Original Research Article

Sonographic evaluation of biparietal diameter and abdominal circumference at term for estimation of foetal birth weight

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Abstract

Background: Predicting the foetal birth weight is paramount in obstetric care. Making appropriate management decisions requires appraisal of foetal birth weight. Ultrasound is an accurate and useful modality fir the assessment of foetal birth weight in modern obstetric. **Aim and Objective:** To evaluate the usefulness of ultrasound measurements of Biparietal diameter and abdominal circumference is estimating the foetal birth weight. **Material and Methods:** 100 patients at term admitted to either Basaveshwar Teaching and General Hospital and Sangameshwar Teaching and General Hospital were selected by simple random sampling technique after considering all inclusion criteria in the study. All patients were subjected to USG and data collected was analysed **Inclusion** 1) Full term pregnancies (38-42 weeks) 2) Single foetus with vertex presentation with absence of maternal disease. **Exclusion Criteria 1)** Congenital malformation 2) Multiple pregnancy 3) Malposition 4) Engagement head
Key Words: Sonographic evaluation, biparietal diameter.

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INTRODUCTION

Ultrasound examination of foetus became integrated into prenatal care soon after its introduction in the late 1950s Ultrasound is a basic diagnostic tool in obstetrics and its benefits extend from use indiagnos is of very early pregnancy to estimate of foetal weight at the time of delivery. Accurate assessment of foetal birth weight is fundamental in managing both low and high risk pregnancies. Accurate determination of foetal weight prior to delivery can have a significant bearing on the management decisions in labour, thereby markedly improving perinatal outcome. In last few decades estimation of foetal birth weight has advanced from estimation by physical examination to foetal ultrasound using multiple parameters. This has increased the accuracy of foetal weight significantly. Multiple formulae have been developed for the estimation of birth weight using ultrasound measurement. Birth weight is the key factor for the outcome in the utero growth of foetus. It helps to determine the mode of delivery, predict the foetal outcome hence reducing the maternal and neonatal morbidity. Estimation of foetal weight is one ultrasonographically using abdominal circumference alone or both abdominal circumference and biparietal diameter. Determination of weight within 10% of actual birth weight is considered acceptable accuracy Sonographic measurements of foetal parts provides a direct way of assuming foetal size and unlike clinical methods, the presence of oligohydramnios, polyhydramnios or maternal obesity has minimal effect on is accuracy. Numerous formulae have been published the most popular are Sheppard, Warsof's with Sheppards modification and Hadlock's.

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MATERIAL AND METHODS

A prospective study was performed on 100 pregnant women at term who got admitted to Basaweshwar Teaching and General Hospital and Sangameshwar Teaching and General Hospital during the period from December 2012 to August 2014. Majority of patients studied were inpatients and cases were selected randomly after through clinical examination. **Inclusion Criteria:** Full term pregnancies and single live foetus with vertex presentation with absence of anymaternal diseases. **Exclusion Criteria:** Congenital malformations, multiple pregnancies, malpresentation, engaged head, obstructed labour.

Procedure: Routine blood group RH typing and urine routine was done ultrasound examination of all cases done prior to delivery BPD, AC, HC were measured and co-related with foetal birth weight; ultrasound frequency of 3.5-5MHz was used and curvilinear transducer was used. Consent from all patients after explaining them about non-invasive nature of procedure the abdomen of the patient in supine position was smeared with gel.

1. **BPD:** the accurate BPD plane identified by noting the oval head shape symmetrical image and presence of shadow of thalami, Cavum septum pellucid, part of falx and possibly insula with middle cerebral artery; measurements taken from the outer margin of proximal skull plate and to the inner margin of the distal skull plate.
1. **AC:** the AC identified by foetal stomach and liver, The bifurcation of the main portal vein or umbilical part of left portal vein are visualized and measured. This can also aid in diagnosis of abnormal foetal head size.
2. **Calliper measurements:** External cephalometry was performed within 24 hours of delivery using a pair of steel callipers.
3. **Actual Fetal Weight:** After delivery foetal weight was recorded using weighing machine. Data collected was analysed by test of significance of Chi square test, paired and unpaired and t-test, ANOVA test.

RESULTS

100 pregnant women at term were studied by ultrasound, where BPD based AC – based and a combined AC & BPD based foetal weight were estimated. Following are the results of the study

Table 1: Age wise distribution of cases

Age(years)	No. of cases	Percentages
≤20	19	19%
21-25	57	57%
26-30	23	23%
>30	1	1%
Total	**100**	**Mean±SD:23.7±2.87**

Table 2: Distribution of cases in primigravida and multigravida with BPD by sonar and calliper

Gravida	No. of cases	Mean BPD by SONAR(cm)	Mean BPD by CALIPER (cm)	Mean difference
Primigravida	47	9.276±0.374	9.20±0.371	0.076(0.76mm)
Multigravida	53	9.316±0.314	9.25±0.301	0.066(0.66mm)

Table 3: Relationship of BPD, AC with EFW

BPD	No. of cases	AC(mm) Mean	EFW(grams) Mean± S.D
≤87	8	315.25	2612.5
88	1	320	2700
89	6	330.5	2875
90	8	323.6	3000
91	8	338.75	3121.5
92	8	340	3185.7
93	10	340.5	3230
94	11	341.81	3254.54
95	12	351.08	3358.33
≥96	28	353.34	3534.48
Total	**100**		

Table 4: Relationship of BPD, AC with actual birth weight

BPD	AC(mm)Mean ±S.D	Actual birth Weight (grams) Mean ±S.D
≤87	315.25	2456.5
88	320	2500
89	330.5	2541.66
90	323.6	2793.75
91	338.75	2812.5
92	340	3000
93	340.5	3107.17
94	341.81	2936.36
95	351.08	3129.16
≥96	353.34	3260.34

Table 5: Discrepancy between ultrasonic and calliper measurements

Discrepancy	No. of Cases	Correlation coefficient	Standard deviation
<0.5mm	40	r=0.980	P<0.001
0.5-1mm	1		0.715
1-2mm	57		Very highly significance(VHS) Positive co-relation
>2mm	2		

Table 6: Relationship between Fetal AC Measurements and Estimated Birth Weight in Centiles (kg)

AC(cm)	No of cases	5th centile	50th centile	90th centile
≤32	14	2.4	2.51	2.6
32-34	28	2.5	2.7	2.8
34-36	53	2.8	2.91	3.2
≥36	5	3.4	3.5	3.6

DISCUSSION

Table No.2: Shows the mean difference of BPD by sonar and calliper, In case of primigravida is 0.76 mm whereas the BPD reduced by 0.66mm in cases of multigravida when checked postnatally by callipers compared to the BPD obtained by sonar Table No.3: BPD in relation to AC (mm), Karl Pearson co-relation coefficient r=0.729; p<0.001 i.e. highly significant means there is a positive co-relation between BPD and AC BPD in relation to EFW, r=0.797; p<0.001 i.e. highly significant i.e. there is a positive correlation between BPD and EFW AC in relation to EFW, r=0.876, p<0.001 i.e. highly significant, i.e. there is a positive correlation between AC and EFW Table No.4: shows: BPD in relation to actual birth weight, r=0.618; p<0.01 i.e. highly significant AC in relation to actual birth weight, r=0.664, p<0.01 i.e. highly significant. Hence there is a positive correlation between BPD, AC and Actual birth weight Table No.5: Shows 40% of cases are within 0.5mm,1% within 0.5mm-1mm, 57% cases are within 1-2mm and 2% cases are >2mm. There is a very highly significant positive correlation between sonar and calliper measurement. Karl Pearson correlation coefficient r=0.980, p<0.001

Table 7: Relationship of BPD, AC with EFW

Shepard et al			Present study		
BPD	AC(mm)	EFW(gms)	BPD(mm)	AC(mm)	EFW(mm)
<87	-	-	<87	315.25	2612.5
88	320	2744	88	320	2700
89	330	2944	89	330.5	2875
90	325	22923	90	323.6	3000
91	335	3131	91	338.75	3212.5
92	340	3262	92	340	3185.7
93	345	3409	93	340.5	3185.7
94	350	3553	94	341.81	3254.54
95	345	3528	95	351.08	3358.33
>96	-	-	>96	353.34	3534.48

Table 6: Relationship of BPD AC with EFW shows that the present study so-relates with Shepherd et al. As the BPD increases AC also increases and EFW and actual birth weight also increases i.e. there is positive correlation between BPD, AC, EFW. Wilock et al observed that 43% of cases with within 0.5mm, 30.5% of cases are within 0.5-1mm, 16.5% of cases are within 1-2mm, 10% cases are >2mm. Mean difference is 0.48 and SD is 0.29. Stuart Campbell 43% cases are within 0.5mm, 23% cases are within 0.5-1mm, 28.5% cases are within 1-2mm and 5.5% cares are within 0.5-1mm, 57% cases are within 1-2mm and 2% cases are >2mm. Mean difference is 0.71, Karl Pearson correlation coefficient is 0.98, SD is± 0.7. Shepherd et al observed that standard deviation of actual weight is 348.98 Gulati et al observed that standard deviation of total actual weight is 358.28, In present study the standard deviation is 414 which is comparable to the previous studies. But in the range of 2500-3500gms and ≥3500gms, in the present study it is observed that the SD and SE are very less compared to the previous studies. It shows that in these three groups present study consistency is more.

CONCLUSION

To be of practical value the screening test should be simple, cost effective and acceptable to the patient and physician, should have a high degree of sensitivity and low degree of false positive results. There is a tremendous progress in application of ultrasound as a diagnostic modality revolutionizing the management towards better care. This is due to non invasive and non ionizing nature beside its effectiveness. The conclusion from the present study are:

1. The present study correlatives with shepard's study where he has used AC and BPD to get estimated foetal weight. These USG parameters in the last 3 weeks of pregnancy can be utilized as one of the criteria to predict the mode of delivery, in different parity as there is no statistically significant difference in weight between EFW and actual birth weight.
2. There is a significant positive correlation between sonar and calliper BPD measurement. As sonar BPD increases, calliper BPD also increases.

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