Al-Azhar Med. J. (Surgery). *Vol. 51(4), October, 2022, 1987-2002*
DOI: 10.21608/amj.2022.255191
https://amj.journals.ekb.eg/article_255191.html

FETAL TRANSCEREBELLAR DIAMETER COMPARED TO BIPARIETAL DIAMETER FOR PRECISE GESTATIONAL AGE EVALUATION IN THE THIRD TRIMESTER OF PREGNANCY

By

Mohammed Omar Abu El-Soud Omar Bakry, Mohammad Taher Ismaeil and Attia Mohammed Attia

Department of Obstetrics & Gynecology, Faculty of Medicine, Al-Azhar University

Corresponding author: Mohammed Omar Abu El Soud,

E-mail: dr.mohammed_bakry2224@gmail.com

ABSTRACT

Background: The provision of obstetric and neonatal care and pregnancy outcomes relies upon the precise determination of gestational age. Many patients in our setup due to socio-economic reasons come for their first antenatal visits in third trimester. There is a crucial requisite for programmatically feasible and accurate approaches of gestational age dating in low and middle income countries. Trans cerebellar diameter (TCD) has evolved as a promising indicator for assessing fetal growth and gestational age.

Objective: This study aimed to compare between the accuracy of fetal transcerebellar diameter and biparietal diameter in gestational age measurement in the third trimester of pregnancy.

Patient and methods: This study comprised 200 pregnant women at third trimester who were chosen from the outpatient clinics at El-Sayed Galal Hospital of Al-Azhar University during the period of research from May 2020 to December 2020. They all had singleton uncomplicated pregnancy at third trimester pregnancy between 28th week of gestation and term (gestational age (GA) evaluation was based on menstrual history (LMP) and early ultrasonographic assessment before 15 weeks of gestation). Additionally, they had sure date of last normal menstrual period (LNMP) and they all had viable fetus in the longitudinal lie, cephalic presentation.

Results: The overall accuracy of estimated gestational age based on various fetal biometric parameters within three days from that calculated via last menstrual period (LMP) was: the highest accuracy was reported in GA-TCD in 55.5 % of cases followed by GA- femur length (FL) & GA- head circumference (HC) that were accurate in 42.5% of cases then GA- abdominal circumference (AC) was accurate in 32 %, and the least was GA- Biparietal diameter (BPD) was accurate in 31.5%. While when detecting accuracy within one week, the highest accuracy was reported in GA-TCD in 83 % of cases followed by GA-FL that was accurate in 76% of cases then GA-HC was accurate in 71.5% GA-BPD was accurate in 65.5%, and the least was GA-AC that was accurate in 57 %, and of cases.

Conclusion: It is concluded that TCD had shown better correlation and predictive accuracy of gestational age determination in third trimester of pregnancy then femur length they were superior to biparietal diameter and with the femur length, TCD can be utilized as a tool to aid in the assessment of gestational age in third trimester. As this is essential particularly notably in our country as many of our patients attend the hospitals with lacking medical record or prior antenatal care visits especially in low socioeconomic rural areas, not recalling their LMP.

Keywords: Trans cerebellar diameter, fetal biometry, Gestational age.

INTRODUCTION

Pregnancy dating is an essential component of antenatal care. Precise knowledge of gestational age is the cornerstone of the obstetrician's ability to successfully optimize prenatal care and is critical to prenatal testing and successful planning for appropriate treatment or intervention *(Al-Mlah et al., 2019)*.

It also helps us to estimate fetal malformation or growth retardation. Moreover, failure can result in iatrogenic prematurity or postmaturity, both being associated with increased perinatal morbidity and mortality and can result in grave complications for the patient and liability for health care providers *(Vedpathak et al., 2020)*.

Assessing gestational age accurately can be challenging because of many factors. In low- and middle-income countries (LMICs), the gestational length of a given pregnancy is commonly unknown or inaccurate. Traditionally, maternal recall of the first day of the last menstrual period (LMP) is used to date pregnancies. However, limitations to LMP include varying menstrual cycle length, misinterpretation of early bleeding and poor recall, with up to two-thirds of women in LMICs without a recorded LMP *(Lee et al., 2020)*. Moreover In low-income and middle-income countries (LMICs), where the burden of preterm birth and intrauterine growth restriction is highest *(Lee et al., 2013)*.

In Egypt remarkably in rural areas, many patients due to socioeconomic reasons come for their first antenatal visit in third trimester. Most of them are uneducated come from remote areas. Also many being lactating mothers are unsure of their LMP or having irregular cycles. Because of non-availability of any dating scans or earlier ultrasound and uncertainty in LMP, it becomes very difficult to calculate their due dates, so many pregnancies considered to be preterm or post-term are wrongly classified *(Askr et al., 2018)*.

Symphysis fundal height can be a misleading measure of gestational age because of variation in maternal adiposity, intrauterine growth restriction, uterine fibroids, or malpresentation *(Deb et al., 2020)*.

The first trimester ultrasound is considered to be the gold-standard method for estimating gestational age in high-income settings, Committee on Obstetric Practice *(Committee on Obstetric Practice, 2017)* but ultrasound early in gestation might not be routinely available in LMICs. In addition, pregnant women in LMICs might not present for antenatal care in early pregnancy. As gestation advances, ultrasound biometry becomes less accurate for estimating gestational age, given the emergence of natural variation in fetal size and the possibility of pathological growth restriction. Indeed, in LMICs, where 19·3% of infants are born small-for-gestational-age, the assumption that fetal size predicts gestational age might not be valid *(Lee et al., 2020)*.

Ultrasound scanning during the 2nd or 3rd trimester of pregnancy allows fetal anthropometrics measurement and screening for fetal size disturbances by comparison to reference values: Biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL) are the most commonly

measured parameters *(Bihoun et al., 2020)*.

These parameters have few limitations as condition altering the shape of skull like dolicocephaly and brachycephaly will affect the BPD which is well accepted indicator, also femur length (FL) varies somewhat with ethnicity *(Mishra et al., 2020)*.

Since the fetal dimensions have been known to depend upon the racial characteristics, genetics, nutrition and many more environmental factors of a particular population, thus the biometric curves obtained from one population may not accurately estimate the fetal gestational age when used for another population *(Aggarwal and Sharma, 2020)*.

There is an urgent need for programmatically feasible and accurate methods of gestational age dating in LMICs *(Greensides et al., 2018)*.

Then, another fetal parameter, trans cerebellar diameter (TCD), has evolved as a promising indicator for assessing fetal growth and gestational age. TCD can be used as an independent parameter against which other established parameters can be compared when gestational age cannot be calculated by LMP as it is least affected by growth restriction *(Rajendra, 2019)*.

The aim of this study was to compare between the accuracy of fetal transcerebellar diameter and biparietal diameter in gestational age measurement in the third trimester of pregnancy.

PATIENTS AND METHODS

This study was a prospective study that was conducted at El-Sayed Galal Hospital of Alazhar University on a total of 200 pregnant women at the third trimester, from May 2020 to December 2020.

Sample size justification:

MedCalc® version 12.3.0.0 program was used for calculations of sample size, statistical calculator based on 95% confidence interval and power of the study 80% with α error 5%, According to a previous study *(Naseem et al., 2013)*, TCD found to give correct assessment in 91.7%; p = 0.001 corresponding to the gestational age by LMP i.e 36 weeks and BPD was found to give correct assessment corresponding to the gestational age by LMP in 77.2% of cases. So it can be relied upon in this study, based on this assumption, sample size was calculated according to these values produced a minimal samples size of 190 patients were enough to find such a difference. Assuming a drop-out ratio of 5%, the sample size was 200 cases.

Inclusion criteria: Primigravida, singleton uncomplicated pregnancy at third trimester pregnancy between 28th week of gestation and term, sure date of last normal menstrual period (LNMP), viable fetus in the longitudinal lie, Cephalic presentation, and gestational age in third trimester calculated from the first day of last menstrual period or by first-trimester ultrasound examination.

Exclusion criteria: Unknown, nonreliable, or inaccurate date of last menstrual period (LMP), oligohydramnios or polyhydramnios, prelabor rupture of membranes or ante partum hemorrhage, multiple gestations, medical disorder with pregnancy as hypertension, pre eclampsia, diabetes mellitus and Rh iso-immunization, any congenital anomalies

or fetal chromosomal abnormalities, and fetal mal-presentations.

All patients were subjected to:

1. A detailed medical history.
2. Then clinical examinations.
3. Laboratory investigations.
4. Ultrasound examination.

All cases underwent for:

Transabdominal ultrasound examination at admission for assessment of:

- Gross anatomical defects.
- Fetal viability.
- Fetal number.
- Placental (site & maturity).
- Liquor (amount described as amniotic fluid index (AFI) & turbidity).
- Fetal biometry [biparietal diameter (BPD) – head circumference (HC)- femur length (FL) - abdominal circumference (AC)]:
  - Measurement of the Biparietal diameter (BPD).
  - Measurement of the Head circumference (HC).
  - Measurement of the abdominal circumference (AC).
  - Measurement of the femur length (FL).
- The estimated fetal weight was determined by measurement of BPD, AC, and FL (in cm) adopting the formula devised by Hadlock:

EFW = 10(1.326−0.00326*AC*FL + 0.0107*HC + 0.0438*AC + 0.158*FL**
(Hiwale et al., 2017).

Measurement of the transcerebellar diameter measurement:

Transverse cerebellar diameter is obtained in the axial plane in the cerebellar view i.e with a slight rotation of the transducer approximately 300 from the conventional thalamic plane where the biparietal diameter is measured using the cavum septi pellucidi, third ventricle and thalami as landmarks. In this plane posterior fossa with cerebellum is visualized. The cisterna magna is just posterior to the cerebellum. This plane provides the widest transcerebellar diameter. In this plane, posterior fossa with cerebellum was visualized. The cisterna magna is just posterior to the cerebellum. This plane provides the widest transcerebellar diameter of fetal intracranial anatomy through the posterior fossa that included visualization of midline thalamus, cerebellar hemisphere and cisterna magna. Measurements were obtained by placing on screen calipers of ultrasound machines at the outer margins of cerebellum *(Jayaprakash and Kumar, 2018)*.

Outcome:

The percentages of accurate assessment of gestational age by the measurements (TCD, BPD and FL, AC and HC) within 3 days and from the actual gestational age measured by LMP or first trimestric ultrasound was calculated.

Statistical Analysis:

In the present study, statistical analyses of data were carried out using SPSS version 23. Shapiro –Wilks test was used to test normal distribution of variables. Numerical data were expressed as mean ± standard deviation or median and range.

Categorical data were summarized as percentages. The significance for the difference between groups was determined by using two-tailed Student's t test and one way ANOVA (analysis of variance) test or for quantitative data as appropriate. Also Qualitative variables were assessed by chi-squared $\chi 2$test. P value < 0.05 was considered significant. Moreover, correlations gestational age by various methods was evaluated using Pearson and spearman's correlation coefficient as appropriate.

RESULTS

A total number of 200 pregnant women were included in this study whose overall age ranged from 18 to 35 years with a mean ± SD was 25.34 ± 3.22 years. Six (3%) patients were below 20 years of age, 180 (90%) were in the age group of 20-30 years, and 14 (7%) patients had their age above 30 years. No woman had body mass index (BMI) below 18.5 kg/m2, 72 (36%) had BMI ranged between 18.5-24.9 kg/m2, 76(38%) had BMI ranged between 25-29.9 kg/m^2 and 52(26%) patients had BMI above 30 kg/m2. The mean BMI of cases included in this study, was 26.57± 4.76 kg/m2) **(Table 1)**.

Table (1): Distribution of study population according to age, BMI

Age	Frequency (n=200)	Percentage (%)
<20	6	3%
20-30	180	90%
>30	14	7%
BMI (kg/m^2)		
<18.5	0	0%
18.5–24.9	72	36%
25.0–29.9	76	38%
≥30.0	52	26%

Majority of the women (70.5% (n=141) delivered by caesarean section (CS), while vaginal delivery was conducted in 59 (29.5%) of women for the current pregnancy. The mean gestational age at delivery was 37.14 weeks of gestation (standard deviation 1.31 days) in all 200 women. The incidence preterm birth was 42 cases (21%) **(Table 2)**.

Table (2): Mode of delivery in the current pregnancy, mean gestational age at delivery and percentage of preterm deliveries

			Cases (N=200)
Mode of Current delivery (%)	Vaginal	N	59
		%	29.5%
	Cesarean section (CS)	N	141
		%	70.5%
Gestational age at delivery (Weeks)	Range		33-39
	Mean ± SD		37.14 ±1.31
Percentage of preterm deliveries	Preterm	N	42
		%	21%
	Term	N	158
		%	79%

Gestational age of cases by LMP compared to fetal biometry items:

All studied cases with reliable dates as suggested by last menstrual period. The mean GA recorded by LMP was 31.33±1.69 weeks. This table gives mean and standard deviation of GA estimated by TCD, FL, AC, HC, and BPD for 200 patients **(Table 3)**.

Table (3): Mean gestational age by LMP and estimated gestational age based on different fetal biometric parameters

	Mean ± SD	**Range**
GA-LMP	31.33±1.69	28-34
GA-TCD	31.01±1.74	27.3-36.9
GA-FL	30.73±1.77	25-36
GA-AC	30.75±1.74	27.1-36.7
GA-HC	30.68±1.75	27-36.7
GA-BPD	30.63±1.73	27.1-36.5

By LMP, gestational age of the collected cases ranged from 28 weeks to 34 weeks. Maximum number of he recruited cases were in gestational age 31 weeks (n=47) followed by those in 30 weeks (n=36), 32 weeks (n=34) and 34 weeks (n=28) respectively. Mean and standard deviation for each group week of gestation showed that estimated gestational age by TCD in mm had strong association with gestational age by LMP in weeks during 28-34 weeks **(Table 4)**.

Table (4): Distribution of study population according to gestational age by LMP with estimated gestational age based on different fetal biometric parameters

Gestational age (weeks)	No. of cases	GA-BPD Mean ± SD	GA-FL Mean ± SD	GA-TCD Mean ± SD	GA-AC	GA-HC
28	**10**	27.3±0.19	27.1±0.76	27.6±0.17	27.42±0.11	27.3±0.18
29	**19**	28.27±0.39	28.61±0.91	28.85±0.94	28.48±0.96	28.5±0.99
30	**36**	29.39±0.38	29.48±0.39	29.71±0.32	29.43±0.36	29.34±0.42
31	**47**	30.33±0.33	30.39±0.32	30.67±0.28	30.43±0.32	30.37±0.32
32	**34**	31.23±0.49	31.28±0.48	31.6±0.46	31.39±0.37	31.29±0.39
33	**26**	32.22±0.3	32.38±0.35	32.6±0.28	32.35±0.24	32.27±0.23
34	**28**	33.35±0.66	33.45±0.69	33.75±0.65	33.44±0.71	33.41±0.68
Total	**200**	30.63±1.73	30.73±1.77	31.01±1.74	30.75±1.74	30.68±1.75

The Pearson Correlation coefficient between gestational age by LMP and that estimated based on different fetal biometric parameters showed that there was a strong positive correlation between gestational age by LMP and that estimated by both BPD, and TCD (r=0.969, P<0.001 & r=0.963, P<0.001; respectively). Furthermore, there was strong positive correlation with other biometric parameters (FL, AC and HC) **(Table 5)**.

Table (5): Correlation between gestational age by LMP with estimated gestational age based on different fetal biometric parameters

Parameters	Gestational age by LMP (weeks)	
	r	**P-value**
GA-TCD	0.963***	<0.001
GA-FL	0.954***	<0.001
GA-AC	0.962***	<0.001
GA-HC	0.959***	<0.001
GA-BPD	0.969***	<0.001

In this study, accuracy of estimated gestational age based on various fetal biometric parameters within three days from that calculated via LMP was: the highest accuracy was reported in GA-TCD in 55.5 % of cases followed by GA-FL & GA-HC that were accurate in 42.5% of cases then GA-AC was accurate in 32 %, and the least was GA-BPD was accurate in 31.5%.

While when detecting accuracy within one week, the highest accuracy was reported in GA-TCD in 83 % of cases followed by GA-FL that was accurate in 76% of cases then GA-HC was accurate in 71.5% GA-BPD was accurate in 65.5%, and the least was GA-AC that was accurate in 57 %, and of cases **(Table 6)**.

Table (6): Overall accuracy of estimated gestational age by fetal biometric parameters in comparison with that recorded by LMP (within 3 days and within one week)

	Parameters (total number 200 cases)	No Not accurate	Yes accurate	Accuracy
Within 3 days	GA-BPD	137(68.5%)	63 (31.5%)	31.5%
	GA-FL	115(57.5%)	85(42.5%)	42.5%
	GA-TCD	89(44.5%)	111(55.5%)	55.5%
	GA-AC	136(68%)	64(32%)	32%
	GA-HC	115(57.5%)	85(42.5%)	42.5%
Within one week	GA-BPD	69(34.1%)	131(65.5%)	65.5%
	GA-FL	48(24%)	152(76%)	76%
	GA-TCD	34(17%)	166(83%)	83%
	GA-AC	86(43%)	114(57%)	57%
	GA-HC	57(28.5%)	143(71.5%)	71.5%

DISCUSSION

This study comprised 200 pregnant women at third trimester who were chosen from the outpatient clinics at El-Sayed Galal Hospital of Al-Azhar University during the period of research from May 2020 to December 2020. They all had singleton uncomplicated pregnancy at third trimester pregnancy between 28th week of gestation and term (gestational age evaluation was based on menstrual history (LMP) and early ultrasonographic assessment before 15 weeks of gestation). Additionally, they had sure date of last normal menstrual period (LNMP) and they all had viable fetus in the longitudinal lie, cephalic presentation.

The overall age ranged from 18 to 35 years with a mean ± SD was 25.34 ± 3.22 years. The majority [180 (90%)] of cases were in the age group of cases had an age ranged from 20-30 years,. Also, 72 (36%) cases had their BMI ranged between 18.5-24.9 kg/m2, 76(38%) had BMI ranged between 25-29.9 kg/m2 and 52(26%) patients had BMI above 30 kg/m2 with the mean BMI was 26.57± 4.76 kg/m2.

As regard increasing BMI, Obesity and overweight are recognized as growing global health problems. The prevalence of overweight adult women increased from 29.8% in 1980 to 38% in 2013 worldwide, especially in middle-income countries *(Ng et al., 2014* and *Silva et al., 2019).*

As regard the mode of delivery, that majority of the women [70.5% (n=141)] were delivered by caesarean section (CS), while vaginal delivery was conducted in 59 (29.5%) of women for the current pregnancy.

There is a surge in the rate of CS at the universal and local levels with the probability that a woman undergoes a cesarean is 3 times more than that of 20 years ago *(Alkhamis, 2019)*.

Deoni et al. (2019) notified that the large range of cesarean delivery rates across hospitals suggests that practice variation, a modifiable factor, also played an important role in the increased prevalence of cesarean delivery.

In Egypt, one study reported that nearly 60% of population-based study of performed cesarean sections in 2014 that greatly exceeded the threshold of 10–15% recommended by WHO *(Al Rifai, 2017)*.

The mean gestational age at delivery was 37.14 weeks of gestation (standard deviation 1.31 days) in all 200 women. The incidence preterm birth was 42 cases (21%).

The incidence of preterm births is increasing in many countries around the world and has become a global health concern *(Walani, 2020)*.

In another similar Egyptian study, *Algameel et al. (2020)* reported that the incidence of preterm labor was 70 out of the included 250 newborns (28%).

Furthermore, as regard the mean GA recorded by LMP, or results revealed that it was 31.33±1.69 weeks. By LMP, gestational age of the collected cases ranged from 28 weeks to 34 weeks. Maximum number of he recruited cases were in gestational age 31 weeks (n=47) followed by those in 30 weeks (n=36), 32 weeks (n=34) and 34 weeks (n=28) respectively.

Mean and standard deviation for each group week of gestation showed that estimated gestational age by TCD in mm had strong association with gestational age by LMP in weeks during 28-34 weeks.

The Pearson Correlation coefficient between gestational age by LMP and that estimated based on different fetal biometric parameters showed that there was a strong positive correlation between gestational age by LMP and that estimated by both BPD, and TCD ($r=0.969$, $P<0.001$ & $r=0.963$, $P<0.001$; respectively). Furthermore, there was strong positive correlation with other biometric parameters (FL, AC & HC).

In agreement with our results, *Rajendra (2019)* in their study declared that there was significant correlation between GA vs BPD p=0.001. r=0.9785. GA versus HC p=0.001 r=0.9785. GA versus AC p=0.001 r=0.9830 and GA versus FL p=0.001 r=9694. Their results showed good Correlation co-efficiency between TCD and various biometric parameters.

In addition, *Nagesh et al. (2016)* study of TCD in normal pregnant women showed curvilinear relationships between the transverse diameter of the cerebellum and the gestational age (R2=0.948, P=0.001), biparietal diameter (R2=0.956, P=0.0001), and the head circumference (R2=0.969, P=0.0001).

In the current study, accuracy of estimated gestational age based on various fetal biometric parameters within three days from that calculated via LMP was: the highest accuracy was reported in GA-TCD in 55.5 % of cases followed by GA-FL & GA-HC that were accurate in 42.5% of cases then GA-AC was accurate in 32 %, and the least was GA-BPD was accurate in 31.5%. While when detecting accuracy within one week, the highest accuracy was reported in GA-TCD in 83 % of cases followed by GA-FL that was accurate in 76% of cases then GA-HC was accurate in 71.5% GA-BPD was accurate in 65.5%, , and the least was GA-AC that was accurate in 57 %, and of cases That was the case in analysis during each week of pregnancy TCD had superior accuracy at weeks from 28 to 34 than BPD and other parameters.

In line with our results, an observational study conducted in Pakistan by *Malik et al. (2010)* assessed the usefulness of TCD as an independent parameter for gestational age in third trimester of pregnancy in135 patients between 26 to 38 weeks. They compared the results of predicted gestational age by BPD, FL and AC (Abdominal Circumference) with actual gestation. They observed that gestational age measured by TCD was consistently correlated with that measured by FL.

Alalfy et al. (2017) settled and concluded that the most, reliable, precise showing superiority in accurate analysis and assessment of fetal gestational age was the TCD followed by the HC then the BPD followed by the FL and the least precise tool of calculating fetal gestational age was AC. These finding is similar to our research results which strengthens and augments these findings and results reliability.

In agreement with our results also, *Naseem et al. (2013)* revealed that out of 228 patients, TCD was found to give correct assessment in 209 patients with gestational age of 36 weeks (91.7%; p = 0.001) corresponding to the gestational age by LMP compared to BPD was found to give correct assessment corresponding to the gestational age by LMP in 176 patients (77.2%).

Reddy et al. (2017) evaluated accuracy of predicting GA using Fetal Transcerebellar Diameter (TCD) and to compare between TCD and other existing parameters in evaluating GA in 15 to 40 weeks of gestation. They showed that TCD is an accurate parameter in estimation of gestational age in second and third trimesters as its values are in close relation with that of GA by LMP. It is also better predictor of the gestational age when compared to other parameters especially in third trimester.

El-Ebeisy et al. (2019) reported that, the accuracy of TCD in late second trimester was 91.6% and 82% in early third trimester.

This could be explained by that when determining gestation age according to BPD, it much depends on the head form. For example, during the ultrasound imaging the fetal head shape should be ovoid, not round (brachycephalic), because this can increase gestational age, just as a flattened or compressed head (dolichocephalic) can decrease BPD *(Žaliūnas et al., 2017)*.

Yet, measurements of the transverse diameter of the cerebellum (TCD) is independent of the gestational age and shape of the fetal head unlike the BPD which is unreliable, thus TCD remains an accurate method of estimating fetal age even in cases of uncertain dates, dolicocephaly or brachycephaly. It was previously suggested that the posterior cranial fossa was not affected by external pressure, therefore evaluations of the cerebellum i.e. TCD may convey more precise information regarding the fetal growth *(Naseem et al., 2014)*.

Furthermore, in our results femur length accuracy for gestaional age evaluation in the 3rd trimester followed the accuracy via TCD.

It was reported that, the femur length (FL) can be measured as early as 10 weeks gestational age because of its size and echogenicity. Correlation with true gestational age is within one week prior to 20 weeks gestational age, but falls to within 2.1 to 3.5 weeks in the third trimester. Including non-ossified portions of the femur and not visualizing the full femur (femoral head/greater trochanter to femoral condyle) are the major sources of error in gestational age assessment by FL. The former over estimates and the latter underestimates gestational age *(Askr et al., 2018)*.

The superiority of FL over the BPD and HC is that fetal head starts to mould as it engages and descends in preparation for birth so that both the BPD and the head circumference (HC) may measure less than they should. Since the fetal thigh does not mould, FL remains unaffected. Hence, in late gestation, FL is the standard biometric parameter to ascertain and establish fetal age, not BPD *(Naseem et al., 2014)*.

With increasing gestational age, the accuracy of FL decreases The study of fetal age assessment based on FL at 10–25 weeks of gestation, and reference ranges for FL to HC ratios showed that fetal age assessment based on FL is equally as reliable as HC and FL/HC is a more robust ratio to characterize fetal proportions than FL/BPD *(Žaliūnas et al., 2017)*.

Also, as regard the superiority of HC over the BPD, HC is less affected than BPD by head shape variations and the presentation of the fetus, so HC is preferred as a more valuable measurement in assessing gestational age *(Lubusky et al., 2010)*.

Finally regarding that AC was the least accurate in assessing GA, Pathological alteration in fetal growth pathway due to macrosomia or IUGR seem to affect AC. AC was the best predictor for SGA with the most reliable cutoff for the prediction of SGA was an AC below the 25th percentile. It was reported that fetal AC and EFWs obtained at 26–34 weeks' gestation were equivalent predictors of SGA at birth compared with HC and the FL *(Kim et al., 2019)*.

Thus, AC should not be used at all to determine gestational age; however, it is one of the key dimensions to assess intrauterine growth restriction (IUGR) and fetal macrosomia *(Žaliūnas et al., 2017)*.

From all of the above, TCD is a precise predictor of gestational age in the third trimester as it has shown better correlation and predictive accuracy than other foetal biometrics measurements. TCD and FL

can be combined and used as a tool to assist in the assessment of gestational age in third trimester.

CONCLUSION

Transcerebellar diameter had shown better correlation and predictive accuracy of gestational age determination in third trimester of pregnancy then femur length they were superior to biparietal diameter and TCD can be utilized as a tool to aid in the assessment of gestational age in third trimester Also by combining accuracy of TCD (83%) and that of FL (76%) we can be near certain of gestational age in most of cases even if they are unsure of their dates. As this is essential particularly notably in our country as many of our patients attend the hospitals with lacking medical record or prior antenatal care visits especially in low socioeconomic rural areas, not recalling their LMP.

REFERENCES

1. **Aggarwal N and Sharma GL. (2020):** Fetal ultrasound parameters: Reference values for a local perspective. Indian Journal of Radiology and Imaging, 30(2):149-153.
2. **Al Rifai RH. (2017):** Trend of caesarean deliveries in Egypt and its associated factors: evidence from national surveys, 2005–2014. BMC Pregnancy and Childbirth, 17(1):417-430.
3. **Alalfy M, Idris O, Gaafar H, Saad H, Nagy O, Lasheen Y, Elsirgany HM and Hassan A. (2017):** The value of fetal trans cerebellar diameter in detecting GA in different fetal growth patterns in Egyptian fetuses. Imaging in Medicine, 9(5):131-138.
4. **Algameel A, Elhawary M, Amin S and Abd Elmenem M. (2020):** Outcome of late preterm newborns in Upper Egypt. Egyptian Pediatric Association Gazette, 68:1-5.
5. **Alkhamis F. (2019):** Pregnancy Outcome in Women with Previous One Cesarean Section, Experience from Kingdom of Saudi Arabia. The Egyptian Journal of Hospital Medicine, 77(3):5109-5113.
6. **Al-Mlah S, Nasef A and El-Masry HA. (2019):** Assessment of Fetal Kidney Length as a Parameter for Detection of Gestational Age at the Third Trimester of Pregnancy. The Egyptian Journal of Hospital Medicine, 75(5):2839-2844.
7. **Askr AA, Mahmoud MS and Salloum AA. (2018):** Comparison between Taans Cerebellar Diameter, Biparietal Diameter and Femur Length for Gestational Age Measurement Accuracy in The 3rd Trimester. The Egyptian Journal of Hospital Medicine, 73(8):7300-7305.
8. **Bihoun B, Zango SH, Traoré-Coulibaly M, Valea I, Ravinetto R, Van Geertruyden JP, D'Alessandro U, Tinto H and Robert A. (2020):** Fetal biometry assessment with Intergrowth 21st's and Salomon's equations in rural Burkina Faso. BMC Pregnancy and Childbirth, 20(1):1-2.
9. **Committee on Obstetric Practice. (2017):** Committee Opinion No 700: methods for estimating the due date. Obstet Gynecol., 129(5): 150-154.
10. **Deb S, Mohammed MS, Dhingra U, Dutta A, Ali SM, Dixit P, Juma MH, Hassan MJ, Sazawal S, Nisar I and Ilyas M. (2020):** Performance of late pregnancy biometry for gestational age dating in low-income and middle-income countries: a prospective, multicountry, population-based cohort study from the WHO Alliance for Maternal and Newborn Health Improvement (AMANHI) Study Group. The Lancet Global Health, 8(4):545-554.
11. **Deoni SC, Adams SH, Li X, Badger TM, Pivik RT, Glasier CM, Ramakrishnaiah RH, Rowell AC and Ou X. (2019):** Cesarean delivery impacts infant brain development. American Journal of Neuroradiology, 40(1):169-177.
12. **El-Ebeisy HA, Mohammed HA and Mohammed BO. (2019):** Accuracy of Fetal Transcerebellar Diameter in the Prediction of Gestational Age in Singleton Pregnancy at the Second and the Third Trimesters. The

Egyptian Journal of Hospital Medicine, 77(1):4714-4719.

13. **Greensides D, Robb-McCord J, Noriega A and Litch JA. (2018):** Antenatal corticosteroids for women at risk of imminent preterm birth in 7 sub-Saharan African countries: a policy and implementation landscape analysis. Global Health: Science and Practice, 6(4):644-656.

14. **Hiwale SS, Misra H and Ulman S. (2017):** Ultrasonography-based fetal weight estimation: finding an appropriate model for an Indian population. Journal of Medical Ultrasound, 25(1):24-32.

15. **Jayaprakash N, Kumar A and PS SD. (2018):** Determination Of Gestational Age In Third Trimester Using Foetal Transcerebellar Diameter And Assessment Of Foetal Growth Using Tcd/Ac Ratio. Journal of Dental and Medical Sciences, 17(8): 54-60.

16. **Kim MA, Han GH and Kim YH. (2019):** Prediction of small-for-gestational age by fetal growth rate according to gestational age. PloS One, 14(4):215-222.

17. **Lee AC, Katz J, Blencowe H, Cousens S, Kozuki N, Vogel JP, Adair L, Baqui AH, Bhutta ZA, Caulfield LE and Christian P. (2013):** National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010. The Lancet Global Health, 1(1):e26-36.

18. **Lee AC, Whelan R, Bably NN, Schaeffer LE, Rahman S, Ahmed S, Moin SM, Begum N, Quaiyum MA, Rosner B and Litch JA. (2020):** Prediction of gestational age with symphysis-fundal height and estimated uterine volume in a pregnancy cohort in Sylhet, Bangladesh. British Medical Journal Open, 10(3):1-10.

19. **Lubusky M, Prochazka M, Langova M, Vomackova K and Cizek L. (2010):** Discrepancy in ultrasound biometric parameters of the head (hc-head circumference, bpd-biparietal diameter) in breech presented fetuses. Biomedical Papers of the Medical Faculty of Palacky University in Olomouc, 151(2):323-326.

20. **Malik G, Waqar F, Ghaffar A and Zaidi H. (2010):** Determination of gestational age transverse cerebellar diameter in third trimester of pregnancy. Journal of the College of Physicians and Surgeons—Pakistan, 16(4):249-252.

21. **Mishra S, Ghatak S, Singh P, Agrawal D and Garg P. (2020):** Transverse cerebellar diameter: a reliable predictor of gestational age. African Health Sciences, 20(4):1927-1932.

22. **Nagesh R, Seetha Pramila VV and Shukla AK. (2016):** Transverse Cerebellar Diameter–An Ultrasonographic Parameter For Estimation of Fetal Gestational Age. International Journal of Contemporary Medical Research, 3(4): 1029-1031.

23. **Naseem F, Fatima N, Yasmeen S and Saleem S. (2013):** Comparison between transcerebellar diameter with biparietal diameter of ultrasound for gestational age measurement in third trimester of pregnancy. Journal of College of Physicians and Surgeons Pakistan, 23(5):322-325.

24. **Naseem F, Ali S, Basit U and Fatima N. (2014):** Assessment of gestational age. The Professional Medical Journal, 21(02):412-417.

25. **Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, Mullany EC, Biryukov S, Abbafati C, Abera SF and Abraham JP. (2014):** Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study. The Lancet, 384(9945):766-781.

26. **Rajendra TM. (2019):** Evaluation of Fetal Transcerebellar Diameter as a Sonological Parameter for the Estimation of Fetal Gestational Age in Comparison to Fetal Biometry. International Journal of Contemporary Medicine Surgery and Radiology, 4(4):66-70.

27. **Reddy RH, Prashanth K and Ajit M. (2017):** Significance of foetal transcerebellar diameter in foetal biometry: a pilot study. Journal of Clinical and Diagnostic Research, 11(6): 1-7.

28. **Silva FP, Souza RT, Cecatti JG, Passini R, Tedesco RP, Lajos GJ, Nomura ML, Rehder PM, Dias TZ, Oliveira PF and Silva CM. (2019):** Role of Body Mass Index and gestational weight gain on preterm birth and adverse perinatal outcomes. Scientific Reports, 9(1):1-2.

29. **Vedpathak S, Jadhav D and Belsare S. (2020):** Ultrasonographic study of transverse diameter of fetal cerebellum and length of femur as markers for accurate estimation of gestational age. International Journal of Anatomy and Research, 8(1.3):7360-7366.

30. **Walani SR. (2020):** Global burden of preterm birth. International Journal of Gynecology & Obstetrics, 150(1):31-33.

31. **Žaliūnas B, Bartkevičienė D, Drąsutienė G, Utkus A and Kurmanavičius J. (2017):** Fetal biometry: Relevance in obstetrical practice. Medicina (Kaunas), 53(6):357-364.

دراسة لتقييم القطر المخيخي للجنين مقارنة بالقطر ثنائي القطب في التحديد الدقيق لعمر الجنين في الثلث الأخير للحمل

محمد عمرأبو السعود عمر بكري، محمد طاهر اسماعيل، عطيه محمد عطيه

قسم أمراض النساء والتوليد، كلية الطب، جامعة الأزهر

E-mail: dr.mohammed_bakry2224@gmail.com

خلفية البحث: تعد المعرفة الدقيقة لعمر الحمل حجر الزاوية في قدرة طبيب النساء و التوليد على إدارة فترة الحمل بنجاح. علاوة على ذلك ، فان لها كبير الأثر على اتخاذ بعض القرارات المصيرية مثل الحث علي تنبيه الرحم للولادة أو اتخاذ القرار بالولادة القيصرية. قد يكون القطر العرضي للمخيخ بمثابة مؤشّر موثوق لتقييم عمر الجنين وقد يكون أدق وأنسب خاصةً عندما لا يمكن تحديدعمر الحمل بتاريخ آخر حيض أو بالسونار المبكر في الثلث الأول من الحمل وفي الحالات المرضية التي يصاحبها تغير في معدل نمو الجنين.

الهدف من الدراسة: تقييم القطرالمخيخي للجنين مقارنة بالقطر ثنائي القطب في التحديد الدقيق لعمر الجنين في الثلث الأخير على معدل نمو الجنين للحمل.

المريضات وطرق البحث: كانت هذه الدراسة إستطلاعية ضمت 200 امرأة حامل في الثلث الثالث من الحمل تم اختيارهن من العيادات الخارجية بمستشفى السيد جلال بجامعة الأزهر خلال فترة البحث من مايو 2020 إلى ديسمبر 2020. وقد تعرضن جميعًا لحمل وحيد غير معقد في المستشفى. الحمل في الثلث الثالث بين الأسبوع الثامن والعشرين من الحمل والمدة (إستند تقييم عمر الحمل إلى تاريخ الحيض والتقييم المبكر بالموجات فوق الصوتية قبل 15 أسبوعًا من الحمل). بالإضافة إلى ذلك ، كان لديهم تاريخ مؤكد لآخر دورة شهرية طبيعية وكان لديهم جميعًا جنين قابل للحياة في الكذب الطولي ، العرض الرأسي.

نتائج البحث: كانت الدقة الإجمالية لعمر الحمل المقدّر بناءً على معايير القياسات الحيوية للجنين خلال ثلاثة أيام من تلك المحسوبة عبر تاريخ اخر دورة شهرية هي: تم الإبلاغ عن أعلى دقة بواسطة قطرالمخيخ 55.5٪ من الحالات تلاها كل من طول عظام الفخذ ومحيط الرأس والتي كانت دقيقة في 42.5٪ من الحالات ثم

محيط البطن حيث كانت دقيقة في 32٪، وأقلها كانت القطر ثنائي القطب دقيقة في 31.5٪. بينما عند اكتشاف الدقة في غضون أسبوع واحد، تم الإبلاغ عن أعلى دقة بواسطة قطرالمخيخ في 83٪ من الحالات تلاها طول عظام الفخذ التي كانت دقيقة في 76٪ من الحالات ثم قياسات محيط الرأس كانت دقيقة في 71.5٪ قياسات قطر ثنائي القطب كانت دقيقة في 65.5٪ ، وأقلها محيط البطن التي كانت دقيقة في 57٪

الاستنتاج: أظهر القطر عبر المخيخ ارتباطًا أفضل ودقة تنبؤية لتحديد عمر الحمل في الثلث الثالث من الحمل ثم طول عظم الفخذ كان متفوقًا على القطر ثنائي القطب ويمكن استخدام قطر المخيخ كأداة للمساعدة في تقييم عمر الحمل في الثلث الثالث أيضًا من خلال الجمع بين الدقة من لقطر المخيح 83٪ و طول عظام الفخذ 76٪ لأن هذا ضروري بشكل خاص في بلدنا حيث تحضر العديد من المريضات إلى المستشفيات مع عدم وجود سجل طبي أو زيارات رعاية سابقة للولادة خاصة في المناطق الريفية ذات الظروف الاجتماعية والاقتصادية المنخفضة، دون تذكرتاريخ أخر دورة شهرية.

الكلمات الدالة: قطر عبر المخيخ، القياسات الحيوية للجنين، عمر الحمل.