**EAS Journal of Radiology and Imaging Technology**
*Abbreviated Key Title: EAS J Radiol Imaging Technol*
ISSN: 2663-1008 (Print) & ISSN: 2663-7340 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-6 | Issue-4 | Jul-Aug-2024 | DOI: https://doi.org/10.36349/easjrit.2024.v06i04.005

**Original Research Article**

# Sonographic Placental Thickness and Its Correlation with Gestational Age among Low-Risk Singleton Pregnant Women at 15 To 36 Weeks Attending Mbarara Regional Referral Hospital

Dr. Malunde Fredrick[1*], Dr. Mugisha J. Sebikali[2], Dr. Mworozi Kenneth[2]

[1]Faculty of Medicine, Department of Radiology, Mbarara University of Science and Technology, Boma, Mbarara, Uganda
[2]Faculty of Medicine, Mbarara University of Science and Technology, Boma, Mbarara, Uganda

**Article History**
Received: 19.07.2024
Accepted: 26.08.2024
Published: 29.08.2024

**Journal homepage:**
https://www.easpublisher.com

**Quick Response Code**

**Abstract:** ***Introduction:*** Accurate determination of gestation is very important in routine antenatal care. Gestation age is usually determined from the last menstrual period, which is unreliable due to recall bias and menstrual irregularities etc. It is also determined from fetal biometry whose accuracy decrease with increasing gestation age. Normal placental growth determines normal fetal growth. ***Aim*****:** To determine the average sonographic placental thickness and its correlation with GA among low-risk singleton pregnant women 15 weeks to 36weeks attending antenatal clinic at Mbarara Regional Referral Hospital. ***Methods*****:** This was a cross sectional study of 249 singleton low risk pregnant women with known first day of last normal menstrual period (LNMP) at 15 to 36weeks of gestation attending antenatal clinic at MRRH from June 2021 to September 2021. Ultrasound scanning was performed using GE logic V2 ultrasound machine with (3-5MHZ) convex probe. Placental thickness (PT) was measured perpendicular at umbilical cord insertion, fetal growth parameters (BPD, HC, AC and FL) were also determined. Statistical analysis was performed using STATA© 15.0 software). Mean placental thickness with standard deviation was calculated. Pearson's correlation was applied to determine the correlation between placental thickness (PT) and gestational age as well as foetal growth parameters. ***Results*****:** In this study the participants age range was 16-43 years with mean of (25±5.59) years. Their parity ranged from 0-7(mean 1.28±1.37). The mean PT was (28.47 ± 5.43) mm. PT ranged from (17.95± 1.10) mm at 15 weeks to (37.50 ± 1.69) mm at 36 weeks. PT (in mm) had a linear relationship and a statistically significant positive correlation with GA (in weeks) (r = 0.96), p=0.001. There was also a statistically significant positive correlation between PT and the fetal growth parameters. ***Conclusion*****:** Placental thickness increases with increase in gestational age. A strong positive correlation between PT and fetal gestational age as well as fetal parameters fetal growth parameters was observed and hence PT can be used to estimate gestational age when last normal menstrual period is uncertain or unknown.

**Keywords:** Placenta, Sonographic Placental Thickness (PT), Gestational age (GA), Ultrasound (USS).



## INTRODUCTION

Gestation age refers to the weeks of fetal development as determined from the last normal menstrual period (Penny, 2018). Accurate determination of gestation is very important in routine antenatal care since it is the determinant of the expected date of delivery which in turn influences timing of specific obstetric care as in cases of premature labour and postdate deliveries (Butt *et al*., 2014).

The first day of last normal of last normal menstrual period and symphysial fundal height, which are, methods currently used for gestation age estimation in Uganda are unreliable. The first day of last normal menstrual period is unreliable due to recall bias, menstrual irregularity, midcycle bleeding, variation ovulation and fertilization timing as well as use of oral contraceptives as stated by (Weinstein *et al*., 2018, Butt *et al*., 2014). Symphysial fundal is imprecise and

***Corresponding Author:** Dr. Malunde Fredrick
Faculty of Medicine, Department of Radiology, Mbarara University of Science and Technology, Boma, Mbarara, Uganda

variable it is influenced by factors such as maternal parity, maternal body habitus, uterine fibroids and fetal position (Nardozza *et al*., 2019). Similarly the accuracy of commonly used fetal biometry (AC, BPD, HC and FL) decrease with increasing in gestation age (Agwuna *et al*., 2016, Rudder, 2019).

Previous studies have shown that sonographic placental thickness measured at the level of umbilical cord insertion is a useful alternative parameter for estimation gestational age in the second and third trimester (Dashottar, 2017, Karthikeyan *et al.*, 2012, Agwuna *et al*., 2016). It is a relatively easy parameter to assess Lee *et al*., (2012) However, there are few publications addressing the utility of sonographic placental thickness in gestational age estimation globally (Revs, 2015) and Africa ,particularly sub-Saharan Africa (Agwuna *et al*., 2016). Furthermore, Agwuna *et al*., (2016) pointe that there is a variation in placenta thickness between population.

Currently there are no established sonographic placental thickness reference values in Uganda. The present study aimed at determining the average sonographic placental thickness and its correlation with gestational age in low-risk singleton pregnancy for women attending Mbarara regional referral hospital at 15 to 36week of gestation.

## STUDY METHODOLOGY

**Study design:** This was a cross-sectional study.

**Study setting:** This study was conducted at Mbarara Regional Referral Hospital, Southwestern Uganda.

**Study duration:** July 2021 to September 2021

**Study population**

Low-risk Singleton pregnant women attending Mbarara Referral Regional Hospital antenatal clinic (ANC) at 15weeks to 36weeks of gestation from July 2021 to September 2021.

**Inclusion criteria**

Women with known first day of last normal menstrual period (LNMP), Gestation age between 15 to 36 weeks based on known first day of last normal menstrual period (LMNP), Age ≥15 years to 49 years and Low risk singleton women.

**Exclusion criteria:**

Based on Ultrasound, all women who were found to have any of the following abnormalities were exclude from the study: Placental anomaly (praevia, accreta, abruption, succenturiate and bilobed placenta), Abnormal Cord insertion (eccentric, marginal cord insertion and velamentous cord insertion), Intrauterine growth restriction, polyhydramnios.

**Data collection and Study Variables**

We enrolled a total of 249 participants. The data collected include: demographics, gestational (in weeks) by 1st day of last normal menstrual period, fetal biometry with their respective Gestational age estimate and sonographic placental thickness (in mm) using using 3-5MHZ convex probe of a GE LOGIC V2 ultrasound system (sample image is shown on Figure 2).

**Data Analysis**

The dataset was analyzed using STATA© 15.0 software (College Station, Texas, USA). Maternal sociodemographic, medical and obstetric characteristics and fetal factors were described using means or medians for continuous variables and proportions for categorical variables and presented in a table.

For determination of the average sonographic placental thickness per gestation age among low-risk singleton pregnant women at 15weeks to 36weeks, the mean with its standard deviation and 95% confidence interval of placental thickness (PT) were determined for each gestation age(weeks) and presented in a table.

The correlation between sonographic placental thickness and gestational age in low-risk singleton pregnancy women at 15weeks to 36weeks was done using Pearson correlation analysis. The results were presented as correlation coefficient (r) and significance level ($p$) were presented in a table. Sonographic placental thickness was considered significant in this analysis at $p<0.05$. Further, linear regression was conducted and the relationship between the placental thickness (PT) and gestational age (GA) was presented graphically using scatter plots. Coefficient of determination (R2) expressed as a percentage and the equation explaining the variance explained by placental thickness on Gestational age was deduced.

The correlation between placental thickness and gestational age derived from commonly used biometry (abdominal circumference, femur length, biparietal diameter and head circumference) Was done based on each biometric measure independently. Using bivariate analysis, repeated analysis using Pearson correlation was performed to establish the correlation between placental thickness with each GA based on each biometric measure independently. The relationship was considered significant in this analysis if it has a $p<0.05$.

**Ethical clearance**

This study was done following ethical clearance from Mbarara University of Science and Technology (MUST), Faculty of Medicine Research Committee (FRC), Institutional Research Ethics Committee (REC), Mbarara Regional Referral Hospital (MRRH) and Uganda National Council of Science and Technology (UNCST). Informed consent was sought from the enrolled participants.

# RESULTS

***Baseline characteristics of study population***

In this study, 255 low-risk singleton pregnant women were enrolled, (6) participants were excluded due to various reasons namely; placental lake at cord insertion (1), twin pregnancy (1), marginal cord insertion (2), irregular placental surface (1), large uterine fibroid (1). 249 participants were finally analyzed. Their baseline characteristics consisted of Participants Mean age of 25.85(±5.59) with majority 82% being in 20-30 years age category, parity ranging from 1 to 4 and predominantly overweight (51%). The average placental thickness was 28.47 (±5.43) mm and predominantly anterior in location (39.8%) followed by posterior location (34.5%) as shown in Table 1.

***Average placental thickness by gestational age among low-risk singleton pregnant women at 15weeks to 36weeks attending antenatal clinic at Mbarara Regional Referral Hospital***

Placental thickness (PT) ranged from (17.95± 1.10) mm at 15 weeks to (37.50 ± 1.69) mm at 36 weeks. The placental thickness was higher than gestation age by 1- 3mm as compared from the corresponding gestational age (in weeks) from 15weeks up to 31weeks and almost matched gestation age at 32 to 36weeks.The overall mean placental thickness (PT) was 28.47 mm (SD = 5.43) at 95% confidence interval (Table 2).

***Correlations between sonographic placental thickness and gestational age in low-risk singleton pregnancy women at 15weeks to 36weeks attending antenatal clinic at Mbarara Regional Referral Hospital***

There was a strong significant positive correlation between placental thickness (PT) and gestational age estimated by first day of last normal menstrual period (LNMP) r = 0.96, p <0.001 (Table 3). n = number of participants, r = Pearson correlation coefficient, p = significance level

The linear regression analysis of placental thickness versus gestation age (figure 1) indicate that placental thickness (PT) predicts 92% of GA ($R^2$ = 92.0%) and placental thickness (PT) shows liner relationship with gestational age (GA); (GA = -1.548 + 0.979 (PT), where for every one mm increase in placental thickness (PT) there is 0.979 weeks increase in gestation (GA).

***Correlation between placental thickness and GA (weeks) derived from commonly used biometric parameters.***

There was a statistically significant positive correlation between placental thickness (PT) and all growth parameters (biparietal diameter, head circumference, abdominal circumference and femur length) in the entire studied gestational ages. However, placental thickness (PT) demonstrated the highest correlations with abdominal circumference (AC) and femur length (FL) ($r$ = 0.956, $p$ <.001) and the lowest correlation with BPD ($r$ = 0.949, $p$ <.001). This is shown in Table 4.

**Table 1: Baseline characteristics of participants**

| Characteristic | Frequency (%) | Mean (SD) |
|---|---|---|
| Maternal age in years | | 25.85 (5.59) |
| **<20 years** | 26 (10.44) | |
| **20-34 years** | 206 (82.73) | |
| **35 years** | 17 (6.83) | |
| Parity | | 1.28 (1.37) |
| **0** | 91 (36.55) | |
| **1-4** | 152 (61.04) | |
| **>4** | 6 (2.41) | |
| Gestational age by 1st day of LNMP (weeks) | | 26.28 (5.51) |
| Maternal BMI (kg/m2 | | 26.35 (3.45) |
| **Normal (18.5-24.9) n (%)** | 91 (36.6) | |
| **Overweight (25.0-29.9)** | 128 (51.4) | |
| **Obese (≥30.0)** | 30 (12.1) | |
| Fetal biometry | | |
| **BPD (mm)** | | 65.16 (15.32) |
| **GA for BPD (weeks)** | | 26.25 (5.46) |
| **HC (mm)** | | 243.44 (56.15) |
| **GA for HC (weeks)** | | 26.67 (5.78) |
| **AC (mm)** | | 215.37 (59.58) |
| **GA for AC (weeks)** | | 25.83 (5.27) |
| **FL (mm)** | | 47.42 (13.87) |
| **GA for FL (weeks)** | | 25.7 8 (5.50) |
| **Average GA (weeks)** | | 25.99 (5.43) |

| | | |
|---|---|---|
| **EFW (g)** | | 1110.74 (719.18) |
| Placenta location | | |
| **Anterior** | 99 (39.8) | |
| **Posterior** | 86 (34.5) | |
| **Lateral** | 23 (9.2) | |
| **Fundal** | 41 (16.5) | |
| Placental thickness (mm) | | 28.47 (5.43) |

**Key:**

BPD= biparietal diameter, HC=head circumference, FL=femur length, AC =abdominal circumference, EFW = estimated fetal weight, GA =gestational age, LNMP=last normal menstrual period.

**Table 1: Means of placental thickness by gestational age among low-risk singleton pregnant women at 15weeks to 36weeks attending Antenatal clinic at Mbarara Regional Hospital (N = 249)**

| GA (weeks) | n | Mean of PT | SD | 95%CI | |
|---|---|---|---|---|---|
| 15 | 4 | 17.95 | 1.10 | 16.20 | 19.70 |
| 16 | 7 | 17.41 | 0.61 | 16.85 | 17.98 |
| 17 | 7 | 20.01 | 2.27 | 17.91 | 22.12 |
| 18 | 7 | 21.60 | 0.96 | 20.71 | 22.49 |
| 19 | 8 | 20.65 | 1.08 | 19.75 | 21.55 |
| 20 | 12 | 23.19 | 1.15 | 22.46 | 23.92 |
| 21 | 8 | 22.49 | 1.24 | 21.45 | 23.52 |
| 22 | 18 | 24.20 | 1.13 | 23.64 | 24.76 |
| 23 | 14 | 25.57 | 1.47 | 24.72 | 26.42 |
| 24 | 9 | 25.98 | 0.92 | 25.28 | 26.69 |
| 25 | 12 | 28.19 | 1.21 | 27.42 | 28.96 |
| 26 | 12 | 28.50 | 3.24 | 26.54 | 30.46 |
| 27 | 15 | 29.16 | 1.62 | 28.26 | 30.06 |
| 28 | 20 | 30.25 | 1.66 | 29.47 | 31.03 |
| 29 | 17 | 31.74 | 1.42 | 31.00 | 32.47 |
| 30 | 15 | 32.08 | 1.90 | 31.03 | 33.13 |
| 31 | 14 | 33.26 | 1.71 | 32.28 | 34.25 |
| 32 | 12 | 33.36 | 1.70 | 32.28 | 34.44 |
| 33 | 10 | 34.28 | 0.78 | 33.73 | 34.83 |
| 34 | 13 | 35.22 | 1.82 | 34.12 | 36.31 |
| 35 | 9 | 35.06 | 3.05 | 32.51 | 37.61 |
| 36 | 6 | 37.50 | 1.69 | 35.73 | 39.27 |
| Overall | **249** | **28.47** | **5.43** | **27.80** | **29.15** |

**Key**: GA= gestational age, PT=placental thickness.

**Table 2: Correlations between sonographic placental thickness and gestational age in low-risk singleton pregnancy women at 15weeks to 36weeks attending Antenatal clinic at Mbarara Regional Hospital (N = 249)**

| | ***n*** | ***r*** | ***p*** |
|---|---|---|---|
| Gestational age (weeks) | 249 | 0.96 | <0.001 |

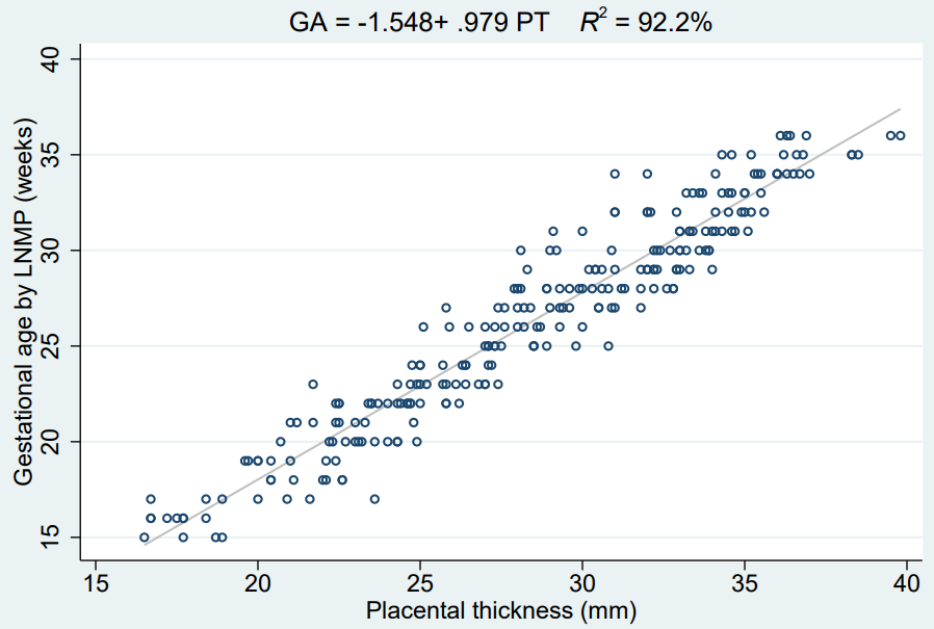


**Figure 1: Relationship between placental thickness (PT) in mm and gestational age (weeks) by first day of last normal menstrual period (LNMP) (N=249)**

**Table 3: Correlation between placental thickness (PT) and GA (weeks) derived from commonly used biometric parameters (BPD, HC, AC and FL)**

| **Fetal biometry (parameters)** | **PT** | |
|---|---|---|
| | ***r*** | ***p*** |
| BPD (weeks) | 0.949 | <.001 |
| HC (weeks) | 0.950 | <.001 |
| AC (weeks) | 0.956 | <.001 |
| FL (weeks) | 0.956 | <.001 |

BPD=Biparietal diameter, HC=head circumference=Abdominal circumference, FL=femur length, PT=placental thickness, r=correlation coefficient, *p*=significance level.

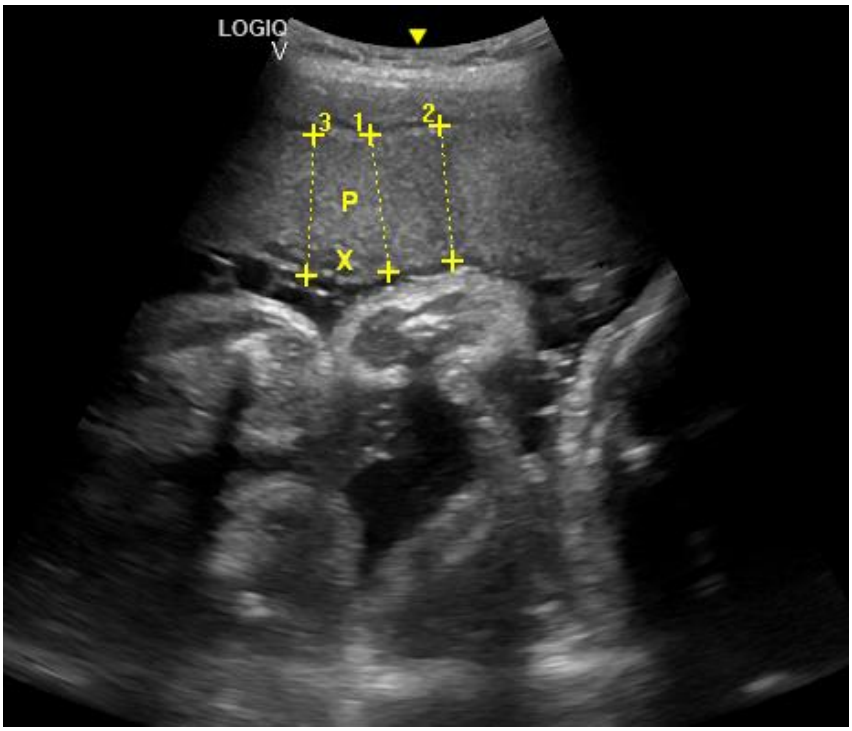


**Figure 2: Sample Ultrasound images (Sonographic placental thickness measurement)**

# DISCUSSION

***Average sonographic placental thickness per gestation age among low-risk singleton pregnant women 15 weeks to 36 weeks***

In this study placental thickness (mm) gradually increased from (17.95±1.1) mm at 15 weeks to (37.5±1.69) mm at 36 weeks. It was noted that average/mean placental thickness (PT) is higher than GA by 1-3 mm from 15 to 31 weeks and almost matched with gestation age at 32 to 36 weeks. This is similar to the findings of Azagidi *et al*., (2020) in Nigeria who reported that placental thickness (PT) was higher than GA by 1-5 mm up to 30weeks almost matched gestational age (GA) for 31 to 35 weeks. Mital *et al*., (2002) also reported that placental thickness (PT) was slightly higher than GA by 1-4mm from 10 to 21 weeks, but almost matched the GA from 22 to 35 weeks. The degrees of the difference between placental thickness and gestation is due to the fact that placental growth is rapid in the second trimester than third trimester (Azagidi *et al*., 2020).

The findings of this study were different from the findings of Ghosh *et al.*, (2019) who conducted a similar study in India involving 100 pregnant women and observed that the placental thickness(mm) almost matched GA (in weeks) from 11 to 36 weeks. This is due to demographic variation of the study population such as variations in food habits and body habitus (Ranjan S and S., 2021). Also most likely because the present study had a relatively large proportional of multipara women since it has been demonstrated by Roland *et al*., (2014) that high parity is associated with relatively high placental thickness.

Furthermore, in this study the mean PT at 15 weeks to 36 weeks was (28.47±5.43) mm while the mean PT at 15 and 36 weeks was (17.9±1.10) mm and (37.50±1.69) mm respectively. These findings are almost similar to the findings of previous studies. Karthikeyan *et al*., (2012) in India reported that the mean PT at 15 weeks to 36 weeks was (29.23 ±1.8) mm while the mean PT at 15 and 36 weeks was 18.28±0.77 mm and (37.60±2.04) mm respectively. Also, Agwuna *et al*., in Nigeria found similar findings where the mean PT at 15weeks to 36 weeks was (27.33 ±3.1) mm while the mean PT at 15 and 36weeks was (18.2±2.9) mm and (38.3±4.2) mm respectively (Agwuna *et al*., 2016). The similarity is due to similar population demographics in terms of food and body habitus between this study and their study.

However, slight lower values compared to the present study were reported by some studies in both Nigeria, India and Pakistani. Jinadu *et al.*, (2021) studied 400 pregnant women in Nigeria from 13 to 37 weeks of GA, the mean PT at 15weeks to 36 weeks was (26.3 ±1.4) mm while the mean PT at 15 and 36 weeks was (16.33±2.03) mm and (35.34±1.73) mm respectively. These finding are slight lower than the present study. Similarly in the study of 100 pregnant women from 14 to 40weeks of gestation by Savitri *et al.*, (2019) at king George hospital, Visakhapatnam, India. The mean PT at 15weeks to 36weeks was (26.4 ±1.0) mm while the mean PT at 15 and 36weeks was (15.5±0.35) mm and (35.8±0.15) mm respectively. On top of that; in the study of 2000 participants from 12$^{th}$ to 40$^{th}$ weeks of GA in Multan Changi Lahore, Pakistani by Ahmad *et al*., (2021), it was reported that the mean PT at 15weeks to 36weeks was (26.35 ±2.75) mm while the mean PT at 15 and 36weeks was (16.9±3.98) mm and (35.65±3.19) mm respectively. This is also lower than our findings. The reason for lower values is likely due to interobserver variability and demographic differences.

Studies by Ohangwa *et al*., and Adeyekun *et al*., in Nigeria showed higher values than the present study. According to the study conducted by Ohangwa *et al*., on 730 pregnant women in Nigeria observed the mean PT at 15 weeks to 36weeks was (29.5 ± 2.8) mm while the mean PT at 15 and 36 weeks was (18.7±3.7) mm and (39.3±7.1) mm respectively (Ohagwu *et al*., 2009). This was slightly higher compared to our study. Similarly, Adeyekun *et al*., studied 420 pregnant women in Benin city, Nigeria and found that the mean PT at 15weeks to 36weeks was (33±4.0) mm while the mean PT at 15 and 36 weeks was (22.6±2.51) mm and (41±7.2) mm respectively (Adeyekun, 2012). The values are relatively high compared to our findings. This is likely due to the suggestion that; possibly they had consistently overestimated the measurements of placenta thickness in their study (Ohagwu *et al*., 2009). Another possible explanation would be involvement of many placentas with short insertion site (Hoddick *et al*., 1985).

Considering the above discussion, it can be concluded that there exist a minimum and maximum values of placental thickness in a given gestation. The ranges found in this study may be used as local refence ranges for normal placental thickness per give gestation age.

***Correlation between sonographic placental thickness and gestational age in low-risk singleton pregnancy women 15weeks to 36weeks***

This study found a progressive linear increase of placental thickness (PT) with advancing gestational age (GA). Also, there is a strong positive correlation between placental thickness (PT) and gestation (GA) estimated by first day last normal menstrual period (LNMP) as indicated by high Pearsons's correlation coefficient ($r = 0.96$, $p < 0.001$) This finding is congruent the findings of previous studies.

The study conducted by Azagidi *et al*., (2020) on 400 Nigerian women, they observed a linear relationship between placental thickness (PT) and gestation age(GA) with a statistically significant positive correlation (Pearson's coefficient of 0.943) inferring to use placental thickness as a marker for predicting gestational age.

In the study of 211 pregnant women between 11 to 40 weeks in India , Karthikeyan *et al*., (2012) found linear relationship between placental thickness (PT) and gestation age with as strong, significant, correlation between them (the correlation coefficient was 0.968), they concluded that PT can be used to estimated gestation age. On top of that they observed that subnormal placental thickness at a corresponding gestational age should rise the suspicion of underlying abnormalities

According to the study by Patil PG (2020) on 242 normal pregnant women in Karnataka India, placental thickness showed a linear progression in relation to the menstrual age similar to our study. They also demonstrated a strong, significant, positive correlation between placental thickness and gestational age (r=0.86) which is lower than what we found in our study.

In a review of 34 studies relating placental thickness at cord insertion and gestational age it was found that, all studies showed a linear positive correlation between placental thickness and gestation. The correlation coefficient (r) ranged from 0.632 to 0.997 and only one study showed a very small correlation coefficient $r = 0.09$ which was attributed to low sample size (Ranjan S and S., 2021). Considering the findings of our study and the literature cited it can be concluded that placental thickness (PT) has significant positive correlation with gestational age. This correlation can be used to reliably estimate gestational age.

***Correlation between placental thickness (mm) and GA (weeks) derived from commonly used biometric parameters (abdominal circumference (AC), femur length (FL), biparietal diameter (BPD, and head circumference (HC).***

In this study placental thickness (PT) was correlated with gestational ages (weeks) of individual growth parameters using Pearson's correlation analysis. There was a statistically significant strong positive correlation between placental thickness (PT) and growth parameters (BPD, HC, AC and FL) in the entire studied gestational ages (15 to 36weeks). This means that the four parameters increase simultaneous increase with increasing placental thickness. However, PT demonstrated the highest correlations with AC and FL ($r = 0.956$, $p < 0.001$) and the lowest correlation with BPD ($r = 0.949$, $p < 0.001$). This is explained by the fact that the fetal head is very malleable and is subject to molding depending on the stage of pregnancy and position of the fetal head.

In the study of 400pregnant women between 11 weeks to 40weeks by Azagidi *et al*., (2020) in Nigeria, similar findings were observed. There was a strong positive correlation between PT and all fetal growth parameters [BPD (r =0.953), HC ($r$ =0.956), AC ($r$ =0.958), FL ($r$ =0.958)] with the highest being PT versus FL and AC and lowest correlation with BPD.

According to Karthikeyan *et al*., (2012) in India, they reported strong positive correlation between PT and all fetal growth parameters [BPD($r$ = 0.914), HC($r$ = 0.926), AC($r$ = 0.946), FL($r$ = 0.935)] with the highest being PT versus AC followed by FL and lowest correlation with BPD which coincides to the results of the our study.

However, different findings were observed by Salah and Mehta (2020) in India, in their study of 403 pregnant women between 14 weeks to 40weeks, there was a strong positive correlation between PT versus [BPD($r$ = 0.945) and HC($r$ = 0.942) which is similar to the current study, moderate correlation with AC($r$ = 0.771) and FL($r$ =0.531)] which are lower than the current study. These findings are different from the findings of the present study and other studies in the literature. Probably the deference is due to interobserver variation in recording the fetal biometry. Another possible explanation is differences in maternal nutrition habits, that in their study population especially low dairy intake during pregnancy (Chang *et al.*, 2003)

**Strength of the study**

1. It's the first study to correlate placental thickness and gestation age in Uganda and East Africa and one of the few similar studied done in sub-Saharan Africa.

**Limitations of the study**

1. This was a single center study and therefore generalization of results is difficult.
2. Our study trusted first day of last normal menstrual from the clients which has no control for comparison to ascertain its certainty, possible minor variations might have been present despite carefully screening which was done.

## CONCLUSION

1. In this study sonographic placental thickness increased gradually as gestation age increased from 15 weeks to 36weeks. The average placental thickness was (28.47±5.43).
2. There was a liner relationship between Sonographic placental thickness and gestational age with a high coefficient of determination (R=92.2%).
3. There was strong, significant correlation between sonographic placental thickness and all growth parameters including abdominal circumference, head circumference, biparietal diameter and femur length

## RECOMMENDATIONS

1. Measurement of placental thickness (PT) should be incorporated in routine antenatal ultrasound examination and it can be used as a reliable parameter for estimating gestation age
2. A multicenter study involving large sample size needs to be done with serial (multiple occasion) measurement of placenta thickness at different gestational ages.

**ABREVIATIONS**

AC: Abdominal circumference
BPD: Biparietal diameter
BMI: Body mass index
EFW: Estimated fetal weight
FL: Femur length
GA: Gestation Age
HC: Head circumference
HIV: Human Immunodeficiency Virus
HMIS: Health Management Information system
Kg: Kilogram
LNMP: first day of the last normal menstrual period
MHZ: Mega Hertz
MRRH: Mbarara Regional Referral Hospital
OBGY: Obstetrics and Gynecology
PT: Placental thickness
SFH: Symphysial fundal height

## AKNOWLEDGEMENT

This dissertation would not have been possible without the guidance and support from my supervisors; Dr. Mworozi KENNETH and Dr. Mugisha Julius SEBIKALI. I appreciate for their time to help me complete this work appropriately. Special thanks to Dr. Moses Acan for his support during early proposal development. My sincere gratitude to my fellow residents as well as other staff members in the department of radiology, MRRH for the cooperation they have given to me during my studies. Thanks to Dr. Daniel ATWINE, Mr. David AYEBARE, Ms. Atuyambe SYLVIA, Mrs. Bakanya ALISON and Mr. Jonas AGABA for the assistance they provided during data collection, entry, analysis and management.

**Funding:** Self-sponsored

**Conflict of Interest:** No conflict of interest related to this submission.

## REFERENCES

- Adeyekun, A. (2012). Ultrasound assessment of placental thickness and its correlation with gestational age in normal pregnancy: A preliminary report. *Sahel Medical Journal*, 15**,** 10.
- Agwuna, K., Eze, C., Ukoha, P., & Umeh, U. (2016). Relationship between sonographic placental thickness and gestational age in normal singleton fetuses in Enugu, Southeast Nigeria. *Annals of medical and health sciences research*, 6**,** 335-340.
- Ahmad, M., Anjum, M., Asif, M., Ayub, S., Muzaffar, A., & Mubeen, I. (2021). Placental thickness and its correlation to gestational age estimated by foetal growth parameters-a cross sectional ultrasonographic study. *Biological and Clinical Sciences Research Journal*, 2021.
- Azagidi, A. S., Ibitoye, B. O., Makinde, O. N., Idowu, B. M., & Aderibigbe, A. S. (2020). Fetal gestational age determination using ultrasound placental thickness. *Journal of medical ultrasound*, 28**,** 17.
- Butt, K., Lim, K., Bly, S., Cargill, Y., Davies, G., Denis, N., Hazlitt, G., Morin, L., Ouellet, A., & Salem, S. (2014). Determination of gestational age by ultrasound. *Journal of Obstetrics and Gynaecology Canada*, 36**,** 171-181.
- Chang, S. C., O'brien, K. O., Nathanson, M. S., Caulfield, L. E., Mancini, J., & Witter, F. R. (2003). Fetal femur length is influenced by maternal dairy intake in pregnant African American adolescents. *The American journal of clinical nutrition*, 77**,** 1248-1254.
- Dashottar, S. (2017). A correlative study to evaluate the gestational age by sonological measurement of placental thickness in normal second and third trimester pregnancy Sujit Pant1, Sunita Dashottar2. *International Journal of Advances in Medicine*, 4**,** 1638.
- Ghosh, S. K., Mandal, S. K., & Nath Sarkar, M. (2019). Evaluation Of Placental Thickness As A Sonological Indicator For Estimation Of Gestational Age and Fetal Outcome in Normal Singleton Pregnancy.
- Hoddick, W., Mahony, B., Callen, P., & Filly, R. (1985). Placental thickness. *Journal of ultrasound in medicine*, 4**,** 479-482.
- Jinadu, F. O., Nelson-Paseda, A. O., Ottun, T. A., & Olumodeji, A. M. (2021). Placenta thickness: A sonographic index for foetal gestational age estimation. *Indian Journal of Obstetrics and Gynecology Research***,** 217-222.
- Karthikeyan, T., Subramaniam, R. K., Johnson, W., & Prabhu, K. (2012). Placental thickness & its correlation to gestational age & foetal growth parameters-a cross sectional ultrasonographic study. *Journal of clinical and diagnostic research: JCDR*, 6**,** 1732.
- Lee, A. J., Bethune, M., & Hiscock, R. J. (2012). Placental thickness in the second trimester: a pilot study to determine the normal range. *Journal of Ultrasound in Medicine*, 31**,** 213-218.
- Mital, P., Hooja, N., & Mehndiratta, K. (2002). Placental thickness-A sonographic parameter for estimating gestational age of the fetus. *Indian journal of Radiology and Imaging*, 12**,** 553-554.

- Nardozza, L. M. M., Júnior, E. A., Rizzo, G., & Deter, R. L. (2019). *Fetal growth restriction: current evidence and clinical practice*, Springer.
- Ohagwu, C. C., Abu, P. O., & Udoh, B. E. (2009). Placental thickness: A sonographic indicator of gestational age in normal singleton pregnancies in Nigerian women. *Internet Journal of Medical Update-EJOURNAL*, 4.
- Patil, N. K., & Saheb, S. H. (2020). A Sonographic Study on Estimating of Gestational Age by Placental Thickness. *Asian Journal of Medical Radiological Research*, 8**,** 110-113.
- Penny, S. M. 2018. *Examination Review for Ultrasound: Abdomen & Obstetrics and Gynecology*, Wolters Kluwer Health.
- Ranjan, S., Balaganesan, H., Shankar, S., & Venkataraman, S. (2021). Sonographic Placental Thickness as a Determinant of Fetal Gestational Age: A Review. *SBV Journal of Basic, Clinical and Applied Health Science*, *4*(3), 66-68.
- Revs, I. J. M. R. (2015). Estimation of gestational age by ultrasonographic measurement of placental thickness. *Int J Modn Res Revs*, 3**,** 889-891.
- Roland, M. C. P., Friis, C. M., Godang, K., Bollerslev, J., Haugen, G., & Henriksen, T. (2014). Maternal factors associated with fetal growth and birthweight are independent determinants of placental weight and exhibit differential effects by fetal sex. *PloS one*, 9**,** e87303.
- Rudder, M. (2019). Use of Ultrasound to Determine Gestational Age in Low and Middle Income Countries: A Systematic Review of the Literature.
- Salah, H. M., & Mehta, J. L. (2020). Takotsubo cardiomyopathy and COVID-19 infection. *European Heart Journal-Cardiovascular Imaging*.
- Savitri, T., Shravya, E. C., Ashalatha, P., & Anusha, T. (2019). Sonological Evaluation of gestational Age by Placental Thickness.
- Weinstein, J. R., Thompson, L. M., Artiga, A. D., Bryan, J. P., Arriaga, W. E., Omer, S. B. & Mccracken, J. P. (2018). Determining gestational age and preterm birth in rural Guatemala: A comparison of methods. *PloS one*, 13.


**Cite This Article:** Malunde Fredrick, Mugisha J. Sebikali, Mworozi Kenneth (2024). Sonographic Placental Thickness and Its Correlation with Gestational Age among Low-Risk Singleton Pregnant Women at 15 To 36 Weeks Attending Mbarara Regional Referral Hospital. *EAS J Radiol Imaging Technol*, *6*(4), 63-71.