



ESTIMATION OF FOETAL WEIGHT AT TERM BY CLINICAL METHOD AND ULTRASOUND AND ITS CORRELATION WITH ACTUAL BIRTH WEIGHT : A CROSS SECTIONAL STUDY

Obstetrics & Gynaecology

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ABSTRACT

Background: Accurate estimation of fetal weight is crucial in obstetric care to anticipate complications associated with both low birth weight and macrosomia. This study aimed to compare clinical and ultrasonographic methods of fetal weight estimation with actual birth weight at term. **Methods:** A cross-sectional observational study was conducted on 76 term pregnant women (37–42 weeks) at RMCH, Bareilly. Fetal weight was estimated clinically using Johnson's and Dare's formulas, and sonographically using Hadlock's formula. These estimates were compared with actual birth weights post-delivery. Data were analyzed using SPSS version 23.0, with $p < 0.05$ considered statistically significant. **Results:** The mean fetal weight estimated clinically was 2912.6 ± 396.4 g, by ultrasound was 3198.64 ± 492.76 g, and actual birth weight was 2834.64 ± 492.74 g. Ultrasound significantly overestimated fetal weight compared to actual birth weight ($p < 0.001$), whereas the clinical method showed no statistically significant difference ($p = 0.284$). Neither method accurately identified the incidence of low birth weight (25%). **Conclusion:** While ultrasonography is a valuable tool, it tends to overestimate fetal weight. Clinical methods, though less precise, show closer agreement with actual birth weight. A combined approach using both methods is recommended to improve accuracy and guide obstetric management effectively.

KEYWORDS

SFH, ultrasonography, foetal weight, clinical method, Johnson's formula, Dare's formula.

INTRODUCTION

Birth weight is the key factor influencing the outcome and survival of newborns. Therefore accurately estimating fetal birth weight is crucial element in the management of labor¹.

Low birth weight and high birth weights are associated with a higher neonatal complications at the time of parturition and after delivery². Newborn with birthweight under 2.5 kg are classified as low birthweight babies and may be at risk for experiencing repeated infections, diabetes, neurodevelopmental disabilities, hypertension as they grow older³. Also associated with higher perinatal morbidity and death which can be caused by premature delivery, intrauterine growth restriction or due to these two³.

Maternal problem including primary post partum hemorrhage caused by uterine atony, cervical and perineal laceration and an increased chanced of surgical deliveries have been linked to vaginal birth for macrosomic babies. Other complications can also occur in macrosomic babies like birth defect, shoulder dystocia, perinatal hypoxia and fetal mortality. The American college of obstetrician and gynaecology advised elective cesarean delivery for fetal weights of more than 4.5 kg in pregnant women with diabetes and more than 5 kgs in pregnant women without diabetes in order to reduce all these problems. A precise assessment of fetal weight will lower the risk of morbidity and death as well as the need for needless cesarean section⁴.

Ultrasonography is gold standard for fetal weight estimation canal so assess fetal wellbeing in the womb⁵. Fetal wellbeing can be assess by estimating different ultrasonography parameters like abdominal circumference, Head circumference and femoral length⁶.

In addition to basic fetal growth tracing, ultrasonography examination estimate fetal size, growth and fluid volume can add in the diagnosis of intrauterine growth restriction and direct the doctor towards corrective action. Estimated fetal weight is referred to as fetal growth restriction on ultrasonography if it is less than 10th centile for gestational age⁷.

The clinical methods used are Dare's formula, Johnson's method, Dawn's rule⁴. Clinical methods are based on palpating fetal part per abdomen and calculation based on fundal height⁷.

Since advanced tool like ultrasound are not always available, clinical estimation of fetal weight is crucial and essential ability in the management of obstetric patients in underdeveloped nations due to its simplicity in low-resource setting⁸.

The purpose of this study is to compare the clinical approach of estimated fetal weight's accuracy with both actual birth weight and ultrasonography.

Aim- Estimation of the fetal weight at term by clinical method and ultrasound and its correlation with actual birth weight.

Objectives-

- 1) To estimate fetal weight by clinical method and ultrasonography.
- 2) Correlation of these estimated birth weight with actual birth weight.
- 3) To determine which method of fetal weight estimation (clinical or sonographic) is more accurate.

MATERIAL AND METHODS-

An Observational cross sectional study has been carried out in pregnant women, visiting the ANC OPD in Obstetrics and Gynecology department of RMCH Bareilly for a period of 3 month. A total 76 study subject were enrolled.

Inclusion Criteria:

1. Gestational age 37- 42 weeks.
2. Singleton pregnancy.
3. Cephalon presentation.
4. Live foetus.
5. Known last menstrual period or ultrasound scan with confirmed expected date of delivery.

Exclusion Criteria:

6. Multiple gestation.
7. Anomalous fetus.
8. Non-cephalic presentation.
9. Intrauterine fetal death.
10. Presence of coexisting fibroids, ovarian cyst.
11. Already diagnosed liquor abnormalities.

Written informed consent was taken from pregnant women attending ANC OPD and meeting inclusion and exclusion criteria. A detailed history was taken which includes patient's education, occupation, socio- economic status, menstrual history, obstetric history, past medical and surgical history and personal history. A thorough general physical and systematic examination was done. Per abdominal examination was performed in supine position.

Johnson's Formula⁸: foetal weight (gram) = $155 \times (\text{Symphysio-}$

fundal height in cm – K) K = 11 (fetal head at plus station).

K = 12 (fetal head at zero station).

K = 13 (fetal head at minus station).

Dare's Formula⁸: Fetal weight in (gram) = Fundal height (cm) × Abdominal girth (cm).

foetal weight estimation by ultrasound was done by inbuilt Hadlock's formula, based on bi parietal diameter (BPD), abdominal circumference (AC), and femoral length (FL). These clinical and ultrasonographic foetal weights are compared with actual birth weights.

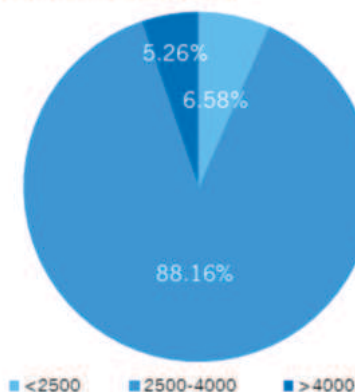
The data collected was entered in Microsoft excel and was analyzed by using SPSS version 23.0 windows software program. The quantitative data was expressed by mean and standard deviation. The qualitative data was expressed in percentages and the differences between percentages was computed using χ^2 test or Fischer exact test. P value less than 0.05 was considered as statistically significant.

RESULT:

Table 1: Estimated Fetal Weight by Ultrasonography among Study Participants (n=76)

Fetalweight (g) by ultrasonography	Number	Percentage
<2500	5	6.58
2500-4000	67	88.16
>4000	4	5.26
Meanweight (Mean±SD)	3198.64 ± 492.76	

Figure 1: Estimated fetal weight by USG among participants



In our study, the Majority of fetuses (88.16%) had an estimated weight between 2500 and 4000 grams. Only 6.58% were <2500g (suggesting low birthweight), and 5.26% were >4000 g (macrosomic). The mean estimated weight of fetuses by Ultrasonography was 3198.64 ± 492.76g.

Table 2: Estimated Fetal Weight by Clinical Examination among Study Participants (n=76)-1

Fetalweight (g) by clinical examination	Number	Percentage
<2500	10	13.16
2500-4000	66	86.84
>4000	0	0.0
Mean weight (Mean±SD)	2912.6± 396.4	

Figure 2: Estimated Fetal Weight by Clinical Examination among Study Participants (n=76)

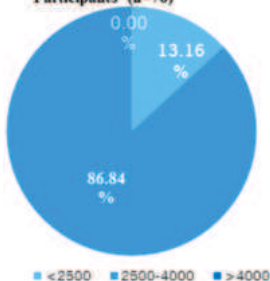
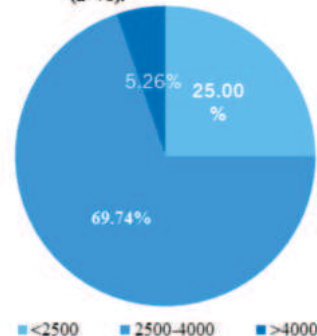


Table 3: Actual Birth Weight Distribution among Newborn (n=76)

Actual fetal weight (g)	Number	Percentage
<2500	19	25.0
2500-4000	53	69.74
>4000	4	5.26
Mean weight (Mean±SD)	2834.64 ± 492.74	

Figure 3: Actual Birth Weight Distribution among Newborn (n=76).



In our study, (table 2) 13.16% of cases were estimated <2500 g, and no cases were estimated >4000 g. 86.84% of weights fell within 2500–4000 g. The mean estimated weight of babies was 2912.6 ± 396.4 g.

Table 4: Comparison of Estimated Fetal Weight by Clinical Examination with Actual Birth Weight.

Mean birth weight	
Clinical examination	2912.6 ± 396.4
Actual weight	2834.64 ± 492.74
P-value-	0.284 (not significant)

Table 5: Comparison of Estimated Fetal Weight by Ultrasonography with Actual Birth Weight.

Mean birth weight	
USG	3198.64 ± 492.76
Actual weight	2834.64 ± 492.74
P-value-	<0.001 (significant)

In our study, (table 3) 25% of babies were born with a weight of <2500 g, 69.7% were in the 2500 – 4000 g range, and 5.3% were macrosomic (>4000 g). The mean actual weight of babies was 2834.64 ± 492.74 g.

In our study, table 4, Estimated Fetal mean Weight by Clinical Examination was 2912.6 ± 396.4 g, Actual mean weight was 2834.64 ± 492.74 g, P-value 0.284, indicating no statistically significant difference between Estimated Fetal Weight by Clinical Examination with Actual Birth Weight.

In our study, table 5, Estimated Fetal mean Weight by Ultrasonography was 3198.64 ± 492.76 g, Actual mean weight was 2834.64 ± 492.74 g, P-value <0.001, indicating a statistically significant difference between Estimated Fetal Weight by Ultrasonography with Actual Birth Weight.

DISCUSSION

Shittu et al. (2007)⁹ in Nigeria compared clinical and ultrasound methods and reported that ultrasound consistently overestimated fetal weight. Their findings emphasized that clinical methods (specifically Dare's formula) showed better correlation with actual birth weight in term pregnancies, consistent with our observations.

Nahum et al. (2002)¹⁰ concluded that ultrasound estimations were within ±10% of actual birth weight in only 70–80% of cases. They found that factors such as operator skill, fetal position, and maternal obesity could significantly affect sonographic accuracy. Our study also reflects this limitation, particularly in overestimation, likely due to similar contributing factors.

Bhandary et al. (2012)¹¹ conducted a study in Nepal that found clinical methods underestimated birth weight, while ultrasound overestimated it in macrosomic babies. However, they still concluded that the difference between clinical and actual birth weight was less than that of ultrasound, reinforcing the idea that clinical methods are more reliable in some settings.

Sherman et al. (1998)¹² analyzed over 500 cases and found that the Hadlock formula, though widely used, had limitations especially in cases of extreme fetal weights. Their study concluded that no single method was universally accurate, and clinical judgment should supplement technology. This supports our recommendation for a combined approach.

Anand et al. (2017)¹³ conducted a cross-sectional study in Maharashtra, India, and observed that clinical methods were more reliable in low-resource settings, particularly for identifying low-birth-weight infants, though with limited precision. This aligns with our conclusion that clinical estimation, despite being less technologically advanced, may be more practical and closer to actual birth weights in low-income environments.

CONCLUSION:

Ultrasonography, though technologically advanced, overestimates fetal weight compared to actual birth weight. This may lead to misclassification, especially of low-birth-weight infants as normal.

Clinical examination, while simple and cost-effective, also tends to overestimate weight but with less deviation than ultrasonography.

Neither method accurately predicted the true incidence of low birth weight (25%), which is clinically significant. Accurate fetal weight estimation remains a challenge, and reliance on a single method may lead to mismanagement. Thus, a combined approach with both clinical assessment and ultrasonography, supported by regular monitoring, is recommended to improve perinatal outcomes.

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