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Assessment of use of ultrasonographic placental thickness in prediction of fetal outcome

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Abstract
Background: Any disease process affecting the mother will have impact on both the fetus and the placenta. The present study was conducted to assess use of ultrasonographic placental thickness in prediction of fetal outcome.
Materials & Methods: 48 with singleton pregnancy between 18 and 40 years of age, with normal BMI were included. Obstetric ultrasound was performed on using a 3.5-MHz curvilinear transducer. Post-delivery birth weight of the baby, placental weight, Apgar score, maturity of baby and sex of the baby were noted. Birth weight of the baby was recorded. Placental thickness at 32 and 36 weeks was correlated with birth weight and neonatal outcome.
Results: The mean placental thickness at 32 weeks was 33.2 mm and at 36 weeks was 35.8 mm. The difference was significant ($P< 0.05$). There was correlation between between placental thickness and Apgar score at 32 weeks and at 36 weeks (p value = 0.05), which is statistically significant. However, no correlation was found between placental thickness and BMI of the patient ($r = 0.007$ at 32 weeks and $r = -0.006$ at 36 weeks).
Conclusion: Placental thickness at 32 and 36 weeks corresponds well with gestational age and is a good prognostic factor in assessing neonatal outcome.

Keywords: Placental thickness, birth weight, ultrasound

Introduction
The placenta is the most important but unfortunately often ignored organ. A normally functioning placenta is required for normal fetal growth and development. It has been historically documented that placental weight in a normal pregnancy at term is about one-fifth of the fetal weight [1]. The fetus and the placenta undergo the same stress and strain in utero life. Any disease process affecting the mother will have impact on both the fetus and the placenta. Thus, placental measurement such as placental thickness must reflect the nutritional status of the fetus and the fetal outcome. Placental thickness is the simplest measurement of placental size [2].
LBW infants are susceptible to hypoxia and fetal distress, long-term handicap and fetal death. Compounding the problem of the LBW infant is the need to identify the fetus failing to reach its growth potential, although its biometry may exceed the standard 10th centile [3]. This suggests that an early detection of intrauterine growth retardation will be beneficial to obstetric and neonatal care. Studies have shown that diminished placental size precedes fetal growth retardation [4]. Recently, attempts made to predict small-fordate infants from placental volume at the second trimester did not yield satisfactory result, however, the fact that small placental size is associated with low birth weight has become established [5]. The present study was conducted to assess use of ultrasonographic placental thickness in prediction of fetal outcome.

Materials & Methods
The present study comprised of 48 with singleton pregnancy between 18 and 40 years of age, with normal BMI. The consent was obtained from all patients.
Data such as name, age, gender etc. was recorded. Obstetric ultrasound was performed on using a 3.5-MHz curvilinear transducer. The fetus was observed for viability and gross anatomical defects, and gestational age was estimated using various growth parameters: biparietal diameter, femur length, abdominal circumference, head circumference. Post-delivery birth weight of the baby, placental weight, Apgar score, maturity of baby and sex of the baby were noted. Birth weight of the baby was recorded.

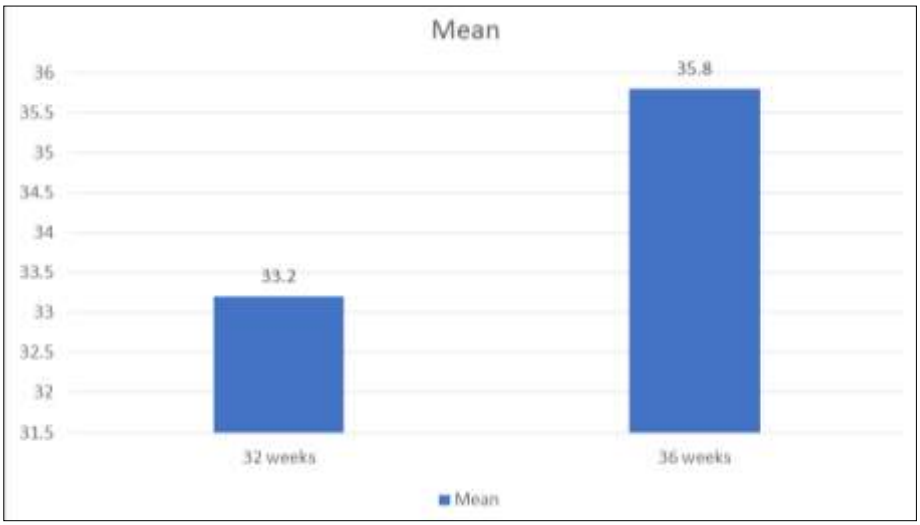
Placental thickness at 32 and 36 weeks was correlated with birth weight and neonatal outcome. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I: Placental thicknesses at 32 and 36 weeks

Placental thicknesses	Mean	P value
32 weeks	33.2	0.05
36 weeks	35.8	

Table I shows that mean placental thickness at 32 weeks was 33.2 mm and at 36 weeks was 35.8 mm. The difference was significant ($P < 0.05$).



Graph I: Placental thicknesses at 32 and 36 weeks

Table II: Correlation of placenta with birth weight, Apgar score and NICU admission

Gestation age (weeks)	Placental thickness	No	Caesarean delivery	Birth weight < 2.5 kg	Apgar < 4 at 1 min	Apgar < 4 at 5 min	NICU admission	NICU stay
32 weeks	<30.1	4	2	4	3	2	2	5.3
	30.1-36.7	42	14	14	7	8	8	3.9
	>36.8	2	1	3	1	1	1	6.2
36 weeks	<30.1	5	2	5	3	3	4	5.9
	30.1-36.7	40	14	12	7	8	8	4.1
	>36.8	1	1	3	1	1	1	6.2

Table II shows that there was correlation between placental thickness and Apgar score at 32 weeks and at 36 weeks (p value = 0.05), which is statistically significant. However, no correlation was found between placental thickness and BMI of the patient ($r = 0.007$ at 32 weeks and $r = -0.006$ at 36 weeks).

Discussion

Many pathological conditions could induce placentomegaly as a result of inflammation, edema or compensatory hypertrophy. Thick placenta is seen in Rh-ve pregnancy, gestational diabetes, intrauterine infections and hydrops fetalis, whereas thin placenta is seen in preeclampsia, intrauterine growth restriction and chorioamnionitis [6]. Normal placental function and structure are required for normal growth and development of the fetus [7]. Placental thickness is the simplest measurement of placental size and can be measured at any center equipped with ultrasound machine. The correlation of placental thickness with gestational age has been documented by many observers [8]. The present study was conducted to assess use of ultrasonographic placental thickness in prediction of fetal outcome.

In present study, mean placental thickness at 32 weeks was 33.2 mm and at 36 weeks was 35.8 mm. Few studies have documented the role of measurement of placental thickness in predicting neonatal outcome [9, 10]. A study in African population concluded that placental thickness at various gestational ages was related to birth weight. Another study in Iranian population in 2013 showed only a weak positive correlation between placental thickness in second and third trimesters and fetal weight in these gestations and birth weight [11].

We found that there was correlation between placental thickness and Apgar score at 32 weeks and at 36 weeks (p value = 0.05), which is statistically significant. However, no correlation was found between placental thickness and BMI of the patient ($r = 0.007$ at 32 weeks and $r = -0.006$ at 36 weeks). Nagpal *et al.* [12] correlated ultrasonographic placental thickness at 32 and 36 weeks pregnancy with neonatal outcome. Placental thickness at 32 and 36 weeks was measured by ultrasound, in 130 pregnant mothers with confirmed dates and uncomplicated singleton pregnancy. Placental thickness was categorized as normal (10th–95th percentile), thin (<10th percentile) and thick (>95th percentile) at each stage and was correlated with birth weight and neonatal outcome. Neonatal outcome was good in

women with normal placental thickness (10th–95th percentile) at 32 and 36 weeks and was compromised in women with thin (<10th percentile) and thick (>95th percentile) placentae.

Hamidi *et al*. [13] investigated the relationship between maximal placental thickness during routine anatomy scan and birth weight at delivery. They measured maximal placental thickness in the sagittal plane from the ultrasound images of the placenta obtained at the 18-21 weeks fetal anatomy screen. The relationship between placental thickness and neonatal birth weight was assessed using Pearson's correlation coefficient (r) with 95% confidence interval (CI). Logistic regression was used to assess the association with secondary binary outcomes of NICU admission and poor APGAR scores. Placental thickness had a positive correlation with neonatal birth weight (r50.18, 95% CI 5 (0.05, 0.32)). The mean placental thickness measured 34.2 6 9.7mm. The strength of the correlation remained similar when adjusting for gestational age (r50.20) or excluding medical comorbidities (r50.19). Logistic regression analysis demonstrated no association between placental thickness and NICU admission, APGAR scores, 7, or medical comorbidities.

Habib *et al*. [14] predicted low birth weight infants by measuring placental diameter and thickness. A prospective study was conducted of 70 consecutive singleton pregnancies to evaluate placental diameter and thickness by ultrasonographic measurement at 36 weeks gestation. A "warning limit" of a placental diameter of 18 cm and placental thickness of 2 cm at 36 weeks gestation were calculated to predict low birth weight infants. Ultrasonographic placental diameter and thickness measurements appears to be of prognostic value in identifying the subsequent occurrence of fetal growth retardation.

Conclusion

Authors found that placental thickness at 32 and 36 weeks corresponds well with gestational age and is a good prognostic factor in assessing neonatal outcome.

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