Original Article

Outcome of Pregnancies in Women Presenting With Increased Body Mass Index

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Abstract

Objective: To determine the pregnancy outcomes in women with baseline body mass index of more than 25 kg/m2, at a tertiary care Hospital.

Methodology: A descriptive case series study was conducted in the Department of Gynecology, Unit II, at Sheikh Zayed Hospital, Rahim Yar Khan, from February 2020 to August 2020. Cases included women aged 20 to 40 years with a singleton pregnancy of less than 12 weeks and a BMI greater than 25. They were monitored throughout the pregnancy to assess the development of gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), miscarriage, preterm labor, and the need for cesarean section. All data were entered and analyzed using SPSS version 26.

Results: Mean age of the patients was 27.73±3.81 years and mean BMI was 28.89±5.11 kg/m2. Out of all, 12.33% patients had DM, 13.7% had HTN, followed by 6.85% cased gestational DM, PIH was in 27.4% cases, miscarriage was in 7.88% cases, pre-term labor was in 21.58% cases and C section was done in 23.29% women. GDM was more common in those with a history of hypertension (p = 0.01), while PIH was higher in cases with three or fewer prenatal visits (p = 0.04). Miscarriages were significantly more frequent with a BMI > 30 (p = 0.03), and preterm labor was more prevalent in those with >3 prenatal visits (p = 0.03). Cesarean section rates were significantly higher in women aged 30–40 years (p = 0.008).

Conclusion: Study revealed that the women with a BMI greater than 25 were at a higher risk of developing pregnancy complications, including GDM, PIH, miscarriage, preterm labor, and cesarean section.

Keywords: GDM, PIH, BMI, Miscarriage, preterm labor

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Introduction

Pregnancy is a critical phase in life of a woman, demanding careful medical concern to ensure both fetal and the maternal well-being. It provides a crucial opportunity to identify potential risks for both the mother and fetus while also preventing the intergenerational transmission of health complications and mental health challenges.[1] In several factors influencing pregnancy outcomes, maternal BMI has emerged as a significant determinant of maternal and neonatal health. The rapid rise in obesity worldwide has prompted the WHO to recognize it as one of the most critical global health challenges of the 21st century.[2,3] Currently, obesity is the most prevalent metabolic disorder and is considered a global epidemic. It is characterized by excessive body fat, which significantly increases the risk of health complications, higher morbidity, and mortality. This growing prevalence has also had a considerable impact on women of reproductive age.[2]

Studies estimates that maternal overweight and obesity contribute to 23.9% of pregnancy-related complications,[4,5] including gestational hypertensive disorders, preterm birth, gestational diabetes, and

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delivering a baby that is large for gestational age. As Asian populations undergo economic and nutritional transitions, the prevalence of obesity is rising. According to a study among overweight and obese women preterm births were 18.5%, 10.5% postdate births, 16% pre-eclampsia, 33% GDM (33%), 2% eclampsia, 8.5% miscarriages, and 25% PIH. For these women, the induction of labor rate was 36.7%. The rate of cesarean sections was 38%, whereas the rate of instrumental deliveries was 6.5%. 5.5% of women experienced postpartum bleeding, whereas 7%, 2%, and 0.5% of women experienced wound infection, endometritis, and DVT, correspondingly.[6] Pre-pregnancy obesity has been linked to an increased risk of preterm birth, but the nature of this relationship remains debated and inconclusive in existing research.

While some studies have identified a positive association between obesity and preterm birth,[7,8] others have found no significant correlation.[7] While few evidences suspected that the raised maternal BMI is linked to higher levels of inflammatory markers, which can lead to preterm labor. Inflammation of the fetal membranes, such as chorioamnionitis, altered placental histopathology frequently underlying factors contributing to the preterm birth.[9] A raised BMI is associated with chronic inflammation, heightened oxidative stress, and disruptions in hormonal balance. Such factors can negatively impact endothelial function and compromise placental blood circulation, potentially leading to adverse outcomes of pregnancy.[10]

Healthcare providers are likely to face higher costs in managing obesity during pregnancy and its associated complications. While interventions aimed at addressing these issues may require significant investment, they have the potential to offset future economic burdens and improve health outcomes for both mothers and their infants.[11] The rising prevalence of obesity in developing countries is largely driven by shifting lifestyles, rapid urbanization, increased consumption of high-calorie foods, and decreased physical activity.[11]

Moreover, earlier studies have often used retrospectively collected data or self-reported BMI, making them susceptible to misclassification and recall bias.[7] Considering the conflicting and inconclusive findings, along with these complications related to maternal obesity, this study has been conducted to investigate the maternal complications among overweight women. Understanding the impact of high BMI on maternal health is essential for developing effective interventions and clinical guidelines. This study may offers important insights into the risks linked to maternal overweight and obesity, helping healthcare providers apply evidence-based strategies for risk assessment, early intervention, and personalized prenatal care.

Methodology

This descriptive case series study was conducted in the Gynecology Unit II at Sheikh Zayed Hospital, Rahim Yar Khan, from February 2020 to August 2020. The study included women aged 20–40 years with a singleton pregnancy of less than 12 weeks' gestation, confirmed by a history of amenorrhea, a BMI greater than 25 kg/m², and an ultrasound showing a biparietal diameter of less than 84 mm, regardless of parity.

Women with multiple pregnancies, a history of previous cesarean section (as determined by medical records and patient history), or a known history of hypertension or diabetes (assessed through medical history) were excluded from the study. The study was conducted after obtaining approval from the Ethical Committee of Sheikh Zayed Hospital. Informed consent was obtained from each patient who met the inclusion criteria. Socio-demographic data, including age, weight, height, BMI, parity, gestational age (weeks), smoking status, educational background, monthly income, employment status (housewife or working woman), family history of diabetes mellitus and hypertension, and the number of prenatal visits, were recorded. Baseline fasting serum sugar levels were measured for all participants and monitored monthly until delivery. If fasting blood sugar exceeded 126 mg/dL, these cases were further evaluated for gestational diabetes mellitus using an oral glucose tolerance test (OGTT). Blood pressure (BP) was measured at each visit. Patients with BP readings exceeding 140/90 mmHg were reassessed after one week, and if hypertension persisted, they were diagnosed with pregnancy-induced hypertension (PIH).

Patients were followed up monthly in the outpatient department and assessed clinically for pregnancy outcomes, including miscarriage. For cases with a gestational age beyond 24 weeks, delivery before 37 weeks was classified as preterm birth. If the pregnancy continued beyond this period, the mode of delivery was recorded, and cases requiring cesarean section (CS) were documented using a standardized proforma. Data analysis was performed using SPSS version 19. A post-stratification chi-square test was applied, with a p-value of ≤0.05 considered statistically significant.

Results

The study included 292 participants with an average age of 27.73±3.81 years, mean gestational age was 35.58 weeks, mean RBS level 97.92±13.94 mg/dL, average BMI was 28.89±5.11 kg/m^2 and mean systolic BP was 114.79±13.51 mmHg. (Table I)

Table I: Descriptive statistics of demographic and clinical variable. (n= 292)

Statistics	Age (years)	G-age (weeks)	RBS (mg/dl)	BMI (kg/m^2)	Systolic BP
Mean	27.73	35.58	97.92	28.89	114.79
SD	3.81	1.87	13.94	5.11	13.51
Minimum	21	30	69	26	90
Maximum	39	39	145	33	145

Out of all study participants, 7.88% were smokers, regarding educational status, 23.29% were educated, whereas 76.71% were uneducated. A history of diabetes mellitus was present in 12.33% of participants, and hypertension was observed in 13.70% (n=40) of the participants, whereas 86.30% (n=252) were normotensive. (Table II)

Table II: Smoking, educational status and medical history of patients. (n= 292)

Variables		N	%
Smoking	Yes	23	7.88%
	No	269	92.12%
Educational status	Educated	68	23.29%
	Uneducated	224	76.71%
Diabetes mellitus	Yes	36	12.33%
	No	256	87.67%
Hypertension	Yes	40	13.70%
	No	252	86.30%

As per various pregnancy-related complications, GDM was diagnosed in 6.85% cases, while PIH was present in 27.4% patients. Miscarriage occurred in 7.88% women, and preterm labor was reported in among 21.58% of study population. Additionally, 23.29% women underwent cesarean section due to pregnancy complications, while 38 women (13.01%) experienced no complications throughout their pregnancy. (Figure 1)

Pregnancy-related complications varied across different factors. GDM was slightly more common in women under 30 years and those with a gestational age of less than 9 weeks. PIH was observed more frequently in younger women and those with a lower gestational age. Miscarriage was significantly higher in women with a BMI greater than 30 kg/m² (p=0.03). Smoking did not show a significant association with any complication. Additionally preterm labor was more common in women under 30 years (44 cases) compared to those aged 30–40 years (19 cases), but the association was not statistically significant (p=0.54). Similarly, gestational age and BMI did not show a significant relationship with preterm labor. C-section rates were significantly higher in older women (p=0.008), with 32 cases in the 30–40 age group compared to 35 cases in younger women. Gestational age, smoking and BMI categories did not significantly impact the likelihood of C-section. (Table III & IV)

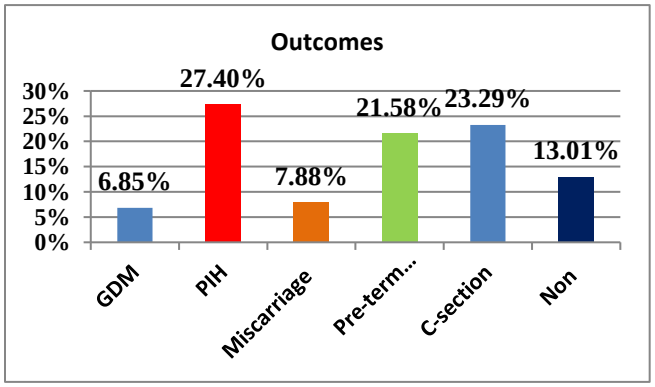

Figure 1: Maternal outcomes among women with raised BMI. (n=292)

Discussion

Obesity is a major health challenge in the 21st century and the most prevalent health disorder among women of reproductive age, with its occurrence steadily rising over the past few decades.[12] It poses significant health risks for both mothers and their children. Due to its high prevalence and associated complications, maternal obesity is recognized as a major preventable risk factor for adverse pregnancy outcomes in many regions.[7] This

Table III: Complications with respect to the age, gestational age, BMI and smoking. (n=292)

Variables		GDM		p-value	PIH		p-value	Miscarriage		p-value
		Yes	No		Yes	No		Yes	No	
Age groups (years)	20-29	15	178	0.46	52	141	0.89	19	174	0.10
	30-40	5	94		28	71		4	95	
GA (weeks)	9-12	6	107	0.48	26	87	0.22	5	108	0.11
	<9	14	165		54	125		18	161	
BMI (kg/m2)	26-30	8	146	0.25	44	110	0.69	7	147	0.03
	>30	12	126		36	102		16	122	
Smoking	Yes	3	20	0.20	5	18	0.63	2	21	0.70
	No	17	252		75	194		21	248	

Table IV: Complications with respect to the age, gestational age, BMI and smoking. (n=292)

Variables		Pre-term labour		p-value	C-section		p-value
		Yes	No		Yes	No	
Age groups (years)	20-29	44	149	0.54	35	158	0.008
	30-40	19	80		32	67	
GA (weeks)	9-12	22	91	0.56	32	81	0.08
	<9	41	138		35	144	
BMI (kg/m2)	26-30	28	126	0.15	16	208	1.0
	>30	35	103		4	62	
Smoking	Yes	3	20	0.43	6	17	0.79
	No	60	209		61	208	

study was done to evaluate pregnancy outcomes in women with raised BMI, with overall mean age of 27.73±3.81 years, mean gestational age was 35.58 weeks and the mean RBS 97.92±13.94 mg/dL. These findings align with the study by Azhar R et al[13] which reported a similar mean age of 28.40±5.30 years among pregnant women. Additionally, the average gestational age in their study were 39.06±1.59 weeks with most participants being multiparous. Consistently, Iffet S et al[14] also reported an overall mean age of 32±11.5 years among obese pregnant women, with a mean BMI of 28.8±8 kg/m². This further supports the observation that obesity is prevalent among women of reproductive age and highlights the need for targeted interventions. On the other hand, another study by Hamid U et al[15] found the mean age of overweight women to be 29.1±2.85 years, with a mean gestational age of 36.7±1.53 weeks, which slightly differs from our findings. Overall, results indicate that maternal obesity is a significant concern, with similar demographic patterns across the studies, while minor inconsistencies in findings may be due to the variations in sample sizes, geographic differences, sample selection criteria and variations in prenatal care accessibility. Additionally in this study, a history of diabetes mellitus was observed in 12.33% of participants, while hypertension was present in 13.70%. These findings are notably lower than those reported by Shepherdson M et al16 where 61% of women had diabetes, 20% had essential hypertension, and 43% were asthmatic.

In this study, as per pregnancy outcomes various pregnancy-related complications were observed as GDM in 6.85% of cases, PIH 27.4%, miscarriage 7.88%, and preterm labor in 21.58% of the study population. Additionally, 23.29% of women underwent cesarean section due to pregnancy complications, whereas 13.01% women found no complications throughout their pregnancy. Our findings align with the study by Hamid U et al[15] where reported that among overweight pregnant women, gestational diabetes 37.5%, and gestational hypertension 34.6%, making them the most common complications followed by intrahepatic cholestasis 30.8%, early pregnancy failure 7.1%, threatened abortion 6.3%, abruptio placentae 1.9% and eclampsia 1.9%. Consistently, the study by Vanlalfeli Z et al[17] supports our findings, demonstrating that pre-eclampsia, GDM, PIH, and the need for labor induction were more prevalent among obese women. Jacob AT et al[18] also reported similar findings, emphasizing that overweight and obese women had a significantly higher risk of developing GDM. Additionally, Shepherdson M et al[16] found that the likelihood of requiring a cesarean section increased by 1.36 times for every unit increase in BMI beyond 50 kg/m², supporting the association between high BMI and adverse pregnancy outcomes. Relatively, few other recent studies also highlighted the negative impact of obesity on pregnancy outcomes, affecting both maternal health and fetal development.[19,20]

Consistently, research by Deshmukh VL et al[21] found a significantly higher incidence of GDM ($p<0.05$) in women with elevated BMI, further substantiating our findings. Overall, this study supported the existing literature, emphasizing those pregnancy-related complications, including GDM, PIH, preterm labor, and increased C-section rates are significantly influenced by the raised maternal BMI and this highlights the need for early intervention and weight management strategies to improve maternal and fetal health outcomes. However, the findings cannot be considered conclusive, as this is a complex subject, and the study has several limitations, including a limited sample size, lack of a control group for comparison, and the absence of an in-depth exploration of the exact mechanisms involved. Therefore, further research investigations are recommended.

Conclusion

This study revealed that women with higher BMI were more likely to experience complications, including GDM, PIH, miscarriage, preterm labor, and an increased likelihood of cesarean section. Specifically,

PIH and miscarriage were significantly associated with higher BMI, highlighting the need for early monitoring and intervention. Carefully targeted prenatal care, lifestyle modifications, and weight management strategies are essential to minimizing the risks associated with elevated BMI in pregnancy. Implementing evidence-based clinical guidelines is crucial for improving maternal health outcomes and reducing the burden of obesity-related complications on healthcare systems.

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