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AGREEMENT BETWEEN ULTRASONIC ESTIMATED FETAL WEIGHT AND ACUTE BIRTH WEIGHT OF NEONATE IN PAKISTAN

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Abstract:

Introduction: *Antenatal care needs frequent examination to analyze the fetal growth. As the time progress the weight of the neonate increases. Measuring weight for identifying the fetal growth pattern in three terms of the pregnancy is therefore very important especially in high risk pregnancies. Ultrasound helps to measure the fetal weight in order to estimate the birth weight. Estimated birth weight helps to plan the delivery options and is a useful parameter for fetal growth.*

Objective: *The aim of the study is to identify the difference between the actual birth weight of neonates and the estimated birth weight calculated by the ultrasound scan in primipara and multipara.*

Method: *The present study was conducted in Lahore General Hospital Radiology Department from June 20th 2019 to July 10th 2019. Pregnant women were included in the study that was falling in their last trimester of pregnancy especially after 37th week of pregnancy and above. Fetus weight from the ultrasound estimation was recorded and the actual birth weight also recorded at the time of delivery to make actual comparison. Sample size of the study was 282 pregnant women.*

Results: *Advancement in medical sciences has helped to reduce the mortality rate among pregnant women and in neonates. The estimation of birth weight with the help of ultrasound has helped the women to diagnose any medical and growth issue before time and from the study there was found no significant gap between the estimated birth weight and actual birth weight.*

Conclusion: *Ultrasound is noninvasive and safe tool to estimate and assess the fetal birth weight for better decision about mode of delivery*

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INTRODUCTION:

Prenatal and maternal health is very important for public health authorities and fetal weight is a parameter which has highest significance. The medical advancement has reduced the morbidity and mortality in the world and also in Pakistan. Gynecologist suggests regular ultrasonic scans for analyzing the growth of the fetus and normal and in high risk pregnancies so that timely intervention can save the life of both mother and baby. Estimated birth weight of the fetus is one of the parameters to analyze the growth pattern and to manage the delivery accordingly especially in high risk cases. High risk cases can be patients with high blood pressure, IUGR, prior c-sections, macrosomia, breech position and preterm labor etc. Estimated fetal weight is useful indicator for managing these cases. Before the extensive use of technology in medical profession different traditional techniques were in practice to assess the fetal growth and delivery options. Ultrasound has become part and parcel of modern obstetric practices and it has reduced considerably the risk of mortality in both mothers and fetal.

The aim of the study is to analyze the use of ultrasound in estimating the fetal birth weight and compare it with the actual birth weight of neonate to measure the diagnostic accuracy of the ultrasound in assessing the birth weight. The measurements which are important to focus in biometry of fetal are

- BPD(biparietal diameter)
- FTCA(fetal trunk cross sectional area)
- HC(head circumference)
- CRL(Crown rump length)
- AC(Abdominal circumference)
- TTD(transverse trunk diameter
- FL(femur length)
- APTD(Anterio posterior trunk diameter)

There are no significant differences in birth weight when compared with the estimated birth weight. The nominal difference in birth weight may vary from women to women depending upon her health and nutritional status, stress and external environmental factors. The study is for Pakistani population.

With every passing day technology is adding value in medical practices and it has made obstetric management easy and planned. Latest and quality ultrasound machines are very important in addition to the expertise of the ultrasound scanning to measure the estimated birth weight. Minor differences in results of estimated birth weight can be observed from machine to machine and also it can slightly vary with the experience of radiologist. In tertiary care hospitals the situation about trained professionals and availability of machine are good therefore the high risk pregnancies are referred at the tertiary cares for better management of labor based on the ultrasonography reports. Ultrasonography has helped to identify many structural abnormalities of fetal and helped the physicians to identify the fetal treatment plan. Low birth weight fetus are prone to risk of many pathological and physiological conditions like kidney disease, heart disease, nerve disease, gum disease, respiratory issues and strokes. Pregnant ladies during the gestational period of 34 weeks to 37 must get at least one sonogram which will help to recognize the newborn risk for the neonatal morbidity based upon the birth estimated weight and gestational age. Preterm is used for the gestational age less than 37 weeks and birth weight less than 2.5 kg is considered low birth weight. Both low birth weight and high birth weight can cause several health issues during childhood and even in adulthood. Fetal growth is dependent upon multiple indicators like maternal nutrition, genetics, and endocrine factor, maternal rate of metabolism and function of placenta perfusion. The response of the fetal to nutrients and growth mobilizing factors play a key role in the weight development.

METHODOLOGY:

This study was carried out in the Radiology department of Lahore General Hospital from the period of 20th June to 10th July 2019.The sample was divided in two groups. Group 1 includes the women with first pregnancy and the group 2 includes the women with multiple births. The criteria for sample selection were 37th week of pregnancy with no pregnancy complications, no history of diabetes mellitus, and normal growth of fetal and expecting normal vaginal birth. Ultrasounds of both the groups were performed at and after 37th week of pregnancy .Patients were examined in supine position with application of good amount of gel. The fetal examination was made thoroughly and all the organs and structure was observed and scanned properly. The amount of liquor and placenta maturity and positions were analyzed. The estimation of fetal weight was multi factorial and was measured by the femur length, head circumference, biparietal diameter and by abdominal circumference. The sonographic weight is calculated by the build in equations of the ultrasound machines and the actual weight of the neonate is calculated at time of birth.

RESULTS:

The selected sample size was 282 pregnant ladies which include both the primipara and multipara. The distribution of both groups is shown in the table 1 below. It is clear that primipara includes 42.5% of the selected sample and multipara includes 57 percent of the sample.

Table 1: Primipara statistics for Actual and estimated birth weight

Weight	Sample N	Percentage
Primipara	120	0.42(42%)
Multipara	162	0.57(57%)
Total	282	100(100%)

Following table 2 describe the pattern of ultrasonic birth weight and neonatal birth weight of both primipara and multipara. Baby weight less than 2.5 kg is considered low birth weight which may be because of many internal and external factors. From the table 2 it is clear that the majority of the neonate lies in the range of normal birth weight that is from 2.5 kg to 3.5 kg which cumulatively includes 71 % in multipara and 85 %in the primipara group. It is obvious that the new born weight increases as the weight of estimated sonographic reports increases.

Table 2

Sr#	Weight	Multipara		Primipara	
		Estimated baby weight	New born weight	Estimated baby weight	New born weight
1	2.0- 2.5 kg	25(15%)	24(14.8%)	20(17%)	18((15%)
2	2.5-3.0 kg	51(31%)	50(30.8%)	40(33%)	39((32.5%)
3	3.0- 3.5 kg	65((40%)	64(39.5%)	45(37%)	45(37%)
4	3.5 kg -4 kg	20(12%)	0	15((12.5)	14(11.7%)
5	Above 4 Kg	1(0.6%)	0	0	

Following table 2 is about the estimated weight of the fetal with comparison to actual birth weight of the neonate in the grams. The table also shows the positive correlation of coefficient with the estimated birth weight and actual birth weight. P value was also less than 0.05 which shows no significant difference in the both actual and calculated weight of the baby. From the table 3 it is also clear that 71% of the babies were in normal birth weight ranging from 2.5 kg to 3.5 kg. In cases of multipara the estimated birth weight calculated by sonographs when compared with actual baby birth weight we found no significant difference as it is clear from the table that from range of low birth weight 25 babies were estimated birth weight from the range of 2 to 2.5 kg and after delivery 24 babies were almost the same weight which was calculated by the sonographs. When we look at the table about primipara the estimated birth weight and the actual birth weight was almost the same with minimal difference and the majority of babies were in normal birth weight range from 2.5 kg to 3.5 kg.Low birth weight babies accounts only 17% in the estimated birth weight and actual they were found 15% after the delivery and the difference was close to margin of normal birth weight.

Table 3 Correlation of actual birth weight with estimated birth weight

Weight	Actual Birth weight	Estimated birth weight	Correlation coefficient	P-Value
Low baby weight Less than 2500 g	2294g ±38g	2287g ±36g	0.96	0.49
Normal weight 2500g-4000 g	3553g ±46g	3536g ±37g	0.95	0.46
Macrosomia Above 4000 g	4315g ±44g	4345g ±51g	0.87	0.22

It means there is no visible difference in the estimated weight and the actual baby weight in the case of primipara deliveries. Accurate measurement of fetal weight helps the obstetrician for the vital delivery decision. From table above it is clear that the P value is less than 0.005 which shows that the diagnostic accuracy of ultrasounds in estimating the birth weight of babies is high and it should be regularly advised in high risk cases like macrosomia and in low birth weight cases. From the table it is also clear that the difference in actual baby weight and estimated baby weight is less than 100 g in each case. Strong positive correlation was observed between the ultrasound results and actual birth weight results.

DISCUSSIONS:

In order to reduce the maternal health risk, it is vital to regularly follow the antenatal care. Estimation of fetal weight with ultrasound helps to reduces many risk of pregnancies like pelvic injuries, longer labour and postpartum bleeding (4, 5).Ultrasound is well trusted imaging type which helps to estimate the fetal weight for better planned delivery (6, 7).Ultrasound access is easily available and is also cost effective. MacKenzie et al 2014 in his study has

identified fetal weight as main indicator for predicting the outcome of pregnancy and is also a main determinant for mortality among infants in their initial year of birth. From the study of Shittu et al 2007 it was observed that the estimation of fetal birth weight is a routine indicator for obstetric care and has helped to manage the preterm deliveries and opt for best delivery route. From this study and by the study of Palmer et al it was found that the estimation of fetal weight played an important role especially in the cases of IUGR (intrauterine growth restriction) for managing the pregnancies. American Pregnancy Association in their manual 2014 has also stressed that excessive large fetus has many maternal risks linked with it like injuries to birth canal, pelvic floor and postpartum bleeding. Therefore in such cases it was suggested to opt for cesarean mode of delivery. MacGregor S (2008) and Henriksen T (2008) have suggested in their study that the infant mortality is more important and sensitive than the estimation of fetal weight compared to their gestational age. Macrsomic fetuses are considered risk and challenge for obstetric care and hence timely prediction can reduce the maternal risk with well preparedness of delivery options. Mohammedbeigi et al 2013 has suggested in his study that the prediction of the fetal weight with the help of ultrasound has helped the obstetric practice well planned and productive. It has also reduced the mortality rate among mothers and infants. Sanders RC (2007) has concluded from his study that the application of ultrasound technology has became popular in world due to its accuracy in estimating the fetal weight and helped to deal with the anomalies among the fetuses. Predanic M, (2005) and Hadlock FP et al (2004) have concluded in their study that the fetal weight can be estimated with the ultrasound by using multiple parameters like femur length, Biparietal diameter, and head circumference and by abdominal circumference. By using the multiple parameters, the accuracy in estimation of fetal weight enhances as the parameters increases.

In the study 282 women were analyzed by the ultrasound to estimate the fetal weight and was compared with the actual baby weight within the normal range which was 2.5 kg 3.5 kg for Pakistani population(2500 g to 3500 g).There was found no significant difference between the estimated weight and actual weight in the study and P value was calculated less than 0.005.This results also supports the literature available by the researcher about the estimation of fetal weight by ultrasound and its comparison with the actual weight of babies after delivery. The normal baby weight range varies from race to race and is different in different ethnic group. (10).The last weeks of gestations is very important to measure the baby weight through ultrasound estimation as the fetus gain weight in last week's especially at the gestation age of 38th week. It was tried to make the last scan within week of delivery so that the difference can be calculated accurately. The study confirmed the positive correlation between the actual birth weight and estimated birth weight.

From the study it was also found that the ultrasound sonography for low birth weight and macrosomia was almost accurate and there found no significant difference between the actual birth weight and estimated birth weight. From the study finding it can be suggested that the prediction of fetal weight by ultrasound seems to be accurate in the selected population and from the study no significant difference statistically was observed between the low birth weight and with excessive birth weight. The findings of the study suggest that the ultrasound prediction of fetal weight helps to manage the obstetric plans according to the findings of ultrasound. From the study it was also observed that the as the mother age and the parity increases the mean fetal weight also observed to increase. The statistical significance $p<0.05$ between the primi para and multipara observed to support the study findings. The study was found comparable with the other studies conducted about the estimation of fetal weight with ultrasound and hence can be useful for delivery management.

CONCLUSION:

Fetal weight estimation by using different multiple parameters in ultrasonography has helped the pregnant ladies for safer deliveries as no significant error was observed in the studies between the estimated fetal weight with actual weight. Ultrasound is noninvasive and widely available technology to support the maternal care and is widely in practice.

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