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Chronic Aflatoxin Exposure During Pregnancy Is Associated With Lower Fetal Growth Trajectories: A Prospective Cohort Study in Rural Ethiopia

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Abstract : Aflatoxins are toxic secondary metabolites produced by Aspergillus fungi, which are ubiquitously present in the food supplies of low- and middle-income countries. Studies of maternal aflatoxin exposure and fetal outcomes are mainly focused on size at birth and the effect on intrauterine fetal growth has not been assessed using repeated longitudinal fetal biometry across gestation. Therefore, this study intends to assess the association between chronic aflatoxin exposure during pregnancy and fetal growth trajectories in a rural Ethiopian setting. In a prospective cohort study, we enrolled 492 pregnant women. A phlebotomist collected 5 mL of a venous blood sample from eligible women before 28 completed weeks of gestation and aflatoxin B1-lysine concentration was determined using liquid chromatography-tandem mass spectrometry. The mean (±SD) gestational age was 19.1 (3.71) weeks at enrollment, and 28.5 (3.51) and 34.5 (2.44) weeks of gestation at the second and third rounds of ultrasound measurements, respectively. Estimated fetal weight was expressed in centiles using the INTERGROWTH-21st reference. We fitted a multivariable linear mixed-effects model to estimate the rate of fetal growth between aflatoxin-exposed (i.e., aflatoxin B1-lysine concentration above or equal to the limit of detection) and non-exposed mothers in the study. Mothers had a mean (±SD) age of 26.0 (4.58) years. The median (P25, P75) serum AFB1-lysine concentration was 12.6 (0.93, 96.9) pg/mg albumin, and aflatoxin exposure was observed in 86.6% of maternal blood samples. Eighty-five percent of the women enrolled provided at least two ultrasound measurements for analysis. On average, the aflatoxin-exposed group had a significantly lower change over time in fetal weight-for-gestational age centile than the unexposed group (ß = -1.01 centiles/week, 95% CI: -1.87, -0.15, p = 0.02). Chronic maternal AF exposure is associated with lower fetal weight gain over time. Our findings emphasize the importance of nutrition-sensitive strategies to mitigate dietary aflatoxin exposure as well as adopting food safety measures in low-income settings, particularly during the fetal period of development.

Keywords : aflatoxin, fetal growth, low-income setting, mycotoxins
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