DOI: https://doi.org/10.53350/pjmhs20221611251

ORIGINAL ARTICLE

Frequency of Correct Fetal Weight Estimation by Clinical and Ultrasound Methods in Pregnant Women

INBISAAT ANUM[1], SYEDA SAHAR ZAHRA[2], SAPNA KUMARI[3], ANUM WAHID[4], UMBER AROOJ TAHIR[5], ASIM IQBAL QURESHI[6]
[1]*Women Medical Officer, THQ Hospital, Jahaniya, Pakistan.*
[2]*Assistant Professor, Department of Obstetrics & Gynecology, Bahawalpur Medical and Dental College and Hospital, Bahawalpur, Pakistan..*
[3]*Consultant Gynecologist, Khadmat Khaliq Foundation Medical Complex, Hyderabad, Pakistan.*
[4]*Demonstrator, DG Khan Medical College, Dera Ghazi Khan, Pakistan.*
[5]*Senior Registrar, Department of Obstetrics & Gynecology, Ibn e Sina Hospital, Multan, Pakistan.*
[6]*Assistant Professor, Consultant Gynecologist, Bakhtawar Amin Hospital, Multan, Pakistan.*
Correspondence to: Syeda Sahar Zahra, Email: syedasahar108@yahoo.com, Cell: +92 336 6045352

ABSTRACT

Objective: To determine the frequency of correct fetal weight estimation by clinical and ultrasound methods in pregnant women.
Study Design: A cross-sectional study.
Place and Duration: Department of Obstetrics and Gynaecology, Nishtar Hospital Multan, From February 2021 to July 2022.
Methodology: A total of 383 women with singleton pregnancy, gestational age between 37 to 40 weeks and who underwent labor induction or elective cesarean section were included. Fetal weight estimation was done by clinical and ultrasound methods in pregnant women. Following delivery, "actual birth weight" of neonate was measured and data recorded in the shape of correct fetal weight estimation by both studied methods.
Results: In a total of 383 women, the mean age was 29.50±2.22 years ranging between 18-35 years while the mean gestational age was 38.09±0.91 weeks. The mean mother's weight was 70.19±10.56 kg, mean clinical weight estimation 3127.03±561.38 grams, mean ultrasound weight estimation 3137.25±658.05 grams and mean actual weight was 3157.63±648.33 grams. Correct clinical weight estimation was reported in 49.6% cases while correct ultrasound weight estimation was noted in 80.9%.
Practical Implications: Accuracy in fetal weight estimation can be achieved by applying Dare's method in the clinical setting.
Conclusion: Fetal weight estimation adopting Dare's formula was found to be comparable to ultrasound estimation for the prediction of actual birth weight within 10%.
Keywords: Fetal weight, gestational age, singleton, ultrasound.

INTRODUCTION

If the growth potential of the fetus is compromised, whether it is congenital or due to the environment, the neonate is in state of failure to thrive.[1] To minimize the incidence of complications in the course of labour and during puerperal period, the weight of the fetus remains in the considerations of the medical professionals, whether it is on lowest side or the other extreme.[2] Exceptionally large fetuses may lead towards certain maternal risks like obstructed labour, rupture of the uterus, cervical and vaginal laceration, injury to the pelvic floor and postpartum haemorrhage.[3,4]

Low birth weight may lead to such perinatal complications that either premature birth takes place or fetal growth is restricted or both of them. In order to have precise assessment of the fetal weight, ultrasound scanning is very much reliable and applicable in the clinics.[5] The ability of ultrasonography to find out the fetal weight is quite evident through literature as around 75% of the "actual birth weight (ABW)".[6] Approximately, in 40% of the cases, ultrasound scanning estimated the fetal weight within 5% of ABW.[7] If the fetal weight at both extremes is not estimated accurately, there are chances of preterm delivery due to the miscalculation like inaccurate values; an unwanted surgical delivery can be a result of the efforts made to avoid the possible risks in the vaginal delivery of macrosomic fetus.

A study conducted by Bajracharya J and his colleagues has revealed that correct estimated weight by ultrasound scanning was 60%.[8] Yadav R and his associates has reported in another recent study that the correct clinical estimated weight was 47% and correct ultrasound estimated weight was79%.[9]

For the estimation of fetal weight, the majority of the data used in Pakistan is acquired from the fetal data of the Western societies but it is quite evident that birth weight is affected by hereditary along with racial factors. There might be the involvement of such hereditary dissimilarities in ethnic differences witnessed in postnatal outcomes.[10] Therefore, in the favor of our local population; statistical evidence is very much needed. We did this study to determine the frequency of correct fetal weight estimation by clinical and ultrasound methods in pregnant women.

METHODOLOGY

This cross-sectional study was conducted at "The Department of Obstetrics & Gynaecology, Nishtar Hospital, Multan" from February 2021 to July 2022. Sample size was calculated to be 383 with 95% Confidence level while least prevalence of (clinical estimated weight within 10% of the actual birth) as 47%[9] with margin of error as 5%. Approval from "Institutional Ethical Committee" was obtained. Informed consents were taken from all the women participating in the study. We included women aged 18-35 years, singleton pregnancy on ultrasound, gestational age between 37-40 weeks as per last menstrual period and who underwent labor induction or elective cesarean section. Women were excluded who had history of diabetes mellitus, body mass index above 30 kg/m^2, congenital anomalies (detected on ultrasound) or those who delivered after days of clinical or ultrasonic fetal weight estimation.

At study entry baseline, demographics (age, parity, gestational age) were recorded. Clinical estimation of the fetal weight (EFW) of participants were carried out. The symphysiofundal height (SFH) was measured from the highest point on the uterine fundus to the midpoint of the upper border of the symphysis pubis using the reverse side (inch surface) of the tape so as to minimize measurement bias. Afterwards, the abdominal circumference was measured at the level of the umbilicus. The fetal weight in grams was then calculated as per Dare's formula:

EFW in grams = abdominal girth (AG) in cms x SFH incms

Ultrasonography examination was performed employing 3.5 MHz convex assay and linear assay transverse. After "biparietal diameter (BPD)", "abdominal circumference (AC)" and "femur length (FL)" were measured in centimeters, the sonography machine calculated fetal weight by formula.

"Log10 (EFW) = 1.4787 – 0.003343 AC x FL + 0.001837 BPD2 + 0.0458 AC + 0.158FL"

The ABW of each woman's neonate was measured after delivery using a standardized neonatal weighing scale within 20 minutes.

Correct fetal weight estimation was defined in terms of weight within 10% of the actual birth weight. Weight within 10% of the actual birth weight was if estimated weight by clinical

estimation or ultrasound estimation was ±10% of actual birth weight calculated by calculator.

Data was analyzed with "Statistical Package for Social Sciences (SPSS)" version 26.00. Descriptive statistics were applied. Stratification was done with regard to age, gestational age, maternal weight and parity to see the effect of these variables on correct fetal weight estimation. Post stratification chi square test was applied taking p ≤0.05 as significant.

RESULTS

In a total of 383 women, the mean age was 29.50±2.22 years ranging between 18-35 years while the mean gestational age was 38.09±0.91 weeks. The mean mother weight was 70.19±10.56 kg, mean clinical weight estimation was 3127.03±561.38 grams, mean ultrasound weight estimation 3137.25±658.05 grams and mean actual weight was 3157.633±648.33 grams. Table-1 is representing baseline characteristics of studied women.

Correct clinical weight estimation was reported in 49.6% cases while correct ultrasound weight estimation was done in 80.9%. Stratification of Correct Clinical weight estimation and correct ultrasound weight estimation with respect to age, gestational age, parity and mother weight are shown in table 2 and 3.

Table-1: Characteristics of Women (n=383)

Characteristics		Number (%)
Age (years)	18-27	55 (14.4%)
	28-35	328 (85.6%)
Gestational Age (weeks)	37-38	266 (69.5%)
	39-40	114 (30.5%)
Parity Status	0-3	355 (92.7%)
	>3	28 (7.3%)
Body Weight (kg)	≤70	272 (71.0%)
	>70	111 (29.0%)

Table-2: Stratification of Correct Clinical Weight Estimation with respect to Study Variables (n=383)

Study Variables		Correct Clinical Weight Estimation		P-Value
		Yes (n=190)	No (n=193)	
Age (years)	18-27	23 (12.1%)	32 (16.6%)	0.212
	28-35	167 (87.9%)	161 (83.4%)	
Gestational Age (weeks)	37-38	127 (66.8%)	139 (72.0%)	0.271
	39-40	63 (33.2%)	54 (28.0%)	
Parity	0-3	175 (92.1%)	180 (93.3%)	0.663
	>3	15 (7.9%)	13 (6.7%)	
Mother Weight (kg)	≤70	134 (70.5%)	138 (71.5%)	0.833
	>70	56 (29.5%)	55 (28.5%)	

Table-3: Stratification of Correct Ultrasound Weight Estimation with respect to 3tudy Variables (n=383)

Study Variables		Correct Clinical Weight Estimation		P-Value
		Yes (n=310)	No (n=73)	
Age (years)	18-27	45 (14.5%)	10 (13.7%)	0.858
	28-35	265 (85.5%)	63 (86.3%)	
Gestational Age (weeks)	37-38	215 (69.4%)	51 (69.9%)	0.932
	39-40	95 (30.6%)	22 (30.1%)	
Parity	0-3	286 (92.3%)	69 (94.5%)	0.504
	>3	24 (7.7%)	4 (5.5%)	
Mother Weight (kg)	≤70	222 (71.6%)	50 (68.5%)	0.597
	>70	88(28.4%)	23 (31.5%)	

DISCUSSION

In the past several years, the estimation of fetal weight has remained a part of the standards in the evaluation of hazardous pregnancies and deliveries during antepartum. Enormous efforts have been put by the researchers in order to develop certain ways and means to calculate the precise weight and size of the unborn fetus. Ultrasound scanning and clinical observations are two of the methods used for weight estimation. Having accurate estimation of the fetal weight, it is helpful for the clinicians dealing with labour to take impressive measures to decrease the chances of intrapartum morbidity and mortality.[11,12]

In this study, correct clinical weight estimation was 49.6% and correct ultrasound weight estimation was 80.9%. Findings of Chauhan et al were relatively comparable with our findings.[13] In a study by Bajracharya J and his colleagues have found that correct ultrasound estimated weight was 60%.[8] Yadav R and his associates reported in another recent study that the correct clinical estimated weight was 47% and correct ultrasound estimated weight was79%.[9] A comparative study conducted by Raghuvanshi et al revealed that with ultrasound scanning, the average error found by means of Headlock's formula was minimum i.e., 140 grams whereas, it was maximum i.e., 454.9 grams according to Jonson's formula.[14] Statistics showed that there was insignificant relationship between the rates of estimation in clinics vs. ultrasound method within 10% of birth weight as founded by Sherman et al and Bhandary et al.[15,16] Our study also presented that in order to estimate the fetal weight, no significant difference was found between ultrasonography method and estimation in the clinic through AG×SHF.[13] The standard deviation to predict the error founded by Chauhan et al was, minimum with Hadlock's formula i.e., 258.8 grams and AG×SHF was next to come.[13] It was noted that the delivery mode was not only affected by the estimated fetal weight but the other factors like fetal distress, and previous LSCS were also involved. The patients gone through vaginal delivery were 57.5% and in 47.5% of the patients cesarean section had to be performed, being at tertiary care unit might be the reason of such high percentage of cesarean.

We came across some limitations with our study as in between the ultrasound scanning day and the delivery day, fetuses kept on gaining some weight. Errors and omissions might be the part of our study because in teaching hospitals multiple radiologists are doing the scanning for different patients. Our study results have a great significance for the better healthcare of the population of developing countries as the availability of innovative USG machines for high performance is not up to the mark but under the expertise of our doctors, it is still possible to estimate the fetal weight accordingly. It is not convincing to have estimation through ultrasound; first, it is not cost effective and second, accuracy in estimation can be achieved by applying Dare's method in the clinic which is time efficient, costs nothing, and execution is not complicated, for the clinicians having not as much of experience.

CONCLUSION

Fetal weight estimation adopting Dare's formula was found to be comparable to ultrasound estimation for the prediction of actual birth weight within 10%.

REFERENCES

1. Hong J, Lee HA, Park EA. Association of mid-pregnancy antioxidative vitamin and oxidative stress levels with infant growth during the first 3 years of life. Food Nutr Res. 2014;58:10.
2. Galal M, Symonds I, Murray H, Petraglia F, Smith R. Postterm pregnancy. Facts Views Vis Obgyn. 2012;4(3):175–87.
3. Mohammadbeigi A, Farhadifar F, Soufi-Zadeh N, Mohammadsalehi N, Rezaiee M, Aghaei M. Fetal macrosomia: risk factors, maternal, and perinatal outcome. Ann Med Health Sci Res. 2013;3(4):546–50.
4. Singh A, Rathore P. A comparative study of feto-maternal outcome in instrumental vaginal delivery. J Obstet Gynaecol India. 2011;61(6):663–6.
5. Wu M, Shao G, Zhang F, Ruan Z, Xu P, Ding H. Estimation of fetal weight by ultrasonic examination. Int J Clin Exp Med. 2015;8(1):540–5.
6. Schmiegelow C, Scheike T, Oesterholt M, Minja D, Pehrson C, Magistrado P, et al. Development of a fetal weight chart using serial trans-abdominal ultrasound in an East African population: a longitudinal observational study. PLoS ONE. 2012;7(9):e44773.
7. Watson WJ, Soisson AP, Haarlass EF. Estimation of weight of the term fetus: accuracy of ultrasound versus clinical examination. J Reprod Med. 1988;1033:369-71.
8. Bajracharya J, Shrestha NS, Karki C. Accuracy of prediction of birth weight by fetal ultrasound. Kathmandu Univ Med J. 2012;38(2):74-76.
9. Yadav R, Sharma BK, Deokota RN, Rahman H. Assessment of clinical methods and ultrasound in predicting fetal birth weight in term pregnant women. Int J Reprod Contracept Obstet Gynecol. 2016;5:2775-9.
10. Straughen JK, Sipahi L, Uddin M, Misra DP, Misra VK. Racial differences in IGF1 methylation and birth weight. Clin Epigenetics. 2015;7(1):47.
11. Baum JD, Gussman D, Wirth JC. Clinical and patient estimation of fetal weight vs. ultrasound estimation. J Reprod Med. 2002;47(3):194-8.
12. Hendrix NW, Grady CS, Chauhan SP. Clinical vs. sonographic estimate of birth weight in term parturients. A randomized clinical trial. J Reprod Med. 2000;45(4):317-22.
13. Chauhan KP, Patel UJ. Comparative study of various methods of fetal weight estimation at term pregnancy. J Integrat Health Sci. 2013;1(1):3-6.
14. Raghuvanshi T, Pawar M. Comparative Study of Fetal Weight Estimation by Various Methods among Term Pregnancies at Rural Tertiary Care Centre, Maharashtra. J Evolut Med Dent Sci. 2014;3(41):10291-6.
15. Sherman DJ. A comparison of clinical and ultrasonic estimation of fetal weight. Obstet Gynecol. 1998;91:212-7.
16. Bhandary Amritha A, Pinto Patrick J, Shetty Ashwin P. Comparative Study of Various Methods of Fetal Weight Estimation in Term Pregnancy. Ind J Gynecol Obstet. 2004;54:336-9.