ORIGINAL ARTICLE

CORRELATION OF PLACENTAL THICKNESS WITH GESTATIONAL AGE IN NORMAL PREGNANT WOMEN WITH SINGLETON PREGNANCY VISITING TO A TERTIARY CARE HOSPITAL

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ABSTRACT

BACKGROUND: Ultrasonography is a safe, rapid, cost effective and readily available imaging tool in obstetric clinics. Our present study is conducted to correlate placental thickness with gestational age in normal pregnant women with singleton pregnancy. **MATERIAL AND METHODS:** This Cross sectional study was conducted from 01st August 2014 to 30th January 2015. Patients referred from 0bstetric inpatient and outpatient department to Radiology department of Combined Military Hospital, Quetta for antenatal scans meeting the inclusion criteria were enrolled in the study. **RESULTS:** The data were analyzed and quantitative metric like mean gestational age (26.98 ± 6.34 weeks) & mean placental thickness (28.19 ± 6.50 mm) were calculated. Correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy was calculated by measuring 26.99 ± 6.34 weeks for gestational age and 28.88 ± 6.51 mm for placental thickness, r value was calculated as 0.9482, showing a strong positive correlation. **CONCLUSIONS:** Correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy is strongly positive and helpful for detection of any abnormality in placental thickness with its corresponding fetal gestational age.

Keywords: Normal pregnancy, gestational age estimation, placental thickness, correlation

Introduction

The placenta is very vascular materno-foetal organ which forms a little later than the foetus[1] & main function is to exchange nutrients and metabolic products and gases between the maternal and fetal blood streams.[2] It grows throughout pregnancy, initial growth being more rapid than that of fetus.[3] It is thought that abnormities of placental growth may precede abnormities of fetal growth.[4] Placental thickness appears to be promising parameters for estimation of gestational age of fetus[6] as it tends to gradually increase with gestational age in a linear fashion.[7] Sonographically, this can be seen to approximately 1 mm per week. The maximum thickness of a normal placenta at any point during pregnancy is often taken considered to be 4 cm.[7] An abnormally increased placental thickness falls under the spectrum of placentomegaly.[7] Thick placentas are noted in hydrops fetallis of varied causes and thin placenta may be seen in cases of IUGR.[3]

Establishment of gestational age is important for the management of pregnancy and its outcome, both normal and complicated.[5] Accurate assessment of gestational age is an important part of any obstetric examination and presently the most effective way to date pregnancy is by the use of ultrasound. Obstetrical ultrasound has proven valuable in a verity of ways, in particular being more accurate pregnancy dating and detection of fetal anomalies.[6] Several sonographi-

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cally derived fetal parameters used to date pregnancy include fetal crown rump length (CRL), biparietal diameter (BPD), head circumference (HC), femur length (FL), and abdominal circumference (AC). With new advances in grey scale and Doppler sonography, we are able to study the sonographic appearance of placenta and its relationship to uteroplacental blood flow and intrauterine growth.

In a study conducted by Dr. T Karthekeyan et al in India, stated that there is a strong positive correlation between placental thickness and gestational age, with coefficient correlation values for 1st, 2nd and 3rd trimesters being r=0.609, r=0.812 and r=0.184 respectively. It also showed a significant positive correlation between placental thickness and fetal growth parameters.[1]

Gestational age (GA) is frequently over or under estimated, as the conventional GA estimation is based on last menstrual period (LMP) and many people are unaware of their LMP and irregular mensuration, thereby posing difficulties in GA estimation. Since no study in this regard is available for our population, if the results of present study showed a positive correlation of placental thickness with gestational age in normal singleton pregnancies, it will help us to make out a simple and clinically useful sonographic parameter of antenatal evaluation for our population in predicting age of the fetus in cases where exact duration of pregnancy is not known and will also help in detecting any abnormality in placental thickness with its corresponding fetal gestational age, so that any disease should be addressed at earlier stage by using a cheap, non-invasive, non-ionizing modality.

Material and Methods

Patients referred from obstetric inpatient, outpatient department to Radiology department of Combined Military Hospital, Quetta for antenatal scans with age ranging from 18-35 years, normal regular menstruation with sure of dates were enrolled in the study. Patients with malformed fetuses, polyhydramnios and pregnancy with medical issues like diabetes mellitus were excluded from study. Our Study was started after approval from Ethical Committee of the institution and after taking informed consent from the patient.

Scan was performed in real time mode by means of a trans-abdominal 3.5-6 MHZ volume transducer with patient lying in supine position and full bladder (in required cases). Level of comfort and ease during examination and privacy of the patient was considered in regard with ethical issue. Placental thickness was measured perpendicular to uterine wall at the site of insertion of umbilical cord in a longitudinal section. The gestational age of each fetus was estimated by measuring CRL in 11 to 13 week fetuses, by composite of BPD and FL in 2nd trimester and BPD, FL & AC in 3rd trimester (Fig. 1-3). Correlation of placental thickness with gestational age was recorded on a specialized Performa designed specifically for the study.

Figure 1: 16 wk gestation = 16 mm placental thickness

Figure 2: 33 wk gestation = 33 mm placental thickness

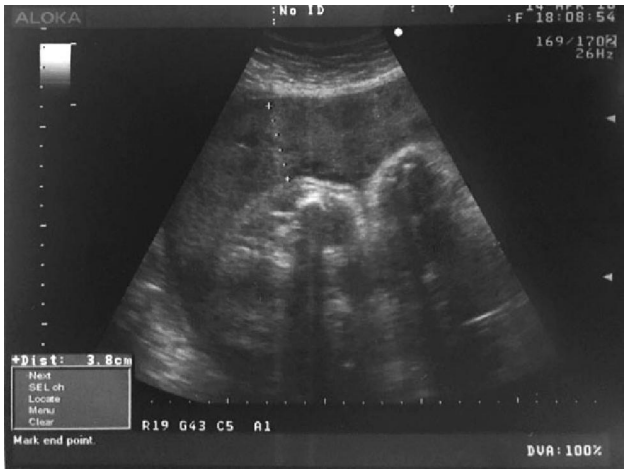

Figure 3: 37 weeks gestation = 38 mm placental thickness

Results

A total of 210 cases were enrolled to determine correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy. Age distribution of the patients was done showing that 27.62% (n=58) were between 18-25 years and 72.38 % (n=152) were between 26-32 years of age, mean ± sd was calculated as 27.91 ± 3.89 years. (Tab.1)

Age (in years)	No. of patients	%
18-25	58	27.62
26-35	152	72.38
Total	**210**	**100**
Mean ± SD	**27.91 ± 3.89**	

Table 1: Age distribution (n=210)

Mean gestational age of the patients was calculated as 26.98 ± 6.34 weeks (Tab. 2).
Mean parity of the patients was calculated as 2.85 ± 1.32 para (Tab. 2).
Mean placental thickness of the patients was calculated as 28.19 ± 6.50mm (Tab. 2).

	Mean	SD
Gestational age (in weeks)	26.98	6.34
Parity	2.85	1.32
Placental thickness(mm)	28.19	6.50

Table 2: Mean gestational age, parity & placental tickness of the patients (n=210)

Correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy was calculated by measuring 26.99 ± 6.34 weeks for gestational age and 28.88 ± 6.51mm for placental thickness, r value was calculated as 0.9482, showing a strong positive correlation (Tab. 3).
Stratification for age and parity was also done and there also a positive strong correlation was recorded. (Tab. 4 & 5).

Gestational age (in weeks)		MEAN Placental thickness		r value
Mean	**SD**	**Mean**	**SD**	
26.99	6.34	28.19	6.51	0.9482

The value of r is 0.9482. This is a strong positive correlation, which means high gestational age go with high placental thickness (and vice versa).

Table 3: Correlation of placental thickness with gestational age in normal pregnant women with signleton pregnancy (n=210)

Age in years	Gestational age (in weeks)		MEAN Placental thickness		r value
	Mean	**SD**	**Mean**	**SD**	
18-25	27.55	6.35	29.05	6.31	0.9968
26-35	26.77	6.34	27.85	6.57	0.9309

The value of r is 0.9968 and 0.9309. This is a strong positive correlation, which means that high gestational age go with high placental thickness (and vice versa).

Table 4: Stratification for correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy with regards to age (n=210)

Parity	Gestational age (in weeks)		MEAN Placental thickness		r value
	Mean	**SD**	**Mean**	**SD**	
1-3	26.59	6.10	27.73	6.35	0.9194
>3	27.00	6.83	28.29	6.84	0.9977

The value of r is 0.9194 and 0.9977. This is a strong positive correlation, which means that high gestational age go with high placental thickness (and vice versa).

Table 5: Stratification for correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy with regards to parity (n=210)

Discussion

The human placenta develops with the principal function of providing nutrients and oxygen to the fetus. Adequate fetal growth and subsequent normal

birth weight depends on the efficient delivery of nutrients from the mother to the fetus via normally functioning utero-placental organ. The definitive placenta is clearly visible on ultrasound from approximately 9-10 weeks of gestation, when it demonstrates a uniformly granular echogenic pattern. Ultrasonography (US) enables the evaluation of the placenta and the detection of placental abnormalities using different parameters such as placental thickness and volume or especial techniques like three-dimensional (3D) power Doppler.

Gestational age is frequently over or under estimated, as the conventional GA estimation is based on last menstrual period and many people are unaware of their LMP and irregular mensuration, thereby posing difficulties in GA estimation. Since no study in this regard is available for our population, we planned this study with the view that if the results of our study showed a positive correlation of placental thickness with gestational age in normal singleton pregnancies, it may help us to make out a simple and clinically useful sonographic parameter of antenatal evaluation for our population in predicting age of the fetus in cases where exact duration of pregnancy is not known and also helpful in detecting any abnormality in placental thickness with its corresponding fetal gestational age, so that any disease should be addressed at earlier stage by using a cheap, non-invasive, non-ionizing modality.

In our study, out of 210 cases, 27.62% (n=58) were between 18-25 years and 72.38% (n=152) were between 26-32 years of age, mean ± sd was calculated as 27.91 ± 3.89 years, mean gestational age of the patients was calculated as 26.98 ± 6.34 weeks, mean placental thickness of the patients was calculated as 28.19 ± 6.50mm. Correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy was calculated by measuring 26.99 ± 6.34 weeks for gestational age and 28.88 ± 6.51mm for placental thickness, r value was calculated as 0.9482, showing a strong positive correlation.

The findings of our study are in agreement with a study conducted by Dr. T Karthekeyan et al in India, stated that there is a strong positive correlation between placental thickness and gestational age, with coefficient correlation values for 1st, 2nd and 3rd trimesters being r=0.609, r=0.812 and r=0.184 respectively. It also showed a significant positive correlation between placental thickness and fetal growth parameters.[1]

Ohagwu CC and others[8] investigated the relationship between placental thickness and fetal growth parameters in normal singleton Nigerian fetuses and recorded that there was significant positive correlation between placental thickness and, BPD and AC in the second and third trimesters with both parameters having identical relationship with placental thickness. Placental thickness has a strong positive correlation with BPD and AC. Subnormal placental thickness for a particular gestational age may be the earliest sign of intrauterine growth retardation. They concluded that measurement of placental thickness should therefore be carried out routinely during obstetrics ultrasound scan.

La Torre opined that at no stage of the pregnancy placental thickness exceeded 40 mm indirectly, thus indicating the cut off value for the upper limit,[9] these findings correspond to our study where maximum 40mm placental thickness was recorded.

Tsonge et al., in their study, found that the mean placental thickness between 18-21 weeks in normal pregnant women and in pregnancies with Hb-barts disease were 24.6 ± 5.2 mm and 34.5 ± 6.7 mm respectively. In this study which was done on normal singleton pregnancies, the mean placental thickness of the corresponding gestational weeks was 23.23 mm.[10]

Habib et al., in their study, said that the PT was 22 mm at 36 weeks in the fetuses which weighed <2500 gm and that the PT was 34.8 mm at 36 weeks in the fetuses which weighed > 2500 gm. They concluded that PT was a predictor of LBW infants.[11]

Considering the above facts, it is evident that a decreased PT is associated with IUGR. So, a subnormal PT may be an earliest indicator of IUGR, which can be treated if it is diagnosed at the earliest. An enlarged placenta (Placentomegaly) is suspected if the PT is > 40 mm at term and if it is associated with gestational Diabetes mellitus, intra uterine infections, hydrops fetalis, anemia and α- thalassaemia type.[12]

However, the results of our study are helpful to make out a simple and clinically useful sonographic parameter of antenatal evaluation for our population in predicting age of the fetus in cases where exact dura-

tion of pregnancy is not known and also helpful in detecting any abnormality in placental thickness with its corresponding fetal gestational age.

Conclusion

We concluded that the correlation of placental thickness with gestational age in normal pregnant women with singleton pregnancy visiting to a tertiary care hospital is strongly positive and helpful for detection of any abnormality in placental thickness with its corresponding fetal gestational age.

Conflict of Interest: None

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