



CORRELATION OF PLACENTAL THICKNESS WITH GESTATIONAL AGE AND FETAL PARAMETERS

Radio-Diagnosis

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ABSTRACT

Background: Placental thickness is a critical sonographic parameter reflecting fetal growth and well-being. It may serve as a non-invasive marker to estimate gestational age and assess fetal development. **Aim:** To evaluate the correlation between placental thickness and gestational age, along with key fetal biometric parameters such as BPD, HC, AC, and FL. **Method:** A cross-sectional analytical study was conducted on 450 antenatal women (14–40 weeks gestation) at Pacific Institute of Medical Sciences, Udaipur. Placental thickness was measured at the level of umbilical cord insertion and correlated with fetal parameters using Pearson's coefficient and regression analysis. **Result:** Placental thickness showed a strong positive correlation with gestational age ($r > 0.9$, $p < 0.001$) and fetal biometric measurements. Thickness increased progressively with gestation, particularly up to 36 weeks. **Conclusion:** Placental thickness is a reliable, simple, and non-invasive ultrasound marker for estimating gestational age and fetal growth.

KEYWORDS

Placental thickness, gestational age, fetal parameters, ultrasonography, fetal biometry.

INTRODUCTION

The placenta is a vital organ formed during pregnancy, serving as the lifeline between the mother and the fetus. It facilitates the exchange of nutrients, oxygen, and waste products while also producing essential hormones for sustaining pregnancy. One of the measurable characteristics of the placenta is its thickness, which can be evaluated non-invasively through ultrasonography. Placental thickness is thought to reflect the health and maturity of the placenta and, by extension, the well-being of the fetus.

Numerous studies have suggested that placental thickness correlates positively with gestational age, especially during the second and third trimesters. This correlation offers a potential adjunct tool for estimating fetal age, particularly when the last menstrual period is unknown or fetal biometry is unreliable. Additionally, placental thickness may provide early clues about fetal growth abnormalities or placental insufficiency, aiding in the detection of intrauterine growth restriction (IUGR) or macrosomia.

Given the simplicity and accessibility of ultrasound, measuring placental thickness offers a valuable addition to routine prenatal screening. This study investigates the relationship between placental thickness and gestational age and examines its association with key fetal biometric parameters, aiming to validate its role as a reliable sonographic marker for pregnancy assessment.

MATERIALS AND METHODS

This was a cross-sectional analytical study conducted over 18 months at the Department of Radiodiagnosis, Pacific Institute of Medical Sciences, Umarda, Udaipur. A total of 450 antenatal women between 14 to 40 weeks of gestation were enrolled after obtaining informed consent. Patients were referred from the Obstetrics & Gynecology department for routine antenatal ultrasonography. Inclusion criteria included singleton, uncomplicated pregnancies with a known last menstrual period (LMP). Exclusion criteria were multiple gestations, congenital anomalies, placental morphological abnormalities, unknown LMP, and any maternal or fetal complications affecting placental or fetal growth.

All patients underwent a detailed clinical assessment followed by ultrasound examination using high-resolution machines (Voluson E8, S10, Samsung V8, and Mindray DC 80) with a 3.5 MHz convex probe. Placental thickness was measured in the sagittal plane at the level of umbilical cord insertion, perpendicular to the placental surface. Fetal biometric parameters including BPD, HC, AC, FL, and estimated fetal weight were recorded.

Data were analyzed using statistical software. Correlation between placental thickness and gestational age, as well as fetal parameters, was evaluated using Pearson's coefficient and regression analysis to determine statistical significance and clinical relevance.

RESULT AND OBSERVATIONS

In this cross-sectional study of 450 antenatal women between 14–40 weeks of gestation, the majority of participants were aged 21–25 years (43.11%) with a mean age of 26.21 ± 4.11 years. Parity distribution was almost equal between primigravida (49.56%) and multigravida (50.44%). Most patients were in the third trimester (56.22%), with a mean gestational age of 28.75 ± 7.52 weeks.

The anterior placental position was the most common (35.78%), followed by fundal posterior (19.56%) and posterior (16.89%). Placental thickness increased progressively with advancing gestational age. A significant linear correlation was observed between placental thickness and gestational age, with the thickness approximately matching the gestational week in millimeters up to 36 weeks.

Fetal biometric parameters such as biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL) also showed a strong positive correlation with placental thickness. In the second trimester, mean placental thickness ranged from 13 mm to 26 mm, while in the third trimester, it ranged from 27 mm to 39 mm.

A statistically significant increase in birth weight was observed between the second and third trimesters, further reinforcing the value of placental thickness as a reliable predictor of fetal maturity and growth.

Placental Thickness Across Gestational Age In The Second Trimester

Gestational age in Weeks Completed		Placental Thickness (in mm)			
		No. of Patients	Percentage	Mean	SD
Second Trimester	13	5	1.11	13	0.70
	14	7	1.56	14	1.63
	15	7	1.56	16	2.44
	16	2	0.44	17	0.00
	17	6	1.33	20	3.57
	18	4	0.89	18	0.81
	19	17	3.78	19	0.70

	20	30	6.67	21	1.14
	21	24	5.33	21	1.25
	22	27	6.00	22	1.10
	23	25	5.56	24	3.36
	24	17	3.78	24	1.23
	25	9	2.00	26	4.79
	26	17	3.78	26	1.65

Placental Thickness Across Gestational Age In The Third Trimester

Gestational age in Weeks Completed	Placental Thickness (in mm)				
	No. of Patients	Percentage	Mean	SD	
Third Trimester	27	8	1.78	26	0.70
	28	10	2.22	29	1.41
	29	14	3.11	29	0.93
	30	13	2.89	30	2.39
	31	12	2.67	32	1.46
	32	16	3.56	32	1.23
	33	18	4.00	33	1.28
	34	23	5.11	34	3.47
	35	45	10.00	35	1.41
	36	30	6.67	36	1.68
	37	34	7.56	38	2.22
	38	22	4.89	40	4.05
	39	6	1.33	41	1.97
	40	2	0.44	39	0.00

DISCUSSION

This study reinforces the value of placental thickness as a reliable, non-invasive parameter in assessing fetal development and estimating gestational age. A strong, statistically significant correlation was observed between placental thickness and gestational age, especially from 14 to 36 weeks, aligning with findings from multiple Indian and international studies. Placental thickness increased linearly with advancing gestation and showed strong associations with fetal biometric parameters like BPD, HC, AC, and FL. These findings suggest that placental thickness can be an effective adjunct when traditional fetal biometric data are unavailable or unreliable, such as in cases of uncertain LMP or fetal malformations.

Several maternal and fetal factors influence placental development, including maternal age, parity, and placental location, all of which were well-represented in our study. The anterior placenta was the most common position observed. Importantly, deviations in placental thickness-whether increased or decreased-could serve as early indicators of adverse fetal outcomes like IUGR or macrosomia.

Our results also emphasize the utility of incorporating placental thickness measurements in routine obstetric ultrasounds. Given the ease and reproducibility of this measurement, it offers an economical and efficient way to monitor pregnancies, particularly in low-resource settings where advanced fetal monitoring may not be available.

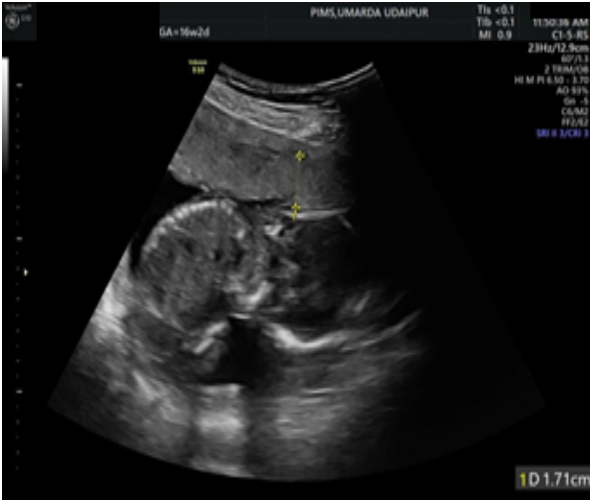


Figure 1: Transabdominal sagittal sonographic image at 16 weeks 2 days of gestation demonstrating placental thickness measurement (calipers) at the level of umbilical cord insertion. The placenta is seen along the anterior uterine wall, with a measured thickness of 1.71 cm.



Figure 2: Transabdominal ultrasound image at 28 weeks 4 days gestation demonstrating placental thickness of 2.8 cm (28 mm). The measurement aligns with the expected range for gestational age, indicating a normal positive correlation between placental thickness and gestational age.

SUMMARY

This cross-sectional analytical study was conducted on 450 antenatal women between 14 and 40 weeks of gestation at Pacific Institute of Medical Sciences, Udaipur. The primary objective was to assess the correlation between placental thickness and gestational age, along with fetal biometric parameters such as BPD, HC, AC, and FL. Measurements were taken using standard ultrasonography at the level of the umbilical cord insertion.

The results demonstrated a strong positive correlation between placental thickness and gestational age, with the mean thickness increasing consistently with advancing gestation. This relationship remained significant throughout the second and third trimesters. Additionally, placental thickness showed statistically significant correlations with all key fetal biometric parameters, indicating its potential as an adjunct tool for estimating gestational age and fetal health.

Most patients in the study were in the age group of 21–30 years, with an even distribution between primigravida and multigravida. The anterior placenta was most commonly observed. The study excluded high-risk pregnancies and placental anomalies to maintain accuracy.

Overall, placental thickness emerged as a simple, cost-effective, and reproducible sonographic marker. Its use is particularly beneficial in cases where the last menstrual period is unknown or fetal biometric data are compromised.

CONCLUSIONS

This study concludes that placental thickness is a reliable, non-invasive sonographic marker that correlates strongly with gestational age and fetal biometric parameters. Measured at the umbilical cord insertion, it increases linearly up to 36 weeks, making it valuable for pregnancy dating and fetal assessment. It is especially useful when LMP or biometric data are uncertain. Placental thickness can help detect complications like IUGR and macrosomia, aiding timely intervention. Its routine inclusion in ultrasound protocols enhances diagnostic accuracy. Simple, cost-effective, and reproducible, placental thickness improves prenatal care and supports better maternal and fetal outcomes, especially in low-resource settings.

REFERENCES

1. Karthikeyan T, Subramaniam RK, Johnson WMS, Prabhu K. Placental thickness & its correlation to gestational age & foetal growth parameters: a cross-sectional ultrasonographic study. *J Clin Diagn Res*. 2012;6(10):1732–1735.

2. Adhikari R, Deka PK, Tayal A, Chettri PK. Ultrasonographic evaluation of placental thickness in normal singleton pregnancies for estimation of gestational age. *Lateral*. 2015;11:1-7.

3. Balakrishnan M, Virudachalam T. Placental thickness: a sonographic parameter for estimation of gestational age. *Int J Reprod Contracept Obstet Gynecol*. 2016;5(12):4377–4381.

4. Omer Ahmed FAS, Ibrahim RM, Farouk AM, Aboushady RMA. Assessment of placental thickness as a predictor of gestational age and fetal weight. *Int J Reprod Contracept Obstet Gynecol*. 2023;12:794–800.

5. Sabeena AA, Joseph L, Varghese AE, Alphonse SC. Placental thickness and its correlation to gestational age. *Int J Acad Med Pharm.* 2023;5(2):721–725.
6. Vinchurkar KN, Aiyappan SK, Kumar CP, et al. Correlation of placental thickness with gestational age in second and third trimester using ultrasonography. *Egypt J Radiol Nucl Med.* 2023;54:164.
7. Naik AN, Kale S, Tayade A, Ghodke D. Placental thickness and its correlation to gestational age estimated by fetal biometry: a cross-sectional study. *Asian J Med Sci.* 2022;13(10).
8. Baghel P, Bahel V, Paramhans R, Sachdev P, Onkar S. Correlation of placental thickness estimated by ultrasonography with gestational age and fetal outcome. *Indian J Neonatal Med Res.* 2015;3(3):19–24.
9. Saxena SS, Rao A, Nigam RK, Madan GS, Yadu N. Ultrasonographic measurement of placental thickness and its correlation with gestational age. *Int J Curr Med Appl Sci.* 2016;10(3):138–143.
10. Shakir RF, Mehendale M, Nayak A. Study of placental thickness with respect to gestational age and fetal weight by ultrasonographical evaluation. *Int J Clin Obstet Gynaecol.* 2020;4(1):74–78.