

Fetal Weight Prediction in 3rd Trimester by Ultrasonography

H KHALIL T RANA A R GORAYA

Department of Gynaecology & Obstetrics, Lady Aitchison Hospital, K.E. Medical College, Lahore
Correspondence to Dr. Haroona Khalil

Fetal weight estimation is a common obstetrical practice now-a-days. It guides clinicians to finalize important obstetrical decision. The antenatal ultrasound measurement of the fetal parameters; abdominal circumference and head circumference were compared with birth weight of new-born delivered within 72 hours of measurement. Birth weight was highly correlated with head circumference ($r=0.95$). Fitted linear regression equations were calculated relating birth weight to the two ultrasound factors. A liver combination of abdomen circumference and head circumference values was better than abdomen circumference alone to predict birth weight.

Key words: Fetal weight, 3rd Trimester, ultrasonography.

The ultrasound estimation of fetal size is now in widespread use, to aid in the management of at risk pregnancies and, increasingly in screening to detect aberrant fetal growth. Weight prediction by the measurement of single abdominal dimension, such as abdominal circumference (AC), has been advocated as providing simple and reliable method¹.

Some demonstrated that greater accuracy may be obtained in predicting fetal weight by measuring fetal volume, although the methods described were usually time consuming.

We compared the relationship between fetal weight and head circumference and abdominal circumference for the improved fetal weight determination.

Methods

Patients attending the Lady Aitchison Hospital, Lahore in whom imminent delivery was expected, were prospectively studied. These included patients in preterm labour receiving beta sympathomimetic drugs or where delivery was elected because of fetal or maternal adversity. A total of 50 singleton pregnancies had an antenatal ultrasound examination within 72 hours of delivery and were included in the study.

The fetuses were scanned by a single operator. The ultrasound machine had an on-screen multidirectional caliper measuring system allowing direct measurement of fetal parts. The head circumference (HC) and abdomen circumference (AC) were obtained after fetal head and abdomen had been aligned for measurement as described by Campbell. The calipers of all systems were to an assumed speed of sound in fetal soft tissue of 1540 MS⁻¹. The newborn weighed naked immediately after delivery.

Results

The birthweight ranged from 620 to 4370 gram. In 10 cases the HC was not obtained either because of engagement of the fetal head or the fetus had assumed either the occipito-anterior or posterior position. Birthweight (BW) was plotted against HC and AC. The apparent linear relationship was obtained between BW and HC; AC. This was confirmed by linear regression analysis.

Variance of BW did not increase with BW and the residual standard deviation of BW is constant. The correlation coefficient were found to be:

$$r(AC, Vol)=0.97$$

$$r(AC, HC)=0.83$$

There was no significant evidence of curvature in the birthweight/ultrasound parameters obtained relationship. The fitted linear regression equations are given below with standard errors (in brackets) for the co-efficient.

$$BW = -3.20(\pm 0.22) + 0.187(\pm 0.007)AC$$

$$BW = -6.94(\pm 0.72) + 0.300(\pm 0.022)HC$$

(HC, AC in cm and BW in kg)

Multiple regression was used to find the best linear combinations of ultrasound parameters to predict birthweight

$$BW = \pm 4.34(\pm 0.47) + 0.158(\pm 0.014)AC + 0.063(\pm 0.024)HC$$

A significant improvement over AC alone ($P < 0.05$) was also obtained by the combination of AC and HC ($r = 0.951$)

Discussion

There was no significant evidence of curvature found in the relationship between birthweight and ultrasound parameters. Other authors have used fitted curves using quadratic polynomial or logarithmic functions².

A comparison of our standard deviation (SD) of predicted BW at an average weight of 3.5Kg with those of other studies is shown in Table 1.

Table 1 Standard deviations of predicted birthweight: comparable studies (for an average of 3.5Kg)

Method	SD(g)	Reference
Abdomen circumference	98	2
Abdomen circumference	215	2
Abdomen area	202	3
Biparietal diameter/Abdomen circumference	313	3
Abdomen circumference	250	This study
Head circumference/abdomen circumference	250	This study

The use of a combination of cross-sectional abdomen measurements with either head measurement or longitudinal fetal measurements has been used to give reliable prediction of BW³.

Deter et al⁴ found that the method of using both biparietal diameters and AC as described by Warsof et al³,

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was superior to that of Campbell using AC alone.

The addition of HC may offer some individual value in the measurement of an asymmetrically grown fetus, but in 15% of cases in this study head measurement was not possible because of technical reasons.

References

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