



PREDICTION OF FETAL BIRTH WEIGHT BY JOHNSON'S FORMULA & ULTRASONOGRAPHY COMPARED WITH ACTUAL BIRTH WEIGHT

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KEYWORDS :

INTRODUCTION

Birth weight is the greatest single factor which determines the survival of the fetus and future health of neonate. It is an important factor for prediction of neonatal problems. Accurate estimation of fetal weight is of paramount importance in the management of labor and delivery. Fetal weight is also 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 intra partum distress, birth trauma and thereby to reduce the neonatal morbidity and mortality¹.

The accurate estimation of fetal weight before delivery helps the obstetrician to decide the mode of delivery and also helps in anticipation of problems during labor. The literature available suggests that there has been a marked reduction of perinatal deaths in developed countries (10 per 1000 births in developed countries), even though the perinatal death in developing countries like India remains high (60 per 1000 births). The perinatal mortality can be reduced by early antenatal registration and regular antenatal visits. The estimation of fetal weight before delivery is of importance considering the hazards of low birth weight, macrosomia² and also maternal complications.

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 are used worldwide including Hadlock formula, Shepard formula, Tokyo university formula, Osaka university formula, Campbell, Hansman, Sabbagha, Worsof Aoki formula^{5,6}.

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, Viswabharathi Medical College, Kurnool dist. A total of 100 women, who satisfies the inclusion criteria were included as study samples. An informed, written consent was taken from all the pregnant women who were enrolled into the study. Clearance from institutional ethical committee was obtained before the study was started. 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

METHODOLOGY

Basic steps of examination in patients include:

1. Written informed consent and counseling
2. A detailed history will be obtained with regard to age, parity, socio-economic status, antenatal check up.
3. A thorough clinical examination including general physical examination, built, nutritional status, height, weight, blood pressure and pulse along with absence or presence of pallor and pedal edema.
4. Per abdominal examination will be done to measure symphysiofundal height, abdominal girth, lie, presentation (Leopald's manouvers)

Johnson's formula for estimation of fetal weight in cephalic presentation is as follows:

Fetal weight (g) = (SFH - n) x 155, where SFH = Symphysis Fundal Height and n=12, if vertex is above ischial spine or 11, if vertex is below ischial spine.

5. Ultrasound

Hadlock is a formula for estimating fetal weight is that devised by Hadlock on the basis of biparietal diameter (BPD), abdominal circumference (AC) and femoral length (FL).

Hadlock 2:-

- $\text{Log}_{10}\text{BW} = 1.304 + 0.005251(\text{AC}) + 0.01938(\text{FL}) + 0.00004(\text{ACXFL})$
6. Ultrasonographic estimation and clinical estimation is done by Johnson's formula within 7 days from the time of delivery.
 7. Both the estimates were documented in a chart.
 8. Actual birth weight is recorded and tabulated.

Statistical analysis: Data will be analyzed using Analysis of variance, t-test and correlation.

Ultrasound procedure

A real time ultrasound scan machine was used for assessing the dimensions to measure the fetal dimensions with a transducer frequency of 3.5 MHZ.

Biparietal Diameter (BPD) was measured on the frozen image from the outer edge of the proximal skull to the inner edge of the distal skull table, with electronic calipers placed on a line perpendicular to mid line echo.

Head circumference (HC) was measured at the same section as above using ellipse method by tracing the head circumference along the outer skull table.

Abdominal circumference (AC) was measured at the level of umbilical vein as it enters liver. Stomach bubble was also taken as landmark. It was measured using ellipse method.

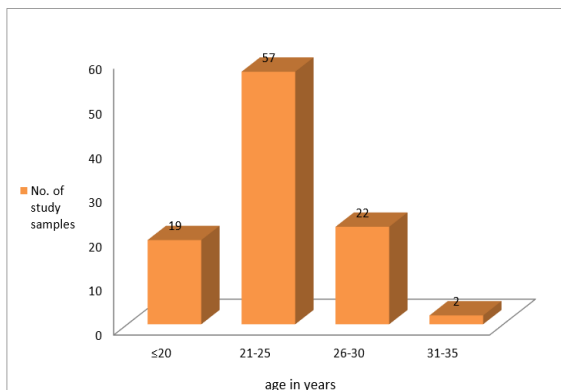
Femur Length (FL) was measured from greater trochanter to external

condyle, excluding femoral head. Then standard tables stored in the equipment calculated EDD.

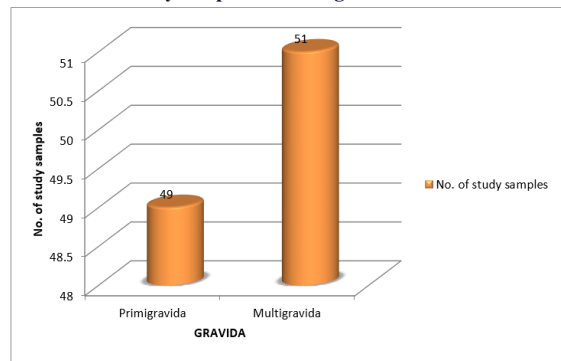
The cardiac activity, number of fetuses, congenital anomalies and placental localization was also assessed. All the ultrasonic examinations were performed by a single operator who had specific training in ultrasonography.

OBSERVATIONS AND RESULTS

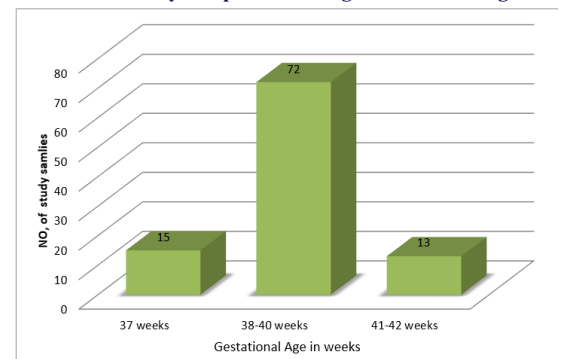
Distribution of study samples according to Age



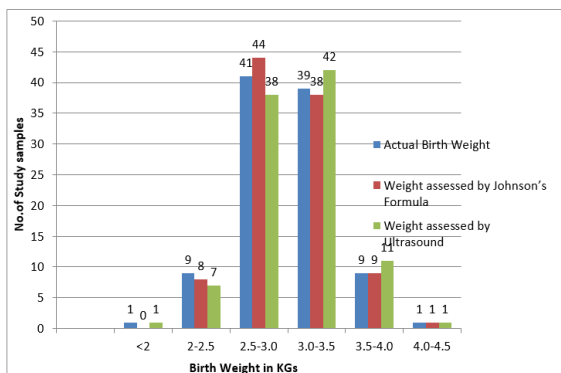
Distribution of study samples according to Gravida



Distribution of Study Samples according to Gestational Age



Comparison of birth weight with Johnson's formula weight and ultrasound weight



DISCUSSION

The birth weight is the greatest factor which determines the survival of the fetus. It is one the important determinant of neonatal survival. Accurate estimation of fetal weight is of paramount importance in the management of labor and delivery. It mainly helps the obstetrician to decide the mode of delivery and also helps in anticipation of problems and shoulder dystocia during labor¹.

The literature available suggests that there has been a marked reduction of perinatal deaths in developed countries (10 per 1000 births in developed countries), even though the perinatal death in developing countries like India remains high (60 per 1000 births)².

The fetal weight estimation has been incorporated into the standard routine antenatal evaluation of high risk pregnancies to decide on the mode of delivery and to anticipate the problems during labor³.

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. Other methods include use of abdominal girth, Johnson's formula and Dawns formula⁴.

Ultrasound is most modern and technologically dependent method for assessing the fetal weight which relies on fetal measurements and forms a gold standard. It mainly helps in estimation of various diameters of the fetus. Various formulas are used worldwide including Hadlock formula, Shepard formula, Tokyo university formula, Osaka university formula, Campbell, Hansman, Sabbagha, Worsof Aoki formula⁶.

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 deliveries³.

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.

A prospective observational study was undertaken in the Department of Obstetrics and Gynaecology at Viswabharati Medical College, Kurnool dist. A total of 100 women attending the Labor Room who satisfied the inclusion criteria were included as study samples.

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