

Original research paper

Ultrasonographical Age Estimation from Fetal Biparietal Diameter

*Garg A, **Pathak N, ***Gorea RK, ****Mohan P

Abstract

In a wide variety of circumstances of feticide, fetal age determination is important for identification. This is an important identification feature in postmortem cases. There are many different parameters to determine the age from fetus. But actual problem arises, when the body of fetus is either mutilated or decomposed. The data of femur length and other variables at various gestational ages can be used for age estimation of fetus at autopsy. But at time of autopsy each bone may or may not be present for autopsy. So, this study of ultrasonic fetal biparietal diameter was done to collect data, which can be utilized to ascertain the age of fetus in autopsy cases particularly in the Punjab region. This regional data can also be used to determine gestation age, if exact last menstrual period date is not known in antenatal cases of this region or to develop charts for ultrasound dating of pregnancy based on bi-parietal diameter and, second, to derive reference curves for normal fetal growth based on bi-parietal diameter.

Key Words: Age Determination, Bi-Parietal Diameter, Ultrasonography, Gestational Age, Pregnancy, Ante Natal

Introduction:

Measurement of various fetal body parts is known as fetal biometry. Ultrasonography is done in every ante natal case for measurement of various fetal parts. If the exact date of LMP is known then it can be useful in correlating the bi-parietal diameter with gestational age.

During fetal autopsy, all the parameters for identification, may or may not be available particularly when body is decomposed or mutilated and sometimes only few bones are available. Then there is no other option except to find out the age from bones. Measurement of length of bone and diameters at autopsy is very easy, less time consuming and a cheaper way of finding out the age of the fetus. In many cases we may not have all the bones. If skull is present then we can measure bi-parietal diameter and by doing this study, we are able to provide data in form of charts to solve such cases.

Review of literature:

No single parameter is sufficient in giving accurate fetal age ultrasonographically. Few useful measurements in the fetus are femur length, length of kidney [1], abdominal circumference and head circumference. [2]

Corresponding Author:

*Assistant Professor,
Department of Forensic Medicine
E mail: anil9637@yahoo.com
Mobile: +919872402904

** Associate Professor, Obstetric & Gynecology
*** Professor & Head, Forensic Medicine
**** Professor & Head, Obstetric & Gynecology
Gian Sagar Medical College, Patiala,
Punjab, India, 140601

If more than one parameter is taken in determining the age of fetus, it is considered better as reliance is not kept on one parameter. [2]

Measurement of kidney length is useful between 24th to 38th weeks. [1] Femur length and BPD have more value prior to 36 weeks but after 36 weeks head circumference and femur length has more value [2]. Length of femur is also better parameter as compared to BPD for determination of age of fetus in the third trimester. [3] Bi-parietal diameter measurement is in less common use after 20 weeks of gestation. Measurements of bi-parietal diameter also help in determination of age of fetus.

The bi-parietal diameter and femur length correlated equally well with gestational age. However, the bi-parietal diameter was more than twice as sensitive as the femur length to variation in fetal growth. Femur length had a larger error associated with its measurement. [4]

It is well established that ultrasound measurement of femur length and bi-parietal diameter are comparably accurate estimators of gestational age when obtained in the first half of pregnancy. Both estimators, however, become less accurate later in pregnancy. [5]

It is well known that ethnicity has a significant influence on fetal biometry. [6, 7]

The correlation coefficient of gestational age versus fetal femur length is statistically greater than that of the gestational age versus fetal biparietal diameter. [8]

Measurement of the fetal femur appears to be a reliable method for assessing gestational age, which can compensate for the limitations of the BPD method. [9]

Material and Method:

The antenatal cases coming to Gian Sagar Medical College for routine Ultrasonography during pregnancy will be studied for bi-parietal diameter. This is a random case study. A total of 271 cases were taken. Only those cases had been taken where there was no mistake for last menstrual period (LMP). Consent of every volunteer was taken. Cases with fetal congenital and developmental abnormalities were excluded. During Ultrasonography, fetal bi-parietal diameter was noted. LMP of these cases was recorded. We had prepared a graph from the available data. Then this graph will be utilized to solve the cases of age determination in medico legal cases.

Result:

With the help of ultrasonic examination of these volunteer cases, the measured bi-parietal diameter is presented in tabulated form.

Chart No. 1 shows location based distribution of cases taken in this study depicted that most of the cases belong to Punjab state.

Chart No. 2 shows age wise distribution of cases taken in this study.

Bi-parietal Diameter:

Table No. 1 shows the tabulated form of bi-parietal diameter at different lunar months of gestational months while Chart No. 3 is showing its graphical representation. According to present study, average bi-parietal diameter of skull at 4th lunar month of pregnancy is 30.63 mm and maximum at 10th lunar month is 87.43 mm.

Table No. 2 shows the tabulated form of biparietal diameter at different weeks of gestational age while chart 4 is showing its graphical representation. According to present study, minimum biparietal diameter of skull at 14 weeks of pregnancy is 28.30 mm and maximum at 39 week is 93.08 mm.

Discussion:

We had prepared the charts or graphs from the available ultrasonic data of biparietal diameter especially for Punjab region. Trend line was also drawn. These trend line and graphs of biparietal diameter obtained ultrasonically can be used to determine the age of fetus brought for autopsy. The expected date of delivery can also be calculated by using these charts or graphs by getting gestation age from biparietal diameter obtained from ultrasound in antenatal cases where last menstrual period is not known. These charts are more useful in Punjab region population as these are directly produced from local population. On the whole, if one variable is known, we can calculate the other variable from these graphs and trend line.

Good curves in the graphs were obtained when horizontal axis becomes lunar month gestational age [10].

Conclusion:

Our new set of reference chart and table for fetal biometric measurements in reference to biparietal diameter is ready for Punjabi population group.

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Chart -1
Location Wise Distribution of Cases

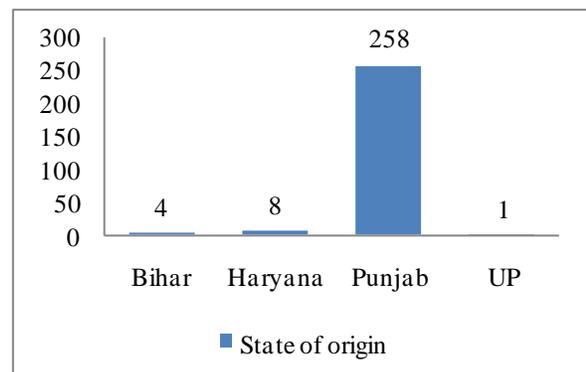


Chart No. 2
Showing Age Wise Distribution of Case

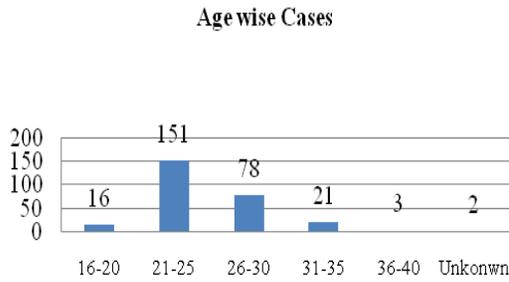


Table-1
Showing Average Biparietal Diameter in Relation to Lunar Months of Pregnancy

Gestational Age (lunar months)	Average length(mm)
4	30.63
5	41.76
6	53.93
7	63.65
8	76.50
9	83.21
10	87.43

Chart-3
Showing Average Bi-parietal Diameter in Relation to Lunar Months of Pregnancy

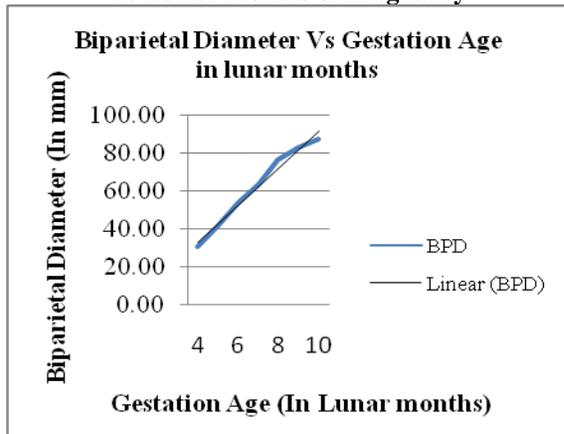


Table- 2
Showing Average Bi-parietal Diameter in Relation to Weeks of Pregnancy

Gestational Age (in wks)	Average BPD (In mm)	Gestational Age (in wks)	Average BPD (In mm)
14	28.30	27	71.73
15	31.10	28	71.44
16	34.68	29	73.63
17	36.98	30	76.65
18	43.73	31	79.88
19	48.03	32	80.91
20	49.20	33	82.52
21	51.68	34	83.31
22	53.65	35	85.77
23	56.88	36	84.12
24	58.24	37	86.94
25	59.47	38	89.69
26	66.12	39	93.08

Chart-4
Showing Average Bi-parietal Diameter in Relation to Weeks of Pregnancy

