Original Research Article

Correlation between gestational age of the foetus and ultrasonographic placental thickness

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ABSTRACT

Background: Study aimed to find the correlation between gestational age of the foetus and ultrasonographic placental thickness.
Methods: This hospital based cross-sectional study conducted at department of Narayana medical college and hospital, Chinthareddypalem, Nellore. The study includes, 100 pregnant women admitted in hospital at more than 28 weeks to 40 weeks. Ultrasonographic measurement of placental thickness taken and correlated with other parameters like BPD, FC, AC, HC.
Results: The mean age of participants was 25.95 ± 2.59 yrs of age, with minimum age of 21yrs and maximum age of 32 yrs pregnant women. The Strength of association of GA with PT was $r=0.087$, $p<0.01$; GA estimated by FL with PT was $r=0.884$, $p<0.01$; GA estimated by BPD with PT was $r=0.902$, $p<0.01$; and GA estimated by AC with PT was $r=0.898$, $p<0.01$.
Conclusions: The study concluded that there is a strong positive strength of association between the gestational age and placental thickness.

Keywords: Gestational age, Placental thickness, Biometry, USG

INTRODUCTION

In today's contemporary obstetrics, each surgery performed on a pregnant woman is entirely reliant on the gestational age or estimated date of confinement. This predicted date of delivery is crucial in controlling obstetric high-risk births. Effective methods are required so, we need numerous factors to narrow down this gestational age, because no one measure can be deemed more reliable for determining gestational age.[1,2]

The placenta is a maternofoetal organ that provides the foetus with endocrine, immunological, excretory, respiratory, and nutritional activities. At the five weeks of pregnancy, the placenta forms at the site of implantation.

The average placenta is 2.5 cm in thickness and is approximately 500 kg weight.[3] During ultrasonography, the placenta is usually assessed based on its location and morphological changes. The placenta is a reflection of the foetus's health. We can diagnose prenatal issues such as maternal gestational diabetes, intrauterine growth restriction, and fetal hydrops based on its morphological alterations such as aberrant form, size, and growth pattern. Placental size is an excellent ultrasonographic metric for examining the placenta.[4,5]

Placental volume can be a reliable metric for determining placental size. However, calculating placental volume is a difficult task. As a result, placental thickness is suitable, clinically straightforward, readily measurable, and

effective metric for measuring placental size.[6,7] Pathological events in the foetus can be identified by abnormal placental thickness. As a result, placental thickness is also significant component in care of high-risk foetuses.

Study aimed to assess the correlation between gestational age of the foetus and ultrasonographic placental thickness.

METHODS

Study type

This study was hospital based cross-sectional study.

Study place

The study was conducted at department of Narayana medical college and hospital, Chinthareddypalem, Nellore, Andhra Pradesh, India.

Study duration

The study period was from May 2019 to February 2021.

Sample size

The study includes, 100 pregnant women admitted in hospital at more than 28 weeks to 40 weeks. Ultrasonographic measurement of placental thickness using Philips HD4 ultrasonographic machine with 2-5 MHz array transducer at the level of umbilical cord insertion is taken and correlated with other parameters like BPD, FC, AC, HC.

Inclusion criteria

All Pregnant women between 28-40 weeks of gestations were included in the study.

Exclusion criteria

Patients with PIH, anaemia, multiple pregnancy, placenta previa, placental anomalies, fetal anomalies, gestational diabetes mellitus, maternal disease and poor visualization of placenta were excluded.

Statistical analysis

All the data was collected and entered in excel sheet. The demographic detail and the measurements are summarized as main standard deviation, frequency and percentage. The summarized data was represented using tables, figure, bar diagrams and pie charts. The main difference between the continuous data was analyzed using independent T-test and correlation between the continuous variables was analyzed using Pearson's correlations. A p-value of <0.05 was considered statistically significant and all the analysis was performed using SPSS v21 operating on Windows 10.

RESULTS

Total of 100 pregnant women fulfilling inclusion criteria are include in present study after obtaining informed consent. The mean age of participants was 25.95 ± 2.59 years of age, with minimum age of 21 years and maximum age of 32 years pregnant women (Table 1). Out of total, 72% cases were multipara and 28% cases were Primipara. (Table 2). There was no statiscally significant difference found between parity and placental thickness (Table 3). The mean Placenta thickness was 38.64mm. The mean femur length was 67.09 mm. The mean Bi-parietal diameter was 86.74 mm. The mean abdominal circumference was 302.58 mm (Table 4). There was a statiscally significant association found between gestational age, femur length, biparietal diameter, abdominal circumference and placental thickness (Table 5). There was a statiscally significant association found between femur length, biparietal diameter, abdominal circumference and placental thickness (Table 6).

Table 1: Showing the mean age of study participants.

	N	Minimum	Maximum	Mean	SD
Age (in years)	100	21	32	25.95	2.599

Table 2: Distribution of pregnancy according to parity.

		Frequency	Percent
Parity	Multi	72	72.0
	Primi	28	28.0
	Total	100	100.0

Table 3: Comparison of placental thickness with parity of pregnant women.

	Parity				P value
	Multi		**Primi**		
	Mean	**SD**	**Mean**	**SD**	
Placental thickness	38.66	2.05	38.6	1.65	0.682

Table 4: Showing mean level of placental thickness and physical parameters to measure the gestational age.

	N	Minimum	Maximum	Mean	SD
Placental thickness (MM)	100	33.89	42.78	38.64	1.93
FL (MM)	100	53.12	78.66	67.09	5.93
BPD (MM)	100	79.56	93.83	86.74	4.51
AC (MM)	100	236	360	302.58	31.56

Table 5: Pearson's correlation of placental thickness with gestational age estimated by various methods.

		Placental thickness
Gestational Age (weeks)	r	0.887**
	Sig.	0.001
FL (weeks)	r	0.884**
	Sig.	0.001
BPD (weeks)	r	0.902**
	Sig.	0.001
AC (weeks)	r	0.898**
	Sig.	0.001

Table 6: Pearson's correlation of placental thickness with parameters among study participants.

		Placental thickness
FL (mm)	r	0.900**
	Sig.	0.001
BPD (mm)	r	0.878**
	Sig.	0.001
AC (mm)	r	0.882**
	Sig.	0001

DISCUSSION

Accurate gestational age determination has become critical for determining the appropriate time for pregnancy termination as well as monitoring fetal growth throughout the pregnancy.[8]

The placenta is a fetal organ that performs important metabolic, endocrine, and immunological functions as well as protecting the fetus from noxious agents. For many years, ultrasonologists treated the placenta as if it were a static feature in a dynamic system. While all fetal measurements were related to menstrual age, placental thickness was classified as normal or abnormal based on a single cut off point.[9]

Determining gestation age is a challenge for obstetricians, especially when evaluating and treating the less educated population who do not understand the importance and fail to keep track of their last menstrual period; and also accurately determining gestational age is a critical tool for the following reasons: To estimate the expected delivery date, To estimate the period of fetal lung maturity and viability, To interpret the prenatal test results, to identify the preterm and post term pregnancy, For assessment of still births and infant deaths and To determine the time of termination of various high risk pregnancies.[10]

Total of 100 pregnant women fulfilling inclusion criteria are include in present study after obtaining informed consent. The mean age of participants was 25.95±2.59yrs of age, with minimum age of 21yrs and maximum age of 32 years pregnant women. Ahmad M et al, average age was 28.37±4.6. 27 Among the study participants, majority were multi para (72%) and 28% were primipara by obstetric score.[11] Similar to present study by Ahmad A et al, documented majority of pregnant women included were Multipara compared to Primipara.[11]

Study correlated the gestational age with placental thickness, we identified a positive linear strength of association between them. The Strength of association of GA with PT was r=0.887, p<0.01; GA estimated by FL with PT was r=0.884, p<0.01; GA estimated by BPD with PT was r=0.902, p<0.01; and GA estimated by AC with PT was r=0.898, p<0.01.

Mahale N et al, in overall study population's placental thickness was compared to gestational age, a coefficient of correlation (r)=0.972 was discovered, which was statistically significant (p<0.001). The thickness of the placenta corresponded well with fetal biometric measures often utilised in prenatal ultrasonography.[12] Acharya S et al., stated that the relationship between placental thickness and gestational age was direct and linear. As a result,

placental thickness is utilised as a predictor for estimating fetal gestational age in instances when LMP is unknown, as well as recognising developing IUGR and low birth weight.[13]

Mehta R et al, found that the mean placental thickness was discovered to have a linear connection with gestational age and other fetal factors, and the statistical link between placental thickness and gestational age and other fetal parameters was discovered to be significant. In dubious circumstances, placental thickness can be utilised to determine gestational age and other fetal characteristics.[14]

Ahmad M et al, pearson's correlation score showed a correlation value of 0.896 between the gestational age and placental thickness. Which of the following suggested that placental thickness and gestational age were substantially correlated. The study found a significant relationship between gestational age and fetal placental thickness. When the last menstruation is unclear or unknown, the thickness of the placenta increased with gestational age and may thus be utilised as a predictor and measure of gestational age prediction.[11]

On assessment of GA with placental thickness at each week of duration, we could see the mean PT was increasing with the gestational age progress. The mean PT in GA of 28 weeks was 36.40 and in 39 weeks GA it was 41.87±0.95 mm of placental thickness. Tiwari et al., noted that up to 21weeks of gestation the mean placental thickness was slightly higher than the gestational age. From 22 to 35 weeks the mean placental thickness almost matched the gestational age in weeks thereafter the placental thickness was lower by 1-2 mm.[15]

According to a study which was conducted by Anupama Jain et al., he found that the placental thickness almost matched with the gestational age from 27-35 weeks of gestation.[16]

Certain limitations were there like it was a hospital-based study among smaller ample size as well as no longer duration of follow up of patients was not done.

CONCLUSION

There is a strong positive strength of association between the gestational age and placental thickness. The thickness of placental increased with increase in the gestational age and hence could be used as a predictor and a parameter of gestational age prediction when the last menstruation is uncertain or is unknown. The study also found there is strong strength of association between the estimated gestational age by FL, BPD and AC with the placental thickness. Also, study documented the positive strength of association of placental thickness with other f0etal biometry like FL, BPD and AC.

Ethical approval: The study was approved by the Institutional Ethics Committee

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