Impact of foetal sex on first trimester placental markers and pregnancy outcome: a prospective study

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Objective. Placental development, maternal adaptations to pregnancy, and birth outcomes seem to differ according to foetal sex. This prospective cohort study investigates the associations between foetal sex, first-trimester markers of foeto-placental development, and birth outcomes.

Materials and Methods. Healthy women with singleton autologous pregnancies were enrolled at 11-13+6 gestational weeks. Blood samples were collected to measure biochemical placental marker (Pregnancy Associated Plasma Protein A, free-β-Human Chorionic Gonadotropin (HCG)). Transabdominal ultrasound scan was performed to measure the mean pulsatility index of uterine arteries (UtA PI), placental volume, and crown-rump length (CRL). Pregnancy outcomes were recorded from medical registries. Multi-adjusted generalized linear models assessed the associations between foetal sex, first trimester feto-placental markers, and pregnancy outcomes.

Results. Among 1,052 pregnant women, 523 had male foetuses and 529 had female foetuses. Maternal characteristics were similar, except for a higher maternal age in mothers of female foetuses ($p < 0.05$). Female pregnancies were associated with lower first-trimester mean UtA PI and CRL measurement, and higher free-β-HCG concentrations. Female sex also correlated with longer pregnancy duration and a 43% lower risk of preterm delivery compared to male foetuses. Increased prenatal growth trajectories were confirmed at birth by higher birth weight and head circumference in male compared to female newborns. Lastly, after excluding women undergoing a planned caesarean section, male foetuses showed lower arterial cord pH values regardless of the delivery mode.

Conclusions. The present study highlights crucial differences in prenatal growth and placentation between male and female foetuses, leading to significant differences in pregnancy duration and response to labour.