

Abstract

Introduction

One of the Sustainable Development Goals (SDGs) is improvement of perinatal outcomes. Although Japan is a high-income country with better perinatal outcomes, some problems remain, and one of them is to combat intrauterine growth restriction (IUGR). More Japanese women are underweight compared to other developed countries, and maternal underweight is believed to contribute to IUGR. Moreover, Japanese weight control policy during pregnancy is stricter than other countries. Understanding the role of maternal underweight and subsequent weight gain as a risk factor for IUGR is important to maintain progress on reducing adverse perinatal outcomes in Japan.

Objectives

A retrospective cross-sectional study of the relationship between underweight and IUGR births was conducted. This study aimed to 1) describe prevalence of IUGR; 2) study the impact of pre-pregnancy body composition and maternal weight gain on birth outcomes; and 3) determine the optimal weight gain during pregnancy required to achieve the lowest perinatal adverse outcomes.

Methods

Data was extracted from the Japan Environment and Children's Study (JECS). IUGR infants were defined as infants who were born with birth weight under the 10th percentile. The odds of an IUGR birth were estimated using logistic regression analysis. The main exposure variables

were pre-pregnant BMI and weight gain during pregnancy. Maternal age, hypertensive disorders of pregnancy (HDP), and smoking during pregnancy were included as covariates. Then, using a spline-smoothing optimization method, the optimal maternal weight gain for the prevention of adverse birth outcomes were estimated.

Results

A total of 79705 infants were included in this study. There were 13465 (16.9%) underweight mothers and 5943 (7.5%) IUGR infants in the sample. Mean weight gain per month was 1.05 ± 0.39 kg. Pre-pregnant underweight increased the odds of IUGR by a factor of 2.23 (95% CI: 1.82- 2.83). The estimated optimal weight gain for the least adverse outcome during pregnancy in underweight women was 14.2 kg (95% CI: 13.7 – 15.6).

Discussion

This study showed low pre-pregnant BMI is associated with IUGR. Educating underweight women to attain a normal BMI before their pregnancies is important, and weight gain during pregnancy is essential to reduce risks of adverse perinatal outcomes. Current Japanese guidelines on weight gain during pregnancy should be loosened to encourage higher weight gain in underweight and normal weight women.

Key words: IUGR, pre-pregnant underweight, weight gain during pregnancy