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Original Research Article

Comparative Study of Clinical and Ultrasound Foetal Weight Estimation Versus Actual Birth Weight in Jos, Nigeria

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Abstracts

Foetal weight estimation prior to delivery is key to clinical decision-making in obstetric delivery management. In anticipated pre-term and post-dated deliveries, counselling on the likelihood of survival and the intervention undertaken to postpone preterm delivery depends on the estimated foetal weight. We, therefore, carried out a comparative analysis of in-utero foetal weight estimation by clinical and sonographic methods with that of actual birth weight at term to determine which method was more accurate in predicting the actual birth weight. The study was an analytical study of clinical and ultrasound estimation of foetal weight compared with the actual birth weight of booked antenatal care women at a Tertiary Health Care facility. The mean actual birth weight was 3559.0 ± 531.2g while the mean of clinical and ultrasound estimated foetal weight were 3663.7 ± 520.8g and 3227.4 ± 6022g respectively. The sensitivity was 53.9% and 7.7% for clinical and sonographic methods respectively. The specificity was 79.5% for both methods. The diagnostic accuracy was 73% and 76% for clinical and ultrasound methods respectively. The accuracy of foetal weight estimation using Dare's formula is comparable to ultrasound estimates for predicting birth weight at term. The clinical method by Dare's formula and the sonographic method by Hadlock's formula prior to delivery are comparable in predicting actual foetal birth weight.

Keywords: Birth weight prediction, Clinical estimation, Foetal weight, North-Central-Nigeria, Ultrasound estimation

INTRODUCTION

Foetal weight estimation prior to delivery is recognized globally as a critical strategy in the management of labour and delivery (Njoku et al., 2014; Shittu et al., 2007). Estimated foetal weight prior to delivery becomes invaluable when managing high-risk pregnancies (Njoku et al., 2014; Shittu et al., 2007; Sharma et al., 2014; Durgaprasad et al., 2019). Decision about mode of delivery of the term foetuses and categorization of foetal weight are all interwoven with an in-utero estimation of foetal weight (Sharma et al., 2014; Durgaprasad et al., 2019). Besides gestational age, birth weight is still the single most important parameter that determines neonatal survival (Durgaprasad et al., 2019; Roy and Kathaley, 2018; Ingale et al., 2019).

The actual birth weight is the weight taken after the birth of the foetus, within 30 minutes to one hour of delivery (Ugwu et al., 2014). The normal birth weight is between 2500g to 4000g (Fayehun and Asa, 2020; Abubakari et al., 2015). Thus, birth weights less than 2500g are low birth weight and weights greater than 4000g are foetal macrosomia (Fayehun and Asa, 2020; Abubakari et al., 2015). Gestational age has been related to foetal birth weight (Nnehe-Agumadu, 2007). Indirect assessment of foetal weight can be done using maternal and foetal parameters while the techniques for the assessment are broadly classified into imaging and clinical methods (Abdulrazak and Mandan, 2013; Alnakash and Mandan, 2013; Weiner, 2002; Raghuvanshi et al., 2014).

The imaging methods include sonography and magnetic resonance imaging (Burd et al., 2009). The sonographic estimations involve the measurement of several foetal dimensions particularly biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL), then the foetal weight is calculated by various equations (Weiner, 2002; Raghuvanshi et al., 2014; Belete and Gayan, 2008; Baum et al., 2002).

The clinical methods based on abdominal palpation of foetal parts and uterine fundus include tactile assessment of foetal size, maternal clinical risk factor, and maternal self-estimated foetal weight and prediction equations of birth weight (Burd et al., 2009; Weiner, 2002; Raghuvanshi et al., 2014; Belete and Gayan, 2008; Baum et al., 2002). Tactile assessment of foetal size by palpation is the oldest technique for foetal weight estimation globally. It involves the palpation of foetal parts using the Leopold manoeuvre to palpate foetal parts and size.

For maternal self–estimation, parous women have the capacity to approximate the size of the current pregnancy baby size once they know the previous baby's birth weight (Baum et al., 2002). This method is comparable to the clinical palpation method but is only useful for multiparous women (Baum et al., 2002).

Another method of predicting foetal weight is using an algorithm from maternal pregnancy-specific features such as routinely recorded variables like birth weight, gestational age, foetal gender, maternal weight, and height to calculate birth weight by means of an already established equation. For instance, Birth weight = gestational age (d) x [9.36 to 262x foetal gender + 0.000237 x maternal height (cm) x maternal weight at 26 weeks (kg) +4.81 maternal parity +1]. In this case, foetal sex is equal to +1 for male, -1 for female, and 0 for unknown sex, while the gestation age is equal to the conception age (d) + 14 (Nahum, 2017). This equation is complex requiring several calculation steps. Besides, maternal weight can be unavailable by 26 weeks in un-booked cases or booking beyond 26 weeks of gestation (Dare et al., 1990).

Birth–weight prediction equation

This refers to the product of the symphysio-fundal height and abdominal girth measured at various levels in centimetres above the symphysis pubis, expressed in grams (Hassibi et al., 2004).

Johnson's formula

This formula is applicable to vertex presentation at term. Foetal weight (g) = FH (cm)n x 155.3 (Baum et al., 2002), Where FH= fundal height n=12 if the vertex is above the ischial spine or 11 if the vertex is below the ischial spine. If the patient weighs more than 91kg, 1cm is subtracted from the fundal height. The Johnson's formula is simple but requires vaginal examination to determine the station of the presenting part.

Dare's method is the product of symphysio-fundal height and abdominal girth at the umbilicus in grams (Dare et al., 1990). This method is simple and can be used bymedical doctors in primary care setting, nurses, and community health workers in resource-limited settings (Njoku et al., 2014; Shittu et al., 2007).

Researchers have long validated the accuracy of both clinical and ultrasound methods of foetal weight estimation, comparing clinical and ultrasound foetal weight estimation with an actual birth weight with the conclusion that both had the same level of accuracy (Njoku et al., 2014; Shittu et al., 2007).

Ultrasound foetal weight estimation cost implication is prohibitive, requires skilled health care personnel, and is time-consuming. Clinical methods. on the other hand, has low-cost implications and lower technically trained health care personnel (Njoku et al., 2014; Shittu et al., 2007). Thus, clinical estimation of foetal weight is simple and requires no special skills or electricity. Hence physicians, nurses, community health workers, and traditional birth attendants in the remotest place can utilize the low-cost foetal weight estimation.

In limited resource settings, the ultrasound method for foetal weight estimation is not available and where it is available, the cost implication is a challenge to patients. To this end, the authors sought to compare the foetal weight estimation by clinical (Dare's) and Ultrasono-graphic (Hadlock's) methods with the actual birth weight to determine their level of accuracy in predicting the actual birth weight of the baby.

Poulos and Langstadt were the first to estimate foetal weight (Poulos and Langstadt, 1953). Their accuracy was about 250g in 69% of estimations, with a correlation coefficient (r) of 0.62 to 0.70beingthe first birth weight prediction byexternal and trans-rectal measurement of the different axes of the uterus. Two theories were deployed here.

The first was the fundamental physical law stating that for a given homogeneous mass, the weight of the mass (W) is directly proportional to its volume (V), where the density (D) is constant (W = DV). To apply this to the birth weight of the newborn and the volume of a uterus, it becomes apparent that the volume of the uterus cannot be known accurately, thus, certain assumptions must be made. Hence the second theory on the volume of the uterus.

The volume of the uterus was assumed to be either a sphere or ellipsoidal organ, (an ellipse rotated around its long axis). The above considerations gave birth to foetal weight formula of: Birth weight (g) =1870 + 0.11D 3 ± 250, with D being the mean of the transverse and longitudinal uterine diameters in cm (Poulos and Langstadt, 1953).

The second method was the use of symphysio-fundal height (SFH) firstdescribed by Johnson and Toshach (Bajracharcha et al., 2012). They noted that the head descent and maternal obesity affected the foetal weight estimation and thus suggested the birth weight formula with the imperial system, as follows: Birth weight = 7 pounds, 8 ounces + [(M + S – O – 34) × (5.52 ounces)] where: M = height of fundus in cm S = station, subtracting 1cm for minus stations, adding 1 cm for plus stations. O = obesity, subtracting 1cm for women weighing over 200 pounds (91kg).

In a subsequent study, Johnson presented a simplified formula that used the more modern metric system. For a foetus with a non-engaged head, it was suggested that: Birth weight in g = (SFH measurement in cm – 13) × (155). However, their claims of reasonable accuracy were never validated in subsequent studies.

Another method is the estimation of foetal weight in grammes by multiplying the longitudinal diameter of the uterus by the square of its transverse diameter and a factor of 1.44, then dividing the product by 2.

Another is Dawn's method with the formula as: Estimated foetal weight = longitudinal diameter of the uterus × (transverse diameter) 2 × 1.44/2. This measurement was made with a pelvimeter and if the double abdominal thickness was more than 3cm, the excess was subtracted from the transverse diameter and half of the excess from the longitudinal diameter (Poulos and Langstadt, 1953; Bajracharcha et al., 2012).

Ojwang *et al.* used the product of symphysio-fundal height (SFH) and abdominal girth (AG) measurement at various levels in centimetres above the symphysis pubis in obtaining a fairly acceptable predictive value but with considerable variation from the mean (Poulos and Langstadt, 1953)

24. (Bajracharcha et al., 2012). Ojwang's method, was further simplified by Dare *et al.* at Ile-Ife, Nigeria, in 1990, who used the product of SFH and abdominal girth at the level of the umbilicus measured in centimetres, that is, (SFH × AG) grammes, with good correlation (Dare et al., 1990; Bajracharcha et al., 2012).

Most recent studies in Nigeria were based on the validated Dare's formula. Some studies compared sonographic estimates and Johnson's formula and concluded that accuracy level was high particularly with foetuses above 3kg (Njoku et al., 2014; Shittu et al., 2007; Ugwu et al., 2014; Ugwa et al., 2014; Ashrafganjooci et al., 2010).

Ashrafganjooci et al., found the clinical palpation method of foetal weight estimation to have a sensitivity of 11.8%, a specificity of 99.6%, and a positive predictive value of 67.0% (Araoye, 2003). The studies done by Njoku et al showed the sensitivity of clinical estimated foetal weight to be 75%, specificity to be 78.6%, positive predictive value was 43.5% and negative predictive value of 93%, and P- value was 0.3447 (Njoku et al., 2014). Thus besides comparing the clinical and sonographic methods this study will also determine the sensitivities, specificities and positive predictive values of each method used to estimate the foetal weight.

MATERIALS AND METHODS

The study was a prospective analytical study that compared clinical and ultrasonic estimation of foetal weight with the actual birth weight of booked antenatal care women that were deliveredin Bingham University Teaching Hospital Jos, Plateau state in North Central Nigeria over a three months period. The data was obtained between the 1st of January to the 31st of March; 2014.

The antenatal clinic runs twice a week. Fifty-two pregnant women who met the inclusion and exclusion criteria were recruited into the study. The inclusion criteria consisted of the following:

1. Pregnant women who were booked for antenatal in BhUTH
2. Women with term pregnancies at 37 weeks, confirmed by dates or early ultrasound scan.
3. Women with singleton pregnancies

The exclusion criteria were as follows

1. Pregnant women who were in labour at the time of recruitment.
2. Women who had ruptured membranes were excluded because ruptured membranes will decrease the symphy-sio fundal height, andthus affect the clinically estimated foetal weight.
3. Women with polyhydramnios were excluded because the symphy-sio fundal height will be increased.
4. Women with abnormal lie and presentation were excluded because the symphi-sio fundal height will be decreased.

Ethical approval was obtained from the Bingham University Teaching Hospital (BhUTH) Research and Ethics Committee. Consent was obtained from each of the study participants prior to the commencement of the study. They were given the option to opt out of the study at any point if they so wished without losing any benefit of antenatal and delivery care.

The sample size was determined using the formula:

n= z2pq/d2 (Sereke et al., 2021).

Where n= sample sizeZ= level of confidence (standard normal deviation at 1.96, which corresponds to 95% confidence interval).

P = Prevalence of normal birth weight obtained from previous study done in Ife, Osun state was 71% (Shittu et al., 2007);

d= detectable difference between mean estimated foetal weight and mean actual birth weight based on study done in Ife was 0.1 (Shittu et al., 2007).

q = 1-p
n= (1.96)2(0.71) (1-0.71)/ (0.1)2
n= 0.79098544/0.01
n= 79.
To correct for sample size when studying proportions in population less than 10,000. The following formula was used;
nf = n /1+(n) / (N) (Sereke et al., 2021). Where nf = the desired sample size when the population is less than 10,000. n = the desired sample size when the population is more than 10,000. N = the estimate of the population size. nf = 79 / 1 +79/114 nf = 79/1+0.69 nf =79/1.69. nf =46.74, approximately 47. The calculated minimum sample was 47. Ten percent of the total sample size which was 4.7 (approximated to 5) was added to the sample size to cover for attrition; therefore, the total number of women recruited for the study was 52 (Sereke et al., 2021).

The study participants who met the inclusion criteria were given a consent form to read and understand. Their recruitment was via a systematic random sampling method as the women presented in the ANC unit. The sampling frame over the study period was 114.The sample size as above was 52thus, sampling fraction was 52/114 or 1/2.

A four-part questionnaire was administered. Section A contained demographic data and antenatal history, Section B the clinically estimated foetal weight, Section C,the ultrasound estimated foetal weight, and Section D, the delivery details. The socio-demographic data were collated and entered into a spreadsheet for the study. The height of the participants was measured using a stadiometer to the nearest 0.5m while the participant was barefoot. The weight in kilograms to the nearest 0.5 kilograms was measured using the hospital weighing scale while the participants had light clothing and were barefoot.

The clinical estimation of the foetal weight in-utero was carried out, using Dare's formula (Shittu et al., 2007). The symphysio- fundal height was measured from the highest point on the uterine fundus to the midpoint of the upper border of the symphysis pubis. The thumb was used to steady the tape. The measurement was made using the reverse side up of the tape, so as to forestall any bias. The abdominal circumference (girth) was measured at the umbilical level. The fundal height was multiplied by the abdominal girth measurement in centimeters to calculate foetal weight in grams. These measurements were recorded on the research card weekly until delivery, and the mean was calculated and recorded.

The ultrasound estimation of foetal weight was done by another clinician with requisite knowledge and skill in ultrasonography, using an ultrasound machine (3.5-5-MHz curvilinear abdominal transducer, sonace 3200 experts, Advanced Technology Laboratories, Bothwell, WA, Australia). The machine used the Hadlock formula (Malik et al., 2012), to determine the weight of the foetus. The ultrasound was also done weekly from 37 weeks gestation till delivery. The clinician carrying out the ultrasound estimation was blinded to the results of the clinically estimated foetal weight. Ultrasound scan Foetal weight was determined from measurements of the biparietal diameter (BPD), abdominal circumference (AC), and femoral length (FL).

The head circumference (HC) was measured from the same image from which BPD was measured by placing the cursor at any point in the foetal skull and then using the trackball to trace the foetal skull perimeter.
All the study participants went through one of, elective caesarean delivery, planned induction of labour, and spontaneous labour. For those who went through labour, the progress of labour was monitored with the use of a partograph by both midwives and the researcher in the labour room. Delivery was supported by the researcher and or the midwife while the weight of the newborn was measured within 30 minutes of delivery using a standard analogue way-master (England) Scale corrected for zero error. The weight was recorded to the nearest grams (g). For the measured foetal weight that was greater than 4 kg, the managing team was informed of decision making in line with BhUTH protocols.

Delivery details such as mode of delivery, APGAR score, actual birth weight, and state of the mother's perineum post-delivery were noted and documented.

The mean of the clinically estimated foetal weight, ultrasound-estimated foetal weight, and the actual weight of the newborn were documented as well.

The mean birth weight and standard deviation from actual birth weight following clinical and ultrasound methods of foetal weight estimations were calculated. The accuracy of the clinical and sonographic estimation of foetal weight was determined. Chi-square was used to compare the relevant categorical variables. The sensitivity and specificity of both clinical and sonographic estimated foetal weight compared to actual birth weight were calculated.

RESULTS

Fifty-two subjects were recruited into the study. The mean age of the study participants was 30.2 ± 4.6. The age group 25-29 years were the most represented 21(40.4%) followed by age group 30 -34, 19 (36.5%). The mean weight of the study participants was 79.58kg±12.9 standard deviation while the mean height was 155.8cm±23.8 standard deviation. The minimum weight of the participants was 66.2Kg while the maximum weight was 92.3Kg. The shortest study participant was 1.33m while the tallest was 1.78m. In terms of parity, 15 (28.8%) of the study participants were primigravida, and thirty-seven (71.2%) were multigravida. Details of the socio-demographic characteristics of the participants are shown

Table 1. Showing the Socio-demographic characteristics of the Respondents

Age in years	Frequency n=52	Percent
20-24	3	5.8
25-29	21	40.4
30-35	24	46,2
36≥	4	7.7
Parity		
0	15	28.8
1-4	27	71.2
Religion		
Islam	5	9.6
Christianity	47	90.4
Family Type		
Monogamous	50	96.2
Polygamous	2	3.8
Level of Education		
Primary	6	11.5
Secondary	12	23.1
Tertiary	34	65.4
Occupation		
Housewife	17	32.7
Business	13	25.0
Students	7	25.0
Teaching	6	11.5
Civil servants	5	9.6
Others	4	7.7

Most of the participants are between ages 20 and 34 82.7% of 52 years while the most represented age group in the study are ages 25 to 29 years 40.4% of 52

Table 2. Mean clinical and sonographic estimated foetal weights compared with Actual Birth weight

Weight (g)	Mean SD	Minimum	Maximum	t-test	P-value
Actual Birth (g)	3559.0±531.2	2600	4900		
Clinical (g)	3663.7±520.8	2742	5037	1.375	0.175
Sonographic (g)	3227.4±602.2	2300	4900	3.471	0.001

Weight (g) means			t-test (P-value)	
Actual Birth weight (1)	**Clinical (2)**	**Sonographic (3)**	**1 Vs 2**	**1 Vs 3**
3559.5±531.2	3663.7±520.8	3227.7±602.2	1.375(0.175)	3.471(0.001)

Table 3. Showing clinical and sonographic estimation of foetal weight in the prediction of foetal macrosomia

Clinical	Actual		Total
MacrosomiaNormal			
Macrosomia	7	8	15
Normal	6	31	37
Total	13	39	52
Sensitivity = 53.9%	Specificity=79.5%	PPV=46.6%	NPV=83.8%
Sonographic	**Actual**		**Total**
Macrosomia	Normal		
Macrosomia	1	8	9
Normal	12	31	43
Total	13	39	52
Sensitivity=7.7%	Specificity=79.5%	PPV=11.1%	NPV=72.1%

in Table 1 above. All the women in this study delivered at term gestation. Table 1 and 2

The mean actual birth weight was 3559.0±531.2g, while the mean estimated foetal weights by clinical and

Table 4. Showing Correlation of Actual Birth Weight with Clinically and Sonographically Estimated Foetal Weight at different gestational age (weeks).

Gestation age (Week)	Clinical Estimate			Sonographic Estimate		
	N	Correlation coefficient (r)	*p*-value	n	Correlation coefficient (r)	*p*-value
37	52	0.411	0.002	52	0.225	0.108
38	41	0.408	0.008	42	0.335	0.030
39	28	0.194	0.323	26	0.006	0.975
40	20	-0.007	0.976	18	0.319	0.197
41	6	0.422	0.380	6	0.026	0.961

sonographic methods were 3663.7±520.8g and 3227.4±602.2g, respectively. The Mean Actual birth weight was not significantly different from clinically estimated foetal weight (t = 1.375, P> 0.05). The clinical method overestimated the birth weight while the ultrasound method significantly underestimated the foetal weight.

Looking at the validity of clinical and sonographic foetal weight estimation as shown in Table 3 above, the clinical method predicted 53.9% of macrosomic babies, whereas only 7.7% were predicted by ultrasound method. Both methods correctly predicted (79.5%, 79.5%) normal birth weight. In all ultrasound method had higher diagnostic accuracy 76% than the clinical method 73%.

Actual Birth Weight was significantly positively correlated with Clinically estimated Foetal Weight at 37 and 38 weeks; with the best correlation at 37 weeks (r = 0.411, p =0.002). Actual Birth Weight was significantly positively correlated with sonographic estimated foetal weight at 38 weeks gestation. Thus, the actual birth weight correlated positively with the two methods at 38 weeks of gestation with coefficients as shown, (r = 0.335, p = 0.030) table 4.

DISCUSSION

We prospectively compared the accuracy of clinical (Dare's formulae) and ultrasonographic (Hadlock's formulae) methods of estimating foetal weight in predicting the actual birth weight in order to recommend clinical method by (Dare's formula) of estimation when found to be comparable with that of ultrasound method.The Dare's clinical method is a simple, rapid and economically more efficient alternative to ultrasound method of estimation particularly in primary care setting.

The diagnostic accuracy of both methods used in estimating foetal weight prior to delivery were comparable with ultrasonographic method having higher accuracy 76% compared to that of Dare's clinical method at 73%.The diagnostic accuracy in predicting normal birth weight, foetal macrosomia and low birth weight are critical in obstetric practice and in delivery plan decision making. This is because foetal macrosomia and low birth weight when unexpected can significantly affect perinatal morbidity and mortality (Njoku et al., 2014; Shittu et al., 2007; Zhang et al., ND). The mean of the clinically estimated foetal weight was 3,663 ± 520.8 g. When compared with the actual birth weight mean, 3,559.5 ± 531.2g, the clinically estimated foetal weight was not statistically significantly different from the actual birth weight (p=0.175). This was similar to that of Njoku et al. (2014). The mean of the ultrasound estimated foetal weight was 3,227.4 ± 602.2 g. The standard deviation here is almost double the mean. The implication of this is that the data here is more spread out and not clustered around the mean showing high degree of variability in the data and occurs when there are extreme values in the data set that are far away from the mean indicating a wide range in the data (Frost, 2023).

The mean birth weight in this study was also higher than the mean actual birth weight of 3,254 ± 622 g reported by Shittu et al in Ife, Nigeria (Shittu et al., 2007), and much higher than 3080 ±0.610g reported from Makurdi, Nigeria (Bhandary et al., 2004). However, it was similar to 3,568 ± 496g reported from the United Kingdom (Swende, 2011). It was significantly lower than the mean actual birth weight of 3559.5± 5321.2g(p=0.001). This is similar to the finding by Shittu et al. (2007) and Ugwu et al. (2014). Thus, our study showed that while the clinical method overestimated the foetal weight ultrasound method underestimated the foetal weight similar to the findings of Njoku et al. (2014) and Shittu et al. (2007).

This also means that when foetal macrosomia is expected it is better incorporate clinical method by Dare's formula and when low birth weight is anticipated one should incorporate ultrasonic method of foetal weight estimation by Hadlock.

Our result, however differs from that of Malik et al, where the clinically estimated foetal weight mean was lower than that of actual birth weight (Malik et al., 2012). It must be noted however that in the Malik study, women were already in labour and rupture of membrane was not an exclusion criteria as was the case in this study (Malik et al., 2012; Swende, 2011). The overestimation of foetal weight by the clinical method in this study can be used by the attending clinician's advantage since it can help the physician prepare for possible foetal macrosomia and thus prevent or reduce consequent foetal morbidity and mortality.

The majority of the babies in this study 44(84.6%) had a normal birth weight 2.5-3.9Kg (Abubakari et al., 2015). This could be explained by the gestational age of the study participants with all the study participants having term gestation. The closer the pregnant woman is to term, the more likely that she will have a normal birth weight baby, gestational age being a major determinant of birth weight (Ugwu et al., 2014; Bhandary et al., 2004).

The mean maternal weight at term was 79.8±12.9kg while the mean maternal height in this study was 155.8cm±23.8 standard deviation. The maximum and minimum maternal weight in this study were 92.3kg and 66.2kg respectively. On the other hand, the tallest and shortest study participant were 1.78m and 1.33m respectively. Studies have shown that when maternal weight increases the foetal weight also increase; for example, in a study carried out in a tertiary centre in the Tigray region of Ethiopia, a 1 kg weight increase in pregnancy was associated with a 97 gram increase in foetal weight. Thus, maternal weight changes in pregnancy can help antenatal care practitioners appreciate possible actual birth weight, even though Ugwa EA in his study found out that maternal weight and height were not good predictors of birth weight (Tela et al., ND; Ugwa, 2015). Maternal height just like maternal weight has also been shown to be associated with foetal birth weight in two separate studies where increase in maternal height was associated with increase in foetal birth weight (Elshibly and Schmalisch, 2008; Softa et al., ND). Some socio-demographic factors of the mothers shown in table 1, also contribute to the foetal birth weight. Studies have shown that maternal age of 25-35 years, increased parity, and a high level of education leads to increase in birth weight (Ashrafganjooci et al., 2010; Swende, 2011). Majority of the patients in this study were within the age bracket 25 to 35 (49 0f 52; 86.6%), had increased parity of 1-4 (71.2%) with high level of education- tertiary education [34 of 52 (65.4%) all of which have been shown to influence foetal weight positively.

The sensitivity of both clinical and sonographic methods of foetal weight estimation of birth weight were 53.9% and 7.7% respectively. The clinical method had higher sensitivity. Both methods have similar specificity (79.5%,79.5%). However, the clinical method had a positive predictive value of 46.6%as against 11.1% by the ultrasound method. The diagnostic accuracy was 73% and 76% for clinical and sonographic methods respectively. This finding is similar to that reported by (Araoye, 2003) but in contrast with that of Ugwu et al., the difference might be that Ugwu et al included women in labour while the index study excluded women in labour (references) (Ugwu et al., 2014).

Concerning correlation of actual birth weight with clinical and ultrasound methods in table 4, the correlation coefficients for both methods compared with actual birth weight were +0.401 and +0.302 respectively showing positive correlation for both methods. The correlation coefficient for clinical method was statistically significant at 37 weeks and 38 weeks (r=0.002 and 0.008 respectively) while that of ultrasound correlated significantly at 38 weeks (r=0.030)similar to findings from other studies (Shittu et al., 2007; Abdulrazak and Mandan, 2013; Baum et al., 2002; Ashrafganjooci et al., 2010).

CONCLUSION AND RECOMMENDATION

The clinical, Dare's method and ultrasound, Hadlock's method of foetal weight estimation were comparable in estimating the actual birth weight and in facilities with ultrasonographic capabilities both clinical and ultrasonographic methods can be combined to improve the accuracy of predicting actual birth weight while in facilities without sonographic capabilities clinical method by Dares formula was almost equally effective in predicting actual foetal birth weight.

RECOMMENDATION

1. There is need for teachers and trainers of primary care doctors, midwives and community health workers to emphasize the use of clinical estimation of foetal weight among doctors, midwives and community health workers working in primary health care settings.
2. Effective screening and monitoring for weight and Height should be promoted to avoid possible morbidity and mortalities associated with extremes of maternal weight and height during pregnancy.

REFERENCES

Abdulrazak HA, Mandan DR (2013). Foetal body weight: How far the clinical and sonographic estimation can coincide. Iraq J Comm Med.;180-183.

Abubakari A, Kynast-Wolf G and Albrecht Jahn A (2015). Prevalence of abnormal birth weight and related factors in Northern region, Ghana. BMC Pregnancy and Childbirth 15:335.

Alnakash AH, Mandan DR (2013). Foetal body weight. How far the clinical and sonographic estimation can coincide. Iraq J Community Med.; 180-3.

Araoye MO (2003). Research methodology with statistics for health and social sciences: subject selection. Ilorin Nigeria. Northardex. 119.

Ashrafganjooci T, Naderi T, Eshrati T, Bahapoor N (2010). Accuracy of ultrasound, clinical and maternal estimate of birth weight in term women. East Meditterr Health J. 16(16):313-17.

Bajracharcha J, Shrestha NS, Karki C (2012). Accuracy of Prediction of birth weight by foetal ultrasound. Kathmandu Univ Med J. 38(2): 74-76.

Baum JD, Gussman D, Wirth JC (2002). Clinical and patient estimation of foetal weight and ultrasound estimation. J Reprod Med.;47(3):194.

Belete W, Gayan A (2008). Clinical estimation of foetal weight in low resource settings: comparison of Johnson formula and the palpation method. Ethopia Med J; 46 (1):37-46.

Bhandary AA, Pinto PJ, Shetty AP (2004). Comparative study of various methods of foetal weight estimation at term. ObstetGynaecol Ind. 54(4): 336-339.

Burd I, Srinivas S, Pare E, Dharan V, Wang E (2009). Is sonographic assessment of foetal weight influenced by formula selection? J ultrasound med.; 28(8):1019-24.

Dare FO, Ademowore AS, Ifaturoti OO, Nganwuchu A (1990). The value of symphysiofundal height/abdominal girth measurement in predicting foetal weight. Int J Gynaecol Obstet.; 31:243–8

Durgaprasad BK, Sharma S, Indira G, Vijayalakshmi P, Bishaik A, Suresh V (2019). Comparative Study between Clinical Methods and Ultrasound Examination in the Estimation of Fetal Weight. Int. J. Health Sci. Res. (www.ijhsr.org)

Elshibly EM, Schmalisch G (2008). The effect of maternal anthropometric characteristics and social factors on gestational age and birth weight in Sudanese newborn infants. BMC Public Health July; 8:244

Fayehun OD, Asa S (2020). Abnormal birth weight in urban Nigeria: An examination of related factors. Accessed online on the 31st of May; 2022 at PLoS ONE, November 24, 15(11): https://doi.org/10.1371/journal.pone.0242796

Frost J (2023). Standard Deviation: Interpretation and Calculations. Accessed online on the 22nd of August; at https://statisticsbyjim.com/basics/standard-deviation/

Hassibi S, Farhataziz N, Zaretsky M, Mclntire D, Twickler DM (2004). Optimization of foetal weight estimation using MRI: Comparison of Acquisitions. Am J Roentgenology. 183: 487-92.

IngaleA, Khade SA, Shirodkar S (2019). Clinical versus ultrasonographic fetal weight estimation and its correlation with actual birth weight. Int J Reprod Contracept Obstet Gynecol. Feb;8(2):503-512.

Malik N, Shahzad S, Malik SM, Anwar S (2012). Comparison of two different methods for estimation of foetal weight at term. Rawal med J. 37(1):1-9.

May, Vol.9; Issue: 5; pg. 79-86.

Nahum G (2017). Estimation of Foetal Weight, Updated: Sep 22,. Accessed online on the 3rd of June; 2022 at https://emedicine.medscape.com/article/262865-overview

Njoku C, Emechebe C, Odosolu P, Abeshi S, Chukwu C, Ekabua J (2014). Determination of Accuracy of foetal weight using ultrasound and clinical estimations in Calabar South, Southern Nigeria. Int Schol Res Notices. 2014: 1-6.

Nnehe-Agumadu U (2007). Assessment and care of the newborn. In: Azubuike JC, Nkanginieme KEO, editors, Paediatrics and childhealth in a Tropical Regional. 2nd ed Owerri, Nigeria: African Educational Services;.p163-177.

Poulos P, Langstadt JR (1953). The volume of the uterus during labor and its correlation with birth weight. I. A method for the prediction of birth weight. Am J ObstetGynecol; 65:233-44.

Raghuvanshi T, Pawar M, Patil A (2014). comparative study of foetal weight estimation by various methods among term pregnancies at rural tertiary care center, Maharashtra. J Evol Med Dent sci.;3(41): 10291-10296.

Raghuvanshi T, Pawar M, Patil A (2014). comparative study of foetal weight estimation by various methods among term pregnancies at rural tertiary care center, Maharashtra. J Evol Med Dent sci.;3(41): 10291-10296.

Roy AG, Kathaley MH (2018). Comparison of Estimation of Fetal Weight by Clinical Method, Ultrasonography and its Correlation with Actual Birth Weight in Term Pregnancy. MVP Journal of Medical Sciences, January-June, Vol 5(1), 75–81.

Sereke SG, Omara RO, BongominFS, Nakubulwa S andKisembo HN (2021). Prospective verification of sonographic fetal weight estimators among term parturients in Uganda, BMC Pregnancy and Childbirth 21:175.

Sharma N, Srinivasan KJ, M. Sagayaraj MB, Lal DV (2014). Foetal weight estimation methods – Clinical, Sonographicand MRI imaging International Journal of Scientific and Research Publications, January; Volume 4, Issue 1, ISSN 2250-3153.

Shittu AS, Oluwafemi K, Orji EO, Makinde NO, Ogunniyi SO, Ayoola OO et al. (2007). Clinical Versus Sonographic estimation of foetal weight in south-west Nigeria. J Health Nutri popultn. 25:14-23.

Softa SM, Aldardeir N, Aloufi FS, Alshihabi SS, KHOUJ M., Radwan E (ND). The Association of Maternal Height With Mode of Delivery and Fetal Birth Weight at King Abdulaziz University Hospital, Jeddah, Saudi Arabia

Swende TZ (2011). Term birth weight and sex ratio of offspring of a Nigerian obstetric population, International Journal of Biological and Medical Research; 2(2):531–532.

Tela FG, Bezabih MA, Adhanu AK (ND). Effect of pregnancy weight gain on infant birthweight among mothers attending antenatal care from private clinics in Mekelle City, Northern Ethiopia: A facility-based follow-up study

Ugwa EA (2015). Maternal anthropometric characteristics as determinants of birth weight in north-west Nigeria: prospective study. J Matern Fetal Neonatal Med March; 28 (4) pg. 460 - 463

Ugwa EA, Sule G, Ashimi A (2014). Estimation of foetal weight before delivery in low-resource setting of north-west Nigeria: can we rely on our skills?J Matern Foetal Neonatal Med. 1-5.

Ugwu EO, Udealor PC, Dim CC, Obi SN, BC Ozumba BC, Okeke DO et al. (2014). Accuracy of clinical and ultrasound estimation of fetal weight in predicting actual birth weight in Enugu, Southeastern Nigeria. Niger J Clin Pract; 17:270-5.

Weiner Z (2002). Clinical and sonographic weight estimation in large for gestational age foetus. Eur J ObstetGynaecolReprodBiol; 105: 20-24.

Weiner Z (2002). Clinical and sonographic weight estimation in large for gestational age foetus. Eur J ObstetGynaecolReprodBiol; 105: 20-24.

Zhang X, Decker A, Platt RW, Kramer MS (ND). How big is too big? The perinatal consequences of foetal macrosomia. Am J ObstetGynaecol; 198(5): 517-523.