

Original Article

Gestational weight gain and risks for adverse perinatal outcomes: A retrospective cohort study based on the 2009 Institute of Medicine guidelines



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ABSTRACT

Objective: To investigate perinatal outcomes according to the 2009 Institute of Medicine (IOM) gestational weight gain (GWG) guidelines.

Materials and methods: A retrospective cohort study was conducted among all term, singleton, live births to women who delivered at the Taipei Chang Gung Memorial Hospital, Taipei, Taiwan between 2009 and 2014. Women were categorized into three groups based on prepregnancy body mass index and GWG relative to the IOM guidelines. Multivariable logistic regression analysis was used to assess the associations between GWG outside the IOM guidelines and adverse perinatal outcomes. Women with GWG within the guidelines served as the reference group.

Results: Of 9301 pregnancies, 2574 (27.7%), 4189 (45.0%), and 2538 (27.3%) women had GWG below, within, and above the IOM guidelines. Women with GWG above the IOM guidelines were at risk for preeclampsia [adjusted odds ratio (OR) 3.0, 95% confidence interval (CI) 1.9–4.7], primary cesarean delivery (adjusted OR 1.4, 95% CI 1.2–1.6) due to dysfunctional labor and cephalopelvic disproportion, large-for-gestational age (adjusted OR 1.8, 95% CI 1.5–2.1), and macrosomic neonates (adjusted OR 2.2, 95% CI 1.6–3.1). Women with GWG below the IOM guidelines were more likely to be diagnosed with gestational diabetes mellitus (adjusted OR 1.5, 95% CI 1.3–1.8) and were at higher risk for placental abruption (adjusted OR 1.7, 95% CI 1.1–2.5), small-for-gestational age (adjusted OR 1.6, 95% CI 1.4–1.9), and low birth weight neonates (adjusted OR 1.9, 95% CI 1.4–2.4).

Conclusion: Women with GWG outside the 2009 IOM guidelines were at risk for adverse maternal and neonatal outcomes.

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Introduction

In 2009, the Institute of Medicine (IOM) published revised guidelines for weight gain during pregnancy [1]. Key changes made from the previous 1990 IOM recommendations include: (1) the adoption of the body mass index (BMI) categories developed by the International Obesity Task Force and endorsed by the World Health Organization, thus providing a consistent and universal message to both women and health care providers about weight status; (2) a

change in the cut-off points for the prepregnancy BMI category, resulting in a smaller proportion of women classified as underweight and a larger proportion classified as overweight; and (3) a specific and relatively narrow range of weight gain recommended for obese women instead of a lower limit. The recommendation is for underweight, normal weight, overweight, and obese women to gain 12.5–18 kg, 11.5–16 kg, 7–11.5 kg, and 5–9 kg, respectively. The 2009 IOM weight gain guidelines were subsequently endorsed by the Ministry of Health and Welfare, Taiwan, and are incorporated into the Maternal Health Booklet for every pregnant woman in Taiwan.

Nevertheless, there have been only a few studies examining maternal and neonatal outcomes in relation to the 2009 IOM guidelines [2–11]. Most of these studies were performed on the American or European populations [2,6–11] and have mainly

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focused on the association between weight gain and neonatal birth weight [4–8]. Data on whether adherence to the guidelines is associated with improved maternal and neonatal outcomes in Taiwanese women remain scarce. Therefore, we conducted a retrospective cohort study to investigate the associations between adverse perinatal outcomes and gestational weight gain (GWG) above or below the 2009 IOM guidelines.

Materials and methods

A retrospective cohort study was conducted among all term, singleton, live births to women who delivered at the Taipei Chang Gung Memorial Hospital, Taipei, Taiwan between 2009 and 2014. The study data were obtained from a computerized obstetrics database, which included demographic characteristics, medical and obstetric histories, and information regarding the course of the index pregnancy and perinatal outcomes. The data in this database were collected by trained personnel through daily abstraction from the medical and delivery records and via *postpartum* interviews, if necessary, to collect supplemental information. Audits of these data were routinely performed every 2 weeks at the departmental meetings. The study was approved by the Institutional Review Board of Chang Gung Memorial Hospital.

We analyzed all deliveries after 37 0/7 weeks of gestation ($n = 9972$), excluding pregnancies complicated by multiple gestations ($n = 466$), fetal chromosomal or structural anomalies ($n = 101$), and fetal demise ($n = 46$). Women with chronic hypertension ($n = 28$) and prepregnancy diabetes mellitus ($n = 30$) were also excluded. Overall, a total of 9301 deliveries were selected for the present analysis. Figure 1 depicts the sample selection process.

In this hospital, all pregnant women were measured for the height and self-reported prepregnancy weight was recorded at their first antenatal visit. Height and self-reported prepregnancy weight were used to calculate the prepregnancy BMI [calculated as weight (kg)/height (m)²], which was further categorized into four groups: underweight (<18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), and obese (≥ 30.0 kg/m²).

GWG was calculated by subtracting each individual woman's prepregnancy weight from her weight at delivery. Women were categorized into three groups based on prepregnancy BMI and GWG relative to the IOM guidelines: (1) weight gain below, (2) weight within, and (3) weight gain above the IOM guidelines.

Perinatal outcomes were compared between the three groups of women, using GWG within the IOM guidelines as the reference group. We examined the following maternal outcomes: gestational diabetes mellitus (GDM), preeclampsia, premature rupture of membranes, acute chorioamnionitis, induction of labor, placental abruption, placenta accreta, *postpartum* hemorrhage (>500 mL for vaginal delivery and >1000 mL for cesarean delivery), operative vaginal delivery, severe perineal injury (3rd and 4th degree perineal injury), and primary cesarean delivery (defined as a cesarean delivery performed for the first time on a pregnant woman). Neonatal outcomes examined were low birth weight (<2500 g), small-for-gestational age (SGA, defined as a birth weight below the 10th percentile for the mean weight corrected for fetal sex and gestational age), large-for-gestational age (LGA, defined as a birth weight above the 90th percentile for the mean weight corrected for fetal sex and gestational age), macrosomia (>4000 g), 1-minute and 5-minute Apgar score < 7, and neonatal intensive care unit admission.

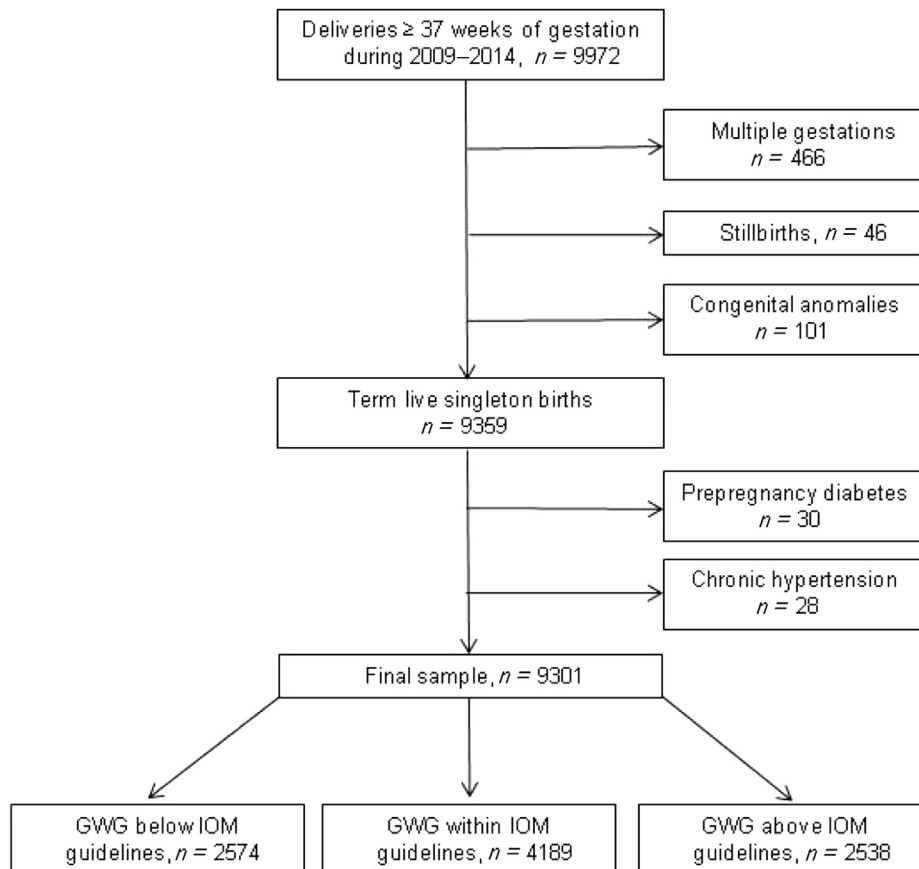


Figure 1. Diagram of patient selection. GWG = gestational weight gain; IOM = Institute of Medicine.

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