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Gynecology

ESTIMATION OF FETAL WEIGHT WITH VARIOUS METHODS AND ITS CORRELATION WITH BIRTH WEIGHT

Dr. K Vandana — Professor & HOD Department of Obstetrics and Gynaecology Alluri Sitarama Raju Academy of Medical Sciences Eluru-534004

Dr. Dasharatha Murmu — Professor Department of Obstetrics and Gynaecology Alluri Sitarama Raju Academy of Medical Sciences Eluru-534004

Dr. G. Lakshmi Seshaveena* — Postgraduate Department of Obstetrics and Gynaecology Alluri Sitarama Raju Academy of Medical Sciences Eluru-534004*Corresponding Author

ABSTRACT

Objective: This study was to estimate the fetal weight in term pregnancy by clinical methods and ultrasound and to compare the results with actual birth weight (ABW).

Material and Methods: This study was conducted at a tertiary care center, Alluri Sita Ramaraju Academy of Medical Sciences. It was a prospective study covering 100 pregnant women at term gestation.

Results: Estimated birth weight by abdominal girth × symphysis fundal height (AG × SFH) formula was closest to the ABW (P = 0.060), as compared to the estimated birth weight by Johnson's formula (P = 0.000) and Hadlock's formula (P = 0.000). Therefore, of the three formulae studied, AG × SFH formula had better predictive value as compared to Johnson's and Hadlock's formulae. The accuracy of AG × SFH (Insler's formula) for estimating the fetal weight at term was found to be comparable to Hadlock's formula (P = 0.104). Conclusion: Clinical estimation of birth weight definitely has a role in the management of labor and delivery. AG × SFH is a simple, easy, cost-effective, and universally applicable method to predict fetal birth weight which can be used even by paramedics like midwives and also in centers where ultrasound is not available.

KEYWORDS : Fetal birth weight, Hadlock's method, Insler's formula, Johnson's formula

INTRODUCTION

Fetal weight is nothing but a measurement of growth of fetus in utero. Knowledge of weight of the fetus in utero is important for obstetricians to decide the time and mode of delivery. It is one of the essential elements which determines the outcome of the fetus. Extremes of birth weight are associated with an increased risk of newborn complications during labour and puerperium.[1]

Effective fetal weight estimation is of utmost important 6 to obstetricians for the following reasons:

- Helps in taking preventive measures while dealing with respiratory distress, hypoglycemia in low birth weight babies and macrosomic babies.
- Helps in anticipation of complications created by macrosomic babies.
- Helps in Prenatal counseling on the likelihood of survival of neonate in case of preterm deliveries and intrauterine growth restriction.
- Deciding on postponement of delivery, selection of the optimal route of delivery or need for reference to a higher center.2,3-8
- Management of macrosomia related risks in mother like obstructed labour, uterine rupture, cervical and vaginal lacerations, pelvic floor injuries and postpartum hemorrhage.
- Management of diabetic pregnancy, vaginal birth after a previous caesarean section and intrapartum management of fetuses presenting by breech. 2,7

MATERIALAND METHODS

This study was conducted at Department of Obstetrics and Gynecology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, Andhra Pradesh, India over a one-year period. The study included 100 pregnant women with singleton pregnancy ≥ 37 weeks of gestation.

Inclusion criteria

- All antenatal women between 37 and 40 weeks of gestation.
- Vertex presentation.
- Singleton pregnancy.
- Only those with reliable date.
- Ability to give informed consent were selected.

Exclusion criteria

- Multiple gestations.
- Obese women (morbid obesity).
- Pregnancy with Oligohydramnios or Polyhydramnios.
- Fetal demise.
- Fetal anomalies.
- Bad obstetric history.
- Women posted for elective caesarian section due abnormal position.

Non consenting patients

METHODOLOGY

100 pregnant women with singleton pregnancy ≥ 37 weeks of gestation admitted to the hospital were included in this study. Gestational age was based on the time when the last reliable menstrual period occurred or the ultrasound performed before reaching 20 weeks.All Scans were performed on the Voluson v8 ultrasound equipment using a convex 3-5 MHz transducer, taking AFI as a modifiable parameter within 1 week of delivery.

Fetal weight was measured in utero at full term pregnancy by three formulas

1. **Dare** et al (2,8,9,10) method of **Fetal weight estimation in grams = SFH X AG (in cms).** Abdominal girth measured at the level of umbilicus.

After emptying the bladder patient placed in supine position with legs flat on the bed , extended both at hips and knee .After correction of dextrorotation, measurement from height of fundus to the upper edge of symphysis pubis was taken in cms by measuring tape .upper hand was placed firmly against the top of the fundus. Reading was taken from perpendicular intersection from the fundus to pubic symphysis during uterine relaxation.

2. Johnson's formula: [2,8,9,10]

-SFH was measured similarly as in insler formula then pelvic examination was done to evaluate the degree of descent of the head into the pelvis

Fetal weight (grams) = (Mc Donald's measurement of SFH in

cms–X) x 155.
Where X = 13, when presenting part is not engaged, X=12when presenting part is at 0 station and X =11 when presenting part is at +1 station. If a patient weighs more than 91 kg, 1 cm has to be subtracted from fundal height

3. Hadlock Formula –
Estimated fetalweight(grams) LOG10=1.304+0.05281(AC) +0.1938(FL) -0.004. (AC×FL)

After delivery, experienced midwives weighed newborn babies within 30 minutes of delivery employing standard analogue scale corrected for zero error

STATISTICALANALYSIS

The data was analyzed with the help of computer software SPSS version 12.0 for windows. Statistically significant differences were evaluated using t- test & Chi square test. P value of <0.05 was considered as statistically significant.

RESULTS

Table 1 : Percentage distribution of the sample according to birth weight of the newborn

Birth weight	Number	Percentage
< 1.5 kg	0	0
1.5-2.5 kg	4	4
2.5-3.5 kg	83	83
>3.5 kg	13	13
Mean SD	3.093 kg 374.721	

Table 2 : Descriptive statistics of various variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	18	41	27.35	3.697
Mat. weight	100	48	105	74.67	11.325
GA delivery	100	37	40	38.11	.920
AG	100	68	122	104.35	9.522
SFH	100	28	40	33.18	2.626
ABW	100	2400	3950	3093.70	374.721
EFW Johnson	100	2325	3875	3114.57	362.468
EFW Dare	100	2108	4484	3460.87	478.318
EFW Scan	100	2514	4017	3166.08	333.954
Difference (J-A)	100	-665	597	21.39	282.502
Difference (D-A)	100	-292	1063	365.19	288.575
Difference (S –A)	100	-560	982	77.24	252.588

The mean difference of EFW between Johnson's, Dare's and ultrasonography with actual birth weight was given as 21.39, 365.19 and 77.24 grams respectively. Johnson's formula underestimated the birth weight with maximum of 665 grams, overestimated to the maximum of 597 grams. Dare's method underestimated the birth weight to the maximum of 292 grams and overestimated to the maximum of 1063 grams. Similarly Hadlock's formula used in the Scan method also difference with the actual birth weight and it overestimated the birth weight to maximum of 982 grams and underestimated maximum to the value of 560 grams.

Table 3 : Correlation of the EFW between the three methods

Group		EFW Johnson VS EFW Dare	EFW Johnson VS EFW Scan	EFW Dare VS EFW Scan
1	1500-2500	0.207	0.536	0.092
2	2500-3500	<0.001	<0.001	<0.001
3	>3500	0.007	0.305	0.205

In group 1: 1500-2500 grams, the correlation between the mean difference values of Johnson's and Dare's methos, Johnson's vs Scan method and Dare vs Scan method was not statistically significant with p values of 0.207, 0.536 and 0.092 respectively.

In group 2: 2500- 3500 grams, when the mean difference of estimated values between Johnson vs Dare, Johnson vs Scan and Dare vs Scan, it was statistically significant with p < 0.001 in all three pairs.

In group 3: > 3500 grams, when the estimated fetal weight was correlated between Johnson and Dare it was whereas in Johnson vs Scan and Dare and Scan, the correlation was not statistically significant with p value of 0.305 and 0.205 respectively.

This mean absolute percentage error was lowest for Johnson's (7.23%), closely followed by Scan (7.28%). Whereas Dare's method had the highest mean absolute percentage error (13.06%) in the overall sample

DISCUSSION

In this study, 100 pregnant women were included, of them majority were primipara (68%) and the remaining multipara 32%. Sample was taken from all age groups but most of them were between the age of 25-30 years (59%). Gestational age of above 37 weeks included in the sample, of them very less i.e. 5% delivered after 40 weeks.

According to the data, 32% of the sample went into labour spontaneously and the remaining 68% were induced to get labour pains. Out of the sample, 60% delivered by FTND, 33% delivered by CS and remaining 7% delivered by Vacuum extraction.

Birth weight was taken, most of the newborns (83%) had weight between 2.5-3.5 kg and 13 weighed more than 3.5 kg. Of the total 100 sample male babies were more.

In the present study 83% were in birth weight range from 2501- 3500 g. Johnson's Formula showed a tendency to overestimate in 60% of the cases and underestimate 40%. On the other hand Sonographic estimation in the present study by Hadlock's method underestimated the weight in 33% of cases and overestimated in the remaining 67%.

All three methods were highly correlated when compared in individual pairs according to the total sample in my study where the paired t test value between Johnsons and Hadlocks t = 3.23 , p = < 0.01 and was statistically significant.

The variation between predicted birth-weight and actual birth-weight was best expressed in the form of mean absolute percentage error. This mean absolute percentage error was lowest for Johnson's (7.23%), closely followed by Scan (7.28%). Whereas Dare's method had the highest mean absolute percentage error (13.06%) in the overall sample . It was clear that all methods overestimated the fetal weight but the error was low for Johnson's method when compared to the other two methods.

Accuracy of each method in estimating fetal weight was calculated by ROC. Maximum Sensitivity of the test was high for Dare's method (91.6%)and low for Johnson's formula(47%), and 76% for Scan method and specificity was noted as 64.7% for Dare's method, 70.6 and 76.5% for Johnson's and Scan method respectively.

The prediction of birthweight within 10% of ABW by Johnson's formula, Dare's method and Scan was found to be 59%, 53% and 59% respectively, which concluded that in experienced hands the intrapartum clinical estimates of birth weight for term infants are at least as good as ultrasound-based predictions, being correct to within 10% of the birth weight in 55 - 72% of estimation.

CONCLUSION

To conclude, in this study the ultrasonographic method and Johnson's formula are equally valuable and superior to Dare's method in terms of error in grams and percentage error.

In developing countries like ours, it is important to remember that ultrasound fetal weight estimation requires expensive equipment and it is a time consuming work for the hospital staff. Moreover they are often working at sub optimal conditions in overcrowded maternity facilities.

We regard overestimation of fetal weight by clinical methods, as a positive factor and strength of this study as it will help the health workers at peripheral centers for earlier referral of mothers with macrosomic fetuses, thus contributing to the reduction of obstructed

labor and shoulder dystocia including their sequelae like brachial plexus injuries, bone injuries and intraprtum asphyxia,but we can say from this study that clinical methods also can be used in conditions where ultrasound facilities are poor.

REFERENCES

1. Jolly MC, Sebire NJ, Harris JP, Robinson S. Risk factors for macrosomia and its clinical consequences. Eur J Obstet Gynaecol Reprod Biol. 2003 Nov;111(1):9-14.
2. Chitra CHS, Kumari KL, Sangeereni M. Comparative study of fetal weight estimation using Hadlock's and Johnson's formula and its correlation with actual birth weight. International Journal of Scientific study. Oct-2014;2(7).
3. Chauhan SP, Hendrix NW, Magann EF, Morrison JC, Jenney SP, Devoe LD. Limitations of clinical and sonographic estimation of birth weight: experience with 1034 parturients. Obstet Gynecol. 1998;91:72-77.
4. Nzeh DA, Oyawoye O, Adetoro OO. Ultrasound estimation of birth weight in late pregnancy among African women. West African J ultrasound. 2000;1:9-14.
5. Hanretty KP, Neilson JP, Fleming EE. Re-evaluation of clinical estimation of fetal weight: a comparison with ultrasound. J Obstet Gynaecol. 1990;10:199-201.
6. Hendrix NW, Grady CS, Chauhan SP. Clinical versus sonographic estimates of birth weight in term parturients. A randomized clinical trial. J Reprod Med. 2000;45:317-22.
7. Sherman DJ, Arieli S, Tovbin J, Siegel G, Caspi E, Bukovsky I. A comparison of clinical and ultrasonic estimation of fetal weight. Obstet Gynecol. 1998;91: 212-217.
8. Sharma N, Srinivasan KJ, Sagayaraj MB, Lal DV. Fetal weight estimation methods-Clinical, Sonography and MRI imaging. International Journal of Scientific and research publications. Jan-2014; 4(1).
9. Johnson RW, Tushach CE, Estimation of fetal weight using longitudinal mensuration. Am J Obstet Gynecol. 1954;68(3):891-6. Dare FO, Ademowore AS, Ifaturoti OO, Nganwuchu A. The value of symphysio – fundal height/ abdominal girth measurement in predicting fetal. Int J Gynaecol Obstet.1990;31(3):243-8.
10. Insler VA, Bernstein DI, Rikover M, Segal TH. Estimation of fetal weight in utero by simple external palpation. American journal of obstetrics and gynecology. 1967 May;98(2):292-3.