



Placental Thickness used as an Indicator of Gestational Age and Fetal Weight in Uncomplicated Singleton Pregnancies: a Sonographic Study

KEYWORDS

Antenatal care, fetal weight, gestational age, placental thickness, sonography

Shashishankar behera

Associate Professor, department of obstetrics & gynecology, kalinga institute of medical sciences, KIIT university, bhubaneswar

Susmita senapati

tutor department of anatomy institute of medical sciences, soa university, bhubaneswar, odishas

PK Chinara

professor & head, department of anatomy, institute of medical sciences, soa university bhubaneswar, odishas

ABSTRACT

Placenta plays a vital role in human reproduction as it provides the physiological link between the pregnant woman & her offspring. This study was designed to investigate about the possibility of using placental thickness as a parameter for estimating fetal weight & gestational age. This study was conducted from 2014 Feb to 2015 march in the department of Obstetrics & Gynecology along with the department of Radiology, KIMS, Bhubaneswar, ODISHA. A total of 286 women out of that 412 women were able to satisfy the inclusion criteria. The gestational age was estimated by using biparietal diameter [BPD], head circumference [HC], femur length [FL] and abdominal circumference [AC]. The placental thickness was measured at the point of umbilical cord insertion. Estimated fetal weight [EFW] was also calculated by using above said parameters. The data was collected in designed clinical data collection sheets which contains all variables of the study [i.e. placental thickness, FL, BPD, HC, AC & EFW]. The placental thickness is considered as one of the parameter for estimating gestational age & weight of the fetus. Placental thickness appears as an accurate indicator for gestational age in singleton pregnancies. Correlation between placental thickness with femur length & biparietal diameter was significant. A strong significant and positive relation was seen between placental thickness and gestational age & fetal weight in 3rd trimester.

INTRODUCTION:

Placenta is an important organ which provides oxygen & nutrients to the fetus. Adequate fetal growth & subsequent optimal birth weight depends up on proper functioning of placenta. Gestational age determination is an important component of antenatal care. Sonographic measurement of different parameters helps us to determine gestational age. Placental thickness can be utilized as an ultrasonographic parameter to determine the gestational age & fetal weight. Placental thickness is related to the gestational age of fetus. The estimation of gestational age by ultrasonography is commonly used by measuring different fetal parameters such as Biparietal diameter (BPD), Abdominal circumference (AC), Head circumference (HC) and Femur length (FL). Birth weight is also equally important parameter which reflects the wellbeing of the pregnancy. The wellbeing of fetus is also influenced by placental morphology. The morphometric study of placenta and ultrasonography was done to establish the fetal weight. It was compared with the fetal weight obtained conventionally from biparietal diameter, head circumference, abdominal circumference & femur length. This study was conducted to investigate about the possibilities of using placental thickness as a parameter for estimating fetal weight & gestational age. This study also explores the relationship between placental thickness and other sonographic parameters like BPD, HC, AC, FL & calculated gestational age with fetal weight.

MATERIALS & METHODS :

A prospective study conducted at Department of Radiology, KIMS, Bhubaneswar, Odisha, in between 2014 February to 2015 March. Total 286 singleton and uncomplicated pregnant women was referred for routine antenatal USG in between 14wk to 40wk of gestational period. The gestational age was estimated by using the following parameters-

- Fetal biparietal diameter (BPD)
- Fetal head circumference (HC)
- Fetal abdomen circumference (AC)
- Fetal femur length (FL)

The placental thickness was measured at the point of umbilical cord insertion

Exclusion criteria:

Complicated pregnancies like IUGR, multiple pregnancy, diabetic & hypertensive, intrauterine growth restriction, congenital malformations and twins. Patients with PIH also excluded in this study. Data on placental thickness, gestational parameters, femur length & head Circumference, abdominal Circumference, biparietal diameter, estimated fetal weight were collected from 286 cases and entered into SPSS16 software for analysis. Descriptive analysis i.e. mean, SD, correlation and regression analysis were undertaken to achieve the objectives of the study with p value < 0.001 indicate a statistical significance.

OBSERVATION :

Table 1 Distribution of cases by age of mothers and Gestational Age						
Age of mothers	Gestational Age					
	Second Trimester		Third Trimester		Total	
	No.	%	No.	%	No.	%
19-23	39	38.4	98	52.9	137	48.07
24-29	38	37.9	49	26.54	87	30.52
>=30	24	23.7	38	20.56	62	21.75
Total	101	100	185	100	286	100

Table 2

Placental thickness(mm) and gestational age(wk)

Gestational Age	N	Mean ± SD
13-16	35	13.62±1.36
17-20	27	18.33±2.12
21-24	39	22.7±2.03
Second Trimester	101	18.6±4.46
25-28	35	26.18±1.56
29-32	38	30.88±1.67
33-36	62	33.57±1.47
37-40	50	34.65±0.86
Third Trimester	185	32.11±3.28
Total	286	28.63±6.93

Fig. 1 Gestational Age for Placental thickness for different trimester

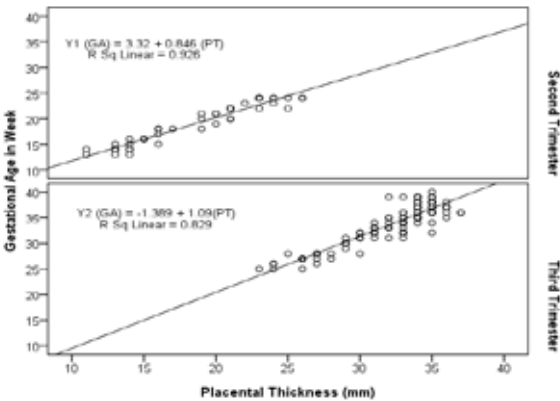


Table 3 Correlation of placental thickness with gestational age

Gestational Age in wk	Variables	Statistics	
Second Trimester	Placental Thickness (mm) N = 101	Pearson Correlation	0.96
		Sig. (2-tailed)	0
		P value	<0.001
Third Trimester	Placental Thickness (mm) N = 185	Pearson Correlation	0.91
		Sig. (2-tailed)	0
		P value	<0.001
Total	Placental Thickness (mm) N = 286	Pearson Correlation	0.98
		Sig. (2-tailed)	0
		P value	<0.001

DISCUSSION :

The placenta is a foeto-maternal organ which nourishes and protects the foetus. Developmentally it has both fetal & maternal component. Since it is closely related to the foetus and the mother, it acts like a mirror, reflecting the statuses of both the mother and the foetus. 286 pregnant women are evaluated sonographically in 2nd & 3rd trimester using trans abdominal scanning (Table 1). Out of 286 cases 101 (35.31%) were in 2nd trimester and 185 (64.69 %) were 3rd trimester. The age distribution of the mothers revealed that majority of cases were in below 29 yrs. The placental thickness in different gestational age group shows a clear trend of increasing in 2nd and 3rd trimester. (Mital P et al and others have also found similar results in their studies) The table 2 shows that in 2nd trimester the mean placental thickness was 18.6±4.46 mm, and in 3rd trimester 32.1± 3.28 mm. (Maryam et al found 21.68± 4.52 and 36.26± 6.4). The figure 2 shows correlation of the placental thickness with gestational age in scattered diagram fairly linear relationship between them. (p < 0.001). The pearson's correlation analysis revealed that there was a significant +ve relationship between placental thickness and gestational age in 2nd & 3rd trimester which shows

in (table 3). They were scanned to identify if there is a correlation between the placenta thickness and the estimation of gestational age. The present study correlate with Christopher et al., they revealed that the maximum mean placenta thickness of 45.1 ± 6.4 mm was recorded at 39 weeks gestation. There was a fairly linear increase in mean placental thickness with gestational age shown in our study in figure 1. There was significant and strong positive correlation between placental thickness and gestational age. Present study correlates with the study of Karthikeyan et al. Mital et al. also found an increasing trend in the values of mean placenta thickness (in mm)

with increase in gestational age (in weeks) and the placenta thickness (in mm) coincides almost exactly with the gestational age in weeks, so more studies is required to establish this new parameter in calculation the gestational age or confirm the fetus age using this parameter. Anupama et al. reported similar correlations between placental thickness and gestational age. Regression Analysis between placental thickness in mm and gestational age in weeks shows linear relationship (r= 0.92 & 0.83 in 2nd & 3rd trimesters respectively) and p < 0.000 which shows very significant association. (Ravi N et al & P.O Abu et al also mentioned similar findings.) Placental thickness and estimated fetal weight have a significantly high +ve correlation in both the trimesters. (P.O Abu et al, Maryam et al). The linear regression relation of placental thickness with all biometric parameters of fetus (BPD, HC, AC, FL) were significant coefficients (p< 0.000) (Mital P. & Hooja et al).

CONCLUSION :

Estimation of gestational age is a very important component of antenatal care in which ultrasonography plays an important role. Fetal parameters determined by using trans abdominal sonography is the mainstay for gestational age & fetal weight determination. Placental thickness alone or along with other parameters can be used as a reliable indicator for gestational age as well as fetal weight determination.

REFERENCES :

1. Ohagwu CC, Abu PO, Udoh BE; Placental thickness: A sonographic indicator of gestational age in normal singleton pregnancies in Nigerian women. Internet Journal of Medical Update, 2009;4(2): 9-14.
2. Mital P, Hooja N, Mehndiratta K. Placental thickness : a sonographic parameter for estimating gestational age of the fetus. Ind J Radio Imag. 2002;12(4):553-54
3. T Karthikeyan, Ramesh Kumar Subramaniam, WMS Johnson, et al. Placental thickness & its correlation to gestational age & foetal growth parameters- a cross sectional ultrasonographic study. J Clin Diagn Res. 2012 Dec; 6(10): 1732-35.
4. Jain A, Kumar G, Agarwal U, et al. Placental thickness – a sonographic indicator of gestational age. J of Obst and Gyne of India. 2001;51(3):48
5. Karthikeyan T, Subramanian RK, Johnson W and Prabhu K.(2012) Placental thickness & its correlation to gestational age & foetal growth parameters- a cross sectional ultrasonographic study. Clin. Diagn Res. 6(10):1732-5.
6. Anupama, J., K. Ganesh, U. Agarwal and edu/hbooks/pathphys/reprod/placenta. S. Kharakwal, 2001. Placental thickness- A ,sonographic indicator of gestational age. Gyne Indian, 51(3):