



Centile Chart for Birth Weight of Newborns in a Tertiary Care Centre in Kerala, India

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Abstract

Anthropometric measurements of newborns are important clinical indicators widely used for evaluation of prenatal growth. A study was conducted to find the mean birth weight of full term neonates and to construct a centile chart of birth weight for them. 1000 live born full term neonates in a tertiary care centre were included in the study. Birth weight was measured soon after birth using a digital weighing machine. The data obtained was analysed and mean weight, standard deviation and centiles were calculated and centile chart was constructed. The mean birth weight for male babies was 2730g with a standard deviation of 0.458. The mean birth weight for female babies was 2708g with a standard deviation of 0.450. The 3rd centile for weight was 1800g and 97th centile was 3600g. The study showed that the mean birth weight and centiles were comparable with the Indian standards and with those of developing countries while all centiles fell short of international standards.

Keywords: Birth centiles, Gestational age, Anthropometry, Indian infants.

Introduction

Anthropometric measurements of newborns are important clinical indicators widely used for evaluation of prenatal growth. It also helps in identification of neonates who require detailed assessment and close monitoring during neonatal period. Neonates whose birth weights are too low or too high have higher mortality or morbidity than those with appropriate weight. They are at increased risk of complications such as peripartum asphyxia, birth trauma, congenital malformation and hypoglycaemia^{[1][2][3]}. Charts showing distribution

of these measurements at each gestational age gained wide acceptance after Lubchenco and colleagues^[4] presented intrauterine growth charts in their 1963 article. The article recommended the use of such charts in evaluating the nutritional status of newborn and the post natal growth of premature infants.

Various studies have formulated dozens of gestational age specific weight standards which are being widely used^{[4][5]}. However significant differences exist among various standards. These include data sources (hospital or population based),

population composition, geographic regions, measurement of gestational age, and criteria of subject exclusion etc^[6]. In this study, mean anthropometric measurements of newborn babies were taken and a centile chart was prepared with an intention to create a standard of reference for Kottayam Medical College, Kerala

Methods

The study was conducted from January 2005 to January 2006 at Government medical college, Kottayam on 1000 term newborns. Live born full term (completed 37 weeks of gestation) babies were included. Gestational age was calculated from Last Menstrual Period (LMP) or antenatal Ultrasonogram done before 20 weeks of gestation. Infants born to mothers with medical conditions or complications of pregnancy were not excluded because the aim was to construct community at large centile charts, rather than those of healthy population. Infants with chromosomal abnormalities, indeterminable gestational age and who were in a moribund condition were excluded.

Weight was measured within 12 hours of birth using the same weighing machine with a variability of +/- 10g. The data so obtained was analysed by standard statistical methods. The mean, standard deviation, and various centiles (3rd, 5th, 10th, 25th, 50th, 75th, 90th, and 95th) were computed. The values were calculated separately for males and females and centile charts were constructed.

Results

1000 full term babies were studied. Of these 484 were males and 516 were females (M:F::1000:1070). The mean birth weight was 2730g for males with a standard deviation of 0.458. The minimum weight measured for males was 1000g and maximum was 4500g. The median weight was 2700g and mode was 2500g. The mean birth weight for females was 2708g with a standard deviation of 0.450. The minimum weight measured for females was 1300g and maximum was 4250g. The median weight was 2700g and mode was 2500g.

The difference in the mean weight between male and females is not statistically significant (p value=0.468)

Out of 1000 babies studied, the average birth weight was 2720g. 250 babies had weight less than 2500g (LBW). This constituted 25% of the study population. Only 7 babies weighed more than 4000g (0.7%)

Table 1. Weight (kg)

	Male	Female	p value	t value
Mean	2.730	2.708	0.468	0.73
SD	0.458	0.450		

The 3rd, 5th, 10th, 25th, 50th, 75th, 90th, 95th and 97th centiles were calculated for weight.

Table 2 Centile chart for weight (kg)

Centile	Total	Male	Female
3 rd	1.8	1.75	1.8
5 th	2.0	2.0	1.95
10 th	2.2	2.2	2.2
25 th	2.45	2.5	2.45
50 th	2.7	2.7	2.7
75 th	3.0	3.0	3.0
90 th	3.25	3.25	3.25
95 th	3.5	3.5	3.45
97 th	3.6	3.6	3.6

Discussion

This study was conducted in a tertiary care centre in Kerala which caters to at least three districts in the state and is representative of its population. The mean birth weight in the present study was 2730g for males and 2708g for females. This corresponds well to the average birth weight in India (2800g). The study finding also correlates with studies conducted in developing countries like Nepal^[7] and Bangladesh^[8].

Table 3 Comparison of mean birth weight (Kg)

Study	Mean birth weight
Nepal ^[7]	2.587
Bangladesh ^[8]	2.679
Present	2.72

The mean birth weight in this study is low when compared to values from developed countries. The measurement of weight when plotted as percentages at each normal centile showed a skewing towards

left indicating that the values at each centile were lower than the normal curve. All the centiles for weight were found to be low when compared to Lubchenco's centile chart. Many studies from developed countries including China^[9] and Canada^[10] show similar higher centile values, more so with the higher centiles (90th and 97th)

Table 4. Comparison of birth weight centiles (Kg)

Study	10 th	25 th	50 th	75 th	90 th
Lubchenco ^[4]	2.6	2.9	3.2	3.5	3.8
Chinese ^[9]	2.65	2.85	3.15	3.4	3.75
Present	2.2	2.45	2.7	3.0	3.25

Applying these standards to babies born in countries like India may unnecessarily show higher percentage of small for gestational age (SGA) babies and smaller number of large for gestational age (LGA) babies. So it's always better to have our own centiles for comparison than blindly following the western standards. This shows the relevance of the present study. The study included 1000 babies with appropriate number of male and female babies. Even though the study was done in a statistically significant number of babies which gives useful information about the reference standards for birth weight of Indian babies, it still has some limitations. All babies with gestational age above 37 weeks were grouped together and preterm deliveries were not included in the study. Gestational age specific centile charts would have been more relevant. Maternal risk factors, nutritional status and height, all of which could affect the fetal growth, were not taken into consideration. The study was conducted in a referral centre which deals with a greater number of antenatal complications. This could have contributed to the lower birth weight centiles noted.

Conclusion

The mean birth weight and weight centiles are low in developing countries like India when compared to the developed countries, as shown by this study also. Each country should have its own gestational age specific centile charts to avoid false labelling of babies into various high risk groups. A multicentric study for this purpose is needed in each country.

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