Original Article

Ultrasonographic Fetal Biometry in the Third Trimester in South Indian Population

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Abstract

Introduction: Knowledge of gestational age is useful in evaluating fetal growth because the normal range for the size of any fetal parameter changes with advancing age and it also allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy.

Materials and Methods: This study was conducted on 1000 normal third trimester pregnant women belonging to South Indian population. 50th percentile values of biparietal diameter, head circumference, abdominal circumference, and femur length were calculated in fetuses ranging from 31 to 40 weeks of the gestational age.

Results: A significant positive correlation was observed between the gestational age and all the parameters.

Conclusion: In all the pregnancies, the parameters taken are correlating with the gestational age and hence the ultrasound examination of parameters is a good guide to the age estimation of fetus.

Key words: Biparietal diameter, Femur length, Fetal biometry, Head circumference, Ultrasonography

INTRODUCTION

Ultrasonographic determination of fetal size to estimate the gestational age is very important in the present day obstetric practice as a significant proportion of pregnant women are unsure of their last menstrual period. Gestational age determination frequently relies solely on sonographic measurements of the fetal parts such as the biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL). Many variables affect fetal growth such as maternal illness, drug exposure, genetic syndromes, congenital anomalies, placental insufficiency, and others. Previous reports have shown that ethnicity plays a role in fetal growth.[1]

Thus, each ethnic group should have their own reference values for the different fetal biometric variables to provide

accurate assessments. It is useful to reduce unnecessary examinations due to wrongly diagnosed growth retardation in the cases with a small fetal growth potential. It also makes sense to improve the detection of objectively retardated children to a disproportionately high growth potential.[2]

Knowledge of gestational age is useful in evaluating fetal growth because the normal range for the size of any fetal parameter changes with advancing age and it also allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy. Hadlock values were commonly being used as reference charts in the ultrasound machine and most widely accepted for biometry measurements. However, literature suggests the ethnic variation in fetal biometry in relation to gestational age. This study was undertaken to give normal 50th percentile values of fetal biometry (biparietal diameter [BPD], FL, HC and AC) in 31-40 weeks gestational age of south Indian population.

MATERIALS AND METHODS

A study was designed to examine the relationships between fetal biometric parameters and gestational age;

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with a total of 1000 normal pregnant women in the last trimester of pregnancy. Biparietal diameter (Figure 1), head circumference (Figure 2), abdominal circumference (Figure 3) and femur length were measured and recorded in all the foetuses of pregnant women. The women with severe complications were not taken into consideration. All the ultrasonographic scans were performed by the sonographers under the supervision of single sinologist. A machine with curvilinear transabdominal transducers was used. In this study, 50th percentile values of BPD, HC, AC, and FL were calculated in fetuses ranging from 31 to 40 weeks of gestational age. All the research participants were recruited after obtaining informed consent. The study was approved by Institutional Ethical Committee.

RESULTS

The 50th percentile of the fetal parameter, i.e., BPD, HC, AC, and FL are calculated from the data obtained from the 1000 normal pregnant women ranging from 31 to 40 weeks of gestation. 50th percentile values were nearer to the means of all the parameters. Gradual increase in the BPD, FL, HC and AC were observed along with the gestational age (Table 1).

The data were processed by Pearson correlation coefficient, and it revealed that there was a strong positive correlation between the gestational age and the 50th percentile values of BPD, FL, HC and AC. The gestational age was independent

variable and BPD, FL, HC, and AC were dependent variables. The correlation suggests that as the gestational age increases all the dependent variables were also increased. Significant correlation was observed between gestational age with BPD, FL, HC and AC. All these parameters can be considered as predictors of gestational age.
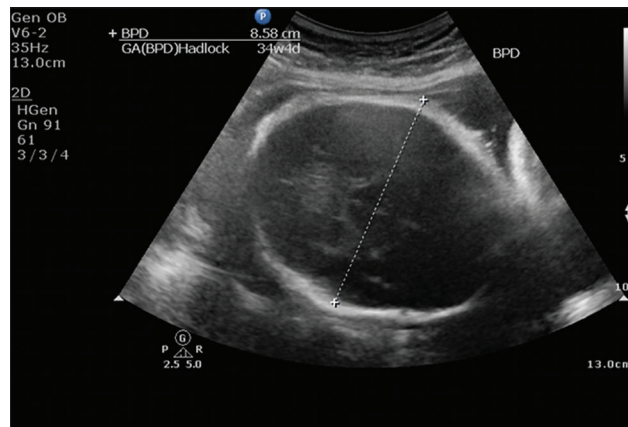

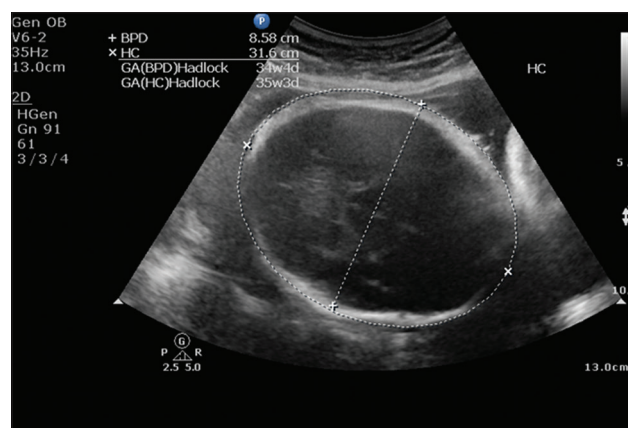**Figure 1: Ultrasonographic image of biparietal diameter of 34 weeks gestation**

Figure 2: Ultrasonographic image of head circumference of 34 weeks gestation

**Table 1: 50th percentile values of the BPD, HC, AC and FL in fetuses from 31 to 40 weeks of gestation age**

Gestational age (in weeks)	Number of cases	BPD	FL	HC	AC
31	82	77	61.88	295.8	275.8
32	104	80	62.2	306.33	285.6
33	99	81.8	65.1	316.4	295.4
34	118	84.5	68	325.8	306.3
35	96	87.4	69.5	331	316
36	101	89.4	71.6	333	321
37	116	92.3	74.2	336	326.3
38	84	94	76	340.5	331
39	128	96	77.8	345.4	335.5
40	72	96.5	78	348	337

BPD: Biparietal diameter, HC: Head circumference, AC: Abdominal circumference, FL: Femur length

Table 2: R, R² and P values

Parameters	R value	R² value	P value	Level of significance
BPD	0.9959	0.9918	0.00001	$P<0.05$ very significant
HC	0.9726	0.946	0.00001	$P<0.05$ very significant
FL	0.9956	0.9912	0.00001	$P<0.05$ very significant
AC	0.9851	0.9704	0.00001	$P<0.05$ very significant

BPD: Biparietal diameter, HC: Head circumference, AC: Abdominal circumference, FL: Femur length

Figure 3: Ultrasonographic image of abdominal circumference of 34 weeks gestation
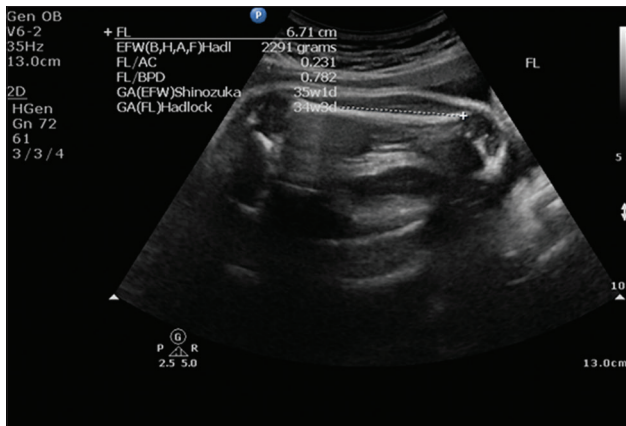
Figure 4: Ultrasonographic image of femur length in 34 weeks gestation

DISCUSSION

USA and UK values were commonly being used as a references chart in the ultrasound machine and most widely accepted for biometry measurement.[3,4] Hadlock *et al.* stated that the regression equations developed from white middle-class population appeared to be applicable to the populations of different socioeconomic and racial characteristics. Various studies have been reported that Indian fetal biometric values are lower than the Caucasian fetuses.[4-7] Lai and Yeo reported that Asians have smaller BPD, HC, AC, and FL when compared with white fetuses.[8] However, in this study, all the four parameters were similar to the western values. This is supported by Gupta *et al.* that the femoral lengths of Indian fetuses were similar to the western values.[9]

In all the pregnancies, the parameters taken are correlating with the gestational age and hence the ultrasound examination of parameters is a good guide to the age estimation of the fetus.

CONCLUSION

This study on fetal biometry by ultrasonography has attempted to show the importance of assessing the gestational age and fetal growth patterns, in the care and management of the pregnant patient, to date the pregnancy, to distinguish normal from abnormal growth patterns, in antepartum management of complications, for the scheduling of invasive procedures such as chorionic villus sampling, genetic amniocentesis and in the interpretation of biochemical tests such as expanded maternal serum alpha – fetoprotein screening. Allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy.

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