

■ *Short Communication*

## Accuracy of prediction of birth weight by fetal ultrasound

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### Abstract

**Introduction:** Estimation of accurate fetal weight is essential in obstetrical management and we aim to see the accuracy of fetal ultrasound in estimating birth weight in our setting. **Method:** 150 women with full term singleton pregnancy leading to live birth were included in the study. Prenatal fetal ultrasound database was reviewed for the fetal biometry and fetal weight estimation and delivery records were reviewed for actual birth weight. Error in estimation was calculated. **Result:** The study showed that fetal ultrasound using Hadlock's formula has error in estimation of fetal weight by about  $290 \text{ gm} \pm 250 \text{ gm}$ . In 40% of the cases, there is an error of estimation by more than 10% compared to actual weight. **Conclusion:** There is a significant error in the estimation of the fetal weight. Depending only on the fetal ultrasound for the estimation of fetal weight can lead to unnecessary obstetrical intervention. It is necessary to correlate the ultrasound findings with clinical examination.

### Introduction

Estimation of accurate fetal weight is paramount in deciding the obstetrical management and the fetal outcome. In last few decades, the estimation of fetal birth weight has advanced from estimation by physical examination to fetal ultrasound using multiple parameters. This has increased the accuracy of the fetal weight estimation significantly. Multiple formulae have been developed for the estimation for birth weight using ultrasound measurement<sup>4,5,6,8,9,10</sup>. At present, fetal ultrasound is extensively used to estimate the fetal weight. In Nepal, Hadlock's formula is very commonly used. The aim of our study is to see the accuracy of the fetal ultrasound in estimating the fetal weight in the setting of Nepal.

### Methods

It is an observational study conducted at a tertiary hospital, Kathmandu Medical College. 150 pregnant women-with singleton pregnancy leading to term live birth between January 2010 & February 2012- from

the prenatal ultrasound database and delivery records were reviewed. Exclusion criteria included multiple pregnancy, preterm birth and intrauterine growth retardation, ultrasounds done more than 7 days before delivery.

All ultrasound examinations were performed by experienced ultrasonographers using standard techniques. Hadlock's formula was used to calculate fetal weight.

Following data were collected: maternal age, date of delivery, mode of delivery, date of ultrasound, gestational age at ultrasound, gestational age at delivery, estimated fetal weights, birth weight and sex of infant.

### Statistical Analysis

The signed error in birth weight prediction was calculated as the difference between the predicted and actual birth weight. The negative values indicate an underestimation of birth weight and positive values indicated overestimation of birth weight. The absolute error in birth weight prediction was calculated as the absolute value of the difference between the predicted and actual birth weight. The absolute percent error was calculated by dividing the absolute error in birth weight prediction by the actual birth

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weight multiplied by 100. Mean error was calculated. Level of significance was set at  $p < 0.05$ .

## Results

**Table1: Maternal and infant demographics**

Characteristics	Mean(Range)
Maternal age(in yrs)	25.51(18-40)
Gestational age at delivery (wks)	(37-42)
Actual Birth weight (kg)	3.07(2.11-4.9)
Estimated Birth weight (kg)	3.2(2.40-4.04)

The study included 150 patients. The USG gestational age was between 37 weeks and 42 weeks. The age range of patients was between 18-40 years, with a mean of 25.51 years. The range of actual birth weight was between 2.11-4.9 kg with a mean of 3.07 kg. Table 1 shows the demographic characteristics of the women and their infants.

**Table 2: Mean error in birth weight prediction**

	Mean SD (kg) ±	95 % Confidence Interval(kg)
Over-estimate	0.37±0.24	0.32-0.42
Under-estimate	0.22±0.23	0.16-0.28
absolute	0.29±0.25	0.25-0.33

Table.2 shows the mean error in birth weight estimation. The mean error in the estimation of birth weight is 290gm (CI: 250-330 gm).Table.3 shows the error estimation. In 56% of the cases, fetal ultrasound over-estimates the birth weight. In average, ultrasound overestimates by 370 gm (CI: 320-420 gm). Fetal ultrasound underestimates the birth weight in 36.67% of the cases. Fetal ultrasound underestimates the birth weight by 220 gm (CI: 160-280gm)

**Table 3: Error estimation**

Characteristics	Number (percentage)
Estimate-1.over-estimate	84(56%)
2. under-estimate	55(36.67%)
3. accurate	11(7.33%)
Estimation error e"10% of ABW	60(40%)

60 out of 150 estimates (40%) were more than 10% off from the actual weight.

## Discussion

Accuracy of fetal weight estimation is paramount in the management of pregnancy. It helps to determine the mode of delivery, predict the fetal outcome. Estimation of fetal weight is done ultrasonographically using Hadlock's and other formulae<sup>4,5,6,7,8,9,10</sup>. Determination of weight within 10% of actual birth weight is considered acceptable accuracy<sup>2</sup>. Our study has found that the USG has an error of about 290 gm in estimating the fetal weight which is almost similar to the other studies<sup>1</sup>. In most of the studies show that about 75% of the estimates are within 10% of the actual weight<sup>3</sup>. In our study, only 60% estimates were within 10% of the actual weight. In our study, Ultrasound under-estimated the actual weight in 36.67% of cases. Since, the ultrasound has such a high estimation error that depending only on the fetal ultrasound may lead to unnecessary obstetrical interventions. We suggest the ultrasound findings need to be correlated with physical examination to determine the accurate estimation of birth weight. We also need to keep in mind that ultrasound measurements are operator dependent. So the high percentage of error in the estimation of the fetal weight may stem from the operator dependence of the procedure.

## Conclusion

There was a significant error in the estimation of the fetal weight. Depending on the fetal ultrasound only for the estimation of fetal weight could lead to unnecessary obstetrical intervention. It is necessary to correlate the ultrasound findings with clinical examination in estimating the fetal weight.

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