

Original article:

A study on analysing the correlation between maternal weight gain and infant's birth weight

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Abstract:

Background: Maternal weight gain during pregnancy is a crucial factor influencing infant birth weight and overall neonatal outcomes. Understanding the relationship between maternal weight gain and infant birth weight is essential for guiding prenatal care and optimizing maternal and neonatal health.

Methods: A retrospective cohort study involving 60 pregnant patients over one year was conducted to analyze the correlation between maternal weight gain and infant birth weight. Maternal weight gain was assessed through pre-pregnancy weight and weight measurements at each prenatal visit, while infant birth weight was recorded at delivery. Statistical analyses, including correlation coefficient calculation and regression modeling, were performed to evaluate the relationship between maternal weight gain and infant birth weight.

Results: The study found a significant positive correlation ($r=0.76$) between maternal weight gain and infant birth weight, with higher levels of maternal weight gain associated with increased infant birth weight. Regression analysis confirmed the predictive value of maternal weight gain on infant birth weight, even after adjusting for potential confounders.

Conclusion: Adequate maternal weight gain during pregnancy is associated with healthier infant birth weights. These findings underscore the importance of promoting appropriate weight gain guidelines and nutritional counseling for pregnant individuals to optimize maternal and neonatal outcomes.

Keywords: Maternal weight gain, Infant birth weight, Pregnancy, Neonatal outcomes.

Introduction:

Maternal weight gain during pregnancy is a crucial factor influencing the health outcomes of both mothers and infants. (1) Understanding the correlation between maternal weight gain and infant birth weight is essential for guiding prenatal care and interventions aimed at promoting optimal maternal and neonatal health. (2) Excessive or inadequate weight gain during pregnancy has been associated with adverse pregnancy outcomes, including low birth weight, preterm birth, and maternal complications such as gestational diabetes and hypertension. Conversely, appropriate weight gain is vital for ensuring the healthy development of the fetus and reducing the risk of complications. (3) Despite extensive research on this topic, there remains a need for further exploration, particularly regarding the nuanced relationship between maternal weight gain and infant birth weight. (4,5) This study aims to contribute to the existing literature by analyzing the correlation between maternal weight gain and infant birth weight, providing insights that can inform clinical practice and public health strategies aimed at optimizing maternal and neonatal outcomes.

Methodology:

A retrospective cohort study was conducted over the course of one year, involving a sample size of 60 pregnant patients. Patient records were collected from obstetrics clinics and hospitals within the study region, spanning a diverse demographic and socioeconomic population.

The inclusion criteria for the study encompassed pregnant individuals who had attended prenatal care and delivered their infants within the designated study period. Exclusion criteria comprised patients with preexisting medical conditions known to impact maternal weight gain or fetal growth, such as pre-gestational diabetes or hypertension. Additionally, patients with incomplete medical records or missing data relevant to maternal weight gain and infant birth weight were excluded from the analysis.

Maternal weight gain was assessed through the comparison of pre-pregnancy weight and weight measurements recorded at each prenatal visit throughout the gestational period. Infant birth weight was documented immediately following delivery.

Statistical analysis, including correlation coefficient calculation and regression modeling, was performed to elucidate the relationship between maternal weight gain and infant birth weight, while controlling for potential confounding variables such as maternal age, parity, and gestational age at delivery.

Results:

Table 1: Descriptive Statistics of Maternal Weight Gain

Variables	Mean (kg)	Standard Deviation (kg)	Minimum (kg)	Maximum (kg)
Total Weight Gain	12.5	3.2	8.0	18.7
First Trimester	2.3	1.1	0.5	4.8
Second Trimester	5.1	1.8	2.0	8.5
Third Trimester	5.1	2.0	1.5	9.3

Table 2: Descriptive Statistics of Infant Birth Weight

Metric	Mean (g)	Standard Deviation (g)	Minimum (g)	Maximum (g)
Birth Weight	3250	400	2600	4200

Table 3: Correlation Between Maternal Weight Gain and Infant Birth Weight

	Maternal Weight Gain	Infant Birth Weight
Pearson Correlation	0.76	
p-value	<0.001	

Table 4: Regression Analysis of Maternal Weight Gain on Infant Birth Weight

	Coefficient	Standard Error	p-value
Intercept	2800	200	<0.001
Maternal Weight Gain	120	25	<0.001

Table 5: Adjusted Regression Analysis of Maternal Weight Gain on Infant Birth Weight

	Coefficient	Standard Error	p-value
Intercept	2700	150	<0.001
Maternal Weight Gain	110	20	<0.001

Discussion:

The findings of this study provide valuable insights into the relationship between maternal weight gain during pregnancy and infant birth weight. The results indicate a significant positive correlation between maternal weight gain and infant birth weight, with higher levels of maternal weight gain associated with increased infant birth weight. This aligns with existing literature highlighting the importance of adequate maternal nutrition and weight gain for optimal fetal development and birth outcomes.(6)

The observed correlation coefficient of 0.76 suggests a strong positive linear relationship between maternal weight gain and infant birth weight. This finding underscores the impact of maternal nutritional status and gestational weight gain on fetal growth and development. Maternal weight gain serves as a proxy for maternal nutrient intake and overall health during pregnancy, both of which play critical roles in supporting fetal growth and ensuring a healthy birth weight. The strong correlation observed in this study reinforces the importance of promoting appropriate weight gain guidelines and nutritional counseling for pregnant individuals to optimize maternal and neonatal outcomes.(7,8)

The regression analysis further elucidates the relationship between maternal weight gain and infant birth weight, providing quantitative estimates of the impact of maternal weight gain on fetal growth. The coefficient of 120 in the initial regression model indicates that, on average, each kilogram increase in maternal weight gain is associated with a 120-gram increase in infant birth weight. This suggests that maternal weight gain during pregnancy exerts a substantial influence on fetal growth and birth weight, highlighting the critical role of maternal nutrition and prenatal care in supporting healthy fetal development.(9)

The adjusted regression analysis, which controls for potential confounding variables such as maternal age, parity, and gestational age at delivery, reaffirms the significant association between maternal weight gain and

infant birth weight. The coefficient of 110 in the adjusted model remains highly significant, indicating that the relationship between maternal weight gain and infant birth weight persists even after accounting for other factors known to influence birth outcomes. This finding underscores the robustness of the observed association between maternal weight gain and infant birth weight, lending further support to the importance of promoting appropriate weight gain during pregnancy.

While the results of this study provide compelling evidence of the association between maternal weight gain and infant birth weight, several limitations should be acknowledged. Firstly, the study's retrospective design may introduce inherent biases and limitations associated with data collection and analysis. Although efforts were made to minimize these biases through stringent inclusion and exclusion criteria, the possibility of residual confounding cannot be entirely ruled out. Additionally, the study's relatively small sample size may limit the generalizability of the findings to broader populations. Future research with larger and more diverse cohorts is warranted to validate these findings and explore potential moderators of the observed relationship.(9)

Furthermore, while the study focused on the association between maternal weight gain and infant birth weight, other factors not examined in this analysis may also influence birth outcomes. For example, maternal nutrition, physical activity, and lifestyle factors such as smoking and substance use can impact fetal growth and birth weight independently of maternal weight gain. Future studies incorporating comprehensive assessments of maternal health and lifestyle factors may provide a more nuanced understanding of the determinants of infant birth weight.

Conclusion:

In conclusion, the findings of this study underscore the importance of maternal weight gain during pregnancy as a critical determinant of infant birth weight. The strong positive correlation observed between maternal weight gain and infant birth weight highlights the need for targeted interventions aimed at promoting appropriate weight gain guidelines and nutritional support for pregnant individuals. By optimizing maternal nutrition and prenatal care, healthcare providers can help ensure healthy fetal development and improve birth outcomes for mothers and infants alike. Further research is warranted to validate these findings and elucidate the underlying mechanisms linking maternal weight gain to infant birth weight.

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