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Original Article

ULTRASONOGRAPHIC STUDY OF PLACENTAL THICKNESS AND FOETAL GROWTH PARAMETERS IN WESTERN U. P. POPULATION

Pratishtha Potdar*, Sanjay Kumar Sharma, Vishnu Datt Pandey,*** Veena Bharihoke******

*Department of Anatomy, Rama Medical College Hospital and Research Centre, Hapur U.P.

**Department of Anatomy, Rajshree Medical Research Institute, Bareilly U.P.

*** Department of Anatomy, LLRM, Medical College, Meerut. U.P.

******Department of Anatomy, Rama Medical College Hospital and Research Centre, Hapur U.P.

ABSTRACT

The normal development of placenta is necessary for supporting healthy fetus during pregnancy, any impairment in its development leads to profound impact on fetal growth &outcome of pregnancy. The aim was to investigate relationship between placental thickness and foetal growth parameters in second & third trimester. 100 females between 13 - 38 weeks of gestation referred from antenatal clinics to department of Radio diagnosis in association with the department of Anatomy from 2015-2016 were studied. Females aged between 15 - 35 years for routine antenatal ultrasound were included. Patient more than 35years, twin pregnancy and other medical complications were excluded. Study was carried out on seimen Acuson 300 machine,3.5MHZ convex probe . The placental thickness at the level of umbilical cord insertion in the longitudinal direction was taken. Mean & standard deviation were used to summarize the variable growth parameters along with pearson's correlation & p values were calculated .The mean of placental thickness, biparital diameter abdominal circumference, head circumference, femur length, is 24.20±4.34 mm, 45.95±13.57mm, 149.29±42.36mm, 172.63±4.3mm, 31.79±11.41mm at second trimester of gestation.& 38.12±7.13mm 82.97±7.42mm, 283.20±34.92mm,304.22±24.22mms 64.26±7.7 mm at third trimester of gestation. The Pearson' s correlation coefficient of BPD , AC, HC & FL with placental thickness is 0.79, 0.708, 0.75, 0.78mm in second trimester & 0.52, 0.50, 0.48, 0.52mm in third trimester of gestation.. Placental thickness has a strong positive correlation with Biparietal Diameter , Abdominal Circumference & Femur Length in second trimester as compared to third trimester. In our study it shows that with the increase in gestational age placental thickness is increasing and foetal growth parameters are also increasing. Thus, Placental thickness is one of the important promising parameters for prediction of fetal outcome.

Keyword – Placental thickness, Biparietal diameter, Abdominal circumference, Head circumference, Femur length, Foetal Growth parameters.

Relationship between Placental thickness and foetal Growth parameters……..

INTRODUCTION

Foetal growth parameters are used for sonographic estimation of gestational age & weight of foetus in second and third trimester but these growth parameters are adversely affected by insufficient nutrient reaching the foetus through placenta. The role of ultrasound in obstetrics has proven invaluable, in accurate pregnancy dating & detection of fetal anomalies.[1] The placenta becomes evident in ultrasonography by 9thweek as a diffuse structure of granular echo texture 2,3. At term placenta is discoid with a diameter of 15-25cm & is approximately 3cm thick and weighs about 500-600gm[4]. A normally functioning placenta is critical for normal fetal growth & development.5 Placental thickness of less than 2.5 cm in second trimester is usually associated with Intra-uterine growth relation (IUGR)[6].

Many workers in different countries have correlated the size of placental thickness with various growth parameters of foetus as the growth of fetus and placenta have a direct relationship with nutrition

Address for Correspondence :
Dr. Pratishtha Potdar,
Associate. Prof. Department of Anatomy
Rama Medical College Hospital and Research Centre, Hapur, U.P. Pin-245304
Rama delhi, NH-24, Delhi – Hapur Highway (38km. Milestone), Near Mother Diary, Pilkhuwa, Hapur
E-mail- drpratishthagupta@gmail.com
Phone:- 09837310545

and ethnic characteristics of the individual. So this study was conducted to find correlation between placental thickness and foetal growth parameters in pregnant women of West Uttar Pradesh, India.

MATERIAL & METHOD

Present study was conducted on 100 Pregnant females between 13th weeks and 38 th weeks of gestation. Study was conducted in Department of Anatomy, & collaboration with department of Radiodiagnosis, Rama Medical College & Hospital, Hapur from 2015-2016 after approval from institute ethical committee.

Inclusion criteria

1. All pregnant women aged between 15 and 35 years for routine antenatal ultrasound.

2. Known Last Mesntrual period.

3. Singleton Pregnancy.

Exclusion criteria

Patient more than35years, twin pregnancy, diabetes, diagnosed cases of fetal hydrops pregnancy with chromosomal anomaly, placenta previa & placenta abruptia

TECHNIQUE -

Study was carried out on Seimen Acuson 300 machine with low frequency tranducer 3.5MHZ convex probe. Patient was placed supine in position with arms above the head. Privacy of patient was maintained. Examination was carried out after consent of patient.

The placental thickness was taken at the level of umbilical cord insertion in the longitudinal direction and a mean of three readings were taken, with patient in supine position. The ultrasonic growth parameters Biparietal Diameter (BPD), Head Circumference (HC), Abdominal Circumference (AC) & Femur Length(FL) is measured along with mean and standard deviation for different gestational ages from the 13thto 38thweek. This findings were compared and statistically analysed using pearson's correlation between placental size and foetal growth parameters. Pearson's correlation analysis was used to establish the degree of relationship between placental thickness & BPD,AC. HC & FL. Values were expressed as mean & standard deviation. Statistical tests were two-tailed with $p<0.01$ to indicate statistical significance .All the data were collected by designed clinical data collection sheets containg all the variables of the study.

OBSERVATIONS

A study of 100 antenatal singleton pregnancies of 13thweeks to 38th weeks were conducted in the department of Radio diagnosis . The mean of placental thickness & foetal growth parameters were taken along with standard deviation .

Table no I shows that the mean placental thickness &growth parameters are divided into five groups The mean placental thickness is19.82±3.42 mm biparietal diameter is 31.72±6.22mm, abdominal circumference is 109.41 ± 29.89 mm, head circumference is 121.15±25.14mm, femur length is 19.67±4.71mm at 14-18 wksn. The mean of placental thickness is 38.90±0.04mm biparietal diameter is 88.82±3.48mm,abdominal circumference is 312.49 ± 11.50 mm,head circumference is 323.73±7.25 mm,femur length is 70.03±5.08 mm at 34-38 wks . The result of our study showed that there were fairly increase in placental thickness & foetal growth parameters in both trimesters.

Table no II shows that the mean of placental thickness, biparietal diameter abdominal circumference, head circumference, femur length, are 24.20 ± 4.34 mm i45.95±13.57mm,, 149.29± 42.36mm, 172.63±4.3mm, 31.79±11.41mm at second trimester of gestation.& 38.12±7.13mm 82.97±7.42 mm, 283.20±34.92mm, 304.22±24.22mm, 64.26±7.7 mm at third trimester of gestation. The Pearson' s correlation coefficient of BPD, AC, HC & FL with placental thickness is 0.79,0.708,0.75,0.78 in second trimester & 0.52,0.50,0.48,0.52 in third trimester of gestation Statistical test showing p values < 0.01 were significant . In our study it shows that the placental thickness has a strong positive correlation with Biparietal Diameter, Abdominal Circumference & Femur Length in second trimester as compared to third trimester. A linear relationship between Biparietal diameter, abdominal circumference, head circumference & femur length and placental thickness were shown in Graph [I to VI]

Fig: 1. Showing measurement of placental thickness in second trimester

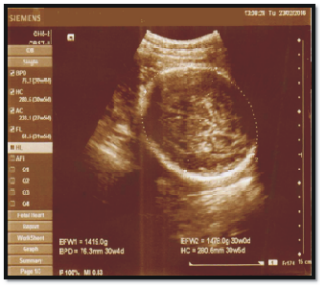


Fig : 2 Showimg measurement of Biparital diameter in third trimester.

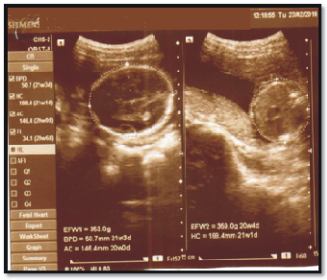


Fig: 3 Showing measurement of Biparital diameter& abdominal circumference in second trimester

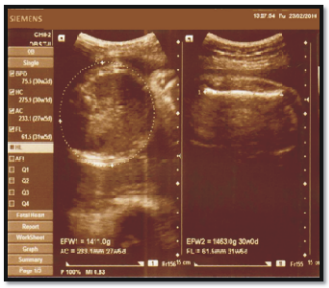


Fig : 4 Showing measurement of femur length & abdominal circumference in second trimester.

Table No.I- Showing mean placental thickness & foetal growth parameters along with standard deviation in 100 pregnant women of second & third trimester

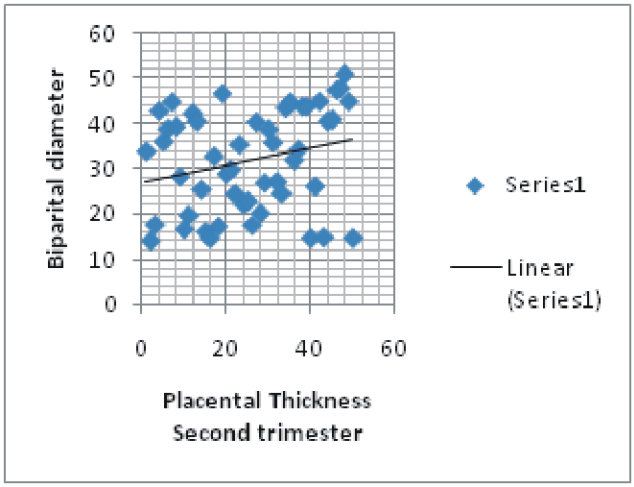
Gastational age (wks)	No. Of case (n)	Placental Thickness in (mm)		Biparital diameter (mm)		Abdominal circumference (mm)		Head Circumference (mm)		Femur Length (mm)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
14-18	20	19.82	3.42	31.72	6.22	109.41	29.89	121.15	25.14	19.67	4.71
19-23	17	26.21	1.03	49.93	5.48	158.90	18.49	185.18	18.42	35.77	5.06
24-28	16	27.52	3.3	63.56	2.93	201.58	12.21	234.06	19.16	46.06	3.15
29-33	23	35.65	3.28	78.76	5.18	261.31	23.06	290.34	6.71	60.14	4.74
34-38	24	38.9	0.04	88.82	3.48	312.49	11.50	323.73	8.25	70.03	5.08

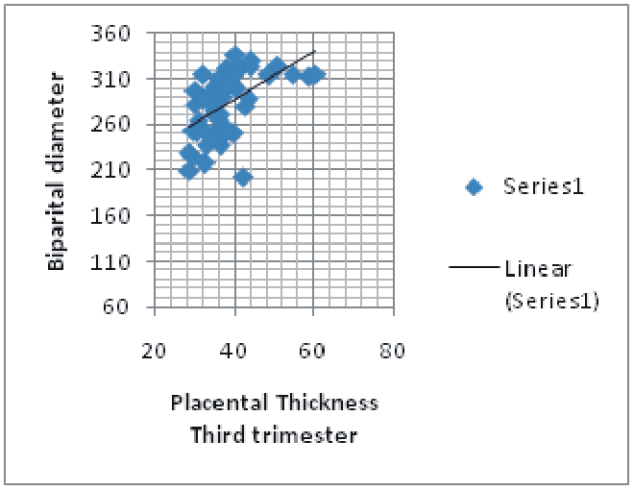
Table no.II- Showing pearson's correlation® between placental thickness and growth parameters (BPD ,AC , FL& HC)

S.No.	Trimester	Placental Thickness (mean & std in mm)	B PD (mean & std in mm)	AC (mean & std in mm)	HC (mean & std in mm)	FL(mean & std in mm)
1	Second N=50	24.20±4.34	45.95±13.57 R =0.797 p=0.0002*	149.29±42.36 R =0.708 p=0.002*	72.63±47.3 R=0.75 p=0.0003*	31.79±11.41 R=0.78 p=0.002*
2	Third N=50	38.28±7.13	82.97±7.42 R =0.50 p=0.001*	283.20±34.92 R =0.52 p=0.001*	304.22±24.22 R=0.48 p= 0.003*	64.26±7.70 R =0.52 p=0.004*

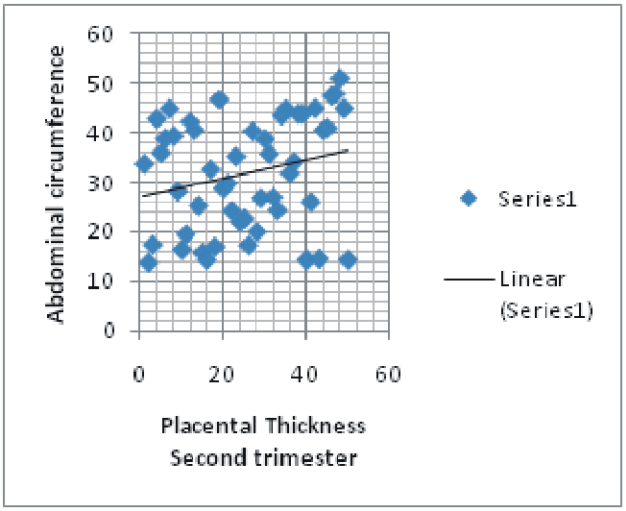
Table no.3 - Showing pearson's correlation® between placental thickness and growth parameters (BPD , AC , FL& HC)

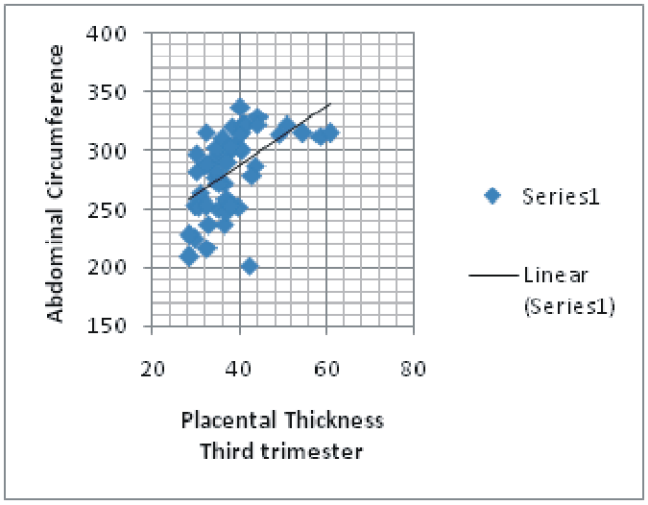
S. No.	Trimester	Bi parital diameter (BPD)	Abdominal circumference(AC)	Head circumference (HC)	Femur length (FL)
1	Second (n =50)	R =0.797 p=0.001*	R =7.08 p=0.002*	R=0.75 p=0.001*	R=0.78 p=0.002
2	Third (n=50)	R =0.50 p=0.0002*	R =0.52 p=0.001*	R=0.48 p= 0.0003*	R =0.52 p=0.004*



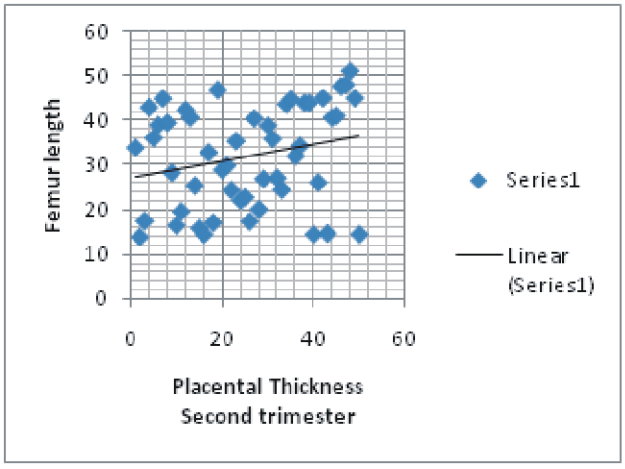


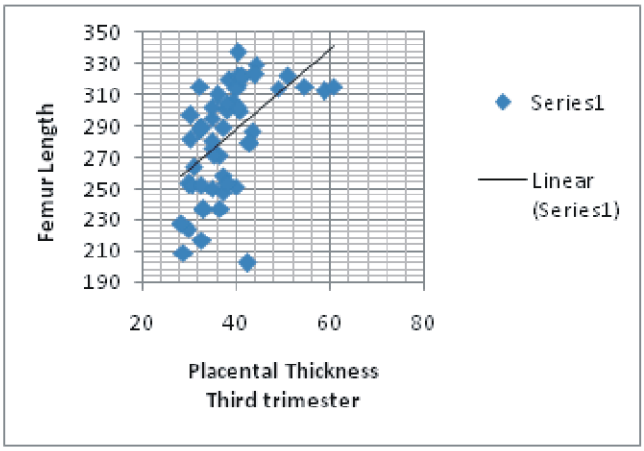
Graph noI&II –scatter plot illustrating the association between placental thickness and Biparital diameter in second & trimester





Graph no. III& IV –scatter plot illustrating the association between placental thickness and Abdominal circumference in second & third trimester





Graph no. V&VI–scatter plot illustrating the association between placental thickness and Femur length in second trimester

DISCUSSION

Ultrasound measurement of placental thickness is useful clinically in detection of placental abnormalities since last two decades. Normal placental function and structure is necessary factor for the formation of a healthy foetus and consequently normal birth weight as it is feto-maternal organ which provide physiological link between the mother & her fetus . Early detection of any pathology in placental villi helps obstetrician to consider prenatal care precisely. Several parameters were used to assess fetal growth in order to quantify intrauterine environmental adequacy and fetal well being.

Various studies were done to deduce a relationship between placental thickness and growth parameters of foetus. Clapp et al[7], showed significant correlation (>0.79) between placental growth rate and birth weight on forty singleton pregnant women. Similarly correlation of placental thickness with gestational age and fetal growth reported in research by karthikeyan et al[8]. Cooley et al[9] also suggested that antenatal ultrasound of the placenta may aid detection of placental disease. They showed that placental thickness was less in pregnant female complicated by chorioamninitis. In present study placental thickness correlation with biparital dimeter is ,abdominal circumference is ,head circumference is ,femur length is nearly similar to the study conducted by C.C Ohagwu et al.[10]. In present study there was a significant positive correlation between placental thickness and growth parameters of fetus in second and third trimester. Regression analysis yielded a linear relationship between fetal growth parameters and placental thickness similar to study of C.C Ohagwu et al. In a study by Elachel et al[11] a linear increase in placental thickness was found to correlate with multiple growth parameters throughout pregnancy. They also showed a higher percentage of thick placenta in birth weight at term above 4000gm or < than 2500gm.Ultrastructural study of Macara et al [12] of placenta indicates that thickening basal Lamina and increase deposition of collagen and laminin together with congestion of the erythrocytes is the cause of limited oxygen transfer from intervillous space to growth retarted fetus. In a recent study investigator proposed that sonographic increment of placental thickness during second trimester is due to over inflation of the intervillous space by maternal blood rather than by adaptive formation of the placental tissue.

Similar to various other studies, our study also shows correlation between placental thickness and Biparital diameter , abdominal circumference ,head circumference and femur length. This relationship suggest that placental thickness can be used as an indicator of growth of fetus.

Therefore,it is concluded that placental thickness can be used as an additional sonographic tool in correlating gestational age and it should be recommend routinely during obstetric ultrasound.

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