Accuracy of Fetal Transcerebellar Diameter in Evaluation of Fetal Gestational Age in Egyptian Pregnant Women

Original Article

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ABSTRACT

Background: Routine sonographic examination is the cornerstone in estimation of gestational age (GA) and management of pregnancy, using Biparietal diameter (BPD), femur length (FL) and Abdominal circumference (AC) ،but there are limitations with using such parameters. fetal cerebellum exhibits a progressive growth throughout the gestation period. So, it is an organ capable of providing information on the prediction of gestational age during the pregnancy this study has evaluated the accuracy of trancerebellar diameter (TCD) over other parameters of gestational age between 30-40 weeks.

Aim: The study aims to evaluate the accuracy of TCD in singleton gestation as an accurate parameter compared to other parameters (Fl, BPD, AC) and Hadlock equation in determining gestational age in normal pregnant woman and normal fetus.

Materials and Methods: This cross-section study was conducted on 100 pregnant women between 30 to 40 weeks of gestational age who attended the antenatal care in the outpatient clinic at Ain-Shams university maternity hospital in the period from September 2018 to September 2019. The whole patients were fulfilling the inclusion and exclusion criteria and counseled for the study and then ultrasound examination and measurements of the TCD, BPD, FL and AC were recorded, GA by different parameters (TCD, FL, BPD and AC) and GA by Hadlock were compared to GA by last menstrual period (LMP).

Results: In our results the TCD was accurate within 1 week in 91% of the cases and was accurate within 3 days in 59% of the cases. While the FL was accurate within 1 week in 82% of the cases and was accurate within 3 days in 51% of the cases. The BPD was accurate within 1 week in 70 % of the cases and within 3 days in 39% of the cases. Finally, the AC was accurate within 1 week in 65 % of the cases and within 3 days in 37% of the cases. Also, GA by TCD and Hadlock equation showed highest correlation with GA by LMP followed by FL and BPD and least accurate was AC.

Conclusion: From the study, we can conclude that TCD is the most accurate method for assessment of gestational age in third trimester followed by FL then BPD and the least accurate is the AC. Also, by combining accuracy of TCD (91%) and that of FL (82%) we can be near certain of gestational age in most of our patients even if they are unsure of their dates. Furthermore, TCD and GA by Hadlock equation showed similar accuracy in gestational age assessment. In all methods the accuracy was higher in <35 week than ≥35 week of gestational age. We recommend to conduct this study on larger sample size for further documentation of the proposed assumption.

Key Words: Abdominal circumference, biparietal diameter, femur length, transcerebellar diameter

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INTRODUCTION

Accurate knowledge of gestational age (GA) is a keystone in successful management of the antepartum care and is of critical importance in ante-natal tests and successful planning of appropriate therapy or intervention. Failure can result in iatrogenic prematurity which is associated with increased perinatal morbidity and mortality[4]. Routine sonographic estimation of gestational age by using biparietal diameter (BPD), femur length (FL), abdominal circumference (AC), head circumference (HC) is considered an important role in management of pregnancy but there are limitations with using such parameters such as BPD and HC after 26 weeks is unreliable in cases of moulding of fetal skull[8]. Also, femur length is unreliable as it is shortened in cases of achondroplasia. A new parameter for estimation of gestational age was developed which is transcerebellar diameter (TCD)[21,11].

Cerebellum is located in the posterior cranial fossa surrounded by dense petrous ridges and the occipital bone which makes it withstand deformation caused by outer pressure. fetal cerebellum can be seen by ultrasound as early as 10-11 weeks and from 2nd trimester it grows with gestational age with progressive linear correlation,

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it is the least affected parameter by external factors as it is surrounded by dense petrous ridges and the occipital bone[11], in case of growth restriction the cerebellum is the least affected parameter maintaining the size in case of fetal growth restriction hence accurate GA can be predicted with TCD[7], by illustrating the advantages of TCD over other parameters this study will be conducted to evaluate the accuracy of TCD over other parameters of gestational age of 30-40 weeks.

AIM OF THE STUDY

The study aims to assess the accuracy of use of TCD in singleton gestation as an accurate parameter in comparison with other parameters (Fl, BPD, AC) and Hadlock equation in determining gestational age in normal pregnant woman and normal fetus.

PATIENTS AND METHODS

Setting: This study was a cross-sectional study conducted on the pregnant women who attended for antenatal care in the outpatient clinic at Ain-Shams University Maternity Hospital in the period from September 2018 to September 2019.

Study population: The study was conducted on 100 pregnant women between 30 to 40 weeks of gestational age. The study protocol and patient informed consent were reviewed and approved by the Ethical Committee of the Obstetrics and Gynecology Department of Ain-Shams University.

Inclusion criteria: Singleton pregnancy. Uncomplicated pregnancy. Normal amniotic fluid volume (deepest vertical pocket 2-8 cm) At 30-40 weeks of pregnancy calculated by the first day of last menstrual periods with sure and reliable dates (3 regular cycles and no history of hormonal contraception intake in the last 3 months preceding pregnancy) and 1st trimester ultrasound between 10-13 weeks with results corresponding to the GA calculated by the last menstrual period (LMP) (sure, reliable) with difference less than 7 days.

Exclusion criteria: Patients who were unsure of dates. Irregular cycles Pre-labor rupture of membranes. Intra uterine fetal death. Ultrasonographical detected congenital fetal malformation Small for gestational age fetuses. Fetal macrosomia. Patients with multiple gestation. Patients with oligohydramnios (deepest vertical pocket less than 2 cm). Patients with polyhydramnios (deepest vertical pocket more than 8 cm). Patients with medical disorders such as hypertension and diabetes were excluded. The sampling method of this study was convenient sampling.

Ethical Considerations: The procedure sat out in this study protocol, pertaining to the conduct, evaluation and documentation of this study, was designed to ensure that the investigation adhered to the principles of good clinical practice and the ethical principles laid down in the current revision of the declaration of Helsinki. This study was done after approval of the Ethical committee of the department of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University. Informed consent was taken from all participants before recruitment in the study, and after explaining the purpose and procedures of the study. The investigator obtained the written, signed informed consent of each subject prior to performing any study specific procedures on the subject. The investigator retained the original signed informed consent form.

Study procedure: Patients included in this study were subjected to the following; informed consent: informed consents were obtained from the pregnant women who were included in the study.

Detailed History: Thorough History Taking which included the name, age, occupation. Emphasis on Obstetric history and first day of last menstrual period (LMP) to ensure its reliability. Gestational age documentation from LMP plus correlation with first ultrasound scan. Medical history, and any drug allergy or obstetric or operative complications were verified.

Physical examination: General examination including: pulse, blood pressure, temperature, body weight, auscultation of lungs and heart. Abdominal examination including (symphysis - fundal height).

Ultrasound to assess the following: Fetal viability. Biparietal diameter. Transcerebellar diameter. Femur length. Abdominal circumference. Estimation of fetal weight according to the formula proposed by[9].

Examination method: The Technique of ultrasound was conducted to perform a Transabdominal ultrasound on all patients while women were in a slightly tilted position with the head of the bed raised 30 degrees and with a small pillow under the right loin.

Methodology of measurement of various parameters: In each patient TCD was measured according to[6] and BPD, AC and FL were measured using standard techniques according to American Institute of Ultrasound in Medicine practice guideline for the performance of obstetric ultrasound examinations (AIUM guidelines J Ultrasound Med 2013).

Transcerebellar diameter: Obtaining the trans thalamic view of BPD then rotation of the probe slightly downward, toward the fetal neck, the posterior horns of the lateral ventricles would be disappeared

Fig.1: Showing TCD measured in pregnant woman 23 years old, 34wks + 3days of gestation

from view to be replaced by the cerebellum. The transcerebellar diameter measured at 90 degree to the long axis of the cerebellum across its widest point, by using the outer to the outer method (Figures 1 and 2).

Fig.2: Showing TCD measured in pregnant woman 23 years old, 36wks. of Gestation

Femur length: It is imaged ideally with both ends of the ossified metaphysis distinctly visible. The measurement of the longest axis of the ossified diaphysis is obtained. An angle of insonation perpendicular to the femoral shaft is typical. With regard to the Caliper placement, each caliper is positioned at the ends of the ossified diaphysis without including the distal femoral epiphysis if visible (Figures 3 and 4).

Fig. 3: Showing FL measured in pregnant woman 23 years old, 32wks+3days of gestation

Fig. 4: Showing FL measured in pregnant woman 23 years old, 34wks+1day of gestation

Biparietal diameter: It was obtained in the thalami view showing the following features: A rugby-football-shaped skull, rounded at the back (occiput) and more pointed at the front (sinciput). A short midline halfway between from the proximal and distal skull echoes.

The cavum septum pellucidum bisected the midline one-third of the distance from the sinciput to the occiput. The thalami, the basal cisterns, the BPD includes the thickness of only the upper parietal bone (outer to outer measurement) (Figures 5 and 6).

Fig. 5: Showing BPD measurement in pregnant women 33wks+5days of gestation

Fig. 6: Showing BPD measurement in pregnant woman 35wks+1day of gestation

Abdominal circumference: It was measured using the ellipse calibers at the outer surface of the skin line and showing the following features: Transverse section of the abdomen, umbilical vein at the level of portal sinus and visible stomach bubble.

Gestational age was computed from TCD, BPD, FL and AC by the ultrasound machine based on Hadlock tables by using regression equations from combination of measurements (computation software package).

Measurements interpretation: Comparison was made between TCD, BPD, AC, FL values and gestational age obtained by LMP using regression analysis. Correlation between TCD and all other parameters (BPD, AC, FL and GA by Hadlock equation) was done to assess accuracy of use of transcerebellar diameter in comparison with other parameters in determining gestational age.

Ultrasound device: Medison sonoAce R5 with transabdominal transducer 3.5 GHz was used or this study. The transducer frequency was chosen to guarantee adequate penetration and resolution to the cerebellum measured. Making use of the freeze frame capacity, the measurements were taken using the electronic calipers of the ultrasound machine (Figure 7).

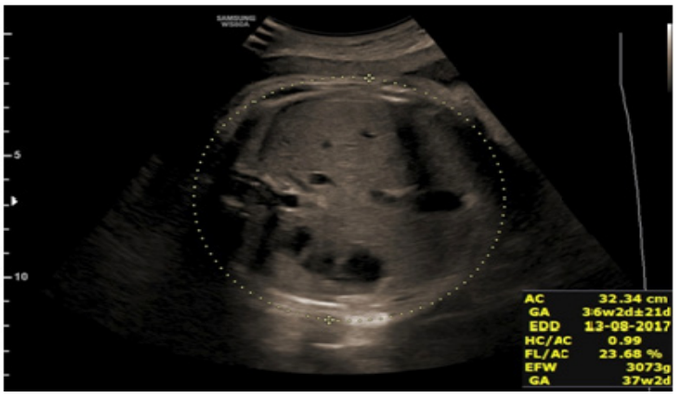

Fig.7: Showing AC measurement in pregnant woman 36wks+2day of gestation

STATISTICAL ANALYSIS

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 18.0, IBM Corp., Chicago, USA, 2009. Descriptive statistics were done for quantitative data as minimum and maximum of the range as well as mean±SD (standard deviation) for quantitative normally distributed data, while it was done for qualitative data as number and percentage.

Inferential analyses were done for quantitative variables using Shapiro-Wilk test for normality testing, independent t-test in cases of two independent groups with normally distributed data and paired t-test in cases of two dependent groups with normally distributed data and Mann whiteny U in cases of two independent groups with non-normally distributed data and Wilcoxon signed rank test in cases of two dependent groups with non-parametric data, ANOVA test with post hoc Tukey test for more than two independent groups with normally distributed data.

Kruskal Wallis test with post hoc Dunn's test for more than two independent groups with non-normally distributed data, repeated measure ANOVA test for more than two dependent groups with normally distributed data and Friedman's test for more than two dependent groups with non-normally distributed data.

Inferential analyses were done for normality testing using Shapiro-Wilk test in qualitative data, inferential analyses for independent variables were done using Chi square test for differences between proportions. Cronbach's alpha testing was used to test reliability of different techniques. Linear regression model was used to find out independent factors affecting LMP. The level of significance was taken at *P value < 0.050* is significant, otherwise is non-significant.

RESULTS

The patients in our study belong to the age group between 19 years and 36 years with mean age of 27 years. In our study also 36 patients out of 100 were primigravida and 64 patients were multigravida. Table 1 showed age and parity of the studied cases.Table 2 showed descriptive statistics of the studied cases (Measures and gestational age).

Using Chi square test, table 3 showed that TCD significantly had lowest deviation grade from LMP, followed by FL. BPD and AC significantly had high deviation grade from LMP within three days and within one week.

Our results showed that the percentages of accurate assessment of gestational age by the 4 parameters (TCD, BPD, FL and AC) within three days of expected gestational age calculated by LMP were as follow: TCD gave accurate assessment within 3 days in 59 patients Out of 100 patients (59%). FL gave accurate assessment within 3 days in 50 patients Out of 100 patients (51%). The BPD gave accurate assessment within 3 days in 39 patients Out of 100 patients (39%). While the AC gave accurate assessment within 3 days in 37 patients Out of 100 patients (37%).

While upon calculating the percentage of accurate assessment of gestational age by the 4 parameters (TCD, BPD, FL and AC) within one week of expected gestational age calculated by Last menstrual period (LMP) the following results were obtained: TCD gave correct assessment of gestational age in 91 patients Out of 100 patients (91%). While the FL gave correct assessment of gestational age in 82 patients Out of 100 patients (82%). The BPD gave correct assessment of gestational age in 72 patients Out of 100 patients (70%). Finally, the AC gave correct assessment of gestational age in 65 patients out of 100 patients (65%).

Using interclass correlation tests Table 4 showed that TCD and GA by Hadlock had highest agreement with LMP, followed by FL. BPD. While AC had lowest agreement with LMP.

Table 5 showed that TCD and GA by Hadlock had highest agreement with LMP, followed by FL. BPD and AC had lowest agreement with LMP. In all methods the agreement was higher in <35.0 week than ≥35.0 week.

Table 6 showed that TCD and FL had lowest Bland Altman deviation grade from LMP. BPD and AC had higher Bland Altman deviation grade from LMP.

Table 1: Age and parity of the studied cases

Variables		Mean±SD	Range
Age (years)		27.0±3.7	19.0–36.0
		N	%
Parity	Primi	36	36.0
	Multi	64	64.0

Total=100

Table 2: Descriptive statistics of the studied cases

LMP week	N	%
30	12	12.0
31	14	14.0
32	8	8.0
33	5	5.0
34	9	9.0
35	15	15.0
36	18	18.0
37	12	12.0
38	5	5.0
39	2	2.0

Method	Mean±SD	Range	95% CI
LMP (week)	34.4±2.6	30.0–39.2	33.9–35.0
Hadlock (week)	34.4±2.7	28.5–40.4	33.9–34.9
TCD (week)	34.4±2.6	29.6–38.4	33.9–35.0
BPD (week)	34.5±2.4	29.6–39.4	34.0–35.0
AC (week)	34.4±2.9	28.1–39.1	33.9–35.0
FL (week)	34.5±2.8	28.3–40.4	34.0–35.1
	Measures		
TCD (mm)	45.2±5.9	35.2–55.0	44.0–46.4
BPD (mm)	84.6±5.6	73.0–95.0	83.5–85.8
AC (mm)	305.0±29.7	240.0–382.0	299.1–310.9
FL (mm)	67.2±6.0	54.0–79.0	66.0–68.4

Total=100

Table 3: Percentages of correct assessment of different measures of the studied cases

Grade	TCD	BPD	AC	FL	*p*
≤±3.0 days	59 (59.0%)	39 (39.0%)	37 (37.0%)	50 (51.0%)	0.005*
≤±7.0 days	91 (91.0%)	72 (70.0%)	65 (65.0%)	82 (82.0%)	<0.001*

Total=100. Chi square test. *Significant

Table 4: Agreement between LMP and different measures

Variable	Chronbach's α	95% CI	*p*
TCD (week)	0.986	0.980–0.991	<0.001*
Hadlock (week)	0.986	0.980–0.991	<0.001*
BPD (week)	0.965	0.949–0.977	<0.001*
AC (week)	0.934	0.903–0.955	<0.001*
FL (week)	0.979	0.968–0.986	<0.001*

Total=100. Interclass correlations test. *Significant

Table 5: Agreement between LMP and different measures before and after 35 weeks

Method	Time (week)	Chronbach's α	95% CI	p
TCD (week)	All	0.986	0.980–0.991	<0.001*
	<35.0	0.961	0.931–0.978	<0.001*
	≥35.0	0.912	0.847–0.950	<0.001*
Hadlock (week)	All	0.986	0.980–0.991	<0.001*
	<35.0	0.959	0.927–0.977	<0.001*
	≥35.0	0.920	0.860–0.954	<0.001*
BPD (week)	All	0.965	0.949–0.977	<0.001*
	<35.0	0.914	0.847–0.952	<0.001*
	≥35.0	0.784	0.624–0.876	<0.001*
AC (week)	All	0.934	0.903–0.955	<0.001*
	<35.0	0.908	0.835–0.948	<0.001*
	≥35.0	0.811	0.670–0.891	<0.001*
FL (week)	All	0.979	0.968–0.986	<0.001*
	<35.0	0.953	0.915–0.973	<0.001*
	≥35.0	0.864	0.763–0.922	<0.001*

Total=100. Interclass correlations test. *Significant

Table 6: Bland Altman deviation grades of different measures from LMP of the studied cases

Grade	TCD	BPD	AC	FL
≤±1.96SD	94 (94.0%)	92 (92.0%)	91 (91.0%)	94 (94.0%)
>±1.96SD	6 (6.0%)	8 (8.0%)	9 (9.0%)	6 (6.0%)

Total=100

DISCUSSION

In Egypt many pregnant women go for their first antenatal care visit in the third trimester because of low socio-economic status as most of them are illiterate who originate from remote areas. Furthermore, many lactating mothers get pregnant which make them unsure of their LMP and other pregnant women have irregular cycles. Due to the absence of earlier ultrasound and uncertainty in LMP, it becomes very difficult to calculate their due dates. Uncertain gestational age has been associated with adverse pregnancy outcomes including low birth weight, preterm delivery and perinatal mortality, post term pregnancy and macrosomia[1].

In our cross-sectional study a total of 100 pregnant women in the third trimester pregnancy attending the outpatient clinic in Ain Shams university maternity hospital were recruited to assess an accurate method for assessment of gestational age in the third trimester of pregnancy. Examinations were performed after an informed consent from the patient with the patient lying in the dorsal supine position with slight tilting. Two-dimensional ultrasounds were carried out. Fetal biometry and amniotic fluid volume were assessed. All women included in the study were subjected to history taking with emphasis on LMP (sure and reliable) and clinical examination.

TCD was compared with FL, BPD, AC and GA by Hadlock equation in accuracy of assessment of gestational age in third trimester of pregnancy. FL, BPD and AC were measured according to AIUM guidelines 2013. TCD was measured as widest diameter across both hemispheres and gestational age data for TCD based on[6]. We found that out of 100 patients, the TCD gave correct assessment of gestational age within 3 days of expected gestational age calculated by LMP in 59 patients (59%) and within 1 week of expected gestational age calculated by LMP in 91 patients (91%). While the FL gave correct assessment of gestational age within 3 days in 50 patients (51%) and within 1 week in 82 patients (82%). BPD gave correct assessment of gestational age within 3 days in 39 patients (39%) and within 1 week in 72 patients (70%). The least accurate was the AC that gave correct assessment of gestational age within 3 days in 37 patients (37%) and within 1 week in 65 patients (65%). TCD and GA by Hadlock equation showed similar accuracy in gestational age assessment. In all methods the accuracy was higher in <35 week than ≥35 week of gestational age.

In third trimester, various ultrasound parameters including BPD, which is one of the most commonly used parameters displays margin of error of 3 to 4 weeks from actual gestational age. This is due to large biological differences in fetal skull shape and size. Management decisions become particularly challenging in conditions where there is growth acceleration or growth restriction and in planning induction for postdate pregnancy[14].

The femur length (FL) can be measured as early as 10 weeks gestational age because of its size and echogenicity. Association with true gestational age is within one week prior to 20 weeks gestational age, but its accuracy decreases to within 2.1 to 3.5 weeks in the third trimester. the main sources of inaccuracy in gestational age assessment by FL are including non-ossified parts of the femur which overestimates gestational age and not visualizing the full femur (femoral head/greater trochanter to femoral condyle) which underestimates gestational age[9,19].

Transcerebellar diameter (TCD) represents an independent biometric parameter as presented in this study. The fetal cerebellum visualized as early as 10 to 20 postmenstrual weeks. It increases in a linear pattern in the second trimester but the curve flattens in third trimester[13,12]. Cerebellum is not liable to change in form and size because it lies in the posterior cranial fossa covered by dense surrounding petrous ridges and occipital bone[13]. Because of this, TCD can be utilized where it is difficult to measure BPD or in cases where there are variations in size and shape of head. Normograms have been determined for TCD and gestational age throughout pregnancy[5,3].

Many studies stated the better correlation of TCD with gestational age in 2nd and 3rd trimester and its usefulness as growth assessing parameter compared to other routine ultrasound parameters[19].

[22,20]studied the posterior cranial fossa of the fetus and verified the ability of the ultrasound to demonstrate the anatomy of the fetal posterior cranial fossa. The vermis

and cisterna magna as well as the cerebellar hemispheres could be visualized easily. They also recommended a systematic approach to prenatal ultrasound examination of the posterior fossa. They suggested that the utilization of fetal transcerebellar diameter in utero between 17 and 40 weeks of gestation is a useful indicator of accurate gestational age. This result is in agreement with the result of our study as TCD is also presented as a useful indicator of accurate gestational age in third trimester of pregnancy.

[18]did ultrasound examination of 178 normal pregnant women at 17- 24 weeks and performed several biometric measurements, it was noticed that TCD seems to be good marker for gestational age calculation compared to other clinical and biometric parameters. This is also proved in our study where TCD seems to be a good marker for gestational age calculation compared with BPD and FL.

[17]studied the growth of fetal cerebellum in normal pregnancy between 20 and 40 weeks and suggested that TCD can be practically applied in cases where it is difficult or impossible to measure BPD or in cases where it is unsuitable because of the moulding of the head. It was noticed that there was a good correlation between the various growth parameters and TCD[20].

[10]in their study in Egypt in 14-40 weeks of pregnancy to verify the accuracy of the TCD in assessment of gestational age within 2 weeks of gestational age measured by LMP and they concluded that TCD is an accurate parameter in estimation of gestational age as its values are in close relation with that of GA by LMP. Additionally, they concluded that TCD showed lowest accuracy (68%) in late third trimester (35- 42 weeks) than other parameters and accuracy of 82% in early third trimester.

In contrast to[10], in the current study TCD was compared with all the parameters (FL, BPD and AC) and gestational age by Hadlock in third trimester of pregnancy (30-40 weeks) and showed that accuracy was higher in all parameters in <35 week than ≥35 week of gestational age. it is concluded that TCD is more accurate than all other parameters in early and late third trimester.

[23]in their study in India to 100 pregnant women in 14-40 weeks of pregnancy to evaluate the efficiency of ultrasonographic fetal parameter TCD diameter as against conventional parameter femur length and they concluded that TCD is equivalent to FL as a biometric parameter for evaluating gestational age in first & second trimester but it less effective than FL in the third trimester.

In contrast to[23], in the current study TCD was compared with all the parameters (FL, BPD and AC) and gestational age by Hadlock in third trimester of pregnancy (30 – 40 weeks) and showed that accuracy was higher in all parameters in <35 week than ≥35 week of gestational age. It is concluded that TCD is more accurate than all other parameters in early and late third trimester.

Many other studies gave results of better accuracy of TCD in determining gestational age than other parameters[15,20,2,21].

An observational study conducted in Pakistan by[15,16] evaluated the valuableness of TCD as an independent parameter for gestational age in third trimester of pregnancy in 135 patients between 26 to 38 weeks. They compared the results of predicted gestational age by BPD, FL and abdominal circumference (AC) with actual gestation. They observed that gestational age measured by TCD was constantly correlated with that measured by BPD, FL and AC.

In the current study This correlation has also been noted between TCD, FL, BPD and AC in 100 patients between 30 to 40 weeks and we find TCD the most accurate parameter followed by FL then BPD and finally the AC.

[20]did a study on 327 patients comparing TCD and BPD accuracy in third trimester and deduced that TCD is a more reliable method of gestational age determination in third trimester than BPD. TCD gave accurate assessment in 91.7% and BPD gave accurate assessment in 77.2% of all patients. In another study done by[19] on 327 patients pregnant in their third trimester comparing TCD with FL illustrated that TCD (80.1% accuracy) is a more reliable method of gestational age determination in third trimester than FL (70.9% accuracy).

In the current study TCD was compared with all the parameters (FL, BPD and AC) and gestational age by Hadlock and showed more accuracy over all other parameters in third trimester. Furthermore, GA by Hadlock showed similar accuracy to Gestational age by TCD.

The same results of the current study were reported by[2] in their study in Egypt on 150 pregnant women in their third trimester to verify the accuracy of the TCD in assessment of gestational age and they deduced that the TCD is a reliable method for assessment of gestational age in third trimester of pregnancy.

[21]assessed accuracy of predicting GA using Fetal Transcerebellar Diameter (TCD) and compared it to other parameters in evaluating gestational age in 15 to 40 weeks of gestation. The concluded that TCD is an accurate parameter in estimation of gestational age in second and third trimesters as its values correlates with that of GA by LMP. He also shows that TCD is also a better predictor

of the gestational age in comparison to other parameters particularly in third trimester.

CONCOLUSION

From the study we can conclude that TCD is the most accurate method for assessment of gestational age in third trimester followed by FL then BPD and the least accurate is the AC. Also, by combining accuracy of TCD (91%) and that of FL (82%) we can be near certain of gestational age in most of our patients even if they are unsure of their dates. Furthermore, TCD and GA by Hadlock equation showed similar accuracy in gestational age assessment. In all methods the accuracy was higher in <35 week than ≥35 week of gestational age. We recommend conducting this study on larger sample size for further documentation of the proposed assumption.

CONFLICT OF INTEREST

There are no conflicts of interests.

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