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ORIGINAL RESEARCH

Sonographically thick placenta a marker for increased perinatal risk: A prospective cross-sectional study

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ABSTRACT

Background: The placenta serves as the critical interface between the mother and the developing fetus. It plays a pivotal role in fetal growth by facilitating the transfer of oxygen and essential nutrients from maternal blood while simultaneously removing carbon dioxide and metabolic waste products during the intrauterine period. Hence; the present study was conducted for assessing the utility of sonographically thick placenta a marker for increased perinatal risk.**Materials & methods:**Two hundred pregnant women who were sure of dates from the antenatal clinic at 32 weeks were recruited. All patients were followed up to 36 weeks and after delivery. The placental thickness obtained by ultrasonography and correlated with foetal parameters such as femur length, bi-parietal diameter, head circumference and abdominal circumference were used to predict the estimated fetal birth weight as the primary outcome. The pregnant women with placental thickness and diameter between the 10th and 95th percentile was taken as having a normal placental thickness and were followed up as one group. Pregnant women with thickness below the 10th percentile and above 95th percentile was defined as having abnormally thin or thick placenta and were classified as a separate group and were followed up until delivery. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:**Mean placental thickness was higher at 36 weeks, i.e., 3.25 ± 0.59, as compared to the placental thickness of 2.89 ± 0.45 at 32 weeks. Mean 10th and 95th percentile of placental thickness at 32 and 36 weeks are represented in table 5. The results revealed that the mean placental thickness at 32 weeks was 2.89, with 10th and 95th percentile being 2.2 and 3.5 respectively, and the mean placental thickness at 36 weeks was 3.25, with 10th and 95th percentile being 2.5 and 4.19 respectively. Pearson's correlation was applied to correlate the birth weight, age and gravida with placental thickness at 32 and 36 weeks. A positive, very weak, non-significant correlation was seen between birth weight and placental thickness at 32 weeks (r=0.072, p=0.314) and 36 weeks (r=0.005, p=0.94). Negative, very weak, non-significant correlation was seen between age and placental thickness at 32 weeks (r= -0.033, p=0.64) and 36 weeks (r= -0.053, p=0.45); between gravida and placental thickness at 32 weeks (r= -0.039, p=0.58) and 36 weeks (r= -0.033, p=0.64). Study subjects with thick placental thickness had more duration of NICU stay, i.e., 4 days at 32 weeks, as compared to subjects who had thin placenta, *i.e.,* 3.33±0.577 and normal placental thickness, 2.38±0.87.**Conclusion:**There existed a significant relationship between placental thickness and foetal weight of women at gestational age of 32 and 36 weeks.Higher placental thickness for particular gestational age could results in low-birth-weight babies and poor fetal outcome.

Key words: Placenta, Perinatal, Sonographically

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INTRODUCTION

The placenta serves as the critical interface between the mother and the developing fetus. It plays a pivotal role in fetal growth by facilitating the transfer of oxygen and essential nutrients from maternal blood while simultaneously removing carbon dioxide and metabolic waste products during the intrauterine period. Additionally, the placenta acts as a protective barrier against infections and harmful substances, and it is responsible for the secretion of hormones into the maternal bloodstream.[1] Abnormalities in placental function can lead to complications during pregnancy that may adversely affect both maternal and fetal health, as well as the subsequent health outcomes of the newborn.Identifying placental variations is crucial, as they may signal potential issues for both the mother and the fetus.[2] Placental thickness (PT) is a significant morphological indicator in prenatal development, with variations in PT linked to various pathological conditions. For example, a decrease in PT is often associated with fetal growth restriction and systemic vascular disorders, while an increase in PT may be observed in conditions such as preeclampsia, gestational diabetes mellitus (GDM), maternal anemia, fetal hydrops, and antepartum infections. Prior research indicates that abnormal PT could serve as an early indicator of potential prenatal complications.[3-5]Hence; the present study was conducted for assessing the utility of sonographically thick placenta a marker for increased perinatal risk.

MATERIALS & METHODS

Source of data :The main source of data for the study are patients from the teaching hospital attached to J.J.M. Medical college, Davangere. Sample size : 200

Procedure of study :This was a prospective observational longitudinal study conducted in the Department of OBG, J.J.M. Medical College, within a study period. Pregnant women, who were sure of dates and gave informed consent, will be recruited from Antenatal Clinic at 32 weeks and will be followed up at 36 weeks and after delivery.After obtaining informed consent, Obstetric ultrasound will be performed using a 3.5-MHz curvilinear transducer. Placenta will be localized in a longitudinal section. The placental thickness will be measured at the level of umbilical cord insertion in longitudinal direction from the lateral chorionic plate to the cord insertion excluding the retro placental area. The pregnant women with placental thickness between 10th and 95th percentile will be taken as having normal placental thickness , and pregnant women with thickness below 10th percentile and above 95th percentile will be defined to be having abnormally thin or thick placenta and will be classified as a separate group and each group were followed up till delivery.Post-delivery birth weight of the baby, APGAR score, NICU admission , total nicu duration and stay ,maturity of baby and sex of the baby will be noted.placental thickness correlated with birth weight and neonatal outcome by statistical analysis.

RESULTS

Mean placental thickness was higher at 36 weeks, i.e., 3.25 ± 0.59, as compared to the placental thickness of 2.89 ± 0.45 at 32 weeks.Mean 10th and 95th percentile of placental thickness at 32 and 36 weeks are represented in table 1. The results revealed that the mean placental thickness at 32 weeks was 2.89, with 10th and 95th percentile being 2.2 and 3.5 respectively, and the mean placental thickness at 36 weeks was 3.25, with 10th and 95th percentile being 2.5 and 4.19 respectively.Pearson's correlation was applied to correlate the birth weight, age and gravida with placental thickness at 32 and 36 weeks. A positive, very weak, non-significant correlation was seen between birth weight and placental thickness at 32 weeks (r=0.072, p=0.314) and 36 weeks (r=0.005, p=0.94). Negative, very weak, non-significant correlation was seen between age and placental thickness at 32 weeks (r= -0.033, p=0.64) and 36 weeks (r= -0.053, p=0.45); between gravida and placental thickness at 32 weeks (r= -0.039, p=0.58) and 36 weeks (r= -0.033, p=0.64).

Table 1: Mean Placental Thickness At 32 Weeks And 36 Weeks

Weeks	N	Minimum	Maximum	Mean	SD
32 WEEKS	200	1.90	3.70	2.89	0.45
36 WEEKS	200	2.00	5.80	3.25	0.59

Table 2: Mean, 10th And 95th Percentile Of Placental Thickness At 32 And 36 Weeks

Placental thickness	32 weeks	36 weeks
Mean	2.89	3.25
10 percentiles	2.2	2.5
95thpercentile	3.5	4.19

Table 3: Pearson's Correlation Between Birth Weight, Maternal Age, Parity And Placental Thickness At 32 And 36 Weeks

Variable	Placental Thickness	r value	p-value
Birth weight	At 32 weeks	0.072	0.314
	At 36 weeks	0.005	0.94
Age	At 32 weeks	-0.033	0.64

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	At 36 weeks	-0.053	0.45
Gravida	At 32 weeks	-0.039	0.58
	At 36 weeks	-0.033	0.64

Table 4: Cross-tabulation of nicu admission and placental thickness at 32 and 36 weeks

	Placental thickness		NICU admission		Total	Chi-square value	p-value
			No	Yes			
At 32 weeks	Normal	Count	165	13	178	23.27	0.00*
		%	82.5%	6.5%	89.0%		
	Thick	Count	4	3	7		
		%	2.0%	1.5%	3.5%		
	Thin	Count	12	3	15		
		%	6.0%	1.5%	7.5%		
At 36 weeks	Normal	Count	159	13	172	16.13	0.003*
		%	79.5%	6.5%	86.0%		
	Thick	Count	7	3	10		
		%	3.5%	1.5%	5.0%		
	Thin	Count	15	3	18		
		%	7.5%	1.5%	9.0%		
TOTAL		Count	Count	19	200		
		%	%	9.5%	100.0%		

*Significant

Results show that at 32 weeks, 3 study subjects out of 7 having thick placental thickness had bad APGAR score and were admitted to NICU. Similarly, at 36 weeks, 3 out of 10 subjects having thick placental thickness had bad APGAR score were admitted to NICU. Study subjects with thick placental thickness had more duration of NICU stay, i.e., 4 days at 32 weeks, as compared to subjects who had thin placenta, *i.e.*, 3.33±0.577 and normal placental thickness, 2.38±0.87.

DISCUSSION

The placenta is a maternal-fetal organ, which begins developing at implantation of the blastocyst and is delivered with the fetus birth. During those nine months, it provides nutrition, gas exchange, waste removal, endocrine and immune support for the development of the fetus. Placenta connects the fetus to the uterine wall and is composed of fetal and maternal portions.[6- 9]Hence; the present study was conducted for assessing the utility of sonographically thick placenta a marker for increased perinatal risk.

Mean placental thickness was higher at 36 weeks, i.e., 3.25 ± 0.59, as compared to the placental thickness of 2.89 ± 0.45 at 32 weeks. Mean 10th and 95th percentile of placental thickness at 32 and 36 weeks are represented in table 1. The results revealed that the mean placental thickness at 32 weeks was 2.89, with 10th and 95th percentile being 2.2 and 3.5 respectively, and the mean placental thickness at 36 weeks was 3.25, with 10th and 95th percentile being 2.5 and 4.19 respectively. Pearson's correlation was applied to correlate the birth weight, age and gravida with placental thickness at 32 and 36 weeks. Elchalal Uet al determined placental thickness by ultrasound examination throughout pregnancy and establish the correlation of sonographically thick placenta with perinatal mortality and morbidity. Placental thickness was determined by routine sonographic examination throughout pregnancy in 561 normal singleton pregnancies. Thick placenta was determined as placenta that was above the 90th percentile. Gravidae between 20-22 weeks' gestation (n=193) and 32-34 weeks (n=73) were then divided into two groups according to placental thickness. The study group consisted of 44 gravidae with thick placenta. The control group included 151 gravidae with placental thickness between the 10th and 90th percentile. A comparison of perinatal mortality and morbidity rates as well as the incidence of small and large for gestational age neonates was conducted.A linear increase of placental thickness was found to correlate with gestational age throughout pregnancy. No statistical differences were observed between the two groups with regard to obstetrical variables such as maternal age, parity and gestational age at delivery. No correlation was found between placental thickness and maternal age or parity. The incidence of perinatal mortality was significantly higher among gravidae with thick placentae. Birthweight at term was found to be above 4000 g in 20.45 per cent of the thick-placenta group as compared to 5.3 per cent in the control group, and birthweight of less than 2500 g was found in 15. 9 per cent of the thick-placenta group as compared to 7.3 per cent in the control group. The incidence of fetal anomalies was 9.1 per cent in the thick-placenta group and 3.97 per cent in the control group (not significant).[10]

A positive, very weak, non-significant correlation was seen between birth weight and placental thickness at 32 weeks (r=0.072, p=0.314) and 36 weeks (r=0.005, p=0.94). Negative, very weak, non-significant correlation was seen between age and placental

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thickness at 32 weeks (r= -0.033, p=0.64) and 36 weeks (r= -0.053, p=0.45); between gravida and placental thickness at 32 weeks (r= -0.039, p=0.58) and 36 weeks (r= -0.033, p=0.64). Rawal S et al measured placental thickness in the second and third trimesters of singleton pregnancies and identified an association between placental thickness and adverse outcomes such as congenital anomalies, fetal growth restriction (FGR), prematurity, low birth weight, stillbirth, and hydrops fetalis. Out of 298 patients, 82 (27.5%) were primigravida and 216 (72.4%) were multigravida. At 18-20 weeks, premature birth was observed in one patient (7.69%) in Group C and six patients (20%) in Group B, compared with eight patients (3.14%) in Group A. At 30-32 weeks, premature birth was seen in two patients (16.67%) in Group C and 11 patients (36.67%) in Group B, compared with two patients (0.78%) in Group A. At 18-20 weeks of gestation, low birth weight was observed for three patients (23.08%) in Group C and 16 patients (53.33%) in Group B, compared with 15 patients (5.88%) in Group A. At 30-32 weeks, low birth weight was observed for four patients (33.33%) in Group C and 19 patients (63.33%) in Group B compared with 11 patients (4.30%) in Group A. A significant association was found between a thin placenta and low birth weight and prematurity at both 18-20 and 30-32 weeks of gestation. Two patients (13.33%) had major congenital abnormalities and a thick placenta at 18-20 weeks. In Group C, hydrops were observed in two patients (15.38%) at 18-20 weeks and two patients (16.67%) at 30-32 weeks. A significant association was found between a thick placenta and hydrops. At 30-32 weeks, 13 patients (43.33%) in Group B had developed FGR compared with six patients (2.34%) with a normal placenta. A significant association was found between a thin placenta and FGR. One patient (7.69%) with a thick placenta had a stillbirth, indicating a nonsignificant association. A positive correlation was observed between congenital anomalies and hydrops and a thick placenta, whereas FGR, preterm labor, prematurity, and low birth weight were associated with a thin placenta.[11]

Numerous studies have established cutoff values for abnormal placental thickness (PT). Hoddick et al., La Torre et al., and Dombrowski et al. concur that PT should not surpass 40 mm at any point during gestation. In their research, Elchalal et al. defined a thick placenta (above the 90th percentile) as one exceeding 35 mm at 20 to 22 weeks of gestation and greater than 51 mm at 32 to 34 weeks. The location of the placenta may also influence PT measurements. Lee et al. found that anterior placentas tend to be approximately 6 to 7 mm thinner than those located posteriorly or at the fundus. They proposed that an anterior placenta measuring over 33 mm and a posterior placenta exceeding 40 mm during the second trimester should be classified as abnormally thick. While a universally accepted definition of thickened placenta remains elusive, it is crucial for clinicians to remain vigilant regarding the potential for adverse perinatal outcomes when PT exceeds 40 mm. Furthermore, in cases where thickened placenta is suspected, magnetic resonance imaging (MRI) may serve as a valuable tool for assessing PT and any related abnormalities.[12- 16]

CONCLUSION

Increased placental thickness is not diagnostic of any specific disorder but may contribute to the management of a fetus at risk .Measurement of Placental Thickness by U/S is a good predictor tool for estimating the fetal weight. Thick placenta is associated with higher incidence of low gestational age and low birth weight. Ultrasound forms a readily available, fairly safe, and forms an effective noninvasive teqnique. A thick placenta should be regarded as a risk factor and needs good follow up during the rest of pregnancy.

REFERENCES

1. Leung AK, Robson WL. Single umbilical artery: a report of 159 cases. American Journal of Diseases of Children 1989;143(1):108-11.
2. Heifetz SA. The umbilical cord: obstetrically important lesions. Clinical Obstetrics and Gynecology 1996;39(3):571-87.
3. Sornes T. Umbilical cord knots. Acta Obstetricia et GynecologicaScandinavica 2000;79(3):157-9.
4. Valsamakis G, Kanaka-Gantenbein CH, Malamitsi-Puchner AR, Mastorakos G. Causes of intrauterine growth restriction and the postnatal development of the metabolic syndrome. Annals of the New York Academy of Sciences 2006;1092(1):138-47.
5. Noor N, Jain A, Parveen S, Ali SM. Ultrasonographic measurement of placental
6. thickness and its correlation with estimated fetal weight. Int J Reproduct Contracept ObstetGynecol2018;7:287-90.
7. Huynh J, Dawson D, Roberts D, et al. A systematic review of placental pathology in maternal diabetes mellitus. Placenta 2015; 36: 101–114.
8. Azpurua H, Funai EF, Coraluzzi LM, Doherty LF, Sasson IE, Kliman M, Kliman HJ. Determination of placental weight using two-dimensional sonography and volumetric mathematic modeling. American Journal of Perinatology 2010;27(02):151-5.
9. Suseela AV, Satyavani BC, Devi GR. Placental thickness and its ultrasonographic correlation with estimated fetal weight. IAIM 2020;7(2):23-28
10. Elchalal U, Ezra Y, Levi Y, Bar-Oz B, Yanai N, Intrator O, Nadjari M. Sonographically thick placenta: a marker for increased perinatal risk--a prospective cross-sectional study. Placenta. 2000 Mar-Apr;21(2-3):268-72.
11. Rawal S, Ray S, Sharma N. Correlation Between Ultrasonographic Placental Thickness and Adverse Fetal and Neonatal Outcomes. Cureus. 2024 Mar 18;16(3):e56410
12. Hoddick WK, Mahony BS, Callen PW, et al. Placental thickness. J Ultrasound Med 1985; 4: 479–482

DOI: 10.69605/ijlbpr_14.2.2025.173

13. La Torre R, Nigro G, Manuela Mazzocco M, et al . The ultrasonic changes in the maturing placenta. Am J Obstet and Gynecol 1979; 42: 915.
14. Dombrowski MP, Wolfe HM, Saleh A, et al. The sonographically thick placenta: a predictor of increased perinatal morbidity and mortality. Ultrasound ObstetGynecol 1992; 2: 252–255
15. Elchalal U, Ezra Y, Levi Y, et al. Sonographically thick placenta: a marker for increased perinatal risk–a prospective cross-sectional study. Placenta 2000; 21: 268–272.
16. Lee AJ, Bethune M, Hiscock RJ. Placental thickness in the second trimester: a pilot study to determine the normal range. J Ultrasound Med 2012; 31: 213–218.