*Original Article*

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# Relationship between Real Time Ultrasonographic Measurement of Placental Thickness and Biparietal Diameter for Estimation of Gestational Age of Fetus

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**Abstract**

*Aim*: This study aimed to establish a relationship between placental thickness and biparietal diameter by real time ultrasound for estimation of gestational age of fetus. *Materials and Methods:* This study consists of 100 pregnant females, between 13th to 39th weeks gestation with their age ranging from 18 -35 years, attending antenatal clinic at the department of Obstetrics and gynecology, Pt..J.N.M. Medical College and Dr. B.R. Ambedkar Memorial Hospital Raipur (C.G.) from October 2008 to august 2009. Who were sure for the last menstrual period and fulfilling all criteria for selection of cases.USG was done for estimating fetal age by biparietal diameter (BPD), and placental thickness (PT). BPD was measured from the outer surface of skull table of one side to the inner margin of skull table on opposite side. PT was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. *Results:* It was observed that the coefficient of correlation (r) between PT and BPD being at 26-30 weeks r = .988 ( p = .002), and at 31-35 weeks r = .963 ( p = .009) which is statistically significant but at more than >35 weeks it become non significant. *Conclusion:* The study concluded a fairly linear relationship between PT and BPD and it provide accurate parameter for estimating fetal gestational age especially in the late mid trimester and early third trimester, where the exact duration of pregnancy is not known.

**Keywords:** Biparietal Diameter; Placental Thickness; Fetal Growth; Gestational Age.

## Introduction

The Assessment of fetal growth, well being and gestational age in different trimesters can be assessed most reliably by ultrasonographic measurement of various fetal biometric parameters, assessment are typically more accurate when multiple parameters are used[1]. The obstetric ultrasound provides us a single most useful tool of information is the accurate determination of gestational age[2]. Gestational age of the fetus is a measurement of time in utero (Inside of the uterus) is approximately 280 days. Which is the time measured from the first day of the women's last menstrual cycle to the current date and is measured in weeks. So the dating of pregnancy starts before the fertilization. For estimation of gestational age and to evaluate the fetal development the placental thickness (PT) and biparietal diameter (BPD) are used as an important fetal biometric parameter in 2nd and 3rd trimester. According to Ohagwu C.C.et al (2008) [3] – "placental thickness should have a certain relationship with fetal growth parameters especially BPD and AC"

Placenta is primarily a fetal organ and its size is a reflexion of the health and size of the fetus. Placental thickness becomes a important parameter for estimation of gestational age of fetus and it can be measured at the level of the insertion of umbilical card[4]. Theera Tongsong et al [5]established normal values of placental thickness during the first half of pregnancy and they found a linear relationship between placental thickness and gestational age. The another fetal biometric parameter which is most frequently and accurately used for assessment of gestational age of fetus during 2nd trimester from 13weeks onward is biparietal diameter (BPD)[6]. The BPD is a more reliable method of predicting date of spontaneous delivery with greater certainty then even certain last menstrual period[7] . The BPD is measured

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from outer surface of skull table of one side to the inner margin of skull table on opposite side (outré to inner)[8] . Several other studies have reported the use of placental thickness and biparietal diameter as a promising parameter for estimation of gestational age of fetus in normal singleton pregnancy using real time ultrasonographic assessment [9,10,11].

## Materials and Method

This study was performed in Department of Anatomy in close association with the Department of Radiodiagnosis, tertiary care hospital of state medical college. This study consists of 100 pregnant females, between 15 weeks to 39 weeks gestation with their age ranging from 18 -35 years.

*Criteria for Selection of Cases*

1. A history of regular menses. The last menstrual period of the patient should be well known.
2. Pregnancy complicated by medical disorders such as anemia, diabetes mellitus in mother and any congenital disorders in fetus were excluded from the study.
3. Pregnancy was single and viable. Absence of multiple gestations (e.g. twins) in the current pregnancy.

Ultrasonographic assessment was performed using a gray scale real time machine (LOGIQ 400) employing a 3.5 MHz convex transducer for real time ultrasonographic scanning of fetal biparietal diameter and placental thickness.

The area between the pubic symphysis and umbilicus was exposed. The ultrasonic jelly was applied uniformly to the skin and transducer's head. The anatomical plane chosen for measurement of various fetal parameters was obtained by placing the transducer over abdomen in the middle sagital section. The fetal head was then looked for the lie of the fetus then placing the transducer over parasaggital plane to define other fetal parts. The placenta was located and placental thickness was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. The biparietal diameter was measured in the scan which shows the widest diameter at the level showing a midline falx echo, two lateral ventricles, and the thalami. The reference point for fetal biparietal diameter was the outer margin of the proximal skull interface to the inner margin of the distal skull interface. To interpret the data was analyzed statistically.

## Results

A prospective study of 100 antenatal singleton pregnancies of >15 weeks of gestation was conducted. The patients were observed for the correlation between placental thickness and biparietal diameter with gestational age.

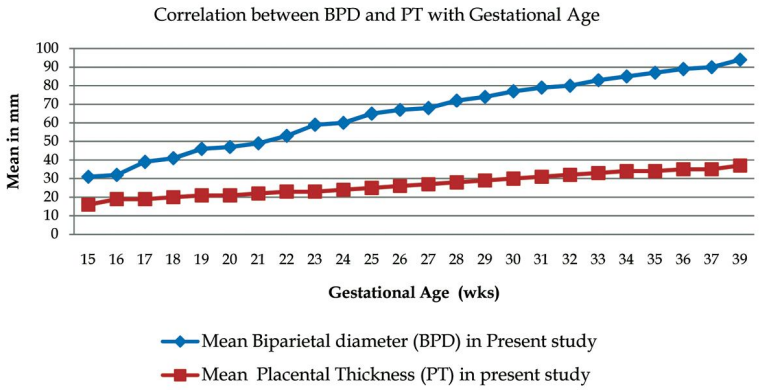
It was observed that the coefficient of correlation (r) between placental thickness and biparietal diameter being r = .878 (p =.022) at 15 – 20 weeks, r = .932( p = .021) at 21 – 25 weeks, r = .988 ( p = .002) at 26 – 30 weeks, r = .963 ( p = .009) at 31 – 35 weeks and r = .982 ( p = .121) at 36 weeks and onwards [ Table -1].

In our study shows linear growth pattern between placental thickness and biparietal diameter in late 2nd and early 3rd trimester.[Graph -1].

**Table 1:** Correlation between BPD and PT with Gestational age (in weeks)

| S.No. | Gestational Age in Weeks | MeanBiparietal diameter (BPD) | Mean Placental Thick ness(PT) | r value | P value |
|---|---|---|---|---|---|
| 1 | 15 | 31 | 16 | .878 | .022 |
| 2 | 16 | 32 | 19 | | |
| 3 | 17 | 39 | 19 | | |
| 4 | 18 | 41 | 20 | | |
| 5 | 19 | 46 | 21 | | |
| 6 | 20 | 47 | 21 | | |
| 7 | 21 | 49 | 22 | .932 | .021 |
| 8 | 22 | 53 | 23 | | |
| 9 | 23 | 59 | 23 | | |
| 10 | 24 | 60 | 24 | | |
| 11 | 25 | 65 | 25 | | |
| 12 | 26 | 67 | 26 | .988 | .002 |
| 13 | 27 | 68 | 27 | | |
| 14 | 28 | 72 | 28 | | |
| 15 | 29 | 74 | 29 | | |
| 16 | 30 | 77 | 30 | | |
| 17 | 31 | 79 | 31 | .963 | .009 |

| | | | | | |
|---|---|---|---|---|---|
| 18 | 32 | 80 | 32 | | |
| 19 | 33 | 83 | 33 | | |
| 20 | 34 | 85 | 34 | | |
| 21 | 35 | 87 | 34 | | |
| 22 | 36 | 89 | 35 | .982 | .121 |
| 23 | 37 | 90 | 35 | | |
| 24 | 39 | 94 | 37 | | |
| | Mean | 65.29 | 25.96 | r=0.986;P<0.0001 | |
| | SD | 19.34 | 6.62 | (n = 24) | |




**Graph 1:** Lines diagram shows correlation between BPD and PT with Gestational age (in weeks)

## Discussion

In our study we adopted a cross sectional design and did not follow the patients longitudinally. The placental thickness [PT] and biparietal diameter [BPD] was measured ultrasonographically and it was seen that PT and BPD increases linearly with advancing gestational age. Early reports of BPD by USG examination were published by Callen p (1991) demonstrated that BPD value to be an accurate predictor of menstrual age before 20th week of gestation. The placenta is a materno - fetal organ and is responsible for protection and nourishment of fetus[12].

This study was in accordance with several other studies in this regards. The study carried out by Ohagwu C.C. et al [3] found that there was critical positive correlation between fetal growth parameters especially BPD, AC, and PT with gestational age. Baghel P et al [11] observed that there is increase in PT and other fetal parameters almost linearly with gestational age.

The relationship between Placental thickness and biparietal diameter is very much significant for assessment of gestational age in mid 2nd and early 3rd trimester and can be used as a reliable parameter for the assessment of gestational age where the exact duration of pregnancy is not known.

## Conclusion

The study concluded a fairly linear relationship between placental thickness and biparietal diameter with gestational age. It provide us accurate parameter for estimating fetal gestational age especially in late mid trimester (21st to 25th week) and early 3rd trimester (26th to 30th week)of gestation where the exact duration of pregnancy is not known.

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