Frequency Of Miscarriage Among Obese Pregnant Women

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Abstract

Background: Obesity, a global epidemic, significantly raises the risk of complications during pregnancy, including miscarriage. The impact of obesity involves hormonal imbalances, inflammation, and oxidative stress, emphasizing the need for preconception counselling and lifestyle changes.

Aims of the study: To estimate the frequency of miscarriage among obese pregnant women in Basra maternity and children hospital in Basra city/ Iraq, and to compare them with normal weight pregnant women.

Subjects and Methods: A comparative study was conducted at Basrah Maternity and Children Hospital from the 1st of October 2023 to the 1st of July 2024. Three groups were followed up to 24 weeks of gestation, matched for age and parity. Data collection included sociodemographic and pregnancy-related characteristics, anthropometric measurements, and follow-up for miscarriage occurrence.

Results: The study found that miscarriage rates were highest among obese women (33.3%), followed by overweight women (15.4%), and lowest in the control group (9.6%), with a statistically significant difference (p=0.04). Miscarriage was most prevalent among women aged 30-39, but this was not statistically significant. Obese women experienced miscarriages at a mean gestational age of 10.2 ± 3.1 weeks, compared to 13.9 ± 2.7 weeks in the control group, though this difference was not statistically significant (p=0.165).

Conclusion: The study revealed a significant association between higher BMI and increased miscarriage risk, with obese women at the highest risk. Sociodemographic and clinical characteristics were consistent across groups, indicating BMI as an independent risk factor. Poor ANC was more common among those with miscarriages, especially in the obese group, but the timing of miscarriage was not significantly affected by BMI.

Keywords: Frequency, Miscarriage, Obesity, Pregnant Women.

INTRODUCTION

The worldwide prevalence of obesity has markedly increased in recent decades, and the World Health Organization (WHO) has characterized this trend as a "global epidemic," with the number of individuals who are overweight or obese approximately tripling between 1975 and 2016. Consequently, there has been an increase in the incidence of maternal obesity, making it a significant health concern during pregnancy. Obesity has an impact on both the mother and children and is linked to many complications, which include gestational hypertension, diabetes, preeclampsia, premature delivery, and spontaneous abortions (1).

For adults, a body mass index (BMI) between 18.5 and 24.9 is considered normal; a BMI between 25.0 and 29.9 is classified as overweight; and a BMI greater than 30.0 falls into the obese group. Even though the rise in body water content during pregnancy decreases the correlation between increasing BMI and morbidity, BMI is still often used to screen for and manage obesity during pregnancy (2).

A miscarriage occurs when the results of conception spontaneously explode or are removed (500 grams or less in weight and fewer than 24 weeks gestational age). (3). Approximately 15% of clinically diagnosed pregnancies worldwide result in miscarriage, while the true rate is likely higher in developing nations owing to unreported miscarriages that often occur at home (4).

Obesity, characterized by excessive body fat accumulation, has emerged as a significant risk factor for miscarriage and adverse pregnancy outcomes.

Numerous studies have demonstrated a strong association between obesity and an increased risk of miscarriage, with obese women experiencing higher rates of pregnancy loss compared to women of normal weight. The underlying mechanisms linking obesity to miscarriage are multifactorial and may include hormonal imbalances, impaired endometrial receptivity, chronic inflammation, and oxidative stress. Additionally, obesity-related comorbidities such as insulin resistance, hypertension, and dyslipidemia further exacerbate the risk of miscarriage (5,6).

It is associated with alterations in the hypothalamic-pituitary-ovarian axis, leading to irregular menstrual cycles and suboptimal ovulatory function, which can adversely affect fertility and increase the likelihood of miscarriage. Moreover, adipose tissue serves as a reservoir for estrogen production, resulting in elevated estrogen levels and disrupted estrogen-progesterone balance, which are critical for maintaining early pregnancy viability (7).

Chronic inflammation and oxidative stress, commonly observed in obese individuals, contribute to placental dysfunction and pregnancy complications, including miscarriage. Adipose tissue secretes pro-inflammatory cytokines and adipokines, which promote a state of low-grade inflammation and endothelial dysfunction, impairing placental development and function. Furthermore, obesity is associated with increased oxidative stress, characterized by an imbalance between reactive oxygen species (ROS) production and antioxidant defense mechanisms, which can disrupt trophoblastic function and foetal-maternal signaling pathways, leading to pregnancy loss (8).

Addressing obesity-related factors through lifestyle modifications, including diet, exercise, and weight management, may help reduce the risk of miscarriage and improve pregnancy outcomes in obese women. Additionally, preconception counseling and personalized interventions aimed at optimizing metabolic and reproductive health are essential for mitigating the adverse effects of obesity on fertility and pregnancy (9).

Overall, the management of miscarriage among obese pregnant individuals requires a patient-centered approach that addresses the physical, emotional, and social needs of the individual while acknowledging the complex interplay between obesity and pregnancy loss (10).

This study aim to estimate the frequency of miscarriage among obese pregnant women in Basra maternity and children hospital in Basra city/ Iraq, and to compare them with normal weight pregnant women.

METHODS

This is a comparative study conducted in Basrah Maternity and Children Hospital. For 6 months duration from the 1st of October 2023 till the 1st of July 2024. To determine the prevalence of miscarriage among obese pregnant women in comparison with those normal healthy non-obese pregnant women.

Ninety-nine pregnant women studied up to 24 weeks of gestation. They matched for age, and parity. It was taken into consideration the residence and occupation. They were divided into:

Group 1: twenty-one obese women with BMI>29.9

Group 2: twenty-six overweight women with a BMI between 25-29.9

Group 3: fifty-two normal weight women with BMI ≤ 24.9.

All groups were matched for age and parity.

All women who agreed to participate in our research were included in the study. Women with previous abortions, Women with chronic medical diseases, Women with medical illness during current pregnancy (PE, and gestational diabetes), Women who had previous surgery, women who had a serious complication of childbirth (previous congenital anomalies), women with a mental pathology, and women who do not consent were excluded.

The data was collected from the Basrah Teaching Hospital for Maternity and Children outpatient clinic or labor ward. A questionnaire was

developed for the sake of this study. The questionnaire includes the following: Socio-demographic characteristics of the patient: age, occupation residency, and educational level. Pregnancy-related characteristics: gravity, party, any previous abortions, current pregnancy complications, gestational age. The mother's anthropometric measurements were assessed including weight, height, and BMI.

Weight: the weight of the women is taken with a portable scale, a scale of the type SECA. The women are weighed with the least amount of clothing possible, well straight in a standing position, the arms in the extension of the body. The scale is calibrated regularly and is calibrated several times during each session. (11)

Height: It has been taken with the help of a graduated height up to 2 m. is measured barefoot, the heels joined, the arms extended along the body, the heels, the shoulders, and the buttocks touching the height. (11).

Calculation of BMI: the gestational body mass index was calculated by dividing weight over height squared. Then, the women were further subdivided according to WHO recommendations into four BMI groups (11):

- The underweight group (BMI < 18.5 kg/m2)
- The normal weight group (18.5-24.9 kg/m2)
- The overweight group (25-29.9 kg/m2)
- The obese group (BMI ≥ 30 kg/m2): this group subdivided into
- Class 1 obesity: BMI of 30 to 34.9 kg/m2
- Class 2 obesity: BMI of 35 to 39.9 kg/m2
- Class 3 obesity (severe obesity): BMI of 40 kg/m2 or higher (11).

A systemic examination and blood pressure measurement were carried out.

Women were followed up till the 24 weeks of gestation and those who developed miscarriage were recorded.

The official endorsement was obtained from the Basrah Health Directorate on carrying out this study. Consent was taken from all groups of patients to participate.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 26. The appropriate statistical tests were performed, and the level of significance (p-value) was ≤ 0.05.

RESULTS

The results of 21 obese women, 26 overweight, and 52 control women with normal body weight were presented below. Their mean age was around 26 years, and there is no significant difference regarding the age of different groups p-value=0.826. More than half of women lived in urban areas, and there is no significant difference between the groups. P-value=0.920. Regarding the educational level, the highest percentage of women in the groups had primary education. Most of the participating women were housewives, there are no significant statistical differences between groups regarding all sociodemographic characteristics.

Table 1: The Participant Women's Sociodemographic Characteristics

Variables		Obese women Group (n=21)	Overweight Group (n=26)	Control group (n=52)	P-value
Age	Mean ±SD	27.6 ± 2.1	26.2 ±2.4	25.8± 4.4	0.826
	< 20	2 (9.5)	4 (15.4)	11 (21.2)	
	20-29	12 (57.2)	14 (53.8)	26 (50.0)	
	30-39	7 (33.3)	8 (30.8)	15 (28.8)	
Residency	Rural	9 (42.9)	12 (46.2)	25 (48.1)	0.920
	Urban	12 (57.1)	14 (53.8)	27 (51.9)	
Educational level	Primary	10 (47.6)	12 (46.2)	25 (48.1)	0.858
	Secondary	7 (33.3)	8 (30.8)	20 (38.5)	
	College and higher education	4 (19.1)	6 (23.1)	7 (13.4)	
Employment status	Housewives	15 (71.4)	17 (65.4)	35 (67.3)	0.904
	Employed	6 (28.5)	9 (34.6)	17 (32.7)	
Total		21 (100.0)	26 (100.0)	52 (100.0)	99

Table 2 shows the clinical characteristics of the women under study. There are no significant differences between the groups regarding the parity, and ANC since p-value > 0.05. The highest percentage of women were having 1-4 children, and had a inadequate ANC.

Table 2: The Clinical Characteristics of the Participant's Women

Variables		Obese women Group (n=21)	Overweight Group (n=26)	Control group (n=52)	P-value
Parity	Nulliparous	9 (42.9)	12 (46.2)	20 (38.5)	0.917
	1-4	10 (47.6)	10 (38.5)	24 (46.2)	
	5 and more	2 (9.5)	4 (15.3)	8 (15.3)	
ANC	Adequate	8 (38.1)	10 (38.5)	27 (51.9)	0.397
	Inadequate	13 (61.9)	16 (61.5)	25 (48.1)	

The association between miscarriage and maternal BMI is presented in Table 3. The prevalence of miscarriage was the highest among obese women (33.3%) than among women with overweight (15.4%) and the lowest percentage was among women with normal body weight (9.6%). This difference was statistically significant since the p-value was 0.04.

Table 3: The Association Between Miscarriage and Maternal BMI

Variable		Obese women Group (n= 21)	Overweight Group (n=26)	Control group (n=52)	P-value
miscarriage	Yes	7 (33.3)	4 (15.4)	5 (9.6)	0.04
	No	14 (66.7)	22 (84.6)	47 (90.4)	

Figure 1 shows the frequency of miscarriage among participant women. The highest percentage of miscarriage was among obese women while most of the women in the control group completed their pregnancy.
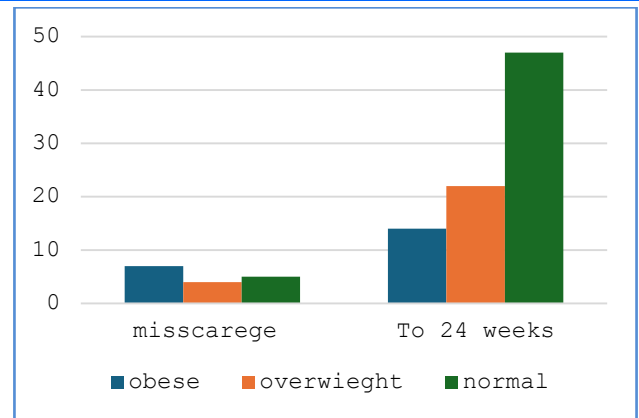

Figure 1: The Frequency of Miscarriage Among Participant Women

The association between miscarriage and maternal characteristics is presented in Table 4. The highest percentage of miscarriage was among women above 30 years old and there is no significant association between the age and BMI. P-value=0.905. There is no significant association between the parity, and ANC and miscarriage since the p-value >0.05.

Table 4: The Association Between Miscarriage and Maternal Characteristics

Variables		Obese women Group (n=7)	Overweight Group (n=4)	Control group (n=5)	P-value
Age	< 20	2 (28.6)	1 (25.0)	1 (20.0)	0.905
	20-29	1 (14.2)	1 (25.0)	1 (20.0)	
	30-39	4 (57.2)	2 (50.0)	3 (60.0)	
Parity	Nulliparous	2 (28.6)	1 (25.0)	2 (40.0)	0.679
	1-4	1 (14.2)	0 (0.0)	2 (40.0)	
	5	4 (57.2)	3 (75.0)	1 (20.0)	
ANC	Adequate	2 (28.6)	1 (25.0)	2 (40.0)	0.872
	Inadequate	5(71.4)	3 (75.0)	3(60.0)	

Table 5 shows the association between miscarriage and gestational age, there is no significant difference in the gestational age of miscarriage between the groups, but obese women show a lower mean of gestational age 10.2 weeks in comparison to 13.9 weeks in women with normal weight.

Table 5: The Association Between Miscarriage and Gestational Age

Variables		Obese women Group (n=7)	Overweight Group (n=4)	Control group (n=5)	P-value
Gestational age for women with miscarriage	Mean ±SD	10.2 ± 3.1	12.4 ± 4.2	13.9 ± 2.7	0.165

DISCUSSION

Miscarriage is a significant public health concern, affecting a substantial proportion of pregnancies worldwide (12). Several factors, including maternal body mass index (BMI), have been implicated in the risk of miscarriage, with obesity and overweight status potentially increasing this risk (13). This study aimed to explore the relationship between maternal BMI and the prevalence of miscarriage, while also examining various sociodemographic and clinical characteristics of the participants.

The sociodemographic variables across the obese, overweight, and control groups showed no statistically significant differences in age, residency, educational level, employment status, or socioeconomic status. This finding suggests that these factors were well-matched among the groups, reducing the likelihood that they confounded the relationship between BMI and miscarriage risk. The lack of significant difference in age distribution is consistent with other studies, which have found age to be a controlled factor in miscarriage risk when BMI is the primary variable of interest as same as was done by Iqbal et al. (2021) (14).

Clinical characteristics such as parity, and adequacy of antenatal care (ANC) were also not significantly different among the groups. This uniformity across clinical variables is crucial because it allows the study to isolate BMI as a variable influencing the miscarriage rate. Previous research by Robinson et al. (2013 and Yland et al. (2023) have similarly noted that parity and contraceptive use do not substantially vary with BMI in a way that affects pregnancy outcomes (15, 16). The absence of significant differences in ANC utilization among the groups also aligns with findings from studies that emphasize the importance of ANC but indicate that its adequacy is often consistent across different BMI categories (17, 18).

The prevalence of miscarriage was significantly higher in the obese group (33.3%) compared to the overweight (15.4%) and control groups (9.6%), with a P-value of 0.04, indicating a statistically significant association between higher BMI and increased miscarriage risk. This finding is consistent with previous studies that have reported a higher miscarriage risk among obese women, possibly due to metabolic, hormonal, and inflammatory changes associated with obesity (6, 19). The findings of this study also align with the "obesity paradox" concept, where obesity is linked to adverse pregnancy outcomes despite sometimes paradoxical protective effects in other health domains (20).

A study by O'Dwyer et al. (2012) compares the incidence of spontaneous miscarriage in women with moderate to severe obesity to that in women with a normal BMI, of the 3,000 women enrolled, the miscarriage rate overall was 3.9% (n = 117), the mean gestational age at enrolment was 11.1 weeks. In classes two and three (BMI > 34.9 kg/m2 obese primigravida the miscarriage rate was 11.3% (n = 8) compared with 2.7% (n = 24) in the normal BMI category (p = 0.003), and 3.7% (n = 5) in class one obese category (not significant) and these findings in agreement with our results (21).

When examining the characteristics of women who experienced a miscarriage, no significant differences were found between the obese, overweight, and control groups concerning age, parity, and ANC. However, the higher proportion of poor ANC among women who experienced miscarriages, particularly in the obese group, suggests that inadequate ANC could exacerbate the risks posed by obesity. Although these findings did not reach statistical significance, they are in line with the hypothesis that poor ANC may compound the adverse effects of obesity on pregnancy outcomes (22, 23).

CONCLUSION AND RECOMMENDATIONS

The study found no significant difference in the gestational age at which miscarriages occurred among the groups, with a P-value of 0.165. This result indicates that while obese women are more likely to experience a miscarriage, the timing of the miscarriage does not significantly differ from that of overweight or normal-weight women. This finding contrasts with some studies that have suggested a link between obesity and earlier miscarriage (18, 7), possibly due to sample size limitations or differences in study populations.

This study highlights the significant impact of maternal obesity on the prevalence of miscarriage, reinforcing the need for targeted interventions to manage obesity in women of childbearing age. The findings are consistent with existing literature on the subject but also suggest areas for further research, particularly concerning the role of ANC and the timing of miscarriages in obese women. The uniformity of sociodemographic and clinical characteristics across groups strengthens the validity of these findings, underscoring the importance of BMI as an independent risk factor for miscarriage.

Conflicts of Interests: None

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Ethical Approvals: Ethical approval for the study was obtained from the relevant institutional review board, and informed consent was acquired from all participants prior to their inclusion in the study.

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