

### Ultrasonographic estimation of Gestational age on basis of Tibial length

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#### Abstract

**Background-** Appropriate assessment of gestational age is paramount in obstetric care. Making appropriate management decisions requires accurate appraisal of gestational age.

**Methods-** The present study was conducted in the Department of Anatomy, in coordination with the Department of Radiodiagnosis, LLRM Medical College, Meerut, in pregnant women during 2<sup>nd</sup> and 3<sup>rd</sup> trimester.

Ultrasonographic measurement of tibial length was done in Radiodiagnosis Department of LLRM Medical College, Meerut.

**Results-** The present study was conducted in 100 pregnant women, between the age range of 18 to 40 years, during 2<sup>nd</sup> and 3<sup>rd</sup> trimester, in the Department of Radiodiagnosis, LLRM Medical College, Meerut. The fetal tibial length increases with advancing gestational age and regression analysis showed a strongly significant relationship between fetal tibial length and gestational age.

**Conclusion** - In normally developing fetus the fetal tibial length increases with advancing gestational age. Fetal tibial length is a good marker for gestational age and can be used in cases, which are not sure about their LMP.

**Keywords-** Fetal tibial length, Gestational age, Ultrasonography.

#### Introduction

Appropriate assessment of gestational age is paramount in obstetric care. Making appropriate management decisions requires accurate appraisal of gestational age. Accurate pregnancy dating may assist obstetricians in appropriately counseling women who are at risk of a preterm delivery about likely neonatal outcomes and is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction. Accurate gestational age is also important in the interpretation of biochemical serum screening test or for counselling patients regarding the option of pregnancy termination. Since clinical data such as the menstrual cycle or uterine size often are not reliable, the most precise parameter for pregnancy dating should be determined by the obstetrician by ultrasound early in the pregnancy. Ultrasound is an accurate and useful modality for the assessment of gestational age in the first and second trimester of pregnancy and, as a routine part of prenatal care, can greatly impact obstetric management and improve antepartum care<sup>1</sup>.

#### Materials and Methods

The present study was conducted in the Department of Anatomy, in coordination with the Department of Radiodiagnosis, LLRM Medical College, Meerut, in pregnant women during 2<sup>nd</sup> and 3<sup>rd</sup> trimester.

Ultrasonographic measurement of tibial length was done in Radiodagnosis Department of LLRM Medical College, Meerut.

The present study was done in 100 pregnant women who were not sure about their menstrual period and having singleton apparently normal foetuses between 15 to 36 weeks of gestation and subjects having any medical pathology were excluded from study.

We measured the tibial length without prior knowledge of gestational age, using Medison S A 8000 S E ultrasonographic machine with curvilinear probe 3.5 to 5 MHz.

**Results**

The present study was conducted in 100 pregnant women, between the age range of 18 to 40 years, during 2<sup>nd</sup> and 3<sup>rd</sup> trimester, in the Department of Radiodagnosis, LLRM Medical College, Meerut.

**Table no.1: Mean Tibial length (No. of cases=100)**

S.no	Gestational age (weeks)	Number of cases	Mean tibial length (mm±SD)
1.	15	4	10.25±0.50
2.	16	4	15.25±0.50
3.	17	4	19.75±0.50
4.	18	5	24.40±0.55
5.	19	4	28.00±0.82
6.	20	6	31.00±0.90
7.	21	4	35.75±0.50
8.	22	5	37.40±0.90
9.	23	4	41.50±0.58
10.	24	5	42.40±0.55
11.	25	4	44.50±0.58
12.	26	5	46.40±0.55
13.	27	4	48.25±0.50
14.	28	6	50.60±0.82
15.	29	5	52.80±0.55

16.	30	5	55.40±0.55
17.	31	4	57.50±0.58
18.	32	5	60.50±0.52
19.	33	4	62.50±0.58
20.	34	4	65.50±0.58
21.	35	4	68.50±0.58
22.	36	5	70.80±0.84



Ultrasound no.1: shows fetal tibial length.

Table no.2; shows predicted values of various parameters (Independent variables like-TL and Dependent variables like –Gestational age in weeks)

Parameters	Intercept(a)		Slope(b)		R <sup>2</sup>	P value
	estimate	S.E	estimate	S.E		
TL	9.117	0.518	0.371	0.011	0.983	<0.0001

**Discussion**

Appropriate assessment of gestational age is paramount in obstetric care. Uncertain gestational age has been associated with adverse pregnancy outcomes including low birth weight, spontaneous preterm delivery and perinatal mortality, independent of maternal characteristics. Making appropriate management decisions

and delivering optimal obstetric care requires accurate appraisal of gestational age. Pregnancy dating may also assist obstetricians in appropriately counseling women who are at risk of a preterm delivery about likely neonatal outcomes.

Accurate gestational age assessment is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction. During the third trimester, fundal height assessment may be helpful in determining appropriate fetal growth by comparing the measurement to a known gestational age. In addition, dating a pregnancy is imperative for scheduling invasive diagnostic tests such as chorionic villus sampling or amniocentesis, as appropriate timing can influence the safety of the procedure. Accurate gestational age is also important in the interpretation of biochemical serum screening test results and may help avoid undue parental anxiety from miscalculations and superfluous invasive procedures, which may increase the risk of pregnancy loss. Gestational age is also crucial for counseling patients regarding the option of pregnancy termination<sup>2</sup>.

Ultrasound assessment of gestational age has become an integral part of obstetric practice in recent times.

In the past, the biparietal diameter (BPD) had been described as a reliable method of determining gestational age. While the BPD was the first fetal parameter to be clinically utilized in the determination of fetal age in the second trimester, more recent studies have evaluated the use several other biometric parameters including head circumference (HC), abdominal circumference (AC), femur length (FL), foot length, ear size, orbital diameters, cerebellum diameter and others<sup>1</sup>.

The present study was conducted in the Department of Anatomy, in coordination with the Department of Radiodiagnosis, LLRM Medical College, Meerut, in pregnant women during 2<sup>nd</sup> and 3<sup>rd</sup> trimester.

Ultrasonographic measurement of tibial length was done in Radiodiagnosis Department of LLRM Medical College, Meerut.

The present study was done in 100 pregnant women who were not sure about their menstrual period and having singleton apparently normal fetuses between 15 to 36 weeks of gestation and subjects having any medical pathology were excluded from study.

C.Exacoustos et al studied linear growth of all limb bones between 13 and 40 weeks of gestation in total of 2317 normal pregnant women by ultrasonographic scan. They found R value=0.994 and Standard deviation= 1.619, for tibial length in their study<sup>3</sup>, on other hand in the present study R value=0.991 and Standard deviation=0.874, the standard deviation is much less as compared between two studies and R values are very near to each other.

Lyn S. Chittya, Douglas G. Altman ultrasonographically scanned 663 fetuses between gestational age of 12 to 42 weeks and measured all long bones, they found Standard deviation=0.049<sup>4</sup> while Standard deviation in our present study is 0.874.

Gestational age (weeks)	Mean tibial length in mm Present study	Mean tibial length in mm E.P.Issel	Mean tibial length in mm C,Exacoustos	Mean tibial length in mm Lyn S.Chitty
15	10.25	-	16.00	14.10
16	15.25	-	20.00	16.90
17	19.75	22.00	22.00	19.90
18	24.40	23.00	23.00	22.80
19	28.00	26.00	26.00	25.70
20	31.00	29.00	29.00	28.50
21	35.75	32.00	32.00	31.20
22	37.40	33.00	33.00	33.80
23	41.50	37.00	37.00	36.40
24	42.40	39.00	39.00	38.80
25	44.50	41.00	40.50	41.00
26	46.40	43.00	43.00	43.20
27	48.25	45.00	45.00	45.30
28	50.60	46.00	46.00	47.30
29	52.80	49.00	48.00	49.20

30	55.40	50.00	49.50	51.00
31	57.50	52.00	52.00	52.70
32	60.50	55.00	55.00	54.40
33	62.50	56.00	55.00	55.90
34	65.50	57.00	57.00	57.50
35	68.50	59.00	59.00	58.90
36	70.80	61.00	60.00	60.30

The above table shows a comparison between the mean fetal tibial length of our study with that of **E.P.Issel,C.Exacoustos, and Lyn S.Chitty.**

The values in our study are lower or higher because there is a significant racial and socioeconomic differences between individuals of the present study and those of studies done by E.P.Issel,C.Exacoustos and Lyn S.Chitty.

### Conclusion

In normally developing fetus the fetal tibial length increases with advancing gestational age. Fetal tibial length is a good marker for gestational age and can be used in cases, which are not sure about their LMP.

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