

ORIGINAL RESEARCH

Clinical and sonographic estimation of fetal weight and correlation with actual birth weight

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ABSTRACT

Background: This hospital based prospective comparative study was conducted at Obstetrics and Gynaecology department, tertiary care hospital, to compare the veracity of clinical and ultrasonographic estimation of fetal weight at term with actual birth weight. **Methods:** this is an hospital based prospective comparative study. Study population includes antenatal women who were admitted in labour room of Obstetrics and gynaecology department of tertiary care hospital from July 2023 to September 2023. All antenatal women with term gestation between 37 weeks to 42 weeks, singleton pregnancy with Vertex presentation, who had gestational age confirmed by dates and ultrasound scanning of <22weeks and those whose amniotic fluid index were found between 5 to 25cms were included in the study. Patients with polyhydraminos, oligohydraminos, Antepartum haemorrhage, Congenital anomalies of fetus, Obese women with body mass index of >30 kilogram/meter ², women with Ruptured membranes, with Intrauterine death and women with uterine/Abdominal mass were excluded from the study. Fetal birth weight was estimated by clinical and ultrasonographic method. Birth weight after delivery was recorded in grams by electronic weighing machine and tabulated. **Results:** Both ultrasonographic and clinical methods of fetal weight estimation has positive correlation with actual birth weight. Both have more sensitivity with normal birth weight group of 2500-4000grams. The overall mean absolute percentage error of clinical method (7.2+/-7.7) was smaller than that of ultrasonographic method (16.2+/-11.1). In low birth weight group, mean absolute percentage error was (9.0+/-11.3) with ultrasonographic estimation and was (11.7+/-9.0)with clinical method of fetal weight estimation. No statistically significant difference was observed among these two methods. **Conclusions:** The present study concluded that clinical estimation of birth weight is as accurate as routine ultrasonographic estimation. Clinical palpation should be considered as diagnostic tool for fetal weight estimation and is equally reliable, cost effective and easy to teach and learn. Need is to practically apply method, so as to guide the management decisions.

Key words: Fetal weight, Clinical Method, birth weight, ultrasonographic method

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INTRODUCTION

Precise estimation of fetal weight is of much importance in the management of labour. Over a duration of 10 - 12 years, estimation of fetal birth weight has been a part of the routine antenatal examination for screening and work up of high risk pregnancies such as pregnancies with gestational diabetic mellitus, hypertensive disorder of pregnancy, vaginal birth after caesarean section, fetal growth restriction, intra-partum management of breech deliveries. [1],[2],[3]

With preterm deliveries, estimation of fetal weight plays a significant role to determine likely intervention to postpone or delay the pregnancy, to

optimize the route of delivery, mode of care to be delivered in respective centres based on the need. Early categorization of fetal weight into small or large for gestational age will lead to timely obstetric interventions.[4],[5],[6]

Fetal birth weight is one of the major parameters to determine neonatal mortality and morbidity. [6],[7]. It has been estimated that, 16 % of live born infants with low birth weight, with accurate estimation of birth weight, help in avoidance of complications associated with macrosomia, thereby decreasing perinatal morbidity and mortality. [8],[9]

The clinical methods used in this study are based on abdominal palpation and measuring symphysio-fundal height and abdominal girth.

Sonographic measures of fetal skeletal parts were applied into regression equations to estimate fetal weight.

Although sonographic estimates are considered more accurate to clinical estimates by some investigators, others, concluded that there is no statistically significant difference among these two methods.

The available methods are broadly described as:

CLINICAL METHODS

Abdominal examination with palpation with help of Leopold's manoeuvre helps in fetal growth assessment and predicts the equation with birth weight.

IMAGING METHODS

Ultrasonographic methods and magnetic resonance imaging

AIM OF THE STUDY

To compare the veracity of clinical and ultrasonographic estimation of fetal weight at term with actual birth weight.

OBJECTIVES OF THE STUDY

Ultrasonographic estimation of fetal weight with actual birth weight and to correlate clinically estimated fetal weight with ultrasonographic weight and then with actual birth weight.

METHODS

It was a hospital based prospective comparative study, duration was from July 2023 to September 2023. Study population included antenatal women who were admitted in labour room of Obstetrics and Gynecology department, tertiary care hospital, Mangalore for safe confinement. For studies of patients, patient records, volunteers, prospective institutional approval was obtained. For studies with human participants, informed consent was obtained.

INCLUSION CRITERIA

- All antenatal women with term gestation between 37 weeks to 42 weeks
- Singleton pregnancy
- Vertex presentation

- Gestational age confirmed by dates and ultrasound scanning of <22weeks
- Amniotic fluid index between 5 to 25cms

EXCLUSION CRITERIA

- Polyhydraminos, oligohydraminos
- Antepartum hemorrhage
- Congenital anomalies of fetus
- Obese (body mass index >30 kilogram/meter²)
- Ruptured membranes
- Intra-uterine death
- Uterine/Abdominal mass

The Data was collected from study population taken as per inclusion and exclusion criteria using prepared proforma, meeting the objectives of study by means of estimation of fetal weight by :

CLINICAL METHOD

Fundal height was measured from highest point on uterine fundus to midpoint of upper border of symphysis pubis with the help of non elastic tape. Measurement was made 3 times using the tape reverse side up to avoid any bias. The mean of 3 readings was obtained to the nearest centimeter.

DARE'S METHOD/INSLER'S FORMULA

Birth weight (grams) = fundal height (centimeters) x Abdominal girth (centimeters).

After clinical estimation of fetal weight, woman was sent for ultrasonographic examination, hence study participants were blinded to the details of ultrasonographic estimation of fetal weight. The sonologist had no access to any clinical records of the antenatal mother. And thereby, the sonologist was blinded to the records of clinical estimation of fetal weight.

ULTRASONOGRAPHIC METHOD

Hadlock's formula is the formula used for ultrasonographic estimation of fetal weight using fetal skeletal parameters like biparietal diameter (BPD), Head circumference (HC), abdominal circumference (AC) and femur length (FL).

Hadlock 3: $\text{Log}_{10}\text{BW} = 1.335 - 0.000034(\text{AC} \times \text{FL}) + 0.00316 \times (\text{BPD}) + 0.0045 (\text{AC}) + 0.01623 (\text{FL})$. The ultrasonographic machine is a real time machine with abdominal sector 3.5 MHz transducer. Birth weight after delivery recorded in grams by electronic weighing machine and tabulated.

ULTRASONOGRAPHIC IMAGES FOR FETAL BIOMETRY

Figure 1: Measurement of femur length (FL).



Figure 2: Measurement of abdominal circumference (AC).



Figure 3: Measurement of biparietal diameter (BPD).



98 antenatal women as per inclusion and exclusion criteria were considered. On the basis of the study, titled "Clinical versus ultrasonographic fetal weight estimation and its correlation with its actual birth weight", conducted by Ashwini Ingale et al, it was observed that overall mean absolute percentage error of ultrasonic method was (16.2 +/- 11.1) and that by clinical method was (11.7 +/- 9.0), hence considering 95% confidence interval, standard deviation of 10.1 and precision (L) of +/- 2, sample size estimated for study is 97.9 (~98).

Sampling technique: convenience sampling technique was adopted to select sample if study subjects from those who fulfill the selection criteria among the antenatal women with term gestation.

Statistical analysis: After data collection, data entry was entered with excel and analysis was done with

proper statistical software.

Descriptive statistics: for continuous variable range, mean and standard Deviation was calculated and for categorical variables proportion and percentage was obtained.

Bivariate analysis: Karl-Pearson's test correlation coefficient was used to measure the strength of relationship between the predicted and actual birth weight.

RESULTS

- Table 1** shows that around 94.89% participants pregnancy has gestational age more than 36 weeks by recent ultrasonography. Mean gestational age was 38.2 weeks with 4.42 weeks standard deviation.

Gestational age in weeks	Number	Percentage
34 to 36 weeks	5	5.10
>36 weeks	93	94.89
Mean gestational age (mean +/- SD)	38.22 +/- 4.420	

Table 1: gestational age among participants by recent ultrasonography (n=98)

- Table 2** shows that 68.36 % participants belonged to group of 30-35cms fundal height, 27.55% participants belonged to >=35cms fundal height and 4.08% participants belonged to 25-30cms fundal height. Mean fundal height was 33.67cms with 0.741 standard deviation.

Fundal height (cms)	Number	Percentage
25-30	4	4.08
30-35	67	68.36
>=35	27	27.55
Mean height (mean +/- SD)	33.67 +/- 0.741	

Table 2: fundal height distribution among study participants (n=98)

- Table 3** shows that 45.91% participants belonged to 80-90cms abdominal girth, 42.85% participants belonged to 90-100cms and 11.22% participants belonged to 100-110cms abdominal girth. Mean abdominal girth was 91.53cms with 10.69 standard deviation.

Abdominal girth (cms)	Number	Percentage
80-90	45	45.91
90-100	42	42.85
100-110	11	11.22
Mean girth (mean +/- SD)	91.53 +/- 10.690	

Table 3: Abdominal girth distribution among study participants (n=98)

- Table 4** tells about fetal weight estimated by ultrasonographic method. Results show that 77.55% fetus were belonged to birth weight group of 2500-4000grams, 19.38% fetus belonged to birth weight group less than 2500grams and 3.06% fetus belonged to birth weight group of more than 4000grams. Mean birth weight by ultrasonographic method was 3045.68grams with 430.77grams standard deviation.

Fetal Weight (grams)	Number	Percentage
<2500	19	19.38
2500-4000	76	77.55
>4000	03	3.06
Mean weight (mean +/- SD)	3045.68 +/- 430.77	

Table 4: Fetal weight by ultrasonography (n=98)

- **Table 5** shows birth weight estimated by clinical method of examination. Results stated that 91.83% fetus belonged to birth weight group of 2500-4000grams, 5.1% fetus belonged to birth weight group of less than 2500grams and 3.06% fetus belonged to birth weight group of more than 4000grams. Mean birth weight measured by clinical estimation was 3224 grams with 293.97grams of standard deviation.

Fetal Weight (grams)	Number	Percentage
<2500	05	5.102
2500-4000	90	91.83
>4000	03	3.06
Mean weight (mean+/-SD)	3224.48+/-293.97	

Table 5: Fetal weight by clinical estimation method (n=98)

- **Table 6** shows actual birth weight measured using electronic weighing machine, immediately after delivery. Results show that 88.77% fetus belonged to birth weight group of 2500-4000grams, 8.16% fetus belonged to birth weight group of less than 2500grams and 3.06% fetus belonged to birth weight group of more than 4000grams. Actual mean birth weight was 3186.22 grams with 284.34 grams of standard deviation.

Fetal Weight (grams)	Number	Percentage
<2500	08	8.16
2500-4000	87	88.77
>4000	03	3.06
Mean weight (mean+/-SD)	3186.22+/-284.34	

Table 6: Actual birth weight of infant(n=98)

- **Table 7** shows that mean birth weight estimated by clinical method of estimation was 3224 grams with 293.97grams of standard deviation is higher than actual mean birth weight which was 3186.22 grams with 284.34 grams of standard deviation. Difference between mean birth weight estimated by clinical method and actual birth weight was statistically significant ($p < 0.05$). There was a statistically significant strong correlation between above two methods for birth weight observation. ($r = 0.97$, $p < 0.0001$)

Mean birth weight	Mean birth weight	P value*	Correlation coefficient
Clinical method	Actual birth weight		0.97**
3224.48+/-293.97	3186.22+/-284.34	<0.001	

Table 7: Correlation of estimated birth weight by clinical examination with actual birth weight (n=98)
(*t-test, ** $p < 0.0001$)

- **Table 8** shows that mean birth weight estimated by ultrasonographic method was 3045.68grams with 430.77grams standard deviation is lesser than actual mean birth weight which was 3186.22 grams with 284.34 grams of standard deviation. Difference between mean birth weight estimated by ultrasonographic method and mean birth weight was statistically significant ($p < 0.05$). There was a statistically significant strong correlation between above two methods for birth weight observation ($r = 0.85$, $p < 0.0001$).

Mean birth weight	Mean birth weight	P value	Correlation coefficient
Ultrasonographic method	Actual birth weight		0.85**
3045.68 +/-430.77	3186.22+/-284.34	<0.001	

Table 8: Correlation of estimated birth weight by ultrasonographic method with actual birth weight (n=98)

(*t-test, ** $p < 0.0001$)

- **Table 9** shows that, out of total deliveries that is taken into consideration, for birth weight less than 2500grams, 24% deliveries were done through vaginal route and 76% deliveries underwent LSCS, for birth weight weighing between 2500-4000 grams, 44.09% underwent vaginal route of delivery while 55.91% underwent LSCS and 60% weighing more than 4000grams underwent LSCS. But the association was found out to be statistically insignificant ($p > 0.05$).

Mode of delivery	Actual birth weight (grams)			p value*
	<2500(%)	2500-4000(%)	>4000(%)	
Vaginal	03 (24%)	41(44.09%)	1 (40%)	0.292

LSCS	07(76%)	45(55.91%)	2(60%)
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Table 9: Association between mode of delivery and actual birth weight among study participants (n=98)

- **Table 10** shows that out of total deliveries, 59 participants (84.9%) belonging to normal birth weight had no risk factors, while 15.1% (15 participants) were found to have history of risk factors. Among the birth weight group of less than 2500grams, 77% participants (16 participants) had absent risk factors and 23% (5 participants) had history of risk factors. Among the birth weight group of more than 4000grams, 60% (2 participants) had history of risk factors, and 40% (1 participant) had no risk factors. This association was found out to be statistically significant (p<0.05)

Risk factor	Actual birth weight (grams)			p value
	<2500(%)	2500-4000(%)	>4000(%)	
Absent	16 (77%)	59(84.9%)	01 (40%)	0.040
Present	05(23%)	15(15.1%)	02(60%)	

Table 10: Association between risk factor and actual birth weight among study participants (n=98)

- **Table 11** shows that out of the total deliveries, birth weight lesser than 2500grams had 84.69% participants with fundal height of 25-30cms, 15.31% participants had fundal height of 30-35cms. Among the normal birth weight group of 2500-4000grams, 57% participants had fundal height of 30-35cms, 35.9% participants had fundal height of 25-30cms and 7.1% participants had fundal height of more than/equal to 35cms. Among the birth weight group of more than 4000grams, 60% participants had fundal height between 30-35cms, 40% participants had fundal height of more than /equal to 35 cms. This association was found to be statistically significant (p<0.05).

Fundal weight(in cms)	Actual birth weight (grams)			p value*
	<2500(%)	2500-4000(%)	>4000(%)	
25-30	21 (84.69)	23 (35.9)	0 (0.0)	0.0001
30-35	4 (15.31)	42(57.0)	02(60)	
>=35	0 (0.0)	5 (7.1)	01 (40)	

*chi square test, **Table 11: Association between fundal height and actual birth weight among study participants (n=98)**

- **Table 12** states that in birth weight group of less than 2500grams, 86% participants belonged to 80-90cms, 14% participants belonged to 90-100cms abdominal girth. In birth weight group of 2500-4000grams, 53.7% participants belonged to 90-100cms abdominal girth, 34.9% participants belonged to 80-90cms girth and 11.4% participants belonged to 100-110cms abdominal girth. Among the birth weight group of more than 4000grams, 80% participants belonged to 1100-110cms abdominal girth and 20% participants belonged to abdominal girth of 90-100cms. This association was found out to be statistically significant (p<0.05).

Abdominal girth (in cms)	Actual birth weight (grams)			p value*
	<2500(%)	2500-4000(%)	>4000(%)	
80-90	21 (86)	24(34.9)	0 (0.0)	0.0001
90-100	3 (14)	37(53.7)	01(20.0)	
100-110	0 (0.0)	07(11.4)	04 (80.0)	

*chi square test, **Table 12: Association between abdominal girth and actual birth weight among study participants (n=98)**

- **Table 13** demonstrated that the accuracy and statistical difference between Clinical and ultrasonographic estimation methods, estimated percentage error was double in ultrasonographic method as compared to clinical method of fetal weight estimation, whereas mean percentage error was lower in ultrasonographic method than clinical estimation of fetal weight, and the difference was statistically significant.

Birth weight	Ultrasonographic method	Clinical Method	p value
Overall			
Mean absolute percentage error	15.2+/- 10.4	7.4+/-7.0	0.0001*
Mean percentage error	-13.1+/-12.1	-3.6+/-8.9	0.0001**
<2500 grams			
Mean absolute percentage error	10.0+/-12.3	11.5+/-9.2	0.70*
Mean percentage error	-5.8+/-20.4	-8.8+/-12.1	0.73**

2500-4000 grams			
Mean absolute percentage error	15.5 +/-10.2	7.6+/-8.4	0.001*
Mean percentage error	-16.4+/-11.8	-4.3+/-9.3	0.001**
>4000 grams			
Mean absolute percentage error	9.8+/-11.4	-	-
Mean percentage error	-9.8+/-11.4	-	-

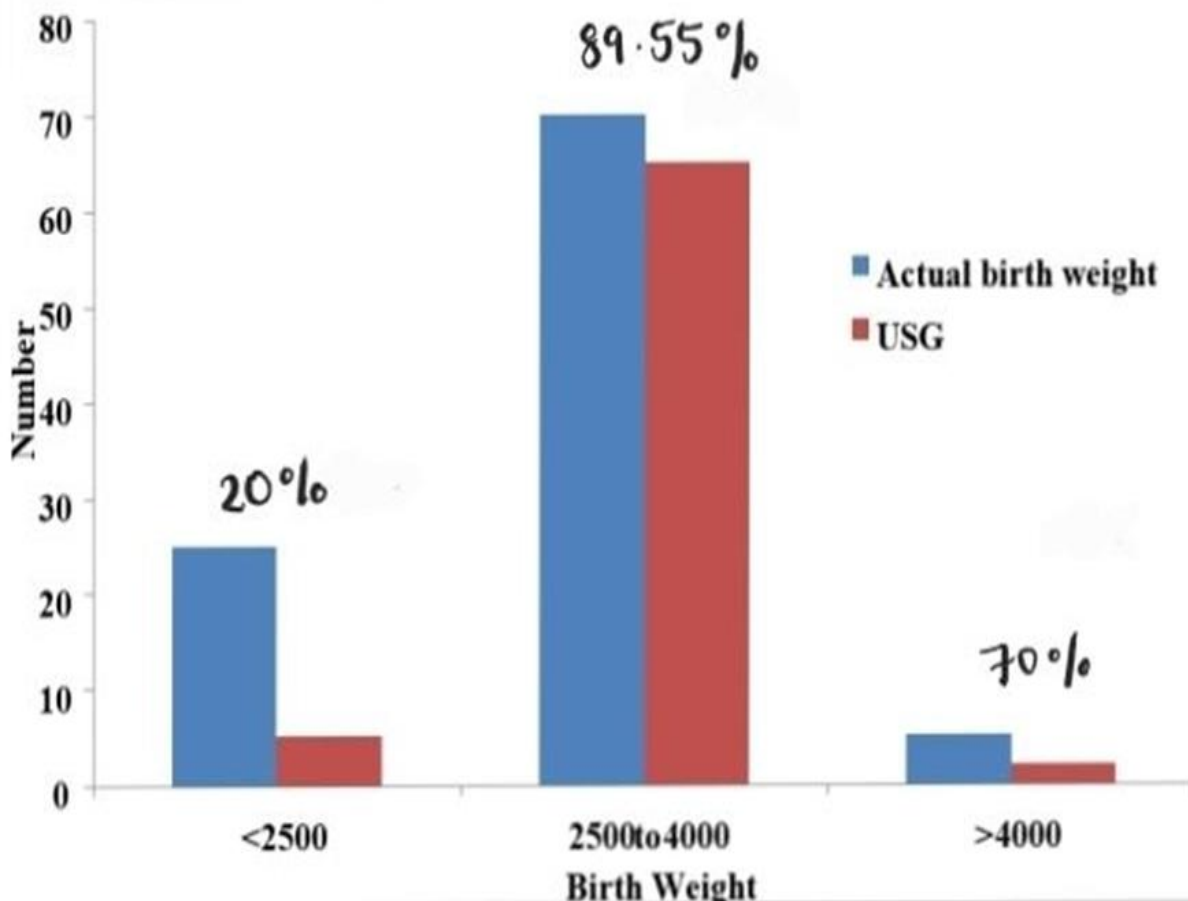
*t-test, **Wilcoxon signed rank test

In birth weight group of less than 2500grams, mean absolute percentage error was higher in clinical method of fetal weight estimation as compared with that of ultrasonographic estimation, and the difference was not statistically significant ($p>0.05$). Mean percentage error was much lower in clinical estimation as compared to that of ultrasonographic method of fetal weight estimation, and the difference was not statistically significant ($p>0.05$). In normal birth weight group of 2500-4000grams, mean absolute percentage error was almost doubled in ultrasonographic method as compared to clinical

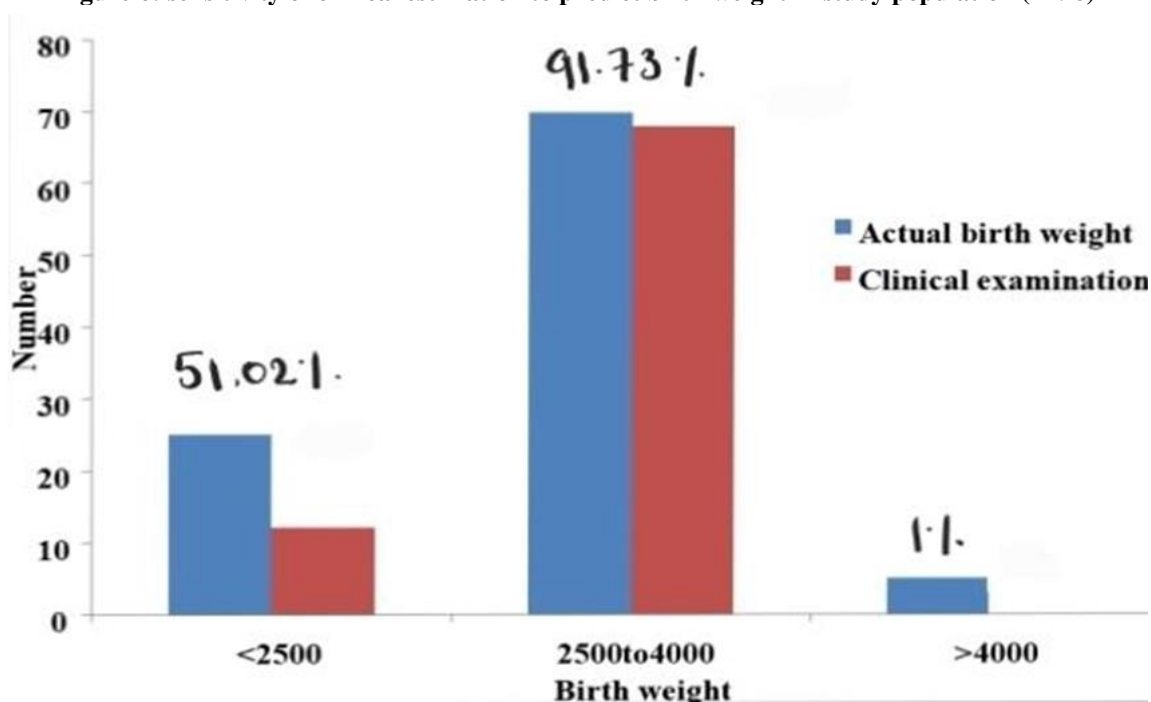
method of fetal weight estimation, and the difference was statistically significant ($p<0.05$). Mean percentage error was much lower in ultrasonographic method of fetal weight estimation, and the difference was statistically significant ($p<0.05$).

- **Figure 5** demonstrates that ultrasonography has around 89.55% sensitivity to predict normal birth weight, 20% to predict low birth weight and 40% to predict birth weight of more than 4000grams.

Figure 5: sensitivity of ultrasonographic method to predict birth weight in study population (n=98)



- **Figure 6** demonstrates that clinical method of fetal weight estimation has 91.73% sensitivity to predict normal birth weight, 51.02% to predict low birth weight and around 1% to predict birth weight of more than 4000grams.

Figure 6: sensitivity of clinical estimation to predict birth weight in study population (n=98)

DISCUSSION

Precise estimation of fetal weight is of much importance in the management of labour. Fetal and maternal factors are taken into consideration for fetal weight measurement. Of the many methods for fetal weight estimation, more preferable methods are the clinical method and ultrasonographic method of fetal weight estimation. Only few studies, help us to understand the comparison between clinical and ultrasonographic estimation of fetal weight at term with actual birth weight.

In earlier studies for fetal weight estimation, no standardized method was used for clinical estimation, making it subjective and poorly defined. The ultrasonographic method of fetal weight estimation was more commonly used as it is objective and a well defined measurement for estimation of fetal weight.

Ingale et al, in their comparison of accuracy in these methods, observed that clinical as well as ultrasonographic method of fetal weight estimation had strong correlation with actual birth weight. The overall mean absolute percentage error of clinical method (7.2+/-7.7) was smaller than that of ultrasonographic method (16.2+/-11.1). In low birth weight group, mean absolute percentage error was 9.0+/-11.3 with ultrasonographic estimation and was 11.7+/-9.0 with clinical method of fetal weight estimation. No statistically significant difference was observed among these two methods. In our study, we have used standardized method of clinical estimation. The Hadlock's formula present on the ultrasound machine in our Radiology unit was used for ultrasonographic estimation of fetal weight, after eliminating the bias, as there is no single formula

estimating birthweight more accurately than a significant degree than any other formulae. [1]

The estimation were obtained independently by two different observers in Obstetrics and Radiology units in this study, precluding the possibility that one estimate may influence the another. The actual birth weight estimation was done immediately after delivery with the help of electronic weighing machine.

The studies by Chauhan et al, Hendrix et al, and Raman et al, showed that clinical estimation of fetal weight was significantly more accurate than ultrasonographic method of fetal weight estimation. [2],[5],[6]

Watson et al, found no statistically significant difference between these two methods of fetal weight estimation. [7]

For practical clinical purposes, the variation between clinical/ultrasonographic methods predicted fetal birth weight and actual birth weight is best expressed as mean absolute percentage error [8]

A hospital based prospective comparative study was conducted at Obstetrics and Gynecology department of tertiary care hospital, Mangalore between July 2023- September 2023, to compare the veracity of clinical and ultrasonographic estimation of fetal weight at term with actual birth weight. Ninety eight pregnant women who fulfilled the inclusion criteria had their fetal weight estimated independently through ultrasonographic method and clinical method of fetal weight estimation.

Following parameters were taken into consideration :

AGE

Highest number (48) of pregnant women belonged to 20 to 25 years of age. Mean age of participants was 25.59 years

GESTATIONAL AGE AND PARITY

Almost 94.89% participant's pregnancy have gestational age more than 36 weeks by recent ultrasonography. Mean gestational age was 38.2 weeks. 64% were multi-gravida and 36% were primigravida.

MODE OF DELIVERY

In this study, 45% delivered vaginally and 55% participants underwent LSCS. However, the association between Actual birth weight and mode of delivery was found to be statistically insignificant.

RISK FACTORS

Actual birth weight is determined based on many other risk factors. Risk factors like overt diabetes mellitus, hypothyroidism, hypertensive disorders of pregnancy, intra-uterine growth restriction, Rh negative pregnancy, patients with DJ stentings, corrected anemia, asymmetrical fetal growth restriction, Post dated pregnancies, rheumatoid arthritis, renal failure, etc. were present in 22% cases. The association between actual birth weight and risk factor was found to be statistically significant in the present study ($p < 0.05$). This helps to correlate the influence of risk factors which might contribute to birth weight estimation.

FUNDAL HEIGHT AND ABDOMINAL GIRTH

Fundal height varies between 28-37cms, whereas abdominal girth varied between 82-110cms among participants at term gestation. Association of abdominal girth with actual birth weight was found to be statistically significant. Hence, these parameters need further studies to consider as independent measure for fetal weight estimation.

FETAL BIRTH WEIGHT ESTIMATED BY ULTRASONOGRAPHY

Results shows that 88.77% fetus belonged to birth weight group of 2500-4000grams, 8.16% belonged to birth weight group of less than 2500grams whereas 3.06% fetus belonged to birth weight group of more than 4000grams. Mean birth weight by ultrasonographic method was 3045.68grams with 430.77grams standard deviation.

Interestingly, the mean percentage error can mislead because it is a sum of positive and negative deviations from actual birth weight, thus artificially reducing the difference between actual birth weight and estimated birth weight. It is a measure of systematic error in each method and not variation from birth weight.

With ultrasound there is limitations of comparing with spatial measurement of weight. Fetal mass is measured with fetal volume and density, here density of fetus at term is not constant.

The major findings from the present hospital based prospective comparative study is that clinical estimation of fetal weight is as accurate as ultrasonographic estimation of fetal weight within the

normal birth weight range of 2500-4000grams. The birth weight while in case of fetal growth restriction, both the methods underestimated birth weight.

FETAL BIRTH WEIGHT BY CLINICAL METHOD

Results demonstrated that 91.83% fetus belonged to normal birth weight group of 2500-4000grams, 5.10% fetus belonged to low birth weight group of less than 2500grams, whereas 3.06% fetus belonged to a group of birth weight more than 4000grams. Mean birth weight measured by clinical estimation was 3224 grams with 293.97grams of standard deviation.

In 1990, Dare et al, proposed a simpler formula for clinical estimation of fetal weight. [10].

In their original paper, a study population of 498 antenatal women with term gestation were observed, and correlation between clinical estimation of birth weight and actual birth weight was obtained ($r=0.742$). In our study, Dare's method was used for estimating fetal weight, and the correlation between actual birth weight and clinically estimated fetal weight was statistically significant ($r=0.97$, $p < 0.0001$) and by ultrasonographic method of estimation was 0.85.

ACTUAL BIRTH WEIGHT

88% neonates belonged to normal birth weight group of 2500-4000grams, followed by 10% neonates belonging to low for birth weight group and around 2% belonging to birth weight group of more than 4000grams. The study sample has an actual birth weight of 3186.22 grams with 284.34 grams of standard deviation. Association of symphysis-fundal height with actual birth weight was found out to be statistically significant as observed in the study proposed by Malik R et al.[11].

The overall mean absolute percentage error of clinical method (7.4+/-7.0) was smaller than that of ultrasonographic method (15.2+/-10.4).

In low birth weight group of less than 2500grams, mean absolute percentage error was (10.0+/-12.3) with ultrasonographic method of estimation and (11.5+/-9.2) with clinical method of estimation. No statistically significant difference was seen. But in measurement of accuracy for normal birth weight range of 2500-4000grams mean absolute percentage error was (15.5+/-10.2) with ultrasonographic method and (7.6+/-8.4) with clinical method of fetal weight estimation which was statistically significant.

SENSITIVITY OF FETAL WEIGHT ESTIMATION BY CLINICAL METHOD AND SONOGRAPHIC METHOD OF ESTIMATION

Our study states that clinical estimation of fetal weight holds equally significant role when as compared to fetal weight by ultrasonographic method. In prediction of normal range of birth weight of 2500-4000grams, Dare's method had more sensitivity of 98.2%, than ultrasonographic method (93.6%). In estimation of fetal weight of low birth weight group

(<2500 grams), 52% sensitivity was found with clinical method of estimation, while 18% sensitivity was noted with ultrasonographic method of estimation. In birth weight group of more than 4000grams, ultrasonographic estimation of fetal weight was more sensitive when compared with that of clinical estimation of fetal weight. Malik R et al in

his study concluded the role of ultrasound as an additional tool for estimation of fetal weight.[11]

In our study, Dare's method of fetal weight estimation showed mean birth weight measured by clinical estimation was 3224 grams with 293.97grams of standard deviation which was highly comparable with actual mean birth weight was 3186.22 grams with 284.34 grams of standard deviation.

Similar results found in following study:

Mean weight in grams	Yadav R[17]	Ratwani K[18]	Ashwini Ingale[1]	Our study
Dare's method	2971+/-337.9	2880+/-350	2916+/-399.15	3224.48+/-293.97
Ultrasonographic method	3240+/-389.7	2540+/-330	3203+/-497.05	3045.68+/-430.77
Actual birth weight	3100+/-455.8	2900+/-430	2831+/-515.79	3186.22+/-284.34

Table 14: Comparison of fetal weight with other studies

Ugwu et al, in his study found a strong correlation between actual birth weight and ultrasonographic estimation of fetal weight ($r=0.71$, $r=0.69$ respectively).[12]

Njoku C et al, found positive correlation between actual birth weight when compared to that of with clinical and ultrasonographic method of fetal weight estimation (+0.740 and +0.847 respectively). [13]

Shittu et al, found similar correlation in his study of +0.78 and +0.74 respectively, and correlation were statistically significant. [14]

As observed in study done by Kumari A et al, the veracity of clinical estimation of fetal weight in normal range of 2500-4000grams was higher, and lowest for large birth weight group of more than 4000grams. [15]

Study conducted by Baum et al, concluded that there was no advantage of ultrasonographic estimation of fetal weight as compared with that of clinical method of fetal weight estimation in antenatal women with term gestation.[16]

Clinical method of fetal weight estimation is considered equally significant and accurate as routine ultrasonographic estimation, except in high birth weight infants. Hence, when clinical method suggests birth weight of more than 4000grams, subsequent ultrasonographic estimation of fetal weight is recommended for better and precise estimation and for neonatal well-being with accurate evaluation regarding trial of labour etc.

Our study indicates clinical estimation of fetal weight as diagnostic tool for fetal weight estimation and is as equally significant for labour care and management for antenatal women at term gestation.

Ultrasonographic method has an added advantage of detecting Congenital malformation and with of biophysical profile to assess well being of the fetus, or else both clinical estimation of fetal weight is considered equally reliable as ultrasonographic estimation method for fetal birth weight. In low socio-economic strata, where resource availability of ultrasound or technician for assessment of fetal functions are not available in every part of a place, clinical estimation of fetal weight holds reliable for fetal weight estimation.

Limitations of this study is that clinical estimation of fetal weight is subjective and usage of only one sonographic method of fetal weight estimation.

CONCLUSION

The present study concluded that clinical estimation of birth weight is as accurate as routine ultrasonographic estimation. Clinical palpation should be considered as diagnostic tool for fetal weight estimation and is equally reliable, cost effective and easy to teach and learn. Need is to practically apply method, so as to guide the management decisions.

We consider the overestimation of fetal weight by clinical estimation as a positive factor, since it will enhance the sensitivity of health workers at peripheral center if properly taught and related knowledge applied for assessment of macrosomic babies and for early referral to higher centers for adequate labour management.

Further studies are needed to improve and determine fetal weight estimation near term, henceforth by improving outcome of the mode of delivery and neonatal well-being.

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Conflict of interest: none declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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