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COMPARISON BETWEEN CLINICAL ESTIMATED FETAL WEIGHTS (CEFW) VERSUS ULTRASONOGRAPHIC ESTIMATED FETAL WEIGHT (UEFW) FOR CO RELATION WITH ACTUAL BIRTH WEIGHT (ABW) IN 3RD TRIMESTER OF PREGNANCY

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ABSTRACT

Background: Accurate prenatal estimation of birth weight is useful in the management of labour and delivery. **Objective:** To determine the correlation between clinical estimated fetal weight with actual birth weight in 3rd trimester of pregnancy and to determine the correlation between Ultrasonographic fetal weight assessment with actual birth weight in 3rd trimester of pregnancy. **Material & Methods:** This cross sectional study with non-probability purposive sampling technique was conducted in three tertiary care hospitals of Punjab, Department of Obstetrics & Gynaecology, Allied Hospital, Faisalabad, Lady Aitchison Hospital Lahore and Lady Willingdon Hospital Lahore. Informed consent was obtained from each female to use their data for research purpose. Demographic details were also noted. Then females undergo CEFW was done by using Johnson's formula. Then ultrasonography was done on every female by experienced radiologists to get UEFW. FW measurement was done by using Shepard formula. Then females were followed-up till delivery of fetus. Actual birth weight (ABW) was noted on birth. Pearson correlation was used to measure the correlation coefficient for CEFW and UEFW with ABW. P-value≤0.05 was taken as significant. **Results:** In our study the mean age of the patients was 29.60±6.23 years and the mean gestational age of 33.30±2.31 weeks. The mean BMI value of the patients was 23.08±1.26 Kg/m2, the mean CEFW value 2219.60±556.41 grams while the mean UEFW value of the patients was 2227.77±521.94 grams and the mean value of ABW of the patients was 2284.00±515.29 grams. In our study the positive correlation was found between the CEFW, UEFW with ABW of the baby. **Conclusion:** Our study results concluded that both the clinical estimation ultrasonography estimation showed the feasible and reliable results. Both showed positive correlation with actual birth weight.

KEYWORDS: Clinical, Actual Birth Weight, Fetal Weight, Ultrasonography, 3rd Trimester, Pregnancy.

INTRODUCTION

Accurate prenatal estimation of birth weight is useful in the management of labour and delivery, permitting obstetricians to make decisions about instrumental vaginal delivery, trial of labour for patients suspected of having a low birth weight or macrosomic fetus.[1] According to the existing literature, there is no truly accurate technique for evaluating FW.[2]

Before delivery, accurate estimation of FW can have a major approach for decision and management of labour, perinatal outcome can be improved better.[3] Estimation of FW can be done by external abdominal measurements, alone or associated with fundal height measurement and/or USG scan near 32 weeks.[4] Since the advent of ultrasound and its dissemination over the last three decades, and despite the lack of conclusive evidence, there has been a widespread belief that ultrasound is more accurate than other methods for predicting fetal weight.[2]

A study correlate clinical estimation of fetal weight (CEFW) and Ultrasonographic estimation of fetal weight (UEFW) and estimated the correlation coefficient taking actual birth weight (ABW) as gold standard. Correlation between CEFW and ABW (r = 0.074) was insignificant and was almost showed no relationship while a significant correlation between UEFW and ABW (r =

0.782).[5] But another study reported that the correlation coefficient for the CEFW was 0.78 and UEFW was 0.74 and it was statistically demonstrated that both showed significant positive correlation ($p<0.001$).[6]

Rationale of this study is to compare the correlation between clinically estimated and actual birth weight and Ultrasonographic estimated and actual birth weight in 3rd trimester of pregnancy. Literature has reported that estimation of fetal weight during last trimester can be helpful in planning labour and delivery and achieving better maternal and perinatal outcome. But there is discrepancy in literature. Through this study we want to confirm that which method i.e. ultrasonography or clinical estimation of fetal weight is the best method to estimate FW before birth and can have a better fetal outcome in case of low FW. In routine, in tertiary care hospitals, obstetricians rely on ultrasonography but in sub urban areas or peripheries, facility of ultrasonography lacks. So we want to assess the reliability of FW clinically, so that we can rely on this method in future to lessen the burden and use of on USG.

OBJECTIVES

The objectives of this study are

- To determine the correlation between clinical estimated fetal weight with actual birth weight in 3rd trimester of pregnancy.
- To determine the correlation between Ultrasonographic fetal weight assessment with actual birth weight in 3rd trimester of pregnancy.

Operational Definition

Clinical estimated fetal weight (CEFW)

It was calculated by using Johnson's formula.

Johnson's formula: It is calculated as the height of the uterus above the symphysis pubis in centimeter minus 12, if the vertex is at or above the level of ischial spine or minus 11, if the vertex is below the level of ischial spine, multiplied by 155 in either case, gives the weight of the fetus in grams i.e.

Fetal weight = (SFH - 12/11) x 155 in grams

SFH: It was measured as distance from the top of the symphysis pubis to the top of the fundus of uterus in centimeter with measuring tape, provided patient is in supine position with empty urinary bladder and relaxed uterus.

Ultrasonographic estimated fetal weight (UEFW): Fetal weight assessment will be done by parameter BPD (biparietal diameter) and AC (abdominal circumference).

BPD: BPD was measured with electronic calipers at right angle to the longitudinal axis of the skull, from outer edge of the anterior to the inner edge of the posterior skull wall at the level of thalami.

AC: AC was measured at the level of liver at which umbilical vein joined the portal sinus.

Shepard formula was used for all the cases for ultrasonographic estimation of fetal weight i.e.FW (g) = 10EXP [(AC x 0.046) – (BPD x AC x 0.002646) + (BPD x 0.166) + 1.2508]

Actual birth weight (ABW): It was measured as weight of baby at birth on weight machine in grams that was set on zero (0) before placing baby on it.

METHODOLOGY: This cross sectional study was conducted in three tertiary care hospitals of Punjab, Department of Obstetrics & Gynaecology, Allied Hospital, Faisalabad, Lady Aitchison hospital Lahore and Lady Willingdon Hospital Lahore from January 2019 to December 2019. Sample size of 100 cases was calculated with 5% type I error, 10% type II error and taking expected value of correlation coefficient i.e. 0.74[6] between CEFW and ABW in 3rd trimester of pregnancy. Non-probability purposive sampling technique. Ethical approval was taken from hospital ethical committee. Females of age 18-40years with presenting in third trimester (gestational age of >30weeks) with single cephalic fetus (on USG) with BMI 18-25kg/m^2 were included in study. While patients with membrane rupture, multiple pregnancy, high risk patients like gestational diabetes (BSR>200gm/dl), PIH (BP>140/90mmHg), pre-eclampsia (PIH with protein urea +1 on dip stick) or eclampsia (pre-eclampsia with convulsions), anemia (Hb<8gm/dl), deranged LFTs (ALT>40IU, AST>40IU), deranged RFTs (serum creatinine>102gm/dl) and those who had big uterine fibroid, polyhydramnios, oligohydramnios and congenital fetal anomaly (on USG) were excluded form study. Written informed consent was obtained from each female to use their data for research purpose. Demographic details (name, age, gestational age, BMI and parity) were also noted. Then females undergo CEFW was done by using Johnson's formula (as per operational definition). Then ultrasonography was done on every female by experienced radiologists to get UEFW. FW measurement was done by using Shepard formula (as per operational definition). Then females were followed-up till delivery of fetus. Actual birth weight (ABW) was noted on birth (as per operational definition). All this information was recorded in the proforma.

STATISTICAL ANALYSIS

The data was entered and analyzed through SPSS version 20. Mean and SD were calculated for quantitative variables like age, gestational age, parity, CEFW, UEFW and ABW. Pearson correlation was used to measure the correlation coefficient for CEFW and UEFW with ABW. P-value≤0.05 was taken as significant.

RESULTS

In this study total 100 patients participated. The mean age of the patients was 29.60±6.23 years with minimum and maximum ages of 18 & 40 years respectively. The

study results showed that the mean gestational age of the patients was 33.30±2.31 weeks with minimum and maximum gestational ages of 30 & 37 weeks respectively. Frequency distribution of the patients showed that 23(23%) patients appeared with no parity, the patients with parity one was 26(26%), patients with parity two were 30(30%), patients with parity three were 13(13%) and 8(8%) patients appeared withy parity four. In this study the mean height of the patients was 168.19±7.033 cm with minimum and maximum heights of 150 & 177 cm respectively. In this study the mean weight of the patients was 65.32±5.33 kg with minimum and maximum weights of 52 & 75 kg respectively. The study results showed that the mean BMI value of the patients was 23.08±1.26 Kg/m^2 with minimum and maximum BMI values of 20.10 & 25 Kg/m^2 respectively. The study results showed that the mean SFH value of the patients was 26.32±3.58 cm with minimum and maximum SFH values of 21 & 34 cm respectively. The study results showed that the mean CEFW value of the patients was 2219.60±556.41 grams with minimum and maximum CEFW of 1395 & 3410 grams respectively. In this study the mean BPD value of the patients was 83.75±5.90 grams with minimum and maximum BPD values of 74 & 94 grams respectively. In this study the mean AC values of the patients was 292.74±22.25 grams with minimum and maximum AC values of 255 & 330 grams respectively. The study results showed that the mean value of UEFW of the patients was 2227.77±521.94 grams with minimum and maximum UEFW values of 1465 & 3177.40 grams respectively. The study results showed that the mean value of ABW of the patients was 2284.00±515.29 grams with minimum and maximum ABW values of 1400 & 3400 grams respectively. In our study the positive correlation was found between the clinical estimated fetal weight and the actual birth weight of the baby. i.e r=0.965. Our study results showed the positive correlation between the ultrasonographic estimated fetal weight and the actual birth weight of the baby. i.e r=0.927.

Table 1: Descriptive statistics of study population.

	age	Gestational age	height	weight in Kg	BMI in Kg/m2
n	100	100	100	100	100
Mean	29.60	33.30	168.19	65.32	23.08
SD	6.23	2.31	7.033	5.33	1.26
Minimum	18.00	30.00	150.00	52.00	20.10
Maximum	40.00	37.00	177.00	75.00	25.00

Table 2: Descriptive statistics of FETUS.

	AC (grams)	UEFW (grams)	Actual birth weight (grams)	SFH (cm)	CEFW (grams)	BPD (grams)
n	100	100	100	100	100	100
Mean	292.74	2227.77	2284.00	26.32	2219.60	83.75
SD	22.25	521.94	515.29	3.58	556.41	5.90
Minimum	255.00	1465.92	1400.00	21.00	1395.00	74.00
Maximum	330.00	3177.40	3400.00	34.00	3410.00	94.00

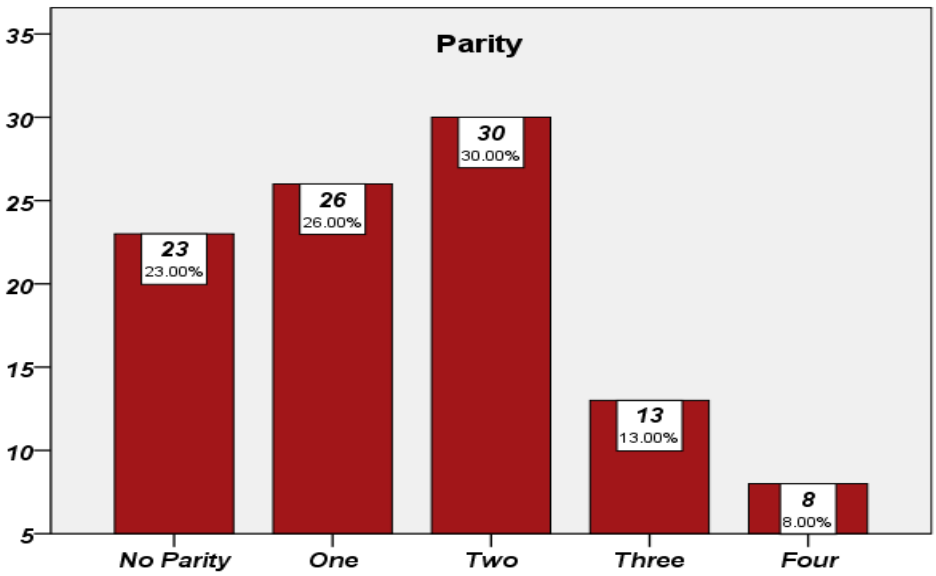

Fig 1: Frequency distribution of parity.

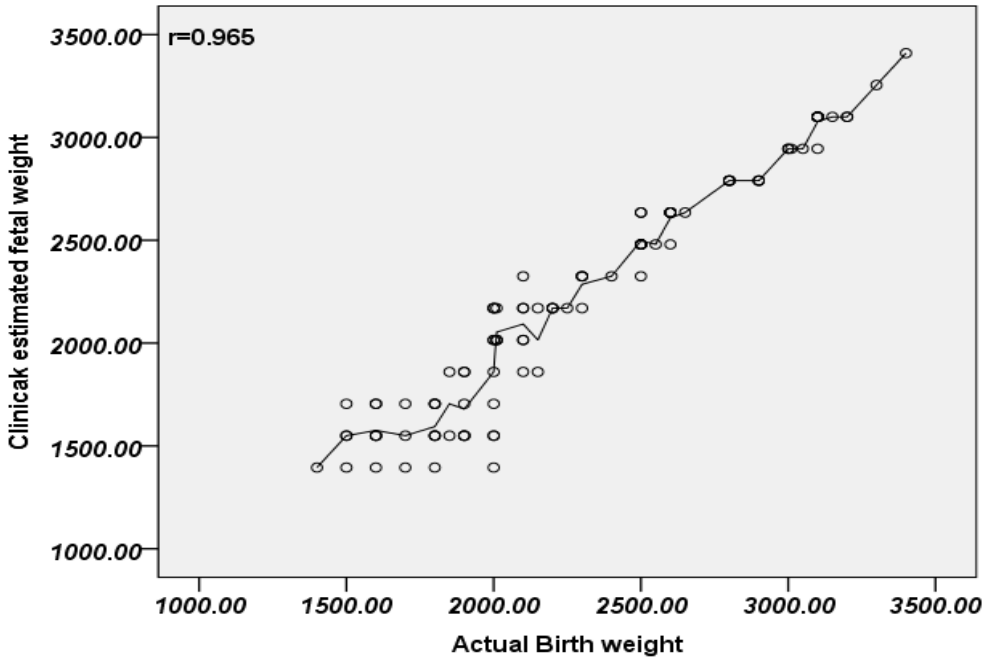

Fig. 2: Correlation between CEFW & ABW.

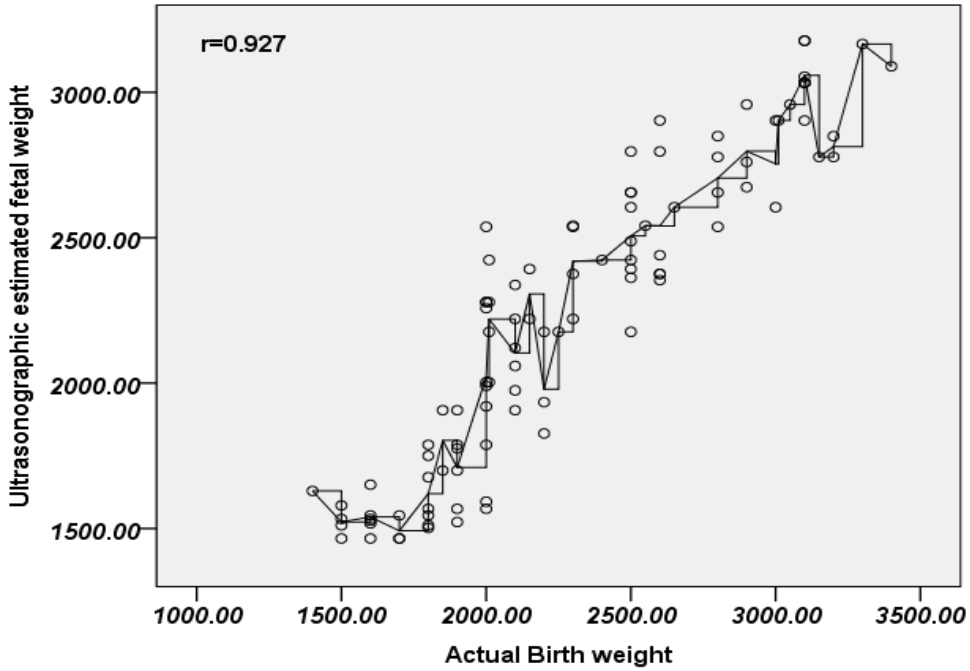

Fig. 3: Correlation between UEFW & ABW.

DISCUSSION

This present cross sectional study was conducted at Unit I, Department of Obstetrics & Gynaecology, Allied Hospital, Faisalabad to determine the correlation between clinical estimation of fetal weight and ultrasound estimation of fetal weight with actual birth weight.

The screening and management of abnormal fetal growth, whether it macrosomia or growth restriction, remain important objectives of prenatal care. In a low-risk and unselected population, such screening is based mainly on a series of ultrasound examinations. Estimating fetal weight is an easy and straight forward way in which to monitor fetal growth and to screen for intrauterine growth restriction (IUGR).[7]

SFH measurement is a simple and inexpensive method to detect abnormal fetal growth; however, according to a recent systematic review, there is not enough evidence to evaluate the use of this technique in the routine antenatal care.[8] in our study the mean value of SFH of the patients was 26.32±3.58 cm.

Alessandra Curt et al[9] showed in their study that the role of obstetric and maternal factors in birth weight prediction at term of pregnancy is confirmed. The value of the variables used to build up the statistical algorithm is higher to clinical estimation performed in labor by an expert obstetrician.[10-13]

Our study results showed that the both clinical and ultrasound estimation of fetal birth are positively correlated with actual birth weight. In our study the mean CEFW value of the patients was 2219.60±556.41 grams and it has positive correlation with ABW (r=0.965), similarly the mean value of UEFW of the patients was 2227.77±521.94 grams and it had positive correlation with ABW (r=0.927).

Nilgün Güdücü et al[14] concluded in their study that ultrasonographic fetal weight estimations correlate with the actual birth weight better when performed in the late third trimester, but ultrasonographic fetal weight estimation early in the third trimester may allow for better follow up and planning of delivery both in small and large for gestational age fetuses.

Akinola S. Shittu et al demonstrated in their study that the accuracy of clinical estimation was highest in the birthweight range of 2,500–<4,000 g and lowest for the low-birthweight group (<2,500 g). This is in consonance with what several investigators have shown that the clinical method is best for estimating foetal weight in the reference birthweight range of 2,500 to <4,000 g with accuracy (mean absolute percentage error) of ±7.5–19.8% depending on gestational age and that below 2,500 g.[15-21]

E. Peregrine et al(22) concluded in their study that clinical estimates of birth weight perform favorably compared with ultrasonographic estimates, ultrasound immediately prior to labor is more accurate at predicting the low- or high-birth-weight fetus.

One more study showed that Clinical estimation of birth weight in early labor is as accurate as routine ultrasonic estimation obtained in the preceding week. In the lower range of birth weight (less than 2500 g), ultrasonic estimation is more accurate; in the 2500–4000 g range, clinical estimation is more accurate. In the higher range of birth weight (greater than 4000 g), both methods have similar accuracy.[23] Correlation between CEFW and ABW (r = 0.074) was insignificant and was almost showed no relationship while a significant correlation between UEFW and ABW (r = 0.782).[5] But another study reported that the correlation coefficient for the CEFW was 0.78 and UEFW was 0.74 and it was statistically demonstrated that both showed significant positive correlation (p<0.001).[6] Ben-Haroush A et al(104) explains that there was a high correlation between EFW and birth weight (R(2) = 0.775, P < 0.001). The mean birth weight was 3207 +/- 561 g, and mean absolute weight difference was 227 +/- 197 g; (absolute range, 0-1700 g; actual range, - 986 to + 1700 g). Sanyal P et al (105) also showed a good correlation between the ultrasound measurements and the postnatal measurements i.e. r^2=0.98. Akinola S et al (15) described that correlation coefficient for ultrasound estimation (0.74) Uotila et al. in their comparison of ultrasonic estimation showed (0.77) correlation. Akinola S et al (15) described the correlation coefficient of clinical estimation (0.78) while Dare et al. also showed the similar proportion (0.74).

CONCLUSION

Our study results concluded that both the clinical estimation and ultrasonography estimation showed the feasible and reliable results. Both showed positive correlation with actual birth weight. So in future we can rely on clinical method in areas where ultrasound facility is not available.

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