TO CORRELATE PLACENTAL THICKNESS WITH OTHER FETAL PARAMETER ON USG IN SECOND AND THIRD TRIMESTER OF PREGNANCY

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Abstract

Background: Gestational age is estimated by last menstrual period. Many women are unaware of their last menstrual period due to irregular menses, conception in lactation amenorrhea and due to illiteracy. The best possible ante partum care and successful labor outcome always revolve around the accurate knowledge of gestational age determination, and is an important component of antenatal care

Methods: This was a prospective observational study conducted in department of obstetrics and gynecology on 200 pregnant women in second and third trimester with singleton live fetus at Mahila chikitsalay, S.M.S. medical college, Jaipur, from June 2018 to December 2019. All women were subjected to USG for estimation of gestational age by placental thickness (measured at the level of umbilical cord insertion).

Results: Mean placental thickness show linear positive correlation with head circumference (HC). ($r=0.960, p<0.0001$). Mean placental thickness show linear positive correlation with abdominal circumference (AC). ($r=0.948, p<0.0001$). Mean placental thickness show positive correlation with FL both have linear correlation ($r=0.946, p<0.0001$). Mean placental thickness show linear positive correlation with estimated fetal weight (EFW). ($r=0.926, p<0.0001$)

Conclusion: All fetal parameter FL, HC, EFW, BPD, AC and gestational age showing positive correlation with placental thickness. All parameter have linear relationship with placental thickness. Correlation may be different with different type of parameter.

Keywords: Ultrasonography (USG), Placental thickness, Gestation age.

Introduction

Gestational age is estimated by last menstrual period. Many women are unaware of their last menstrual period due to irregular menses, conception in lactation amenorrhea and due to illiteracy¹. The best possible ante partum care and successful labor outcome always revolve around the accurate knowledge of gestational age determination, and is an important component of antenatal care².

Implantation commences on day 19 of cycle and is completed on day 23. The concept us at this stage is 0.1 mm in length and cannot be seen by currently available ultrasound equipment.

At 5 weeks- Gestational sac

Gestational sac + yolk sac - 5.5 weeks

Gestational sac + yolk sac + embryo - 6 weeks

Crown Rump length is used to assess gestational age from 5 weeks 3 days to 13 weeks 6 days of pregnancy .This is the most accurate parameter for assessing gestational age in a pregnancy³.

In second trimester Biparietal diameter, Femur length, Abdominal circumference, Head circumference are used for assessing the gestational age .Of these none of them is reliable in third trimester

First trimester - ± 3 days

Second trimester - $\pm 1 - 2$ wks

Third trimester - $\pm 2 - 3$ wks

So other sonological parameters like humerus length, clavicle length, trans – cerebellar diameter, foot length, placental thickness, cephalic index, occipito- frontal distance, diameter of distal femoral epiphysis and binocular distance are also available in prediction of gestational age³.

Material and Methods

This was a prospective observational study conducted in department of obstetrics and gynecology, Mahila chikitsalay, S.M.S. medical college, Jaipur, from June 2018 to December 2019. 200 Pregnant women with Known LMP with regular menstrual cycle, age group 18-35yr, with normal BMI at ≥ 13 wks of gestation ,with singleton live pregnancy attending ANC OPD were recruited for the

study. Pregnant women with hypertensive disorders of pregnancy, diabetes mellitus, and other medical disorders, with fetal and placental anomalies were excluded from the study.

After recruitment detailed history and medical and physical examination were done. After obstetric examination all base line investigations were done. All women were then subjected to detailed sonography for foetal being. Thickness of placenta was measured at the level of umbilical cord insertion in every case. All parameters were measured by same observer and on the same machine.

Statistical Analysis

All the data were entered in Excel sheet and Data were analyzed statically using SPSS software. For the statistical significance using intra class correlation coefficient (r). Significance found by student t- test. A p value of <0.05 considered significant. Linear regression equations were formulated.

Observations and Discussion

Table 1: Demographic distribution of study population

1.	Mean Age	24.5+_3.18
2.	Mean gravidity	1.68+_0.899
3.	Residence-	
	Urban	54.5 %
	Rural	55.5%
4.	Religion -	
	Hindu	72%
	muslim	28%
5.	Literacy	
	Literate	71.5%
	Illiterate	28.5%

Table 2: Correlation of placental thickness and HC

Ges. Age	placental thickness		HC		Correlation coefficient (r)	P-value
	Mean	Std. Deviation	Mean	Std. Deviation		
13-19	17.18	2.543	129.26	29.141	0.718	<0.0001
20-26	23.14	2.358	207.98	20.759	0.686	<0.0001
27-33	29.98	2.590	280.67	21.881	0.663	<0.0001
34-40	34.69	1.996	321.93	15.585	0.380	<0.0030
Total	26.94	6.975	242.65	74.563	0.960	<0.0001

(R=0.960,p<0.0001)

Table no. 2 show correlation between placental thickness and head circumference with gestational age. Head circumference and placental thickness increase with increasing gestation age. Both have strong positive correlation (p<0.0001) in earlier gestation 13-33 week. In later 34-40 week lesser positive correlation (r=0.380, p<0.0030) in comparison to earlier gestation.

Overall correlation coefficient r=0.960, p value <0.0001 that was showing positive correlation between placental

thickness and head circumference. After 33 week of gestation head circumference increase slowly

N. Mahale et al⁴ observed that correlation coefficient between PT and HC was in 2nd trimester r=0.836 and in 3rd trimester was r=0.880. The head circumference have positive correlation but in comparison to other parameter it was less significant for estimating gestational age.

R. Rajesh Gowtham et al⁵ observed linear relationship between both parameter (PT and HC) and calculated a linear regression Analysis equation $y=0.866x+1.751$.

Table 3: Correlation of placental thickness and AC

Ges. Age	placental thickness		AC		Correlation coefficient (r)	P-value
	Mean	Std. Deviation	Mean	Std. Deviation		
13-19	17.18	2.543	108.64	26.182	0.754	<.0001
20-26	23.14	2.358	179.21	25.982	0.653	<.0001
27-33	29.98	2.590	261.00	30.045	0.708	<.0001
34-40	34.69	1.996	314.66	36.060	0.343	<.0070
Total	26.94	6.975	223.94	83.086	0.948	<.0001

(R=0.948,p<0.0001)

Table no. 3 show correlation between placental thickness and Abdominal circumference with gestation age. Abdominal circumference (AC) and placental thickness (PT) linear increase with gestational age. AC and placental thickness show strong positive correlation from 13-33 week of gestation. 34-40 week of gestation show less positive correlation in comparison to earlier gestation.

In late period of gestation correlation coefficient was r=0.343,p value<0.0070 show less correlation but had positive relation. Overall correlation coefficient was r=0.948 and p value <0.0001.

Similar study done by Ohagwu CC et al⁶ showed significant positive linear correlation ($r^2=0.91$, p<0.0001) between placental thickness and fetal parameter (BPD, AC).

R. Rajesh Gowtham et al⁵ observed linear relationship between both parameter (PT and AC) and calculated a linear regression Analysis equation $y=0.866x + 1.751$.

N. Mahale et al⁴ observed linear relation between both parameter from 12-40 week of gestation. They calculated strong correlation coefficient between those parameter i.e.in 2nd trimester r= 0.820 and in 3rd trimester r=0.881.

In our study placental thickness and abdominal circumference have linear correlation similar to above studies. Correlation coefficient was r=0.948 and p<0.0001.

A linear analysis equation calculated i.e. y (AC) = 11.29x(PT) - 80.156, $R^2=0.8981$.

Table 4: Correlation of placental thickness and FL

Ges. Age	placental thickness		FL		Correlation coefficient (r)	P-value
	Mean	Std. Deviation	Mean	Std. Deviation		
13-19	17.18	2.543	22.69	5.935	0.654	0<.0001
20-26	23.14	2.358	40.69	5.148	0.738	<0.0001
27-33	29.98	2.590	58.43	5.865	0.637	<0.0001
34-40	34.69	1.996	70.13	6.876	0.127	<0.3300
Total	26.94	6.975	49.89	18.608	0.946	<0.0001

(R=0.946,p<0.0001)

Table no. 4 show correlation between placental thickness and Femur length with gestational age. Femur length (FL) and placental thickness increase with increasing gestation age. Both have strong positive correlation (avg) $r=0.676$ ($p<0.0001$) in earlier gestation 13-33 week.

In later 34-40 week correlation coefficient $r=0.127$ and p value<0.3300. Late period of gestation did not show significant correlation between placental thickness and Femur length (FL). Overall correlation coefficient $r=0.946$, p value <0.0001 show placental thickness and Femur length(FL) linear positive correlation with gestation age. After 33 week of gestation there was not significant relation between placental thickness and FL.

Similar study done by Suresh K.K. et al⁷ observed that in 12-24 week of gestation placental thickness and femur length almost matched .They observed positive correlation between those parameter ($r=0.982$, p value<0.0001). They calculated linear regression analysis equation i.e. $Y(FL)=0.959 \times (PT)+0.419$. In third trimester have no relation between placental thickness and FL.

Table 5: Correlation of placental thickness and EFW (ESTIMATED FETAL WEIGHT)

Ges. Age	placental thickness		EFW		Correlation coefficient (r)	P-value
	Mean	Std. Deviation	Mean	Std. Deviation		
13-19	17.18	2.543	140.62	70.627	0.804	<0.0001
20-26	23.14	2.358	490.97	178.718	0.777	<0.0001
27-33	29.98	2.590	1382.24	388.321	0.747	<0.0001
34-40	34.69	1.996	2652.07	368.830	0.486	<0.0001
Total	26.94	6.975	1268.95	1047.478	0.926	<0.0001

(R=0.926,p<0.0001)

Table no. 5 show correlation between placental thickness and estimated fetal weight with gestation age. Estimated fetal weight (EFW) and placental thickness show linear increase with gestational age. EFW and placental thickness show strong positive correlation from 13-33 week of gestation. 34-40 week of gestation show less positive correlation in comparison to earlier gestation.

In late period of gestation correlation coefficient was $r=0.486$, p value<0.0001 show less correlation but had positive relation. Overall correlation coefficient was $r=0.926$ and p value <0.0001. That was showing statically significant correlation.

But in comparison to other fetal parameter EFW have minimum correlation to placental thickness.

Similar study done by Nasreen Noor et al¹ observed a significant positive correlation. Both parameter increased linearly with increasing gestation age.

Rajesh Gowtham et al⁵ found a perfect linear correlation between placental thickness and Estimated fetal weight. They calculated linear regression analysis equation for calculating fetal weight i.e. $EFW=1345+232 \times PT$.

Conclusion

All fetal parameter FL, HC, EFW,BPD, AC and gestational age showing positive correlation with placental thickness. All parameter have linear relationship with placental thickness. Correlation may be different with different type of parameter.

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