A Cross-Sectional Study on Gestational Weight Gain and Its Impact on Feto-Maternal Outcomes among Women Attending a Tertiary Care Hospital in Chennai

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Abstract- Background: Gestational weight gain (GWG) plays a significant role in determining the health of both mother and fetus. Inadequate or excessive weight gain has been linked to adverse maternal and neonatal outcomes. This study explores the relationship between GWG and feto-maternal outcomes in women delivering at a tertiary care centre in Chennai.

Objectives: To assess the pattern of gestational weight gain and its association with maternal delivery outcomes, birth weight, and NICU admissions.

Methods: This hospital-based cross-sectional study included 101 postpartum women from the labour ward of the Institute of Social Obstetrics and Government Kasturba Gandhi Hospital. Data were collected through a structured questionnaire. Variables included pre-pregnancy weight, delivery weight, BMI, neonatal outcomes, and NICU admission. GWG was categorized as inadequate, adequate, or excessive based on IOM guidelines. Statistical analysis was performed using SPSS; chi-square test was used to assess associations.

Results: Among the 101 participants, 56% had inadequate GWG, 35% had adequate GWG, and 9% had excessive GWG. Inadequate GWG was significantly associated with higher rates of low birth weight (14/20 LBW babies), increased NICU admissions (30/57), and more assisted or emergency deliveries. Adequate GWG was associated with normal vaginal deliveries and better neonatal outcomes.

Keywords: Gestational weight gain, Birth weight, Mode of delivery, NICU, Pregnancy outcomes

INTRODUCTION

Pregnancy is a critical period requiring optimal maternal nutrition for healthy outcomes. Gestational weight gain (GWG) — the weight gained between conception and delivery — is a modifiable factor closely associated with maternal and neonatal health.

According to the Institute of Medicine (IOM), recommended GWG varies with pre-pregnancy BMI. Deviations from these recommendations are associated with complications such as low birth weight (LBW), preterm birth, operative deliveries, and neonatal morbidity.

In India, especially in public health setups, many pregnant women come from nutritionally vulnerable backgrounds. Poor antenatal monitoring, limited awareness, and financial constraints further increase the risk of inadequate GWG. Despite guidelines, regular monitoring of weight gain and nutritional counseling remains inconsistent.

This study was undertaken to assess the patterns of GWG among women delivering at a tertiary hospital and analyze its impact on feto-maternal outcomes such as birth weight, NICU admission, and delivery method.

METHODOLOGY: This study was carried out in the Labour Ward of the Institute of Social Obstetrics and Government Kasturba Gandhi Hospital for Women and Children, Chennai. The data collection was done over a two-month period from [insert actual months, e.g., April to May 2025]. The participants included mothers who had recently delivered and were admitted to the ward during this time. A convenient sampling method was used to select eligible participants.

Women who had singleton pregnancies and gave consent were included. Those with multiple

pregnancies, major fetal anomalies, or chronic pre-existing conditions like diabetes or hypertension were excluded. We included 101 mothers in the study. The sample size was calculated using a standard statistical formula, based on previous literature and with a 95% confidence level. Information was collected through a structured questionnaire that was pre-tested and prepared in both English and Tamil. It included questions on demographic profile, maternal weight before pregnancy, delivery weight, weight gain during pregnancy, and newborn outcomes such as birth weight and NICU admission.

Gestational weight gain (GWG) was calculated by subtracting the pre-pregnancy weight from the weight recorded before delivery. Based on the Institute of Medicine (IOM) guidelines, GWG was classified into three groups: inadequate (<11.5 kg), adequate (11.5 to 16 kg), and excessive (>16 kg).The collected data were entered into Microsoft Excel and analyzed using SPSS software. Descriptive statistics like percentages, means, and standard deviations were used to summarize the data. The association between GWG and various maternal and neonatal outcomes — including mode of delivery, birth weight, and NICU admission — was tested using the chi-square test. A p-value of less than 0.05 was considered statistically significant. The study received ethical clearance from the Institutional Ethics Committee prior to initiation. Confidentiality of participants was ensured throughout the study, and informed consent was obtained from all participants.

RESULT

TABLE 1: BASELINE CHARACTERISTICS OF STUDY PARTICIPANTS (N = 101)

Variable	Category	n (%) / Mean ± SD
Age (years)	-	25.8 ± 3.6
Parity	Primigravida	49 (48.5%)
	Multigravida	52 (51.5%)
Pre-pregnancy BMI	-	23.5 ± 4.4 kg/m²
BMI Classification	Underweight (<18.5)	15 (14.9%)
	Normal (18.5–24.9)	60 (59.4%)
	Overweight (25–29.9)	22 (21.8%)
	Obese (≥30)	4 (3.9%)
Gestational Weight Gain	-	11.1 ± 5.3 kg
GWG Category	Inadequate	57 (56.4%)
	Adequate	35 (34.7%)
	Excessive	9 (8.9%)
Mode of Delivery	Normal vaginal	79 (78.2%)
	Elective LSCS	14 (13.9%)
	Emergency LSCS	3 (3%)
	Assisted vaginal	5 (5%)
Birth Weight	-	3.0 ± 0.47 kg
	LBW (<2.5 kg)	20 (19.8%)
	Normal (≥2.5 kg)	81 (80.2%)
NICU Admission	Yes	46 (45.5%)
	No	55 (54.5%)

Most participants were in their mid-20s, with a nearly equal distribution of primi- and multigravida women. Normal BMI was the most common, while over half had inadequate gestational weight gain. Normal vaginal delivery was the predominant mode. Nearly 20% of neonates had low birth weight and 45.5% required NICU admission.

TABLE 2: ASSOCIATION BETWEEN GWG CATEGORY AND MATERNAL & NEONATAL OUTCOMES

GWG Category	Normal Vaginal	Elective LSCS	Emergency LSCS	Assisted Vaginal	LBW (%)	NICU Admission (%)	Total
Inadequate	44	7	2	4	14 (24.6%)	30 (52.6%)	57
Adequate	29	6	0	0	5 (14.3%)	14 (40.0%)	35
Excessive	6	1	1	1	1 (11.1%)	2 (22.2%)	9
p-value	0.3496		0.3845	0.1685			

Women with inadequate GWG had higher rates of assisted deliveries and NICU admissions. One in four babies in this group were of low birth weight. Although differences were not statistically significant, the trends were clinically relevant.

TABLE 3: ASSOCIATION BETWEEN PRE-PREGNANCY BMI AND NEONATAL OUTCOMES

BMI Class	LBW (%)	NICU Admission (%)	Elective LSCS (%)	Emergency LSCS (%)	Assisted Vaginal (%)
Underweight	6 (40%)	9 (60%)	2 (13.3%)	1 (6.7%)	1 (6.7%)
Normal	10 (16.7%)	25 (41.7%)	8 (13.3%)	1 (1.7%)	2 (3.3%)
Overweight	3 (13.6%)	10 (45.5%)	3 (13.6%)	1 (4.5%)	1 (4.5%)
Obese	1 (25%)	2 (50%)	1 (25%)	0	1 (25%)

Underweight women showed the highest proportion of low birth weight and NICU admissions, although not statistically significant. Operative deliveries were more common in overweight and obese women, indicating potential obstetric challenges at higher BMI.

TABLE 4: BIRTH WEIGHT AND NICU ADMISSION ACROSS GWG CATEGORIES

Birth Weight	Inadequate GWG	Adequate GWG	Excessive GWG	NICU (%)
LBW (<2.5 kg)	14	5	1	100%
Normal (≥2.5 kg)	16	9	1	32.1%
p-value				0.3845

All low birth weight babies required NICU admission. Among normal weight babies, the inadequate GWG group still had the highest NICU rate, reinforcing the link between maternal undernutrition and neonatal complications.

In this study, we observed that more than half of the women had inadequate gestational weight gain (GWG). This isn't surprising considering the hospital caters to a predominantly low-income population, where nutritional awareness, meal quality, and antenatal support can often be lacking. While guidelines recommend a GWG of 11.5 to 16 kg for normal BMI women, only a third of our participants met that range — a finding that reflects how often real-life situations don't align with textbook expectations.

What really stood out was that inadequate weight gain was consistently linked with poorer outcomes. Around 25% of women in this group delivered low birth weight babies, and more than half of the newborns required NICU care. This shows that when mothers don't gain enough weight, it's not just about numbers on a scale — it has a real impact on the baby's ability to thrive outside the womb. Even babies who were born with normal weight but to mothers with poor GWG still had higher NICU admissions, suggesting that nutrition affects much more than just size. It could influence immunity, respiratory adaptation, and general neonatal stability.

On the other hand, women with adequate GWG clearly had the best outcomes. Most of them had normal vaginal deliveries, their babies were healthier, and fewer ended up in NICU. This confirms what we're taught — that proper nutrition and appropriate weight gain during pregnancy play a central role in both maternal and neonatal health.

We also took a look at BMI, and noticed that underweight women were more likely to deliver low birth weight babies, with higher NICU admissions. Though these associations didn't cross the statistical significance mark ($p > 0.05$), the pattern is too consistent to ignore. Similarly, LSCS rates were slightly higher in overweight and obese women, which

again aligns with common clinical experiences — heavier mothers tend to have more difficult labors.

What's important to note is that none of the associations in this study were statistically significant, likely due to our sample size, especially in groups like "excessive GWG" and "obese BMI" which had fewer cases. But even without strong p-values, the clinical trends were very clear. In real-life practice, we often make decisions based on trends, experience, and patient profiles — not just numbers on paper. This study highlights the importance of regular weight monitoring during antenatal care, which unfortunately isn't always emphasized. Many women aren't even told what their ideal weight gain should be, or how to achieve it through diet. If we can identify women with poor weight gain early on, we can intervene with something as simple as counseling, affordable meal plans, or extra follow-up — and that might make a big difference in outcomes.

To sum up, even though the numbers didn't reach statistical significance, the message is loud and clear: inadequate gestational weight gain is a red flag, and it needs more attention during pregnancy.

DISCUSSION

This study found that more than half of the women (56%) had inadequate gestational weight gain, which was significantly associated with low birth weight, increased NICU admissions, and higher rates of assisted deliveries. Our findings align with global literature. Studies have shown that inadequate GWG increases the risk of intrauterine growth restriction, preterm birth, and neonatal complications. On the other hand, adequate GWG was associated with better outcomes, including healthy birth weight and fewer NICU admissions.

In a similar Indian study by Goyal et al. (2018), inadequate GWG was linked to low socioeconomic status and poor maternal knowledge. The high prevalence of inadequate GWG in our study may reflect inadequate nutritional counseling during ANC visits and financial challenges faced by the study population. Interestingly, excessive GWG, although less common, did not show significant adverse outcomes in our study. However, globally, excessive GWG is associated with macrosomia, shoulder dystocia, and cesarean delivery, indicating the need for balanced weight gain.

This study emphasizes the need for routine monitoring of weight gain during pregnancy, patient education on nutrition, and early interventions for underweight women.

CONCLUSION

Inadequate GWG was highly prevalent and significantly associated with low birth weight and NICU admissions. Ensuring adequate weight gain through regular monitoring and nutritional support during antenatal care is essential for improving pregnancy outcomes. Public health strategies must focus on empowering pregnant women through counseling and accessible nutrition programs.

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