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■ Original Research Article

Ultrasound Assessment of Placental Thickness and its Correlation with Gestational Age in Normal Pregnancy in Maiduguri, Northeast Nigeria

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Abstract

Background: The placenta is a highly vascularised organ that serves as medium of exchange of metabolic and gaseous products between maternal and foetal blood streams and produce hormone. Sonography is a safe and non-invasive tool used to evaluate placental position, morphology and growth throughout pregnancy. Increase in normal placenta growth occurs throughout pregnancy, thus placental dimensions such as thickness and volume can be measured. **Objective:** To correlate the ultrasonographic placental thickness with gestational age in University of Maiduguri Teaching Hospital. **Methodology:** This is a longitudinal study carried out among booked pregnant women for antenatal care with gestational age between 15 and 39 weeks, in the department of Obstetrics and Gynaecology, University of Maiduguri Teaching Hospital, Maiduguri, between August and October 2017. The placenta was examined in the sagittal plane and anterioposterior thickness measured at the level of cord insertion. Placental thickness was measured in millimetres (mm) from the echogenic plate to placenta-myometrium interface and the myometrium. Data was verified, coded, and transferred into an IBM compatible PC and analysed using SPSS version 20, Chicago, IL, USA. Means, standard deviations and Pearson's correlation Coefficient® were calculated and P-value of less than 0.05 was considered significant. **Conclusion:** It was observed in this study that there is a positive correlation between placental thickness and gestational age. This finding showed that placental thickness may be an accurate parameter to estimate gestational age in singleton pregnancies in our environment.

Keywords: Placenta thickness, Gestational age, UMTH, North-east Nigeria.

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Introduction

The placenta is a very vascular foetal organ whose main function is to exchange nutrients, metabolic products and gases between the maternal and foetal blood streams.[1] It is closely related to the mother and the foetus and reflect their health statuses and foetal parameters measurement which are necessary for management of the foetus for good perinatal outcome.

Decisions on management and delivery of pregnant women revolves around the gestational age of the fetus[2]. Assessment of gestational age is important in differentiating between normal from pathological growth in the fetus[3]. Many women either cannot remember their last normal menstrual period or do not have a regular menstrual cycle that will help in determining the accurate gestational age. Ultrasound scan has been used to determine gestational age, but this is subjected to the expertise of the sonographer and the timing of the ultrasound in relation to the trimester of the pregnancy and therefore may not be accurate[4]. Therefore, the need to use a more reliable means of assessing gestational age.

The placenta is a vital organ needed for the growth and development of the foetus. Until recently, the placenta was evaluated mainly to determine its position or its premature separation, however, the thickness and growth pattern of the placenta also has an impact on pregnancy outcome[5]. Placental thickness has been associated with foetal problems, and previous studies have noted a thickness of less than 25mm at term to be associated with intrauterine growth restriction[6] while a placental thickness of greater than 40mm is associated with gestational diabetes, hydrops foetalis and intrauterine infection[7].The thickness of the placenta can therefore be said to be tantamount to the functionality of the placenta and it is expected that the placenta thickness will change in relation to the growth of the foetus and may be a reliable means of determining gestational age if specific predetermine values have been obtained.

There are reports on placenta measurements in the developed nations, but very few data are available in Nigeria. The aim of this study is to investigate placental thickness as a parameter for estimating gestational age of the foetus in normal singleton pregnancies in Maiduguri, Northeastern Nigeria. It is hoped that findings of this study may aid in formulating crucial measures that will improve the estimation of gestational and hence the well-being of the foetus.

Materials and Methods

The study was longitudinal study which was carried out on 52 consenting women who presented to the antenatal clinic in the Department of Obstetrics and Gynaecology University of Maiduguri Teaching Hospital from August to October 2017. All the women were informed of the study and its purpose. Full explanation was given on the methodology of the study. They were assured of confidentiality and that their participation was voluntary and that they could decide to withdraw from the study at any point in time during the study that they felt uncomfortable. A convenient nonprobability sampling method was used select the sample population. The inclusion criteria were healthy women carrying normal singleton pregnancies with sure dates (women who were curtained of their LMP) which were confirmed by ultrasound. While those women who had history of hypertension, diabetes or chronic renal disease were excluded from the study. Also excluded were patients whose babies had congenital anomalies detected on ultrasound scan and those who did not complete the study.

A numbered, pretested Proforma containing demographic information was filled for each patient prior to performing the transabdominal ultrasonography USG. All women underwent transabdominal US using Nemio XG model SSA-550A ultrasound system (Toshiba Medical Systems, Japan) using a curvilinear trans-abdominal 3.75 MHz transducer. The USG examinations were performed by the lead author (MB), certified in obstetric and gynaecological US for over 7 years and an author of an US textbook (ref). All the clients recruited for the study had baseline US for biometry but only 34 had their placental measurements taken, others were lost to follow up. Two foetuses who were found to have ventriculomegaly and were excluded from the study. The sample was therefore reduced to 32. The scans were performed between 15-40 weeks and none of the patients were made to pay for the ultrasound done.

The patients were examined in supine position with the abdomen exposed from the xiphisternum to the pubic symphysis and the transducer was placed on the skin after applying the coupling gel. Scanning was done in both longitudinal and transverse planes. Biometry was completed after viability was confirmed. The placenta was examined in the sagittal plane and the anteroposterior thickness measured at the level of cord insertion. Doppler was used where there were difficulties in identifying the site of cord insertion, placental thickness was measured in millimeters (mm) from the echogenic chorionic plate to placenta myometrial interface and the myometrium. The placenta thickness value in

mm was calculated by averaging the three best measurements for each case.

Care was taken to take all measurements in the absence of uterine contractions. The lead author was blinded to the entry and analysis of the result which was done by the third author (Hassan). After collection, data was verified, coded, and transferred into an IBM compatible PC and analysed using SPSS (SPSS IBM Version 20, Chicago, IL, USA). Means, standard deviations and Pearson's correlation coefficient (r) were calculated and p-value of ≤ 0.05 was considered significant.

Ethical approval was gotten from the ethics committee University of Maiduguri Teaching Hospital

Results

The age of the study population ranged from 19-38 years with a mean of 27.3±4.9 years. Their parity ranged from 0-10 and majority (56%) of the participants were of normal weight (Table1). Out of the 50 cases studied, anterior placenta was noted in 19 cases, posterior in 17 cases, fundal in 12 cases. The placenta location was not recorded in 2 of the cases (Table 3).

Table 1. Socio-Demographic and Clinical Characteristics of the Study Population

Variables	Frequency (n) N=50	Percentage (%)
Age (years)		
<20	3	6
20-34	41	82
≥35	6	12
Total	**50**	**100**
Parity		
0	14	28
1-4	29	58
≥5	7	14
Total	**50**	**100**
Body mass index (BMI)		
Underweight	2	4
Normal	28	56
Overweight	15	30
Obesity	5	10
Total	**50**	**100**

Discussion

The placenta is a very vascular fetal organ whose main function is to exchange nutrients, metabolic products and gases between the maternal and fetal blood streams[2]. It is closely related to the mother and the fetus and reflects their health statuses.

Table 2. Mean values of placental thickness with gestational age of the study population

Gestational age in weeks	Sample subject (n)	Mean +SD (mm)
15	1	11.50 ± 3.50
16	1	20.10 ± 4.10
19	1	16.90 ± 7.90
21	2	22.60 ± 1.13
22	3	22.00 ± 0.01
23	1	20.30 ± 2.70
25	3	31.20 ± 3.58
26	5	26.06 ± 0.03
27	4	24.50 ± 1.25
28	1	25.00 ± 3.00
29	2	30.40 ± 0.99
30	1	21.00 ± 9.00
31	2	28.35 ± 1.87
34	1	31.00 ± 3.00
37	2	32.70 ± 3.04
38	1	24.00 ± 14.00
39	1	18.00 ± 21.00

Table 3. Placental location of the study population

Placenta location	Frequency (n) N=48	Percentage (%)
Anterior	19	39.6
Posterior	17	35.4
Fundal	12	25.0

Pearson's correlation coefficient (r) of 0.381 with a p value of 0.05

Table 4. Pearson's correlation between placental thickness and gestational age

Parameters	Mean	SD	R	P
Gestational age (weeks) by USG	26.78	5.88	0.381	0.031
Placenta thickness (mm)	25.26	6.41		

In this study, placental thickness has been shown to increase with advancing gestational age though, in a nonlinear fashion. The result of this study differed from other studies which showed an increase in placental thickness in relation to gestational age in a parallel fashion [8, 9] and study by Ohagwu et al, that showed a fairly linear relationship between placental thickness and gestational age[1].The difference noted in this study maybe due to its small sample size and the late booking of parturient which has been noted in our center. Other studies however noted a parallel increase only until 30 weeks[10] and 35 weeks[11] respectively. Notwithstanding, this study has shown a significant positive correlation between gestational age and placental thickness and this finding was noted by several other studies[11-16]. It can be concluded that placental thickness could be used for estimating gestational age. However, Arafa et al., Nagwani et al. and Peter et al. in their studies found no statistical correlation between placental thickness and gestational age.[17-19] They concluded that an increase in gestational age doesn't have any significant influence on the thickness of the placenta. The difference could be attributed to demographic variations amongst women.

Maximum PT was noted at 37 weeks' gestation (32.7mm). Acharya et al. in their series also noted maximum placenta thickness at 37 weeks though with a higher value (50mm).[20,21] A placental thickness of greater than 40mm has been associated with gestational diabetes, hydrops foetalis and intrauterine infection[7]. This difference in PT at similar GA could be attributable to racial factor.

In this study, most common placental location was anterior (39.6%) followed by posterior in 35.4% and fundal in 25.0% of women. Like our findings, Acharya et al[20] and Ritu[22]et al also documented preponderance of anteriorly located placenta in their series. In contrast, Adhikari R. et al. reported that most of the placenta (46%) were posteriorly located.[23] The difference could possibly be variability of placental location among population according to geography. In a study by Ganjoo et al. a relationship was noted between placental location and placental thickness as anteriorly located placenta were found to be thinner than posteriorly located placenta by about 0.7mm.[24]

In conclusion, this study has shown a positive correlation between placental thickness and gestational age. However, this result may not be generalizable because of the longitudinal nature of the study and the fact that it is single center and small sample sized study. However, because women present late for antenatal care and uncertain of their last menstrual period, the result of this study can be used to possibly date their pregnancy.

We recommend that standardized values for placental thickness and gestational age be determined so that by measuring placental thickness the expected gestational age of the foetus can be determined.

Support – none

Conflicts of interest – none

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