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FREQUENCY OF FETO-MATERNAL OUTCOMES IN WOMEN WITH GESTATIONAL WEIGHT GAIN

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Abstract

Background: *Gestational weight gain (GWG) is a critical factor influencing both maternal and fetal health outcomes during pregnancy. Excessive or inadequate weight gain can lead to complications such as gestational diabetes mellitus (GDM), gestational hypertension, preterm birth, and low birth weight, which significantly impact maternal and neonatal well-being. Understanding the frequency and implications of these outcomes is essential for improving prenatal care and reducing adverse fetomaternal risks. This study aims to evaluate the frequency of fetomaternal outcomes associated with GWG in a tertiary care setting.*

Objective: *To determine the frequency of fetomaternal outcomes in women with gestational weight gain presenting to Khyber Teaching Hospital, Peshawar.*

Material and Methods: *This descriptive case series was conducted from 25th September 2022 to 25th March 2023 at Department of Obstetrics and Gynaecology, Khyber Teaching Hospital, Peshawar. A total of 115 pregnant women with gestational weight gain were included. Patients were followed up until delivery, and fetomaternal outcomes, including gestational diabetes mellitus, gestational hypertension, cesarean section (C-section), preterm birth, low birth weight, and neonatal intensive care unit (NICU) admission, were recorded.*

Results: *The age range of participants was 18 to 40 years, with a mean age of 27.773 ± 3.51 years. The mean gestational age was 26.913 ± 2.58 weeks, mean parity was 1.182 ± 1.47, and mean preconception weight was 67.504 ± 4.93 kg. The frequency of observed outcomes was as follows: gestational diabetes mellitus (27%), gestational hypertension (22.6%), C-section (21.7%), preterm birth (11.3%), low birth weight (10.4%), and NICU admission (25.2%).*

Conclusion: *This study highlights the significant impact of gestational weight gain on fetomaternal outcomes, particularly the association with gestational diabetes mellitus and gestational hypertension. The findings underscore the need for targeted interventions and monitoring during pregnancy to mitigate risks and improve maternal and neonatal health.*

INTRODUCTION

Inadequate or excessive gestational weight gain (GWG) in pregnancy has been shown to have deleterious consequences for the short- and long-term health of mother and child.[1] For example, insufficient GWG increases the risk of preterm birth and low birth weight, whereas excessive

GWG is associated with increased risk of pregnancy-induced hypertension, pre- eclampsia, emergency cesarean delivery, hyperglycemia, and macrosomia.[2,3] Moreover, excessive GWG is linked to an elevated risk of postpartum weight retention and of developing overweight and obesity in both the mother and her children.[4] Although some evidence suggests that the maternal and infant health risks associated with GWG are independent of maternal pre-pregnancy BMI, the impact of GWG on maternal and infant health outcomes may depend on the mother's pre-pregnancy BMI.[5] For instance, less GWG results in more favorable outcomes for women with higher BMI, whereas inadequate GWG for women with a normal or low BMI may be detrimental.[5]

Several maternal and infant health problems have been related to excessive GWG and pre-pregnancy BMI,[6] such as: (i) maternal comorbidities during pregnancy, including gestational diabetes and preeclampsia; (ii) delivery complications, such as instrumental or cesarean delivery; (iii) being born large for gestational age; and (iv) long -term effects in offspring such as adiposity or lower cognitive skills.[7,8] In a study by Singh K, et al. has shown that frequency of gestational diabetes mellitus was 30.5%, Gestational hypertension 23.2%, C-section 17.1%, Pre-term birth 12.2%, Low birth weight 15.9% and NICU stay was 23.4% in women with gestational weight gain.[9]

There are very few studies from Pakistan that have looked at the applicability of the gestation weight control guidelines in pregnant Pakistani women. Furthermore, there are no national guidelines for weight gain during pregnancy in Pakistan. The weight gain recommendations are, in turn, based on Western WHO BMI cutoffs, making it difficult to compare, translate, or generalize their findings to Asian Pakistani. Therefore, I had planned to determine the frequency of feto-maternal outcomes in women with gestational weight gain presenting to Khyber Teaching Hospital, Peshawar.

MATERIALS AND METHODS

This descriptive case series study was conducted at the Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, from 25th September 2022 to 25th March 2023. A total of 115 pregnant women with gestational weight gain were included in the study. The sample size was calculated using WHO sample size software with a 95% confidence interval, a 6% margin of error, and an expected frequency of preterm birth of 12.2% in women with gestational weight gain. Non-probability consecutive sampling was used to select participants.

The inclusion criteria consisted of women aged 18 to 40 years with a singleton pregnancy confirmed by ultrasound, a gestational age of more than 20 weeks on a dating scan, any parity, and gestational weight gain as per the operational definition. Women with a history of chronic hypertension, pregestational diabetes, uncontrolled thyroid disorders, chronic renal disease, connective tissue disorders, or major fetal malformations on ultrasound were excluded from the study.

Patients meeting the inclusion criteria were selected from the Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, after obtaining approval from the ethical committee. Informed consent was obtained from all participants. Demographic data, including age, gestational age, parity, and preconception weight, were recorded. All patients were followed up until delivery, and feto-maternal outcomes such as gestational diabetes mellitus, gestational hypertension, cesarean section (C-section), preterm birth, low birth weight, and neonatal intensive care unit (NICU) admission were noted as per the operational definition. All women were managed according to the standard departmental protocol, and data were recorded on a specially designed proforma.

Data were analyzed using IBM-SPSS version 25. Quantitative variables such as age, gestational age, parity, and preconception weight were presented as mean ± standard deviation (SD). Frequencies and percentages were calculated for qualitative variables, including gestational diabetes mellitus,

gestational hypertension, C-section, preterm birth, low birth weight, and NICU admission. Feto-maternal outcomes were stratified based on age, gestational age, parity, and preconception weight. Post-stratification analysis was performed using the chi-square test, with a p-value of ≤0.05 considered statistically significant.

RESULTS

Age range in this study was from 18 to 40 years with mean age of 27.773±3.51 years, mean gestational age 26.913±2.58 weeks, mean parity 1.182±1.47 and mean preconception weight 67.504±4.93 kg as shown in Table-I.

Gestational diabetes mellitus was observed in 27% patients, gestational hypertension 22.6%, C-section 21.7%, preterm birth 11.3%, low birth weight 10.4% and NICU stay was 25.2% as shown in table 2.

Stratification of feto-maternal outcomes with respect to age, gestational age, parity and preconception weight are shown in Table 3.

Table- I: Descriptive Statistics of Maternal Characteristics (Mean ± SD)

Characteristics	Mean ± SD
Age(years)	27.773±3.51
Gestational age (weeks)	26.913±2.58
Parity	1.182±1.47
Weight (Kg)	67.504±4.93

Table 2. Distribution of Maternal Complications and Neonatal Outcomes

Variable	Frequency	Percentage
Gestational diabetes mellites	31	27%
C-section	25	21.7%
Preterm birth	13	11.3%
Low birth weight	12	10.4%
NICU stay	29	25.2%

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Table 3: Correlation of Variables with Feto-maternal Outcomes

Variable	Category	Outcome	Yes (n)	No (n)	P-value
Age	18-30	GDM	9	80	0.000
	>30		22	4	
Gestational Age	20-30	GDM	28	69	0.284
	>30		3	15	
Parity	0-2	GDM	9	80	0.000
	>2		22	4	
Weight	<70 kg	GDM	6	82	0.000
	>70 kg		25	2	
Age	18-30	Gestational Hypertension	17	72	0.096
	>30		9	17	
Gestational Age	20-30	Gestational Hypertension	21	76	0.568
	>30		5	13	
Parity	0-2	Gestational Hypertension	17	72	0.096
	>2		9	17	
Weight	<70 kg	Gestational Hypertension	17	71	0.128
	>70 kg		9	18	

Variable	Category	Outcome	Yes (n)	No (n)	P-value
Age	18-30	C-section	10	17	0.000
	>30		15	11	
Gestational Age	20-30	C-section	22	75	0.570
	>30		3	15	
Parity	0-2	C-section	10	17	0.000
	>2		15	11	
Weight	<70 kg	C-section	7	81	0.000
	>70 kg		18	9	
Age	18-30	Preterm Birth	5	84	0.000
	>30		8	18	
Gestational Age	20-30	Preterm Birth	11	86	0.978
	>30		2	16	
Parity	0-2	Preterm Birth	5	84	0.000
	>2		8	18	
Weight	<70 kg	Preterm Birth	3	85	0.000
	>70 kg		10	17	
Age	18-30	Low Birth Weight	11	78	0.212
	>30		1	25	
Gestational Age	20-30	Low Birth Weight	10	87	0.919
	>30		2	16	
Parity	0-2	Low Birth Weight	11	78	0.212
	>2		1	25	
Weight	<70 kg	Low Birth Weight	12	76	0.043
	>70 kg		0	27	
Age	18-30	NICU Stay	12	77	0.000
	>30		17	9	
Gestational Age	20-30	NICU Stay	25	72	0.750
	>30		4	14	
Parity	0-2	NICU Stay	12	77	0.000
	>2		17	9	
Weight	<70 kg	NICU Stay	10	78	0.000
	>70 kg		19	8	

DISCUSSION

In this study, pregnant women who were underweight at the time of starting pregnancy had tendency to gain less than recommended weight during pregnancy as compared to overweight and obese women. Likewise, women who were overweight or obese in pre-pregnant state, gained more than recommended weight during pregnancy as compared to underweight and normal weight women. This was consistent with the study by Heerman et al in their study in 2015, it was observed that, women who were overweight and obese had tendency to gained more than recommended weight during pregnancy.[10] Thorsdottir et al, Brennand et al and Kieffer et al also reported that women whose gestational weight gain (GWG) was below the recommended range had a higher likelihood of GDM.[11-13] Li et al observed that overweight and obese women who had above recommendation

GWG had 16 to 22 fold risk of GDM as compared to those with normal weight and recommended GWG.[14] In the present study number of women with hypertensive disorders of pregnancy was higher in those who had above recommended GWG and least in those who had below recommended GWG. Larger studies are required to confirm any association between low weight gain in pregnancy and hypertensive disorders of pregnancy. Similar conclusion was drawn by Chasan et al who reported that those who gained weight above IOM guidelines had an odds ratio of 3.82 for hypertensive disorder.[15] Shin D et al also found similar outcome in their study that obese women who had excessive GWG showed almost 6 fold rise of pregnancy induced hypertension compared with women with Normal pre-pregnancy BMI and adequate GWG.[16] In our study gestational diabetes mellitus was observed in 27% patients, gestational hypertension 22.6%, C-section 21.7%, preterm birth 11.3%, low birth weight 10.4% and NICU stay was 25.2%.

In a study by Singh K, et al. has shown that frequency of gestational diabetes mellitus was 30.5%, Gestational hypertension 23.2%, C-section 17.1%, Pre-term birth 12.2%, Low birth weight 15.9% and NICU stay was 23.4% in women with gestational weight gain.[9]

Indication for cesarean delivery like contracted pelvis, cephalopelvic disproportion, cesarean on demand, previous cesarean delivery were excluded in this study. Similarly, Bush R et al also found in their study in 2018 that there was no statistically significant relationship between GWG and mode of delivery.[17] Similarly, in a meta analysis by Zhu et al, found that excessive weight gain was associated with poor APGAR.[18] 72 out of 300 (24%) babies required NICU admission. 23.4% of below recommended GWG group required NICU admission of their babies, 24.3% of recommended GWG group and 24.4% of above recommended GWG group babies required NICU admission. There was no statistically significant difference in need for NICU admission in different GWG groups. On the other hand, Calika et al found that the rate of the admission of newborns to the neonatal intensive care unit was significantly more in women with excessive GWG than in women with normal weight gain.[19] On the contrary, Baugh et al in found that women who had less than recommended GWG were more likely to give birth to babies who required NICU admission just after birth.[20] Thus, further large scale studies are required to establish association of GWG and NICU stay, if any. Preterm birth were more in both above and below recommended GWG groups i.e. 12.2% and 12.1% respectively as compared to 7.2% in recommended GWG group. Although maximum number of preterm birth was in above recommended GWG group, the difference was statistically insignificant when the study groups were compared with each other (p=0.395). This result was in consonance with the study by Tabatabaei et al in which no relationship between GWG and preterm delivery was observed.[21] In their study 58 out of 300 (19.33%) babies were low birth weight, and 3 were macrocosmic in the study population. Out of 3 macrocosmic babies, two belonged to GWG above recommended group. Maximum percentage i.e. 24.3% babies in below recommended GWG group were low birth weight as compared to 17.1% in recommended GWG group and 15.9% in above recommended GWG group. But statistically there was no significant difference in distribution of low birth weight babies between different study groups. A large multicenter randomized controlled trial (RCT) is essential to validate these findings, ensuring their reliability and generalizability across diverse populations. Such a study would provide robust evidence to confirm the observed associations and assess their clinical significance, ultimately guiding future clinical practices and interventions.

CONCLUSION

This research contributes significantly to our understanding of the intricate interplay between gestational weight gain, gestational diabetes mellitus, and gestational hypertension. The insights garnered from this study underscore the importance of early intervention, comprehensive

antenatal care, and patient education to promote healthy weight management during pregnancy. As we continue to refine our understanding of these connections, there is great potential to enhance the overall well-being of both mothers and their infants, fostering healthier pregnancies and improved long-term outcomes.

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