



BIRTHWEIGHT STANDARDS IN SERVICES BABIES

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ABSTRACT

Objective:-To construct centile charts for birth weight for infants born during August 2008 to April 2016 from 33 weeks to 42 weeks in service hospitals in Central & North India

Study design:-Cross-Sectional, Retrospective study

Subjects: -- All consecutive live born singleton infants from 33 weeks to 42 weeks of gestation in various service hospitals in Central & North India.

Methods: - Data was collected for birth weight from various service hospitals of central and North India from August 2009 to April 2016 from 33 weeks to 42 weeks. Percentiles curves were created separately for the male and female infants.

Results:- Curves for weight percentiles at birth were created from a total of 5355 babies comprising of 2736 males and 2619 females. The mean birth weight in male babies was 3125 grams and that in female babies was 2956 grams. The mean birth weight of male babies was higher as compared to females. As compared to other Indian growth curves the mean birth weight in this study was higher by 40 Gms to 120 gms, but lower across all gestations and centiles as compared to international data.

Conclusion: -- The updated centile charts in this study may be used as a reference charts for the birth weight for the country, as the study has been designed in the babies of services personal coming from all parts of India.

KEYWORDS : Birth centile, Growth curves, Gestational age, Anthropometry, Indian infants

Birth weight for gestational age is universally used as a measure for intra uterine growth. It is most commonly used for assessment of size of baby and is strongly associated with fetal, neonatal & post neonatal, infant and child mortality and long term growth and performance(1). Birth weight for gestational age is often used as an indirect measure of fetal growth. Although true growth depends on serial increase in size over two or more time points during gestation. In the absence of valid and precise ultrasonography or other non invasive measures to assess true fetal growth in utero, birth weight for gestational age is used as an overall index of fetal growth from the time of conception to the moment of birth.(2). There is a general consensus that sex specific fetal growth standards are appropriate.(1). Female infants are smaller at any given gestational age than male infants, yet they are at a lower risk for mortality & morbidity than males of the of the same gestational age.(1,3,4,5)

Lubchenco & her co workers (6) in 1963, were first to present intra uterine growth norm in the form of centile curves, head circumference and crown heel length. Since then many growth curves have been published by different workers reflecting growth patterns of diverse population in various parts of the world. In India, there has been lot of work, on intra uterine fetal growth standards from different parts time to time. The disadvantage of cross sectional growth curve is that they are developed from anthropometric data at different gestational ages to represent longitudinal growth of fetus in utero. The growth curves based on ultrasonography estimated fetal weight have the question of accuracy. A comprehensive axiological evaluation of the neonate should consider not only weight, length and head circumference at birth but also fetal ultrasound biometry and Doppler velocimetry.(7)

The present study attempts to have intrauterine growth of a cross section of Indian population. The personal in services comprise of individuals from all parts of India and all the ethnic groups.

Methods

This was a retrospective cross sectional study conducted over 08years (July 2008 to April 2016) at various services hospitals. All the live born delivered during the study period were included in the study and ethical approval was obtained. Gestational age was estimated by first day of LMP & where LMP was unknown or in clinically discrepant cases, it was confirmed by clinical assessment using new Ballard's scoring system. If the difference between LMP and scoring was more

than two weeks then gestational age as estimated by new Ballard's score was included. Birth weight was measured within 24 hours of birth on the digital weighing scale to nearest +2gms. The details which were recorded for enrolled newborns, name and age of mother, address, ethnic group, maternal occupation & educational level, obstetric history & medical illness history, LMP & EDD, Apgar score, weight, sex, and anthropometry.

The mean SD and 10th and, 90th centiles of each variable at each gestation were computed for all for all live born infants, there after centile charts & growth curves were constructed with statistical analysis. Still births, multiple pregnancies, gross congenital malformation, infants born to diabetic mothers or mothers with medical illness were excluded from this study.

There were a total of 5355 newborns, of which males were 2736 & females 2619. The number of term babies was 4830 and that of preterm babies was 449. Out of term babies, 4027 were AGA, 251 LGA & 552 SGA. The mean birth weight in male babies was 3125grams and that in female babies was 2956grams. There were a total of 773 low birth weight babies out of which 552 were term SGA & 221 were preterm. Amongst low birth weights in the range of less than 2500gms to 1500gms there were 201 babies, and in the range of less than 1500 gms to 1000 gms there were 17 newborns and only 03 babies in the range of <1000 gms.

Relation of Maternal variables, medical illness and obstetric causes with birth weight (n=5355)

| Age of mother | No of mothers | No of LBW newborns |
|--------------------------|---------------|--------------------|
| <18 yrs , | 187(3.5%) | 21 |
| 18 to 35 yrs, | 4273 (79.8%) | 166 |
| 36 to 40 yrs, | 921 (17.2%) | 99 |
| >40 yrs | 295(5.5%) | 35 |
| Antenatal care | | |
| Booked | 95% | |
| Unbooked | 05% | |
| Institutional deliveries | 100% | |
| Height | no- | , |
| <155 cm, | 536 (10%) | 44 |
| 155to165cm | 3213(60%) | 149 |
| 165 to 170 cm, | 1339(25%) | 96 |
| >170cm | 268 (5%) | 32 |

| | | |
|-----------------------------|-------------|-----|
| Parity | no- | |
| Primigravida, | 2142(40%) | 139 |
| Multipara>1, | 2945(55%) | 93 |
| Grand multipara>2 | 268(5%) | 89 |
| Education | no | |
| <matriculate, | 1339 (25%) | 124 |
| Matriculate | 2838(53%) | 149 |
| Graduate | 1178(22%) | 48 |
| Mother' weight(first visit) | | |
| <50 kg | 1285 (24%) | 66 |
| 50--55kg | 3159 (59%) | 225 |
| >55kg | 561 | 30 |
| Maternal hemoglobin | | |
| <7gm% | 107 (2%) | 29 |
| 7-10 gm% | 1017 (19%) | 219 |
| >11 gm% | 34230 (79%) | 102 |

| | | |
|---------|------------|----|
| Smoking | 348 (6.5%) | 93 |
| Alcohol | 268(5%) | 67 |

| | | |
|----------------------------------|------------------|-------------------------------|
| Hypertension in pregnancy | 1071(20%) | No of LBW newborns-207 |
| Hypothyroid | 321(6%) | 28 |
| Heart diseases | 28(0.5%) | 12 |
| GDM | 160(3%) | 52 |
| Oligohydramnios | 295 (5.5%) | 130 |
| Polyhydramnios | 64(1.2%) | 26 |
| Anemia | 107 (2%) | 39 |
| Bad Obstetric History | 268(5%) | 67 |
| Twins | 268(5%) | 139 |

Table: 1. Birth weight for each week of gestation for male=2736 and female =2619

| Gestation in weeks | Male | | | | | | Female | | | | | |
|--------------------|-------------|----------|-------|------------|--------|--------|-------------|--------|-------|------------|--------|--------|
| | Number | Mean | SD | Percentile | | | Number | Mean | SD | Percentile | | |
| | | | | 90 | 50 | 10 | | | | 90 | 50 | 10 |
| 34 | 21 | 2154.005 | 58.51 | 2250.9 | 2165.0 | 2050.7 | 12 | 1985.0 | 182.4 | 2223.8 | 1968.9 | 1659.7 |
| 35 | 24 | 2372.5 | 59.45 | 2474.4 | 2372.8 | 2268.3 | 15 | 2140.0 | 106.6 | 2328.4 | 2142.6 | 2005.8 |
| 36 | 48 | 2491.9 | 77.51 | 2639.9 | 2495.6 | 2357.1 | 78 | 2326.9 | 82.3 | 2490.3 | 2321.9 | 2180.6 |
| 37 | 258 | 2653.5 | 50.50 | 2738.5 | 2652.6 | 2549.6 | 186 | 2528.7 | 80.0 | 2663.5 | 2531.8 | 2371.7 |
| 38 | 354 | 2792.5 | 37.50 | 2866.0 | 2792.4 | 2720.0 | 483 | 2689.8 | 96.5 | 2881.0 | 2684.8 | 2517.2 |
| 39 | 789 | 2889.2 | 55.40 | 2992.9 | 2889.1 | 2789.1 | 675 | 2813.8 | 102.0 | 3009.9 | 2810.9 | 2631.1 |
| 40 | 888 | 2952.3 | 60.90 | 3066.9 | 2951.3 | 2840.3 | 819 | 2892.3 | 87.0 | 3065.9 | 2889.1 | 2736.7 |
| 41 | 255 | 3045.4 | 54.60 | 3152.5 | 3044.0 | 2947.4 | 231 | 3015.6 | 79.0 | 3155.7 | 3007.6 | 2871.8 |
| 42 | 57 | 3100 | 73.25 | 3215.5 | 3100.4 | 2946.9 | 99 | 3105.4 | 71.0 | 3236.7 | 3102.8 | 2978.9 |
| 43 | 42 | 3203.6 | 69.23 | 3312.8 | 3202.4 | 3059.8 | 21 | 3228.6 | 136.1 | 3439.6 | 3221.5 | 3044.1 |
| Total | 2736 | | | | | | 2619 | | | | | |

Figure: 1.1 Percentile curve for birth weight at different gestations male

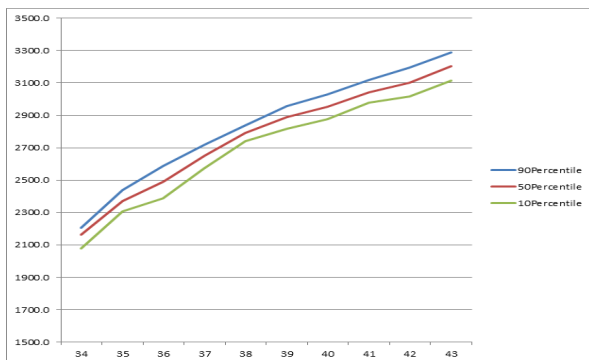


Figure: 1.2 Percentile curve for birth weight at different gestations Female

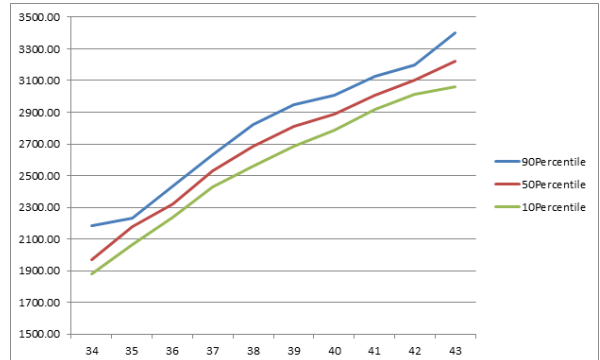


Table: 2. Birth Head circumference for each week of gestation for male=273 and female =2619

| Gestation in weeks | Male | | | | | | Female | | | | | |
|--------------------|-------------|-------|------|------------|------|------|-------------|------|------|------------|------|------|
| | Number | Mean | SD | Percentile | | | Number | Mean | SD | Percentile | | |
| | | | | 90 | 50 | 10 | | | | 90 | 50 | 10 |
| 34 | 21 | 30.2 | 0.38 | 30.5 | 30.2 | 29.9 | 12 | 30.9 | 0.53 | 31.5 | 30.9 | 30.3 |
| 35 | 24 | 31.9 | 0.20 | 32.2 | 31.9 | 31.7 | 15 | 32.0 | 0.32 | 32.4 | 32.0 | 31.7 |
| 36 | 48 | 31.9 | 0.20 | 33.1 | 32.8 | 32.3 | 78 | 32.4 | 0.23 | 32.7 | 32.4 | 32.1 |
| 37 | 258 | 33.3 | 0.24 | 33.6 | 33.3 | 33.0 | 186 | 32.9 | 0.14 | 33.1 | 32.9 | 32.7 |
| 38 | 354 | 33.6 | 0.21 | 33.9 | 33.6 | 33.3 | 483 | 33.3 | 0.21 | 33.6 | 33.3 | 33.0 |
| 39 | 789 | 33.7 | 0.19 | 34.0 | 33.7 | 33.5 | 675 | 33.6 | 0.16 | 33.8 | 33.6 | 33.4 |
| 40 | 888 | 33.8 | 0.21 | 34.1 | 33.8 | 33.6 | 819 | 33.6 | 0.20 | 33.9 | 33.6 | 33.4 |
| 41 | 255 | 34 | 0.17 | 34.2 | 34.0 | 33.8 | 231 | 33.9 | 0.18 | 34.1 | 33.9 | 33.7 |
| 42 | 57 | 34.2 | 0.18 | 34.4 | 34.2 | 34.0 | 99 | 34.1 | 0.23 | 34.4 | 34.1 | 33.8 |
| 43 | 42 | 34.35 | 0.13 | 34.5 | 34.4 | 34.2 | 21 | 34.3 | 0.38 | 34.8 | 34.2 | 33.9 |
| Total | 2736 | | | | | | 2619 | | | | | |

95% of the pregnancies were booked in the hospital before 20 weeks of gestation and 40 % of mothers were primiparous. The incidence of PIH was-20%.

On superimposing our charts for the 10th, 50th and 90th centiles, our babies both preterm and term were almost or slightly higher than the Indian baby's centiles. Similar pattern was noted for both sexes.

When weight centiles were compared with the Lubchenco charts, the

Canadian and Scottish data, birth weights were lower across all the gestations and centiles. Superimposition of study centiles of male infants on the recently published North American centiles revealed, lower birth weights for the 50th and 90th centiles at term gestation. and similar birth weights for the 10 th centiles across all gestation.

Discussion

The study presents the centiles , means. Standard deviations and curves of birth anthropometry in a large cohort of neonates for weight. It is the

first study of its kind in services which may represent a true picture of trends in our country for the birth weight. There were not many babies in the lower age groups so the data was constructed from 33 weeks onwards. The incidence of prematurity, low birth weight and obstetric morbidities like maternal diabetes, hypertension and multiple pregnancies was much lower as compared to national figures.

The study meets the standards required to obtain an ideal reference growth chart. The data includes singleton babies born from a multiethnic group and the best method for gestational age estimation (first trimester based ultrasound dating) was used in 100% of the included infants as all of them were registered in our hospital. The gold standard LMS method was used for estimating the centiles curves.

There has been a secular trend of increasing birth weight at higher gestational ages. This was also evident in our study. The mean birth weights were higher after 34 weeks our study as compared to previous studies. The mean birth weights were higher by 150 to 250 grams at term gestation. This was more significant in babies born to mothers from hills and north east India. Lubchenco charts are still used worldwide to classify the babies at birth into small for gestational age (SGA) and large for gestational age (LGA). On comparing with Colorado charts and other international growth charts, the birth weight in our babies was lower. Population specific and updated growth charts should be used for the classification of infants in to SGA, AGA, and LGA.

Ideally at each gestational age there should be 100 babies for estimating centiles and to prepare smoothened centiles. Our data lacks this. There were not many babies at gestational ages less than 33 weeks in our study.

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