Annals of Epidemiology 25 (2015) 46–54

Contents lists available at ScienceDirect

Annals of Epidemiology

journal homepage: www.annalsofepidemiology.org

Original article

Low-to-moderate prenatal alcohol consumption and the risk of selected birth outcomes: a prospective cohort study

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ARTICLE INFO

Article history:
Received 13 August 2014
Accepted 11 October 2014
Available online 16 October 2014

Keywords:
Alcohol
Birth outcomes
Low birthweight
Preterm delivery
IUGR

ABSTRACT

Purpose: To estimate whether low-to-moderate prenatal alcohol exposure is associated with selected birth outcomes.
Methods: Low-to-moderate prenatal alcohol drinking and effects on low birthweight, preterm delivery, intrauterine growth restriction, and selected neonatal outcomes were evaluated among 4496 women and singleton infants. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated using multivariable logistic regression, controlling for confounding variables.
Results: Early pregnancy drinking was associated with reduced odds of low birthweight, OR, 0.66 (95% CI, 0.46–0.96) and birth length less than 10th percentile, OR, 0.74 (95% CI, 0.56–0.97). Drinking during the first 3 months showed lower odds for birth length and head circumference less than 10th percentile, OR, 0.56 (95% CI, 0.36–0.87) and OR, 0.69 (95% CI, 0.50–0.96), respectively. Third trimester drinking was associated with lower odds for low birthweight, OR, 0.56 (95% CI, 0.34–0.94) and preterm delivery, OR, 0.60 (95% CI, 0.42–0.87).
Conclusions: Our results suggest low-to-moderate alcohol exposure during early and late gestation is not associated with increased risk of low birthweight, preterm delivery, intrauterine growth restriction, and most selected perinatal outcomes.

Introduction

Alcohol use during pregnancy has historically been associated with a range of negative birth outcomes and developmental effects that include fetal alcohol syndrome (FAS), alcohol-related birth defects, and alcohol-related neurodevelopmental disorders [1,2], often characterized at birth by facial dysmorphology, poor growth, and neurologic functional and structural abnormalities, including reduced head circumference [3]. Although epidemiologic research has delineated adverse effects of heavy or chronic drinking on the fetus, reported effects of low to moderate prenatal alcohol, which represents the majority of exposures, are inconsistent. Previous studies have documented increased risks between alcohol and infertility [4], miscarriage [5], stillbirth and infant mortality [6,7], congenital anomalies [8], low birthweight [9], reduced gestational age [10], preterm delivery [11], and intrauterine growth restriction (IUGR) or small-for-gestational age [8,12,13], but at relatively higher consumption levels. Conversely, other research demonstrated no increase in risk from light-to-moderate alcohol consumption for selected perinatal or developmental outcomes [14–18], and several studies have reported reductions in risk of adverse pregnancy outcomes, including a curvilinear effect for increasing levels of prenatal alcohol exposure [9,19–21]. A systematic review of low-to-moderate prenatal drinking reported lacking evidence of increased risk for selected birth outcomes including IUGR, prematurity, birthweight, and malformations [22]; yet, results overall were inconclusive.

Methodologic difficulties related to study design, including retrospective exposure assessment, potential exposure misclassification, and inadequate control for potential confounders have resulted in limited high-quality analyses of low-to-moderate prenatal alcohol drinking. The present study is a prospective investigation of alcohol use during pregnancy and IUGR, low birthweight,

The authors state no conflict of interest.

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http://dx.doi.org/10.1016/j.annepidem.2014.10.011
1047-2797/

preterm delivery, and other selected neonatal outcomes among a cohort of 4496 women and their newborns.

Materials and methods

Sample

The study population included women enrolled in two related and almost concurrent prospective longitudinal cohorts: one examining prenatal caffeine exposure and the other investigating asthma in pregnancy (Fig. 1). Pregnant women were recruited from 56 obstetric practices and 15 clinics associated with six hospitals in Connecticut and Massachusetts during the period of September 1996 to June 2000. Study design for each cohort was similar with respect to methodology, timing, and content of structured interviews [23,24]. The final sample was restricted to singleton live births yielding a total study sample of $N = 4496$ for the current analyses.

All women completed a baseline interview before 24 weeks gestation. Information was collected on multiple risk factors through the pregnancy, including comprehensive maternal characteristics and potential confounding variables. Detailed pregnancy history was collected, including preexisting medical conditions. The postpartum interview was conducted after delivery, typically in the hospital during the postpartum stay or within 1 month of delivery. Medical records for both the mother and infant were reviewed to collect detailed information related to labor and delivery, selected medical risk factors, and potential confounders.

Exposure ascertainment

Alcohol consumption information was collected for specific months of pregnancy during two study visits: baseline prenatal interview and postpartum interview. In the baseline prenatal interview, participants were asked in detail about alcohol use during months 1 to 3 of gestation in addition to any alcohol exposure up to the baseline interview; median gestational age at baseline interview was 14 weeks (range 6–24 weeks). During the postpartum interview, an assessment of drinking was completed for gestational month 7 and the third trimester. Second trimester alcohol use was not assessed. For each beverage type (wine, beer, and liquor), women were asked how often they drank alcohol and how many drinks they consumed during the specific period. Using a previously established algorithm [25], alcohol content values for each beverage were summed for a total exposure score expressed as daily ounces of absolute alcohol (AA) for each month per trimester.

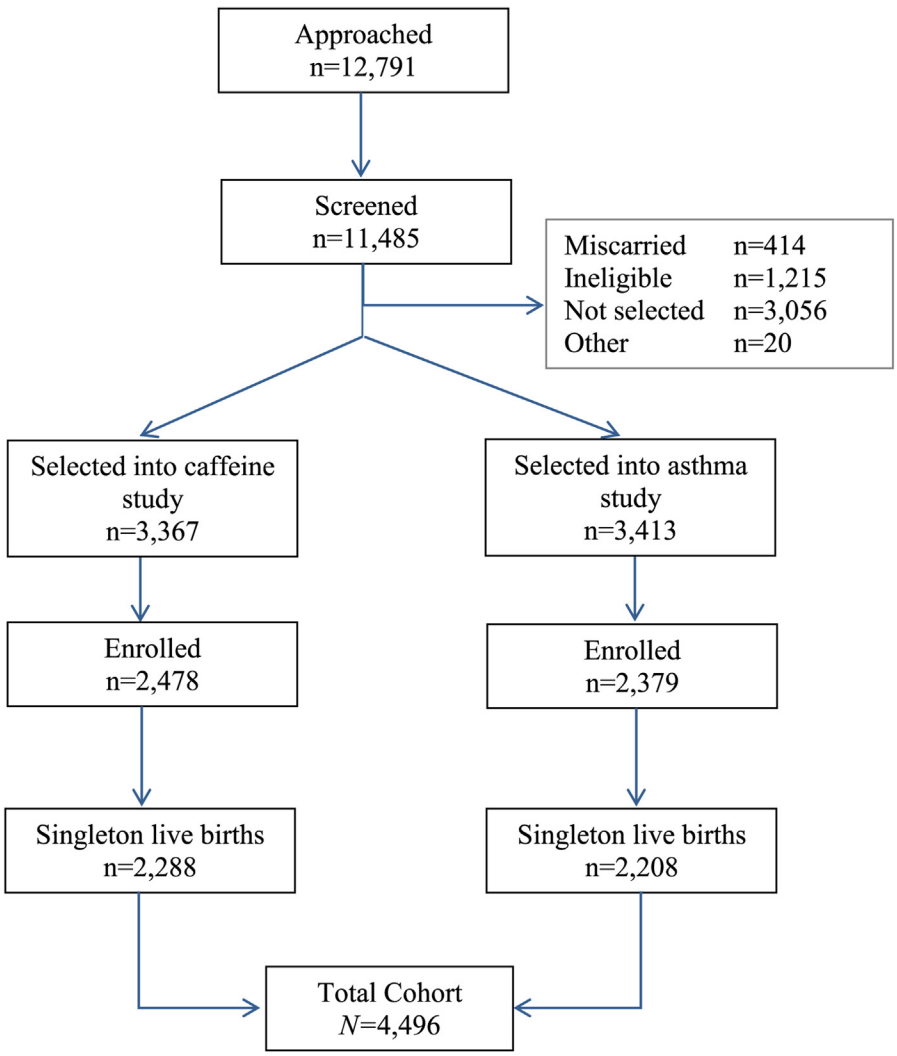

Fig. 1. Number of subjects approached, screened, and enrolled into the total cohort. Low-to-moderate alcohol use in pregnancy and birth outcomes: Connecticut/Massachusetts, 1996 to 2000.