

### **Body Mass Index and Weight Gain in Pregnant Women With HIV: A National Study in Italy**

Despite the growing number of human immunodeficiency virus (HIV)-infected women who are pregnant or planning a pregnancy, there is limited information on body weight status and weight gain in pregnancy in this population. The issue is relevant, because inadequate or excessive body mass index (BMI) and weight gain in pregnancy are risk factors for adverse pregnancy outcomes in the general population [1, 2], and may increase the risk of some events commonly observed among pregnant women with HIV, such as preterm delivery or glucose

**Table 1. Body Mass Index Status at Conception and Weight Gain in Pregnancy**

Characteristic	BMI (kg/m <sup>2</sup> ) Status at Conception				All
	Underweight (<18.5)	Normal (18.5–24.9)	Overweight (25.0–29.9)	Obese (≥ 30)	
No. (%)	54 (7.3)	511 (69.4)	125 (17.0)	46 (6.3)	736 (100)
Recommended total weight gain during pregnancy <sup>a</sup> , kg	12.5–18.0	11.5–16.0	7.0–11.5	5.0–9.0	...
Weight gain during pregnancy, kg, mean (SD)	12.5 (4.2)	11.6 (4.1)	10.5 (5.5)	9.1 (7.3)	11.4 (4.6)
Weight gain per wk, kg, mean (SD)	0.339 (0.12)	0.315 (0.11)	0.283 (0.14)	0.246 (0.20)	0.308 (0.12)
Weight gain during pregnancy					
Inadequate	26 (48.1)	265 (51.9)	29 (23.2)	10 (21.7)	330 (44.8)
Adequate	25 (46.3)	188 (36.8)	46 (36.8)	13 (28.3)	272 (37.0)
Excessive	3 (5.6)	58 (11.4)	50 (40.0)	23 (50.0)	134 (18.2)
Weight gain <0.100 kg/wk	1 (1.9)	4 (0.8)	10 (8.0)	10 (21.7)	25 (3.4)
Weight gain >0.400 kg/wk	16 (29.6)	97 (19.0)	20 (16.0)	10 (21.7)	143 (19.4)
Weight gain <5 kg	1 (1.9)	10 (2.0)	14 (11.2)	10 (21.7)	35 (4.8)
Weight gain >18 kg	3 (5.6)	30 (5.9)	11 (8.8)	4 (8.7)	48 (6.5)

Data are No. (%) unless otherwise specified.

Abbreviations: BMI, body mass index; SD, standard deviation.

<sup>a</sup> Institute of Medicine recommendations [9].

metabolism abnormalities [3, 4]. We investigated BMI status, weight gain in pregnancy, and gestational outcomes within the Italian National Program on Surveillance on Antiretroviral Treatment in Pregnancy, a large cohort study of pregnant women with HIV [5].

All information was taken from clinical records. Given the variability in screening procedures and diagnostic criteria for gestational diabetes during the 10-year interval considered, we used a restrictive definition that considered among the recent American Diabetes Association criteria [6] only fasting plasma glucose levels >92 mg/dL at 20–28 weeks. Preterm delivery was defined as delivery before 37 completed weeks of gestation and low birthweight as neonates weighing <2500 g. Cesarean delivery was considered nonelective if performed after the rupture of membranes, the onset of labor, or both. Birth defects were defined according to the Antiretroviral Pregnancy Registry criteria [7], and sex-adjusted and gestational age-adjusted birthweight percentiles were

calculated according to Italian reference standards [8]. The associations between potentially predictive variables and pregnancy outcomes were assessed using univariate logistic regression, and were expressed as odds ratios (ORs) and 95% confidence intervals (CIs).

Data were extracted from the study database on 25 July 2012. At this time, 736 pregnancies with live births had available information on BMI and weight gain in pregnancy and were therefore analyzed. The BMI categories (underweight, normal, overweight, obese) of the population studied and the pregnancy weight gain for each BMI category, including proportions of women meeting the Institute of Medicine recommendations for weight gain in pregnancy [9], are shown in Table 1.

Although most of the women (69.4%) had a normal BMI at start of pregnancy, only 37% had an adequate weight gain during pregnancy. Inadequate body weight gain was more common (44.8%) than excessive weight gain (18.2%), but 40% of overweight women and 50% of

obese women had an excessive weight gain in pregnancy, with about 9% of the women in these categories gaining >18 kg during pregnancy (Table 1).

Only 1.9% of the women had a vaginal delivery; elective and nonelective cesarean deliveries accounted for 81.3% and 16.7% of deliveries, respectively. Compared to underweight/normal women, overweight/obese women had similar occurrences of preterm delivery (23.4% vs 22.7%,  $P = .871$ ), significantly lower rates of low birthweight (14.2% vs 24.2%,  $P = .007$ ) and nonelective cesarean deliveries (11.7% vs 18.3%,  $P = .042$ ), and a significantly higher occurrence of fasting plasma glucose >92 mg/dL at 20–28 weeks (12.1% vs 6.6%,  $P = .027$ ), hypertension during pregnancy (6.4% vs 2.7%,  $P = .019$ ), and gestational age-adjusted birthweight >90th percentile (15.5% vs 5.0%,  $P < .001$ ). Complications of delivery, major birth defects, and HIV transmission were similar between the 2 groups (7.3% vs 7.6%,  $P = .881$ ; 2.6% vs 3.5%,  $P = .589$ ; and 0.8% vs 0.5%,  $P = .661$ , respectively).

An inadequate weight gain during pregnancy was associated with an increased risk of nonelective cesarean delivery (OR, 1.589 [95% CI, 1.077–2.346],  $P = .020$ ). Excessive weight gain during pregnancy was not associated with either hypertension (OR, 1.364 [95% CI, .537–3.465],  $P = .514$ ) or 20–28 week glucose level of  $>92$  mg/dL (OR, 0.841 [95% CI, .399–1.772],  $P = .648$ ), but was significantly associated with birthweight  $>90$ th percentile (OR, 2.271 [95% CI, 1.229–4.195],  $P = .009$ ), and appeared to be protective against low birthweight (OR, 0.544 [95% CI, .323–.918],  $P = .023$ ) and birthweight  $<10$ th percentile (OR, 0.297 [95% CI, .117–.752],  $P = .007$ ).

Our data show that almost one-quarter of pregnant women with HIV are overweight or obese at the beginning of pregnancy, and that women in these groups have a significantly increased occurrence of diabetes and hypertension in pregnancy. The risks of low birthweight and nonelective cesarean delivery were higher in the underweight/normal BMI categories. Consistent with data from the general population [10], only 37% of pregnant women with HIV had an adequate weight gain in pregnancy. Excessive weight gain during pregnancy was particularly frequent among overweight and obese women. Inadequate weight gain was associated with nonelective cesarean delivery, and excessive weight gain with large-for-gestational-age infants. BMI and weight gain represent modifiable risk factors that should be adequately identified and corrected in order to reduce adverse pregnancy outcomes in this population.

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## Appendix

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