COMPARISON OF CLINICAL METHODS AND ULTRASOUND FOR PREDICTION OF EXPECTED FETAL WEIGHT WITH TRUE BIRTH WEIGHT IN TERM PREGNANCIES- A PROSPECTIVE STUDY

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Endorsement

This is to certify that the dissertation entitled **"COMPARISON OF CLINICAL METHODS AND ULTRASOUND FOR PREDICTION OF EXPECTED FETAL WEIGHT WITH TRUE BIRTH WEIGHT IN TERM PREGNANCIES** "is a bonafide research work done by **BJ0110005**

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ABBREVIATIONS

AG	: Abdominal girth
AC	: Abdominal circumference
BPD	: Bi-parietal diameter
CPD	: Cephalo-pelvic disproportion
DTA	: Deep transverse arrest
EFW	: Expected fetal weight
FL	: Femoral length
HC	: Head circumference
IUD	: Intra -Uterine Death
LSCS	: Lower Segment Caeserean Section
SFH	: Symphsio- Fundal Height
TBW	: True birth weight
USG	: Ultrasonography
VBAC	:Vaginal birth after Caeserean Section

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ABSTRACT

Background-

Fetal weight is an important predictor of perinatal morbidity, mortality and maternal morbidity. Apart from its role in diagnosing IUGR, it guides to choose the mode of delivery to give the best possible outcomes to both mother and child. Fetal weight can be estimated by ultrasound(USG), clinical methods like measurements of symphysio-fundal height(SFH) and abdominal girth(AG). Ultrasound needs training, expertise and is an expensive equipment which may not be easily available especially in low-resource settings.In such circumstances, clinical methods of estimating fetal weight aid in obstetric decision making. Therefore development and validation of simple, inexpensive, accurate and effective clinical methods are important and relevant especially in countries like India where high cost equipment and trained manpower are scarce.

Materials and methods-

This is a prospective study of 200 term pregnant women who were admitted to labour ward either in early labour for induction of labour or for elective LSCS. Women fulfilling inclusion criteria were enrolled. Ultrasound examination was performed if she did not possess a report of the scan done in the past one week for expected fetal weight(EFW) by mediscan and Hadlock formula. SFH and AG were measured. Estimated fetal weight was calculated using two clinical formulae-Johnson's and Dare's formulae.These were compared with true birth weight(TBW).

Statistical analysis-

Average error, maximum error and percentage error was calculated for all the methods. Co-relation co-efficient was calculated using mean average errors and compared using unpaired “t” test.

Results-

Between birth weight of 2500 gms and 3500gms clinical formulae predicted EFW as accurately as USG with average error of 250- 300gms and percentage error of 10-15% of TBW. Dare’s formula correlated better than Johnson’s formula with true birth weight .

Conclusion-

Clinical formulae can be used to predict EFW in routine obstetric practice.USG can be used in clinical suspicion of IUGR or macrosomia.

INTRODUCTION

Accurate estimation of fetal weight is one of the important aspects in management of labour. It needs to be emphasized that birth weight is an important parameter for perinatal morbidity and mortality. It is important in making the the diagnosis of both intrauterine growth restriction (IUGR) [1] and fetal macrosomia

Estimation of expected fetal weight helps to determine the deviation of fetus from normal growth. It helps in deciding the mode of delivery and predict intranatal complications like shoulder dystocia. Estimating fetal weight is also important when dealing with preterm births where counseling regarding the prognosis, survival of the newborn and need for intensive care depends on fetal weight.[6]

Abnormalities in fetal growth can be detected clinically or by ultrasound (USG). Simple methods like measurements of symphysio-fundal height (SFH) and abdominal girth (AG) can be used to predict expected fetal weight in low resource settings. [1]

Ultrasound is also used for estimation of expected fetal weight and diagnosis of impaired growth. But, it is not easily available in all places offering obstetric care, especially in low resource settings. Fetal weight estimation using ultrasound needs training , expertise and an expensive equipment. In such circumstances clinical methods of estimating fetal weight can aid in obstetric decision making. [3]

Therefore, development and validation of simple, inexpensive, accurate and effective clinical methods are important and relevant especially in countries like India, where expensive equipment and trained manpower are scarce at most places of delivery.

Various clinical formulae based on measurements of symphsio-fundal height and abdominal girth have been developed. Johnson's formula for estimating fetal weight in vertex presentations was developed.

Ojwang et al. used product of symphysio-fundal height (in cms) and abdominal girth (in cms) to obtain expected fetal weight with fairly acceptable predictive value but with considerable variation from the mean. To further simply this formula, Dare et al. in 1990 used the product of symphysio-fundal height and abdominal girth at level of umbilicus to give the expected fetal weight in grams which correlated well with the birth weight.

The other methods of fetal weight estimation viz. clinical palpation and Dawn's formula have been found to be inaccurate due to inter-observer variations.

Therefore, in our study, we have studied 200 full term pregnancies in early labour, induction of labour or elective LSCS to compare the accuracy of the two clinical formulae viz, Johnson's and Dare's formula to estimate the fetal weight in comparison with ultrasound estimated fetal weight and actual birth weight

AIMS AND OBJECTIVES

Objective - To compare expected fetal weight estimation by 2 clinical methods viz. Johnson's formula and Dare's formula, and Ultrasound estimated fetal weight with actual birth weight.

REVIEW OF LITERATURE

Accurate prediction of fetal weight has been of interest to obstetricians, and many of them used different methods to achieve this, as it has implications in the management[1]. The factors influencing birth weight are a subject of controversy till date. Studies have shown that both increase in parity and increasing maternal age influence the birth weight [1]. Gestational age, sex of the fetus and maternal nutrition have a role to play in determining the fetal weight[2]. According to the existing literature, there are no accurate methods of evaluating the fetal weight[2].

Davis C. H. et. al. (1923) have in their study shown that birth weight is related to maternal weight gain. Weight gain during pregnancy is generally proportional to the caloric intake of mother and greater the calories consumed, the more it is incorporated into developing fetal tissues too. On the other hand, McLLroy et.al. (1937) found that birth weight is not directly related to weight gain[3].

Karn and Penrose (1952) demonstrated that birth weight is related to both maternal age and parity. The greater the number of parity, larger the fetus likely to be. But, once maternal parity is specified, maternal age is not an independent predictor of fetal weight[3].

Johnson et. al. (2006) in their study showed that male infants were significantly of more birth weight than female infants at birth when appropriately matched for gestational age and other factors. On an average, male fetus weighs 136 gm more than the female fetus at term[8].

O Sullivan et.al. (1965)[4] study showed that maternal age, parity, past history of having delivered a large baby, length of gestation and male sex had a significant correlation with infant birth weight. On further analysis it was shown that the effect of parity was entirely due to maternal pre-pregnant weight.

Nahum G.G. (2002), in his study has shown that maternal height is an easily measurable physical characteristic that is positively correlated with term foetal weight[12]. Though lifestyle patterns can modify other maternal physical characteristics, maternal height is the single most important measure of native human-size potential. This study concluded that " big people have big babies".

Abrahams B. and Selvin S. (1995) studied patterns of maternal weight gain and its correlation with fetal weight. It was noted that strongest association between maternal weight gain and birth weight was seen in second trimester (32.8gm/ kg increase).

Of the many methods of fetal weight estimation, abdominal palpation of the pregnant woman had reasonably good predictive value. Further studies concluded that this method was found to give error of 800gms when compared to actual birth weight. It was also found to be less accurate in post-term pregnancies.[2,4,5,16,17]

Walraven G. E. concluded that single pre-delivery symphysio-fundal height measurement can explain 41% of observed variations in birth weight. He found SFH a better predictor of birth weight than other variables like maternal height or pre-delivery weight .[18,19]

Clinical methods:

Clinical estimation of fetal weight is a time- honoured method to assess the expected fetal weight. Though it has been inaccurate, it remains the method of clinically estimating the gestational age, fetal weight, amount of liquor, and to rule out feto-pelvic disproportions. Though it is convenient and inexpensive, it is a subjective assessment and associated with notable predictive errors, but if done correctly the EFW obtained using these clinical formulae was comparable with the ultrasound EFW and actual birth weight.

Insler V. et. al. (1967) concluded that simple external palpation of the fetus gives fairly accurate estimate of the fetal weight[5]. On studying 1250 random cases of singleton term fetuses with longitudinal lie he found the percentage error of 10% of ABW in 67% of the cases, in 15% of the cases the error was > 500gms and 5% of the cases had error of >800gms[7,11,13].

Herrero et. al. (1999) found 60.9% clinical estimates were within 10% of actual birth weight. However, clinical estimation of birth weight is often inaccurate due to inter and intra observer variation due to variations in amniotic fluid volume, maternal obesity, uterine abnormalities. With a view to minimize these various external measurements were made and clinical formulae were used to measure the expected fetal weight[10]. Measurement of symphysio-fundal height (SFH) is the single most contributing measurement in estimating fetal weight. It can also be used to ascertain the gestational age and for serial monitoring of fetal growth [13].

Fetal weight estimation using fundal height and abdominal girth are more objective, easy to teach and reproduce. Work of Johnson et al and Dare et al showed

promising results.[8,9] These are time-honoured methods of clinical examination and they are important in taking decisions regarding mode of delivery and to rule out cephalo-pelvic disproportion. Below are the enlisted 2 formulae which have been devised in this regard.

Woo J.S. et. al. in 1985 studied 208 cases where he compared SFH and AG. He found SFH alone estimated EFW with 10% error in 75% cases. It over-estimated fetal weight in lower weight groups and under estimated it in high weight groups. But SFH and AG could estimate fetal weight in 85% cases with 10% error.[15]

Johnson R. W. (1957)[8] proposed the formula for estimation of fetal weight using the symphysio-fundal height measurement as

Estimated Fetal weight in gms = (SFH- X) x 155

X= 12 when presenting part is at or above 0 station.

X=11 when presenting part is below ischial spines.

Correction for obesity was done by subtracting 1cm from symphysio-fundal height measurement. He found that fetal weight estimation was within 240gms error in 50.5% cases and 375 gms error in 70% cases.

Dare F. O. (1990) [9]studied 590 women using SFH and AG to estimate fetal weight. He found that the total average error for EFW estimation was 5.8%. He observed that the formula overestimated fetal weight in > 3500gms.

Dare's formula is as follows

EFW in grams = Symphsio-fundal height (in cms) X Abdominal girth (in cms)

SFH was taken similar to Mc donald's measurement.

Abdominal girth was taken at the level of umbilicus.

Ultrasound estimation of expected fetal weight.

Obstetric ultrasound is a modern method of fetal weight estimation. Sonographic assessment of fetal weight has been integrated into main stream of obstetric practice in the recent past[2,3]. It involves the use of various fetal parameters. The advantage of this method was that it relies on the linear and/or planar measurements of in-utero dimensions that are definable objectively and are also reproducible[15].

Studies have shown that sonographic estimation of fetal weight were no better than clinical methods[16,17,18]. Also several technical limitations of sonographic technique for fetal weight estimation were found, to name a few; maternal obesity, oligoamnios, anterior placentation etc. Other disadvantages being labour-intensive, expensive, limited availability and accessibility and need for special technical training[17,19].

Various ultrasound formulae have been used to estimate fetal weight. The most commonly used and extensively studied is the Hadlock's formula. It is widely used and is found to be more accurate than other formulae as it takes into account all important fetal parameters. Other formulae viz., Warsoff formula, Shephard formula etc are not commonly used as they do not take all fetal parameters into account to estimate fetal weight.

Studies by Dr.. S.Suresh done in Chennai in 2010 where he studied 2000 fetuses and derived population based normograms in south Indian population and devised mediscan software . this software avoided the over-diagnosis of IUGR[26].

Studies by Hendrix et.al (2000) and Raman et.al (1992)[13] showed clinical estimation of fetal weight was more accurate than ultrasound prediction of EFW. Similar results were found from studies by Sherman et.al[15] and Titapant et al[22] when USG EFW was made in low birth babies. But, both studies showed that both methods underestimated the fetal weight by 400 gms.

Watson et.al found no difference in both methods even in extremes of birth-weight at term. Likewise Baum et.al (2002)[5], Nahum (1999) and Stanislaw [12]found no advantage of ultrasound over clinical methods.

Chauhan et.al in their comparison of accuracy of the 2 methods observed no benefit in obtaining a sonographic estimate because its accuracy was no better than clinical methods[2].

Various formulae for EFW estimation have been devised, software constructed and incorporated into ultrasound machine and are presently available for clinical use.

MATERIALS AND METHODS

The study is ethically approved by institutional review board of Jawaharlal Nehru medical college, Belgaum, Karnataka, India.

Study Design: prospective study

Sample size: 200

STATISTICAL ANALYSIS

Formula used= $n = \frac{P(1-P)Z^2}{d}$

Source for data collection:

All women during pregnancy who came to the labour ward in early labour or for induction of elective LSCS at K.L.E.S Dr. Prabhakar Kore Hospital and MRC were included in the study.

Informed Consent: Women who presented to labour room of K.L.E.S Dr. Prabhakar Kore hospital & MRC, Belgaum were screened for enrollment in the study using inclusion and exclusion criteria. Informed consent was obtained, a signature or left had thumb impression from the consented subject was obtained after reading the informed consent document. The women were not compelled to participate in the study. No monitory benefit was offered to any of the participants enrolled in the study.

Method of data collection

The following were the inclusion criteria:

1. Age > 18yrs
2. Singleton pregnancy
3. Cephalic presentation
4. Live fetus
5. Known last menstrual period or scan with confirmed expected date of delivery
6. Gestational age ≥ 37 weeks and ≤ 42 weeks
7. Admission of subjects in early labor or for induction of labour or elective caesarean-section within 1week of admission.

The following were the exclusion criteria:

1. Multiple gestation
2. Non-cephalic presentations
3. Anomalous fetus
4. Intrauterine fetal death
5. Presence of co-existing fibroids, ovarian cysts.
6. Already diagnosed liquor abnormalities

On admission to labour room , the women who fulfilled the inclusion criteria were asked to consent for participation in the study. At admission, height and weight were recorded and body mass index was calculated.

After a brief general physical examination, per abdominal examination was performed in supine position. Patient was asked to empty the bladder before

examination. The uterine height was palpated from xiphisternum downwards after correction of dextro-rotation of the uterus. Upper border of pubic symphysis was palpated and the symphysio –fundal height in centimeters was measured using flexible standard measuring tape with the markings of cms towards the patient and keeping the measuring tape in skin contact. This was followed by measurement of abdominal girth in centimeters at the level of umbilicus in similar way.

Expected fetal weight was calculated using 2 clinical formulae, namely Johnson's formula and Dare's formula.

The patient was subjected to ultrasound if she did not possess report of the ultrasound scan done in the past 1 week. This was for estimation of fetal weight by ultrasound. The ultrasound was performed using C 2- 5 transabdominal curvilinear probe on Philips HD 11 machine. To avoid inter-observer variation, ultrasound done by 4 obstetricians trained in performing ultrasound was taken for the study. Biometry of the fetus was taken using the following parameters; bi-parietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femoral length (FL).

Bi –parietal diameter was measured at the level where both thalami and cavum septum pellucidum were visualized. BPD was measured from inner to outer table of the skull bones. Head circumference was measured in the same plane. Abdominal circumference was measured at the level of bifurcation of the hepatic vein into right and left branches. Femoral length was measured with the femur excluding the femoral head and the epiphysis along the vertical axis seen transversely. Expected fetal weight was obtained using mediscan software devised by Dr S. Suresh, and Hadlock formula. The expected fetal weight was

obtained by inbuilt software. This was also combined with measurement of liquor. All women enrolled in the study, delivered within 2 days from the time of estimation of fetal weight by clinical and USG methods. This was important as the fetus in-utero continues to grow with weight gain of 30-35 gms per day at term. This growth could contribute to error of fetal weight estimation.

The patient was delivered either by vaginal route or by lower segment caesarean section. The maximum delivery interval after USG and clinical estimation was 48hrs. After birth, the actual birth weight was measured using standard digital weighing machine approved by ISI. The scale was corrected for zero error. The expected fetal weights by clinical formulae and ultrasound was compared with the actual birth weight. The average error, maximum error, percentage error and standard deviation of estimation of fetal weight in comparison with true birth weight was calculated both for clinical and ultrasound methods.

RESULTS

The mean age of the patients included was 23.8± 2.9yrs. Out of 200 women, 45% of women were primigravida and 55% were multigravida. The mean maternal weight was 61.5±6.23kg. The mean maternal height was 1.51±0.4mts. The mean maternal BMI was 26.5±2.62kg/m^2. There was no association noted between age, parity and BMI in our study.

The cases were distributed as per the birth weight of babies into five groups as described below. Maximum weight distribution was in the 2501 gms to 3000gms group.

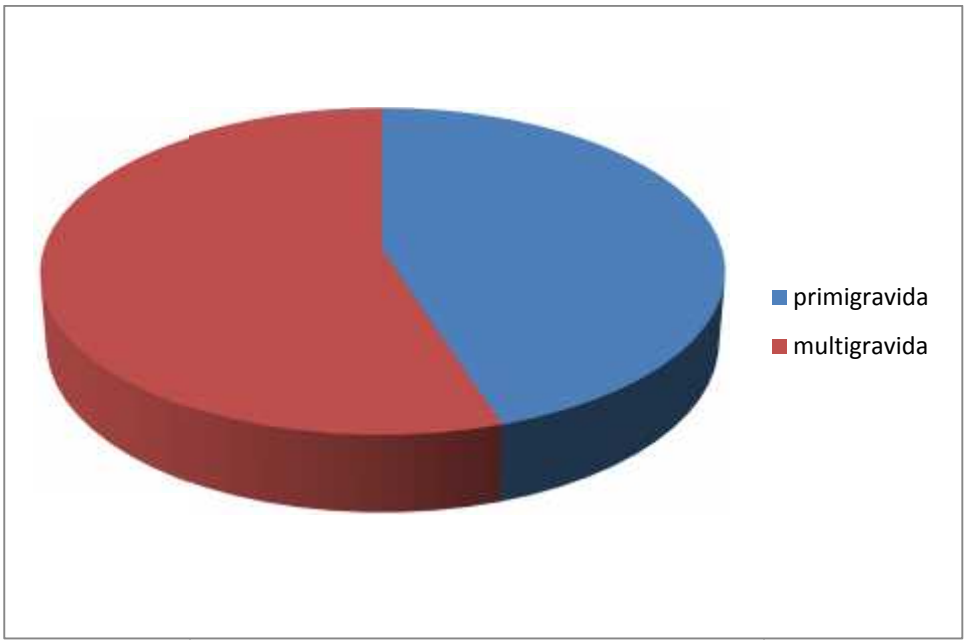

Figure 1- Case distribution according to parity

Distribution of cases according to birth weight:

Birth weight in gms	No. of cases(n)	Percentage
1. <2000gms	03	1.5
2. 2001-2500 gms	40	20
3. 2501-3000 gms	102	51
4. 3001-3500 gms	45	22.5
5. >3500gms	07	3.5

Table No 1. Case distribution according to birth weight.

Out of the 200 patients, 65% (n=130) delivered by LSCS due to various indications. Remaining 35% (n=70) delivered vaginally.

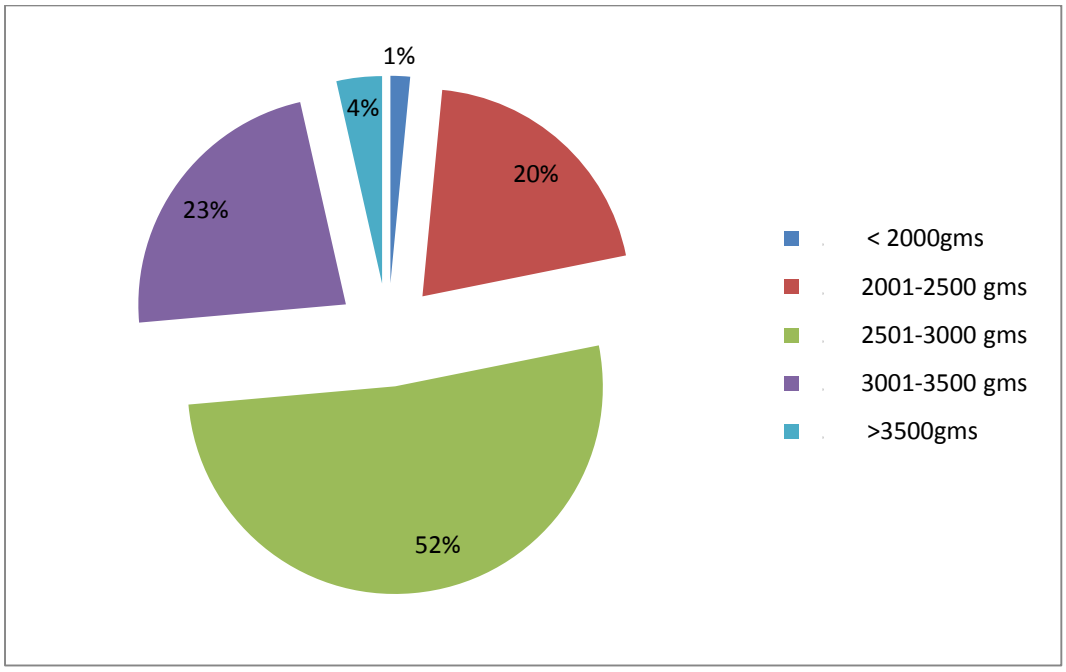

Figure 2. Case distribution according to birth weight

Case distribution according to various indications for LSCS.

Indications for LSCS	No of cases of LSCS (n)
1. Fetal distress	46
2. Not willing for VBAC	23
3. Failed induction	21
4. Previous 2 LSCS	19
5. Suspected scar dehiscence	08
6. Non-progress of labour a. CPD b. DTA	 04 03
7. Uncontrolled severe pre-eclampsia	03
8. Placenta praevia	02
9. Maternal request	01
Total (n)	130

Table No 2. Case distribution according to various indications for LSCS.

Among the enrolled cases, 45 cases were directly taken up for LSCS. Others were allowed for vaginal delivery. Since most cases were multigravida with previous LSCS, the repeat LSCS rate was high. EFW affected the mode of delivery .

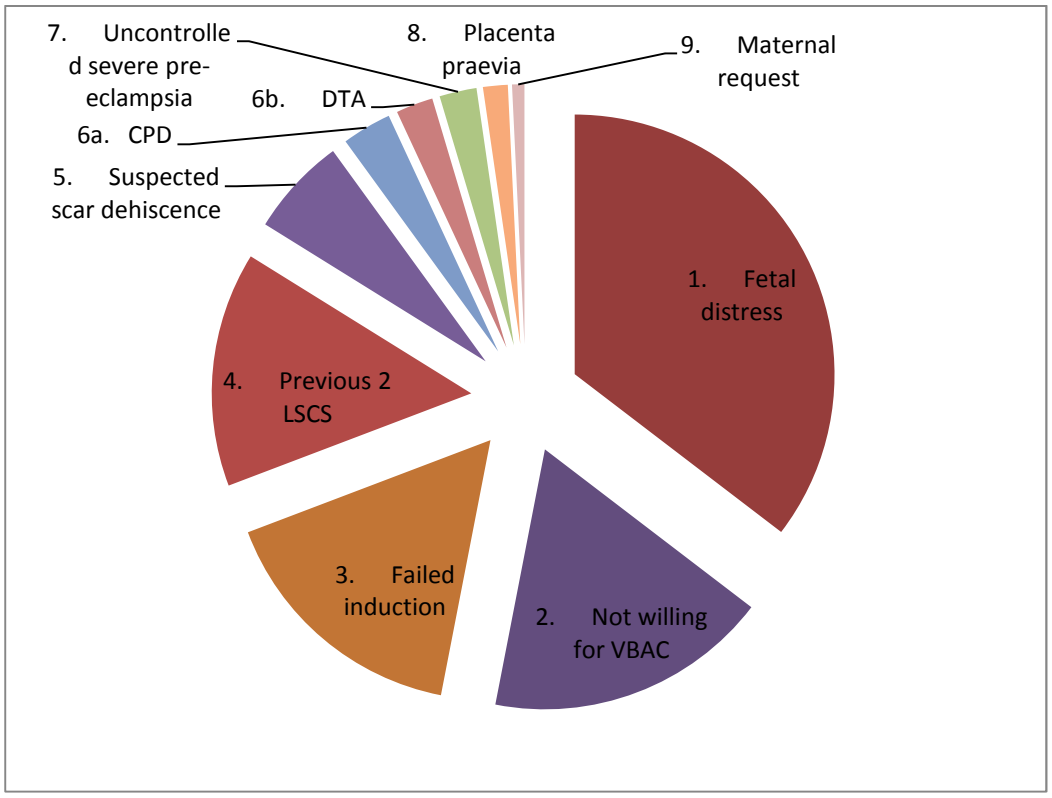

Figure 3. Case distribution according to various indications of LSCS .

Average error in fetal weight estimation by clinical formulae and ultrasound in various groups.

True birth weight	<2000	2001-2500	2501-3000	3001-3500	>3500	All cases
Johnson's formula	347.5	227.7	124.8	172	304.2	167.6
Dare's formula	335	202.1	123.1	143.3	327.1	155.9
USG	237.5	115.6	86.1	135.2	254.2	111.4

Table No. 3 -Average error in various fetal weight groups by 2 clinical methods and USG in (gms).

The mean average error represents the sum of the positive (over-estimation) and the negative (under-estimation) from actual birth weight. Johnson's formula EFW had highest average error in all weight groups. Dare's formula EFW was close to USG EFW with difference of 45 gms . Average error was least in the USG EFW in the 2501-3000gms group. USG and Dare's formula were comparable with minimal average error for estimation of fetal weight.

Maximum error in various fetal weight groups.

True birth weight	<2000	2001-2500	2501-3000	3001-3500	>3500
Johnson's formula	420	600	600	470	640
Dare's formula	440	510	560	490	810
USG	400	580	300	410	520

Table no. 4. Maximum error in various fetal weight groups by 2 clinical methods and USG (gms).

Johnson's EFW was consistent in estimation of fetal weight with over estimation of fetal weight in all groups. Dare's EFW was closer to USG EFW in all groups except in >3500gms. Maximum number of women were in the 2500-3000group. Dare's formula over estimated fetal weight in >3500gms group with maximum error of 800gms. USG EFW was consistent for birth weight with maximum error of 300 gms in 2500-3000gms group.

Percentage error in various fetal groups.

% error	Johnson's formula	Dare's formula	USG
Upto 5%	51%	58.5%	72%
Upto 10%	81.5%	82%	95.5%
Upto 15%	93%	90.5%	98.5%
Upto 20%	96.5%	98%	99.5%
Upto 25%	99%	100%	100%

Table No. 4- Percentage error in various fetal weight groups by 2 clinical methods and USG.

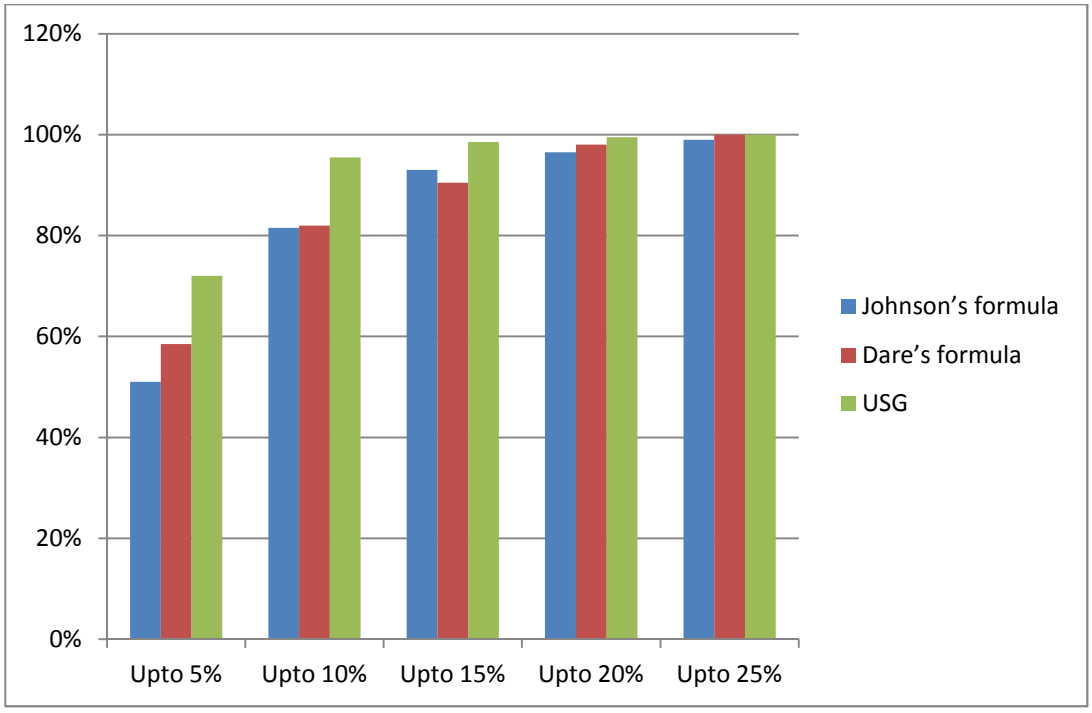

Figure 4. Case distribution according to percentage error in various groups in clinical methods and ultrasound derived weight.

In 95% of the cases, Dare's formula correlated well with TBW with error of 15% . This was in consonance with USG weight which was also between 10-15% of the TBW. The error was more for Johnson's formula with 95% of cases with error of 20%.

Standard Deviation of predicted error of the various methods.

Methods of fetal weight estimation	Standard deviation of predicted error (gms)
Johnson's formula	175.17
Dare's formula	142.81
USG	120.8

P<0.05%

Table No.5 - Standard Deviation of predicted error of the various methods.

Standard deviation was calculated using the mean of errors for each of the methods. It was found that the least deviation was for the USG with 120.8gms, closely followed by the Dare's formula with 142.8 gms. Johnson's formula had maximum deviation with 175.1 gms.

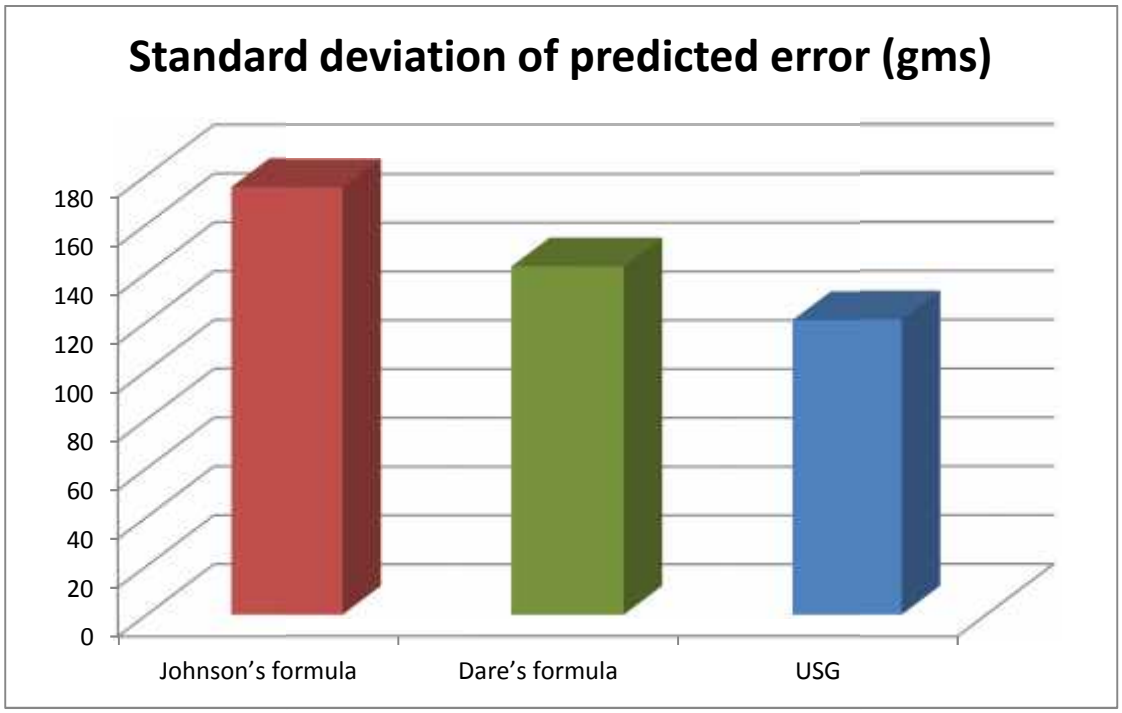

Figure 5. Standard deviation of clinical methods and ultrasound.

Correlation co-efficient (r)

Johnson's formula	0.745	P<0.001
Dare's formula	0.854	P<0.001
USG	0.932	P<0.001

Table No.6 - Correlation co-efficient (r).

Statistical analysis using unpaired "t" test with p value of <0.001 showed that the 2 clinical formulae correlated well with USG for estimation EFW. Dare's formula had better correlation than Johnson's formula. Highest correlation was seen with USG.

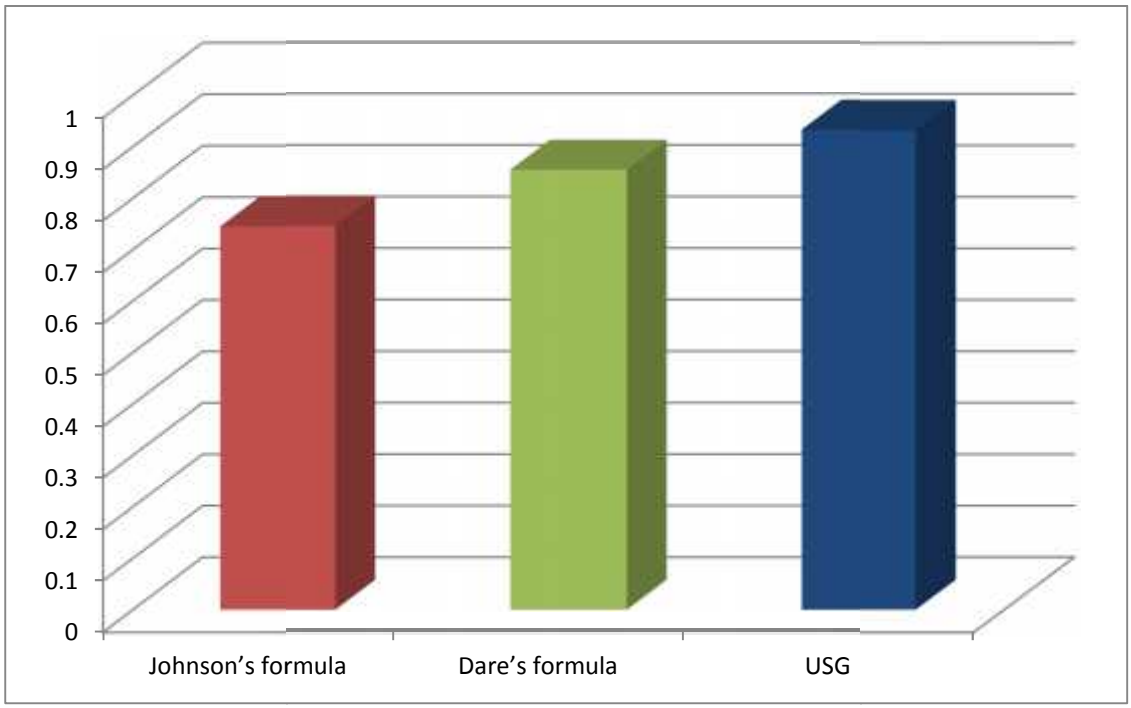

Figure 6- Correlation co-efficient of clinical methods and ultrasound.

DISCUSSION

Estimation of EFW has become increasingly important for obstetric decision making regarding induction of labour, evaluation of feto-pelvic disproportion, mode of delivery especially in Vaginal Birth. After C-section (VBAC), detection of IUGR. The ultimate aim of obstetric practice is delivery of a healthy baby with least amount of maternal morbidity. Birth weight assumes importance in that its accurate estimation in-utero gives a fairly good estimate of the neonatal outcome. Various methods of fetal weight estimation have been used in clinical practice.

In our study we have attempted to compare 2 clinical formulae and ultrasound EFW with TBW. The comparison was done by calculating the following-

1) Average error-

   Average error in weight group of Dare's formula was significantly less in comparison with Johnson's formula with mean average error of 155.9gms. Johnson's formula had a mean average error of 167.6 gms. The average error by ultrasound EFW was maximum in fetal weight of >3500gms and least in <2500gms.

2) Maximum error-

   Maximum error was with Johnsons formula. Again Dare's formula seemed to be better with less error than other formulae wich was comparable with the ultrasound EFW.

3) Over estimation and under-estimation of fetal weight-

In most previously done studies it was observed that clinical estimations based on maternal abdominal girth measurements tended to over-estimate the fetal weight more

so when there was abdominal wall edema was present in conditions like pre-eclampsia, heart failure and renal disease. USG tends to under-estimate fetal weight in >3500gms . In our study it was observed that over-estimation was consistently more with Johnson's formula in all groups. Dare's formula correlated well with birth weight except in birth weight >3500gms.USG tends to estimate birth weight with good accuracy. It under estimated birth weight >3500gms and accurately estimated it in all other groups.

4) Percentage error –

In the present study , Dare's formula and USG had error around 15% in 95% of the TBW in % of the cases, whereas Johnson's formula had error of 20% in 95% of the cases.

5) Standard deviation of prediction error-

The standard deviation was minimal for USG EFW followed closely by Dare's formula with difference of 20.2 gms. The maximum standard deviation was present for Johnson's formula.

In most of the previous studies, there was no standardized method for clinical estimation of EFW making it very subjective, poorly defined and non-reproducible. Hence, the USG derived EFW became widely used as it was more objective and reproducible.

In our study, we used standardized method of clinical estimation using 2 formulae that were used for fetal weight estimation. The ultrasound fetal weight estimation was done using mediscan software and Hadlock's formula by obstetricians trained in USG. The estimates were obtained by 2 different observers viz, the

obstetricians performing USG and the residents in the labour ward, to preclude the possiblity that one estimate may influence the possibility of the other.

The major finding from this prospective study is that the clinical estimation of fetal weight by Dare's formula is as accurate as USG estimation of EFW within birth weight range of 2500gms to 3500gms. USG estimates were more accurate in weights <2300 gms.

Despite the differences in the study design our findings were in consonance with the previous studies which reported that accuracy of fetal weight estimation was similar if not better than the USG estimation in normal range of birth weight. When the clinical formulae suggest EFW below the normal birth weight range USG is recommended to yield better prediction of EFW and to evaluate other prognostic parameters viz liquor quantity and doppler.

Our study implies that there is clearly a role for EFW estimation by clinical formulae suggesting that clinical estimation is sufficient in estimating EFW and manage labour and delivery in term pregnancies, USG being indicated only when there is clinical disparity of gestational age and EFW.

Strengths of the study-

Our study was conducted in a tertiary care hospital with USG being done on Philips HD-11 machine which has excellent resolution and hence the prediction of birth weight was close to accurate. USG performed by trained obstetricians to avoid observer bias. The mediscan scan software is based on the Hadlock's formula with adjustments to suit the south-Indian population so that over-diagnosis of IUGR can be avoided. The clinical estimation of fetal weight was done by residents in the labour room the results of which were not disclosed to the person performing the USG. The

patients who had an USG report done in the week prior to delivery or those who came in early labour were included. This was to avoid the wrong measurements of the BPD and HC when the fetal head was deeply engaged. Patients having liquor abnormalities were excluded to avoid the confounding in SFH measurements.

Drawbacks of the study-

The potential limitations of our study could be the subjectivity of clinical estimation because it was measured by only one of the residents attending the patient. There was a tendency to over- estimate EFW by clinical formulae as compared to USG. The fetus in-utero continues to grow with weight gain of 30-35gms per day at term. This could be one of the limitations of the ultrasound estimation of EFW as it is one-time estimate and does not take into account the further growth. Another potential limitation is the use of only one sonographic model to derive the estimates of fetal weight.

Though clinical methods tend to over-estimate EFW, it can be considered as a positive factor since it can enhance the sensitivity of health workers at peripheral centres if done correctly for early referral of mothers with macrosomic fetuses. Thus contributing to reduction of obstructed labour and its sequelae. Also can help in diagnosis of IUGR and LBW fetuses to refer them in-utero for safety of the mother and the child.

One more important limitation was that the comparison has been done near the term of the pregnancy, whether the results can be extrapolated to pregnancies before 37 weeks of gestation is unknown

CONCLUSION

The clinical methods viz. Johnson's formula and Dare's formula both had tendency to over-estimate fetal weight. In the 2501-3500 groups Dare's formula and USG EFW concurred with true birth weight with minimal error. Both groups had least average error. Since majority of the normal term pregnancies fell in this group and it was reasonably accurate (Dare's formulae > Johnson's formula) with the USG weight. Clinical methods can be used in clinical practice where no USG facilities are avaliable.

SUMMARY

This is a prospective study done at K L E Society's Dr.Prabhakar Kore Hospital to compare the estimation of EFW by 2 clinical formulae and USG with true birth weight. This study was an attempt to observe if simple, inexpensive and easy to teach clinical methods can be used in peripheries where expensive USG equipment and expertise professional are a derth This study was performed on 200 term pregnant women who fulfilled the inclusion criteria. The clinical estimation of fetal weight was done by measuring the SFH and AG. Estimates were obtained using Johnson's formula and Dare's formula. The ultrasound estimation of fetal weight was obtained by measuring the various fetal parameters viz bi-parietal diameter, head circumference, abdominal circumference and femoral length. The clinical estimates and the ultrasound estimate of birth weight were compared with true birth weight . It was seen in this study that clinical methods can reliably estimate EFW and can be used in settings where USG is not available. Dare's formula EFW correlated closely to TBW as compared formula. USG was only needed when there arose clinical suspicion of IUGR or LBW or fetal macrosomia.

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Annexure II

Proforma for data collection-

Title of the study- Comparison of clinical methods and ultrasound for estimation of expected fetal weight with true birth weight in term pregnancies- a prospective study.

Sno | | | |

Date | | | | | | | | |

IPD no | | | | | | | | |

Unit _____

Patient's name _____

_____

Age | | |

Address _____

_____

Contact no _____

Is pregnancy singleton- 1) yes 2) no ☐

Obstetric history- G- P- L- A- D-

Menstrual history- past cycles- _____

LMP- ☐☐☐☐☐☐☐☐

EDD- ☐☐☐☐☐☐☐☐

Corrected EDD ☐☐☐☐☐☐☐☐

Period of gestation- ☐☐

Examination findings-

Pulse-_____ BP- _____

CVS- _____

RS- _____

Per abdomen- uterine height- _____

Cephalic presentation- 1) yes ☐ 2) no

Symphysio- fundal height- _____ cms

Abdominal girth- _____cms

EXPECTED FETAL WEIGHT-

1) Johnson's formula-
   EFW in gms- (SFH – X) X 155 = ___ gms

2) Dare's formula-
   EFW in gms- SFH X AG = ___

ULTRASOUND EFW-

BPD- _____

HC- _____

AC- _____

FL- _____

EFW- _____

Gestational age at delivery- _____

Actual birth weight- _____

Apgar score- ☐ 1min

☐ 5min

Mode of delivery-

☐ Vaginal –

☐ Ventouse-

☐ Forceps-

☐ LSCS-

1) Elective 2) ☐ Emergency-

Indication- ——————

Annexure III

s.no	DOA	age	weight(kg)	height (mts)	BMI= WT/HT^2	gravida	para	living	abortion	SFH (cms)	AG (cms)	Johnson's formula wt (gms)	Dare's formula wt (gms)	USG wt(gms)	Actual birth wt(gms)
SN001	13/10/2011	26	76	1.6	30	3	1	1	1	36	102	3700	3700	3500	3700
SN002	14/10/2011	27	55	1.5	26	5	4	4	0	35	101	3500	3500	3400	3700
SN003	11/10/2011	22	69	1.5	30	2	1	1	0	36	101	3700	3600	3500	3500
SN004	14/10/2011	23	65	1.5	27	2	1	1	0	29	80	2630	2300	2880	2300
SN005	7/10/2011	25	57	1.6	29	2	1	1	0	28	95	2640	2660	2650	2600
SN006	14/10/2011	21	58	1.6	26	1	0	0	0	29	86	2600	2460	2750	2500
SN007	15/10/2011	24	63	1.6	26	1	0	0	0	32	91	3100	2910	2850	2500
SN008	17/10/2011	24	65	1.6	26	2	1	1	0	29	83	2600	2400	2600	2400
SN009	5/10/2011	23	62	1.5	26	2	1	1	0	30	93	2930	2790	2740	2800
SN010	15/10/2011	23	56	1.5	24	1	0	0	0	30	93	2700	2790	2810	2800
SN011	15/10/2011	21	60	1.6	29	2	1	1	0	32	100	3100	3200	3100	3200
SN012	15/10/2011	24	66	1.6	28	1	0	0	0	30	93	2700	2790	2810	2600
SN013	15/10/2011	24	56	1.5	25	1	0	0	0	32	91	3100	2910	3000	2900
SN014	15/10/2011	22	54	1.5	27	2	1	1	0	32	90	3100	2800	2960	2880
SN015	8/10/2011	21	50	1.5	25	1	0	0	0	31	96	2900	2970	3200	3000
SN016	18/10/2011	20	54	1.5	26	1	0	0	0	27	92	2320	2490	2750	2500
SN017	20/10/2011	21	67	1.6	27	1	0	0	0	28	90	2480	2520	2300	2400
SN018	20/10/2011	21	65	1.5	30	1	0	0	0	30	90	2790	2700	2740	2700
SN019	21/10/2011	23	54	1.5	26	1	0	0	0	27	90	2320	2430	2300	2400
SN020	21/10/2011	20	59	1.5	25	1	0	0	0	31	90	2900	2790	3200	3000
SN021	12/10/2011	20	65	1.5	28	1	0	0	0	32	90	3100	2880	3200	3300
SN022	19/10/2011	25	62	1.5	28	1	0	0	0	32	91	3100	2980	3100	3000
SN023	22/10/2011	19	54	1.5	25	1	0	0	0	30	90	2700	2700	2800	2700
SN024	22/10/2011	19	55	1.5	25	1	1	0	0	30	91	2700	2980	2800	2800
SN025	22/10/2011	24	75	160	30	2	1	1	0	29	90	2630	2610	2600	2600
SN026	22/10/2011	20	59	1.5	27	2	0	0	1	30	90	2790	2700	2700	2800
SN027	22/10/2011	23	69	1.5	30	1	0	0	0	31	90	2390	2790	2900	2800
SN028	18/10/2011	23	65	1.5	27	2	1	1	0	31	90	2930	2790	2900	2900
SN029	22/10/2011	24	69	1.5	30	2	1	1	0	31	92	2930	2850	2900	3100
SN030	22/10/2011	25	65	1.5	28	2	1	1	0	32	100	3100	3200	3200	3200
SN031	23/10/2011	20	62	1.5	28	1	0	0	0	31	94	2930	2910	2800	2900
SN032	22/10/2011	21	60	1.5	27	1	0	0	0	34	101	3400	3430	3400	3700
SN033	21/10/2011	23	54	1.5	25	1	0	0	0	34	99	3400	3360	3400	3300

SN034	24/10/2011	24	55	1.5	25	1	0	0	0	29	90	2600	2600	2520	2600
SN035	24/10/2011	22	62	1.6	26	2	1	1	0	31	91	2900	2820	2700	2800
SN036	25/10/2011	21	64	1.6	26	3	2	2	0	31	91	2900	2820	2700	2900
SN037	25/10/2011	25	58	1.5	26	3	2	2	0	31	93	2930	2970	3100	3100
SN038	25/10/2011	23	56	1.5	25	1	0	0	0	30	90	2790	2700	2700	2700
SN039	26/10/2011	24	56	1.5	26	2	1	1	0	28	83	2480	2350	2400	2300
SN040	25/10/2011	22	52	1.5	24	2	0	0	1	28	82	2480	2290	2500	2300
SN041	26/10/2011	30	59	1.5	26	3	2	2	0	29	90	2.63	2.66	2600	2600
SN042	26/10/2011	32	68	1.6	28	4	3	2	1	30	100	2.79	3000	2900	3000
SN043	27/10/2011	21	69	1.6	31	2	1	1	0	33	100	3.25	3300	3400	3400
SN044	27/10/2011	21	72	1.6	30	1	0	0	0	27	90	2310	2000	2400	2300
SN045	26/10/2011	20	70	1.6	28	1	0	0	0	31	90	2930	2790	2800	2700
SN046	28/10/2011	28	64	1.5	28	2	1	1	0	31	90	2930	2790	2800	2800
SN047	27/10/2011	26	66	1.5	29	2	0	0	1	32	100	3100	3200	2900	3000
SN048	28/10/2011	29	69	1.6	29	2	1	1	0	28	90	2420	2520	2300	2250
SN049	29/10/2011	24	62	1.6	26	3	1	1	1	29	90	2630	2610	2670	2600
SN050	29/10/2011	27	69	1.6	28	3	1	1	1	33	92	3200	3000	3200	3300
SN051	29/10/2011	26	62	1.6	26	2	1	1	0	31	99	2930	2850	2900	2900
SN052	30/10/2011	28	69	1.6	27	3	2	2	0	32	100	3100	3200	3200	3000
SN053	30/10/2011	22	76	1.6	30	2	0	0	1	29	84	2630	2430	2500	2400
SN054	30/10/2011	22	56	1.5	26	1	0	0	0	31	100	2930	3100	2950	3000
SN055	31/10/2011	28	59	1.5	27	1	0	0	0	30	100	2790	3000	2700	2600
SN056	31/10/2011	29	69	1.5	30	1	0	0	0	30	90	2790	2940	2700	2800
SN057	31/10/2011	24	65	150	27	2	1	1	0	30	98	2790	2940	2700	2800
SN058	29/10/2011	20	70	1.5	30	3	2	2	0	30	84	2790	2400	2500	2500
SN059	1/11/2011	20	69	1.5	29	1	0	0	0	30	81	2790	2430	2600	2550
SN060	11/01/2011	25	64	1.5	28	1	0	0	0	29	90	2630	2600	2700	2600
SN061	31/10/2011	25	52	1.5	23	2	1	1	0	30	90	2700	2700	2700	2700
SN062	11/02/2011	28	58	1.6	24	2	1	1	0	32	90	3100	3200	3400	3500
SN063	11/02/2011	24	62	1.6	26	2	1	1	0	32	91	2910	2900	2900	3100
SN064	11/02/2011	21	55	1.5	26	1	0	0	0	30	100	2900	3000	2800	2800
SN065	11/10/2011	28	65	1.5	29	2	1	1	0	33	101	3100	3300	3500	3500
SN066	13/11/2011	21	72	1.6	30	1	0	0	0	29	87	2600	2500	2500	2700
SN067	13/11/2011	24	55	1.5	25	1	0	0	0	31	84	2930	2600	2500	2600
SN068	14/11/2011	25	62	1.5	28	1	0	0	0	29	90	2630	2610	2300	2300
SN069	17/11/2011	25	56	1.5	25	1	0	0	0	30	98	2790	2900	2700	2600
SN070	14/11/2011	24	62	1.6	26	1	0	0	0	34	101	3410	3430	3400	3230
SN071	31/11/2011	19	67	1.5	29	1	0	0	0	32	100	3100	3200	3000	3000
SN072	11/05/2011	25	49	1.4	25	2	1	1	0	29	95	2630	2750	2300	2300
SN073	11/02/2011	26	66	1.5	29	1	0	0	0	30	100	2930	3000	3300	3200
SN074	16/11/2011	30	68	1.5	30	3	2	2	0	32	100	3100	3200	3300	3200
SN075	18/11/2011	24	62	1.6	26	1	0	0	0	30	87	2790	2600	2600	2600

SN076	14/11/2011	23	60	1.6	25	2	1	1	0	31	100	2930	3100	2800	2800
SN077	17/11/2011	26	65	1.6	27	3	2	2	0	30	99	2790	2900	2800	2800
SN078	17/11/2011	23	68	1.5	29	1	0	0	0	27	85	2400	2300	2400	2300
SN079	18/11/2011	19	60	1.5	27	1	0	0	0	27	85	2400	2300	2400	2000
SN080	19/11/2011	23	66	1.6	28	1	0	0	0	33	100	3250	3300	3300	3400
SN081	19/11/2011	26	56	1.5	26	2	1	1	0	33	100	3250	3300	3000	3000
SN082	20/11/2011	30	66	155	28	1	0	0	0	27	96	2320	2592	2320	2400
SN083	20/11/2011	30	66	1.6	28	1	0	0	0	31	99	2930	3069	2750	2800
SN084	20/11/2011	25	56	1.5	23	1	1	0	0	29	90	2630	2610	2520	2600
SN085	20/112011	22	55	1.5	24	1	0	0	0	31	100	2930	3100	2950	3000
SN086	21/11/2011	21	64	1.6	25	2	1	1	0	30	99	2790	2970	2600	2700
SN087	21/11/2011	24	55	1.4	27	1	0	0	0	33	100	3250	3300	3300	3400
SN088	21/11/2011	30	52	1.5	24	3	2	2	0	30	99	2790	2970	2700	2800
SN089	20/11/2011	25	59	1.5	26	1	0	0	0	28	90	2480	2520	2300	2500
SN090	21/11/2011	27	56	1.5	25	1	0	0	0	25	80	2010	1800	2000	2200
SN091	22/11/2011	25	52	1.5	24	2	1	1	0	30	99	2790	2970	2750	2900
SN092	25/11/2011	22	69	1.5	29	2	1	1	0	31	100	3100	3100	2900	3310
SN093	25/11/2011	24	49	1.4	25	2	1	1	0	31	90	3100	2790	3100	3600
SN094	12/01/2011	21	66	1.5	29	1	0	0	0	30	90	2790	2700	2400	2200
SN095	12/01/2011	26	68	1.5	30	1	0	0	0	31	100	3100	3100	2850	3000
SN096	12/03/2011	26	64	1.6	26	2	1	1	0	30	90	2790	2700	2500	2600
SN097	12/03/2011	20	56	1.5	25	1	0	0	0	30	91	2790	2730	2600	2800
SN098	12/03/2011	20	62	1.6	26	1	0	0	0	31	100	2930	3100	3100	3200
SN099	12/03/2011	22	60	1.6	25	1	0	0	0	30	100	2790	3000	2900	3000
SN100	12/04/2011	20	56	1.5	26	1	0	0	0	29	100	2630	2900	2600	2500
SN101	12/07/2011	24	64	1.6	26	3	1	1	1	34	100	3410	3400	3200	3500
SN102	12/07/2011	22	52	1.5	24	2	1	1	0	29	90	2630	2810	2750	2600
SN103	12/08/2011	23	52	1.5	24	3	1	1	1	30	90	2930	2700	2500	2600
SN104	12/08/2011	30	66	1.5	29	4	3	3	0	26	100	2170	2600	2400	2300
SN105	12/07/2011	24	66	1.5	29	1	0	0	0	34	100	3410	3400	3300	3500
SN106	12/07/2011	21	62	1.6	26	2	1	1	0	28	90	2480	2520	2500	2650
SN107	12/08/2011	21	60	1.5	1.5	1	0	0	0	26	90	2400	2340	2400	2200
SN108	12/07/2011	22	69	1.6	29	1	0	0	0	29	100	2630	2900	3000	3100
SN109	12/09/2011	21	69	1.5	30	2	1	1	0	31	100	3100	3100	3000	3000
SN110	12/09/2011	24	52	1.5	24	2	1	1	0	30	90	2900	2700	2500	2400
SN111	12/09/2011	24	58	1.5	26	1	0	0	0	31	100	2930	3100	2850	2950
SN112	23/12/2011	23	69	1.6	28	3	1	1	1	29	100	2690	2900	2600	2700
SN113	24/12/2011	30	55	1.5	25	2	1	1	0	28	90	2480	2520	2300	2100
SN114	23/12/2011	23	69	1.5	30	1	0	0	0	28	90	2630	2520	2500	2500
SN115	23/12/2011	26	55	1.5	25	2	1	1	0	26	90	2320	2340	2300	2200
SN116	24/12/2011	27	72	1.6	30	2	1	1	0	26	90	2300	2340	1900	2000
SN117	23/12/2011	22	69	1.5	29	1	0	0	0	30	90	2630	2700	2600	2600

SN118	24/12/2011	28	62	1.6	26	3	2	2	0	34	100	3410	3400	3200	3500
SN119	24/12/2011	20	62	1.6	26	2	1	1	0	26	90	2300	2340	2000	2100
SN120	26/12/2011	25	69	1.5	30	3	2	2	0	30	90	2790	2700	2700	2700
SN121	25/12/2011	30	52	1.5	24	3	1	1	1	29	90	2630	2610	2800	2750
SN122	26/12/2011	28	56	1.5	25	4	3	2	0	30	100	2900	3000	2800	2900
SN123	26/12/2011	20	58	1.5	26	1	0	0	0	30	100	2900	3000	3000	2950
SN124	01/02/2012	22	58	1.5	26	1	0	0	0	30	100	2900	3000	2500	2600
SN125	01/02/2012	25	59	1.5	25	1	0	0	0	32	100	3100	3200	3260	3300
SN126	01/02/2011	28	69	1.6	28	4	2	2	0	32	100	3100	3200	3100	3100
SN127	01/03/2012	25	67	1.6	26	1	0	0	0	28	90	2500	2520	2300	2300
SN128	01/03/2012	25	55	1.5	25	1	0	0	0	31	100	2930	3100	3000	3000
SN129	01/03/2012	21	56	1.5	25	2	1	1	0	26	90	2300	2340	2600	2900
SN130	01/03/2012	21	56	1.5	26	1	0	0	0	28	90	2480	2520	2530	2800
SN131	01/04/2012	21	62	1.6	26	1	0	0	0	29	90	2630	2610	2852	3100
SN132	01/03/2012	20	69	1.6	28	2	0	0	1	26	90	2170	2650	2240	2300
SN133	01/04/2012	21	56	150	25	2	1	1	0	26	80	2170	2020	1982	2100
SN134	01/04/2012	20	52	1.5	24	1	0	0	0	29	90	2630	2610	2800	2800
SN135	01/05/2012	20	62	1.5	28	1	0	0	0	26	80	2300	2340	2400	2450
SN136	01/05/2012	27	70	1.5	30	5	2	1	2	30	90	2790	2700	2890	3000
SN137	01/04/2012	28	70	1.6	28	1	0	0	0	29	90	2630	2610	2100	2100
SN138	01/04/2012	23	62	1.5	28	2	1	1	0	29	90	2630	2610	2457	2600
SN139	01/05/2012	20	59	1.5	27	1	0	0	0	30	90	2790	2700	2430	2300
SN140	01/06/2012	19	65	1.5	27	1	0	0	0	29	80	2630	2230	2400	2400
SN141	01/06/2012	26	56	1.5	26	2	1	1	0	30	100	2790	3000	2790	2900
SN142	01/06/2012	20	69	1.6	27	2	1	1	0	32	100	3100	3200	3000	2800
SN143	01/06/2012	28	56	1.5	25	3	2	2	0	29	90	2630	2680	2330	2400
SN144	01/06/2012	19	64	1.6	26	2	0	0	1	26	90	2450	2650	2240	2300
SN145	01/07/2012	19	56	1.5	23	1	0	0	0	29	100	3100	2900	2700	3000
SN146	01/07/2012	24	62	1.5	28	1	0	0	0	30	100	2930	3100	2900	3000
SN147	01/09/2012	28	55	1.5	25	2	1	1	0	29	90	2630	2610	2360	2400
SN148	01/09/2012	25	69	1.6	29	2	1	1	0	35	100	3410	3600	3200	3450
SN149	01/09/2012	28	56	1.5	25	1	0	0	0	32	90	3100	2880	2900	3100
SN150	01/09/2011	22	70	1.5	30	1	0	0	0	29	90	2630	2610	2700	2800
SN151	01/09/2012	25	59	1.5	26	3	2	2	1	28	90	2400	2520	2500	2450
SN152	01/10/2012	22	76	1.6	30	2	1	1	0	35	102	3560	3570	3100	3500
SN153	01/10/2012	28	50	1.6	21	2	1	0	0	27	90	2320	2430	2430	2600
SN154	01/10/2012	27	64	1.6	26	2	1	1	0	28	90	2480	2720	2600	2650
SN155	01/10/2012	24	70	1.6	29	3	2	2	0	33	100	3250	3300	2870	2800
SN156	15/1/2012	22	68	1.5	30	2	1	1	0	30	100	2790	3000	2750	2900
SN157	16/1/2012	27	62	1.6	26	2	1	1	0	31	100	2930	3100	3100	3200
SN158	16/1/2012	25	56	1.5	25	2	1	1	0	30	90	2790	2700	2700	2900
SN159	16/1/2012	23	64	1.5	28	2	1	1	0	29	90	2630	2210	2560	2600

SN160	15/1/2012	24	69	1.5	30	1	0	0	0	31	100	2930	3100	2900	3100
SN161	16/1/2012	22	55	1.5	25	1	0	0	0	29	90	2630	2610	2400	2300
SN162	17/1/2012	24	68	1.5	30	3	2	2	0	35	101	3500	3535	3300	3400
SN163	17/1/2012	24	55	1.5	25	1	0	0	0	27	80	2320	2160	2200	2100
SN164	16/1/2012	24	69	1.5	30	2	1	1	0	32	100	3100	3100	3100	3100
SN165	17/1/2012	24	56	1.5	25	4	2	2	1	30	99	2790	3070	2900	2600
SN166	18/1/2012	22	56	1.5	25	2	1	0	0	30	90	2790	2700	2500	2600
SN167	15/1/2012	20	52	1.5	24	1	0	0	0	30	90	2790	2700	2450	2500
SN168	19/1/2012	22	65	1.5	27	1	0	0	0	30	90	2790	2700	2800	2800
SN169	20/1/2012	19	54	1.5	25	1	0	0	0	30	100	2790	3000	2850	2900
SN170	20/1/2012	24	65	1.5	28	2	1	1	1	30	100	2790	3000	2700	3000
SN171	21/1/2012	22	55	1.5	25	2	0	0	1	31	100	2930	3100	2850	3100
SN172	21/1/2012	24	69	1.6	28	2	1	1	0	33	101	3200	3300	3500	3400
SN173	21/1/2012	21	62	1.6	26	1	0	0	0	30	90	2790	2700	2800	2800
SN174	23/1/2012	24	69	1.6	29	1	0	0	0	26	90	2320	2340	2000	2100
SN175	21/1/2012	25	69	1.6	29	3	2	2	0	31	90	2930	2790	2800	2800
SN176	16/1/2012	29	64	1.5	28	2	1	1	0	30	90	2930	2700	2700	2700
SN177	23/1/2012	24	62	1.6	26	2	1	1	0	29	90	2790	2610	2700	2600
SN178	24/1/2012	22	64	1.6	26	2	0	0	1	29	100	2790	2900	2750	2800
SN179	25/1/2012	30	56	1.5	25	5	4	3	0	30	100	2970	3000	2900	2900
SN180	25/1/2012	28	62	1.6	26	1	0	0	0	27	80	2320	2160	2200	1900
SN181	24/1/2012	26	55	1.5	25	2	1	1	0	35	100	3560	3500	3100	3200
SN182	25/1/2012	22	52	1.5	24	2	1	1	1	30	94	2790	2820	2750	2700
SN183	27/1/2012	28	66	1.6	28	1	0	0	0	31	90	2930	2790	3000	3000
SN184	28/1/2012	24	62	1.5	28	2	1	1	0	30	94	2970	2820	2850	2900
SN185	27/1/2012	24	68	1.5	30	2	1	1	0	30	100	2950	3000	2800	2900
SN186	28/1/2012	24	62	1.6	26	2	1	1	0	32	100	3100	3200	3000	3200
SN187	29/1/2012	26	64	1.5	28	2	1	1	0	33	100	3250	3300	3000	3100
SN188	28/1/2012	22	52	1.5	24	1	0	0	0	32	90	3100	2880	2900	2900
SN189	25/1/2012	21	62	1.6	26	3	2	1	0	35	106	3400	520	3500	3700
SN190	30/1/2012	26	62	1.6	25	2	1	1	0	33	100	3250	3300	3000	3100
SN191	29/1/2012	22	56	1.5	25	1	0	0	0	32	90	3100	2880	2900	2900
SN192	02/02/2012	26	52	1.5	25	2	1	1	0	29	90	2790	2610	2670	2700
SN193	02/04/2012	28	54	1.5	25	2	1	1	0	34	100	3410	3400	3360	3500
SN194	02/04/2012	22	56	1.5	25	2	1	1	0	34	100	3410	3400	3520	3600
SN195	02/11/2012	20	52	1.5	24	1	0	0	0	24	90	1860	2160	2400	2300
SN196	02/12/2012	27	69	1.6	29	6	1	1	4	29	100	2630	2900	3200	3000
SN197	02/12/2012	22	59	1.5	26	1	0	0	0	28	100	2480	2900	2760	2800
SN198	13/2/2012	23	62	1.6	26	2	1	1	0	35	102	3560	3570	4000	4200
SN199	13/2/2012	21	64	1.5	28	1	0	0	0	26	90	2170	2340	1750	1900
SN200	23/2/2012	24	53	1.5	25	1	0	0	0	30	98	2790	2940	2700	2800

Annexure 1

CONSENT FOR PARTICIPATION IN RESEARCH STUDY

STUDY: COMPARISON BETWEEN CLINICAL METHODS AND ULTRASOUND PREDICTION OF EXPECTED FETAL WEIGHT WITH TRUE BIRTH WEIGHT- A PROSPECTIVE STUDY

Principal Investigator: BJ0110005

We request you to be a participant in above said research to be conducted at KLE'S Hospital from Sep 2011. Study will be conducted by, Postgraduate student in the Dept. Of obstetrics and gynecology at J.N. Medical College, Belgaum.

Your participation in this study is your voluntary decision whether or not to participate will not affect your current or future relationship with the KLE'S Dr. Prabhakar Kore Hospital and Medical Research Centre.

Procedure Involved:

If you agree in this research we would subject you to clinical measurement of symphysio-fundal height and abdominal girth. You would also be subjected to ultrasound examination to estimate expected fetal weight. The birth weight of your baby will be measured on a standard weighing scale.

Risk and benefits:

There are no additional risks involved in this procedure. Ultrasound examination is safe in pregnancy and it would be used only for fetal weight estimation. Participants will be getting the

same conventional treatment that they would receive, if they were not part of the study. If any complications arise during the procedure then the patients will be treated with best of our knowledge. There will be no compensation or payment for such medical treatment.

During the course of study you will be informed of any significant new findings such as changes in risks and benefits resulting from participation in the research.

Privacy and Confidentiality:

The only people who will know that you are a research participant are members of the research team. No information about you or provided by you, during the research will be disclosed to others without your written consent. When the results of the research are published or discussed the conferences, no information will be disclosed that would reveal your identity. Any information obtained in connections with this study and that can be identified with you remain confidential and will be disclosed only with your permission.

Voluntary participation:

Your participation in this study will help us to compare clinical methods and ultrasound expected fetal weight with true birth weight. This in turn will help us know if clinical methods can be used in low resource settings where ultrasound facilities are not available. You are free to discontinue the participation in the study at any time for any reasons and you will not be paid any reimbursement for participation in the research.

If you have any questions about your rights or research as research participant you may contact. You will be given a copy of this form for your information and to keep for your records.

Statement of Consent:

To voluntarily agree to take part in this study I must sign on the line below: If I chose to take part in this study I may withdraw at any time I am not giving up any of my legal rights, by signing this form. My signature below indicates that I have read or have read to me this entire consent form including the risks and benefits and had all questions answered, I will be given a copy of this consent form.

Signature of the Subject:

Name: Date:

Signature of the authorized representative:

Name: Date:

Relation to the Subject:

Signature of the witness:

Name: Date:

Signature of the investigator:

Name: Date: