



## COMPARISON OF FETAL WEIGHT ESTIMATION AT TERM BY JOHNSON'S FORMULA, ULTRASOUND AND ACTUAL BIRTH WEIGHT

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### ABSTRACT

**BACKGROUND:** Fetal weight is important in assessing whether the fetus is small for gestational age or large for gestational age in order to have a good obstetrical decision making and also to avoid the intrapartum distress, birth trauma and thereby to reduce the neonatal morbidity and mortality. **MATERIAL AND METHODS:** A prospective observational study was undertaken in the Department of Obstetrics & Gynaecology, Kurnool Medical College, Kurnool. A total of 100 women, were included as study samples. **RESULTS:** There is statistically highly significant difference of birth weight between actual birth weight and Johnson's formula estimated weight ( $p < 0.01$ ). There is also statistically highly significant difference of birth weight between actual birth weight and ultrasonographic estimated weight ( $p < 0.01$ ). There is statistically highly significant difference of mean error of birth weight between Johnson's formula estimated weight and ultrasonography birth weight ( $p < 0.01$ ). **CONCLUSION:** In order to resolve the controversies of different methods in weight estimation, this study was undertaken to determine the most accurate method to estimate fetal weight. Thus it improves the management of labor by comparing the accuracy of clinical and ultrasonographic estimation of fetal weight at term and its correlation with actual fetal weight.

### KEYWORDS

ultrasonography, ultrasonographic

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### INTRODUCTION

Fetal weight is important in assessing whether the fetus is small for gestational age or large for gestational age in order to have a good obstetrical decision making and also to avoid the intrapartum distress, birth trauma and thereby to reduce the neonatal morbidity and mortality. The fetal weight can also be estimated by using maternal characteristics, birth weight prediction equation. Other methods include use of abdominal girth, Johnson's formula and Dawns formula.

Ultrasound is most modern and technologically dependent method for assessing the fetal weight which relies on fetal measurements and forms a gold standard. Various formulas like Hadlock formula, Shepard formula, Tokyo university formula, Osaka university formula, Campbell, Hansman, Sabbagha, Worsof Aoki formula are used. This study was undertaken with the aim of resolving the controversies, determine the most accurate method to estimate fetal weight thereby improving the management of labor by comparing the accuracy of clinical and ultrasonographic estimation of fetal weight at term and its correlation with actual fetal weight.

### AIMS AND OBJECTIVES

- 1) To correlate clinically estimated fetal weight by Johnson's formula with actual birth weight.
- 2) To correlate the ultrasonographic fetal weight with actual birth weight.
- 3) To compare the above two groups and justify the use of the best method.

### PATIENTS AND METHODS

A prospective observational study was undertaken in the Department of Obstetrics & Gynaecology, Kurnool Medical College, Kurnool. A total of 100 women, who satisfies the inclusion criteria were included as study samples. The inclusion and exclusion criteria were as follows,

### INCLUSION CRITERIA

- All the term pregnancies between 37-42 weeks.
- Singleton gestation
- Cephalic presentation
- Women who had gestational age confirmed by dates and ultrasound scanning.

### EXCLUSION CRITERIA

- Abnormal lie and presentation
- Multiple pregnancies
- Obvious congenital abnormalities
- Polyhydramnios and Oligohydramnios
- Antepartum haemorrhage
- IUD
- Mass per abdomen

### OBSERVATIONS AND RESULTS

The mean and standard deviation age of pregnant women was  $24.5 \pm 3.12$  in the study maximum number of study samples belong to the age group of 21-25 years that is 57.2% followed by the age group of 26-30 years 22.0% minimum number of samples belongs to the age group of 31-35 years were 1.6%. Out of 100 study samples 51.2% pregnant women were multigravida and primigravida pregnant women were 48.8%.

Maximum number of pregnant women belongs to the gestational age group of 38-40 weeks were 72.2% and minimum number of pregnant women in gestational age group of 41-42 weeks were 12.4%.

Out of 100 pregnant women 41.8% of babies born to the pregnant women had birth weight between 2.5-3.0 kgs and the birth weight of 38.4% of the babies were 3-3.5 kgs. Total 44% babies had predicted weight of 2.5 Kg-3 Kg by Johnson's formula and 38.4% babies had birth weight between 2.5-3 Kg by ultrasonography.

The symphysio-fundal height in 63.2% of the pregnant women were 30.1-35 cms, 34.4% women had SFH 25.1-30 cms and 2.4% women had SFH 35.1-40.0 cms.

The mean  $\pm$  SD of ultrasonography predicted weight was  $2995.79 \pm 113.70$  gms. The clinical weight estimated by using Johnson's formula was  $3024 \pm 328.63$  grams and the actual birth weight was  $2929.45 \pm 393.6$ .

There is statistically highly significant difference of birth weight between actual birth weight and Johnson's formula estimated weight ( $p < 0.01$ ). There is also statistically highly significant difference of birth weight between actual birth weight and ultrasonographic estimated weight ( $p < 0.01$ ).

There is statistically highly significant difference of mean error of birth weight between Johnson's formula estimated weight and ultrasonography birth weight ( $p < 0.01$ ).

**Table-10: Actual Birth Weight Interval Wise comparison of Mean Birth Weight of Johnson's Formula Weight and Ultrasound Weight**

Birth Weight	Mean $\pm$ SD	
	By Johnson's Formula	By Ultrasound Weight
< 2 Kgs	2590.0 $\pm$ 173.49	2363.33 $\pm$ 251.06
2.0-2.5 Kgs	2722.83 $\pm$ 276.57	2532.25 $\pm$ 337.33
2.5-3 Kgs	2856.18 $\pm$ 247.34	2854.98 $\pm$ 256.33
3.0-3.5 Kgs	3152.48 $\pm$ 259.78	3171.41 $\pm$ 239.21
3.5-4.0 Kgs	3430.70 $\pm$ 224.44	3433.04 $\pm$ 287.58
4.0-4.5 Kgs	3720.0 $\pm$ 379.67	3763.0 $\pm$ 327.13

There is statistically highly significant difference of mean birth weight with different birth weight intervals in Johnson's formula estimated weight and ultrasonography birth weight ( $p < 0.01$ ). There is statistically highly significant difference of birth weight mean error with different actual birth weight intervals in Johnson's formula estimated weight and ultrasonography birth weight ( $p < 0.01$ ).

## DISCUSSION

The fetal weight can be estimated by using maternal characteristics by using birth weight prediction equation. However, this method included application of a quantitative birth weight prediction equation that is based on maternal and pregnancy specific factors. Currently-available techniques for estimating the fetal weight have significant degree of inaccuracy as evident by various studies. Limiting the potential complications associated with birth of both small and excessively large fetuses requires that accurate estimation of fetal weight occurs in advance of deliveries<sup>3</sup>.

In order to resolve the controversies of different methods in weight estimation, this study was undertaken to determine the most accurate method to estimate fetal weight. Thus it improves the management of labor by comparing the accuracy of clinical and ultrasonographic estimation of fetal weight at term and its correlation with actual fetal weight. Over and under estimation of the birth weight

The weight was overestimated in 48.0% of the babies who had birth weight between 2.5-3.0, 33.3% of 3-3.5 Kgs and 15.3% of the babies with 2-2.5 Kgs. The weight was underestimated in 55.3% of the babies of 3-3.5 Kgs, 36% of the 2.5-3.0 Kgs and 21.1% of the babies with 3.5-4.0 Kgs by Johnson Formula.

Ultrasound weight estimation had shown that, about 49.6% of the weight of 2.5-3.0 Kgs, 31.7% with 3.0-3.5 Kgs, 13.3% with a birth weight of 2-2.5 Kgs was overestimated. The weight was underestimated in 43.2% of the babies with a birth weight of 3.0-3.5 Kgs, 23.7% in babies with a birth weight of 2.5-3.0 Kgs and 12.7% in babies with a birth weight of 3.5-4 Kgs by ultrasound estimation of weight.

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