
FETAL ULTRASOUND BIOMETRY

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Fetal biometry (biparietal diameter, BPD and femur length, FL) is used to establish gestational age in the first half of pregnancy and to assess fetal growth later in gestation.¹

Microcephaly is associated with many different syndromes, usually resulting in mental retardation and poor perinatal outcome.^{2,3} Microcephaly cannot be ruled out by routine second trimester ultrasound. The presence of intracranial calcification prior to 22 weeks gestation, even when the BPD is normal suggests a high risk for the development of microcephaly-serial sonograms prove helpful in the subsequent detection of head growth anomalies as in many cases microcephaly cannot be diagnosed reliably using a single screening scan in the second trimester.¹ BPD must be measured, but it is also essential to calculate the head: body ratio to exclude intrauterine growth retardation (IUGR). Isolated microcephaly, without other anomalies, is rare and the diagnosis can be difficult in borderline cases. Serial examinations at intervals of at least two weeks or even 3 weeks and very careful interpretation are necessary.⁴

A femur is short if it is more than two standard deviations (2 SD) below the mean. A skeletal dysplasia is likely only if FL is even smaller than 5 mm or smaller than 2 SD below the mean.⁴ Fetal growth is influenced by many factors e.g. race, nutrition, antenatal care, parental income etc.^{5,7}

In a fetal structural survey at 15 to 20 week's gestation, the fetuses of Asian women had less-than-expected femur lengths (-0.66 ± 1.64 mm) and the fetuses of black women had greater-than-expected femur lengths (-0.88 ± 1.57 mm) than the fetuses of white women in the second trimester.⁶ The average length of the fetal femur may even differ among

various Asian sub-populations.⁸ Parker and colleagues showed that the crown-rump length (CRL) and biparietal diameter (BPD) are similar for Asian and white fetuses up to 20 weeks.⁹ Lai and Yeo demonstrated slightly smaller BPD, head circumference, abdominal circumference and femur length (FL), more pronounced over the course of gestation in Asian compared with white fetuses.¹⁰ Fukada and colleagues showed that 7 of 549 fetuses (1.3 %) of Japanese women had femur and humerus lengths that varied more than 1.5 SD from a growth curve determined from their study population, which had no abnormalities.¹¹ Kurmanavicius et al showed almost no differences in biparietal diameter (BPD) centiles,¹² but Merz's centiles for femur length (FL) were higher than Kurmanavicius.¹³ They used a large sample size which is evenly distributed from 12 to 42 weeks of pregnancy. Raman and associates compared growth between the three different ethnic groups in the Malaysian population in a longitudinal prospective study at the University Hospital, Kuala Lumpur--the Indian fetuses had significantly longer limb lengths than the non-Indian fetuses (Malays and Chinese). Their limbs grew faster by 0.15 mm/week for femur length and 0.1 mm/week for humeral length ($P < 0.001$).¹⁴ In a study from Khulna Nuclear Medicine Centre (Bangladesh) the sensitivity of antenatal detection of intrauterine growth retardation (IUGR) by ultrasound was 76.4% with predictive value for positive test 79.2% and perinatal mortality rate 13 per thousand.¹⁵

The association between the nuchal fold and Down syndrome (trisomy 21) was first noted in

second trimester fetuses, when a nuchal thickening of 6mm or more was considered abnormal and highly predictive of Down syndrome.¹⁶ Transvaginal sonography can identify many first trimester fetuses with nuchal thickening.¹⁷ The normal first trimester fetus has an area of posterior nuchal lucency measuring less than 3 mm in thickness (anteroposterior).¹⁸ Bromley et al. Reports that fetal nose bone length is a marker for Down syndrome in the second trimester in a high-risk population.¹⁹ Yeo and coworkers state that most aneuploid fetuses have sonographically small ears (< / = 10th percentile for gestational age) and this smallness is not entirely related to overall small fetal size, but in almost half of the cases, the fetal ear length is disproportionately smaller than the BPD.²⁰

Rate of fetal growth, rather than fetal weight alone, is a strong predictor of adverse neonatal outcomes. Morbidity and mortality are significantly increased among fetuses with an estimated fetal weight in the 5th percentile or less for gestational age.²¹

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