



TRANSCEREBELLAR DIAMETER AS A PARAMETER FOR DETERMINATION OF GESTATIONAL AGE FROM 20TH WEEK TO TERM IN HEALTHY WOMEN WITH UNCOMPLICATED PREGNANCY

Obstetrics & Gynaecology

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ABSTRACT

Background: - Accurate assessment of gestational age is pivotal to give quality maternity care. Ultra-sonographic fetal biometry is the most widespread method to establish gestational age (GA). Ultrasound parameters like Biparietal Diameter (BPD), Head Circumference (HC), & Femur Length (FL) in second and third trimester are not very reliable for dating the pregnancy. Fetal Transverse cerebellar diameter (TCD) has been shown to strongly correlate with gestational age in late trimesters and even in cases like IUGR, where others parameters like BPD, HC & AC are affected.

Methods: - The present study was conducted in Government Medical College, Jammu on a population of 100 pregnant women between 20-36 weeks of gestation. The accurate gestational age of all the subjects of study population was already calculated from early dating scan. TCD was measured in all subjects in centimeters at 20 weeks, 28 weeks & 36 weeks of gestation along with other parameters like BPD, HC & FL.

Result: - In the present study, it was found that standard error from the gestational age at all weeks is least for TCD. It indicates that the TCD in the present study correlated well with assigned gestational age.

Conclusion: - It has been concluded from the present study that TCD can be used as an individual parameter in estimating gestational age especially in late trimesters and in cases like IUGR where other biometric indices are not reliable.

KEYWORDS

Pregnancy, TCD, Ultrasound.

INTRODUCTION:-

Sine long time, there has been search for a single ultrasonographic parameter to determine the gestational age which is not affected by IUGR. As accurate age of the fetus plays an important role in obstetrical management, uncertain dates and no assigned ultrasound dates in early trimester poses a dilemma in management decisions leading to iatrogenic pre or post maturities. There is need for accurate gestational age while planning for termination of pregnancy due to complications in high risk cases like Preeclampsia, IUGR, GDM and accurate gestational age is also required for planning fetal investigation and fetal therapy. Various sonographic parameters commonly used are BPD, HC, AC & FL. As the pregnancy advances these parameters became increasingly unreliable in prediction of GA. Therefore accurate estimation of GA in late 2nd and 3rd trimesters and in conditions like IUGR where these parameters are affected, still remains a problem. Various non traditional sonographic parameters for estimating GA are being studied like Transverse cerebellar diameter, Fetal Foot length, epiphyseal ossification centers, amniotic fluid volume, Placental grading and fetal kidney length. Transverse cerebellar diameter is strongly correlated to gestational age and is more accurate method of GA estimation than BPD, FL & HC after 24th Weeks of gestation. In this study, we sonographically measured TCD, evaluated its role in estimation of GA and compared its accuracy with other established biometric indices.

TCD is calculated by the maximum diameter between the cerebellar hemispheres on axial scan. The value of TCD in millimeters corresponds roughly to the period of gestation between 14-40 weeks.

METHODS:-

This study was conducted for a period of one year. Pregnant women referred from Department of Obstetrics and Gynecology for antenatal scan comprised present study sample. 100 women with singleton pregnancies who were certain of their LMP's and whose pregnancies were accurately dated by an early dating scan were included after counseling and informed consent. Study group women underwent fetal biometric and Transverse Cerebellar Diameter measurement at 20, 28 & 36 Weeks of pregnancy.

Cases of Chromosomal and Congenital anomalies, multiple pregnancies were excluded from the study. The TCD is calculated by the maximum diameter between the cerebellar hemispheres on axial scan. Statistical analysis was done. Pearson correlation was calculated for estimated gestational age and the measured gestational age by BPD, HC, FL & TCD.

RESULT:-

100 women were selected to complete the study with the ages ranging from 18-35 years.

Figure 1 show maximum number of women between 24-28 years of age (56%) and which was the highest number of the study, whereas 29-34 age group was lowest (17%) in number among the subjects selected for the study.

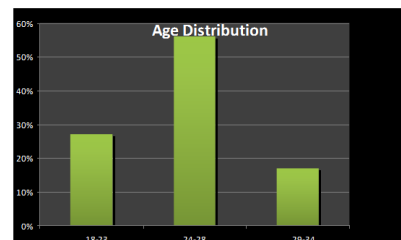


Figure 1:- Age Distribution of the subjects in the study

Figure 2 shows that both primigravide and multigravide were included in the study and primigravide (66%) was the highest frequency compared to multigravide (34%).

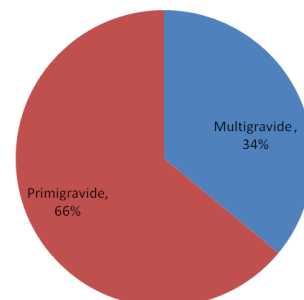


Figure 2:- Distribution of parity

Table 1 indicates the mean of the gestational age determined by all parameters including TCD. According to the observations, the standard deviation from the gestational age is least for TCD. It can be concluded that TCD estimates the gestational age at any given gestation with the least deviation from the mean.

Table 1:- The relationship of gestational age and the various indices used for gestational age between 20-36 weeks including TCD.

WEEKS	MODE	SD (Standard Deviation)	SE (Standard Error)
At 20 Weeks			
BPD	19 weeks	0.624	0.062
HC	19 weeks	1.620	0.16
FL	19 weeks	0.614	0.0614
TCD	20 weeks	0.545	0.0545
At 28 Weeks			
BPD	28 weeks	0.893	0.0893
HC	28 weeks	1.127	0.1127
FL	28 weeks	0.862	0.0862
TCD	28 weeks	0.612	0.0612
At 36 Weeks			
BPD	34 weeks	0.397	0.0397
HC	35 weeks	1.924	0.192
FL	37 weeks	1.451	0.145
TCD	36 weeks	0.315	0.0315

Table 2 shows that the standard deviation and 95% confidence interval of all the measurements. It is clear from table 2 that 95% confidence interval and standard deviation for TCD is least at all gestations indicating the reliability for TCD for estimation of gestational age at all gestational ages. Also, TCD at any given gestation in millimeters almost corresponds to the gestational age of the fetus. This also helps in easy estimation of gestational age without any software or formula.

Pearson's correlation was calculated for estimated gestational age and the measured gestational age by BPD, HC, FL & TCD. It is observed that all parameters are highly correlated ($r^2=0.90-0.98, P<0.05$).

Table 2:- The mean and confidence interval of measurement of various parameters at different gestational age.

WEEKS	Mean (cm) ± SD	95% CI
At 24 weeks		
BPD	4.51 ± 0.239	4.51 ± .1049
HC	16.98 ± 0.94	16.98 ± 0.41
FL	3.17 ± 0.18	3.17 ± 0.079
TCD	2.142 ± 0.189	2.142 ± 0.037
At 28 weeks		
BPD	7.03 ± 0.21	7.03 ± 0.121
HC	25.7 ± 0.77	25.7 ± 0.33
FL	5.30 ± 0.158	5.30 ± 0.069
TCD	3.08 ± 0.315	3.08 ± 0.617
At 36 weeks		
BPD	8.74 ± 0.19	8.74 ± 0.083
HC	31.5 ± 0.606	31.5 ± 0.265
FL	6.82 ± 0.147	6.82 ± 0.084
TCD	4.02 ± 0.241	4.02 ± 0.0472

With increasing gestational age, there was a significant increase in TCD values. The correlation between TCD and gestational age is very strong ($r=0.984$). The standard error is least for TCD at different gestational age when compared with other parameters.

DISCUSSION:-

Estimation of gestational age in the pregnancies without accurate last menstrual period information is a daunting task for sonologist, especially in case of growth restricted pregnancies. Although for normal pregnancy fetal biometric parameters are helpful for the estimation of gestational age as successive growth of these parameters during the course of pregnancy helps to identify the gestational age, however in case of growth restricted pregnancies, the fetal growth is often impaired and fails to match with the progression of pregnancy. In such cases, estimation of gestational age is difficult more so in case of missing LMP information.

Hence the focus of a sonologist is generally on such parameters that can be used independently without being affected by the impaired growth of the fetus. In recent years, Trans cerebellar Diameter has been identified as a useful growth indicator that sustains the growth pattern irrespective of the overall growth pattern of pregnancy.[1]

by Darshottar et al. [1] In the present study, TCD correlated well with assigned gestational age and found almost same gestational age as all parameters put together (BPD, HC & FL). This provided an obvious advantage in cases where these parameters (BPD, HC & FL) are affected like in cases of IUGR.

The TCD measurement in our study is comparable with Darshottar et al.[1]

The present study found a strong Pearson's correlation between TCD and the gestational age ($r=0.98, P<0.05$) like Gupta et al [2], Luiz et al [3] and Bansal et al [4].

In the present study we found strong Pearson's correlation for BPD ($r=0.97, P<0.05$). It is in accordance with Vikey et al [5] and Parshad and Likhith et al [6] which also found TCD & BPD to be a better predictor of gestational age as compared to other fetal biometric parameters.

The present study also reveals that TCD can be used in estimation of gestational age in combination with other parameters for better prediction and in cases where dates were uncertain and in women who present late for ultrasound biometry dating. The present study concludes that TCD is a good indicator of gestational age.

The limitation of the present study was the size of the population. Larger study population is required to improve the accuracy of the values which are obtained.

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Conflict of Interest:-None Declared.

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Growth variations in the fetus affects all organs except TCD as evidenced