n=13) had a birth weight exceeding 4 kg. The statistical analysis indicated no significant association between maternal BMI and birth weight (P-value = 0.347).

Table 4: Association Between Maternal BMI and Birth Weight of the Baby

weight of baby		bmi of mother		P value
		18-25	Above 25	
2.5-4kg	Count	22	10	0.347
	% of Total	34.38%	15.63%	
Less than 2.5 kg	Count	5	7	
	% of Total	7.81%	10.94%	
More than 4kg	Count	3	13	
	% of Total	4.69%	20.31%	
Total	Count	30	30	
	% of Total	50.0 %	50.0 %	

Table 5: The analysis of maternal BMI and pregnancy-related complications showed that preeclampsia was more common among obese mothers (31.67%) compared to those with normal BMI (23.33%), but the difference was not statistically significant (P = 0.291). Similarly, gestational diabetes mellitus (GDM) was observed more frequently in obese mothers (26.67%) than in those with normal BMI (14.29%), without statistical significance (P = 0.482). Infections were more prevalent in obese mothers (10%) compared to those with normal BMI (5%), with a borderline insignificant association (P = 0.063). Preterm labor was higher in obese mothers (18.33%) compared to those with normal BMI (5%), though not statistically significant (P = 0.093). No cases of smoking were reported in either group (P = 0.854), while postpartum weight retention was more frequent among obese mothers (18.33%) compared to those with normal BMI (15%).

Table 5: Maternal and Neonatal Outcomes in Relation to Maternal BMI

			bmi of mother		Total
			18-25	Above 25	
preeclampsia	No	Count	16	11	0.291
		% of Total	26.67%	18.33%	
	yes	Count	14	19	
		% of Total	23.33%	31.67%	
	Total	Count	30	30	
		% of Total	50.0 %	50.0 %	
gestational dm	no	Count	22	14	0.482
		% of Total	35.71%	23.33%	
	yes	Count	8	16	
		% of Total	14.29%	26.67%	
	Total	Count	30	30	
		% of Total	50.0 %	50.0 %	
infection	No	Count	27	24	0.063
		% of Total	45.0%	40.0%	
	Yes	Count	3	6	
		% of Total	5.0%	10.0%	
	Total	Count	30	30	
		% of Total	50.0 %	50.0 %	
preterm labour	No	Count	27	19	0.093
		% of Total	45.0%	31.67%	
	Yes	Count	3	11	
		% of Total	5%	18.33%	
	Total	Count	30	30	
		% of Total	50.0 %	50.0 %	
smoking	No	Count	30	30	0.854
		% of Total	50.0%	50.0%	
	Yes	Count	0	0	
		% of Total	0.0%	0.0%	
	Total	Count	30	30	
		% of Total	50.0%	50.0%	
postpartum weight retention	No	Count	21	19	0.653
		% of Total	35.0%	31.67%	
	yes	Count	9	11	
		% of Total	15.0%	18.33%	
	Total	Count	30	30	

		% of Total	50.0%	50.0%	

Discussion

Of the participants in our study, 71.7% were aged 18–30 years, and the average gravida was 3.32, parity was 2.83, and the abortion rate was 0.47. Helpfully, 50% of the mothers were termed obese. This is indicative of generally high fertility among the study population, and maternal obesity is a common characteristic. A study by Al-Kubaisy et al. (2014) which reported align findings that maternal obesity were prevalent among women of reproductive age and also being associated with multiparity. Given the prevalence of obesity among pregnant women, early weight management strategies may reduce pregnancy related complications [14].

In our study, 68% of obese mothers had undergone cesarean section (CS) compared to 33.3% of mothers who had normal BMI, statistically significant association ($P = 0.021$) . These results suggest that obese mothers have a higher risk of needing CS, likely due to more pregnancy complications like macrosomia, labor dystocia, and cephalopelvic disproportion.

Our findings are in align with that of Faraj et al. (2019) report which obese and overweight women had a significantly higher cesarean section rate than normal BMI. It found that over 30% of women with BMI $\geq$ 25 had a CS, the results aligned with many researchers on the statement of obesity being a strong predictor of surgical delivery. Higher rates of CS in obese women may occur because of prolonged labor, impaired uterine contractions, and a larger fetus, all of which often require medical intervention. Given the physical and metabolic assurances that CS provide pregnant women, these findings reiterate the need for preconception weight management to lower the risk of CS and CS-related complications[15].

In our study fetal distress (17.5%), previous CS (15%) and Cephalopelvic disproportion (7.5%) were the commonest indications for CS while prolonged labor was frequent in normal BMI mothers (22.5% vs. 7.5% among the obese mothers). No statistically significant association between indications for CS and maternal BMI was noted (P = 0.386). , Also, the association between obesity with a higher CS rate could be related to the fact that the reasons for CS do not vary significantly in obese and non-obese mothers.

Our findings are concordant with the study of Majeed et al. (2018), the reported that fetal distress and cephalopelvic disproportion ranked as the first two reasons of CS among the obese mothers. They explain that these factors increase the risk for fetal distress resulting from placental insufficiency and metabolic changes that may decrease fetal oxygenation. Larger maternal sheath out and excess maternal adiposity may result in mechanical difficulties during labor and lead to failure of vaginal delivery (McCarthy et al., 2000). Research such as this indicates obese pregnant women require closer fetal monitoring and planning for their delivery to reduce perinatal risks[16].

In our study 20.31% of neonates born to obese mothers had a birth weight of more than 4 kg compared to 4.69% of neonates born to mother with normal BMI. In contrast, 10.94% of newborns born to mothers with obesity had a birth weight≥2.5 kg versus 7.81% in the normal BMI group. These differences however did not reach statistical significance with regards to maternal BMI and neonatal birth weight (P = 0.347). However, the studied trend indicates that maternal obesity could be a risk factor for fetal macrosomia, which is a well-known consequence of excess gestational weight gain and metabolic dysregulation.

Our findings were corroborated by the study of Bahaa et al. (2019) that maternal obesity was significantly associated with higher fetal birth weight and with the increased incidence of macrosomia among the obese mothers. In women with

obesity, the most common mechanism is thought to be insulin resistance and excessive nutrient transfer to the fetus, which might lead to accelerated fetal growth and an increased rate of complications such as shoulder dystocia and trauma to the newborn at birth. These results reinforce the need for dietary advise and glucose monitoring in obese expectant mothers to decrease the risk for fetal macrosomia[17].

Maternal BMI may be an independent risk factor for adverse pregnancy outcomes. In our study, there were higher rates of preeclampsia (31.67% vs 23.33%), GDM (26.67% vs 14.29%), and preterm labor (18.33% vs 5%) with maternal obesity compared to mothers with normal BMI. However, these associations were statistically nonsignificant. The prevalence of postpartum weight retention was also found to be higher among obese mothers (18.33%) than normal BMI mothers (15%). This outcome suggests that although obesity has been shown to be a contributing factor to adverse pregnancy outcomes, there may be additional factors such as genetics, metabolic induction and antenatal care that also contribute greatly.

Our findings are similar to the Al-Hijazi et al. (2014) , it was shown that obese women had significantly higher rates of preeclampsia, GDM and preterm labor. Excess adiposity is also associated with increased chronic inflammation, enzyme pathways leading to endothelial dysfunction and insulin resistance, which may endorse pregnant women to develop hypertensive disorders and metabolic complications during pregnancy. Issues in driving the outcome home Their work also highlighted the fact that maternal obesity was an independent risk factor for both neonatal complications, such as increased NICU admissions and macrosomia-associated birth injuries. These findings emphasize the importance of early screening, lifestyle changes, and personalized prenatal management of obese women in pregnancy to reduce negative maternal and neonatal outcomes[18].

Conclusion

Among mothers with normal BMI, maternal obesity was associated with a higher rate of cesarean deliveries, and a higher prevalence of neonatal birth weights > 4 kg as well as pregnancy complications such as preeclampsia, gestational diabetes, and preterm labor. Although maternal BMI did correlate with mode of delivery (statistical significance P = 0.021), other complications such as infections and hypertensive disorders did not statistically correlate.

Recommendations

1. **Preconception Counseling:** Provide nutritional education and physical activity recommendations that promote weight management and healthy lifestyle behaviors prior to pregnancy.
2. **Lifestyle Changes:** Encourage healthy eating habits and safe exercise in pregnancy to decrease complications.
3. **Education Programs:** Inform pregnant women about obesity risks and the effects on maternal and neonatal health.
4. **Pregnancy-Related advice :** Stress on prevention and management of weight postpartum to avoid chronic diseases associated with obesity.

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