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Moderate Caffeine Consumption During Pregnancy

ABSTRACT: Moderate caffeine consumption (less than 200 mg per day) does not appear to be a major contributing factor in miscarriage or preterm birth. The relationship of caffeine to growth restriction remains undetermined. A final conclusion cannot be made at this time as to whether there is a correlation between high caffeine intake and miscarriage.

Because caffeine crosses the placenta (1) and increases maternal catecholamine levels, concerns have been raised about a potential relationship between caffeine exposure and the incidence of spontaneous miscarriage. However, studies investigating the association between caffeine intake and miscarriage have been limited by small sample size and the retrospective collection of data influenced by recall bias, particularly in patients interviewed after pregnancy loss (2, 3).

Two recent studies have attempted to overcome this limitation by prospectively monitoring a large population of women receiving prenatal care before 16 weeks of gestation, collecting data on caffeine consumption during early gestation, and adjusting for relevant confounders. A study conducted by Savitz et al examined 2,407 pregnancies that resulted in 258 pregnancy losses before 20 weeks of gestation (4). Caffeine exposure was analyzed with respect to intake: none; less than or equal to the median consumption, which was approximately 200 mg per day; or greater than 200 mg per day (Table 1). Three time points were analyzed: 1) before pregnancy; 2) 4 weeks after the most recent menstrual period; and 3) at the time of the interview, which occurred before 16 weeks of gestation. Applying an adjusted survival model, levels of caffeine consumption at all three time points and at all levels of consumption were unrelated to the risk of miscarriage. Reported caffeine exposure at the time of the interview was associated with an increased miscarriage risk among those women with pregnancy losses before the interview. This was thought to reflect recall bias. Ultimately, the study did not show an association between caffeine consumption and miscarriage, regardless of the amount consumed.

Weng et al performed a population-based prospective cohort study in which women were interviewed regard-

ing caffeine exposure at a median gestational age of 71 days (10 weeks) (5). Caffeine exposure was divided into none, less than 200 mg per day, and greater than 200 mg per day. Of the 1,063 pregnant women interviewed, 172 experienced a miscarriage during their pregnancies. The investigators found an increased risk of miscarriage with higher levels of caffeine consumption, with an adjusted hazard ratio of 2.23 (95% confidence interval [CI] 1.34–3.69) for intake of 200 mg per day or more. In contrast

Table 1. Caffeine Content of Foods and Beverages

| Food and Beverages | Milligrams of Caffeine (Average) |
|---|----------------------------------|
| Coffee (8 oz) | |
| Brewed, drip | 137 |
| Instant | 76 |
| Tea (8 oz) | |
| Brewed | 48 |
| Instant | 26–36 |
| Caffeinated soft drinks (12 oz) | 37 |
| Hot cocoa (12 oz) | 8–12 |
| Chocolate milk (8 oz) | 5–8 |
| Candy | |
| Dark chocolate (1.45 oz) | 30 |
| Milk chocolate (1.55 oz) | 11 |
| Semi-sweet chocolate (1/4 cup) | 26–28 |
| Chocolate syrup (1 tbsp) | 3 |
| Coffee ice cream or frozen yogurt (1/2 cup) | 2 |

U.S. Department of Agriculture, Agricultural Research Service, 2000.

to the findings of the Savitz et al study, the timing of the interview in relation to a miscarriage did not affect the positive association identified between caffeine consumption and miscarriage.

Although both studies involved appropriate statistical analyses and large study populations, they reached contradictory conclusions. Factors that may account for the discrepancy include 1) differences in populations studied, 2) different analytic approaches, and 3) issues related to the baseline risk of miscarriage and corresponding statistical power. Because of the conflicting results of these two large studies, a recommendation regarding higher levels of caffeine consumption and the risk of miscarriage cannot be made at this time. Neither report demonstrated a significant increase in the risk of miscarriage with levels of caffeine intake less than 200 mg per day.

Two large studies have been performed to assess the relationship between caffeine intake and preterm birth. A randomized double-blind controlled trial of caffeine reduction in 1,207 women evaluated birth data for 1,153 singleton live births (6). An average intake of 182 mg per day of caffeine did not affect length of gestation. Additionally, a prospective, population-based cohort study conducted by Clausson et al evaluated the effect of caffeine consumption on gestational age at delivery in 873 singleton births (7). Again, no association was found between caffeine and preterm birth. Consequently, it does not appear that moderate caffeine intake is a contributor to preterm birth.

Studies also have investigated whether caffeine contributes to intrauterine growth restriction (IUGR). Although caffeine does cross the placenta, it has been shown that caffeine does not cause a decrease in uterine blood flow or fetal oxygenation (8). Two studies have assessed the relationship between caffeine consumption and mean birth weight differences (6, 7), and two others have recently reported on IUGR. A study of 2,635 low-risk pregnant women recruited between 8 weeks and 12 weeks of gestation was performed to determine if a relationship exists between caffeine consumption and IUGR (9). Intrauterine growth restriction was the primary outcome measure and was defined by birth weight less than the 10th percentile on a personalized growth chart. Of the 2,635 women, IUGR was identified in 343 (13%) of the newborns. The association of caffeine intake with the incidence of IUGR was equivocal at all levels of caffeine consumption. Compared with an average daily consumption of less than 100 mg, odds ratios (OR) for IUGR at increasing levels of caffeine intake are as follows: consumption of 100–199 mg per day (OR, 1.2; 95% CI, 0.9–1.6), 200–299 mg per day (OR, 1.5; 95% CI, 1.1–2.1), and more than 300 mg per day (OR, 1.4; 95% CI, 1.0–2.0).

A prospective cohort study found no association between caffeine consumption and IUGR (3). Thus, at this time, there is no clear evidence that caffeine exposure increases the risk of IUGR.

Moderate caffeine consumption (less than 200 mg per day) does not appear to be a major contributing factor in miscarriage or preterm birth. The relationship of caffeine to IUGR remains undetermined. A final conclusion cannot be made at this time as to whether there is a correlation between high caffeine intake and miscarriage.

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