

# Prediction of gestational age by ultrasonic measurement of the Biparietal diameter in third trimester

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## Abstract

**Background:** Rapid and accurate determination of gestational age (GA) may be vital to the appropriate care of the pregnant patient and improve obstetric care through allowing the optimal timing of necessary interventions and the avoidance of unnecessary ones. Ultrasound scans are considered to be the most cost-effective, accurate and safe method for measurement of various fetal parts in pregnant women. **Objectives:** To study the prediction of Gestational Age by Ultrasonic Measurement of the Biparietal Diameter in Third Trimester. **Materials and Method:** In the present study total 100 pregnant female attending antenatal clinic of the study institute in third trimester were enrolled. Detailed demographic profile including age, address etc was obtained. Detailed history regarding the exact knowledge of her LMP, cycle regularity and duration of cycle was taken. All patients then underwent detailed examination i.e. general and systematic examination. The gestational age at time of scanning was confirmed by LMP, and abdominal examination. All the women in the study underwent ultrasonography. The ultrasound was done by a single operator to avoid bias in observations. All the fetal parameters were assessed and special attention was given to the Biparietal diameter. The collected data was entered in Microsoft excel. Primary analysis was conducted by using Epi Info statistical software. **Results:** Majority of the patients (38%) belonged to age group 20- 25 years followed by 36 patients in 25-30 years. Gestational age was calculated according to the LMP and it was observed that majority of the patients were of 35 weeks gestation (14%) followed by 30 weeks (12%) and minimum were of 40 weeks gestation. The mean gestational age was  $33.53 \pm 3.368$  weeks. The gestational age was calculated by using BPD on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 33 weeks of gestation (13%) with mean gestational age of  $35.87 \pm 2.96$  weeks. Similarity of GA in LMP with BDP was observed in 13 patients. The Correlation coefficient between GA by LMP and GA by BDP was 0.9268 with P-Value  $<0.05$ . Thus there was significant correlation between GA by LMP and BDP. **Conclusion:** The gestational age estimated from Biparietal diameter was correlated with the gestational age calculated from the LMP with Correlation coefficient of 0.9268 with P-Value  $<0.05$ . Thus we conclude that the Biparietal diameter can be useful in evaluation of Assessment of Gestational Age in Third Trimester and the findings

**Key Words:** Ultrasonographically age estimation, BPD, Third Trimester.

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## INTRODUCTION

Appropriate assessment of gestational age is quintessential in obstetric care. The accurate dating of pregnancy is critically important for pregnancy management from the first trimester to delivery and is particularly necessary for determining viability in premature labour and in postdates deliveries<sup>1</sup>. Prior to the widespread use of ultrasound, caregivers relied on a combination of history and physical examination to clinically determine gestational age. The clinical estimate of gestational age typically relies on clinical history

(menstrual cycle length, regularity, and recall of the first day of the last menstrual period), followed by confirmation by physical examination or other signs and symptoms.<sup>2,3,4</sup> Rapid and accurate determination of gestational age (GA) may be vital to the appropriate care of the pregnant patient and improve obstetric care through allowing the optimal timing of necessary interventions and the avoidance of unnecessary ones. Ultrasound scans are considered to be the most cost-effective, accurate and safe methods for measurement of various fetal parts in pregnant women.<sup>5</sup> When ultrasound is performed with quality and precision, there is evidence to suggest that dating a pregnancy using ultrasound measurements is clinically superior to using menstrual dating with or without ultrasound, and this has been advocated and adopted in other jurisdictions.<sup>6,7</sup> Ultrasound gave clinicians a method to measure the fetus and therefore to estimate gestational age. Measuring body parameters will allow verification of size and growth of the foetus and will greatly help in the diagnostic management of intrauterine growth retardation in late pregnancy.<sup>8</sup> Biparietal diameter is a straight line between the sides of the head circumference; it has been stated by different researchers that biparietal diameter measurement in assessment of foetal age before 30th weeks can offer accuracy but after 30th weeks the accuracy decreases.<sup>9,10</sup> The determination of biparietal diameter has been a problem due to the breech presentation of the foetus<sup>11,12</sup>.

## MATERIALS AND METHOD

The present study was conducted in the department of obstetrics and gynecology of ACPM Medical College, Dhule with the aim to evaluate the usefulness of foetal femur length in assessment of gestational age in third trimester. The study was conducted from August 2014 to September 2016. Following inclusion and exclusion criteria was used to select the study population.

### Inclusion Criteria

1. Pregnant woman in third trimester with Singleton live pregnancy attending OPD of study institute.
2. Woman with known last menstrual period and regular cycles.
3. Woman not on any oral contraceptive pills for last three months before last menstrual period.

### Exclusion Criteria

1. Woman with unknown last menstrual period and irregular cycles.
2. Intrauterine growth restriction, polyhydramnios and oligohydramnios, Multiple Pregnancies.
3. Congenital anomalies of baby.
4. Medical disorders of pregnancy like DM, PIH, heart diseases etc.

Thus by using the above mentioned inclusion and exclusion criteria total 100 Pregnant females attending antenatal clinic of the study institute in third trimester were enrolled in the present study. Detailed demographic profile i.e. age, address etc was obtained from each patient, as per pre designed proforma. Detailed history regarding the exact knowledge of her LMP, cycle regularity and duration of cycle was taken. All patients then underwent detailed examination i.e. general and systematic examination. The gestational age at time of scanning was confirmed by LMP, and abdominal examination. The women were asked to take plenty of oral fluids and attended the USG clinic with full bladder. They were made to lie down in supine position exposing their abdomen from xiphisternum up to pubic symphysis. Then the abdomen was scanned with help of probe to obtain different fetal parameters. The ultrasound was done by a single operator to avoid bias in observations. All the fetal parameters were assessed and special attention was given to the Biparietal diameter (BPD). The collected data was entered in Microsoft excel. Primary analysis was conducted by using Epi Info statistical software.

## RESULTS

**Table 1: Distribution According to Age and gravida**

Variable		Frequency
Age Group	<20 Years	14
	20-25 Years	38
	25-30 Years	36
	30-35 Years	10
	>35Years	2
Gravida	Primi	58
	Multi	42

Out of 100 patients, majority of the patients (38%) belonged to age group 20- 25 years followed by 36 patients in 25-30 years. It was seen that 58% were Primi Gravida and 42% were of multi gravida.

**Table 2: Distribution According to Gestational Age by LMP and Fetal Biparietal diameter**

GA (Weeks)		Frequency
GA (Weeks) by LMP	28 Week	8
	29 Week	9
	30 Week	12
	31 Week	9
	32 Week	4
	33 Week	10
	34 Week	7
	35 Week	14
	36 Week	6
	37 Week	9
	38 Week	6
	39 Week	4
	40 Week	2

GA (Weeks) by BPD	28 Week	0
	29 Week	3
	30 Week	1
	31 Week	5
	32 Week	10
	33 Week	13
	34 Week	8
	35 Week	3
	36 Week	9
	37 Week	11
	38 Week	16
	39 Week	21
	40 Week	0

Gestational age was calculated according to the LMP and it was observed that majority of the patients were of 35 weeks gestation (14%) followed by 30 weeks (12%) and minimum were of 40 weeks gestation. The mean gestational age was  $33.53 \pm 3.368$  weeks. The gestational age was calculated by using BPD on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 33 weeks of gestation (13%) with mean gestational age of  $35.87 \pm 2.96$  weeks.

**Table 3:** Difference between Gestational Age estimated by LMP and Fetal Biparital diameter

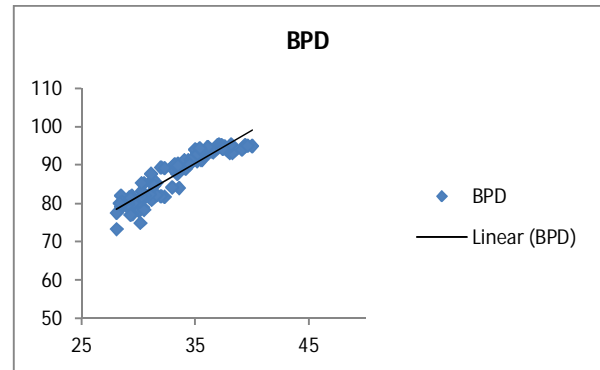
Difference Between USG (BPD) and LMP Frequency	
No difference	13
1-2 Week	26
2-3 Week	29
3-4 Week	26
4-5 Week	6
>5 Week	0
<b>Total</b>	<b>100</b>

Difference between GA (BPD and LMP) was observed in 87 patients out of 100 patients. Maximum observed difference between GA by BDP and LMP is 2 to 3 weeks. Similarity of GA in LMP with BDP was observed in 13 patients.

**Table 4:** Correlation of gestational age estimated by LMP with gestational age estimated by Fetal Biparital diameter

	LMP	BDP
Pearson Correlation	1	0.9268
P-Value	-	.000
N	100	100

From above table it was evident that the Correlation coefficient between GA by LMP and GA by BDP was 0.9268 with P-Value <0.05. Thus there was significant correlation between GA by LMP and BDP.



**Figure 1:**

## DISCUSSION

The present study was conducted with objective to study the prediction of Gestational Age by Ultrasonic Measurement of the Biparietal Diameter in Third Trimester. The study was conducted among the 100 pregnant woman with third trimester attending OPD of study institute with known last menstrual period and regular cycles. It was seen that out of 100 patients, majority of the patients (38%) belonged to age group 20-25 years followed by 36 patients in 25-30 years. The mean age of study women was  $25.43 \pm 4.72$  years with the range of age was from 18 to 35 years. The findings were comparable with Sherif A. Akl *et al*<sup>13</sup>, kansaria and parulekar<sup>14</sup> and konje *et al*<sup>15</sup>. It was seen that 58% were of Primi Gravida and 42% were of multi gravida. Sherif A. Akl *et al*<sup>13</sup> and Patre *et al*<sup>16</sup> also observed similar findings in their study. Gestational age was calculated according to the LMP and it was observed that majority of the patients were of 35 weeks gestation (14%) followed by 30 weeks (12%) and minimum were of 40 weeks gestation. The mean gestational age was  $33.53 \pm 3.368$  weeks. The gestational age was calculated by using BPD on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 33 weeks of gestation (13%) with mean gestational age of  $35.87 \pm 2.96$  weeks. The findings were comparable with findings reported by Hadlock *et al*<sup>17</sup>, Shepard and Filly<sup>18</sup>, Kurtz *et al*<sup>19</sup> and Sabbagha and Hughey<sup>20</sup>. Difference between GA (BPD and LMP) was observed in 87 patients out of 100 patients. Maximum observed difference between GA by BDP and LMP is 2 to 3 weeks. Similarity of GA in LMP with BDP was observed in 13 patients. It was observed that the correlation coefficient between GA by LMP and GA by BDP was 0.9268 with P-Value <0.05. Thus there was significant correlation between GA by LMP and BDP. Similar findings were also reported by Sherif A. Akl, *et al*<sup>13</sup>, kansaria and parulekar<sup>14</sup> and konje *et al*<sup>15</sup> Patre, *et al*<sup>16</sup> and Kumar *et al*<sup>21</sup>. The relationship between the BPD and

GA has been studied by various workers.<sup>22-25</sup> BPD is a fairly accurate method of estimating the GA.<sup>20</sup> In the present study, the correlation coefficient between GA and BPD is equal to 0.9268, indicating that BPD is highly correlated to GA. The biparietal diameter has been described as a reliable method of determining gestational age. The prediction of gestational age by biparietal diameter measurements before 30 weeks gestation can provide accuracy but its precision declines thereafter<sup>26</sup>. It has been documented that proper measurement of biparietal diameter can often be difficult under various conditions such as deeply engaged fetal head, direct occipito-anterior and occipito-posterior positions and in breech presentation. Furthermore, with the aid of real time ultrasound, the femur length can easily be measured under the conditions in which biparietal diameter measurement is difficult.

## CONCLUSION

The gestational age estimated from Biparietal diameter was correlated with the gestational age calculated from the LMP with Correlation coefficient of 0.9268 with P-Value <0.05. Thus we conclude that the Biparietal diameter can be useful in evaluation of assessment of gestational age in third trimester.

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