Anthropometric measurements of term neonates in tertiary care hospital of Wardha district

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Abstract: *Objective:* The present study was undertaken to find the anthropometric parameter like birth weight (BW), length, occipitofrontal circumference(OFC), midarm circumference(MAC), chest circumference (CC), midthigh circumference(MTC) and maximum calf circumference (MCC) of normal healthy neonates at birth which can be used to draw growth chart. *Study design:* Hospital based cross-sectional study. This study was done in the pediatric department of AVBRH hospital, Sawangi (Meghe), Wardha from April 2012 to August 2012. *Materials and methods:* 211 full terms, normal, singleton newborn babies were included BW, length, OFC, MAC, CC, MTC and MCC were taken within 72 hours of birth. *Results:* Of the 211 neonates 115 (54.5%) were male and 96 (45.5%) female. The mean BW, length, OFC, MAC, CC, MTC and MCC were 2.815(0.28) kg, 51.15(3.31) cm, 33.52(1.92) cm, 10.12(1.30) cm 28.66(2.52) cm, 14.33(1.74) cm and 10.58(1.20) cm respectively. No statistically significant difference was present in the anthropometric parameter of boys and girls. *Conclusions:* This study establishes local normal values for anthropometric measurements for healthy, full term newborn in wardha district. To develop our population data, community based studies should be conducted regularly.

Keywords: Neonates, Birth Weight, Length, Occipitofrontal circumference, Midarm circumference

Introduction

Anthropometry is the measurement of physical dimensions of the human body at different ages. Anthropometric measurements can assess growth cross sectionally or longitudinally. When assessing intrauterine growth, the anthropometric parameters in neonate at birth are considered to be of great value. Comparison of these measurements with standards measurements provides a reliable and simple method of identifying the infant that deviates from the normal. The determination of birth indices is essential in population from different locations for planning their subsequent children growth chart [1]. WHO released new standards for assessing the growth and development of children from birth to five years of age in April 2006 [2].

The physical growth of a newborn is evaluated by comparing body measurements such as weight, length and OFC, with standards established in Western countries. These reference standards have a limited international comparative value, as they are obtained from white Caucasian populations. Various studies have been done on anthropometric standards at birth from other parts of the world [3-6]. The ideal is to establish local national growth chart reflecting each country own genetic characteristics and prepared according to the features mentioned by WHO. The aim of our study was to measure the weight, length, OFC, MAC, CC, MTC and MCC of term neonates born in a rural hospital in Wardha district and to determine the percentile values in this sample.

Material and Methods

This study was carried out in the Pediatric department, AVBRH hospital, Sawangi (Meghe), Wardha. AVBRH hospital being a tertiary care hospital situated in a rural area and all types of deliveries take place here. It was a hospital based cross-sectional study. The study was done on 211 live born neonates who were born during the month of April 2012 to August 2012. All newborn infants were term babies (gestational age 37-42 weeks). Babies of mothers with risk factors, premature, and malformed babies were all excluded.

Equipments used during the study were of flexible, non-stretchable measuring tapes, electronic weighing machine, and infantometer. Nude weight of the baby was taken in a beam balance electronic measuring scale. Length were recorded to the nearest of 0.1cm on an infantometer with baby supine, knees fully extended and soles of the feet held firmly against the foot board and head touching fixed board.

OFC was measured by putting the measuring tape anteriorly at glabella and posteriorly along with the most prominent point. MAC was measured midway between acromion process and olecranon process of left arm to the nearest of 0.1cm by measuring tape. CC was measured at the level of xiphoid cartilage by measuring tape to the nearest of 0.1cm. The MTC was measured by putting the baby on his right side and measure the circumference on the point over the left quadriceps muscle midway between the hip and knee joints. MCC was measured at the most prominent point in the semiflexed position of the leg.

All the measurements were recorded by trained social worker within 48 hour of birth. The anthropometric measures of newborn babies are presented as mean and standard deviation. The 2-tailed t-test was used to compare all variables by using STATA software 10.0 version. A significant statistical difference of variables was considered when p-value≤0.05.

Results

Of the 211 neonates 115 (54.5%) were boys and 96 (45.5%) girls given a girl: boyratio of 1:1.19. The mean BW, length, OFC, MAC, CC, MTC and MCC were 2.815(0.28) kg, 51.15(3.31) cm, 33.52(1.92) cm, 10.12(1.30) cm, 28.66(2.52) cm, 14.33(1.74) cm and 10.58 (1.20) cm respectively.

Table 1. shows the mean, standard deviation and p-value of the above measurements in relation to gender. For BW of boys it was 2.83± 0.29kg, while for girls it was 2.79± 0.25 kg, with no significant difference (p-value > 0.05). Regarding length, it was 51.39± 3.01cm for boys and 50.86± 3.64cm for girls, with no significant difference (p-value> 0.05). The OFC for boys was 33.62± 1.39cm, while for girls it was 33.49± 2.41cm, with no significant difference(p-value>0.05).

Regarding MAC, for boys it was 10.1± 1.21cm, while for girls it was 10.28±1.38cm with no significant difference (p-value>0.05). The CC was 31.83±2.54cm and 31.41±2.46cm for boys and girls respectively with no significant difference (p-value>0.05). The MTC was 14.23 ± 1.90cm for boys and 14.44 ±1.54cm for girls with no significant difference (p-value>0.05). The MCC was 10.55 ± 1.27cm for boys and 10.61 ± 1.11cm for girls with no significant difference(p-value>0.05). Table 2 shows the percentiles (3rd, 50th and 95th) of all the studied anthropometric measurements.

Table-1: The mean, standard deviation, and p-value of measurements according to gender differences			
Variables	**Male (n=115)**	**Female (n=96)**	**P value**
BW (Kg)	2.83(0.29)	2.79(0.25)	0.855
Length(cm)	51.39(3.01)	50.86(3.64)	0.876
OFC(cm)	33.62(1.39)	33.49(2.41)	0.265
MAC(cm)	10.1(1.21)	10.28(1.38)	0.056
CC(cm)	31.83(2.54)	31.41(2.64)	0.877
MCC (cm)	10.55(1.27)	10.61(1.11)	0.360
MTC(cm)	14.23(1.90)	14.44(1.54)	0.192

Table-2: Shows the percentiles (3rd 50th and 95th) of all the studied measurements			
Variables	3rd percentile	50th Percentile	95th Percentile
BW (Kg)	2.5	2.75	3.4
Length(cm)	46	51	57.4
OFC(cm)	30	33	35
MAC(cm)	8	10	12
CC (cm)	28	31	39
MCC(cm)	09	10.8	12.82
MTC(cm)	09	15	16.82

Discussion

Anthropometry is an effective and frequently performed child health and nutrition screening procedure. The value of physical growth data depends on their accuracy and reliability, how they are recorded and interpreted. Birth weight data indicate the important role of geographic location as an environmental factor on fetal growth. Various studies have shown that male babies are larger than the female babies [6-7]. Similar finding was present in our study group. The findings of the present study are consistent with these observations. Always attention should be given to ethnic, social, economic and geographic variation, when comparing BW or other physical parameters. Therefore, it is difficult to compare our results with those already published for other population groups.

Ratnayake A et al [7] reported the mean birth weights are 2795.8g and 2940.0g in different groups. Studies done in other countries like Bangladesh [8] and Sudan [9] where birth weights were recorded as 2.889 kg and 3.027 kg respectively. The mean length of 48.2 cm in a series of 100 full-term babies, reported by Gomes [10] is much lower than the values of 51.15cm was found in the present study. Akram et al [11] reported a value of 46.8 cm for the length. Ratnayake A et al [7] reported a value of 50.33 cm for the length. Akram et al [11] found that the mean OFC was 33.4 cm in their study group. The mean OFC of 33.52cm established in the present study is very close to the value of 32.79 cm reported by Ratnayake A [7]. Hanoudi BM et al [12] reported that the mean OFC was 34.48± 1.281 cm. Fok TF et al [13] reported the mean Chinese newborns OFC at birth was 34.4(± 1.2) cm (male :female 34.7± 1.2 :34.0± 1.1cm) [9]. This study showed that the mean OFC at birth

was 33.52±1.92 cm. The study done by Kalanda et al [14] reported that the birth weight, height and head circumference of babies in Malawi with gestational age 35-41 weeks were lower at all percentiles compared with babies from a developed country.

The mean CC and MAC were (28.66 and 10.12) respectively, were lower than Sreeramareddy Study in Nepalese newborn [15]. Huque F et al [16] reported the high mean values of CC and MAC than the present. Also the mean MAC of our study was higher than Bettina B et al study [17]. Our study shows that the MCC of males and females were of no significant difference (p-value >0.05). Virdi VS et al [18] conclude that calf circumference correlates best with the BW<2500 g, yet the cut-off values may vary for different geographical areas and racial distributions. Mattoo GM et al [19] reported the mean MTC was 14.68 +or- 0.14 cm for MTC. The MTC results (14.23(1.90) for boys and 14.44(1.54) cm for girls) were of no significant difference (p-value >0.05) and is result agree with Huque study [16].

The limitation of our study is that the percentile values we obtained reflect the results of only one hospital and a limited population, indicating that generalization to the indian population cannot be made. In conclusion, determination of anthropometric measurements, especially of BWbirth weight of newborn in first few days is important for the assessment of neonatal nutritional status and gestational maturity. We established normal values for anthropometric measurements for full term newborns in the wardha district.

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