

Prediction of the birth weight based on the abdominal circumference at the first trimester screening

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Objective

The aim of this study was to investigate if the estimated fetal abdominal circumference (AC) at the first trimester screening can determine the birth weight (BW).

Methods

A total of 7527 live births were studied. Z scores (z) were used based on published models based on gender and gestation period to standardize our two primary variables: independent variable AC(z) and dependent variable BW(z). Data collected and considered included mother demographics and risk factors, fetal first trimester measurements and blood tests, birth data including timing, gender, weight and height. The BW(z) versus AC(z) association was studied using Linear regressions as well as using BW(z) estimates using increasing AC(z) 5% size were done. Multiple linear regressions were used to determine predictors of BW (z).

Results

Study group included 3889 male and 3638 female births. Birth weights varied widely in this sample especially with gestational age. BW(z) was found to be correlated significantly to AC(z) levels [$BW(Z) = 0.124 * AC(z) - 0.147$; $p < 0.001$], yet there was substantial variation in this association indicating the presence of other factors influencing BW(z). Rolling groups of BW(z) estimates using increasing AC(Z) 5% size (N=376 each and of 2.5% overlap) provided confirmatory evidence of a linear relation between BW(z) and AC(z) over a wide range, however this trend was not true for low and high AC(z) values with evidence of a sigmoidal association. Multiple linear regression identified, in addition to AC(z) [coefficient (95% confidence interval): 0.13 (0.11-0.15); $p < 0.001$], positive correlation of b-HCG [0.07(0.04-0.1); $p < 0.001$], gestational age at delivery [0.03(0.01-0.04); $p < 0.001$], BMI [0.03(0.02-0.04); $p < 0.001$] and negative correlation for smoking [-0.27(-0.35-0.19); $p < 0.001$]. A strong linear relationship $R = 0.992$ ($BW(z) = 4.225 * NT \text{ group} + 2.119$) between the mean BW(z) and each NT group of 0.5 intervals.

Conclusion

Abdominal circumference and NT measurements at the first trimester of pregnancy can be predictive of birth weight.