

ULTRASONOGRAPHIC MEASUREMENT OF PLACENTAL THICKNESS AND ITS CORRELATION WITH GESTATIONAL AGE IN A TERTIARY CARE CENTRE, COIMBATORE, TAMILNADU

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Abstract

Background: The principal function of the human placenta is by providing nutrients and oxygen to the fetus. As the gestational age increases the placenta will also grow in size. We use ultrasonography for estimating the gestational age using parameters like Femur length, bi-parietal Diameter, Head Circumference and Abdominal Circumference. The aim of the study is to find out correlation between the placental thickness and Gestational age. **Materials and Methods:** Study population is pregnant women attending the antenatal clinic and admitted in obstetric ward in the Department of Obstetrics and Gynaecology in Government Medical College and ESI Hospital, Coimbatore. Based on inclusion and exclusion criteria the study participants were recruited during the study period. The finally obtained sample size is 100. The data collected will be entered in Excel sheet and analysis will be done by SPSS 23. P value <0.05 is considered as statistically significant. **Result:** The most common age group in our study was 21-25 years of age 48% followed by 26-30 years 42%. Most of the study participants were second gravida 43% Nearly 50% of the study participants were in 32-36 weeks of gestation. The placental thickness increases with increase in gestational age. There is a linear relationship between the placental thickness and the gestational age. There is a positive relationship between the placental thickness and Biparietal diameter, Femur length, abdominal circumference. There is a strong relationship present between the placental thickness and gestational age ($r = 0.915$). **Conclusion:** Our study concludes stating that placental thickness increases with advancing gestational age especially in third trimester. There is a linear relationship observed between gestational age and the placental thickness. Linear relationship also observed between placental thickness and other parameters like BPD, Femur Length and Abdominal circumference. Thus for estimating the gestational age we can use placental thickness also as an additional parameter like BPD, Femur length and Abdominal circumference.

INTRODUCTION

Placenta develops from the Chorionic villi at fifth week of intrauterine life. It can be visible at around tenth week of gestation through transvaginal ultrasonography (TAS).^[1] The principal function of human placenta is to provide oxygen and nutrients to the fetus.^[2] The normal functioning of utero-placental organ is important for adequate fetal growth and subsequent normal birth weight.^[3] During gestation, normal development of the placenta is important for the healthy fetus.^[4] Thus any impairment in placenta

development will have an impact on fetal development and pregnancy outcome.

Gestational age is accurately determined by obstetrics ultrasound. As most of the women are unaware of their last menstrual period, gestational age is solely measured by sonographic measurements of the fetal parts like head circumference (HC), biparietal diameter (BPD), occipito-frontal diameter (OFD), head circumference (HC), abdominal circumference (AC) and femur length (FL).^[5,6]

Placental thickness is the easiest to measure. Historically a greater than 4 cm of placenta was regarded as the abnormal and it is found to be

associated with poor outcomes. In 1940s the ratio of the birth weight and the placental weight has been used as an index of appropriateness of the fetal growth. Only few studies were done to correlate with placental thickness with the gestational age. Thus this study is done to throw some light in the grey area. The aim of the study is to find out correlation between the placental thickness and Gestational age.

MATERIALS AND METHODS

Type of Study: Cross sectional study

Period of Study: 1 year

Place of Study: Government Coimbatore Medical College Hospital, Coimbatore

Inclusion Criteria

- The normal singleton third trimester antenatal women 28 to 40 weeks of gestation
- History of regular menstruation
- Known last menstrual period

Exclusion Criteria

- Women with medical disorders like Hypertensive disorders, Diabetes mellitus, Anemia
- Intrauterine growth restriction
- Multiple pregnancies
- Fetal anomalies
- Irregular menstruation
- Last menstruation period not known
- Placenta previa

Placental abnormalities like bilobate placenta, succrntriate lobe, placenta membraneca

Abnormal insertion of umbilical cord like velamentous placenta and bottledore placenta

Poor visualization of the placenta

Sample Size: Based on inclusion and exclusion criteria the final sample size recruited during the study period was 100.

Measurement of placental thickness in ultrasound: The patient was asked to lie down in supine position with a moderately distended bladder for scanning. The ultrasonographic gel was applied

over the probe and was placed on the patient's abdomen. The amniotic fluid index was measured first to rule out oligohydramnios and polyhydramnios. Then Biparietal diameter, Femur length, abdominal circumference were measured next. Placental thickness is measured at the level of umbilical cord insertion in millimetre. The site of insertion of umbilical cord is mostly in the central part of the placenta. Placental thickness is the distance between the echogenic chorionic plate to the placental myometrial interface. When the uterus is in the relaxed stage we have to measure the placental thickness, not during uterine contractions. Maternal blood, placental tissue and the fetal blood are the factors which influence the thickness of placenta. In the sonographic field ,it is very important to identify the both the edges of the placenta. Once after identifying the cord insertion site, a straight line should be drawn from the cord insertion to the placental maternal surface. Placental thickness should be measured perpendicular to uterine wall.

Statistical analysis: The obtained data was entered in the MS Excel Windows 10. Statistical analysis was done with the help of SPSS 23. Continuous data was expressed in terms of Mean and Standard deviation .Categorical data was expressed in terms of Numbers and percentages. Pearson correlation was done to find the association between the continuous variables. Test of association for Categorical data was Chi square test and for Continuous data was t test and Anova test. p value <0.05 is considered as statistically significant.

RESULTS

The most common age group in our study was 21-25 years of age 48% followed by 26-30 years 42%. Most of the study participants were second gravida 43% followed by Third gravida 30%. Nearly 50% of the study participants were in 32-36 weeks of gestation.

Table 1: Demographic profile of the study participants

Variables	Number (N)/ Percentages (%)
Age category	
<20 years	4
21-25 years	48
26-30 years	42
>30 years	6
Parity	
Primigravida	27
Second Gravida	43
Third Gravida	30
Gestation weeks	
<=28	1
29-32	25
32-36	50
37-40	24

Table 2: Placental thickness distribution

Gestational age	Mean	Standard deviation
28 weeks	34.9	0
29 weeks	35.2	1.99
30 weeks	36.02	1.05

31 weeks	36.69	0.07
32 weeks	37.52	0.89
33 weeks	38.25	0.64
34 weeks	38.85	0.4
35 weeks	39.23	0.65
36 weeks	39.66	0.44
37 weeks	40.4	0.91
38 weeks	41.5	1.19
39 weeks	42.83	1.33
40 weeks	43.41	0

Table 3: The relationship between the placental thickness and other parameters [FL, BPD, AC].

Correlations		GA	FL	BPD	AC	PT
PT	Pearson Correlation	.915**	.896**	.844**	.896**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

** . Correlation is significant at the 0.01 level (2-tailed).

The placental thickness increases with increase in gestational age from 28 weeks to 40 weeks.

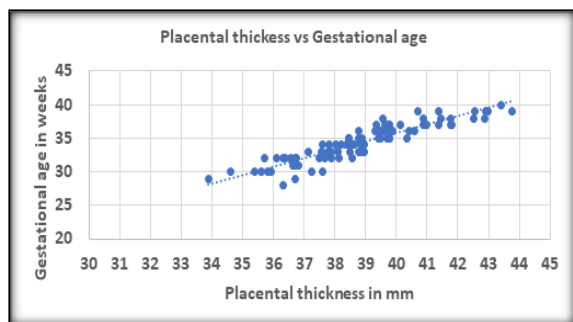


Figure 1: Correlation of gestational age and placental thickness

There is a linear relationship between the placental thickness and the gestational age

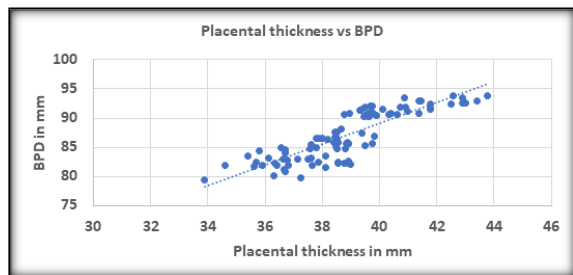


Figure 2: Correlation of placental thickness and biparietal diameter

Placental thickness increases as BPD also increases. So, this can be used when there is difficult for measuring BPD like abnormal fetal head, hydrocephalus, abnormal fetal position.

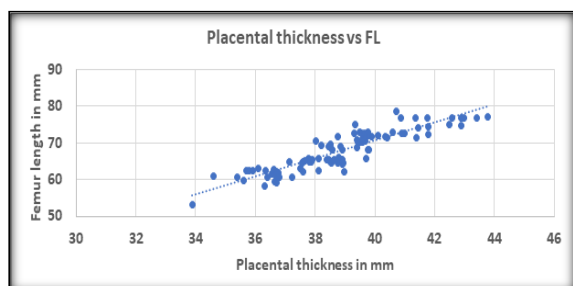


Figure 3: Correlation of placental thickness and Femur length

There is a positive relationship between the placental thickness with femur length. Placental thickness increases as femur length also increases. It can be used when there is difficult for measuring femur length and short femur bone.

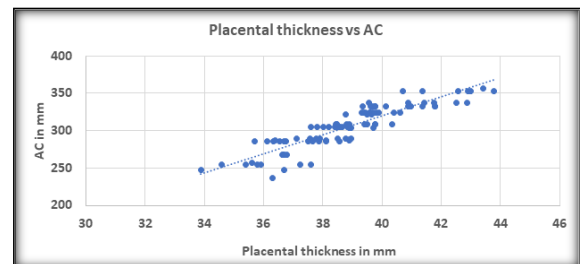


Figure 4: Correlation of placental thickness and Abdominal circumference

There is a positive relationship between the placental thickness and abdominal circumference. Placental thickness increases as the abdominal circumference increases. So, this can be used when there is any sonographic difficult for measuring abdominal circumference.

There is a strong relationship present between the placental thickness and gestational age. r value is 0.915 and the P value is significant. Pearson correlation showed that placental thickness has a strong correlation with other parameters [FL, BPD, AC]. [Table 3]

DISCUSSION

Placenta acts as a link between the mother and the fetus. The placenta will deliver oxygen and nutrients from mothers blood as well as excretes the waste. Thus the placenta promotes the fetal development. As the gestational age increases the placental thickness increases. The placental thickness is a promising parameter for estimating the fetal weight. Placenta thickness acts as a mirror thus reflecting the mother and the fetus. Placental thickness <25 mm at term found to be associated with Intrauterine Growth Retardation (IUGR) by Kulman and Warsoff.^[7]

Placental thickness of >40 mm at term found to be associated with intrauterine infections, gestational diabetes and hydrops foetalis.^[8]

In our study the most common age group was 21-25 years (48%) followed by 26-30 years (42%). This was similar to Noor N et al,^[9] study where the most common age group was <25 years 66(43.5%). Most of the study participants were second gravida (43%) followed by Third gravida (30%). Nearly 50% of the study participants were in 32-36 weeks of gestation. The placental thickness increases as the gestational age advances.

Placental thickness increases as BPD, Femur length and Abdominal circumferences also increases. Pearson correlation showed that placental thickness has a strong correlation with other parameters like Biparietal Diameter, Abdominal Circumference and Femur Length($r=0.9$). This was similar to Afrakhteh M et al,^[10] study where the placental thickness and the fetal weight was found to be positively correlated with fetal weight in second and third trimester. Abu PO et al,^[11] study also showed positive correlation in both the trimesters. Similar results was also seen in Clapp et al,^[12] study where 40 singleton pregnant women and showed a significant correlation ($r>0.79$). Estimated Fetal weight is an important component of the antenatal care in which the ultrasonography has an important role. Placental thickness should be measured at the level of umbilical cord insertion which can be used as an sonographic indicator for assessing as it has a linear correlation.

CONCLUSION

Our study concludes stating that placental thickness increases with advancing gestational age especially in third trimester. There is a linear relationship observed between gestational age and the placental thickness. Linear relationship also observed between placental thickness and other parameters like BPD, Femur Length and Abdominal circumference. Thus for estimating the gestational age we can use placental thickness also as an additional parameter like BPD, Femur length and Abdominal circumference. Abnormal placental thickness

indicates the maternal diseases and fetal abnormalities.

Limitations: In our study we used single dimension ultrasonography, in which the placental thickness measurements is less accurate when compared to 3-dimensional sonography. Serial measurements of the placenta in same individual in not done with which we can identify the growth of placenta.

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