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ACCURATE PRENATAL ESTIMATION OF BIRTH WEIGHT IS USEFUL IN THE MANAGEMENT OF LABOUR AND DELIVERY

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Abstract:

Objective: *Our purpose was to determine whether clinical or ultrasonographic prediction of fetal macrosomia influences subsequent delivery route and birth outcome in a clinical setting where macrosomia is not considered an indication for cesarean delivery.*

Methodology*: A prospective observational study was undertaken at Name of the hospital, City, Country from [Duration of the study]. A total of 90 pregnant women were enrolled in the study. Women with multiple gestations and those with cardiac heart disease or diabetes mellitus (type 1 or type 2) were excluded from the study. Estimation for prenatal birth weight was done for all participants using clinical and ultrasonographic approach. The Statistical Package for the Social Sciences (SPSS v.25) was used to analyze the data. P-value of <0.05 was considered statistically significant.*

Results: *The mean maternal age + SD of the participants reported was 23.6 + 6.3 years with the mean parity of 4.6 + 1.2. The mean + SD actual birth weight was 3422 + 426 g, while the mean estimated fetal weights by ultrasound and clinical approach was 3263 + 325 g and 3369 + 449 g, respectively. The ultrasound and clinical sensitivity of predicting the birth weights were 16.7% and 25.0% with specificity of 94.0% and 98.8% respectively.*

Conclusion: *In the present study, it has been shown that both the clinical and ultrasonographic approach to estimate the birth weight of the infant prior to the delivery are equal in terms of sensitivity, specificity, and predictor of mode of mode of delivery outcome.*

Key words: *birth weight; fetal weight; leopold's maneuver; prenatal; ultrasound*

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INTRODUCTION:

The term prenatal care is the healthcare a woman is offered from the time of conception till the delivery of the infant. It is interchangeably used with the term antenatal care.[1] The goal of prenatal care is to provide regular check-ups that allow the obstetrician to treat and prevent any potential disease that may complicate the maternal or fetal outcome and to promote healthy lifestyles that benefit both mother and the infant. [2]

Accurate prenatal estimation of birth weight is extremely important in the management of labor and delivery. The prenatal estimation for fetal viability is complicated by continuing advances in neonatal intensive care and the inherent inaccuracies in prenatal fetal age and weight estimates. It often becomes difficult for the obstetrician to keep up with the unrealistic expectations of the parents and the realistic chances of survival for the infant. [3,4]

It becomes crucial to counsel the family members regarding the chances of survival and the risk of long-term morbidity of the infant so that they can prepare themselves mentally and emotionally, and make subsequent informed choices.1 Several studies have indicated the importance of estimating the accurate gestational age and birth weight in predicting the outcome of the neonate. [5-7] Unfortunately, the precise and accurate establishment of the gestational age as per last menstrual period is often not possible.

The counseling of parents and family members regarding neonatal outcomes are based on actual birth weight estimations.[8] In general, it is assumed that the prenatal birth weight calculated with the help of ultrasonography closely approximates to the actual birth weight. However, it is often erroneous. The potential for errors associated with ultrasonography has been previously noted.[9-10]

It has been suggested that the prediction of neonatal outcome on the basis of prenatal ultrasonographic measurements and other data available before delivery should be done regularly in patients and should be used for counseling.[11] In this study, we address the importance of accurate estimation of birth weight and its association with the neonatal outcome.

In the present study we aimed to evaluate the importance of accurately estimating the birth weight of the fetus prior to delivery with a comparison between clinical and ultrasonographic methodology. To the best of our knowledge no such study has been conducted in Pakistan before.

METHODOLOGY:

A prospective observational study was undertaken at Name of the hospital, City, Country from [Duration of the study]. After obtaining ethical approval from the Institutional Review Board (IRB) of NAME OF INSTITUTE, [IRB number], and informed written consent by the participants, 90 women with singleton pregnancies were enrolled in the study. Women with multiple gestations and those with cardiac heart disease or diabetes mellitus(type 1 or type 2) were excluded from the study. The two different methods for the estimation of fetal weight (EFW) were; (i) clinical and (ii) ultrasonography.

The ultrasound EFW was obtained for all participants by the same technician with a 3.5 MHz transducer **(enter company name)** using standard Hadlock reference tables that used biparietal diameter, abdominal circumference and femur length for calculating the fetal weight.

For the clinical method, Leopold manoeuvres were used to estimate the birth weight using palpation on the day of operation. Data including maternal age, parity, gestational age at each sonogram, fetal biometry and estimated fetal weight, gestational age at delivery, birth weight, and the latency between sonogram and delivery was collected using predefined questionnaire. Prenatal estimation of birth weight was done using ultrasonography at least 3 days before delivery. Actual birth weights for all live singleton births were recorded post delivery.

The maternal outcomes that were observed included: the mode of delivery, complication rates, and postnatal admissions. Neonatal outcomes included preterm delivery of less than 37 weeks, preterm delivery of less than 34 weeks, birth weight, large for gestational age, small for gestational age, and admissions to the neonatal intensive care unit (NICU).The overall number of discharge of a live infant from the hospital was also recorded. The association between the prenatal estimation of birth weight of the infant and the maternal and neonatal outcomes were evaluated. The sensitivity, specificity and positive and negative predictive values for the ultrasonography and clinical estimations were compared with actual birth weight. Normal birth weight was considered as 2500–4000 g.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS v.25) was used to analyze the prenatal estimation of birth weight and its association with the complication rates was calculated using the Chi-square test. Categorical and continuous variables

such as parity, age at conception, ethnicity, and gestational age at delivery were presented as frequency or mean + SD, respectively. A p value of less than 0.05 was considered as statistically significant.

RESULTS:

The mean maternal age + SD of the participants reported was 23.6 + 6.3 years with the mean parity of 4.6 + 1.2. The mean + SD actual birth weight was 3422 + 426 g, while the mean estimated fetal weights by ultrasound and clinical approach was 3263 + 325 g and 3369 + 449 g, respectively. The ultrasound and clinical sensitivity of predicting the birth weights were 16.7% and 25.0% with specificity of 94.0% and 98.8% respectively.

Table 1. Specificity, sensitivity, and positive predictive values for estimation of birth weight using ultrasound and clinical methods

	Normal Weight Infants*		Abnormal Weight Infants*		Specificity	Sensitivity	Positive predictive values
Method of Estimation	Correctly Estimated N (%)	Incorrectly Estimated N (%)	Correctly Estimated N (%)	Incorrectly Estimated N (%)	%	%	%
Ultrasound	79 (87.8%)	5 (5.6%)	1 (1.1%)	5 (5.6%)	16.7	94.0	14.3
Clinical	81 (90%)	1 (1.1%)	2 (2.2%)	6 (6.6%)	25.0	98.8	67.0

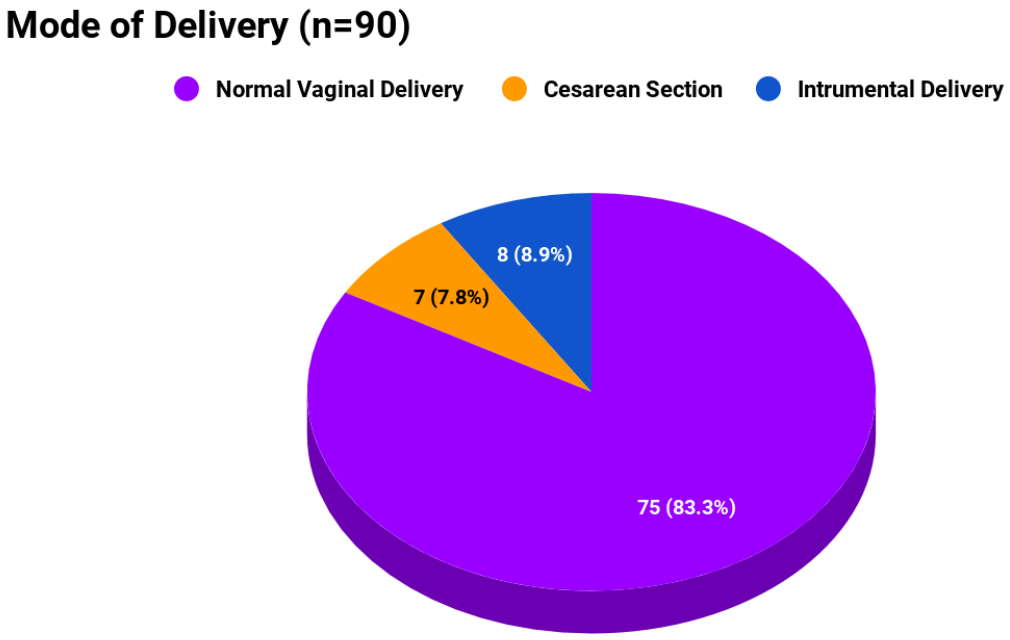

Figure 1. The different mode of delivery in patients in the study (n=90)

We reported normal vaginal delivery rate of 75 (83.3%), instrumental delivery in 8 (8.9%), while 7 (7.8%) Cesarean section.

Table 2. Correlation of Birth weight with the mode of delivery in the study (n=90)

Mode of Delivery	Very low birth weight (<1500 g)	Low birth weight (<2500 g)	Normal Weight (2500-4000 g)	Macrosomia (>4000 g)	p-value
Spontaneous vaginal delivery	4	10	49	12	0.04
Cesarean Section	-	-	2	5	0.000
Instrumental delivery	-	-	2	6	0.06

DISCUSSION:

Accurate prenatal estimation of birth weight is extremely important in the management of labor and delivery, permitting obstetricians to make decisions about instrumental vaginal delivery, trial of labour after caesarean delivery and elective caesarean section for patients suspected of having a macrosomic fetus and counseling the prospective parents about the realistic likelihood of survival of the fetus.

In the present study, we found that the two methods of estimation of fetal birth weight i.e. ultrasonography and clinical were almost equally accurate with a sensitivity of 16.7% and 25.0% with specificity of 94.0% and 98.8% respectively.

Furthermore, parous women's estimates of birth weight were more accurate than either clinical or ultrasound estimation. Past studies have shown inconsistency between the results about the accuracy of the various methods of estimating fetal weight before delivery.

It has been reported that the clinical estimation of prenatal birth weight using abdominal palpation method was accurate in 85% of the cases, with increased accuracy in the average, complete term infant as compared to the preterm and postterm neonate.[12-14]

In a study by Preyer O. et al, it was revealed that both the clinical and the ultrasonography methods equal in terms of accuracy when applied on normal weight pregnant women while the accuracy of ultrasound was significantly better as compared to Leopold's manoeuvres when applied on overweight pregnant women.[12] This indicates that the accuracy of the method of prenatal birth weight estimates are dependent upon the maternal as well as fetal characteristics.

In contrast, Diase K. et al, reported that in their study of diabetic pregnant women, neither parity status nor weight of the mother affected the accuracy of any of the methods used to estimate the infant's birth weight prior to delivery.[15] In the present study, it was observed that parity positively influenced the accuracy of estimates of birth weight with ultrasonography method as compared to the abdominal palpation method.

Upon comparison of the different methods for estimation of fetal weight prenatally, it was reported by some authors that ultrasound was the best and the most accurate method to deduce the accurate estimation of prenatal birth weight.[12, 16, 17, 18]

However, we did not report any significant difference in the accuracy of either ultrasound or clinical estimates. Our study is in accordance with other studies that deny any difference between the accuracy of various methods for fetal weight estimation.[19-20]

We also concluded that the outcome of delivery is significantly influenced by the birth weight of the infant ($p<0.005$).

The major limitation of our study is the small number of participants which may not be sufficient to ensure statistical validity of the reported results which reveal that accurate measures should be used to estimate the prenatal birth weight of the fetus and then manage accordingly.

CONCLUSION:

In the present study, it has been shown that both the clinical and ultrasonographic approach to estimate the birth weight of the infant prior to the delivery are equal in terms of sensitivity, specificity, and predictor of mode of mode of delivery outcome.

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