Influence of Parity on Placenta Thickness and Diameter Among Pregnant Women in Usman Danfodio Teaching Hospital Sokoto

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Abstract

The management of pregnancy requires knowledge of the gestational age. It is usually estimated by ultrasound using parameters like femur length, bi-parietal diameter, and abdominal circumference. A healthy placenta is crucial for fetal well-being, growth, development and neonatal survival. Fetal Sonographic biometric parameters are crucial in obstetric decision making, the placenta's weight is important in detecting functioning after birth, as placenta's gross examination could shed light on the new-born's weight and any pregnancy-related complication fetus .The purpose of the study determine The Influence of Parity on Placenta Thickness and Diameter Among Pregnant Women in Usmanu Danfodiyo University Teaching Hospital Sokoto. A cross-sectional study design was conducted among 72 pregnant women who were between 24 to 40 weeks of gestational age and came for an ultrasound in the Radiology department at Usmanu Danfodiyo University Teaching Hospital, Sokoto. Data were collected using proforma. Data was processed using IBM® SPSS version 25 and analysed using descriptive and inferential statistics. The finding of the results reveals majority of the respondents were in the age group 25-29 years. The majority of the mothers were multigravida 60(83.3%) and about 84% of the respondent was multipara. The mean placental diameter and thickness were 14.10 ± 1.4cm and 4.58 ± 4.2cm respectively. The placental thickness and diameter all rise linearly with increased gestational age (r = 0.422, P<0.001, r=0.24, p=0.044, respectively. Placental thickness and diameter are positively correlated with parity and gestational age. (r=0.24, p=0.044 and r=0.24, p=0.040, respectively).it is recommended Placenta thickness and diameter is an index. it is recommended to incorporated measurement of placenta thickness and diameter as a routine into conventional fetal biometric for fetal age estimation and weight during antenatal ultrasound.

Key words: *Placenta diameter, thickness and Gestational age, pregnant women and ultrasound*

Introduction

The placenta, which joins the developing embryo to the uterine endometrium, is a flat, roundish organ with spongy tissue (Azaggidi, et al., 2019). The placenta develops from the chorionic villi at the implantation site at about the 5th week of gestation and by the 9th or 10th weeks of the diffuse granular, echotexture of the placenta is clearly apparent at sonography It is usually 2-4 cm thick and weighs about 600 grams. It is technically defined as the apposition or fusion of fetal organs to maternal tissue for the purpose of physiologic exchange the placenta thickness appears to be promising parameter for estimation of gestation of intra uterine fetus age. This is due to increase in placental thickness with gestational age several studies have reported an increase the placenta.

Between the fetus and the maternal blood flow, the placenta serves as a lifeline. It permits the fetus to breathe and eat during the entire pregnancy which is optimal for fetal survival. The placenta absorbs oxygen, nutrition, and immunological chemicals moving through your body as your own blood passes through your uterus. These are transported through the umbilical cord, the amniotic sac, and your baby's blood vessels. Similar to this, your baby uses the placenta to transfer waste products like carbon dioxide back to you (Muraliswar, 2019). The average thickness of a normal placenta ranges from 2 to 4 cm, about 20 cm in diameter. A typical placenta weighs about500g.

Placental volume may predict birth weight and outcome of pregnancy. The size of the placenta can be determined by two-dimensional solography and volumetric mathematic modelling and placental volume could be calculated at each ultrasound scan.

The usual term placenta is about 22 cm in diameter and 2.0 to 2.5 cm thick. It generally weighs approximately 470 g however the measurements can vary considerably. However, the size and shape of the placenta are affected by environmental exposures the mother faces during pregnancy. Access to quality foods and a well-balanced diet, exposure to toxic stress and certain environmental chemicals all play a role in the development of the placenta.

Estimated Placental Volume (EPV) is a simple measurement that can be done via ultrasound while a baby is in utero to estimate the size of a placenta. It requires 3 measurements (width, height, and thickness) that can be entered into a free app called Merwin's EPV Calculator to determine the volume (cc) of a placenta.

Fertilization is a course of coordinated events involving sperm preparation, sperm-to-egg binding, and fusion and activation of the fertilized egg (Adeyekun, 2016). After ovulation, the oocyte is surrounded by the zona pellucida and the corona radiata. The sperm penetrates both layers causing a calcium wave throughout the cytoplasm of the oocyte. Due to the calcium wave, a rapid activation of glucose-6-phosphate dehydrogenase (G6PDH) occurs and large quantities of the reduced co-enzyme NADPH are immediately produced. This is used as a substrate for a peroxidase enzyme, which instantly catalyzes the hardening of the zona pellucida, preventing polyspermy (WHO, 2016). After fertilization, a diploid embryo is formed, which is the beginning of the fetus and its placenta. While it undergoes cell divisions, the embryo is passively transported towards the uterus. Around day 5, the embryonic cells are freed from the zona pellucida and the blastocyst is formed, ready for implantation (WHO, 2019). At implantation, 7-12 days after ovulation, the blastocyst contains the blastocyst cavity, the inner cell mass or the embryoblast and the trophoblast at the periphery. The later

becomes the placenta.

A variety of methods are used to determine fetal age and, in some cases, to calculate or estimate the expected date of delivery (EDD), which is of paramount importance to mothers and caregivers. The most commonly used methods are ultrasonography and non-ultrasonography. In the past, menstrual history and physical examination were used to assess gestational age other than ultrasonography. Both are subject to significant errors that can occur due to date uncertainty and premature implantation bleeding that can be confused with menstruation.

Ultrasonography is the primary imaging technique used to evaluate the placenta throughout the antepartum phase. Due to villous proliferation and maternal blood coming into contact with the villus in the early stages of pregnancy, the typical placenta is homogeneous and somewhat hyper echoic in comparison to the myometrium. The placenta can occasionally have a discoid shape, be placed along the anterior or posterior uterine walls, and have homogeneous echogenicity with rounded borders. It measures between 20 to 40 mm thick and 150 to 250 mm in diameter (Daud, et al., 2017).

The placental thickness feature of ultrasonography can be used to assess the placenta. Placental weight is known to increase gradually with gestational age, reaching a maximum weight of 500g at term. Placental weight is known to increase slowly and linearly with gestational age. This gradual growth occurs at a rate of roughly one millimeter every week.

The placental thickness ± 10 mm equals the gestational age (in weeks). Usually, the placenta that is anteriorly placed is 0.7 cm thinner than the placenta that is posterior (Aggarwal, et al.,2020).

Placental thickness (PT) is a **global** morphological parameter in prenatal programming, and changes in PT have been observed in association with many abnormal conditions. For **example, decreased** PT **is seen** in fetal growth restriction and systemic vascular **disease,** and increased PT **is seen** in preeclampsia, gestational diabetes mellitus (GDM), maternal anemia, **hydrops fetalis,** and **prenatal infections** Previous studies **have suggested an increase in PT. Abnormal** PT may be a warning sign of prenatal complications (Aggarwal, et al.,2020).

According to Sharami, et al., (2022), the association between placenta diameter and gestational age enables obstetricians to put policies in place that will improve the fetal outcome. The gestational age has an impact on the interventional modality that is employed when an abnormality is discovered. Almost all crucial clinical choices, like as caesarean sections and elective labour inductions, depend on knowing the gestational age. The gestational age is roughly 280 days and is determined by counting backwards from the first day of the last menstrual cycle. As a result, the dating of the pregnancy begins even before conception. A frequent clinical issue is figuring out the gestational age. By taking measurements of the fetal dimensions, such as the biparietal diameter (BPD), abdominal circumference (AC), head circumference (HC), and femur length (FL), ultrasonography (USG) is frequently used to determine the gestational age (Azagidi, et al., 2019).

As stated by Muraliswar (2019), who used ultrasonography to correlate placental thickness with gestational age and fetal weight, the relationship between placenta thickness and gestational age cannot be overlooked. The results show that the placenta is primarily a fetal organ. The fetus's size and health are impacted by thickness. The gestational age of the fetus can be determined by total placental volume, which is likely the most reliable estimate of placental thickness and provides a clear picture of the fetus to ensure that the right measurements are taken during the delivery process.

In a study carried out by Junaidu, et al., (2021) in similar study they found a progressive

linear increase of the placenta thickness with advancing ultrasonographic estimated gestational age, with a very strong Pearson's correlation coefficient of r = 0.968; p = 0.000. The correlation coefficient in second trimester was r = 0.921 while it was 0.871 in the third trimester. This shows that PT correlated more with GA in the second trimester than the third trimester

Relationship between Placental Thickness and Gestational age**.** To identify thick placentas, Daud, et al., (2017) cut out a representative portion that was at least 4 cm thick and perpendicular to the chorionic plate. At 36 weeks of gestation Kallepally (2019) found a statistically significant correlation between placental thickness, gestational age, and estimated fetal weight change of p=0.001 in a cross-sectional prospective study they carried out from October 2021 to July 2022 at the National Medical College and Teaching Hospital, Birgunj, Nepal. Estimated foetal weight and gestational age had a very significant correlation (r=0.873), and placental thickness and gestational age had a very good correlation (r=0.974). Placental thicknesses change along with changes in fetal weight and gestational age.

In a related study by Muraliswar,et al., (2019), it was determined that placental thickness was correlated with the mother's age, parity, and estimated fetal weight. The study found that there was no statistically significant relationship between the mother's age and placental thickness ($p > 0.05$), but that there was a relationship between the mean placental thickness and the estimated fetal weight ($p > 0.001$).

Njeze (2020) in a related study enrolled 400 healthy third trimester participants who met inclusion criteria and found that PD and PT were not correlated with equivalence in this study. Gestational age, placental thickness, and diameter all increase linearly with time. From the 38th to 40th week of gestation, this increase is even more intense. 205.01.4, 43.000.0 through 215.01.4, 46.002.8. In summary, placental diameter and thickness can be used to determine gestational age. Therefore, he recommends using PT and PD for ultrasound-based obstetric evaluation, especially when the last menstrual period (LMP) is obscure.

Statement of the Problem

The prenatal placental assessment offers an issue in Sokoto state in particular since it is quite limited in establishing gestational age. Major health issues in Africa, notably in Nigeria and the North, have been linked to maternal and neonatal mortality. Because it is typically discarded and cannot be used to determine birth weight, the placenta has also received less investigation. This was also observed in Ethiopia (Tiruneh, 2018). Unfortunately, sonologists rarely include placental thickness and diameter in their usual assessments of pregnancy (Jinadu et al., 2021).

The research found that ultrasound evaluation of placental thickness and diameter is not typically performed as a routine check-up, which could be useful in determining the fetus' gestational age in a healthy singleton pregnancy. The conventional method of estimating gestational age (GA) is based on the last menstrual period (LMP), which is not typically known by pregnant women but can be seen on ultrasound. These measurements are important because placenta thickness changes are a sign of normal fetal growth and can be seen on ultrasound, which can be used to describe normal physiology. This is the rationale for the decision to conduct this research.

Study Justification

Although the fetus cannot undergo direct physical or clinical examination, it is a very fragile creature that requires careful monitoring and special care for its survival and optimal growth. Proper dates of pregnancy are critical to quality obstetric care, which in turn influences maternal and fetal morbidity and mortality. This study may help overcome some of the

limitations of commonly used fetal biometrics (BPD, FL, AC). In general, the accuracy of these predictors decreases as gestational age increases. The reliability of BPD is compromised by microcephaly or macrocephaly and fetal head depression. Femoral length shows racial and ethnic differences and is usually unreliable in skeletal dysplasia. On the other hand, malnutrition, anemia, and intrauterine infections affect AC accuracy. Using placental thickness measurements in combination with other fetal biometrics improves the accuracy of gestational age estimation. Since no single variable has an advantage in predictive accuracy, the accuracy of estimating fetal age using a composite variable is always better than using a single variable. These include parallel growth of the placenta in the second and third trimesters of pregnancy and its thickness (approximately equal to fetal GA in weeks), as reported by many authors, It can be used to determine the age of pregnancy or to cross-check for abnormal pregnancies. Variation in other fetal biometric data. This study is of value to humanity and is particularly important in this region where up to 45% of pregnant women do not know their last menstrual period date and may not book an appointment early enough to take advantage of the nearly accurate dates for CRL assessment. Estimation of foetal maturity is common in obstetric practice especially when the women do
not keep accurate menstrual records. An accurate establishment of expected date of delivery is fundamental to the management of both high risk and normal pregnancies enabling them in:

1. Provide evidence-based care to improve the quality of prenatal and maternal outcomes
2. Spread awareness about prenatal evaluation and care
3. As a recommendation for additional research

Purpose of the Study

Assess the influence of parity on placenta thickness and diameter among pregnant women in UDUTH Sokoto. Specifically, the study sort to;

1 Assess the influence of parity on placenta thickness and diameter among pregnant women in UDUTH Sokoto.
2 Find out the placental diameter among pregnant women in UDUTH Sokoto.
3 Idenfy the placental thickness among pregnant women in UDUTH Sokoto.

Research Questions

1. What is the influence of parity on placenta thickness and diameter among pregnant women in UDUTH Sokoto?
2. What is the placental diameter among pregnant women in UDUTH Sokoto
3. What is the placental thickness and gestational age among pregnant women in UDUTH Sokoto?

Hypotheses

H_o1: There is no significant relationship between the placental diameters among pregnant women in UDUTH Sokoto.

H_o2: There are no significant differences between the placenta thickness and gestational age pregnant women in UDUTH Sokoto.

Significance of the Study

The placenta's high vascularity ensures that the mother and fetus can interact successfully. A successful pregnancy depends on a healthy, normal placenta, which is known to encourage

fetal growth. Fetal growth is hampered when the placenta is not working properly.
The study will improve our comprehension of placental thickness and diameter abnormalities, which are used as diagnostic indicators in a number of pathologic illnesses. The nation's high rates of maternal and neonatal morbidity and mortality will be reduced as a result, which will help with the care of expectant women.
The measurement of placental thickness and diameter in conjunction with gestational age will be the main focus of this study because it helps to distinguish between normal and abnormal pregnancies, forecasts neonatal outcomes, and may also be used to help pregnant women. When regular fetal biometry cannot be utilized to establish fetal gestational age and weight, the study will improve the management team's understanding of how to evaluate placental thickness and diameter as an alternate metric.

Methods

The study's design used was observational cross-sectional study that examines pregnant women between the gestational age of 24-40 weeks gestation by used of ultrasonography the correlation between placenta diameter and thickness with gestational age in UDUTH Sokoto north east, Nigeria.
This investigation was carried out in the Sokoto metropolis's Usmanu Danfodiyo University Teaching Hospital (UDUTH). The Sokoto (Kebbi) River runs along Sokoto State's border, slightly east of the latter river's confluence with the Rima River. Sokoto State is situated in the Northwest area. The town has a total area of 25,973 km2 and is administratively divided into 23 Local governments. It is located about 80 km (50 miles) south of the Niger border on a traditional caravan route that crosses Nigeria's Sahara in the direction of the north. The 2006 Census indicates that there are approximately 3.7 million people living there (https://www.britannica.com) The Usmanu Danfodiyo University Teaching Hospital (UDUTH) in Sokoto served as the study's location. It is situated in Wamakko Local Government region of Sokoto State along Garba Nadama road off Gawon Nama. The hospital is a tertiary medical center that acts as a referral hub for primary and secondary healthcare facilities in the states of Sokoto, Kebbi, Zamfara, and the neighbouring Niger Republic. Usmanu Danfodiyo University Teaching Hospital Sokoto (UDUTH) is the new name for the hospital, which was first opened in 1989 under the name Sokoto University Teaching Hospital. The hospital has a number of departments, including the Radiology department, which does mammography, ultrasound, X-rays, and other imaging tests.
The target population consists of expectant mothers between the ages of 18 to 39 years who came in for ultrasounds in the radiology department after being referred by the ANC at Usmanu Danfodiyo University Teaching Hospital (UDUTH) Sokoto. Every month, on average, 525 pregnant women visit for ultrasounds. From November 1st, 2022, through January 31st, 2023, data was gathered.

The minimum sample size (n) is given by: $\boldsymbol{n} = \frac{\boldsymbol{Z_{1-\propto/2}2\sigma2}}{\boldsymbol{d2}}$

$\mathbf{Z_{1-\alpha/2}}$ = percentage point of the normal distribution corresponding to the required (two-sided) significance level (α) of 0.05 = 1.96
σ = standard deviation of the variable from a previous study = 8.19mm
d = minimum difference (in placental thickness) considered to be
Significant = 2mm
Substituting these values into the equation above now gives:

$$\mathbf{n} = \frac{(1.96)^2 \times (8.19)^2}{(2)^2}$$

n = **65**

In practice, if a response rate of 90% is anticipated, the final sample size to be
Elected (n_s) to correct for non-response = 65/0.9 = **72.**
The type of data gathered was primary data, which involved pregnant women who are scheduled for ultrasound examination and who are between the ages of 18 and 39 years and have the gestational age between 24 weeks to 40 weeks gestation. The placenta's thickness and diameter were measured, along with the gestational age, by the radiographer and the researcher. After getting the client's permission by consent form mobile ultrasound equipment equipped with a SONOSITE M-Turbo (manufactured in the USA) was utilized to scan 72 pregnant women who had been referred for a routine obstetric scan and who met the inclusion criteria. 3.5 to 5 MHz for the curve-shaped probe.Coupling gel was placed to the abdomen after it had been exposed on the participants, who were lying supine on the examination sofa.
Data was collected using a portable ultrasound device made in the USA, the SONOSITE M-Turbo. Coupling gel was placed to the abdomen after it had been exposed using a curvilinear probe at a frequency of 3.5 to 5 mHz while the participant was supine on the examination sofa. Placental size and diameter were measured, with data being entered into a data sheet. The placenta's upper and lower limits were measured parallel to the length of the chorionic surface. The placenta was measured using a split-screen technique, in which one half of the screen was used to measure from the midline to the lower limit of the screen, and the other half was used to measure from the midline to the top limit of the screen At the point where the umbilical cord is inserted, the placental thickness was measured perpendicularly from the feto-placental surface to the placenta-endometrial surface. The 24-–40 weeks' gestational age mark of a normal, viable singleton pregnancy was the inclusion criterion. The same rules applied to uterine masses, moms with diabetes mellitus or sickle cell illness, and women who were unsure of their dates. A millimeter (mm) measurement of placental thickness was obtained by measuring the placenta at three different locations: the cord insertion site, the middle region, and its largest width. Other fetal traits like CRL, BPD, AC, HC, and FL were collected in order to determine the fetus' gestational age and weight. Additionally, the age and height of each participant was recorded. Average and composite measurements of placental thickness were made under the supervision of the radiologist in the department at UDUTH Sokoto.
The inclusion criteria used was pregnant women who are scheduled for ultrasound examination and who are between the ages of 18 and 39 years and have the gestational age between 24 weeks to 40 weeks gestation was used for this study.
The exclusion criteria were pregnant women with the following Maternal health condition
Gestational Diabetes, Hypertension (Systemic hypertension and Pregnancy induced hypertension)-,Anaemia-,Last menstrual period not known or irregular menstrual periods
Placenta previa, placental anomalies and poor visualization of the placenta Multiple pregnancies and fetus with congenital anomaly The placenta from multiple live births and of the unknown gestational age was excluded from the study.
Because both inclusion and exclusion criteria was employed for the pregnant women, the validity of the instrument was objective.
In order to establish the accuracy of the data, the researcher made sure that each ultrasound measurement of the placenta's thickness and diameter in relation to gestational age was performed under the guidance of a radiologist and that it was done more than once in the same setting. All of the data was also validated by making sure that it came from the proper source and served the intended purpose.

The data analysis was done using IBM's statistical package for social sciences (SPSS), version 25. The analysis of the data revealed any missing values. Prior to beginning the data analysis, the data were edited and cleaned. Running frequencies and descriptive statistics for each variable was done as data editing. The mean and standard deviation were used to summarize a quantitative variable, whereas frequencies and percentages were used to summarize categorical data. The relationship between placental diameter and gestational age was discovered using a bivariate analysis and Pearson's correlation test additionally, the link between placental thickness and gestational age was evaluated using Pearson's correlation test. Tables and charts were used to present the findings. The level of significance (α) was set at $p<0.05$

The university, ACEPUTOR Uniport, granted ethical approval for the study. The subject was given a consent form outlining the study's goal and justification, which was absolutely secret and meant only for academic purposes. Due to the nature of the setting in which the data was acquired, consent form was translated into both English and Hausa.

Results and Discussions

The response rate and completeness of data for this research was 100% which was very good since there was no any participants that absconded in the research or withdrawn her consent.

Table 1: Socio demographic variables of the pregnant women

Variable	Frequency	Percentage
Age		
18-24	21	29.2
25-29	24	33.3
3034	16	22.2
35-39	11	15.3
Religion		
Islam	49	68.1
Christianity	23	31.9

Table 1: presents socio demographic variables of the pregnant women. Majority of the women are between the age range group 25-29 years with 33.3%. while 2 (2.8%) had only Quranic education.

Table 2: Obstetric history of the pregnant women

Variable	Frequency	Percentage
Gravidity		
Primigravida	12	16.7

Multigravida	60	83.3
Parity		
Para	12	16.7
Multipara	57	83.3

Table 2 gives the obstetric history of the pregnant women. Majority of the mothers were multigravida 60(83.3%).

Placental diameter among respondents

The mean placental diameter among pregnant women was 14.10 ± 1.4cm.

The placental thickness among respondents

The mean placental thickness among respondents was 4.58 ± 4.2cm.

Figure 1 below depicts Pearson correlation between placental diameter and gestational age (weeks) of respondents.

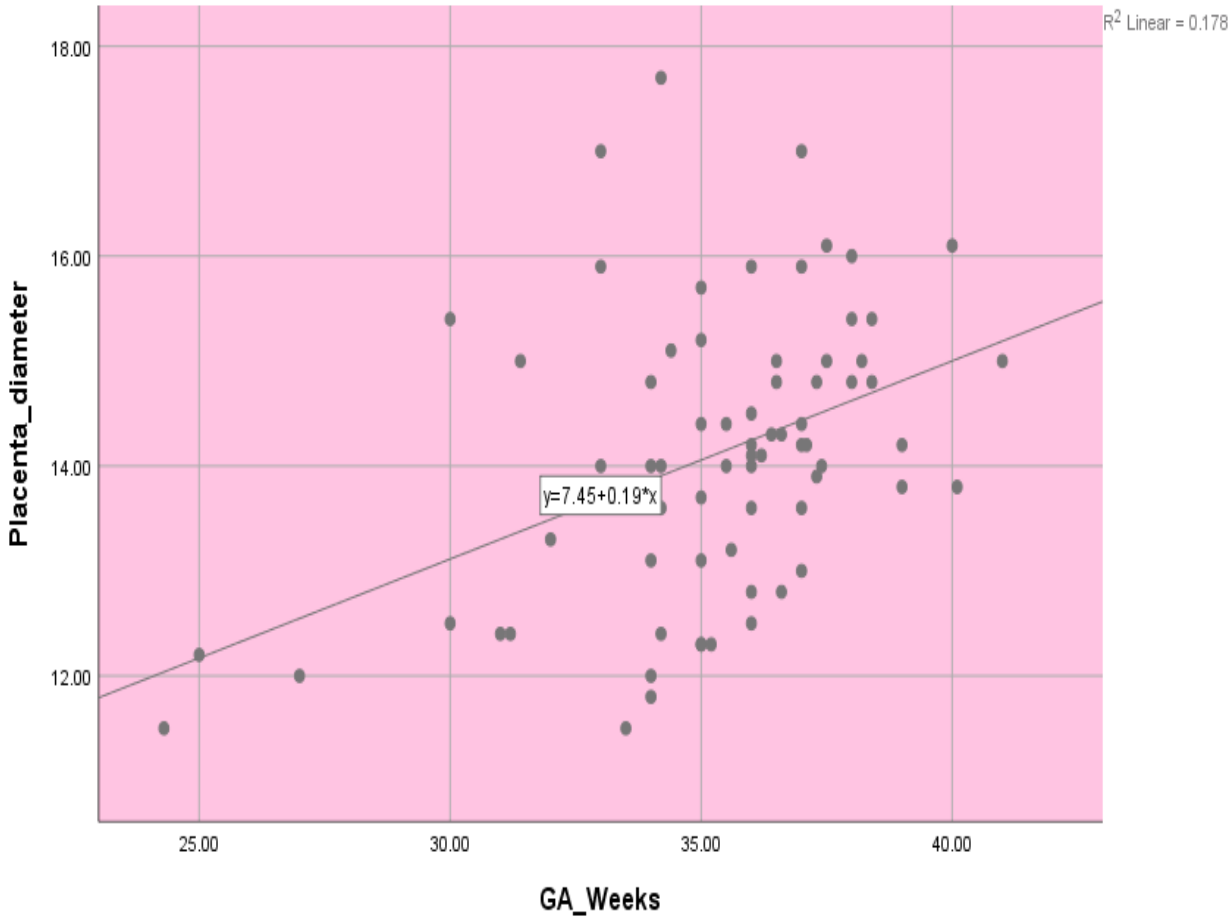

Figure 1: Correlation between placental diameter and gestational age among respondents

At *0.05* level of significance, there is significant relationship between placental diameter and gestational age (weeks) of respondents with *r=0.422, p<0.05*
Therefore, Pearson correlation analysis revealed that placental diameter was significantly and positively correlated with gestational age of respondents.
Relationship between placental thickness and gestational age among respondents
Figure 2 below shows a Pearson correlation between placental thickness and gestational age (weeks) of respondents.

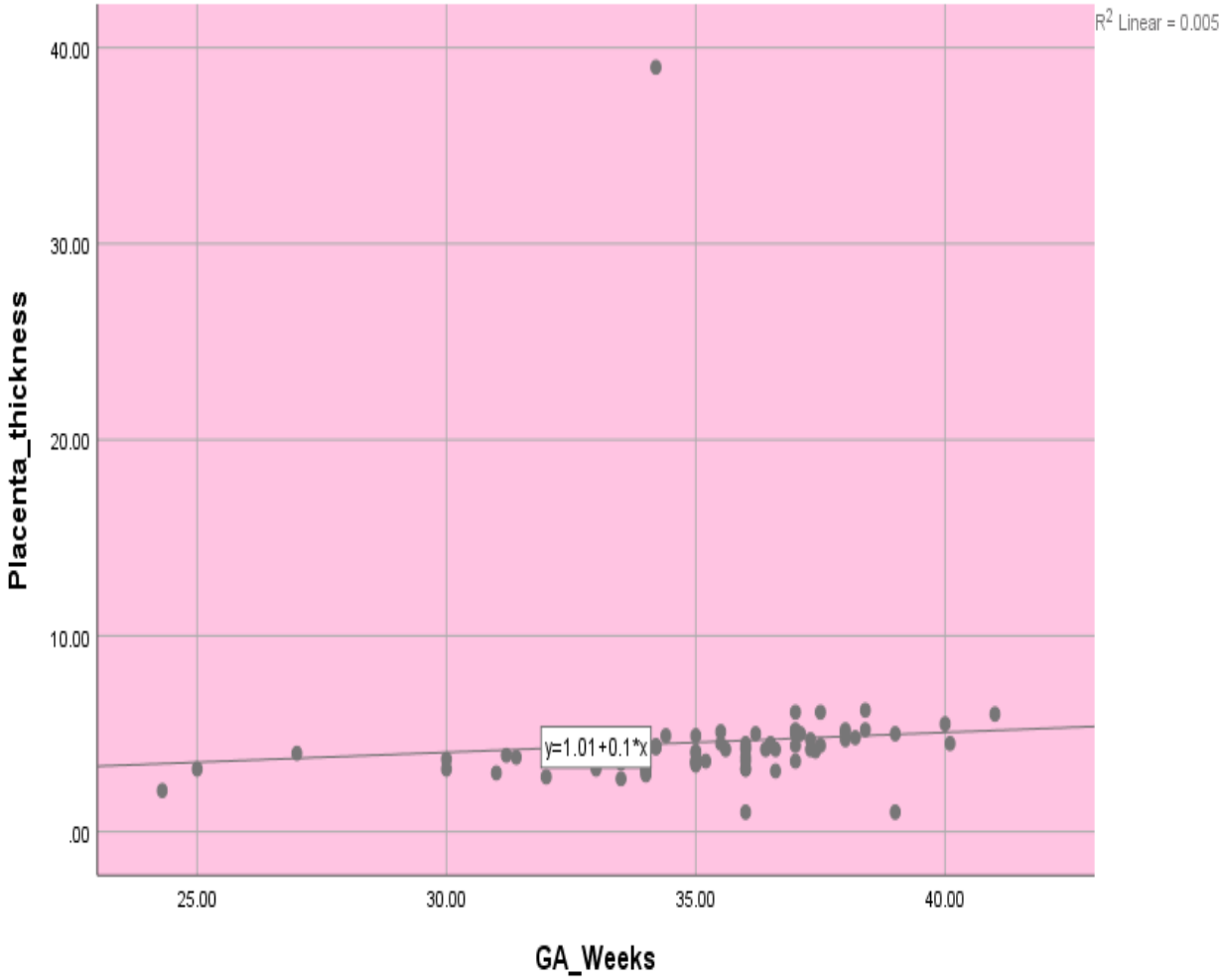

Figure 2: Correlation between placental thickness and gestational age among respondents
At *0.05* level of significance, there is weak significant relationship between placental thickness and gestational age (weeks) of respondents with *r=0.073, p>0.05*.
However, the Pearson correlation result above suggested that placental thickness and gestational age (weeks) of respondents was related but weak.
Relationship between parity and placental thickness among respondents
Figure 3 below is showing Pearson correlation between placental thickness and number of parities of respondents.

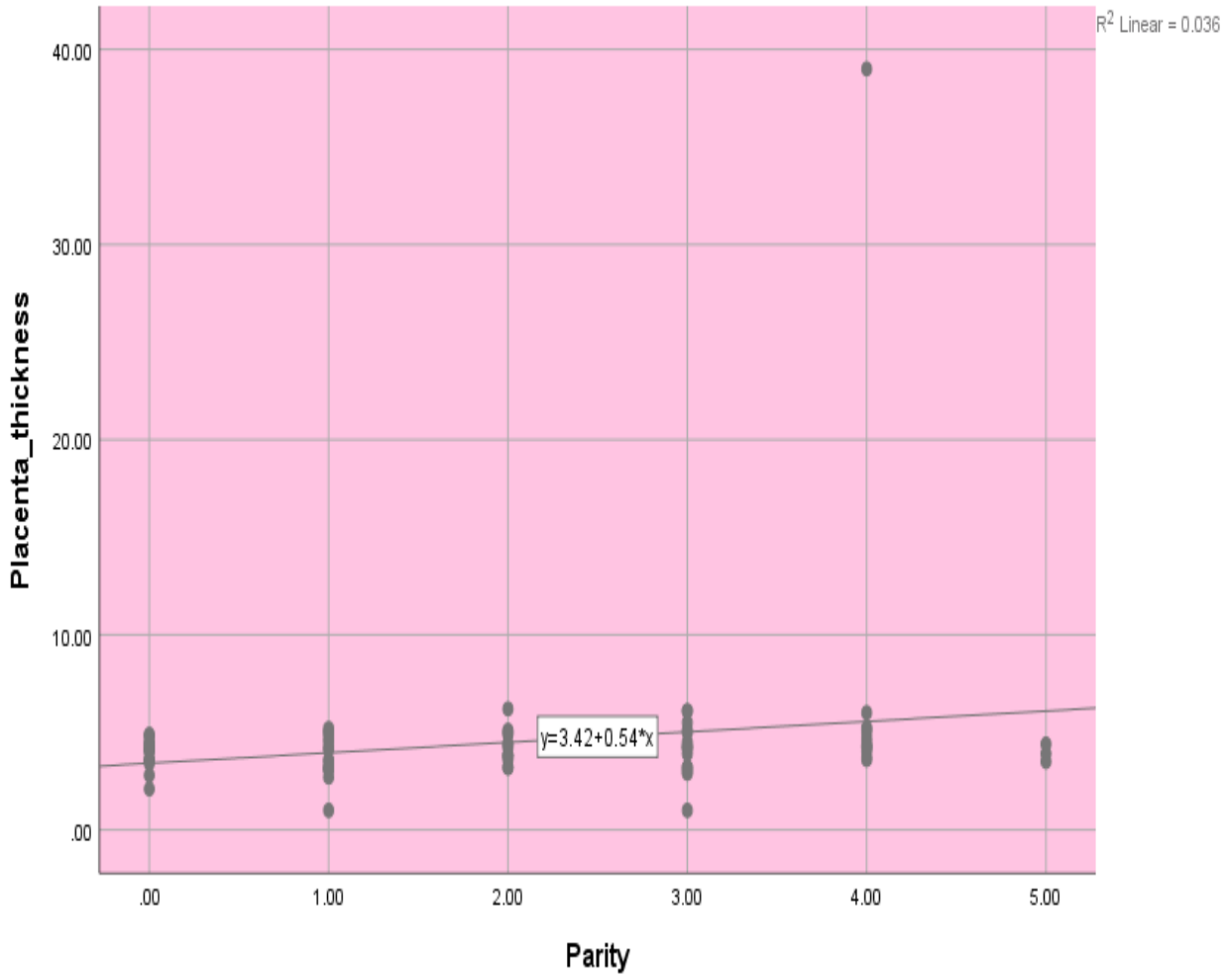

Figure 3: Correlation between parity and placental thickness among respondents

At *0.05* level of significance, there is significant relationship between placental thickness and number of parity of respondents with $r=0.24$, $p<0.05$.

Hence, the Pearson correlation analysis results indicated that placental thicknesses are related with number of parity of respondents.

Influence of parity on placenta diameter among pregnant women

Figure 4 below depicts influence of number of parity on placental diameter of pregnant women.

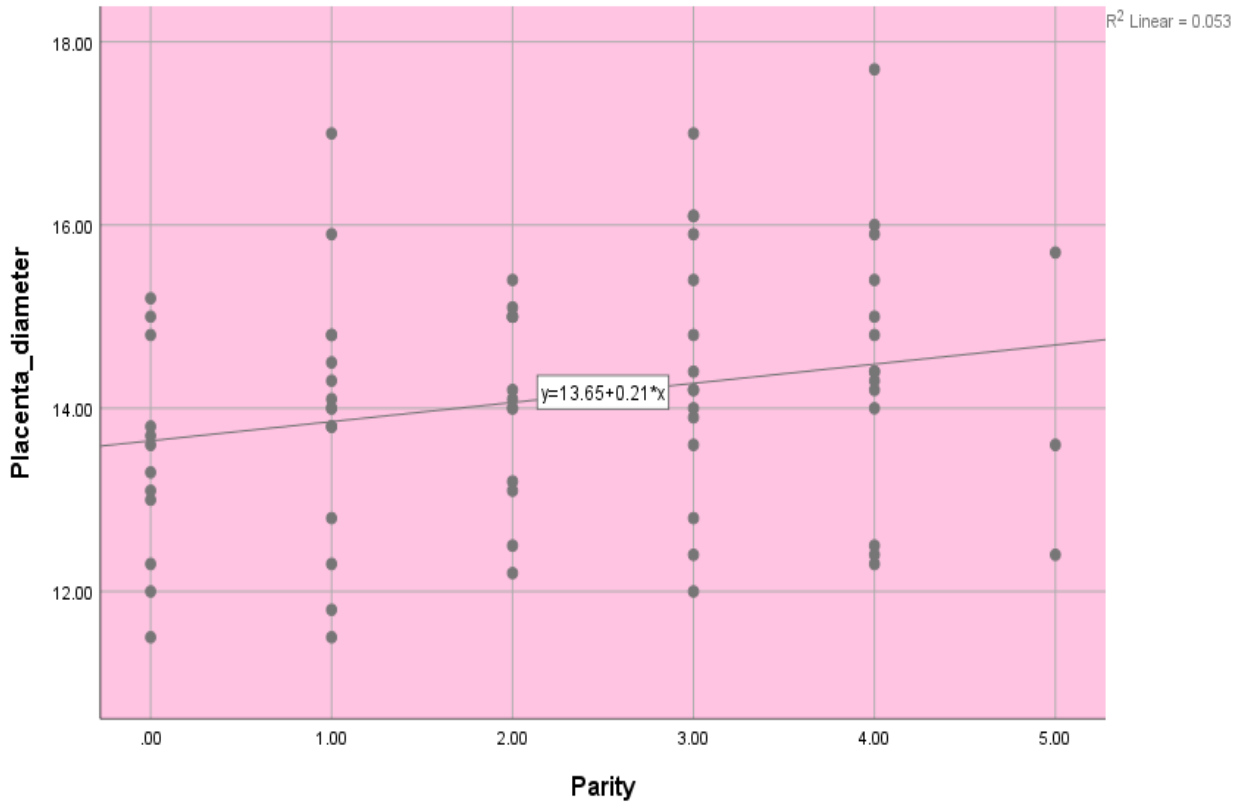

Figure 4: Correlation between parity and placental diameter among respondents

At *0.05* level of significance, there is significant and positive relationship between placental diameter and number of parity of respondents with $r=0.23$, $p<0.05$. Number of parities of pregnant women influences placental thickness to the extent of 0.21 (21%).

However, the result above implied that number of parities of pregnant women influenced placental thickness.

Figure 5 shows the parity status of pregnant women attended Antenatal Clinic (ANC) of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto.

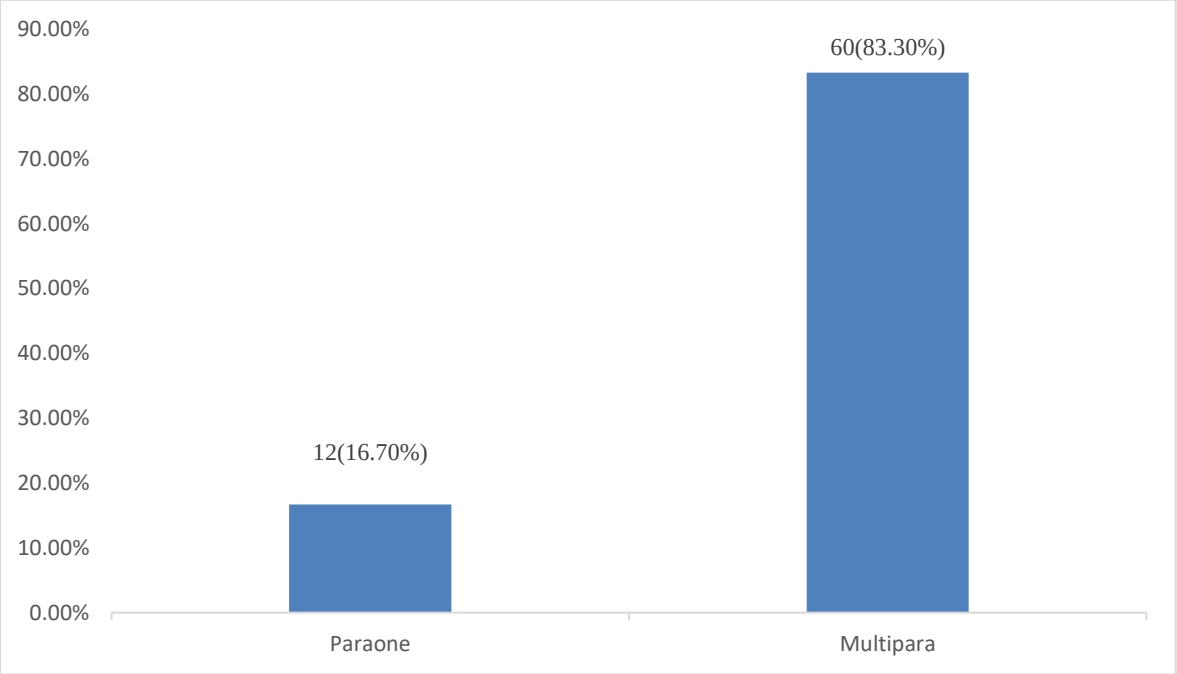

Figure 5: Parity status among the respondents
Findings shows that about 83.3% of the respondents are multipara and 16.7% are para one.

Study Findings
The Radiology Department scanned a total of 72 women with singleton pregnancies at 24 to 40 weeks who met the inclusion criteria from the Antenatal Clinic (ANC), Usmanu Danfodiyo University Teaching Hospital (UDUTH), and Sokoto. The placenta thickness, diameter, and gestational age were measured using an ultrasonography machine.
Table 1: The Socio- Demographic characteristic of the studies shows that the majority of the women, 24 (33.3%), were in the 25–29 age range.
Table 2: Obstetric history of the pregnant women Majority of the mothers was multigravida 60(83.3%). About 84% of the mothers were multipara and more than half (55.6%) have their placenta located anteriorly while only 12.5% had their placenta located fundal.
Placental diameter among respondents shows that the mean placental diameter among pregnant women was 14.10 ± 1.4cm and the mean placenta thickness among the respondents was 4.58 ± 4.2cm.
The study found that in:
Figure 1: The influence of number of parity of pregnant women on placental thickness is weak was not statistically significant with $t\ (71) = 1.970,\ p > 0.05$ for parity in particular and $F\ (1, 70) = 3.882,\ p > 0.05$ for overall parameters (parity and placental thickness).
Figure 2: The relationship between placental diameters and gestational age (weeks) of respondents was statistically significant with $r = 0.422,\ p < 0.05$.
Figure 3: The relationship between the placental thickness and gestational age (weeks) of respondents is weak with $r = 0.073,\ p > 0.05$.
Discussions
Prenatal investigations play an important role for the identification of various parameters

related to the growth and development of the fetus. These parameters were very difficult to understand before the advent of various diagnostic techniques. One of the biggest boons for prenatal diagnosis and management that has been widely used at present time is ultrasonography. One such important parameter to see in prenatal ultrasound is Placenta. Long back examination of placenta was just associated with its retrospective examination. Appropriate functioning of placenta and formation of its structure is very necessary for development of normal healthy fetus

Before the advent of prenatal investigation techniques, morphological examination of the placenta was limited to retrospective information and had little influence on pregnancy management. With the improvement of ultrasound equipment, it is now possible to examine the placenta in detail from the beginning of first trimester. For many years ultrasonologists have described the placenta as a 'static' part in a dynamic system. While all measurements of fetus were related to menstrual age, based on a single cut off point the placental thickness was categorised as normal or abnormal. The present study confirms that placental thickness is a function of age. Abnormal thickening or thinning must be correlated with other estimates of pregnancy duration. Sonographic measurements of the placenta during pregnancy have been described previously. To determine whether a given placental thickness is normal or abnormal, normal placental thickness must be defined for each week of gestational age throughout pregnancy Placental thickness is known to increase progressively with gestational age and at term the placenta is known to attain a weight of 500g.15, 16 Its thickness tends to increase steadily with GA in a linear fashion. This progressive increase is by about one millimeter per week. Thurston18 and Anna19 variously reported that placental thickness indeed parallels gestational age and that it has a very high correlation with GA. We also noted a strong correlation and linear increase of PT and PD with GA. Daud, et al., (2021) were hopeful that placental thickness would be used to estimate gestational age.

The finding shows that majority of the women were in the age group of 25 – 29 years with 24 (33.3%). This showed that the pregnant women were in their early adolescent years, which is excellent for reproductive activities and essential because proper placental functioning and formation is essential for the development of a normal, healthy fetus and, ultimately, for a normal birth weight in women in their adolescent years, reducing the risk of complications associated with late pregnancy brought on by congenital abnormality of late childbearing age If any abnormalities are found, treatment options will be carried out according to what ultrasonography reveals. In Africa, particularly Nigeria and the Northern region, particularly Sokoto, maternal and new born mortality have been recognized as some of the significant health issues. According to the study, the majority of the mothers were multigravida 60 (83.3%) and the number of women dying during pregnancy, from linked problems, neonatal deaths, and childbirth is rising. About 84% of the mothers were multipara and more than half (55.6%) have their placenta located anteriorly. while 2 (2.8%) had only Quran education.

The first objective of this study established that the mean placental diameter among pregnant women was 14.10 ± 1.4cm. Daud, *et. al. (2017)* reported that the diameter of placenta was between 150 mm to 250 mm (15 to 25 cm). This to some extent confirmed that this study found. Therefore, the mean placental diameter among the mothers attending ANC, UDUTH, Sokoto can be used as 14.10 ± 1.4cm.

This study found that the placental thickness was 4.58 ± 4.2cm. This is in line with what Daud, *et. al. (2017)* discovered in which it was stated that the placental thickness range is between 20 to 40mm. However, this can be considered as the average (4.58 ± 4.2cm) of placental thickness among mothers attending ANC, UDUTH, Sokoto.

This is also in line with Junaidu et al (2021) who conducted similar research the results reveals progressive increase in mean thickness from 14.50mm ± 0.71mm at 14 weeks of gestation to 36.58 ± 1.54 mm at 37 weeks. More participants were scanned in the third trimester 228 (57%) as against 172 (43%) in the second trimester. The mean PT for each GA from 14–32 weeks GA was greater than corresponding GA. Beyond 32 weeks; PT measurement was less than GA. There was positive correlation between placenta thickness and all fetal parameters. However, placenta thickness is most strongly correlated with EGA ($r = 0.968$, $p < 0.001$) Least correlation was with the HC ($r = 0.481$, $p < 0.001$). The finding of study shows that parity correlate with PD and PT. There is an increase of placental thickness especially at the second and third trimester. These findings are also in keeping with ours. However, it is expedient to note that increased placental thickness is not diagnostic of any specific disorder but may contribute to the management of a fetus at risk. In addition, an increase in placental thickness during second trimester is due to over-inflation of the intervillous space by maternal blood rather than by adaptive formation of functional placental tissue correlate antenatal placental assessment with reduced fetal movement.25 Noor26 and colleagues identified placental thickness as a promising tool for estimating fetal weight found there was significant relationship between mid-pregnancy placental volume and birth weight Campbell et al. are of the opinion that effective placental volume is a new useful parameter for identifying small for gestational age babies and co –workers also did their work on placental volume and observed there was a weak correlation between estimated placental volume and birth weight it was observed that only few authors like Junaidu, et al., (2021) carried out studies on placental diameter. She found that using PD and PT could be a good prognostic assessment for identifying retarded fetal growth

The results of this study suggest that parents who have placental thicknesses of over 27 mm in the second trimester and over 37 mm in the third trimester deliver babies who are smaller. According to the findings of this extensive study, using cut points for placental thickness may help obstetricians forecast birth weight and spot fetuses who are at risk of having low birth weight babies, despite this, we are aware that some of the aforementioned inconsistencies may have caused the study to be incorrect. The study's insufficient patient enrollment is its main bias. It suggests analysing these variables with a bigger sample size in order to more accurately estimate this cut point.

In terms of the association between placenta thickness and parity, the study discovered that there was a substantial relationship between respondents' number of parities and placenta thickness *$r=0.24$, $p<0.05$this is in line with study of* Neik, et al., (2021) Correlation of Placental Thickness in Relation to Gestational Age and Fetal Weight by using Ultrasonograph: At gestational age of 11-35 weeks, there was no statistically significant difference between the mean of gestational age (18.97±8.02) and placental thickness (19.02±8.00) and there is a high degree positive correlation between gestational age and placental thickness ($r =0.989$) which was highly significant. At >35 weeks of gestational age, there is a statistically significant difference between the mean of gestational age (37.53±1.45) and placental thickness (35.33±1.44) and there is a poor degree positive correlation between gestational age and placental thickness ($r =0.248$) which was also statistically not significant. Statistically significant positive correlation was observed yielding a Pearson's correlation coefficient (r) of 0.902 and 0.856 for the second and third trimesters respectively

This outcome was consistent with Kallepally's (2019) finding that placental thickness and parity had a strong association. Thus, there was a statistical relationship between placental thickness and parity.

The results of this study contradicted prior findings by Kallepally (2019) and provided additional evidence for what was already established above. It was revealed that parity had no discernible effect on placental thickness. However, only looking at parity makes it impossible to determine the effect of parity on placental thickness; perhaps taking into account more variables might help to establish the association.

PD & PT in this study did not correlate with parity. There is a linear increase of gestational age and placental thickness and diameter. These increases heighten between 38th week gestation and 40 weeks' gestation. 205.0±1.4, 43.00±0.0 to 215.0±1.4, 46.00±2.8 respectively The relationship between the placental thickness and gestational age (weeks) of respondents was not significant with r=0.073, p>0.05 in this study which is similar with Junaidu et al study reveals the placenta thickest. F= 2.389, p = 0.050) revealed that the difference was not statistically significant however this contradict similar study conducted by Wolfson, et al., (2019) reveals 10 participants in the study (7.46%) were pregnant and in the first trimester (27 weeks). The PT was measured in various trimesters, and a link between the GA and the ultrasonography-measured PT was discovered. According to Table 1, the mean PT and standard deviation (SD) throughout the course of 27 weeks were 34.67 mm and (4.21). For various GAs between 11 and 40 weeks, the mean PT values and the corresponding standard deviation were computed. It is noted that PT steadily rises from roughly 10 mm at 11 weeks to 41.95 mm at 39 weeks of GA and had a linear association from this analysis, a linear regression model was created, producing the equation Y = a + bX, where Y is the dependent variable, an is the intercept or constant, and b is the regression coefficient of Y onto X. Independent variable is X. In light of this, Y (PT in mm) = 0.905 (a) + 0.995 (b) X (GA in weeks). An extremely positive correlation between the mean and total PT readings and the GA as determined by ultrasonography was found using the Pearson's correlation test, as shown in Table 2, with the Pearson's correlation coefficient being (r = 0.966)

Also this study also supports at the University of Nigeria Teaching Hospital Ituku Ozalla, Enugu, a cross-sectional study using sonography was undertaken on 627 healthy pregnant women with GA between 14 and 40 weeks from May 2013 to February 2014. At the point where the umbilical cord was inserted, the placenta's anterior-posterior diameter was measured. For the purpose of estimating GA, the women's most recent period was measured together with the femur length, biparietal diameter, head circumference, and abdomen circumference of the fetus. The statistical analysis made use of descriptive statistics, regression analysis, and the independent sample t test the results. In the third trimester, the mean PT increased to 36.1 (3.6) mm from 23.2 (2.8) mm in the second trimester. The present study's values and those from comparable research in other populations differed significantly (P 0.04). The following mathematical correlations for the second and third trimesters were found in the GA = 0.982 (PT) + 3.614 and GA = 0.977 (PT) + 3.354, respectively, because there was a significant correlation between GA and PT According to a study by Naik et al., placental thickness increased with gestational age and was seen in subjects who presented from week 12 to week 39 of their respective trimesters. The mean placental thickness in the first trimester, or the 12th week, was 15.035 0.587, and it increased to 17.050 0.283 in the next week. The placental thickness was measured in the second trimester and ranged from 18.246 0.286 at the beginning, or 14th week, to 28.602 0.399 at the end, or 26th week. At the beginning of the third trimester, or the 27th week, the placental thickness was reported to be 29.394 0.087, and by the 40th week it had increased to 38.560 0.546. First trimester measurements showed a 15 mm rise in placental thickness, second trimester measurements showed a 13 mm increase, and third trimester measurements showed a 10 mm increase in

placental thickness. This demonstrated that the placenta's growth rate peaked in the first trimester and slowed down in the third. The results of a study by Neik, et al. (2021) showed a substantial positive link between placental thickness and estimated fetal birth weight, with a Pearson's correlation coefficient of 0.982 between the two measures. Thus, the projected fetal birth weight and the related increase in placental thickness are justified (p-value = 0.001)

The relationship between the placental thickness and number of parity of respondents was significant with $r=0.24$, $p<0.05$ in this research this is similar with the finding study by Adeyekun (2015), it was determined that placental thickness was correlated with the mother's age, parity, and estimated fetal weight. The study found that there was no statistically significant relationship between the parity and placental thickness ($p > 0.05$), but that there was a relationship between the mean placental thickness and the estimated fetal weight ($p > 0.001$) this is in line , (Nyberg, et al., 2015) on Correlation of Placental Thickness Estimated by - Ultrasonography with Gestational Age and Fetal Outcome, on a prospective observational longitudinal study conducted in the Department of Obstetrics and Gynaecology in collaboration with the Departments of Radio diagnosis and Paediatrics in Kasturba Hospital, BHEL Bhopal, between April 2012 and April 2013 shows at 24 weeks gest The gestational age can be estimated using the mean placental thickness, which at 24.5 mm is equal to the gestational age in weeks, or 24 weeks. Placental thicknesses at 32 weeks of pregnancy show a strong positive connection with biometric ultrasonography measures. Mean The gestational age can be calculated using the mean placental thickness of 24.5 mm, which equals a this contradict a study by Njeze, et al., (2020), in a related work using ultrasound in Enugu, South-East Nigeria, found a correlation between placental diameter and thickness and gestational age. The results showed that PD and PT in this study did not correlate with parity. With growing gestational age, the placenta's width and thickness linearly increase. The 38th and 40th weeks of pregnancy saw the greatest rises in these rates. Because placental thickness and diameter range from 205.01.4, 43.000.0 to 215.01.4, 46.002.8, respectively, they can be used to estimate gestational age. Because of this, it is advised to use PT and PD in ultrasonography obstetric assessment, especially when the Last Menstrual Period (LMP) is uncertain.

The study found out that influence of number of parity of pregnant women on placental thickness is weak was not statistically significant with $t\ (71) =1.970$, $p>0.05$ for parity in particular and $F\ (1, 70) =3.882$, $p>0.05$ for overall parameters (parity and placental thickness) this is in line with Njeze, et al., (2020) In a related study, 400 healthy participants were enrolled in the third trimester of pregnancy after meeting the inclusion criteria, and it was discovered that the PD and PT in this study did not correlate with parity. Gestational age, placental thickness, and diameter all rise linearly with time. Between the 38th and 40th week of gestation, these increases become more pronounced. accordingly, from 205.01.4, 43.000.0 to 215.01.4, 46.002.8. In conclusion, placental diameter and thickness can be utilized to gauge gestational age. Therefore, it is advisable to use PT & PD in ultrasound-based obstetric assessment, particularly when the Last Menstrual Period (LMP) is unclear.

Summary

This research dissertation on determine the Influence of Parity on Placenta Thickness and Diameter Among Pregnant Women in Usmanu Danfodiyo University Teaching Hospital (UDUTH) Sokoto. A cross-sectional study design was conducted among 72 pregnant women who were between 24 to 40 weeks of gestational age and who came for an ultrasound in the Radiology department at Usmanu Danfodiyo University Teaching Hospital, Sokoto. Data was collected using proforma. Data was processed using IBM® SPSS version 25 and analyzed

using descriptive and inferential statistics.

The majority of responders, according to the statistics, were between the ages of 25 and 29. 83.3% of the mother was multigravidas, while 84% of respondents identified as multipara

The mean placental diameter and thickness were 14.10 ± 1.4cm and 4.58 ± 4.2cm respectively. The placental thickness and diameter all rise linearly with increased gestational age ($r = 0.422$, $P<0.001$, $r=0.24$, $p=0.044$, respectively. Placental thickness and diameter are positively correlated with parity ($r=0.24$, $p=0.044$ and $r=0.24$, $p=0.040$, respectively). There is a linear relationship between gestational age and placental thickness and gestational age

So placenta thickness and gestational age can be used to calculate and estimate fetal gestational age determination various methods are in use to determine fetal age and possibly calculate or estimate the expected date of delivery (EDD) which often, is of primary concern to mothers and the carers. The commonly employed methods are sonographic and non-sonographic. Historically, nonsonographic evaluation of gestational age employed the use of menstrual history and or clinical examination. Both are subject to considerable errors, which could result from uncertainty of date and early implantation bleeds, sometimes mistaking for menses. Menstrual history is reliable for dating in women who are certain of their last menstrual date and known to have regular cycle. Menstrual age is calculated on the assumption that conception occurs on day14 of the cycle4, 5, while Nagele's rule of adding 7 to the first day of LMP and 9 to the month is used to determine the Expected Date of Delivery (EDD).

Conclusion

The placenta is the most important structure for maternal and fetal health and viability and fetal development until birth. Nevertheless, today, most therapeutic strategies used during pregnancy focus on manipulating the placenta for maternal or fetal therapy. The placental thickness's linear association and statistical consistency with estimates of gestational age and fetal weight. Any departure from the usual may signal the emergence of abnormalities. When the last menstrual period (LMP) is uncertain, it is recommended to use PT and PD during an ultrasonography obstetric assessment because a growing body of information is highlighting the importance of placental-targeted or placental-focused therapies for maternal and fetal health. Advances in molecular biology, technology, imaging, and genomics are just a few of the ways in which our understanding of placental anatomy, physiology, maturation, and pathophysiology is further enhanced and underpins effective treatment of the placenta. In antenatal care, measuring the placenta's thickness and diameter via ultrasound together with the gestational age is essential.

Recommendation and Proposal for Future Works

For the purpose of estimating fetal age and fetal weight during antenatal ultrasound, it is advised to include the placenta's thickness and diameter as a biometric indicator.

Estimation of gestational age in prediction of fetal weight and outcome of pregnancy should be part of routine antennal obstetric Sonographic evaluation

A community based study is recommended to confirm the finding of this study

Government should increase budget and financing of radiological department in equipping with ultrasounds machine

It should be recommended that antenatal services in primary, secondary and tertiary health care institution should incorporate ultrasound machine in the department to reduce maternal and neonatal rates that are currently in Nigeria.

Quality assurance should be ensured in each facility to ensure optimum outcome of good

antennal in detection of good services by ensuring services are rendered in assessment of fetal biometric in provision of good care to pregnant women

Government should increase budget and financing of antenatal services in primary, secondary and tertiary health institution in reducing maternal and neonatal mortality rate that are higher currently in Nigeria.

Contributions to Knowledge and Critique of Work

This study may be considered as contribution to knowledge in following ways:

1. It confirms and supports what other researchers have found about relationship of placenta parameters and gestational age and parity.
2. The relationship between the placental thickness and number of parity of respondents was significant with $r=0.24, p<0.05$.
3. The influence of number of parity of pregnant women on placental thickness is weak was not statistically significant with $t\ (71) =1.970, p>0.05$ for parity in particular and $F\ (1, 70) =3.882, p>0.05$ for overall parameters (parity and placental thickness)
4. It adds to volume of literature and works on obstetrics and gynaecology (O and G).
5. . This work can serve as steppingstone for beginners in the field of nursing.

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