

Evaluation of Gestational Age by Measurement of Placental Thickness on USG in Second and Third Trimester of Pregnancy

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Abstract

Purpose: Evaluation of gestational age by measurement of placental thickness with ultrasonography in second and third trimester of pregnancy.

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 age was 24.5 ± 3.18 yrs. Mean Placental thickness increase linearly with gestational age till 33 week thereafter decreases marginally from 34 to 40 weeks of gestation. strong correlation ($r=0.969, p<0.0001$) with gestational age. Linear

regression analysis yielded mathematical equation for calculation of gestational age in second and third trimester as $Y(\text{Gestational Age}) = 1.0573 \times \text{placental thickness} - 1.1834, R^2=0.9391$

Conclusion: Placental thickness on USG seems to be good parameter for calculation of gestational age of fetus in second and third trimester specially 13 to 33 weeks of gestation .

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.

Generations of midwives and doctors have learned Naegele's rule, based on menstrual dates, to calculate gestational age. Naegele's rule assumes a 28-day-cycle with ovulation on day fourteen³.

Women who do not recall last menstrual period and have irregular periods the use of ultrasonography helps in estimating the correct gestational age⁴.

Ultrasonography has provided a safe and non-invasive method to evaluate the placenta and fetus. Ultrasonography is commonly used to estimate the gestational age by measuring the fetal dimensions like BPD,AC,HC and FL⁵.

As of now, the first dating ultrasound is the most reliable method of assessment of gestational age⁶.

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 trimester⁶

Placental thickness measured at the level of umbilical cord insertion can be used as an accurate sonographic indicator in assessment of gestational age in singleton pregnancies⁷.

In our study we will use placental thickness as a new parameter to estimate gestational age.

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

,other medical disorders, with fetal and placental anomalies were excluded from the study.

After recruitment detailed history and medical and physical examination was 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

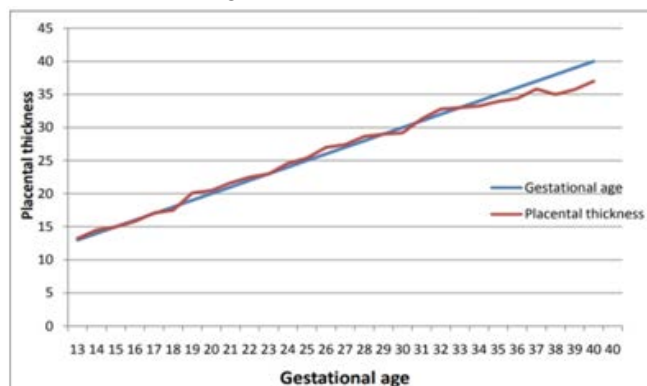
Table 1: Demographic Distribution of Study Population

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

Table 2: Relation of gastastional age and mean placental thickness

Ges. week	Age	N	Mean (mm)	Std. Deviation
13		4	13.25	1.893
14		2	14.50	0.707
15		2	15.00	1.414
16		6	15.83	0.983
17		11	17.09	0.539
18		4	17.50	1.291
19		10	20.10	2.558
20		10	20.50	0.972
21		8	21.63	1.768
22		10	22.50	1.581
23		10	23.00	1.155
24		5	24.60	1.140
25		8	25.38	1.768
26		7	27.00	1.633
27		7	27.43	1.718
28		6	28.67	2.160
29		3	29.00	1.000
30		5	29.20	1.643
31		3	31.33	0.577
32		10	32.80	2.098
33		8	33.00	1.927
34		8	33.25	1.282
35		17	33.94	1.713
36		10	34.40	1.955
37		12	35.83	1.850
38		7	35.00	2.449
39		4	35.75	0.957
40		3	37.00	1.732
Total		200	26.94	6.975

Graph 1 : The Linear Graph Of Placental Thickness And Gestational Age.



Our study result showed linear increase of placental thickness with gestational age till 33 week and thereafter there was decrease in placental thickness.

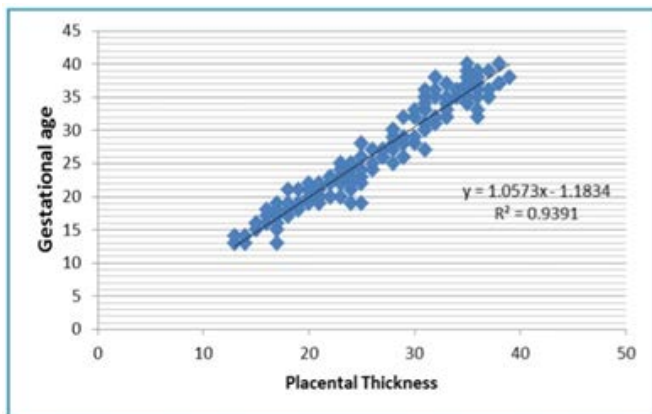
Similar results were reported by P Mital et al⁸ and Aditi tiwari et al⁹ Anupama jain et al¹⁰ Ashok verma et al¹¹

Table 3: Correlation analysis showing relationship between placental thickness and gestational age.

Ges. Age	N	Mean (mm)	Std. Deviation	Correlation coefficient (r)	P-value
13-19	39	17.18	2.543	0.767	<0.0001
20-26	58	23.14	2.358	0.758	<0.0001
27-33	42	29.98	2.590	0.735	<0.0001
34-40	61	34.69	1.996	0.470	<0.0001
Total	200	26.94	6.975	0.969	<0.0001

Correlation coefficient (r) = 0.969, p value =<0.0001

Graph 2: Correlation between Placental Thickness and Gestation Age.



Correlation coefficient(R)=0.969,P value<0.0001

All groups were showed positive correlation but correlation coefficient was less in 34-40 year group in comparison to other groups.

Similar results reported by Maya menon et al¹², Aditi Tiwari et al⁹, Anupama jain et al¹⁰, Karthikeyan T et al¹³, Hellman et al,¹⁶ Ashok kumar verma et al,¹¹ Sujit pant et al,¹⁴ and N Idaya vani et al¹⁵.

This study conclude placental thickness (mm) increase with increasing gestational age(in weeks) almost matching from 13 week to 33 week of gestation .The relationship between placental thickness with gestation age falls marginally and growth rate of placental thickness decreased after 34 week of gestation and thickness was lower by 1-3 mm.Both have significant positive correlation

Table 4: Linear regression analysis for predicting the gestational age based on placental thickness:

Variable In Mode	Unstandardized Coefficients		Standardized □ Coefficients	P value	R ² value (%)
	Beta	Std. Error	Beta		
Constant	-1.183	0.533	-	0.027	93.9
Placental thickness	1.057	0.019	0.969	0.0001	

Dependent variable: =>

- Gestational age

- R²=93.9%

- P value<0.0001

Coefficient r=0.969, p<0.0001, R²=93.9%

The equation for prediction based on regression analysis is given below.

$$Y \text{ (Gestational age)} = 1.057 \times \text{Placental Thickness} - 1.183$$

By this equation the gestational age can be predicted from the measurement of the placental thickness.

Conclusion

From our study we concluded that ultra sonographic measurement of placental thickness at the point of insertation of umbilical cord can be used as an important and accurate parameter for estimation of gestational age in second and third trimester of pregnancy. Placental thickness (in mm) increase with increasing gestational age(in weeks) almost matching from 13 week to 33 week of gestation. The relationship falls marginally as the growth rate of placental thickness decreased after 34 week of gestation and thickness was lower by 1-3 mm. The limitation of our study is a small number of study population . However a larger study is required to substantiate our results .

References

1. Nasreen noor, Akanksha Jain, Shazia Praveen, Syed Manazir Ali, Mohd Khalid.age. IOSR Journal of Nursing and Health Science.2017;6(4):68-71
2. DC Dutta. Textbook of Obstetrics. 8th edition. Konar H, editor. New Delhi: Jaypee Brothers Medical Publishers Private Ltd; 2015:106.
3. Thomas F. Baskett Professor, fritz Nagal. Naegele’s rule: a reappraisal. British Journal of Obstetrics and Gynaecology 2000 (107),1433-1435.

4. Daftary SN, Chakravathi S. Holland and Brews- Manual of obstetrics. 16th ed. New Delhi: B.I Churchill Livingstone Pvt Ltd. 1998:23-32.
5. Salafia CM, Zhang J, Miller RK, Charles AK, ShROUT P, Sun W. Placental growth patterns affect birth weight for given placental weight. Birth Defects Res Clin Mol Teratol. 2007;79(4):281-84.
6. Ian Donald's textbook of practical obstetric problems, 7th edition, Renu mishra Editor .New Delhi:Walters cluver india pvt. Ltd. 2018; 56 -62.
7. Preeti Baghel, Vinita Bahel, Rashmi Paramhans, Pomila Sachdev, Sonal Onkar. Correlation of Placental Thickness Estimated by Ultrasonography with Gestational Age and Fetal Outcome. Indian Journal of Neonatal Medicine and Research. 2015 Jul, Vol-3(3): 19-24
8. Mittal P, Hooja K, Mahindratta: Placental thickness-A Sonographic parameter for gestational age estimation. Indian J Radiol image 2002,12(4);553-554.
9. Aditi Tiwari, Kavita Chandnani. A study to evaluate gestational age with the help of placental thickness. International Journal of Reproduction, Contraception Obstetrics and Gynecology. 2013;2(4):503-505.
10. Anupama Jain, Ganesh Kumar, Agarwal et al: Placental thickness-A Sonographic parameter for gestational age estimation. Indian J. Radiol image 2002,12:(4):553-554.
11. Ashok Kumar Verma, Vinita Malhotra, Rajlakshmi Yadav, Rahul Chavhan. Placental thickness estimation by ultrasonography and its correlation with gestational age in normal pregnancies in late 2nd and 3rd trimester. Asian Pacific Journal of Health Sciences.2017;4(4),130-32.
12. Maya Menon, Vinodha M. Gestational age determination by ultrasonic placental thickness measurement. Indian Journal of Obstetrics and Gynecology Research . 2016;3(3):279-282.
13. Karthikeyan. T, Ramesh Kumar subramaniam, Johnson WMS, K Prabhu. Placental thickness & its correlation to gestational age & fetal growth parameters-A Cross sectional Ultrasonographic study. J. Clin Diag Res.2012;6(10):132-1735.
14. Sujit Pant, Sunita Dashottar. A correlative study to evaluate the gestational age by sonological measurement of placenta thickness in normal second and third trimester pregnancy. International Journal of advances in medicine .2017 ;4(6):1638-1644
15. N Idaya Vani . Placental thickness an ultrasonographic parameter for estimation of gestational age of the fetus. ACTA Scientific medical science 2018;4(2):27-31
16. Hellman LM, Kobayashi M, Tolles Wet al. Ultrasonic studies on the volumetric growth of human placenta. Am J Obstet Gynecol.1970;32.