

Placental thickness estimation by ultrasonography and its correlation with gestational age in normal pregnancies in late 2nd and 3rd trimester

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ABSTRACT

Introduction: At present, the most effective way to date pregnancy is by the use of ultrasound. Placental thickness can be used as a new parameter to estimate gestational age. **Aim:** The aim is to study placental thickness as a parameter for estimation of the gestational age of the fetus and assess the placental growth pattern with the advancement of gestational age. **Methods:** A total of 298 antenatal women between 18th week and 40th week of gestation (GA) by last menstrual period (LMP) were included who were sure of their LMP. Pregnancies with a history of medical disease, fetal anomalies, placental anomalies, and poly/oligohydramnios were excluded from the study. Pregnancies with poor visualization of placenta were also excluded. Placental thickness was measured at the level of insertion of umbilical cord, and gestational age was calculated by LMP. Correlation of mean placental thickness with GA age by ultrasonography was studied. **Results and Discussion:** We observed that mean placental thickness gradually increased from 18.7 mm at 18th week to 30.5 mm at 40th week of GA. From 18th to 32th weeks of GA, placental thickness (mm) almost matches the gestational age (weeks), and thereafter, placental thickness slightly decreases and remains nearly constant till 40th week of GA with an average value of 31 mm. Findings were consistent with the previous studies where several authors have found that mean placental thickness (mm) increases with gestational age and coincides almost with gestational age (weeks). **Conclusion:** Placental thickness measurement can be an important parameter for estimating gestational age.

Key words: Gestational age, last menstrual period, placental thickness, ultrasonography

INTRODUCTION

An ultrasound can be used for a variety of reasons during pregnancy. Two important role of ultrasonography (USG) is in the determination of gestational age and detection of congenital malformations. The placenta is a fetal organ of pregnancy, responsible for providing nutrition and oxygen to the fetus as well as excretory functions. Ultrasound is the first-line modality in imaging the placenta due to its wide availability and its use of non-ionizing radiation. The placenta appears as a uniformly echogenic structure along uterine wall, with a deep hypoechoic band separating it from normal uterine myometrium. There may also be numerous anechoic areas, representing venous lakes within the placenta itself. Donald^[1] introduced placental localization by ultrasound in 1965. Accurate assessment of fetal growth by USG at any particular gestational age is done by multiple fetal parameters, for which various normograms have been derived in different population. Placental thickness also can be used as a gestational age indicator due to a linear increase in its thickness with advancing gestational age as reported in the previous studies by Mital *et al.*^[2] and Jain *et al.*^[3]

The purpose of the present study is measuring placental thickness at the level of umbilical cord insertion in women who are sure of their last menstrual period (LMP) to assess the relationship of

placental thickness with gestational age by LMP. Furthermore, assessment of growth pattern of placenta was done with advancing gestational age.

MATERIALS AND METHODS

The study was carried out in the Department of Radiodiagnosis in collaboration with the Department of Obstetrics and Gynaecology in GSVM Medical College, Kanpur. All pregnant out patient department and admitted women who were sure of LMP coming for antenatal USG from 18th to 40th gestational week were included in the study. Women with diabetes mellitus, multiple pregnancies, IUGR pregnancies, diagnosed cases of fetal hydrops, and pregnancies with any morphological variation in placenta and cord insertion site were excluded from the study.

USG was performed in the supine position with moderately full bladder, and placental thickness at cord insertion site was measured keeping the plane of transducer perpendicular to placental basal and chorionic plates (Figure 1). Mean of three readings of placental thickness was taken from echogenic chorionic plate to basal plate. Retroplacental hypoechoic space was not included in measurement. Gestational age was calculated by LMP. Mean placental thickness with standard deviation was calculated for each gestational age group. Correlation and

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regression analysis were used to establish the relationship between placental thickness and gestational age by LMP. $P < 0.01$ was considered to be statistically significant. The data were analyzed through SPSS 10.0 software. The study protocol was approved by the Ethical Committee of GSVM Medical College, Kanpur.

RESULTS

A prospective cross-sectional study of 298 normal pregnancies was conducted from 18th to 40th gestational weeks. Mean placental thickness with respective standard deviation was calculated for each gestational age group as shown in Table 1. It was observed that value of mean placental thickness was increasing from 18.7 mm at 18 week to 30.5 mm at 40th week. It was also observed that value of standard deviation increases as pregnancy advances toward term suggest increased variability in the placental thickness in later gestational ages. Pearson's correlation coefficient (r) was calculated to be 0.7450 suggesting a strong positive linear correlation between placental thickness and gestational age with $P < 0.005$. Regression analysis yielded a linear equation of relationship with placental thickness (Y) and gestational age (X) as follows:

$$(Y) = 6.062 + 0.794(X)$$

A line diagram is shown in Figure 2 showing a linear relation between the placental thickness and gestational age. Value of

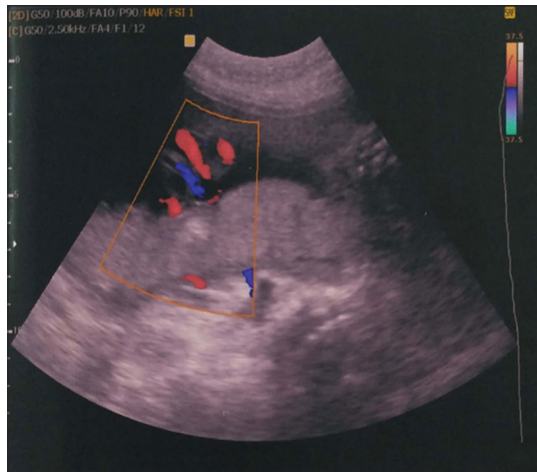


Figure 1: Cord insertion site

mean placental thickness in mm corresponds with gestational age in weeks from 18th to 32th gestational week, after that mean placental thickness slightly reduces and remains nearly stationary till 40th gestational week with an average value of 31 mm. Maximum mean thickness observed was 33 mm in 36th gestational week. Minimal placental thickness observed was 17.2 mm in 18th gestational week and maximum placental thickness observed was 44 mm at 36th gestational week in normal pregnancies.

DISCUSSION

Placental thickness changes are an expression of normal growth of the fetoplacental unit amenable to measurement with USG and of value in describing normal physiology. Some diseases or abnormalities of the fetus can be detected through measurement of placental thickness.^[4] The measurements relative to gestational

Table 1: Relationship between gestational age and mean placental thickness

GA by LMP	Number of cases	Mean±SD
18-18.6	28	18.7±1.6
19-19.6	15	19.6±1.9
20-20.6	19	20.6±2.8
21-21.6	12	21.6±2.7
22-22.6	11	23.1±6.1
23-23.6	16	23.8±2.6
24-24.6	13	25±1.9
25-25.6	10	25.5±3
26-26.6	12	26±3.1
27-27.6	11	27±2.1
28-28.6	11	28.1±3.3
29-29.6	6	28.5±2.5
30-30.6	16	29.1±2.7
31-31.6	16	30.7±3.3
32-32.6	25	32±5.4
33-33.6	15	30.9±5.8
34-34.6	16	31.8±2.9
35-35.6	16	31.2±4.8
36-36.6	14	33±5.1
37-37.6	8	29.8±5
38-38.6	4	31.5±3.7
39-40	4	30.5±7
Total	298	

SD: Standard deviation, GA by LMP: Gestation by last menstrual period

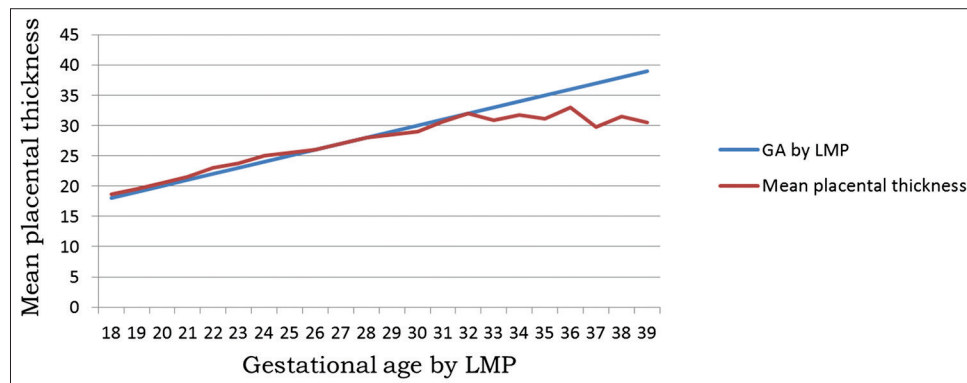


Figure 2: Line diagram showing relationship between gestational age and mean placental thickness

age should serve to facilitate recognition of altered placental thickness induced by pathologic processes. In our study, significant linear positive correlation was observed between placental thickness and gestational age. The result of this study is consistent with the observations in previous studies by Hoddick *et al.*,^[5] Mital *et al.*,^[2] Jain *et al.*,^[3] and Granum and Hobbins^[6] They also found a significant correlation between these two variables. Mital *et al.* and Jain *et al.* both reported that placental thickness in mm almost matches gestational age in week up to 33 gestational weeks. Berkowitz *et al.* reported a gradual decrease in placental size after 32 gestational weeks until term.

CONCLUSION

Measurement of placental thickness at umbilical cord insertion site can be used as an ultrasonographic indicator for gestational age estimation in normal singleton pregnancies specially from 18th to 32th gestational week. Moreover, any abnormally thin or thick placenta at any particular gestational week can be identified with the help of normal placental thickness normagram, and further, evaluation for IUGR pregnancies, maternal diabetes mellitus, severe anemia, and hydrops fetalis can be considered.

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