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Comparative study between placental thickness and Femur Length for estimation of gestational age of fetus by real time ultrasonographic measurement.

KEYWORDS: Femur Length. Placental thickness, fetal growth, Gestational age.

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ABSTRACT

Aim: This study aimed to establish a relationship between placental thickness and Femur Length by real time ultrasound for estimation of gestational age of fetus. Materials & Methods : This study consists of 100 pregnant females, between 13th to 39th weeks gestation with their age ranging from 18 -35 years, attending antenatal clinic at the department of Obstetrics and gynecology, Pt..J.N.M. Medical College & Dr. B.R. Ambedkar Memorial Hospital Raipur (C.G.) from October 2008 to august 2009. Who were sure for the last menstrual period and fulfilling all criteria for selection of cases.USG was done for estimating fetal age by Femur Length (FL) and placental thickness (PT).The femur Length measured sonographicaly from the greater trochanter above to the lateral condoyle below. The PT was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. Results: It was observed that the coefficient of correlation (r) between PT and FL being at 26-30 weeks r = .998 (p = .000), and at 31-35 weeks r = .985 (p = .002) which is statistically significant but at more than >35 weeks it become less significant. Conclusion: The study concluded a fairly linear relationship between PT and FL and it provide accurate parameter for estimating fetal gestational age especially in the late mid trimester and early third trimester, where the exact duration of pregnancy is not known.

Introduction:

The obstetric ultrasound provides us a single most useful tool of information is the accurate determination of gestational age. The Assessment of fetal growth, health and gestational age in different trimesters can be assessed most reliably by ultrasonographic measurement of various fetal biometric parameters, assessment are typically more accurate when multiple parameters are used. Gestational age of the fetus is a measurement of time in utero (Inside of the uterus) is approximately 280 days. Which is the time measured from the first day of the women's last menstrual cycle to the current date and is measured in weeks. So the dating of pregnancy starts before the fertilization. For estimation of gestational age and to evaluate the fetal development the placental thickness (PT) and Femur Length (FL) are used as an important fetal biometric parameter in 2nd and 3rd trimester. According to Ohagwu C.C.et al (2008) – "placental thickness should have a certain relationship with fetal growth parameters especially FL, BPD and AC"

Placental thickness becomes a important parameter for estimation of gestational age of fetus and it can be measured at the level of the insertion of umbilical card. Theera Tongsong et al established normal values of placental thickness during the first half of pregnancy and they found a linear relationship between placental thickness and gestational age. Placenta is primarily a fetal organ and its size is a reflexion of the health and size of the fetus. The another fetal biometric parameter which is most frequently and accurately used for assessment of gestational age of fetus during 2nd trimester from 13weeks onward is Femur Length. The Femur Length is a more reliable method of predicting date of spontaneous delivery with greater certainty then even certain last menstrual period. The femur Length measured sonographicaly from the greater trochanter above to the lateral condoyle below. Several other studies have reported the use of placental thickness and Femur Length as a promising parameter for estimation of gestational age of fetus in normal singleton pregnancy using real time ultrasonographic assessment.

Materials and method:

This study was performed in Department of Anatomy in close association with the Department of Radiodiagnosis, tertiary care hospital of state medical college. This study consists of 100 pregnant females, between 15 weeks to 39 weeks gestation with their age ranging from 18 -35 years.

Criteria for selection of cases :

The pregnant females with history of regular menses, known last menstrual period, singleton and viable fetus and with the ability of patient to come for follow up at regular intervals were included. Pregnancy complicated by medical disorders such as anemia, diabetes mellitus in mother, twin pregnancy and any congenital disorders in fetus were excluded from the study.

Ultrasonographic assessment was performed using a gray scale real time machine (LOGIQ 400) employing a 3.5 MHz convex transducer for real time ultrasonographic scanning of fetal Femur Length and placental thickness.

The area between the pubic symphysis and umbilicus was exposed. The ultrasonic jelly was applied uniformly to the skin and transducer's head. The anatomical plane chosen for measurement of various fetal parameters was obtained by placing the transducer over abdomen in the middle sagital section. The fetal head was then looked for the lie of the fetus then placing the transducer over parasaggital plane to define other fetal parts. The placenta was located and placental thickness was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. For the measurement of femur length the transducer was placed at right angle to the fetal spine and passed down the fetus, maintain this angle to the caudal end because the distal

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femur was visualized. After a clear image of the femur was obtained , the freeze frame was employed and with multi-directional electronic calipers the femur length was measured. To interpret the data was analyzed statistically.

Results:
A prospective study of 100 antenatal singleton pregnancies of >15 weeks of gestation was conducted. The patients were observed for the correlation between placental thickness and Femur Length with gestational age.

It was observed that the coefficient of correlation (r) between placental thickness and Femur Length being r = .965(p =.002) at 15 – 20 weeks, r = .904(p = .035) at 21 – 25 weeks, r = .998 (p = .000) at 26 – 30 weeks, r = .985 (p = .002) at 31 – 35 weeks and r = .988 (p = .099) at 36 weeks and onwards [Table -1].

In our study shows linear growth pattern between placental thickness and biparietal diameter in late 2nd and early 3rd trimester.[Graph -1].

Discussion:
In our study we adopted a cross sectional design and did not follow the patients longitudinally. The placental thickness [PT] and Femur Length (FL) was measured ultrasonographically and it was seen that PT and FL increases linearly with advancing gestational age. Early reports of FL by USG examination were published by O'Brien G. D. in 1981. The prediction of menstrual age from femur length showed variability of ± 9.5 days between 12 to 23 weeks. Beyond 23 weeks variability increased up to ± 22 days .The placenta is a maternal - fetal organ and is responsible for protection and nourishment of fetus.

This study was in accordance with several other studies in this regards. The study carried out by Ohagwu C.C. et al found that there was critical positive correlation between fetal growth parameters especially FL, AC, and PT with gestational age. Baghel P et al observed that there is increase in PT and other fetal parameters almost linearly with gestational age.

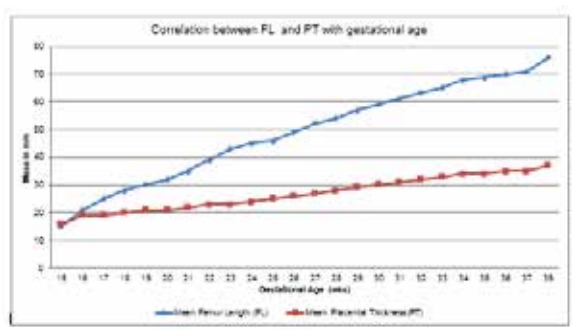
The relationship between Placental thickness and Femur Length is very much significant for assessment of gestational age in mid 2nd and early 3rd trimester and can be used as a reliable parameter for the assessment of gestational age where the exact duration of pregnancy is not known.

Conclusion: The study concluded a fairly linear relationship between placental thickness and Femur Length with gestational age. It provide us accurate parameter for estimating fetal gestational age especially in late mid trimester (21st to 25th week) and early 3rd trimester (26th to 30th week)of gestation where the exact duration of pregnancy is not known.

Table 1

S.No.	Gestational Age in Weeks	Mean Femur Length (FL)	Mean Placental Thickness(PT)	r value	P value
1	15	15	16	.965	.002
2	16	21	19		
3	17	25	19		
4	18	28	20		
5	19	30	21		
6	20	32	21		
7	21	35	22	.904	.035
8	22	39	23		
9	23	43	23		
10	24	45	24		
11	25	46	25		
12	26	49	26	.998	.000
13	27	52	27		
14	28	54	28		
15	29	57	29		
16	30	59	30		
17	31	61	31	.985	.002
18	32	63	32		
19	33	65	33		
20	34	68	34		
21	35	69	34		
22	36	70	35	.988	.099
23	37	71	35		
24	39	76	37		
	Mean	48.88	25.96	r=0.991;P< 0.0001 (n = 24)	
	SD	17.66	6.62		

Table 1 : Correlation between FL and PT with Gestational age (in weeks)



Graph 1: Lines diagram shows correlation between FL and PT with Gestational age (in weeks)

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