

Comparison of Actual Birth Weight with the Ultrasonographic and Clinical Estimation of Fetal Birth Weight: A Prospective Study

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ABSTRACT

Introduction:

Determination of fetal weight is important for the management during labour and delivery. It helps in determining the mode of delivery and aids in diagnosing low birth weight, macrosomia, and intrauterine growth restriction fetus. Ultrasound may not be available in under-resourced settings. Therefore, it is important to study the accuracy of clinical estimation of fetal weight with the sonographic and actual birth weight.

Methods:

One hundred and fifty women fulfilling the inclusion criteria were enrolled for the study. Clinical estimation of fetal weight was done by using the Johnson formula. Then the women were subjected to ultrasound. Sonographic estimation of fetal weight was done by the Hadlock method. The two estimated fetal weights were then compared with the actual birth weight. Data were analyzed using SPSS (VERSION 16).

Results:

Actual birth weight has a strong correlation with the ultrasonographic birth weight ($p=0.01$). However, the clinical birth weight estimation was less correlating to the actual birth weight ($p=0.638$)

Conclusion:

The ultrasound method is better in determining the actual birth weight as compared to the clinical method. Hence, ultrasound has to be recommended whenever available.

Keywords: Birth weight; Gestational Age; Ultrasound

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INTRODUCTION

Estimation of fetal birth weight before delivery is of utmost importance in the management of labour and delivery. It helps in monitoring the fetal growth and also aids in deciding the mode of delivery in high-risk pregnancies, especially in women with borderline cephalopelvic disproportion, previous cesarean section, diabetic mother, and breech presentation. During the last decade, estimation of fetal birth weight is being incorporated into the standard routine antepartum evaluation of high-risk pregnancies.¹ The birth weight of a neonate at the time of delivery is also one of the important factors for survival. Both low birth weight and macrosomia are associated with an increased risk of perinatal morbidity and mortality.^{2,3} Fetal weight can be estimated by various methods. The two main methods for predicting fetal birth weight in current obstetrics are Clinical techniques by abdominal palpation of fetal parts and calculation using fundal height and abdominal girth and Ultrasound estimation of fetal weight.^{4,5} The present study aims at comparing the accuracy of the clinical method of EFW with the ultrasonographic and actual birth weight at term pregnancy. This will help in appropriate decision-making in the management of pregnant women.

METHODS

This was a cross-sectional prospective study which was conducted in the Obstetrics Department of Manipal Teaching Hospital after getting the ethical clearance. All pregnant women beyond 37 weeks of pregnancy who fulfilled the inclusion criteria were included in the study. The inclusion criteria included: pregnancy beyond completed 37 weeks, singleton pregnancy and who delivered either vaginally or via cesarean section within seven days after clinically estimating the fetal weight. However, those with preterm labour, multiple pregnancies, congenital anomalies, intrauterine fetal death, polyhydramnios and oligohydramnios, mothers with obstetric complications like severe preeclampsia, eclampsia, HELLP syndrome and those with medical illnesses were not included in the study. Verbal consent was taken from all the women enrolled on the study. Women were asked to empty their bladders. Then, she was asked to lie

down with the knee joints slightly flexed. One of the three obstetricians then measured the symphysis-fundal height by measuring the highest point in the uterine fundus to the mid-point of the upper border of the symphysis pubis. The measurement was done with a measuring tape with the reverse side up to avoid any bias. The EFW was calculated by using Johnson Formula.⁶

Fetal weight in grams = (fundal height in centimeter-n) x 155

n denotes the station of the presenting part of the fetus in relation to the maternal pelvic spine.

n=13 when the presenting part is above the ischial spine.

n=12 when the presenting part is at the level of the ischial spine.

n=11 when the presenting part is below the level of the ischial spine

The estimated weight was documented in the chart. After the clinical estimation, the client was subjected to ultrasound which was done by a radiologist who was not aware of the clinical estimation of the fetal weight. The ultrasonographic fetal weight was estimated with Hadlock formula using a combination of the biparietal diameter (BPD), abdominal circumference (AP) and femur length (FL) of the fetus. After delivery, the weight of the newborn was recorded using a standard weighing scale corrected for zero error. Age, parity, gestational age, symphysis-fundal height, clinical and ultrasonic estimation of fetal birth weight and actual birth weight was recorded. The birth weight of the newborn via normal vaginal delivery or cesarean in the past one month was retrieved from the hospital record. There were a hundred and two deliveries those fulfilled the inclusion criteria. The average birth weight of the newborn was 2801±567 gms. The sample size was calculated as 140 using Nomogram for calculation of sample size or power at 95% level of confidence, 80 % power and standardized difference of 0.49.⁷ However, 150 sample size was taken for the study.

Data were analyzed using SPSS version 16.

RESULTS

In this study, 150 patients were included. The mean age was 26.3±4.6. the minimum age was 17 years and the maximum age was 40 years. Among them, 49.3% (n=74) were primipara, 38.7% (n=58) were parity 2 and 12% (n=18) were more than parity three.

The mean fetal weight estimated clinically was 3.0087 while that of fetal weight estimated by USG was 3.07 and that of actual birth weight was 3.02 (Table 2). The minimum and maximum fetal weight calculated by using the Johnson formula were 2.30 kg and 3.60 kg respectively. The minimum fetal weight estimated by USG was 2.20 kg and the maximum weight was 4.20 kg. The minimum actual birth weight was 2.10 kg and the maximum birth weight was 4.20 kg (Table 2).

Table 1: Distribution of the patients according to parity

Parity	No	%
1	74	49.3
2	58	38.7
3≤	18	12
Total	150	100

Table 2: Comparison of Clinical Fetal Weight, USG Fetal Weight with Actual Birth Weight

	Clinical Fetal Weight (kg)	USG Fetal Weight (kg)	Actual Birth Weight (kg)
Mean	3.00	3.07	3.02
Standard Deviation	0.25	0.39	0.41
Minimum weight	2.30	2.20	2.10
Maximum weight	3.60	4.20	4.20

Using Paired t-Test, the mean clinical fetal weight was 3.0087 with a standard deviation of 0.25 and the mean actual birth weight was 3.0200 with a standard deviation of 0.41, the p-value was 0.638 which is insignificant (p<0.05). this showed that the estimation of fetal weight clinically did not

accurate with the actual birth weight (Table 3).

The correlation of USG fetal weight with the mean weight of 3.07 with a standard deviation of 0.39 and actual birth weight of, the mean birth weight of 3.02 with a standard deviation of 0.41, using Paired t-Test, the p-value was 0.01 which was a significant (Table 4).

Table 3: Comparison of USG Fetal Weight with Actual Birth Weight

	Mean	Standard Deviation	p value
USG Fetal Weight	3.07	0.390	0.01
Actual Birth Weight	3.0200	0.41	

Table 4: Comparison of Clinical Fetal Weight with Actual Birth Weight

	Mean	Standard Deviation	p value
Clinical Fetal weight	3.0087	0.25	0.638
Actual Birth Weight	3.0200	0.41	

DISCUSSION

Estimation of fetal weight is of utmost importance and helps the obstetrician for good obstetrics and perinatal outcome. It is one of the factors in determining the perinatal outcome. Information about the fetal weight helps in identifying the high-risk pregnancies such as cephalopelvic disproportion, macrosomia, and intrauterine growth restriction and determines the mode of delivery in previous cesarean section, breech delivery.^{1,2,3}

The mean actual birth weight in this study was 3.02 kg which was similar to the mean actual birth weight of 3.24±0.508 kg reported by Njoku et al., Nigeria and 3.07 kg reported by Bajracharya et al., Nepal.^{8,9} However, it was much less than the mean weight of 3,568±496 gm reported by Richards et al., a study was done among the British.¹⁰ This variation must be due to the socio-economic and environmental factors affecting the birth weight in this study, the mean USG birth weight was 3.07

kg with a standard deviation of 0.39 as compared to the mean actual birth weight of 3.0200 kg with a standard deviation of 0.41 and the p-value was 0.01 which was significant. This showed that USG was accurate in determining fetal weight. Several studies have been done for comparing the USG fetal weight with actual birth weight.^{11,12,13} A study conducted by Paravathavarthini et al. showed that USG was closer to estimating the fetal weight than the actual birth weight.¹⁴ Other studies have also shown that ultrasonographic estimation is more accurate in estimating fetal weight.^{15,16}

In this study, the mean clinical birth weight was 3.0087 kg with a standard deviation of 0.25 as compared to the mean actual birth weight of 3.0200 kg with a standard deviation of 0.41 and the p-value was 0.638 which was highly insignificant. This study is similar to the study conducted in Nigeria by Shittu et al. which showed that the accuracy of clinical estimation was highest in the birth weight range of 2.5 to <4 kg and lowest for the low birth weight group (<2.5 kg).¹⁷ Similarly, Njoku et al. showed that the clinical method overestimated the fetal birth weight.⁸ However, Nayak et al. conducted a study which showed that the fetal weight estimation by the clinical method was as accurate as of the ultrasound method.¹⁸ Some studies have shown that the clinical method has the same accuracy or even better than USG.^{19,20}

This study has shown that the ultrasound method of fetal weight estimation was more accurate than the clinical estimation of fetal weight estimation which is similar to the studies done by Ugwa et al. and Chauhan and coworkers.^{1,3} Therefore, ultrasound should be recommended for fetal weight estimation whenever available.

CONCLUSION

This study showed that the USG was more accurate in estimating the fetal weight as compared to the clinical weight by Johnson's formula. So, whenever available, USG must be recommended.

CONFLICT OF INTEREST

None

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None

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