ORIGINAL ARTICLE

Concordance of Sonographic Fetal Weight Estimation and Actual Birth Weight in Pakistani Population Using Hadlock Formula

AASMA ASHRAF¹, MAIMOONA CHIRAGH², KHALID REHMAN YOUSAF³, SHAHZAD SAEED⁴, IRUM IQBAL⁵, NADIA NAZEER⁶, AFZAAL MEHMOOD⁷, M. USMAN BAIG⁸, ALI ASAD⁸

¹Consultant Radiologist, Department of Radiology, Sir Ganga Ram Hospital, Lahore, Pakistan

²Senior Consultant Radiologist, Social Security Teaching Hospital Multan Road, Lahore, Pakistan

³Associate Professor of Radiology, Fatima Jinnah Medical University/Sir Ganga Ram Hospital, Lahore, Pakistan

⁴Assistant Professor of Radiology, Services Institute of Medical Sciences, Lahore, Pakistan;

⁵Assistant Professor of Radiology, Services Institute of Medical Sciences, Lahore, Pakistan;

⁶Consultant Radiologist, THQ, Kasur, Pakistan

⁷Consultant Radiologist, Services Hospital, Lahore, Pakistan

⁸Post-graduate trainee, Radiology Department, Services Hospital, Lahore, Pakistan

Correspondence to: Dr. AasmaAshar, Email: draasma.ashar@gmail.com

ABSTRACT

Background: To plan mode of delivery and to prevent complications, exact analysis of fetal weight is very important.

Aim: To assess the concordance of sonographically estimated fetal weight by using Hadlock formula and actual birth weight at term in Pakistani population.

Methodology: This study was done at New Radiology Department, Services Hospital, Lahore. Duration of study was 6 months. It was a cross sectional study. 200 females in last trimester of pregnancy fulfilling inclusion criteria were enrolled, using random sampling technique. Data is analyzed by using SPSS version 17.

Results: The mean age was 31 ± 4.0 years, mean estimated fetal weight (EFW) was 3288 ± 429 gms and mean actual birth weight (ABW) was 3259 ± 430 gms. Concordance was 100%. The absolute difference between EFW and ABW was 29 ± 28.03 gms. Percentage error of fetal weight estimation was 0.92 ± 0.91 .

Conclusion: The use of Hadlock formula to estimate fetal weight in Pakistani population within 72 hours of delivery shows acceptable results when comparing with actual birth weight.

Keywords: Concordance, Fetal Weight, Sonography, Hadlock formula

INTRODUCTION

Neonatal weight is an important predictive parameter of neonatal outcome¹. The calculation of neonatal weight is very important in managing labor and delivery². Labor abnormalities as well as neonatal complications are associated with fetal macrosomia³. Exact calculation of fetal weight is important in taking decisions how to manage the delivery of fetus with abnormal fetal weight. Now a day's calculated fetal weight has been incorporated into the standard routine antepartum evaluation of high-risk pregnancies and deliveries^{4,5}.

Calculation of fetal weight by USG is obtained from measurements of fetal parts and then apply the measures in a formula called regression analysis for birth weight determination. Calculation of birth weight by USG showed absolute percent error (APE) between 6%--15%. In 75% of cases, USG can calculate weight of fetus within 10% of actual birth weight.In about 40% of cases, accuracy within 40% of actual birth weight (AWB) is also observed in a stud⁶.Hadlock formula 1 and 2 is the most reliable formulae for calculation of estimated birth weight and actual birth weight.⁷

METHODOLOGY

A cross sectional study, performed in Radiology department, Services Hospital, Lahore from 1st Jan2015 to 30 June 2015. Sample size of 200 cases was estimated

Received on 23-02-2020 Accepted on 14-07-2020 using 95% confidence level, 6% margin of error; taking an expected percentage of fetal weight estimation within 10% of actual birth weight.

Random sampling was done. The first patient was selected randomly and then every third was added in the study. All pregnant women 20 – 40-year age old, with singleton pregnancyin cephalic presentation, 37 to 42 weeks gestation determined by last menstrual period and ultrasonography were included. Patients on any chronic medication for any medical disease like hypertension, diabetes, chronic kidney disease and thyroid disorders, BMI more than 40 kg/m², mass/fibroid in uterus were excluded. Intrauterine congenital anomaly determined by ultrasonography was also an exclusion criterion.

Data Collection: Subjects were admitted for normal deliveries, or caesarean section. Gestational age of the cases was confirmed by using USG before 22 weeks.200 mothers included in the study. The duration of ultrasound between in-utero fetal weight estimation and delivery of the baby was within 72 hours. Data about age, last menstrual period, gestational age, and parity was recorded. The formula for estimating fetal weight was Hadlock formula that is biparietal diameter (BPD), abdominal circumference (AC), and femoral length (FL).

Post delivery birth weight of the babies was calculated within 30 minutes of delivery.

Data Analysis: Data collected was analyzed by SPSS version 17.Mean± SD was calculated for quantitative variables. Studentt-test was used to compare the significance of difference. Duration between ultrasound and

delivery was stratified to control time lag. The absolute difference between EFW and ABW as well as relative difference or the percentage error of fetal weight estimation [100 (EFW - ABW)/ ABW] was calculated.

RESULTS

In this study total 200 women in last trimester of pregnancy and according to selection criterion presenting to Labor room or OPD of Services Hospital, Lahore were enrolled in study. Demographic data of study population is given in table 1.

Calculated birth weight by ultrasound was higher than actual birth weight as given in table 2. The difference was non significant. Concordance was found in 200 (100.0%) women. Stratification of concordance with respect to duration between ultrasound and delivery is shown in Table 3. The absolute difference between EFW and ABW was 29 \pm 28.03. Relative difference of fetal weight calculation was 0.92 \pm 0.91.

Table 1: The demography of study population

Demography	Mean ± SD	Median	Ranges
Age (yrs)	31.0 ± 4.0	31	22-40
Parity	2.0 ± 1.3	2	0-5
Gravidity	3.0 ± 1.3	3	1-6

Table 2: The birth weights and fetal weights calculated by ultrasound

	Mean ± SD	Ranges	p-value
Calculated birth weight	3288 ± 429	2000-4250	6.917
Actual birth weight	3259 ± 430	2000-4200	

Table 3: Stratification of concordance with duration Between ultrasound and delivery

	Concordance		
Duration	Yes	No	
≤ 24 hours	105	00	
	(100%)	(0%)	
> 24 and ≤ 72 hours	95	00	
	(100%)	(0%)	

DISCUSSION

In this study, The mean \pm SD values of birth weight is 3,259 \pm 430 gm. This study is in consistent with the results of Njokuet al who also observed birth weight of 3,242 \pm 508 gm.⁸ and 3300 \pm 550 gm in another study in Nigeria⁹, and higher than 2817 \pm 783 gm in Bangladesh ¹⁰ and 2926 \pm 1051gm documented in Germany¹¹. The reason may be due to regional and socioeconomic factors in different countries.¹²The mean \pm SD of ultrasonic weight calculation is 3288 \pm 429gm. When comparing these results, the difference was non significant statistically.

In this study, concordance i.e. No. of calculations in 10% of birth weight is 100%. In a study done in Nepal, concordance is only 60%. It is seen that concordance decreases when gap between USG calculation and delivery increases. It was 81% when procedure of delivery was within seven days of calculation and decreased to 70% as delivery delayed i.e. > 8-14 days¹².

In this study, absolute difference between calculated birth weight and actual birth weight is 29 ± 28 gm, and it is

more when time between USG estimation and delivery is increased¹³. In this study, %age error of fetal weight estimation is $0.92 \pm 0.91\%$ when delivery was done in 72 hours of estimation. In a Canadian study with same formula, it was much higher with large sample size i.e. 3697 subjects. It was $0.43 \pm 8.7\%$ when delivery was within 3 days and $0.73 \pm 9.11\%$ when delivery was within 7 days¹⁴. Mean error in our study is high, but SD of percentage error is much lower.

CONCLUSION

Use of Hadlock formulae for estimation of fetal weight in Pakistani population within 72 hours of delivery shows acceptable results when comparing with actual birth weight. By using Hadlock formula, 100% concordance was noted between calculated and actual birth weight.

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