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A Comparative Analysis of Different 3rd Trimester Using Fetal Biometric Parameters- An Ultrasound Study

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ABSTRACT

Title- A Comparative Analysis of Different 3rd Trimester using Fetal Biometric parameters-An Ultrasound study

Objective- The objective of the study to determine the accuracy of 3rd trimesters for determining gestational age with the help of regression tables formulated to collaborate menstrual age with gestational age.

Background- Each examination was performed after the routine antenatal check up by the obstetrician prior to the scan. The patients were explained the procedure and its purpose, prior to scanning. Patient was placed supine and the area between the pubic symphysis and umbilicus was exposed, the ultrasonic jelly was applied to the skin and transducer's head. The jelly serves to make better contact between the skin surface and the transducer, making the passage of ultrasonic wave easier.

Subjects-The Study is being Conducted in 200 normal pregnant females between 29th to 39th weeks of gestation.

Methods- All examinations were performed by using a Gray scale real time machine (Sonosite Micromax M Turbo) employing a 3-5 MHz convex transducer.

Result- There was significant reduction in overall variability and maximum observed error when multiple fetal parameters were used instead of single parameter.

Conclusion and Discussion- Our present study also revealed that the use of multiple fetal parameters results in greater accuracy for gestational age determination.

Keywords: *Gestational age (Biparietal diameter, Femur length, Foot length)*

1. INTRODUCTION

Fetal biometry is a methodology devoted to the measurement of several parts of fetal anatomy and their growth**.** Fetal growth is defined as the time dependent changes in body dimensions that occur throughout the pregnancy. The real-time ultrasound scanners have given a number of ultrasonic biometric parameters to determine gestational age. Fetal biometry is of great interest in obstetrical practice. (1, 2, 3, 4) In addition, fetal biometry distinguishes the normal from abnormal fetal structures. Prenatal measurement of fetal parameters and estimated size and weights vary among different populations, depending upon their racial, demographic characteristics and nutrition. (5, 6, 7) It is therefore important that fetal biometry be performed for local population and local charts of normal biometry be constructed and followed for these populations and ethnic groups. Biometric curves for one population may over or under estimate the fetal age when used for another population with different demographic characteristics. (8, 9)

Thus the construction and use of biometric Normograms specific for population and ethnic groups is always recommended. The above mentioned three parameters are most frequently used for the estimation of gestational age, estimate fetal weight and its growth. They are considered as the **'gold standard'** and they collectively assess the gestational age to the highest degree of accuracy.(10, 11, 12) Anatomic dimensions of fetus vary according to the race, nutrition status, build and

geographic location of the origin of the parents. For this reason it is essential to quote both the variation in an individual measurement and the variation within a population and to distinguish between the two when reporting a measurement. Only then will it be capable of reproduction or useful interpretation. (13, 14)

Materials and method- The present study entitled "A Comparative Analysis on 3rd Trimester using Different Fetal Biometric parameters-An Ultrasound study has been conducted upon 200 normal pregnant females between 29th to 39th weeks of gestation, referred from antenatal clinics towards Department of Radio diagnosis, S.N. Medical College and Care Diagnostic Centre, Agra for Ultrasonography to determine fetal Gestational Age.

1. Ultrasonography machine: Sonosite Micromaxx M Turbo.
2. Aqua saline jelly like ultragel
3. Single coated sonographic films
4. Convex Probe Frequency (3-5) MHz.

ABBREVIATIONS USED:

1. Biparietal Diameter (BPD)
2. Foot Length (FOL)
3. Last Menstrual Period (LMP)
4. Gestational Age (GA)
5. Femur Length(FL)

Inclusion and Exclusion Criterion- Normal and Healthy Subjects and Subjects of North Indian Origin are the Inclusion criterion. Subjects with history of trauma and affected limbs are the Exclusion criterion.

Image-02 femur length in 3rd trimester

Image-01 Biparietal diameter in 3rd trimester

Result- Table No.01 Distribution of women according to gestational age in 3rd Trimester

GA according to LMP (in weeks)	No. of pregnant women	%
29	5	2.50
30	12	6.00
31	13	6.50
32	13	6.50
33	10	5.00
34	12	6.00
35	12	6.00
36	10	5.00
37	8	4.00
38	4	2.00
39	1	0.50
Total	100	100.00

Table no. 1 shows distribution of cases according to GA (LMP) in 3rd trimester. Maximum no. of cases (13 i.e. 6.5%) were found in 31st and 32nd weeks whereas minimum no. of cases (1 i.e. 0.5%) were found in 39th week.

Table No.2- Comparison of mean Bi Parietal Diameter of present study with Hadlock's finding according to Gestational Age (Last Menstrual Period) in 3rd trimester

GA according to LMP (in weeks)	Present Study (in mm)	Hadlock (in mm)	% difference
29	70.75	73	-3.18
30	75.08	76	-1.22
31	75.77	78	-2.94
32	78.38	81	-3.34
33	80.80	83	-2.72
34	82.92	85	-2.50
35	84.42	87	-3.06
36	85.50	89	-4.09
37	91.25	90	-1.37
38	86.25	92	-6.67
39	94.00	193	1.06

Table no. 2 shows comparison of mean BPD of present study with Headlock's finding according to GA (LMP) in 3rd trimester. % difference varies from -2.29% to -6.67% in 3rd trimester. Overall trend in both trimesters (in every respective week) shows mean BPD in present study is lower than mean BPD of Headlock's table.

Table No. 3-Distribution of difference of mean Gestational Age according to Last Menstrual Period and Femur Length in 3rd trimester

Mean GA according to LMP (in weeks)	Mean GA according to FL	% difference
29	27.60	-4.83
30	29.71	-0.97
31	29.57	-4.61
32	31.27	-2.28
33	31.81	-3.61
34	32.42	-4.65
35	33.95	-3.00
36	33.94	-5.72
37	34.79	-5.97
38	35.14	-7.53
39	36.61	-6.13

Table no. 3 shows distribution of difference of mean GA according to LMP and FL in 3rd trimester. % difference varies from -0.97% to -8.75% in 3rd trimester. Overall trend is MGA (FL) is lesser than MGA (LMP) in all weeks of both trimesters.

Table No. 4-Comparison of Foot Length values (in mm) of present study with Nomogrm according to GA (LMP) in 3rd trimester

GA according to LMP (in weeks)	Present Study (in mm)	Joshi's (in mm)	% difference
29	56.50	58	-2.65
30	59.71	61	-.216
31	61.00	63	-3.28
32	63.16	65	-2.91
33	66.00	68	-3.03
34	67.92	70	-3.06
35	70.80	73	-3.10
36	72.60	75	-3.30
37	74.90	177	-2.80

Table no. 4 shows comparison of foot length values of present study with Joshi's nomogram according to GA (LMP) in 3rd trimester. % difference varies from -2.16% to -3.30% in 3rd trimester. Overall trend in both trimesters (in every respective week) shows foot length values in present study are lower than mean foot length values of Joshi's nomogram table.

Table No. 05 Correlation between Gestational Age and Bi Parietal Diameter, Head Circumference, Abdominal Circumference, Femur Length & Foot Length

Correlation	r-value	p-value	Significance
GA v/s BPD	0.994	< .001	HS*
GA v/s FL	0.938	< .001	HS*
GA v/s FoL	0.976	< .001	HS*

Table no. 5 shows that there is a high degree of positive correlation between Gestational Age and Bi Parietal Diameter, Femur Length and Foot Length. The correlation coefficient was +0.994, +0.938 and 0.976 which is statistically highly significant i.e. P < .001. As the BPD, FL and FoL increase, GA also increases.

2. DISCUSSION

The Previous study compared the difference between mean Gestational Age (Last Menstrual Period) and mean Gestational Age (Femur length). It was found that mean Gestational Age (Femur length) was lower than mean Gestational Age (Last Menstrual Period) in every week of 3rd trimesters. Table no. 2 showed the distribution of cases according to Gestational Age (Last Menstrual Period) in 3rd trimester. Maximum no. of cases (13 i.e. 6.5%) were found in 31st and 32nd weeks whereas minimum no. of cases (1 i.e. 0.5%) were found in 39th week. In 3rd trimester Gestational Age (Femur Length) was similar to Gestational Age (Last Menstrual Period) in 21% cases with variability of ±1 week in 36% cases. Accuracy of Femur Length to predict Gestational Age had decreased from 28% to 21% in 3rd trimester. Foot Length values (in mm) in present study were lower than Joshi's nomogram in each week of 3rd trimesters.

3. CONCLUSION

Ultrasonography as a method to determine fetal gestation age was found to be a reliable, accurate and safe imaging modality in modern era. Our present study also revealed that the use of multiple fetal parameters results in greater accuracy for gestational age determination. Our study also revealed that fetal foot length measurement as a gestational age assessment tool has proven to be as efficacious as the other commonly used parameters like -Biparietal diameter (BPD) and Femur Length (FL).

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