

Fetal Biometry in Late 3rd Trimester for Gestational Age Indian Standards

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Abstract

Introduction: Ultrasound (USG) study in antenatal patients is a very valuable tool especially when it comes to estimation of gestational age. Fetal biometry in late 3rd trimester differs very much in Indians compared to their western peers.

Objective: To frame out a fetal biometry chart in late 3rd trimester as per Indian standards and thereby eliminate the chance of being deceived by western charts in the case of term pregnancies.

Materials and Methods: A prospective study was conducted with study sample of 340 cases during a 12-month period. SPSS 16.0 Mann-Whitney *U*-test, the χ^2 for qualitative and students *t*-test for quantitative variables. A *P* = 0.05 was considered significant.

Results: (1) There was definite discrepancy in Indian standard values of fetal biometry, being less than their western counterparts in late 3rd trimester, (2) average fetal weight of Indian babies at term was found 2.9 kg compared to 3.6 kg in western group.

Conclusion: There should be a fetal biometry chart by Indian standards incorporated in USG machines instead of relying on western charts.

Key words: Fetal biometry, Indian standards, Late 3rd trimester, Ultrasound study

INTRODUCTION

Most of the ultrasound (USG) machines incorporate a chart of fetal biometry and gestational age by Western standards, e.g., Hadlock *et al.*,¹ Sabbagha *et al.*,² Jeanty *et al.*,^{3,4} and Campbells *et al.*⁵ Even though fetal age estimation by USG in late pregnancy is not a reliable method, we intend to frame a chart for the 3rd trimester fetal biometry by Indian standards. There is definite deviation of values to the lower side in comparison to western charts.

Aim of Study

1. To establish a variation in fetal biometry in 3rd trimester in Indian population comparing with the western population

2. To develop a nomogram for the Indian population in relation to fetal biometry for gestational age in late 3rd trimester.

Inclusions Criteria

- Only cases with early documented gestational age were included
- Biparietal diameter (BPD) and femoral length (FL) were the two main parameters considered. Abdominal circumference (AC) and head circumference (HC) also noted
- Estimated fetal weight calculation was noted from the default chart in USG machines.

Exclusion Criteria

- Macrosomic babies outside 10th and 90th percentile expected for Indian standards were excluded
- Grossly obese mothers excluded due to less clarity in imaging
- Cases of oligohydramnios
- Cases of growth retardation/fetal anomalies
- Other parameters such as humeral length, binocular

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distance, and cerebellar measurements were not considered.

MATERIALS AND METHODS

We had a study of fetal biometry and fetal age correlation of babies beyond 32 weeks of pregnancies in Kannur Medical College OBG Department during a 12-month period from July 1, 2013, to June 30, 2014, and data from 340 cases during the period were collected and analyzed.

The cases selected was from booked antenatal cases attending our clinic and also from those in our study group for elective induction at 38 weeks + gestation.

Most of these cases had 1st and 2nd trimester (around 20 weeks) USG reports with reliable documentation of gestational age. The cases included primigravida as well as multigravida. The USG was done by the first author with 19 years expertise in obstetric USG scanning.

The machine used for the purpose was Wipro Logic Alpha 200 and a curvilinear abdominal probe with 3.5 MHz frequency was used.

RESULTS

Its observed that average baby in India weighs 2.8-3 kg by 38-40 weeks, whereas by western standards average baby weight at term is 3.6 kg.

It is observed that up to 32 weeks the biometry - BPD, FL, AC, HC parameters do not differ much between western and Indian standards. From 32 weeks onward, there are lesser values for the above parameters in Indian babies compared to corresponding periods of Western babies. This disparity is seen widened as age advances.

The above disparity is explained perhaps by racial and ethnic reasons of Indian babies being less in weight to their western peers. The following chart of Indian versus Western standards of fetal biometry is self-illustrative.

Table 1 showing Western versus Indian standards of fetal biometry from 32 to 40 weeks.

Fetal biometry and estimated fetal weight Western versus Indian standards at 37 and 38 weeks (Figure 1).

Fetal biometry and estimated fetal weight Western versus Indian standards at 39 and 40 weeks (Figure 2).

By the study, we have developed a chart of fetal biometry and estimated fetal weight for gestational age 32-40 weeks

Table 1: Western Vs Indian chart for Fetal biometry-32 to 40 weeks

| Weeks | BPD (cm) | | FL | | HC | | AC | | EFW (kg) | |
|-------|----------|-------|------|-------|------|-------|------|-------|----------|-------|
| | West | India | West | India | West | India | West | India | West | India |
| 32 | 7.9 | 7.9 | 6.3 | 6 | 29.7 | 28.5 | 28 | 26.8 | 1.81 | 1.72 |
| 33 | 8.2 | 8 | 6.5 | 6.1 | 30.4 | 28.8 | 29 | 28.2 | 2.01 | 1.9 |
| 34 | 8.4 | 8.1 | 6.6 | 6.3 | 31.2 | 29.2 | 30 | 28.7 | 2.22 | 1.99 |
| 35 | 8.6 | 8.3 | 6.8 | 6.6 | 31.8 | 30 | 30.9 | 29.6 | 2.43 | 2.15 |
| 36 | 8.8 | 8.5 | 7 | 6.7 | 32.5 | 30.9 | 31.8 | 30.1 | 2.65 | 2.3 |
| 37 | 9 | 8.6 | 7.2 | 6.9 | 33.6 | 31.3 | 32.7 | 31.3 | 2.89 | 2.45 |
| 38 | 9.1 | 8.7 | 7.3 | 7 | 33.6 | 31.5 | 33.6 | 32.5 | 3.15 | 2.62 |
| 39 | 9.3 | 8.8 | 7.5 | 7.1 | 34.1 | 32.1 | 34.5 | 32.7 | 3.36 | 2.78 |
| 40 | 9.5 | 9 | 7.6 | 7.2 | 34.5 | 32.9 | 35.4 | 33.4 | 3.52 | 2.96 |

EFW: Estimated fetal weight, BPD: Biparietal diameter, FL: Femural length, HC: Head circumference, AC: Abdominal circumference

in Indian population. Our study correlates well with the study of Rajan *et al.*,⁶⁻⁸ 1993 both in fetal biometry and estimated fetal weight.

Variation of estimated fetal weight from 32 to 40 weeks in Western versus Indian standards (Figure 3).

DISCUSSION

The duration of pregnancy is classically described in menstrual age by adding 40 weeks to the last menstrual period (Nagle's rule). The clinical application of USG in obstetrics was introduced and popularized by Ian Donald in Glasgow in 1958. Nowadays the real-time imaging with high-resolution probes has revolutionized antenatal USG study. The most effective way to date pregnancy is by USG even though late 3rd trimester scan for gestational age is not that reliable.

The variation in gestational age calculation by USG, 1st trimester \pm 7 days, 2nd trimester \pm 10-14 days, 3rd trimester \pm 14-21 days.

The formula for estimated fetal weight shows an error up to \pm 10% of the predicted value.

In our study, we have compared our findings taking Hadlock *et al.*,⁹ as the main western representative as this is the default chart provided in most of the USG machines.

All the Western standard charts show a BPD at 40 weeks ranging from 95 to 98 mm (baby weight - 3.5-4 kg) whereas Rajan *et al.*, and our study (Indian standards) show average BPD 90 mm with estimated fetal weight (EFW) around 2.9-3 kg. Hence, unless the reporting sonologist take this into consideration, a 40 weeks Indian baby maybe reported as 36-37 weeks by Western standards. This discrepancy is there in FL, HC, and AC as well.

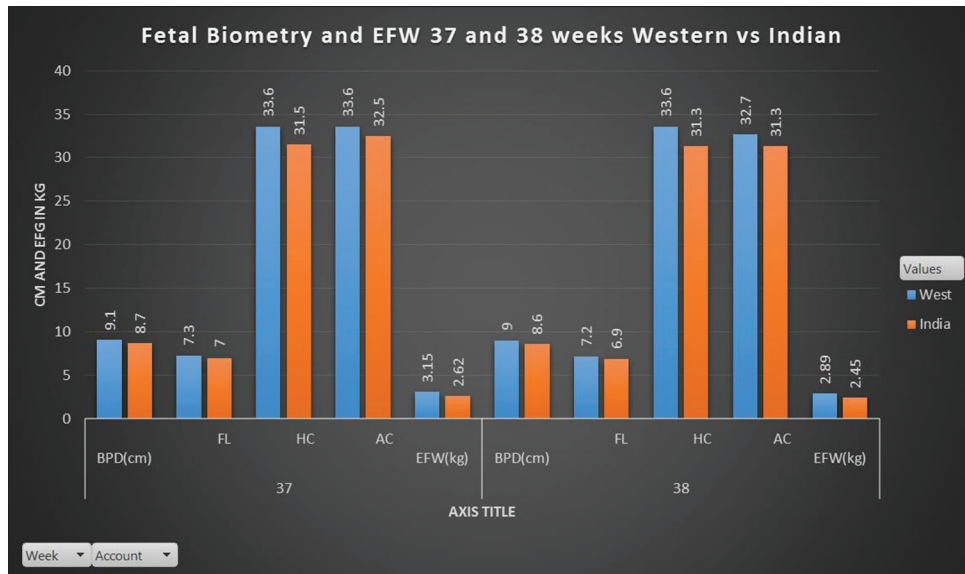


Figure 1: Fetal biometry and estimated fetal weight 37 and 38 weeks Western versus Indian

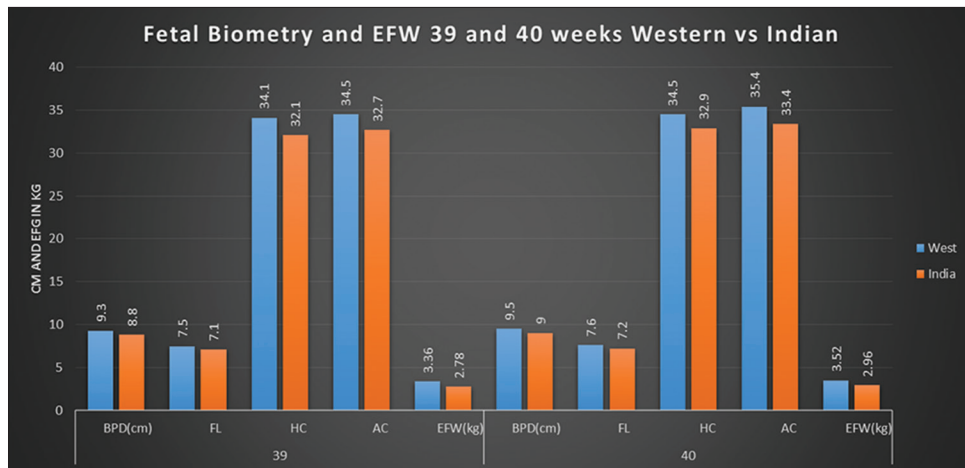


Figure 2: Fetal biometry and estimated fetal weight 39 and 40 weeks Western versus Indian

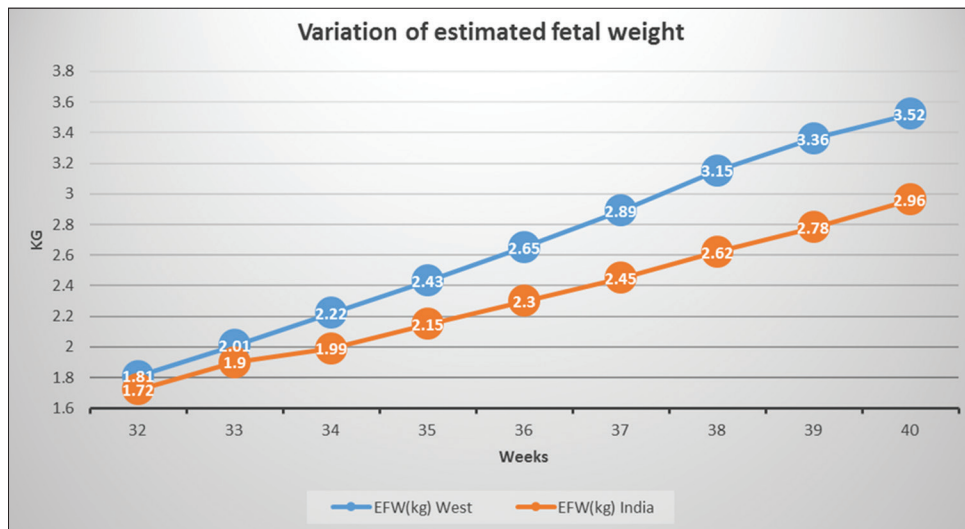


Figure 3: Variation of estimated fetal weight

The status of placental grading AFI and BPP has to be considered in this context. A biophysical profile and a Doppler study in high-risk pregnancies were considered near term.

There are many tables and normograms that describe the normal growth of various fetal parameters. Thenormograms developed for a particular population need not be true for another population especially in late 3rd trimester and we are highlighting the above point in our study.

CONCLUSION

Newborn in India weighs <3 kg, whereas Western newborns weigh 3.6 kg in an average. Hence toward term, there is a discrepancy in all fetal biometric parameters between Indian babies and their Western counterparts. However, the EFW shows a real value as it depends on the actual biometry recorded. BPD and FL are the best parameters for fetal age in late pregnancy, but the fetal weight is mainly reflected by the AC. An experienced sonologist and a machine with good resolution are a must for a true evaluation. In our study, an average gain in weight of 160 g per week is observed from 36 to 40 weeks. Always a reliable 1st trimester scan will help a lot when there is confusion.

Hence, at least, some of the obstetricians who are unaware of the above situation may be deceived by sonology report done outside. Hence, even though a late trimester scan is not that reliable for gestational age, the obstetrician should be always vigilant about the above scenario.

We make a conclusion that all the machines should have software for fetal biometry and estimated fetal weight with Indian standards as framed out in our study.

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