

FETAL BIPARIETAL DIAMETERS IN THE SECOND HALF OF GESTATIONAL PERIOD DETERMINED CLINICALLY AND ULTRASONOGRAPHICALLY

by

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SUMMARY

One hundred and ninety-eight fetuses were used for clinical measurement of biparietal diameter (BPD) with vernier caliper and 100 pregnant women with normal history were subjects for BPD measurement with ultrasonography. The results obtained with the two methods gave more or less similar data except that the BPD measured ultrasonographically was 2 to 3 mm less than that recorded clinically. The study helped, inter alia, in comparing the BPD measured clinically with that measured ultrasonographically during the second half of gestation.

Introduction

It is observed that the health standards of Indian adults vary widely from region to region. Similar regional variations are expected in the health standards of Indian babies. Such differences are due to ethnic and socio-economic differences in multi-racial developing country as India. Thus it is natural that growth rates of Indian fetuses too would exhibit wide regional variations. Starting from Streeter (1920) to Hern (1984) various workers have studied the fetal growth rate by measuring fetal parts and correlated the same with the gestational age. The earlier works were based on clinical measurements of fetal

parts undertaken on aborted fetuses or those delivered due to other fetal and or maternal pathological conditions. With the advent of ultrasonography it has been possible to monitor the growth rate and measure fetal parts with reasonable accuracy during pregnancy. The principal parameters studied for fetal growth monitoring included biparietal diameter, head circumference, abdominal transverse diameter, crown-rump length and length of femur. However, such studies have so far been conducted mostly in developed countries.

In India clinical measurements of fetal parts have been undertaken by Mukherjee and Mitra (1984) and ultrasonographic measurements of BPD have been studied by Sangeeta Pruthi Nee Sehra (1984). Since these studies have been carried out in different regions of a multiracial deve-

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loping country it is expected that the standard reference values would vary from region to region.

This study has been designed to record the standard fetal biparietal diameter (BPD) with clinical as well as ultrasonographic methods at different periods of gestation in Pondicherry and adjoining regions of Tamil Nadu. The data of BPD thus obtained would help in preparing for this region standard reference values of fetal BPD's at different gestational periods.

Material and Methods

The gestational age of fetuses studied ranged from 18 to 40 weeks. The gestational age was calculated from the date of last menstrual period (LMP). In order to avoid the possibility of recording dubious LMP only educated pregnant women belonging to similar socio-economic group were chosen for both clinical and ultrasonographic measurements. All subjects were from Pondicherry and adjoining regions of Tamil Nadu in South India. They were primigravidae (age 20 to 25 years, height 160 to 165 cm and weight 40 to 45 kg). None presented any deficiency syndrome, all having haemoglobin

concentration of > 10 gm%. It was confirmed in all cases that the subjects did not undergo hormone therapy during six months prior to the LMP. One hundred ninety-eight fetuses were used for clinical measurement of BPD. These fetuses were obtained from cases of spontaneous abortion, fetal death due to cord prolapse and abruptio placenta. All the fetuses were received from JIPMER hospital. The measuring instrument used for this purpose was a pair of calipers with vernier attachment.

A real time scanner Tomoson D (DSS-D-160) with an ultrasound velocity setting of 1500 m/sec is used and sonographic cephalometry is performed by electronic calipers using Real time Sector Scanner (B mode outer to inner) in all cases attending this hospital. Out of these cases the BPD of 100 fetuses of pregnant women who did not develop any complication throughout the period of pregnancy and delivered normally were considered for ultrasonographic measurement.

Results

The mean and standard error of the mean of fetal BPD's recorded clinically and

TABLE I
Values of Fetal BPD Measured Clinically (column A) and With the Ultrasound Technique (Column B)

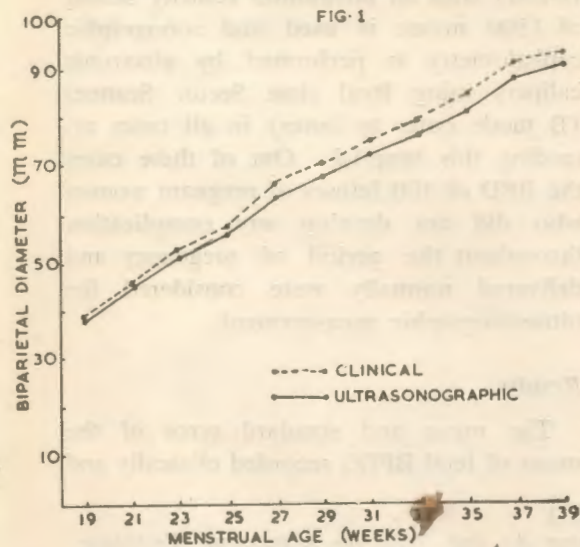
Gestational age (weeks)	Biparietal diameter (mm) $\bar{X} \pm$ SEM	
	A	B
19	39.1 \pm 0.094	38.8 \pm 0.022
21	47.3 \pm 0.057	46.0 \pm 0.007
23	53.3 \pm 0.095	51.9 \pm 0.020
25	58.4 \pm 0.079	56.8 \pm 0.027
27	66.8 \pm 0.085	64.0 \pm 0.023
29	71.6 \pm 0.022	68.9 \pm 0.020
31	76.4 \pm 0.091	73.0 \pm 0.018
33	80.0 \pm 0.097	77.7 \pm 0.030
35	85.8 \pm 0.025	82.0 \pm 0.023
37	92.4 \pm 0.066	89.0 \pm 0.023
39	94.5 \pm 0.075	91.7 \pm 0.022

ultrasonographically during 18 to 40 weeks of gestation are presented in Table I. It is evident from Fig. 1 that the increase in the fetal BPD in normal intrauterine development is gradual. This growth rate shows a liner pattern. It is observed that the values of BPD measured by the two methods do not vary significantly provided allowance of 2-4 mm is made in the clinical measurement values on account of gradual increase in the soft tissue surrounding the skull particularly from 27 weeks of gestation onwards.

of racial and socio-economic differences. For a multiracial developing country as India the standard reference values of different fetal parameters, are likely to vary from region to region. Clinical measurements of some fetal parameters at different gestational periods in Pondicherry and surrounding regions of Tamil Nadu have been undertaken by Mukherjee and Mitra (1984). Some Indian authors have measured fetal BPD's only ultrasonographically (Sangeeta Pruthi Nee Sehra, 1984) in Delhi region.

BPD is one of the most reliable of fetal growth parameters. Hence this work was undertaken to measure fetal BPD's at different gestational periods in Pondicherry and surrounding regions of Tamil Nadu. In order to increase the reliability of these measurements both clinical and ultrasonographic techniques had been employed and data thus obtained had been compared.

In the present work it is found that the increase in fetal BPD from 19 to 39 weeks is linear with slight flattening of curve after 35 weeks. The data obtained with the two methods do not show any significant variation before 27 weeks of gestation. The higher values obtained by clinical measurement after 27 weeks of gestation is due to gradual increase in soft tissue surrounding the skull.



Discussion

Various fetal parameters have been measured ultrasonographically, e.g. CRL (Robinson and Felming, 1975) biparietal diameter and abdominal circumference (Campbell and Thomas, 1977), head circumference (Doubilet and Greenes, 1984) and abdominal transverse diameter (Sturla and Per Goltum, 1982). The data published by these authors would not be applicable in case of Indian fetuses on account

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References

1. Campbell, S. and Thomas, A.: *Brit. J. Obstet. Gynec.*, **84**: 165, 1977.
2. Doubilet, P. M. and Greenes, R. A.: *A.J.R.* **142**: 661, 1984.

- 3. Hern, W. M.: *Obstet. Gynec.*, **63**: 26, 1984.
- 4. Mukerjee, B. and Mitra, S. C.: *J. Anat. Society of India*, **34**(1): 1985.
- 5. Robinson, H. P. and Felming, J. E. E.: *Brit. J. Obstet. Gynec.*, **82**: 702, 1975.
- 6. Sangeeta Pruthi Nee Sehra: M.D. thesis *Obstet. Gynec.*, Delhi University, 1984.
- 7. Streeter, G. L.: *Contrib. Embryol.*, **1**: 143, 1920.
- 8. Stula H. and Per Goltim Aita *Obstet. Gynec. Scand.*, **61**: 299, 1982.

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SUMMARY

This study was conducted to determine the relationship between fetal biparietal diameter and gestational age. A group of 100 normal pregnancies was compared with a group of 100 abnormal pregnancies. The results showed that the biparietal diameter was significantly smaller in the abnormal group. This finding suggests that fetal growth retardation is associated with abnormal pregnancies.

... during pregnancy and full term ... (1977) ... (1975) ... (1973) ...

... of pregnancy is a disease ... (1977) ... (1975) ... (1973) ...