A Study of Crinio-facial Measurement (Biparietal Diameter) of Fetus by Ultrasonography in Different Age Group of The Tribal Population of Jharkhand

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ABSTRACT

Introduction: The pregnancy cannot be dated accurately by clinical evaluation alone. Sonography is a useful and an accurate tool for estimation of the gestational age. Biparietal diameter is one the robust method of the basic biometric parameter used to assess fetal size and age.

Aims and objective: The aim of this study was to collect data on craniofacial measurement of fetuses of the different age group by Ultrasonography at RIMS, Ranchi and to correlate its relationship with the different fetal age group.

Materials and methods: The study was carried out on 100 pregnant women who gave definite history of their last menstrual period and 100 pregnant women who were not able to give definite history of their last menstrual period, in the tribal population of Jharkhand. The cases were selected from antenatal clinic of out-patients department of obstetrics and gynecology of RIMS, Ranchi. The ultrasonography was done by Dept of Radiology, RIMS, Ranchi.

Discussion: In obstetrics the duration of pregnancy is calculated by the first day of the last menstrual period at present study standard variation of gestation age base on L M P when the pregnancy cannot be date accurately alone by clinical evaluation alone. Sonography is accepted as the most useful and accurate tool for estimating gestational age.BPD diameter was measured by ultrasonography and along with clinical findings, average gestational age was determined.

Conclusion: Sonography is accepted as the most useful and accurate tool for estimating gestational age in those pregnant women who were not able to give definitive history of last menstrual period. Our study showed that the Growth rate of fetal BPD increases progressively as the fetal age increase in early weeks of pregnancy whereas growth is slow in later weeks of pregnancy, our study also showed that measurement of Biparietal diameter is a useful criterion to predict GA & determining EDD.

KEYWORD: Pregnancy, Gestational age (GA), Biparietal diameter (BPD), Ultrasonography (USG), Expected date of delivery (EDD).

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INTRODUCTION

Fetal age estimation is an important factor for maintaining the fetal growth and its development. It can influence obstetricaldecision concerning the timing and route of delivery. Ultrasound has proved to be a useful and

accurate method for determining the gestational age of the patient [1].

The measurement of biparietal diameter is an accurate method for providing the estimation of fetal age. The other parameters that can be used are crown-rump length, head circumference and femur length. These parameters also help in giving information about the growth of the fetus and the weight of the fetus [2]. In our country especially in a state as Jharkhand where the majority of the population lives in the rural background, most female don't have the record of the last menstrual period (LMP) and then these parameters are valuable in measuring the gestational age of the fetus. One of the most accurate and commonly used parameter is measurement of BPD for determining the age of the fetusup to the third trimester (36 weeks) [3,4].

According to race [5], nutrition [6] and demographic characteristic, variation can be seen in various populations [7] while measuring the size and weight of the fetus prenatally.

Since the record of the LMP is often unavailable measurement of BPD by ultrasound provides us with an accurate idea about the GA of the fetus. Our study was undertaken to assess GA with the help of USG in the local population of Jharkhand and to compare these values with other studies.

MATERIALS AND METHODS

This study was carried out at RIMS, Ranchi. Patients coming to the out-patient of obstetrics&gynecology were included in this study. The USG investigation was carried out by department of radiology, RIMS, Ranchi. The study was done between Jan 2019 and Dec 2019. The study group consisted of 200 pregnant women coming from rural areas of Jharkhand. Prior approval by the ethical committee was taken before the start of the study. In compliance with the pre-conception and prenatal diagnostic technique act (PCPNDT act), the F − form was completely filled by the patient and duly signed by the radiologist was taken.

The patient selection criteria were as follows:

1. Healthy females of the age group 18 and 35 years with a singleton pregnancy and cephalic presentation.

2. Women who did not develop any maternal or fetal complications during pregnancy

3. Women with normal blood pressure and a normal hemoglobin level

4. No history of any oral contraceptive use in three months prior to conception

The study group was divided in two groups:

1. The first group consisted of 100 patients who gave a definite history of the first day of the last menstrual period.

2. The second group consisted of 100 patients who were not able to give a definite history of last menstrual period.

Preparation of the patients: A detailed history was taken and patients were given appointments for ultrasonographic examination.

Patients were advised not to pass urine and come with full bladder that is the patients should drink 12 ounces of water or tea approximately 45 minutes prior to the examination. This is required as bowel loops are pushed away and the full bladder acts as acoustic window for proper visualization. Full bladder raises fetal head out of the pelvis for more accurate measurements. Full bladder can disengage and raise the head for accurate measurements.

Patient is placed supine, whole abdomen is exposed, and ultra-scan jelly is applied to the skin or transducer head and spread all over abdomen, so that there is no air between skin and transducer. Now the transducer is moved over the abdomen for searching the fetal head.

3 to 5 MHz transducer frequency should be used to provide high resolution with adequate depth penetration in all patients. In some obese patient low frequency like 3 MHz were used for taking craniofacial measurements.

Measuring Biparietal Diameter (BPD)

· The head of fetus was test visualized as an ovoid shape with complete midline echo in its longest axis.

· Thalami and cavum septum pellucidum were indentated as landmark for measuring BPD.

· The BPDs of fetuses were measured from leading edge to leading edge (from the outer

edge of temporoparietal bone to inner edge of the other temporoparietal bone at the level of thalamus). The soft tissues outside the calvarium are not included.

· A transverse scan was determined by placing the ultrasonic beam at right angles to midline echo and reading the angle from scale.
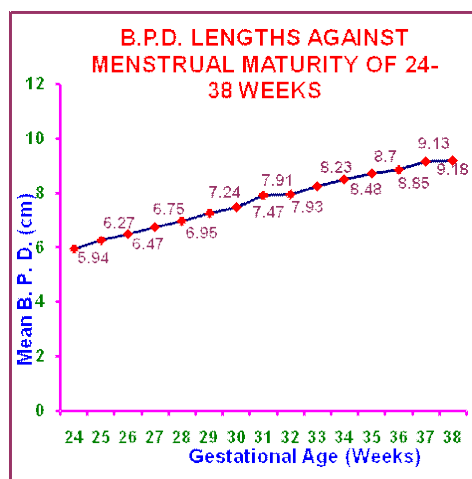
Ultrasonic beam is then placed at right angle to the midline echo across the maximum convexity of parietal bone and measurements were taken.
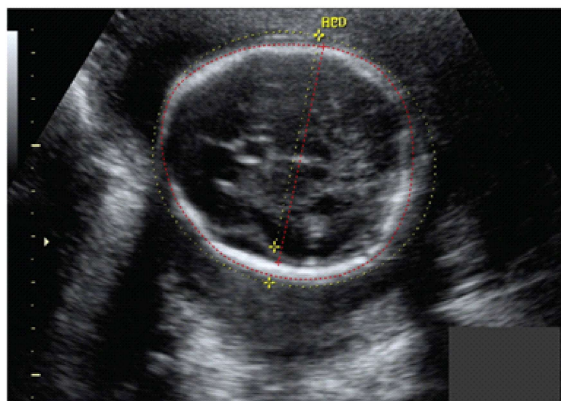
Correlation was done between GA and BPD using Microsoft excel 2013 software and correlation coefficient was derived.

OBSERVATIONS

Figure 1.

In our study there was a linear increase of fetal BPD from 24 to 38 weeks, the linear increase was statistically. A positive correletation was found between GA and the BPD (r-0.35).

The table 1 represents the mean BPD increase as follows:

(a) From 24 to 27 weeks it was 5.8 to 6.9

(b) From 28 to 31 weeks it was 5.9cm to 8.5 cm

(c) From 32 weeks to 35 weeks it was 7.5cm to 8.8 cm

(d) From 36 wks to 38 wks it was 8.0cm to 9.4 cm

Table 1:

GA (in week)	Number of cases	Range (CM)	Mean (GA)+_SD	
0	11	5.8-6.1	5.95 0.09	0.08
25	12	6.1-70	6.27 0.23	0.54
26	28	6.2-6.7	6.47 0.09	0.09
27	11	6.7-6.9	6.45 0.06	0.04
28	20	6.7-7.1	6.75 0.06	0.65
29	9	7.2-7.3	6.95 0.25	0.02
30	11	7.4-7.6	7.24 0.05	0.06
31	9	7.7-8.5	7.47 0.07	0.56
32	19	7.4-8.0	7.91 0.23	0.2
33	17	8.1-8.4	7.93 0.4	0.07
34	15	8.4-8.6	8.23 0.08	0.06
35	6	8.6-8.8	8.48 0.07	0.08
36	18	8.0-9.0	8.7 0.08	0.49
37	6	9.1-9.2	9.1,9.2	0.02
38	9	8.5-9.4	9.18,0.02	0.07

DISCUSSION

The present study has been conducted in 200 pregnant women and B.P.D.; H.C. B.O.D. measurements were made using real time gray scale ultrasound.

In the control group (1st group) we studied normal pregnant women who gave definite history of first day of last menstrual period.

Measurement of the B.P.D. become more accurate than CRL because CRL reflects errors associated with fetal flexion and extension.

More accurate measurement depends on examiner experience. In present study the sonologist performing obstetric ultrasound examination is having appropriate training in obstetric ultrasound. They are registered radiologists and having adequate knowledge of the basic physical principles of ultrasound equipments, record keeping requirements, indications, and safety.

At present study the standard velocity (1540 mt/s) is used to minimize the variation of gestational age based on LMP.

In study of 2nd group patients, who were not able to give definite history of last menstrual period, B.P.D. diameter was measured by ultrasonography and along with clinical findings,

average gestational age was determined. Comparison of the accuracy of ultrasonic measured was made by physical examination and weight of the neonates, delivered by normal delivery or by elective caesarean section.

In absence of reliable menstrual date, clinical estimators of fetal age are date of onset of quickening, first audible fetal heart sound and palpated dimension of height of fundus measured at regular interval. There are investigations like amniocentesis, radiology, vaginal cytology for determination of fetal age. Result of these investigations is less reliable and hazardous. Obstetricians needed a non-invasive, safe, reliable, and quick procedure for determination of fetal age. Ultrasonography has provided all these requirements.

According to Goldstein A. Tamir et al (1998) [8] conducted a study to construct nomograms of the size of the fetal orbit and lens during gestation. A linear growth function was observed between gestational age (GA) and orbital diameter, orbital circumference, and orbital area.

Kramer MS et al (1988) [9],stated that clinical dating of a pregnancy is usually based on the patient's recollection of the first day of her last menstrual period and on physical exami-nation of uterine size. Both these methods may be inaccurate, leading to inaccuracies in gestational age assignment.

Campbell et al (1985) [10] demonstrated 45% of pregnant women were not certain about their LMP. Dating by last menstrual period may be inaccurate because of variability in length of menstrual cycles (early or late ovulation occurs in approximately 20% of population), recent exposure to oral contraceptives or bleeding during early pregnancy.

Clinical dating is accurate only if the patient is giving first day of LMP with regular menstrual cycle and the uterine size correlates closely with the last menstrual period.

When the pregnancy cannot be dated accu-rately by clinical evaluation, sonography is ac-cepted as the most useful and accurate tool for estimating gestational age.

Tunon K (1999) [11] assessment of gestational age from the time of in vitro fertilization (IVF and BPD of embryo) in pregnancies conceived after IVF shows equally high agreement. This supports the ultrasound as a reliable method for estimation of gestational age.

Biparietal diameter is the most important measurement of the fetal head because its values are significantly superior to that of the average cranial circumferences.The use of ultrasound to measure the fetal BPD in utero has afforded the modernobstetrician to know beforehand the relationship between the size and shape of the fetal head and the pelvic brim. BPD has several practices which include determining the gestational age, estimating fetal weight and evaluating fetal growth.

In our study as shown in figure 1 there is a linear increase in mean BPD till the gestational age of 34 wks and there after the curve flattens out. Our study closely correlates with the studies done by other Indian authors such as Rajan et al [12]and Vaidya et al [13].

CONCLUSION

Sonography is accepted as the most useful and accurate tool for estimating gestational age. BPD is one of the useful criteria to predict GA and determining EDD. Our analysis confirmed that fetus anthropometric measurements significantly differ among different population group. Early ultrasound measurements are more accurate. The variation of ultrasound dating increase with gestation age. The present study shows that in India particularly in the tribal population of Jharkhand the first day of last menstrual period is not reliable.So there is need for antenatal determination of fetal age by ultrasound. The prenatal mortal-ity and morbidity can be reduced by properly estimating GA and growth using serial ultrasonography of fetus.

Conflicts of Interests: None

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