



FETAL BIRTH WEIGHT: ULTRA SONOGRAPHIC STUDY IN THE MAHARASHTRIAN MUSLIM FEMALES.

Gynaecology

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ABSTRACT

Two hundred antenatal patients were studied at term pregnancy at Government Medical College, Miraj, and fetal birth weight estimation was done in utero ultrasonographically. The parameters measured were Abdominal Circumference (AC), Biparietal diameter (BPD) and Femur Length (FL); fetal weight prediction was done with Shepard's formula using AC and BPD as well as Hadlocks formula using FL and AC. The scan delivery interval was maintained at 72 hours or less. Results of both formulae were compared with the actual fetal birth weight taken within 15 minutes of delivery. With Shepard's formula, the predicted fetal weight was within 100 gms of the actual fetal weight in 71% cases, within 150gm in 86% cases, within 200 gms in 93% cases and within 250 Gms in 98%. With Hadlocks formula, the predicted birth weight was within 100 Gms of the actual fetal weight in 72% cases, within 150 Gms in 83%, within 200 Gms in 92% cases and within 300 Gms in 98%. The mean percent error calculated as $\text{Error \%} = \frac{\text{Predicted weight} - \text{actual weight}}{\text{actual weight}} \times 100$ was 2.9% with Shepard's formula and 3% with Hadlocks. These data thus support a significant correlation between ultrasonographic estimation and actual fetal birth weight.

KEYWORDS

Fetal birth weight, FL, AC, BPD

Introduction:

The assessment of fetal birth weight forms an important part of prenatal care. The clinical management, the outcome of pregnancy, delivery and survival of the newborn are greatly influenced by the knowledge of fetal weight. Accurate determination of fetal weight prior to delivery can have a significant bearing on management decisions in labour, thereby markedly improving perinatal outcome. The route of delivery is also influenced by the size of the baby. Knowledge of fetal by the most suitable route. Fetuses weighting more than 3.5kgs. If presenting by the podalic extremity will be better managed by delivery via the abdominal route. Similarly in a case of multifetal pregnancy with gross discordance in fetal sizes, where the much smaller twin presents as the first candidate for delivery, one may opt for a caesarian section.

Various clinical methods for fetal weight estimation have now been surpassed by the more accurate ultrasonographic measurements. Various parameters like Abdominal Circumference, Biparietal diameter, Femur length and Head circumference are used. In our study three sonographic parameters were used in an attempt to estimate fetal weight. There were Biparietal diameters - as an index of head size abdominal circumference - as an index of body size Femur Length - as an index of crown heel length.

Material and methods:

200 antenatal cases were selected randomly from the local population, admitted to Government Medical College, Miraj for delivery and scanned ultra-sonographically. Three parameters BPD, AC and FL were studied. Only full term pregnancies were included in the study. Cases were selected irrespective of associated complications like diabetes, pregnancy induced hypertension, I.U.G.R. etc. The scan-delivery interval was maintained at 72 hours or less. Fetuses suspected of having dolichocephaly (cephalic index less than 7). BPD¹ was measured as the largest diameter between the outer and inner skull tables at right angle to his falx at a plane slightly above and parallel to the cantho-meatal line which includes the falx, thalamus, septum pellucidum and an oval head shape. Abdominal Circumferenc^{2, 3} measurements was obtained in the transverse plane perpendicular to

the long axis of the fetal aorta or spine at the Porto-umbilical vein complex within the liver. Femur Length⁴ was measured as the linear distance between the greater trochanter of the femur to the distal metaphysis. All measurements were made in millimeters and an average of three reading taken. Estimation of fetal weight was done using two formulae.

Shepard's - Estimated fetal wt EFW:

$\text{Log}_{10}(\text{BW}) = -1.7492 + 0.166(\text{BPD}) + 0.046(\text{AC}) - 2.646(\text{AC} + \text{BPD}) / 1000$

Hadlock's - Estimated fetal wt EFW:

$\text{EFW: log}_{10}(\text{BW}) = 1.3598 + 0.051(\text{AC}) + 0.1844(\text{FL}) - 0.0037(\text{AC} \times \text{FL})$

Results:-

The actual birth weights ranged from 2000-4000 Gms with a mean of 2739 Gms. Using Shepard's formula the estimated birth weights ranged from 2089-4050 gms with a mean of 2716 gms. Hadlocks formula estimated a range of 1847-4145 Gms with a mean of 2713 Gms.

The predicted fetal weight was within 100 Gms of actual weight in 76% cases, within 150 Gms in 86% cases, within 200 Gms in 91% and 250 Gms in 98% with Shepard's formula. Using Hadlocks formula the results were within 100 Gms of actual weight in 72% cases, within 150 Gms in 83%, within 200 Gms in 92% and within 300 Gms in 98% cases. The t test was performed to determine the statistical significance of the difference between estimated weight and actual weight. With both formulae, $t = 0.78$, $p > 0.05$ which is not significant. The implies a significant correlation between actual and estimated weights.

Discussion:

The estimation of fetal weight in utero is an important factor in the management of pregnancy, more so in high risk pregnancies. As such numerous studies have been conducted in an attempt to predict fetal weight ultra sonographically. Our study showed comparable results to some of these.

Hill⁵ et al in 1985 using Shepard's model of AC and BPD reported 50% of the estimated weight within 225 Gms and 90% within 605 Gms. Gulati⁶ et al in 1989 estimated 72% cases within 150 Gms. In our study 70% of the estimates were within 100 gms and 85% within 150 gms which is comparable to the above study. Shepard et al⁷ in 1982 obtained a mean % error of 3.5%. In our study using Shepard's model the mean percent error was 2.9% and with Hadlock's model it was 3%. In this study both formulae were found to be equally applicable to the population.

The accuracy of a combined BPD/AC model which involves both measurements of the fetal head and trunk in which most of the fetal mass lies has been confirmed by most authors. Hadlock's⁸ models based on AC & FL is equally comparable. This is due to the strong linear relationship of femur length to crown heel length. In cases where the BPD may prove to be unreliable as a parameter as in dolichocephaly / brachycephaly, or when the deeply engaged head prevents accurate measurement, Hadlocks model will prove to be extremely useful.

Conclusion:

This study supports a significant correlation between the ultrasound estimate of fetal weight and actual fetal birth weight. Both the formulae have shown a comparable accuracy in predicting expected fetal weight. In some cases where the head is deeply engaged and it is difficult to measure BPD, Hadlock's formula may be used. Accurate estimation of fetal weight particularly in high risk pregnancies should be encouraged to ensure a better obstetric ultrasound reports.

Table- I Showing range of predictability in relation to actual weight with both formulae.

Predictability	Shepard's 'No of	Hadlocks 'No of
within gms	cases ¹	cases ¹
50	45	41
100	76	72
150	86	83
200	91	92
250	98	96
300	100	98
350	-	99
450	-	100

Table- II Showing difference between estimated birth weight and actual birth weight in 3 different weight categories.

Actual birth weight	No. of	Absolute difference in gms.		Mean % error	
in gms	cases	Mean SD			
		Hadlock's	Shepard's	Hadlock's	Shepard's
<2500	126	111.6-86.55	65.04-59.8	4.6	2.8
2501-3000	72	77.2-72.2	83.69-65.9	2.6	3
>3000	2	96-51	104-554.5	2.3	2.5

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