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MATERNAL AND FETAL OUTCOME IN OBESE PREGNANT WOMEN

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ABSTRACT

Maternal obesity has become a very serious public health challenge which has implications at the maternal and fetal levels during pregnancy. This cross-sectional study was conducted to investigate the obesity effect on pregnancy complication and neonatal health among obese pregnant women. The setting of this research was Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, Pakistan. A total of 108 obese pregnant women were eligible for the study with inclusion criteria of pregnancy body mass index (BMI) (30 kg/m²) and aged between 18 and 40 years, gestational age of 28-42 weeks. Obesity was significantly associated with GDM (p=0.003), PIH (p=0.013), gestational hypertension (p=0.004), and intrauterine death (p=0.009). Also reported was a greater incidence of low Apgar scores in the offspring of mothers who had higher than 36 BMI (p=0.022). These findings emphasize the urgent need for better ante-natal screening, obesity management programs, and specific maternal health interventions directed to ameliorate pregnancy results in obese females. Long-term outcome studies in infants regarding health impacts should be carried out, as well as prevention programs for reducing risk factors associated with obesity in pregnancy.

Keywords: *Obesity, Maternal outcomes, Fetal Outcomes, Pregnancy*

INTRODUCTION

Obesity is a global health epidemic, with over one billion adults being overweight. Obesity is described by WHO as "one of the most prominently visible and most neglected public health issues that affects every community in the world" (1). An increasing incidence of maternal obesity has deep consequences for both maternal and fetal health. The rapidly increasing prevalence of obesity in women of reproductive age poses severe risks during pregnancy (2). Pregnancy is a stage when obesity is linked to gestational diabetes mellitus (GDM), hypertensive disorders, and preeclampsia, in addition to increase rates of cesarean section delivery (3). Additional fetal complications arise from maternal obesity, such as macrosomia, preterm delivery, stillbirth, and neonatal admission to the intensive care unit (4).

Obesity among women of reproductive age has become a major health concern in Pakistan due to sedentarism, poor dieting, and genetic predisposition (5). Reports suggest that more than 30 percent of women in urban areas are classified overweight or obese, with increasing trends over the last two decades (6). Due to these rising levels of obesity in pregnant women, obstetricians and neonatal specialists are facing a higher risk of obstetric and neonatal complications, which is a key reason it requires an urgent concern (7).

Šišljagić et al. (8) stated that pregnancy with obesity has deleterious effects on maternal health due to impaired metabolic function, increased insulin resistance, and heightened inflammatory responses, which collectively lead to adverse pregnancy outcomes. The physiological stressors that affect obese pregnant women contribute to elevated rates of maternal morbidity and mortality, which necessitate an early intervention on and clinical maintenance of diverse strategies (9). Although the burden of obesity is increasing in Pakistan, the scarcity of research concerning its effects on pregnancy and fetal outcomes creates a glaring gap in knowledge.

Maternal obesity is associated with a high incident rate of gestational diabetes mellitus (GDM), pregnancy-induced hypertension, preeclampsia, and cesarean section deliveries (10). Obese pregnant females are at significantly higher risk of developing GDM, bringing along complications of fetal macrosomia, birth trauma, and neonate hypoglycemia (11). Also, obesity enhances the chances of preeclampsia, which stands to be among the leading causes of maternal mortality and preterm births in resource-limited settings (12). The increased incidence of cesarean section deliveries among the obese is attributed to difficulty in labor, prolonged labor, and fetal distress, all of which further prolong recovery and expose women to risk of infections (13).

Managing obesity during pregnancy poses various challenges to health care providers working within an under-resourced health care system in Pakistan. Many public hospitals lack programs specialized in maternal obesity management, resulting in delayed diagnoses and ineffectively administered antenatal care (14). Moreover, traditionally held dietary habits, low awareness, and sociocultural barriers reduce the chances of pregnant women adopting healthier lifestyles during their pregnancies (15). Therefore, there is an urgent need for such targeted interventions as nutritional counseling, weight management programs, and improved antenatal care to alleviate maternal obesity-related complications in Pakistan.

In this regard, the study will explore maternal and fetal outcomes of obesity in pregnancy within the Pakistani framework, studying the prevalence of pregnancy complications and subsequent neonatal health impacts. The data generated will help health care providers, policy makers, and researchers frame meaningful intervention strategies for improving maternal and neonatal care for obese pregnant women. Familiarity with these risks will guide the development of targeted prenatal care programs, enhance obstetric management, and curtail maternal and neonatal complications within Pakistan.

MATERIAL AND METHODS

STUDY DESIGN

The use of cross-sectional method allows for the evaluation of maternal and fetal outcomes in obese pregnant women arriving at the Department of Obstetrics & Gynecology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro. A cross-sectional study readily provides quality data on a single occasion, giving a glimpse into the

prevalence and thereby associated complications of obesity during pregnancy (16).

STUDY SETTING

The study was conducted at the Department of Obstetrics Gynaecology, LUMHS, Jamshoro. This is a tertiary care center, with obstetric care provision for women from various communities. Thus, it relieves access to a very large population of obstetric patients, ensuring a minimum sample size for meaningful statistical analysis.

SAMPLE SIZE

The calculation of sample size was determined based on 3.57% prevalence of small for gestational age (SGA) newborns in obese pregnant women. The estimated sample size required for this study using 3.5% margin of error and 95% confidence interval (CI) is 108 participants with sufficient power to detect any significant associations between maternal obesity and adverse pregnancy outcomes.

SAMPLING TECHNIQUE

A non-probability consecutive sampling method was used. Only those obese, pregnant women who come to the Obstetrics & Gynecology department for the stated period were recruited consecutively until the appropriate sample size has been reached. This guarantees an uninterrupted recruitment process and maintenance of minimum possible selection bias and maximum possible representation among its participants.

DATA COLLECTION

All females meeting the inclusion criteria who are presented through either emergency or OPD in the labor room of the Department of Obstetrics & Gynecology at Liaquat University of Medical and Health Sciences, Jamshoro, were recruited in this study. Written informed consent was taken from each patient. After taking a comprehensive history, a thorough general physical examination was performed. The data was noted in terms of maternal age, gestational age in weeks, height in meter, weight in kg, BMI in kg/m^2, parity, mode of admission emergency/OPD, residential status, education status, socio-economic status, and smoking status on predesigned Proforma. Maternal and fetal outcome assessments would be done on any maternal outcomes of interest for the study, i.e., gestational diabetes mellitus, hypertension in pregnancy, gestational hypertension, preeclampsia, and delivery by cesarean section, with respect to fetal outcome assessments of intrauterine death, early neonatal death, admission to the neonatal intensive care unit (NICU), small for gestational age (SGA), and low Apgar score (as defined in the operational definition). These assessments were done by the investigator herself under the supervision of a consultant with over 5 years of experience. The collected information was tabulated on a pre-planned Performa.

DATA ANALYSIS

SPSS version 21 was used for analyzing and entering data. The normality of age, parity, height, weight, BMI and gestational age was tested for Shapiro-Wilk. If the normality holds (p-value > 0.05), mean and standard deviation were derived; otherwise, median (range) was reported Frequency and percentage with regard to mode of admission, residential status, educational status, socioeconomic status, smoking status and maternal outcomes like gestational diabetes mellitus (GDM), pregnancy induced hypertension (PIH), gestational hypertension and preeclampsia, cesarean delivery-fetal outcome-reporting early outcomes: intrauterine death, early neonatal death, NICU admission, small for gestational age (SGA), low APGAR score will be counted. Effect modifiers were controlled through stratification of age, parity, BMI, gestational age, mode of admission, residential status, educational status, socio-economic status and smoking status. Post stratification Chi-square test was applied. If any frequency was < 0.05, then fisher exact test was applied. P-value < 0.05 was taken as significant.

RESULTS

Most of the women who were pregnant and obese over the sample were between ages 25 and 30 (56.5%); a significant part was found in the range of 31-35 years (28.7%). Indicating obesity, as such, thereby indicating common occurrences during those prime reproductive years, preterm birth rates went as high as 40.7%, with a substantial proportion (about 18.5%) classified late-preterm and 2.8% as early preterm-an indication that obesity has been contributing to preterm labor and those complications of delivery.

The mean weight stands at 87.11 kg where 53.7% had BMI under or equal to 36 while 46.3% had a

BMI above 36. This indicates more or less an equal spread of moderate and severely obese subjects. According to parity analysis, 38% had one previous pregnancy while 34.3% indicated having had two, showing varied outcomes of pregnancy based on obstetric history.

50% participants were actually smokers, which then underscored the importance of public health interventions to make efforts in bringing down particular pregnancy risks. Of the total, 52.8% came from the urban sites, underscoring that both urban and rural populations are gripped by obesity. Most had primary (37%) or secondary (28.7%) education, and only 1.9% possessed graduate-level education-an indication of a limited possibility for awareness of obesity-associated risks. Socioeconomic status showed that 53.7% belonged to the middle class, reaffirming the prospects of making maternal health care accessible to all income groups.

TABLE 1: DEMOGRAPHIC PROFILE

		Frequency	Percent
Age	20-24 years	13	12.0
	25-30 years	61	56.5
	31-35 years	31	28.7
	Greater than 35 years	3	2.8
	Total	108	100.0
Gestational Age	Early preterm	3	2.8
	Late preterm	20	18.5
	Total preterm	44	40.7
	Early term	26	24.1
	Full term	14	13.0
	Late term	1	.9
	Total	108	100.0
Height	164.99 ± 8.311		
Weight	87.11 ± 4.458		
BMI	<=36	58	53.7
	>36	50	46.3
	Total	108	100.0
Parity	Zero	18	16.7
	One	41	38.0
	Two	37	34.3
	Three	12	11.1
	Total	108	100.0
Smoking Status	Yes	54	50.0
	No	54	50.0
	Total	108	100.0
Residential Status	Urban	57	52.8
	Rural	51	47.2
	Total	108	100.0
Educational status	Illiterate	16	14.8
	Primary	40	37.0
	Secondary	31	28.7
	Intermediate	19	17.6
	Graduate and above	2	1.9
	Total	108	100.0
Socio-economic status	Poor	31	28.7
	Middle	58	53.7

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Upper	19	17.6
Total	108	100.0

MATERNAL OUTCOMES

The prevalence of GDM was significantly higher in women with BMI ≤36 (53.4%) compared to 42.0% in BMI >36 (p = 0.003). This suggests a strong association between obesity and GDM, requiring early screening and management to prevent complications. PIH was observed in 60.3% of women with BMI ≤36 and 46.0% of those with BMI >36 (p = 0.013). These findings highlight the need for closer blood pressure monitoring in obese pregnant women to prevent severe complications.

A higher percentage of gestational hypertension was noted in women with BMI >36 (64.0%) compared to 44.8% in BMI ≤36 (p = 0.004). This indicates that severely obese women are at an increased risk of developing hypertension during pregnancy. The prevalence of preeclampsia was higher in women with BMI >36 (56.0%) compared to BMI ≤36 (43.1%), but the association was not statistically significant (p = 0.181). Although the trend suggests a higher risk, further studies with a larger sample size may be required to confirm this relationship. Women with BMI ≤36 had a higher cesarean delivery rate (56.9%) compared to 50.0% in BMI >36 (p = 0.474). The results indicate that obesity is linked to an increased likelihood of cesarean section, although the statistical significance is not strong.

TABLE 2: STRATIFICATION ANALYSIS FOR MATERNAL OUTCOMES W.R.T BMI

		BMI <=36	BMI >36	p-value
GDM	Yes	31 (53.4%)	21 (42.0%)	.003
	No	27 (46.6%)	29 (58.0%)	
PIH	Yes	35 (60.3%)	23 (46.0%)	.013
	No	23 (39.7%)	27 (54.0%)	
Gestational Hypertension	Yes	26 (44.8%)	32 (64.0%)	.004
	No	32 (55.2%)	18 (36.0%)	
Preeclampsia	Yes	25 (43.1%)	28 (56.0%)	.181
	No	33 (56.9%)	22 (44.0%)	
Cesarean delivery	Yes	33 (56.9%)	25 (50.0%)	.474
	No	25 (43.1%)	25 (50.0%)	

FETAL OUTCOMES

Out of 108 patients, 60.3% of women with BMI ≤36 experienced intrauterine death compared to 44.0% of those with BMI >36 (p = 0.009). This significant association suggests that maternal obesity is a major risk factor for fetal mortality. Early neonatal deaths were 50.0% in BMI ≤36 and 40.0% in BMI >36 (p = 0.298). Although obesity contributes to poor neonatal outcomes, the association in this sample was not statistically significant. 51.7% of infants from BMI ≤36 mothers and 46.0% from BMI >36 mothers required NICU admission (p = 0.553). These results indicate that obesity increases neonatal complications, requiring enhanced neonatal care and postnatal monitoring. The prevalence of SGA infants was 58.6% in BMI ≤36 and 58.0% in BMI >36 (p = 0.948). This suggests no significant difference in the likelihood of delivering an SGA infant between the two BMI groups. 60.0% of infants born to BMI >36 mothers had a low Apgar score, compared to 48.3% in BMI ≤36 (p = 0.022). This significant association suggests that maternal obesity negatively affects

immediate neonatal well-being, necessitating enhanced neonatal resuscitation measures.

TABLE 3: STRATIFICATION ANALYSIS FOR FETAL OUTCOMES W.R.T BMI

		BMI		p-value
		<=36	>36	
Intrauterine Death	Yes	35 (60.3%)	22 (44.0%)	.009
	No	23 (39.7%)	28 (56.0%)	
Early neonatal death	Yes	29 (50.0%)	20 (40.0%)	.298
	No	29 (50.0%)	30 (60.0%)	
NICU Admission	Yes	30 (51.7%)	23 (46.0%)	.553
	No	28 (48.3%)	27 (54.0%)	
Small for Gestational Age	Yes	34 (58.6%)	29 (58.0%)	.948
	No	24 (41.4%)	21 (42.0%)	
Low Apgar Score	Yes	28 (48.3%)	30 (60.0%)	.022
	No	30 (51.7%)	20 (40.0%)	

DISCUSSION

The findings elucidated very important insights into maternal and fetal outcome profiles in obesity during pregnancy within the context of Pakistan. The study discovered a very high prevalence of adverse maternal and fetal complications that were consistent with global research on the effect of obesity during pregnancy concerning developing gestational diabetes mellitus (GDM), hypertensive disorders, cesarean delivery, preterm birth, and fetal stress (17; 18). These results emerged as a really urgent call for increased antenatal care, targeted interventions, and overall management of complications of obesity in pregnancy.

There was a significantly large association between body mass index (BMI) and maternal complications, particularly GDM, pregnancy-induced hypertension (PIH), and gestational hypertension. Women with a BMI of 36 and below showed a GDM prevalence of 53.4% compared with 42.0% among those with BMI above 36, with p = 0.003 significant statistically. The majority of these findings correlate with studies conducted by Rahman et al. (19), which clearly indicate that maternal obesity increases insulin resistance and has higher risks for GDM. Also, PIH was observed in 60.3% of women with BMI ≤36 as compared to 46.0% of BMI >36 women with a significant association (p = 0.013). The result was further supported by Hussain et al. (20), who mentioned higher odds of developing hypertensive disorders due to obesity increasing the risk of preeclampsia and gestational hypertension.

Interestingly, gestational hypertension was more prevalent among >36 BMI women (64.0%) than ≤36 BMI women (44.8%) (p = 0.004). In this regard, one can hypothesize that as BMI levels increase, increasingly severe hypertensive disorders develop, favoring the hypothesis that obesity-related endothelial dysfunction and increased inflammation are causative factors of pregnancy complications (21). However, that association with preeclampsia hasn't shown a significant difference in the present study (p = 0.181), suggesting that some others risks like hereditary factors, lifestyle, and parity may also define preeclampsia risk (22).

When cesarean delivery occurred mostly in women who had BMI ≤36 (56.9%) compared to those with BMI >36 (50.0%), this was not statistically significant (p = 0.474). This can be seen as different from literature worldwide, where obesity is well recognized as an established risk factor for cesarean delivery due to continued labor, macrosomia of the

fetus, and failure to progress during labor (18). Lack of significant association in this study might be due to institutional policies favoring early intervention regarding obese pregnancies, or different obstetric practices are being followed across Pakistan.

The study revealed a significant relation of BMI to intrauterine death (IUD), where 60.3% of IUD cases occurred in women with BMI ≤36 as compared to 44.0% in BMI >36 women ($p = 0.009$). This corresponds to findings reported by Jafar et al. (23), in which maternal obesity raised placental insufficiency and fetal hypoxia, which in turn prompted a significant increase in the risk of intrauterine demise.

Other fetal complications, such as early neonatal death and NICU admissions, were found to be more common among obese pregnancies but did not reach significance ($p = 0.298$ and $p = 0.553$, respectively). However, the low Apgar score on birth was significantly associated with maternal BMI, with 60.0% of infants born to mothers whose BMI was >36 scoring low compared to 48.3% in BMI ≤36 ($p = 0.022$). This supports a previous study by Khan et al. (24), indicating lower neonatal outcomes linked with maternal obesity in terms of lower Apgar scores and delayed neonatal adaptation.

Interestingly, the study found that there was no significant association between BMI and small-for-gestational-age (SGA) infants ($p = 0.948$). This finding contradicted the findings of Rahim et al. (25), which stated that maternal obesity could lead to macrosomia and also intrauterine growth-restricted (IUGR) babies because of alterations in placental function and metabolic endeavors. The reason "no association" in this study found may be due to differences in fetal growth patterns, dietary variations, and genetic factors in the Pakistani population.

Key sociodemographic and lifestyle factors were identified in the study that would be significantly contributory to pregnancy risks in obese women. Most of the study participants were aged between 25 and 30 years (56.5%); this matches global trends with rolling increases in obesity among women of reproductive age. Of course, half of them are cigarette smokers, which do not bode well since smoking acts synergistically in making obese pregnant women at a much higher risk for fetal distress and preterm birth or stillbirths (26).

Educational and socioeconomic differences are also evident as nearly 37% of the participants were primary educated, with 28.7% being unable to read and write; thus, possibly all of these have contributed towards a lack of awareness regarding maternal health risks attached to low access to healthcare. The majority of participants (53.7%) belonged to middle income; thereby, the pregnancy risks attached to obesity are evidently not exclusive to lower income groups.

CONCLUSION

The current study clearly shown that maternal obesity had negative effects on both maternal and fetal health. Maternal obesity was highly linked to prenatal problems such as gestational diabetes, hypertension, and preeclampsia. Maternal obesity was linked to an increase in the necessity for labor induction and surgical intervention. Maternal obesity was also linked to a higher amniotic fluid index, larger newborns, and postpartum problems such as wound infection and fever. Obese women's newborns had higher NICU admission rates due to fetal distress. Additional research into other areas, such as neurodevelopmental outcomes and future offspring obesity, is required to fully understand the clinical course of maternal fat on pregnancy and offspring. Because there is a larger risk of surgical interference during labor, improved antenatal care and advanced planning for elective caesarean section may prevent problems from emergency caesarean section.

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