

Ultrasonic Measurement of Fetal Femur Length in Assessment of Gestational Age in Third Trimester

Shruti Singh*, Alka Patil**, Nilay Patel***

Abstract

Introduction: Appropriate assessment of gestational age is of paramount importance in obstetric care. Uncertain gestational age has been associated with adverse pregnancy outcome including low birth weight, spontaneous preterm delivery and perinatal mortality. **Objectives:** To evaluate the usefulness of fetal femur length in Assessment of Gestational Age 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 femur length. The collected data was entered in Microsoft excel. Primary analysis was conducted by using Epi Info statistical software. **Results:** The mean age of the women was 25.43 ± 4.72 years. The gestational age according to the LMP was

calculated and it was observed that majority of the patients were of 35 weeks gestation (14%) followed by 30 weeks (12%). The mean gestational age was 33.53 ± 3.368 weeks. The gestational age was also calculated by using Femur length on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 32 weeks of gestation with mean gestational age of 34.15 ± 3.40 weeks. The gestational age calculated by LMP and FL showed no statistically significant difference. Thus the gestational age calculated from femur length was comparable with the gestational age calculated by LMP. The correlation coefficient between GA by LMP and GA by FL was 0.9603 with P-Value < 0.05 thus there was significant correlation between GA by LMP and FL. **Conclusion:** The gestational age estimated from femur length was correlated with the gestational age calculated from the LMP with Correlation coefficient of 0.9603 with P-Value < 0.05 . Thus we conclude that the foetal femur length can be useful in evaluation of Assessment of Gestational Age in Third Trimester and the findings.

Keywords: Fetal Femur Length; Gestational Age; Ultrasonographic Age Estimation.

Introduction

Pregnancy is an entity which in majority of women is uneventful, but full of uncertainty. It is a phase of both physical and mental challenge for the woman. The responsibility thereby lays in the hands of obstetrician to see to it that the female sails through her pregnancy successfully. An accurate assessment of the gestational age of

*Senior Resident
**Professor & HOD
***Junior Resident, Dept. of
Obstetrics and Gynecology,
ACPM Medical College,
Dhule, Maharashtra
424001, India.
Corresponding Author:
Shruti Singh, Senior
Resident, Dept. of
Obstetrics and Gynecology,
ACPM Medical College,
Dhule, Maharashtra
424001, India.
E-mail:
shrutisingh3120@gmail.com

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the fetus is the first step in the management of pregnancies.

Appropriate assessment of gestational age is of paramount importance in obstetric care. Uncertain gestational age has been associated with adverse pregnancy outcome including low birth weight, spontaneous preterm delivery and perinatal mortality [1]. Making appropriate management decisions and delivering optimal obstetric care requires accurate appraisal of gestational age. For e.g., proper diagnosis and management of preterm labor and post term pregnancy requires an accurate estimation of fetal age. Many pregnancies considered to be preterm or post term are wrongly classified. Unwarranted interventions including induction for supposed post term pregnancies may lead to an increased risk of maternal and neonatal morbidity. In addition, pregnancies erroneously thought to be preterm may be subject to avoidable and expensive hospitalisation stays [2,3].

The conventional methods used to estimate gestational age are date of onset of the last menstrual period (LMP), clinical assessment of the fundal height and fetal weight, and ultrasonographic fetal biometry [4]. Some pregnant women are not sure of their menstrual dates or do not have regular 28-day cycles. In addition, bleeding in early pregnancy or a recent use of hormonal contraception may lead to incorrect assumption of the date of ovulation [5].

Ultrasonic studies have proven useful in determination of gestational age (GA) in first and second trimester, but their accuracy in third trimester is not reliable because of biologic variations like racial differences in fetal biometric measurements and inter-population variations [6]. Obstetrical (OB) ultrasound technicians routinely measure biparietal diameter (BPD), head circumference, abdominal circumference, and femur length (FL) to estimate gestational age in an outpatient setting [7]. In the present study we assessed the gestational age with special reference to femur length on ultrasonography.

Objectives

To evaluate the usefulness of fetal femur length in Assessment of Gestational Age in Third Trimester.

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.

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 femur length.

The collected data was entered in Microsoft excel. Primary analysis was conducted by using Epi Info statistical software.

Observation and Results

It was seen that majority if the patents were in the age group of 20-25 and 25-30 years. The mean age of

the women was 25.43±4.72 years. Out of 100 patients, 58 were of Primi Gravida and 42 were of multi gravida.

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±3.368 weeks.

The gestational age was also calculated by using Femur length on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 32 weeks of gestation with mean gestational age of 34.15±3.40 weeks.

The gestational age calculated by LMP and FL showed no statistically significant difference. Thus the gestational age calculated from femur length was comparable with the gestational age calculated by LMP.

The difference between gestational age calculated by LMP and femur length on USG was compared and it was seen that difference of 1-2 weeks in GA was in 24 cases whereas 2-3 weeks difference was in 2 cases. In the remaining total 74 cases the gestational age on calculated by LMP and femur length on USG was comparable.

It was seen that correlation coefficient between GA by LMP and GA by FL was 0.9603 with P-Value <0.05

Table 1: Distribution According to Age and gravida

		Frequency	Percentage
Age Group	<20 Years	14	14
	20-25 Years	38	38
	25-30 Years	36	36
	30-35 Years	10	10
	>35Years	2	2
Gravida	Primi	58	58
	Multi	42	42
TOTAL		100	100

Table 2: Distribution According to Gestational Age by LMP and Fetal Femur Length

	Frequency LMP	No. of pt FL
28 Week	8	5
29 Week	9	11
30 Week	12	6
31 Week	9	6
32 Week	4	14
33 Week	10	4
34 Week	7	5
35 Week	14	10
36 Week	6	10
37 Week	9	9
38 Week	6	16
39 Week	4	4
40 Week	2	0
TOTAL	100	

Table 3: Comparison of estimation of Gestational Age by LMP and Fetal Femur Length

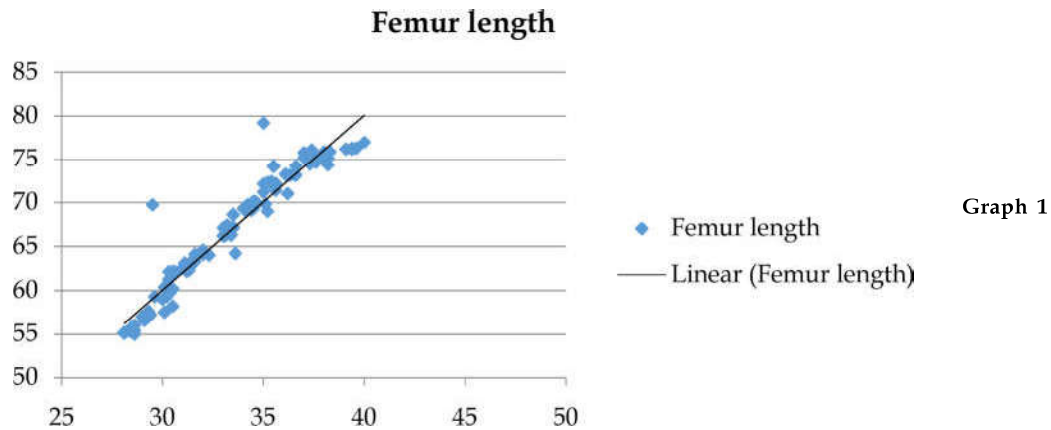
Gestational age	Mean± SD	SEM	P value	Statistical significance
LMP	33.53±3.37	1.28492	0.200323	Not significant
FL	34.15±3.40			

Table 4: Difference between Gestational Age estimated by LMP and Fetal Femur Length

Difference Between USG (FL) and LMP	Frequency	Percentage
No difference	74	74
1-2 Week	24	24
2-3 Week	2	2
3-4 Week	0	0
4-5 Week	0	0
>5 Week	0	0

Table 5: Correlation of gestational age estimated by LMP with gestational age estimated by fetal femur length

		LMP	FL
LMP	Pearson Correlation	1	0.9603**
	P-Value	-	0.000
	N	100	100



thus there was significant correlation between GA by LMP and FL.

Discussion

Gestational age, synonymous with menstrual age, is defined in weeks beginning from the first day of the LMP prior to conception. Accurate determination of gestational age is fundamental to obstetric care and is important in a variety of situations. Clinicians may choose to incorporate sonographic measurements into their final estimate of gestational age, as prior research suggests that the use of LMP to determine gestational age can be inaccurate [8] and that even a single second trimester sonogram may be more reliable [9]. The present study was conducted in the department of obstetrics and gynaecology with the objective to evaluate the usefulness of foetal femur length in assessment of gestational age in third trimester.

Maximum number of patients observed in this belongs to age group 20-25 years followed by patients in 25-30 years, the range of age was from 18 to 35 years with mean age of 25.43 ± 4.72 years. Similar findings were also observed by Sherif A. Akl, et al [10], kansaria and parulekar [11] and konje et al [12] in their studies. Out of 100 patients, 58 were of Primi Gravida and 42 were of multi gravida. The findings of the present study were comparable with the findings reported by Sherif A. Akl et al [10], Manisha Bakliwal [13] and Patre, et al [14].

The gestational age in the study women was

calculated according to the LMP. It was seen that the mean gestational age was 33.53 ± 3.368 weeks with majority of the patients were of 35 weeks gestation (14%) followed by 30 weeks (12%) and minimum were of 40 weeks gestation. The gestational age was also calculated by using Femur length on ultrasonography and it was seen that majority of the women were of 38 weeks of gestational age (16%) followed by 32 weeks of gestation with mean gestational age of 34.15 ± 3.40 weeks.

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Radiological measurements e.g. lengths of foetal long bones, have been earlier considered to determine gestational age [15,16]. Martin and Higginbottom¹⁷ reported on parallax radiological measurement of the femoral shaft in approximately 100 fetuses from 16 to 38 weeks. The method was mathematically complicated and the number of cases after 30 weeks was small but it showed that growth in length of the femur occurred at a regular rate for each week of gestation. Uncertain gestational age has been associated with adverse pregnancy outcomes including low birth weight, spontaneous preterm

delivery and perinatal mortality, independent of maternal characteristics. Accurate gestational age assessment is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction.

It was seen that correlation coefficient between GA by LMP and GA by FL was 0.9603 with P-Value <0.05 thus there was significant correlation between GA by LMP and FL. Similar findings were also reported by Sherif A. Akl et al [10], kansaria and parulekar [11], Patre et al [14], Kumar et al [18] and konje et al [19].

Prior to the widespread use of ultrasound, caregivers relied on a combination of history and physical examination to clinically determine gestational age. Ultrasound gave clinicians a method to measure the fetus and therefore to estimate gestational age. Much of our current clinical practice is based on studies from the 1980s and 1990s. As new information emerges in fields, such as reproductive biology, perinatal epidemiology, and medical imaging, our current clinical practice is being challenged. "Certain" menstrual dating, for example, is less certain than previously thought [10-24].

Conclusion

The gestational age estimated from femur length was correlated with the gestational age calculated from the LMP with Correlation coefficient of 0.9603 with P-Value <0.05. Thus, we conclude that the foetal femur length can be useful in evaluation of Assessment of Gestational Age in Third Trimester.

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