

Article

The Influence of Maternal Body Weight on Childbirth Delivery Method

Enas Jaleel Alobaidy ^{1*}, Rawaa Imad Majeed ², Saja Abbood Khaleel ³

¹College of Medicine, Diyala University, Iraq

²AL-Zahraa Hospital Diyala, Iraq

³Al Batool Teaching Hospital, Diyala, Iraq

* Correspondence: enas@uodiyala.edu.iq

Abstract: Maternal obesity is a significant health concern during pregnancy, impacting both the mother and the offspring. It is associated with various complications and adverse outcomes, including an increased risk of cesarean section delivery and stillbirth. Educating pregnant women on healthy habits and risks can help maintain a normal BMI and reduce the likelihood of complications during childbirth. This study aimed to investigate the link between maternal obesity and the mode of delivery. Data were collected from 100 pregnant women, categorizing them based on their BMI. The mode of delivery, either vaginal or cesarean section, was recorded and analyzed in relation to their BMI. The study found that women with normal weight or slight weight gain were more likely to have a natural birth. In contrast, obese women were more likely to undergo cesarean sections. The data indicated a clear correlation between higher BMI and increased risk of complications during delivery. Maternal obesity significantly increases the risk of cesarean section delivery and other complications during childbirth. Maintaining a normal BMI through healthy habits can reduce these risks and promote better outcomes for both mother and infant. Future research should focus on developing and implementing interventions to optimize outcomes for both mother and infant. Additionally, educating pregnant women on the importance of maintaining a healthy BMI and the potential risks associated with obesity during pregnancy is crucial.

Keywords: Maternal Obesity, Pregnancy Complications, Mode of Delivery, Cesarean Section, and Healthy BMI

1. Introduction

The prevalence of obesity globally has seen a significant rise in recent decades, termed by the World Health Organization (WHO) as a "global epidemic," with the number of overweight and obese individuals nearly tripling between 1975 and 2016 (James WP, 2008). Correspondingly, maternal obesity rates have also been on the rise, emerging as a critical health concern during pregnancy (James WP, 2008). Obesity not only impacts the mother but also affects her offspring, leading to various complications such as gestational hypertension, diabetes, pre-eclampsia, premature delivery, and spontaneous abortions (Fitzsimons KJ et al., 2009). The fetus faces an increased risk of congenital defects and macrosomia, with recent studies indicating potential long-term health implications extending into adulthood (Catalano PM and Shankar K, 2017). This heightened morbidity and mortality due to maternal obesity contribute to

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increased healthcare costs and pose a public health threat. Various guidelines for managing obesity during pregnancy advocate for comprehensive approaches, including behavioral lifestyle interventions involving diet and exercise (Catalano PM and Shankar K, 2017). With the prevalence of maternal obesity rising, maternity care clinicians inevitably encounter unique challenges during pregnancy and delivery. Maternal body weight significantly influences the likelihood of impaired fertility, miscarriages, fetal anomalies, birth risks, and long-term adverse effects on both mothers and offspring, underscoring the importance of differentiated basic research (Strauss A, 2021). According to the World Health Organization, women are categorized into four BMI groups: underweight (<18.5 kg/m²), normal (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), and obese (≥ 30.0 kg/m²) (World Health Organization, 2017). Reports indicate an increasing number of women starting pregnancy overweight (BMI at booking ≥ 25 kg/m²), with rates ranging from 15% to 30% (Papoutsis D et al., 2017; Masho SW et al., 2013). The primary aim of this research is to examine the potential link between maternal obesity and the mode of delivery. Specifically, the study will investigate whether there is a significant association between maternal obesity and the method of childbirth, such as vaginal delivery or cesarean section. Maternal obesity is a significant public health concern that has been linked to an increased risk of adverse pregnancy outcomes, including stillbirth (Huang, Ouyang, and Redding 2019). A meta-analysis by Chu et al. (2007) found that maternal obesity was associated with a higher risk of stillbirth compared to normal-weight mothers. The authors suggested that the increased risk may be due to various mechanisms, such as placental dysfunction, metabolic abnormalities, and increased risk of gestational diabetes and hypertension in obese women. The mode of delivery is another important aspect that can be influenced by maternal body weight. A study by Lynch et al. (2008) examined the relationship between obesity and the mode of delivery in both primigravid and multigravida women (Gul et al. 2020). The researchers found that obese women, regardless of parity, had a higher likelihood of undergoing a cesarean section compared to normal-weight women. This finding highlights the potential challenges that healthcare providers may face when managing labor and delivery in women with obesity. Similarly, Majeed et al. (2018) investigated the factors associated with the mode of delivery in obese women. Their study revealed that maternal obesity was a significant predictor of cesarean delivery, along with other factors such as advanced maternal age, gestational diabetes, and

macrosomia. These findings suggest that the presence of maternal obesity can complicate the delivery process and increase the risk of interventions, such as cesarean sections.(Vats et al. 2021) The existing literature suggests that maternal body weight, particularly obesity, can have a substantial impact on the mode of delivery and the overall pregnancy outcomes. Obese women are more likely to experience complications during labor and delivery, leading to a higher rate of cesarean sections. Additionally, maternal obesity has been linked to an increased risk of stillbirth, highlighting the need for comprehensive prenatal care and management strategies to address this public health concern. Future research should continue to explore the specific mechanisms by which maternal body weight influences the delivery process and explore potential interventions to optimize outcomes for both the mother and the infant(Zhang, Zhang, and Wang 2019). Healthcare providers should also be aware of the increased risks associated with maternal obesity and incorporate appropriate screening, counseling, and management strategies into their clinical practice(Lewandowska 2021).

2. Materials and Methods

2.1 Study design

This is a prospective randomized study to illustrate the impact of maternal obesity on mode of delivery. The study was evaluated between October 2023 and December 2023 in AL-Batoul Hospital for Obstetrics and Gynecology in Baquba/ Diyala/ Iraq(Li et al. 2022).

2.1.1 Patients' selection

Data from 100 pregnant women who attempted AL-Batoul hospital for delivery were evaluated and selected for the study. Detailed socio-demographical information, medical history, mode of delivery, together with other information were collected. Information like age, weight just before delivery, height was obtained to evaluate patient's BMI. Information about smoking habits and dietary habits were obtained to evaluate the health of the patient. All this information was obtained using a specially designed data sheet (appendix 1).

2.1.2 Patients' criteria

Patients' criteria for this study included women with normal pregnancies at 37 weeks of gestation, both primigravida and multigravida with natural pregnancies, and those with single live vertical embryos. Exclusion criteria were pregnant women who had undergone selective cesarean sections, as well as those with hypertension, asthma, or diabetic disease. Additionally, women with abnormal fetal development were also excluded from the study(Choi et al. 2022).

2.1.3 Study groups

The samples were divided into three groups according to age

Group 1: women under 18 years old

Group 2: women between 18 and 35 years old

Group 3: women older than 35 years

2.1.4 Anthropometric measurements

The study participants underwent anthropometric measurements to collect relevant data. Their weight was recorded using a precise digital scale, with the participants wearing minimal clothing, and the results were documented to the nearest 0.1 kg(Roland et al. 2020). Height was measured using a specialized device, with the participants not wearing shoes, and the measurements were recorded to the nearest 0.1 cm. Based on the 2000 guidelines from the Center for Disease Control and Prevention (CDC), the participants' body mass index (BMI) percentile was determined. BMI is a metric that calculates the ratio between an individual's weight and height, obtained by dividing the weight in kilograms by the square of the height in meters ($BMI=kg/m^2$). This BMI measurement was used to assess the participants' weight status in relation to their height(Choi et al. 2022).

2.1.5 Statistical analysis

The statistical analysis for this study was conducted using the SPSS program, version 24. Fisher's exact test of independence was used to assess the association between the variables. If the p-value obtained from the analysis was less than 0.05, the result was considered statistically significant, indicating a significant association between the variables. Conversely, if the p-value was greater than 0.05, the

result was deemed not statistically significant, suggesting no significant association between the variables(Carlin et al. 2019).

3. Results

1.1. Socio-Demographic Characteristics of Study Participants

The current study was designed for the purpose of evaluating the maternal obesity and its effect on mode of delivery among pregnant women. Data from 100 pregnant women were collected which their age range from less than 18 years old and over 35 years old divided into 3 age groups (less than 18 years, 18-35 years old, over 35 years old). Table (3-1), set the socio-demographic data for patients including: age, residence, level of education, women BMI, parity, family history of being overweight and mode of delivery.

Most of the pregnant women were non-educated (30%), equal percentage were found with 28% of the women had primary and secondary education level(Berger et al. 2019). Only 7% had college and postgraduate education level and 91% of them were un-employed and only 6% of them had work. 52% of the study pregnant women were living in urban places and 48% in rural places. According to the collected data which showed that most of the study women were between 18-35 years old with 83%, women less than 18 years were 10% and only 7% of the women were over 35 years old and most of them had normal BMI under 24kg/m² and only 28% had a family history of being overweight. 55% had multigravida and 45% were Primigravida. According to the mode of delivery 77% of the study pregnant women had vaginal delivery and only 23% had cesarean section(Li et al. 2019).

Table 1. Distribution of selected socio-demographic variables among studied women.

Socio-Demographic Characteristics		Frequency	Percentage %
Women Education	Non-educated	30	30%
	Primary	28	28%
	Secondary	28	28%
	College	7	7%
	Post-graduated	7	7%
	Total	100	100%
Employed Women	Un-employed	91	91%
	Retired	3	3%
	Work	6	6%

	Total	100	100%
Residence status	Rural	48	48%
	Urban	52	52%
	Total	100	100%
Age at delivery	<18 yrs.	10	10%
	18-35 yrs.	83	83%
	>35 yrs.	7	7%
	Total	100	100%
Women BMI	Normal	43	43%
	Overweight	37	37%
	Obese	20	20%
	Total	100	100%
Parity	Primigravida	45	45%
	Multigravida	55	55%
	Total	100	100%
Family history of being overweight	Yes	28	28%
	No	72	72%
	Total	100	100%
Mode of delivery	Vaginal delivery	77	77%
	CS	23	23%
	Total	100	100%

1.2. Distribution Of Delivery Mode and Maternal Characteristics

According to the study data, the distribution of studied sample according to the mode of delivery and showed that (23) of the pregnant women who had a vaginal delivery were non-educated and (7) pregnant women who went under CS were non-educated, (21) pregnant women who went under vaginal delivery and (6) pregnant women who went under CS had primary education level. The statistical analysis of these value was p value = 0.7805 which show non-significant results(Drucker et al. 2019).

About (68) of pregnant women who went under vaginal delivery and (22) pregnant women who went under CS were unemployed, (5) pregnant women who went under vaginal delivery and (1) women who had CS were worked women, this result is non-significant because the p value equal to 1.00. According to the residence status (36) pregnant women who went under vaginal delivery and (12) pregnant women who had CS were living in the rural side and (41) pregnant women who had vaginal delivery and (11) pregnant women who had CS were living in the urban side, this result is non-significant because the p value equal to 0.8125 which >0.05(Chen, Chen, and Hsu 2020).

According to the collected data women who had a vaginal delivery (38) of them had normal BMI, (24) were overweight and (15)

obese, while women who had CS (6) of them had normal BMI, (12) were overweight and (5) were obese. About (7) pregnant women who had vaginal delivery and (3) pregnant women who had CS were under 18 years old, (64) pregnant women who had vaginal delivery and (19) pregnant women who had CS were between 18-35 years old, these results were non-significant because the p value is more than 0.05. Only (25) pregnant women who had vaginal delivery and (20) pregnant women who had CS were Primigravida, (52) pregnant women who had vaginal delivery and (3) pregnant women who had CS were multigravida, these results non-significant because the p value was less than 0.05(Tahir et al. 2019).

Table 2. Distribution of delivery mode and maternal characteristics.

maternal obesity and maternal characteristic		Maternal BMI		P Value
		Normal	Overweight	
Women education	Non educated	6	24	0.7410
	Primary	5	23	
	Secondary	9	19	
	College	2	5	
	Post-graduated	1	6	
	Total	23	77	
Employed women	Unemployed	21	70	1.000
	Work	1	5	
	Retired	0	3	
	Total	22	78	
Smoker women	Yes	0	0	1.000
	No	23	77	
	Total	23	77	
Age at delivery	<18 yrs.	4	7	0.1932
	18-35 yrs.	18	64	
	>35 yrs.	0	7	
	Total	22	78	
Parity	Primigravida	10	35	1.00
	Multigravida	13	42	
	Total	23	77	

2. Discussion

Obesity is considered one of the important problems that women face during pregnancy because it has a major impact on the health of the mother and the child(Dalbye et al. 2021). Through our case study, we tried to find out the extent of the effect of obesity on the method of birth. We found that most of the women participating in the study gave birth vaginally about (77%) out of (100) women in the study, and this suggests that most of the women had a normal weight (43%).

From this we conclude that having a normal weight helps women give birth vaginally and avoid a cesarean section, and this is resembling Khawla Ali Majeed et al., in cross-sectional study conducted in Baghdad with 340 pregnant women divided into three age groups which found an association between maternal obesity and mode of delivery as obese women with a higher risk of having a CS (Majeed, Khawla et al., 2018).

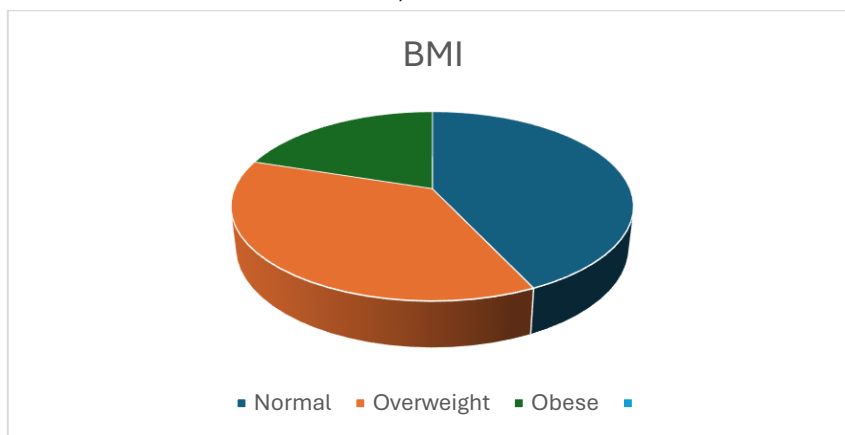


Figure (1). Distribution of women BMI in the study sample.

About 42% of pregnant women studied were obese, 41% were overweight and only 17% of pregnant studied women had normal BMI. The highest proportion of pregnant women studied were 18-35 years old (83%), and lower proportion age was >35 years old (7%) while the age of pregnant women less than 18 years (10%). According to the mode of delivery (77%) of the study pregnant women had vaginal delivery and (23%) had cesarean section, figure (3). As for the frequency of parity (55%) of the study pregnant women were multigravida and (45%) were Primigravida, figure (2).

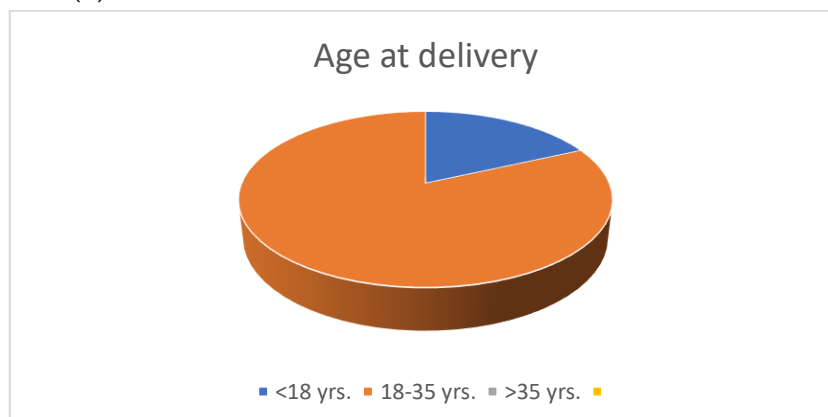


Figure (2). Distribution of women age at delivery in the study samples.

In contrast, a retrospective cohort study conducted by Lynch et al. examined the effects of maternal body mass index (BMI) on the mode of

delivery for both primigravida (first-time mothers) and multigravida (mothers with previous pregnancies) women. The study involved 5,162 participants and concluded that an increase in maternal BMI progressively adversely impacts the rates of vaginal delivery for both primigravida and multigravida women. Additionally, a meta-analysis by Chu et al. reviewed several studies that reported an increased risk of cesarean delivery among overweight or obese women compared to those with a normal weight. The findings indicate that the risk of a cesarean delivery is approximately two times higher for obese women and three times higher for severely obese women compared to those with a normal weight during pregnancy (Windham et al. 2019).

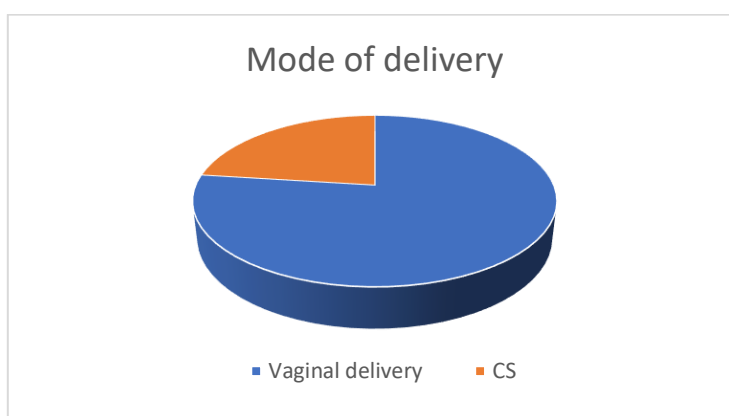


Figure (3). Frequency of mode of delivery in the study samples.

Age is considered one of the most important factors that may influence mode of delivery. This study shows that the age of most women ranges between 18-35 years with no association between age and mode of delivery as shown in figure (2), and this is also what was determined by Khawla Ali Majeed et al., in cross-sectional study conducted in Baghdad with 340 pregnant women (63%) of them were between 18-35 year which also shows there is no significant association between age and mode of delivery (Majeed, Khawla et al., 2018).

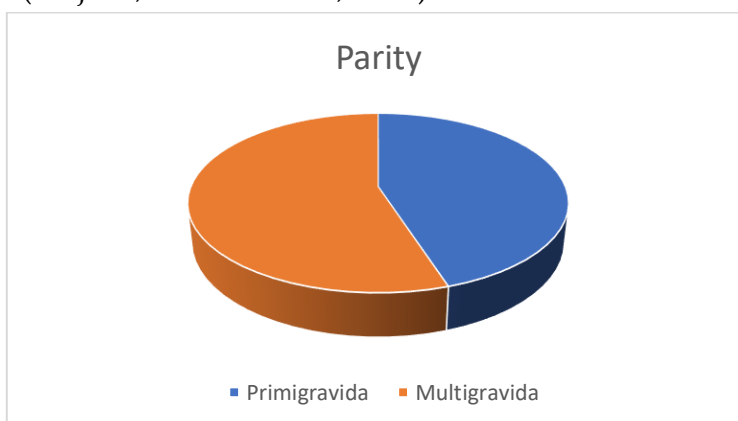


Figure (4). Frequency of parity in the study samples.

The current study has shown that there is a relationship between the level of education and obesity, highly educated women tend to demonstrate better awareness of health practices, to avoid obesity. and our current study has proven this, as most of the women were educated but most of them were unemployed and there is no association relationship between mode of delivery and education, this is was also seen by Khawla Ali Majeed et al., in cross-sectional study conducted in Baghdad with 340 pregnant women only 130(38.2%) of the sample included in this study were working, while the majority of women 210 (61.8%) were not working (unemployed). with significantly associated with employed women with the mode of delivery (cesarean section)(Berger et al. 2019).

4. Discussion

Obesity is considered one of the most widespread problems of our time and has the greatest impact on human health. Obesity is widespread among women, especially during pregnancy, and constitutes a major risk factor for the health of the mother and child, as it can lead to several diseases and major risks, including gestational diabetes, gestational hypertension, the birth of a child with a low weight, and others. Our current study focused on studying the effect of obesity in pregnancy on the method of childbirth. We tried to see whether obesity influences making women unable to give birth naturally and forcing women to undergo a caesarean section. We found that most of the women who were taken as samples in this study had a normal weight mass or a slight increase in weight, and this is what helped them have a more natural birth. Increasing weight during pregnancy may cause a lot of side effect on the mother and fetus and on the mode of delivery as if the women had normal BMI will help her in having vaginal delivery and avoid her CS because increasing BMI make it difficult to have vaginal delivery. Consuming healthy food and good exercise prevent all these risks also the advice from the physician and letting the patient aware of

all the possible risks will help the pregnant women maintain normal BMI

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