



CORRELATION OF FOETAL FEMUR LENGTH, FOETAL BIPARIETAL DIAMETER WITH FOETAL WEIGHT IN 2nd & 3rd TRIMESTER BY ULTRASONOGRAPHY

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ABSTRACT

Accurate knowledge of foetal gestational age is important as it helps the pregnant women, her family; the obstetricians and the radiologists in the planning of pregnancy in the prediction of the maturity and expected date of delivery and in the detection of growth retardation of foetus and congenital anomalies e.g Hydrocephalus, Spina bifida, Anencephaly etc. The advent of ultrasound method for imaging of foetus and its environment which began first with bistable static images and has now evolved to its current status of a very high resolution dynamic imaging has had a broad encompassing impact upon the very essence of obstetric care. Foetal ultrasonography has been one of the fastest developing fields in imaging of foetus. The ability to examine the foetus and to detect foetal growth, foetal gestational age and any other foetal anomalies has dramatically changed the diagnosis and practice of Obstetrics. Hence to determine the correct foetal gestational age various sonographic parameters are used.

AIMS AND OBJECTIVES- To determine the gestational age using the biparietal diameter, femur length from 28- 40 weeks of pregnancy along with foetal weight. In the present study data was compared to standards through their means and standard deviations to find out the prediction error in population.

MATERIAL AND METHOD- 500 normal pregnant women were observed in radiodiagnosis department of Jnana Hospital, Ajmer. Patient of 2nd and 3rd trimester were considered and ultrasonographic measurements with consent form were recorded.

RESULT- The range of variation of observed value of Biparietal Diameter, Femur length of foetus with $\pm 2SD$ were taken to eradicate error.

CONCLUSION The mean Biparietal Diameter increased from 73.11 mm at 28 weeks to 73.11 mm at 40 weeks while the femur length comparatively increased from 28 to 40 weeks but at a lower variations from 51.75 to 75.78

KEYWORDS : Biparietal Diameter, Femur length, foetal G.A, Ultrasonography.

INTRODUCTION-

Foetal ultrasonography has been one of the fastest developing fields in imaging of foetus. The ability to examine the foetus and to detect foetal growth, foetal gestational age and any other foetal anomalies has dramatically changed the diagnosis and practice of obstetrics. Hence to determine the correct foetal gestational age various sonographic parameters are used. Biparietal diameter is the most commonly measured parameter of foetal size to predict the gestational age, evaluation of foetal growth and foetal weight estimation. It has satisfactory results in 95% cases. It has good reproducibility because of fixed intracranial landmark and well defined end points for measurements. Femur length is especially useful where it is difficult or impossible to obtain a reliable BPD. The measurement is best obtained with a linear array transducer. Khalid Shehzad, Moazzam Ali and Shahida Zaidi (2006) said that Foetal biometry is a discipline devoted to the measurement of the several parts of foetal anatomy and their growth. The real-time ultrasound scanners have given a numbers.

MATERIAL & METHOD

The study on the estimation of Foetal Biparietal Diameter and Femur Length in 2nd trimester and 3rd trimester in normal pregnant women by real time ultrasound measurement has been conducted in Radiodiagnosis department of Jnana Hospital Ajmer. Total of 500 cases were taken. The patients included in this study were of gestational age of 2nd and 3rd trimester. The ultra sound measurement of foetal Biparietal Diameter and Femur Length were made in millimeters.

- Biparietal Diameter (BPD)- was measured from the leading edge of echo from the proximal skull surface to the leading edge of echo from distal echo surface – outer to inner diameter.
- Femur length (FL)- was measured using a straight -line measurement between the two ends of femoral diaphysis.

OBSERVATION:-

500 cases were studied from 28 weeks of gestation age to 40 weeks excluding twins and any congenital anomalies.

Table 1

S.NO.	F.G. Age	No. of cases
1	28	34
2	29	30
3	30	60
4	31	52
5	32	49
6	33	65
7	34	52
8	35	39
9	36	41
10	37	32
11	38	19
12	39	12
13	40	05

TABLE -2 SHOWING MEAN OF FOETAL BIPARIETAL DIAMETER AND FOETAL LENGTH

Foetal Gestational Age (weeks)	No. of cases	Mean BPD (mm)	Mean FL (mm)
28	32	73.11	51.75
29	30	75.97	56.77
30	54	78.31	58.41
31	55	80.42	59.73
32	48	81.67	62.75
33	65	84.58	65.28
34	60	85.15	66.88
35	42	86.91	69.12
36	44	89.69	70.10
37	30	90.47	71.62
38	19	93.21	74.29
39	7	95.31	74.90
40	4	95.85	75.78

Table 3- CALCULATED EQUATION TO ESTIMATE THE FOETAL BIPARIETAL DIAMETER AND FOETAL LENGTH BY FOETAL GESTATIONAL AGE

S.NO.	PARAMETERS	VERSUS FOETAL BIPARIETAL DIAMETER	VERSUS FOETAL FEMUR LENGTH
1	Number of cases	500	500
2	Covariance	26.25	27.12
3	Correlation	0.99	0.98
4	Intercept	21.68	0.08
5	Slope	1.87	1.93
6	Standard error of prediction	2.52	1.19

Table 4-CALCULATED EQUATION TO ESTIMATE THE FOETAL GESTATIONAL AGE BY FOETAL BIPARIETAL DIAMETER & FOETAL LENGTH

S. No.	Parameter	VERSUS FOETAL BIPARIETAL DIAMETER	VERSUS FOETAL FEMUR LENGTH
1	Number of cases	500	500
2	Covariance	26.25	27.12
3	Correlation	0.99	0.98
4	Intercept	-11.23	0.721
5	Slope	0.52	0.50
6	Standard error of prediction	0.34	0.61

RESULT

From the present study the data observed was put into the software and the following resultant equation can be generated

From table no 3; the foetal Biparietal Diameter and Femur Length can be generated by foetal gestational age-

$$Y = 21.68 + 1.87 * G.A(x) \text{ where } X = \text{Biparietal Diameter}$$

$$Y = \text{Foetal Gestational Age}$$

$$Y = 0.08 + 1.93 * G.A(x) \text{ where } X = \text{Foetal Femur length}$$

$$Y = \text{Foetal Gestational Age}$$

From table no 4; the Foetal gestational age can be generated by foetal Biparietal Diameter and Femur Length -

$$Y = -11.23 + 0.52 * X \text{ where } X = \text{Foetal Biparietal Diameter}$$

$$Y = \text{Foetal Gestational Age}$$

$$Y = 0.721 + 0.50 * X \text{ where } X = \text{Foetal Femur length}$$

$$Y = \text{Foetal Gestational Age}$$

DISCUSSION-

The variability in predicting gestational age from the Biparietal Diameter increases as pregnancy progress. Sabbagha et. al have advocated that the relationship between the Biparietal Diameter and foetal age. A method was presented in which the third trimester foetal Biparietal Diameter values were used to precise probability the estimation of foetal age. The range of variation of the observed mean of the foetal Biparietal Diameter with + 2SD to eradicate the error in the present study. The observed mean foetal Biparietal Diameter for each week of third trimester shows least variation from the data presented by Hadlock et.al in his studies.

While the study done by Campbell and Warsof found the estimated date of confinement on ultrasonography measurement of foetal Biparietal Diameter was compared with menstrual history in its ability to predict the actual onset of spontaneous labour of patients. The present study shows that if we take multiple parameters we can assess gestational age more accurately.

O'Brien and coworkers found the Foetal Femur length as an indication of menstrual age subsequently several studies have evaluated that the Foetal Femur length as a prediction of menstrual age. These studies have demonstrated that the measurement of

Foetal Femur length with ultrasonography is very reproducible because of sharp bony margin.

It had been noted that significant improvement in the observed variability in predicting menstrual age from foetal measurements can be achieved when two or more of these measurements are used in combination to produce a composite age estimate. Due to anomalies present in head and femur ; the number of workers have use the multiple parameters to detect the gestational age.

Summary and Conclusion – It is concluded that data and results are predictive of foetal gestational age, and it can guide and give the correct foetal gestational age to radiologists as well as the obstetricians to make the right decision regarding the management of the patients. In present study the mean estimated from real time ultrasound, was similar to study done by R.Rajan. observed mean of the Fetak Biparietal Diameter and Femur length for each week of third trimester shows least variations from the data presented by Hadlock et.al.

References

1. Hadlock FP, Harriet RB, Carpenter RJ et al. Sonographic estimation of foetal weight. The value of foetal femur length in addition to head and abdomen measurements. *Radiology* 1984; 150:535.
2. Hadlock FP, Harriet RB, Deter RL et al. A prospective evaluation of foetal femur length as a predictor of foetal gestational age. *J Ultrasound Med* 1983; 2: 111
3. Hebbar , Shripad (2003) Critical evaluation of various methods of estimating foetal weight by ultrasound. *Journal of Obstetrics and Gynaecology of India*, 53 (2) .pp. 131-33
4. Heer IM, Kumper C, Vogtle N, Muller- Egloff S , Dugas M , Strauss A: Analysis of factors influencing the Ultrasonic Foetal Weight Estimation. *Foetal Diagn Ther* 2008 ; 23: 204-210.
5. Hobler CW, Qu3etel TA . The relationship between foetal femur length and foetal biparietal diameter in the last half of pregnancy. *Am. Institute of Ultrasound in Med* Aug 17-21, 191 ; 34.
6. Mhaskar R; Agarwal N; Takkar D; Buckshree K; Anand Lakshmi,Deorare A .: J. *Obstet Gynaecol* 1992; 42, 321.
7. Ming Neng Yeh , Luis Bracero et al. ultrasonic measurement of foetal femur length as an index of foetal gestational age. *Am J Obstet & Gynaecol* 1982 ; 144: 519
8. Niknafs, Parvin Ph. D. ; Sibbald , John Ph. D. Accuracy of single ultrasound parameters in detection of foetal growth restriction *American Journal of Perinatology* . 2001. Pp 18(6) : 325-334.
9. Chauhan SP, Perry KG, Magann EF. Intrapartum assessment of birth weight at term: clinical versus sonographic models using from one to four foetal parameters. *J. Matern. Foetal Invest.* 1994; 4:263-7.
10. Nahum Gerard G; Stanislaw Harold Ultrasonographic prediction of term birth weight. *American Journal of obstetrics and gynecology* .2003, vol.