

# New Gestational Age Parameter - Transverse Diameter of Heart - TDH

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## Abstract

**Introduction:** Fetal growth assessment, for induction and timing of repeat caesarean, relies on accurate gestational age. Various ultrasonography fetal biometry has been used to assess gestational age in practice. This information is invaluable because most obstetrical management decisions are strongly influenced by consideration of fetal development, which closely correlates with fetal age.

**Aim:** To evaluate the accuracy of fetal Transverse Diameter of Heart (TDH) measured by real time ultrasound to predict the gestational age during second & Third diameter and to correlate with FL, BPD, AC, HC to assess variation.

**Materials & Methods:** Prospective Study was carried out at Saveetha Medical College. Total 150 cases attending antenatal clinic in first, second & third trimesters were considered. Routine measurements of FL, BPD, HC, AC along with TDH taken. TDH is taken in mm at closed AV valve junction, outer to outer points in four chamber view of heart.

**Results:** Out of 150 cases 64 were in second trimester, 86 in third trimester. 102 patients had confirmed first trimester gestational age TDH in second & third trimester is more closed to actual gestational age than average gestational calculated by other parameters. The TDH was calculated and found that the variance in the second half (from 28 weeks onwards) was stated to be very less as shown in the tabulated value as variance of 0.01376 as against first half of 0.0393. The population confidence interval was 0.95%. From Predicted value of TDH & confidence interval, we suggest that when compared to other parameters like BPD Bipariteal diameter, HC head circumference FL femur length, AC abdominal circumference - TDH Transverse diameter of heart dimensions are equivalent to actual gestational age from 28 week on wards.

**Conclusion:** TDH can be a useful parameter when LMP is not known. It can be used as additional parameter when ever needed.

**Keywords:** Transverse Diameter of Heart, TDH, Gestational Age Parameter, Fetal Biometry.

## 1. 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 high risk pregnancy and about likely neonatal outcomes. Ultrasonography has advanced obstetric practice by enabling relatively detailed assessment of the fetus in utero. Fetal growth assessment, for induction and timing of repeat caesarean, relies on accurate gestational age. Various ultrasonography

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fetal biometry has been used to assess gestational age in practice. This information is invaluable because most obstetrical management decisions are strongly influenced by consideration of fetal development, which closely correlates with fetal age.

The aim of the current study was to evaluate the accuracy of fetal Transverse diameter of Heart (TDH) measured by real time ultrasound to predict the gestational age during second & Third diameter and to correlate TDH with FL, BPD, AC, and HC to assess variation.

## 2. Materials and Method

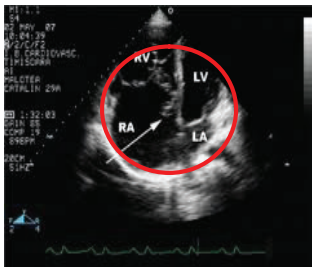
Prospective Study was carried out in Obstetric and gynecology department, Saveetha Medical College, Chennai, Tamil Nadu, India. Total 150 cases attending antenatal clinic in, first, second & third trimester were considered. Each woman had three ultrasonographic measurements – at the first visit - first trimester for ascertaining gestational age, secondly at 18–20 weeks along with fetal anomaly scan, fetal biometry with TDH, thirdly at third trimester along with fetal biometric measurements BPD, HC, AC, FL, transverse diameter of heart were taken. TDH is taken in mm at closed AV valve junction, outer to outer points in four chamber view of heart with 3.5 MHz convex transducer (Figure 1).

## 2.1 Inclusion Criteria

Patients with sure of LMP with regular cycle and those who had first trimester dating Scan, Singleton and Low risk patients.

## 2.2 Exclusion Criteria

Patient with irregular cycle; those without dating Scan; When cardio thoracic ratio greater than 0.50; IUGR; structural



**Figure 1.** TDH is taken in mm at closed AV valve junction, outer to outer points in four chamber view of heart with 3.5 MHz convex transducer.

abnormality and fetal chromosomal abnormality and High risk patients.

If the gestational age from LMP and CRL measurement difference was less than 7 days, the gestational age was based on LMP. If the differentiation was up from 7 days, the gestational age was based on the CRL measurement.

## 2.3 Statistical Analysis

Residual-based Diagnostic Tools for Data Transformation Decisions, with linear regression analysis and confidence interval of 95%.

### 3. Results

Table 1 shows that out of 150 cases, 64 were in second trimester and 86 in third trimester. Among them, 102 patients had confirmed first trimester gestational age.

Table 2 shows measurement of TDH and BPD, HC, AC, FL in various gestational age TDH Transverse diameter of heart dimensions are equivalent to actual gestational age from 28 week on wards. The TDH was calculated and found that the variance in the second half was stated to be very less as shown in the tabulated value as variance of 0.01376 as against first half of 0.0393. The population confidence interval of 0.95%.

Table 3 shows statistical analysis of different variables shows that the growth parameters more predictable in TDH as compared to other parameter. which tends to the linearity of slope at  $m = 1.027$ . The linearity clearly predicts that the TDH parameter is the best comparable parameter as compared to AC, HC, BPD, FL.

## 4. Discussion

This study provides baseline information on the use of TDH which has linear growth throughout gestation. There

**Table 1.** Number of cases TDH done in second & Third Trimester

Second Trimester(16–27 weeks)	64 cases
Third Trimester (28–40weeks)	86 cases
Total	150*

\*Out of 150 cases, 64 cases from 16 weeks to 27 weeks and 86 cases from 28 weeks to 40 weeks. Among them, 102 patients had confirmed first trimester gestational age.

**Table 2.** Measurement of TDH and BPD, HC, AC, FL in various gestational age

Actual age	TDH -mean	By TDH USG/GA	BPD-mm	By-BPD USG/GA	HC-mean	By-HC USG/GA	FL-mean	By-FL USG/GA	AC-mean	By-AC USG/GA
16 weeks	15.7	15.6 weeks	37	17.0	130	16.4	22	16.3	108	16.6
17	16.8	16 wk. 2 days	40	17.1	140	17.6	23	16.6	118	17.3
18	17.9	17.6	43	18.2	152	18.5	27	17.6	128	18.1
19	18.8	18.6	46	19.1	163	19.5	30	18.6	139	19.04
20	19.1	19.3	49	20.7	175	20.6	32	19.6	149	19.7
21	19.9	20.6	52	21.6	187	21.6	35	20.6	161	20.6
22	21.8	21.5	56	23.1	198	22.9	38	21.7	172	21.6
23	22.9	23	59	24.2	210	24.3	41	22.6	183	22.7
24	23.8	23.6	62	25.3	222	25.6	43	23.7	195	23.6
25	24.7	24.6	66	26.6	234	27.6	46	24.6	219	26.0
26	25.6	26.1	69	27.6	245	28.3	48	25.7	231	27.6
27	26.8	27.1	72	29.1	256	29.6	51	27.0	243	28.3
28	27.9	28	74	30.3	267	30.5	53	27.9	254	29.3
29	29	29	76	31.6	274	32.1	56	29.3	254	29.2
30	30.1	30.1	78	32.7	287	33.3	58	30.1	266	30.5
31	30.9	31	80	33.7	296	34.3	60	30.1	277	31.6
32	32.1	32	82	35.1	304	35.2	62	32.0	287	32.7
33	33.0	33	83	36.0	311	36.0	64	33.0	297	33.7
34	34.1	34.2	84	37.0	317	36.6	66	34.0	307	33.6
35	35	35.1	85	37.6	323	37.7	68	34.5	316	34.6
36	36.1	36	86	38.5	327	37.8	69	35.7	324	35.0
37	37	37.2	87	39.4	330	38.0	70	35.5	332	36.6
38	38	38.1	88	39.4	332	38.2	71	36.5	339	38.1
39	39.1	39	89	39.7	333	38.3	71.1	35.5	345	38.2
40	40	40.1	90	40.4	335	38.5	71.2	36.5	352	38.5

**Table 3.** Statistical analysis of different variables

	First Half variance	second half Variance	correlation	Slope
TDH	0.127	0.0137	0.99	1.027
BPD	12.34	15.48	0.977	2.86
FL	3.49	7.92	0.989	2.02
HC	90.48	209.63	0.983	9.122
AC	73	68	0.98	10.58

was a close correlation between heart circumference and gestational age in TDH [1] was found to be a reliable predictor of gestational age from 28 weeks onwards. The inability to ascertain gestational age by ultrasound parameters in the third trimester has proved to be a major cause of undiagnosed fetal IUGR. Since TDH was found to be a

reliable predictor of gestational age in the third trimester in normally growing fetus [1].

Ultrasound has enabled a more accurate estimation of gestational age, allowing for improved detection of the fetus who is small for gestational age and reducing the number of women who are diagnosed as being overdue [2]. The latest biometry namely TDH can be used for assessment of growth and dating in third trimester when LMP not known

Correct assessment of gestational age and fetal growth is essential for optimal obstetric management. In Verburg et al. [3] study for ultrasound dating of pregnancy based on crown-rump length and biparietal diameter, head circumference, transverse cerebellar diameter, abdominal circumference and femur length from 10 weeks of gestational age onwards were compared. Verburg et al. [3] in his conclusion up to 24 weeks of pregnancy, dating by

ultrasound examination provides a better prediction, but in our study TDH after 28 weeks till term it correlates with actual gestational age. Kidney length is a more accurate method of determining gestational age than the fetal biometric indices of biparietal diameter, head circumference, femur length and abdominal circumference between 24 and 38 weeks' gestation [4]. Similar to this TDH is more accurate for gestational age after 28 weeks. As mentioned by [5], more recent data has revealed that ultrasound estimation of gestational age in late pregnancy may be better than indicated in older publications. Still, third trimester sonographic estimates of gestational age should be used with caution, and hence TDH can be used as a new parameter for assessment of third trimester gestational age. As mentioned by Hill et al. [1] in his conclusion that Heart circumference cannot be used as an independent parameter for gestational age evaluation in fetuses with disturbances of growth. Hence TDH can be used as additional biometry for assessment of gestational age when LMP not known.

## 5. Future Scope

Specific biometry charts – Nomo gram for TDH is needed.

This report would be the preliminary study for the future applied study of TDH with other parameters to predict IUGR in Third trimester.

## 6. Conclusion

In Indian population mostly LMP is not known and when menstrual cycle and uterine size are not reliable, correct determination of gestational age is difficult. Since appropriate

estimation of gestational age is of great importance in day to day obstetric practice, in these circumstances TDH will be a useful new parameter to assess gestational age. It can be used as additional parameter to assess gestational age especially in third trimester.

## 7. Acknowledgement

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