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Outcome of the Pregnancy in Women with Increased Body Mass Index (BMI)

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ABSTRACT

Objective: to evaluate and record the outcome of the pregnancy in women with increased body mass index (BMI). **Settings:** Department of Obstetrics and Gynecology, Allied Hospital Faisalabad. **Study Duration:** September 2024 to February 2025. **Methodology:** Using non-probability consecutive sampling, we enrolled 390 pregnant women with BMI >27 before 12 weeks of gestation and followed for maternal (GDM, pre-eclampsia) and fetal outcomes (shoulder dystocia, macrosomia). **Results:** Of the 390 pregnant women with BMI >27, the mean age was 28.66 ± 7.02 years and most (75.6%) had parity 0–3. A majority (63.1%) had BMI >30. Gestational diabetes was observed in 57.2%, pre-eclampsia in 8.7%, shoulder dystocia in 4.9%, and fetal macrosomia in 7.7%. No significant associations were found between these outcomes and age or parity ($p > 0.05$). **Conclusion:** This study reinforces the association between increased maternal BMI and adverse pregnancy outcomes, both regionally and globally. Given that obesity is a modifiable risk factor, early identification and counseling during antenatal visits are essential.

INTRODUCTION

Obesity is very common health issue worldwide. Obesity is having BMI greater than 30 but for Asians it is 27 so a woman with BMI greater than 27 is fall in obese category because of high prevalence of obesity among Asians. GDM is defined as abnormal glucose metabolism recognized for the first time during pregnancy.[1] Current ADA definitions specify its onset in mid-to-late pregnancy in women previously undiagnosed with diabetes.[2] It is the most frequently observed metabolic complication[3] during gestation and is becoming more widespread,[2,4-6] in part due to the obesity and type 2 diabetes epidemic. Data reveals that up to 50% of expectant mothers are either overweight or obese at the start of pregnancy.[6]

BMI is derived by dividing an individual's body weight in kilograms by the square of their height in meters. It serves as a practical screening tool to determine weight classification and is moderately associated with true body fat levels. The Institute of Medicine (IOM) has outlined recommended ranges for gestational weight gain to optimize outcomes. For obese pregnant women, a gain of 5 to 9 kg (11–20 lb) is advised, while overweight women are recommended to gain 6.8 to 11.3 kg (15–25 lb) [7].

Although widely used, the IOM gestational weight gain guidelines are primarily based on data from observational studies involving women of European descent, which raises concerns about their applicability to more diverse populations, including those from low- and middle-income countries. Internationally, adherence to IOM recommendations varies. For example, the UK's National Institute for Health and Care Excellence (NICE) has not adopted these guidelines, citing insufficient supporting evidence for clinical use. Nevertheless, the IOM guidelines remain a helpful reference for clinicians addressing obesity during pregnancy, given their correlation with metabolic health risks.

According to research, prevalence of gestational diabetes is 36.8% in Pakistan and ranging 59.2% among obese pregnant woman, pre-eclampsia 8.3%, shoulder dystocia 3.8% and fetal macrosomia 7.54%. Although its prevalence varies among different races and different ethnic groups, it affects approximately 6–10% of all newborns [1, 2].

The rationale of my study is to overcome these maternal and fetal complications by proper counseling

prenatally and during antenatal period and encourage women to maintain weight according to BMI. Woman will be assessed in terms of BMI at booking visit. As obesity is modifiable and preventable, pregnant woman with increased BMI is considered as high-risk pregnancy.

METHODOLOGY

This study was designed as a descriptive, cross-sectional study conducted at the Department of Obstetrics and Gynecology, Allied Hospital Faisalabad. The duration of the study was six months, commencing after the approval of the research synopsis by the Institutional Ethical Review Committee. The sampling technique employed was non-probability consecutive sampling. The target population included pregnant women presenting for antenatal care at Allied Hospital Faisalabad. A total of 390 participants were selected using the WHO sample size calculator for single population proportion, assuming a prevalence (P) of 3.8%, a 95% confidence level, and an absolute precision of 1.9%. Inclusion criteria comprised pregnant women aged between 18 to 40 years, with a body mass index (BMI) greater than 27, presenting before 12 weeks of gestation and expected to deliver at Allied Hospital. Women with pre-existing medical conditions such as diabetes mellitus, hypertension, renal disease, cardiac disease, asthma, or tuberculosis were excluded. Additional exclusion criteria included a history of medications like corticosteroids, antiepileptics, anticonvulsants, or teratogenic drugs that could influence pregnancy outcomes, as well as unreliable age records or missing menstrual history. Informed consent was obtained from all eligible participants.

Demographic data including age, parity, socioeconomic status, BMI, and gestational age at booking were recorded. BMI was classified using Asian standards, with a BMI >27 considered obese. Participants were monitored throughout pregnancy for maternal complications such as gestational diabetes mellitus (GDM), i.e. glucose level $\geq$100 mg/dL(fasting) or post-glucose load blood sugar >140 mg/dL following a 75 g oral glucose tolerance test. Pre-eclampsia was identified by the presence of hypertension with proteinuria >300 mg in a 24-hour urine sample. Fetal outcomes were recorded at the time of delivery and included shoulder dystocia and fetal macrosomia, i.e. fetal weight >4.2 kg. All deliveries and outcome assessments were conducted at Allied Hospital Faisalabad. Data collection was carried out using a structured proforma (Annexure-I), and all variables were defined operationally to ensure consistency. Quantitative variables such as parity, age, gestational age, BMI and parity, were analyzed as mean ± standard deviation. Categorical variables including socioeconomic status, shoulder dystocia, GDM, pre-eclampsia, and fetal macrosomia were expressed as frequencies and percentages. Chi-square test was applied to assess associations between categorical variables, with a p-value <0.05 considered statistically significant.

RESULTS

Table 1

Demographic Information of Women with Increased BMI (n=390)

Variable	Group	Frequency	Percent	Mean+SD
Age(years)	18-30	221	56.7	28.66±7.02
	>30-40	169	43.3	
Parity	0-3	295	75.6	2.08±1.48
	>3	95	24.4	
SES	Poor	177	45.4	--
	Middle	148	37.9	
	High	65	16.7	
Gestational age(weeks)	6-8	131	33.6	9.09±1.80
	>8-12	259	66.4	
BMI	25-30	144	36.9	31.01±2.29
	>30	246	63.1	

This table presents the demographic characteristics of 390 women with increased Body Mass Index (BMI). It includes various variables such as age, parity, socio-economic status (SES), gestational age, and BMI. The data shows that 56.7% of the women fall within the 18-30 age range, with an average age of 28.66 years (±7.02 years). The remaining 43.3% are aged between 30 and 40 years. Regarding parity, most women (75.6%) had 0 to 3 children, with a mean parity of 2.08 (±1.48). In terms of socio-economic status, 45.4% of the women belonged to the poor category, 37.9% were from the middle class, and 16.7% came from high SES backgrounds. For gestational age, 33.6% of women were in the 6-8 weeks range, while 66.4% were in the 8-12 weeks range. Regarding BMI, 36.9% of the women had a BMI ranging from 25-30, while 63.1% had a BMI over 30. This table effectively summarizes the key demographic characteristics of the study population.

Table 2

Outcome of the Pregnancy in Women with Increased BMI (n=390)

Outcome	Group	Frequency	Percent
Gestational Diabetes	Yes	223	57.2
	No	167	42.8
Pre-eclampsia	Yes	34	8.7
	No	356	91.3
Should dystocia	Yes	19	4.9
	No	371	95.1
Fetal macrosomia	Yes	30	7.7
	No	360	92.3

Table 2 provides data on the pregnancy outcomes of the women with increased BMI. It highlights the incidence of various pregnancy complications such as gestational diabetes, pre-eclampsia, shoulder dystocia, and fetal macrosomia. According to the data, 57.2% of the women developed gestational diabetes, while 42.8% did not. The incidence of pre-eclampsia was relatively low, with 8.7% of women affected and 91.3% unaffected. Shoulder dystocia occurred in 4.9% of the women, while the vast majority (95.1%) did not experience this complication. Fetal macrosomia was diagnosed in 7.7% of the cases, with 92.3% of the women not having macrosomic infants. This table provides valuable information regarding the pregnancy outcomes associated with increased BMI.

Table 3

Outcome of the Pregnancy in Women with Increased BMI According to Age (n=390)

Outcome		Age(years)		Total	Chi square test P value
		18–30	>30–40		
Gestational Diabetes	Yes	126 56.5%	95 56.9%	221 56.7%	0.940
	No	97 43.5%	72 43.1%	169 43.3%	
Pre-eclampsia	Yes	16 47.1%	205 57.6%	221 56.7%	0.237

	No	18 52.9%	151 42.4%	169 43.3%	
Shoulder Dystocia	Yes	13 68.4%	208 56.1%	221 56.7%	0.289
	No	6 31.6%	163 43.9%	169 43.3%	
Fetal Macrosomia	Yes	15 50.0%	206 57.2%	221 56.7%	0.443
	No	15 50.0%	154 42.8%	169 43.3%	

Table 3 presents the pregnancy outcomes in relation to age. The outcomes include gestational diabetes, pre-eclampsia, shoulder dystocia, and fetal macrosomia, with comparisons between two age groups: 18-30 years and 30-40 years. The data shows that the prevalence of gestational diabetes is almost identical between the two age groups, with 56.5% of the younger group and 56.9% of the older group affected, yielding a chi-square p-value of 0.940, indicating no significant difference. For pre-eclampsia, the younger group showed a higher prevalence (47.1%) compared to the older group (42.4%), but again, the p-value of 0.237 suggests no significant association. Similarly, no significant differences were found in the rates of shoulder dystocia (p=0.289) and fetal macrosomia (p=0.443) between the two age groups. These findings suggest that age does not significantly influence the pregnancy outcomes in women with increased BMI.

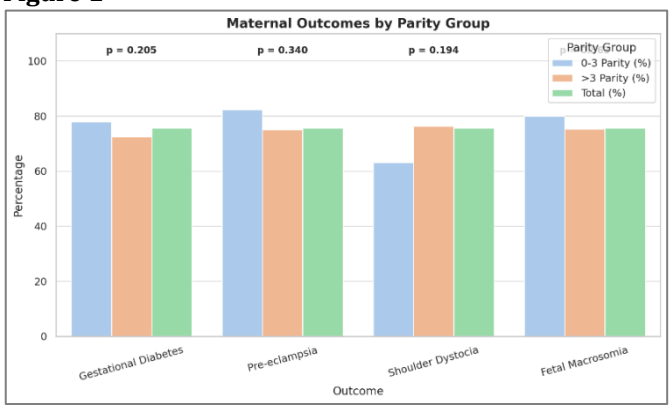
Table 4

Outcome of the Pregnancy in Women with Increased BMI According to Parity (n=390)

Outcome		Parity		Total	Chi square test P value
		0-3	>3		
Gestational Diabetes	Yes	174 78.0%	121 72.5%	295 75.6%	0.205
	No	49 22.0%	46 27.5%	95 24.4%	
Pre-eclampsia	Yes	28 82.4%	267 75.0%	295 75.6%	0.340
	No	6 17.6%	89 25.0%	95 24.4%	
Shoulder Dystocia	Yes	12 63.2%	283 76.3%	295 75.6%	0.194
	No	7 36.8%	88 23.7%	95 24.4%	
Fetal Macrosomia	Yes	24 80.0%	271 75.3%	295 75.6%	0.563
	No	6 20.0%	89 24.7%	95 24.4%	

Table 4 examines the pregnancy outcomes according to parity, comparing women with 0-3 children versus those with more than 3 children. For gestational diabetes, 78.0% of women with 0-3 children developed the condition, compared to 72.5% in the >3 parity group, with a chi-square p-value of 0.205 indicating no significant difference. Similarly, the rates of pre-eclampsia were 82.4% in women with 0-3 children and 75.0% in those with more than 3 children, with a p-value of 0.340, showing no significant association. The incidence of shoulder dystocia was lower in women with 0-3 children (63.2%) compared to those with more than 3 children (76.3%), but the p-value of 0.194 suggests no significant difference. Finally, fetal macrosomia was found in 80.0% of women with 0-3 children, versus 75.3% in women with more than 3 children, with a p-value of 0.563, indicating no significant relationship between parity and fetal macrosomia. In summary, no significant differences were found in the pregnancy outcomes based on parity, highlighting that parity may not significantly affect outcomes in women with increased BMI.

Figure 1



DISCUSSION

This study investigated pregnancy outcomes in women with increased body mass index (BMI) using the Asian cut-off (>27), which is more appropriate for South Asian populations due to higher metabolic risk at lower BMI levels. Among 390 pregnant women, we found a notably high prevalence of gestational diabetes mellitus (GDM) at 57.2%, followed by pre-eclampsia (8.7%), shoulder dystocia (4.9%), and fetal macrosomia (7.7%). These findings are consistent with a growing body of international and regional literature linking maternal obesity with adverse maternal and neonatal outcomes.

Our GDM frequency (57.2%) closely aligns with the regional data reported by Farooq et al[11] who found a 60% increased risk of GDM and pre-eclampsia in overweight and obese women in a Pakistani cohort. Similarly, Qazi et al[12] also in Pakistan, reported significantly higher maternal complications, including postpartum hemorrhage and macrosomia, in women with BMI ≥25. These similarities highlight the consistent burden of obesity-related complications within the local population, affirming the need for region-specific antenatal strategies.

From a global perspective, our findings are supported by Kominiarek et al., who demonstrated significantly elevated risks of GDM (aOR: 2.6), hypertensive disorders (aOR: 3.2), and cesarean delivery (aOR: 1.9) in obese women in the U.S.[13] The meta-analysis by Yan et al., comprising over one million pregnancies, further confirmed the association of maternal obesity with GDM (RR: 3.04), pre-eclampsia (RR: 2.09), and cesarean section (RR: 1.56).[14] Notably, Doi et al. reported an extremely high aOR of 8.25 for GDM in obese women from Scotland,[15] suggesting that the magnitude of association may vary depending on healthcare systems, dietary patterns, and screening protocols.

In terms of fetal outcomes, our macrosomia rate (7.7%) was lower than that reported by Farooq et al. (22.3%)[11] and Tang et al[16] who associated increased BMI with large-for-gestational-age births and higher stillbirth risk (aIRR up to 1.44). Mackeen et al. similarly reported higher odds of macrosomia (OR: 2.1) in women with

elevated BMI.[17] Differences in diagnostic definitions and population characteristics may explain the variation in macrosomia prevalence.

We also stratified outcomes by age and parity, but no statistically significant differences were observed. This may reflect the overriding influence of BMI on pregnancy complications, as also suggested by Lackovic et al., who found prepregnancy BMI to be a stronger predictor of poor fetal motor outcomes than other demographic factors.[18]

Strengths of this study include its use of operational definitions for outcome variables, adherence to standardized BMI criteria for Asian populations, and analysis of both maternal and fetal outcomes. Conducting the study in a tertiary care setting ensured data uniformity and reliable documentation. Additionally, the use of a sizable sample (n=390) enhances the generalizability of findings within similar healthcare contexts in Pakistan.

However, several limitations should be acknowledged. First, the study used a non-probability consecutive sampling method, which may limit external validity. Second, the cross-sectional design restricts causal inference. Third, some outcome variables such as NICU admission, mode of delivery, and long-term neonatal complications were not assessed, which could provide a more comprehensive understanding of obesity's impact. Lastly, data on gestational weight gain and nutritional intake were not collected, which are known modifiers of maternal and fetal outcomes.

CONCLUSION

This study reinforces the association between increased maternal BMI and adverse pregnancy outcomes, both regionally and globally. Given that obesity is a modifiable risk factor, early identification and counseling during antenatal visits are essential. Incorporating culturally tailored interventions and strengthening nutritional education could reduce the burden of obesity-related complications and improve maternal-child health outcomes in Pakistan and similar low-middle income settings.

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