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Association of Ultrasonographic Determination of Foetal Weight with Actual Birth Weight: A Cross Sectional Research from North India

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ABSTRACT

Background: Determination of the weight of fetus by averages of Ultra-sound is an important predictor of the labour outcome and the perinatal morbidity, mortality and also the maternal morbidity. Ultra-sound determination of foetal weight at term gives an idea to the obstetrician to determine about the manner of delivery.

Objective: The principal objective of this research is to correlate the ultrasonographic estimated foetal weight at term with real birth weight in subjects attending the medical institute hospital.

Methods: This was a cross sectional research done in a medical institute hospital in North India. Retrospective research of 500 females with singleton term pregnancies attending obstetrics department Medical Institute and Hospitals was done. The connection between estimated foetal weight and real birth weight was assessed by Pearsons connection coefficient and the reliability of foetal weight was measured by average absolute difference, average standard error of averages , percentageage of error and proportion of estimates within 10% of real birth weight.

Results: There was positive connection between the Ultra-sound estimated foetal weight and the real birth weight. About 87.6% of estimated weights fell within the interval of (Average ± 10%) of real birth weight.

Conclusion: The Ultra-sound foetal weight correlated well with the real birth weight. This is an extremely important tool to make decisions in the labour room.

Keywords: Real birth weight, estimated foetal weight by Ultra-sound, Central India

Introduction:

Before the advent of Ultra-sound, it was customary to estimate intrauterine foetal weight by Johnsons or Dares formula. These clinical methods though still used in many health care facilities have been largely superseded by Ultra-sound determination of foetal weight[1]. Extremes of birth weight are associated with raised danger of complications in the newborn. This gives valuable input to the practicing obstetrician and enabling him to take decision regarding the manner of delivery, whether to allow a vaginal delivery or else to go for caesarean section[2,3]. The scan delivery interval can dilute the importance of foetal weight determination as it is well known that the fetus continues to gain weight of 30-35 gms/day at term[4]. There are several technical limitations of sonography for estimating foetal weight – maternal obesity, oligohydramnios, anterior placenta. In our country the administrative armamentarium in the health department are continuously monitoring the well being of antenatal mothers and have succeeded in bringing down the maternal and perinatal morbidity and mortality[5,6]. Though we are yet to reach the figures of the developed nations, we are slowly and consistently striding towards that goal[7]. Determination of foetal weight by Ultra-sound is a component of antenatal care. Appropriate literary reviews were made on this topic, which were a guiding platform for our research[8].

Objective: The principal objective of this research is to correlate the ultrasonographic estimated foetal weight at term with real birth weight in subjects attending the medical institute hospital.

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MATERIALS AND METHODS

Research site: The research was done at Medical Institute and Hospitals from North India in OBG department in coordination with the radiology department.

Research design: This was a retrospective cross sectional research done over the period of two years.

Research population: They included all the term singleton pregnancies who fulfilled the inclusion criteria. Informed consent was obtained. A total of 500 pregnant females were included.

Inclusion criteria: Only females with singleton pregnancies, Term pregnancies >37 weeks, Cases uncomplicated by maternal and foetal diseases, Delivery within 7 days after Ultra-sound.

Exclusion Criteria: Females with complicated pregnancies like multiple pregnancy, IUGR & Delivery >7 days after USG.

Institutional Ethical Committee clearance was got before proceeding with the studies.

Procedure and Data collection methods: The patient's case sheets were obtained to get information about age, last menstrual period, gestational age, parity, the real birth weight, and Ultra-sound estimate of the term foetal weight.

Procedure for determination of Ultra-sound foetal weight: The machine used was Samsung Accuvix XG in the radiology Department. Scans were done by an experienced radiologist using a 3.5 MHz curvilinear transducer. Foetal weight was computed using Hadlock formula which takes into consideration BPD – Biparietal diameter, HC- Head circumference, AC – Abdominal Circumference and FL- Femoral length. Babies of similar weights can have different head sizes, so HC alone is of little value. Femoral length is not always reliable as babies can have different lengths though same weight. All the collected parameters are fed in to computer software program. The most common equations for calculating Effective foetal weight are Shepard and Hadlock formulae. Before commencing, the procedure of scanning was explained to patient. Patient was made to lie in the supine position with the abdomen exposed. Gel was applied over the abdomen.

BPD and AC measurement: As a transverse image of the skull, it was produced at a level that revealed a smooth symmetric head, a well defined midline echo, thalami, the cavum septum pellucidum, and the third ventricle. The callipers were set from the outside edge of the parietal bone to the inner edge of the parietal bone on the other side.

AC measurement: The shortest length of the umbilical portion of the left portal vein was displayed in a transverse image taken at the level where the right and left portal veins were continuous with one another, forming a 'J shape.' Another landmark was the foetal stomach, and the vertebrae were in the horizontal plane.

FL measurement: The transducer was moved till the full length of the femur was visible and as horizontal as feasible once an iliac bone was identified. FL is the distance between the diaphysis of the femoral bone's outer margins. To improve the reliability of FL measurement, care was made to ensure that soft tissue was visible beyond both ends of the femur and that the femoral bone did not blend with the thigh skin at any point.

After foetal parameters were measured, the Ultra-sound scanner automatically computed the average and the scanner automatically measured foetal weights.

Measurement of real birth weights (ABW): The birth weight was established using a digital baby scale after the baby had been cleaned.

Data was entered into a Microsoft Excel spreadsheet for study. To analyse the data, descriptive statistics such as average and standard deviation were utilised, as well as inferential statistics such as paired t test and pearsons product moment connection (r). The significance level for the results was set at P 0.05. SPSS software version 24 was used for the analysis.

RESULTS

A total of 500 pregnant women took part in the study. The average age of the mothers was 24.7 years (Range 18 to 37 years). The average ultrasound-estimated foetal weight was 2.9 kg, while the average birth weight was 2.89 kg.

Table 1: AGE DISTRIBUTION

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Upto 20 years	62	12.4%	12.4%	12.4%
21-25	218	43.6%	43.6 %	56.0%
26-30	182	36.4 %	36.4 %	92.4%
31-35	36	7.2 %	7.2 %	99.6%
36+	2	0.4 %	0.4 %	100.0%
Total	500	100.0%	100.0%	

Table1 shows the age distribution amongst the 500 subjects studied. 62 subjects fell within the 'up to 20 years' group [12.4%]. Between the 21-25 we had 218 subjects [43.6%][majority of cases in this age group], between 26- 30years,182 subjects[36.4%]. Between 31-35 are 36 subjects [7.2%]. Only 2 subjects were more than 35 years .

Table 2: GRAVIDA DISTRIBUTION

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Primi Gravida	168	33.6%	33.6%	33.6%
Second Gravida	170	34.0%	34.0 %	67.6%
Multi Gravida	162	32.4 %	32.4 %	100.0%
Total	500	100.0 %	100.0%	

Of the 500 subjects studied, table 2 shows 168 subjects (33.6%) were primis, 170 (34%) were second gravid, 162 (32.4%) were multi gravida.

Table 3: BIRTH WEIGHT DISTRIBUTION

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
2000 -2499 Grams	82	16.4%	16.4%	16.4%
2500-2999 Grams	222	44.4 %	44.4 %	60.8%
3000 Grams and above	196	39.2 %	39.2 %	100.0%
Total	500	100.0 %	100.0%	

Table 3 shows ABW 2000 -2499 grams as 41 subjects (16.4), 2500-2499 grams as 111 subjects (44.4%), 3000 grams and above as 98 subjects (39.2%).

DISCUSSION

The extent of antepartum and intrapartum care denotes the robustness of the health delivery systems. Prediction of the foetal weight is of crucial importance in planning manner of delivery[9]. We have travelled a long way from the time of Ian Donald and reached a stage where the prediction of foetal weight, amount of liquor etc has been mastered to perfection by averages of Ultra-sound[10]. The original mannerl of the machine has been upgraded several times and we now have machines with inbuilt formulae for determining the foetal weight with precision. Especially when we are contemplating VBAC, assisted breech delivery,

this weight determination becomes very important[11]. According to our findings, in 87.6% of cases, the real birth weight was within 10% of the USG projected weight. According to Dr.Pratik Poudel's research at a tertiary care hospital in Bharatpur, Nepal, the percentageage of estimates within a +10 percentage of real birth weight was determined to be 65 percentage[12]. Bajracharya et al., La font et al., Dimasi et al., Bolanka et al., Colman et al., and others have reported 60 percentage, 69 percentage, 69.6 percentage, 72.25 percentage, and 75 percentage, respectively, in similar investigations. There was a link between effective foetal weight as determined by USG and real birth weight in our study. Beyond the issue of labor room dynamics, determination of term intra uterine foetal weight helps in the categorization as per the weight and predict the perinatal morbidity and mortality. Connection between USG estimated foetal weight and the real birth weight r= 0.75, which is high +ve connection and significant at P value 0.0001. The paired T test was applied to compare the real birth weight and estimated USG foetal weight. The average difference is significant at 99% confidence level at P=0.01. The absolute average difference rated as 1.476% to the Real Birth weight. Average difference = 0.042672 kg, Standard error = 0.016527 kg, T value = 2.582, P value = 0.01. Weight agreement level Birth weight +10% is considered as an acceptable interval in which USG weight may fall. 62 USG weight fell outside this interval. 438 fell within the interval. This amounts to 87.6% acceptance[13].

CONCLUSION

Due to the ease of the procedure, availability of technologically improved versions of the USG, non invasiveness, Ultra-sound has come to be the mainstay for predicting the foetal weight. The concurrence between the term Ultra-sound weight and the real birth weight at + 10% interval was found to be 87.6% in our research. Sonography appears to be an accurate predictor of the weight of fetuses. However in certain studies it has been concluded that Ultra-sound offers no extra benefit and that the age old clinical methods of prediction of foetal weight are good enough. The experience of the radiologist is a very important criterion for getting accurate estimates of the foetal weight. The rationale behind choosing this research was to determine the connection between real birth weight and the term Ultra-sound foetal weight amongst the population of pregnant females so that we can extrapolate the research inference to these subjects thus helping us to make our labour room decisions.

LIMITATIONS

The sample size was taken from a population of antenatal subjects attending medical institute and hospital in Central India, so the question arises as to the extent of generalizability. Further studies need to be done to determine the most appropriate algorithm for foetal weight determination to increase the validity of findings.

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