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The intrauterine growth pattern and estimated fetal weight: Ultrasound based longitudinal study, Butajira, Ethiopia

Yalemwork Getnet
Addis Ababa University, Ethiopia

Background: Pregnancy is the time in which the major determinants for perinatal outcomes and postnatal growth are laid down. Hence, it is crucial to monitor fetal growth in utero by ultrasonography. However, there are very few ultrasound-based longitudinal studies worldwide and a single ultrasound-based study in Ethiopia. Therefore, this study will serve as a basis for the development of context-specific nutritional interventions that can improve birth outcomes and the long-term quality of life of the mother and her offspring.

Methods: Ultrasound-based longitudinal study among 747 pregnant women was conducted in Butajira, Ethiopia. Serial ultrasonographic examination at baseline and scheduled visits at least at 14, 26 and 36 weeks of gestation to evaluate intrauterine growth pattern was done. Fetal weight estimation was done using the Hadlock algorithm. Fetal growth biometry analyzed by the International Fetal Growth Standards application. Reference curves were estimated based on centiles for individual biometrics. Estimated fetal weight was derived at each gestational age from 14 to 40 weeks using the intergrowth 21ˢᵗ application. The z-scores and percentiles of biometric measurements and EFW were calculated and fitted to INTERGROWTH-21ˢᵗ International Standards for Fetal Growth. Z-score for EFW was calculated using the International Fetal Growth Standards - Estimated Fetal Weight (Version 1.0).

Results: We analyzed a total of 2,074 ultrasound scans among 747 singleton fetuses that have 2 and above ultrasound scans after ≥14 weeks of gestation. The median age of the women during enrolment was 26 years IQR (23,30) and 62.4% (464/744) of the women were in the age range between 25-34 years. About 10.4 % (77/742) of the women were underweight during enrolment. 23.5% (175/746) of the women have MUAC measurements below 23 cm during enrolment. The median number of ultrasound scan per fetus was 3 ranging from 2-6. We found that 10% of the fetus were small for gestational age (below the 10th percentile) based on the Z-score of EFW. When we fit to the INTERGROWTH-21ˢᵗ application software, the Z-score distribution of biometric measurements in our study is different.

Conclusion: We found that the overall intrauterine growth distribution is mostly similar with the previous study done in Ethiopia as well as with the WHO and INTERGROWTH-21ˢᵗ fetal growth reference standards. About 10% of the fetus was found to be growth restricted. Both Abdominal Circumference (AC) and estimate EFW gave the same result in detecting the magnitude of fetal growth restriction. We recommend subsequent follow up studies to evaluate the effect of intrauterine fetal growth on birth outcome and subsequent child growth and development.

Keywords: Intrauterine growth, longitudinal study, Ethiopia.