

## ANTHROPOMETRIC PARAMETERS OF NEWBORN INFANTS

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### Summary

*Bangladesh is a densely populated developing country. Majority of the population live here in the rural community. Illiteracy, poverty and malnutrition are widely prevalent here. Health service facilities even for the neonate are not satisfactory. Anthropometric parameters at birth are considered to be of great value. Incidence of low birth weight is high in our area. Though study on anthropometric parameters on neonate in our country had been undertaken in the past, attempt on various anthropometric parameters at a time are not much. Here, an attempt has been taken to study maximum anthropometric parameters on neonates at a time so that an idea can get on these parameters. It was a descriptive cross-sectional study on 560 newborn infants over a period of one year six months. In this work, mean gestational age of neonate was 37.9±10 week. Mean birth weight was 2507 ± 580 gm but mean birth weight of term neonates were 2770 gm. Approximately 47% babies were low-birth weight. Though observed mean birth length was 48.1 ± 3.1cm, the average length for term babies was 49.4±1.8 cm. Values of observed mean mid-arm circumference, head circumference, chest circumference, abdominal girth and calf circumference were 9±1.3 cm, 32.8±2.0 cm, 30.2±2.9 cm, 27.7±2.6 cm and 10.1±1.2 cm respectively. All anthropometric parameters were marginally more in male than in female babies.*

### Key words

Anthropometric parameters; newborn; infant

### Introduction

Bangladesh is a densely populated developing country where majority (>80%) of the population live in the rural community [1]. Illiteracy, poverty and malnutrition are widely prevalent here. Health service facilities even for neonate in rural community, is not satisfactory till today. Many socio-biological factors interplay in the size of neonates. The anthropometric parameters at birth are considered to be of great value. Again, size of neonate differs on the basis of many contributing factors. In some part of Asia low birth weight babies

account for more than 30% of total births, while in some developed countries the incidence is well below 10% [2]. Birth weight correlates with other anthropometric parameters of the newborn [3-13]. Different workers in Bangladesh studied anthropometric parameters on newborn infants in the past. But most of the work here, known so far dealt with either birth weight or with two or three parameters only. The studies were conducted mainly either to see birth weight or to find out the factors affecting the birth weight [14-17]. At present, the physical growth of a newborn is evaluated by comparing body measurements such as weight, crown-heel length, head circumference and other parameters. Our health workers have reasonably good ideas on birth weight, but ideas on most of other neonatal anthropometric parameters are not emphasized. The work was undertaken on maximum number of neonatal anthropometric parameters.

### Materials and methods

Five hundred and sixty live born infants from three different hospitals of Dhaka city over a period of one year six months of 2000 and 2001 constituted study population. Babies with major congenital malformation, caput succedaneum, gross cephal hematoma, seriously ill and twin were excluded. Babies of mothers having serious obstetrical or medical problem or diabetes were excluded from the study. A simple proforma was used as research instrument. A sensitive modified weighing scale, an infantometer and a measuring tape were used as research equipments. Head circumference (HC) was measured at the level of supraorbital ridges in front and maximum occipital prominence behind. Chest circumference (ChC) was measured at the level of xiphisternum and below the inferior angle of scapula. Abdominal girth (AG) at the level of umbilicus, Calf circumference (CC) at the most prominent point in semi flexed position of the left leg and Mid-arm circumference (MAC) was taken at midway between the tip of acromion process of scapula and olecranon process of ulna of left arm. Weight was recorded up to a minimum value of 20 gm and all other anthropometrical variables up to 0.1cm. All measurements were recorded by one of the researchers within 24 hours of delivery. Data was collected by face to face interview of mothers, from case sheets and by measuring newborn babies. Standard statistics were used for determination of different anthropometric measurements.

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### Results

Out of 560 newborn babies 53% were male and 47% were female infants. The mean gestational age was  $37.9 \pm 10$  weeks among which 30% were preterm and only 3.4% were post term infants. The mean postnatal age of babies was  $12.2 \pm 7.4$  hours. In this work the mean birth weight irrespective of sex was  $2507 \pm 580$  gm. Here, 5% neonates were found to have birth weight  $<1500$  gm, 18.6% were  $<2000$  gm and 46.6% showed birth weight  $<2500$  gm. Mean birth length irrespective of sex was  $48.1 \pm 3.1$  cm. The average length for preterm infants was  $44.8 \pm 3.0$  cm. For term babies the observed value was  $49.4 \pm 1.8$  cm and for post-term it was  $50.4 \pm 1.8$  cm. The difference was statistically insignificant ( $p < 0.01$ ). The observed mean mid-arm circumference (MAC) of neonates was  $9 \pm 1.3$  cm. For term infant the mean value for this parameter was  $9.6 \pm 0.9$  cm.

Head circumference (HC) of the studied group was  $32.8 \pm 2.0$  cm. For term newborn babies the mean value for this parameter was  $33.7 \pm 1.4$  cm. Sex wise difference of this parameter was insignificant like that of other anthropometric parameters. The observed mean values for neonatal other parameters like chest circumference (ChC), abdominal girth and calf circumference were  $30.2 \pm 2.9$  cm,  $27.7 \pm 2.6$  cm and  $10.1 \pm 1.2$  cm respectively. Table-I and II showed distributions of newborn infants by gestational age and postnatal age respectively. Anthropometric parameters of newborn infants on the basis of sex and gestational age of neonates was detailed in table-III and IV. The observed weight and length of term newborn infants were  $\sim 2770$  gm and  $\sim 49$  cm respectively. The values of all anthropometric parameters were marginally more in male than in female babies.

**Table I :** Distribution of babies by their gestational age

| Gestational age of Neonates(weeks) | No. of Neonates | Percentage | Cumulative percentage |
|------------------------------------|-----------------|------------|-----------------------|
| Pre term <37                       | 165             | 29.6       | 29.6                  |
| Term 37-42                         | 376             | 67.1       | 96.7                  |
| Post term >42                      | 19              | 3.4        | 100.1                 |
| Total                              | 560             | 100.0      |                       |

Mean  $\pm$  SD =  $37.9 \pm 10.0$

**Table II :** Distribution of babies by their postnatal age

| Age of neonates (hrs) | No. of Babies | Percentage | Cumulative percentage |
|-----------------------|---------------|------------|-----------------------|
| 1-6                   | 132           | 23.6       | 23.6                  |
| 7-12                  | 131           | 23.4       | 47.0                  |
| 13-18                 | 141           | 25.2       | 72.1                  |
| 19-24                 | 156           | 27.9       | 100.0                 |
| Total                 | 560           | 100.0      |                       |

Mean  $\pm$  SD =  $12.2 \pm 7.4$  hours

**Table III :** Overall findings on anthropometric parameters of babies by sex

| Sex of Babies | No  | Weight of Babies(gm)       |         |         | P value |
|---------------|-----|----------------------------|---------|---------|---------|
|               |     | Mean $\pm$ SD              | Minimum | Maximum |         |
| Male          | 297 | 2538.3 $\pm$ 635.5         | 1000    | 4320    | 0.180   |
| Female        | 263 | 2472.3 $\pm$ 508.7         | 1000    | 3600    |         |
| Total         | 560 | 2507.3 $\pm$ 579.8         | 1000    | 4320    |         |
|               |     | Length of Babies(cm)       |         |         |         |
| Male          | 297 | 48.3 $\pm$ 3.4             | 36      | 56.5    | 0.138   |
| Female        | 263 | 47.9 $\pm$ 2.6             | 39      | 54.0    |         |
| Total         | 560 | 48.1 $\pm$ 3.1             | 36      | 56.5    |         |
|               |     | Mid-arm circumference (cm) |         |         |         |
| Male          | 297 | 9.0 $\pm$ 1.3              | 5.9     | 12.5    | 0.911   |
| Female        | 263 | 9.0 $\pm$ 1.1              | 6.1     | 12.0    |         |
| Total         | 560 | 9.0 $\pm$ 1.2              | 5.9     | 12.5    |         |
|               |     | Head circumference (cm)    |         |         |         |
| Male          | 297 | 32.9 $\pm$ 2.3             | 23.4    | 37.5    | 0.247   |
| Female        | 263 | 32.7 $\pm$ 1.8             | 26.0    | 37.5    |         |
| Total         | 560 | 32.8 $\pm$ 2.0             | 23.4    | 37.5    |         |
|               |     | Chest circumference (cm)   |         |         |         |
| Male          | 297 | 30.3 $\pm$ 3.0             | 21.0    | 37.6    | 0.515   |
| Female        | 263 | 30.1 $\pm$ 2.5             | 21.5    | 37.7    |         |
| Total         | 560 | 30.2 $\pm$ 2.8             | 21.0    | 37.7    |         |
|               |     | Abdominal girth of (cm)    |         |         |         |
| Male          | 297 | 27.8 $\pm$ 2.8             | 19.5    | 34.5    | 0.315   |
| Female        | 263 | 27.6 $\pm$ 2.4             | 20.0    | 33.5    |         |
| Total         | 560 | 27.7 $\pm$ 2.6             | 19.5    | 34.5    |         |
|               |     | Calf circumference (cm)    |         |         |         |
| Male          | 297 | 10.0 $\pm$ 1.3             | 6.7     | 13.6    | 0.937   |
| Female        | 263 | 10.1 $\pm$ 1.1             | 7.0     | 12.6    |         |
| Total         | 560 | 10.1 $\pm$ 1.2             | 6.7     | 13.6    |         |

**Table IV :** Gestational age wise mean anthropometric parameters of newborn babies

| Anthropometric parameters | Gestational age wise mean anthropometric parameters of newborn Babies |                              |                                |                |
|---------------------------|---|------------------------------|--------------------------------|----------------|
|                           | Preterm<br><37 weeks<br>n=165   | Term<br>37-42 weeks<br>n=376 | Post term<br>>42 weeks<br>n=19 | Total<br>n=560 |
| Birth weight(gm)          | 1862.9±407.6  | 2770.4±402.5                 | 2895.78±372.0                  | 2507.3±579.8   |
| Length(cm)                | 44.8±3.0  | 49.0±1.8                     | 50.4±1.8                       | 48.1±3.1       |
| Mid-arm circumference(cm) | 7.6±0.7   | 9.6±0.9                      | 9.9±0.7                        | 9.0±1.2        |
| Head circumference(cm)    | 30.7±1.9  | 33.7±1.4                     | 34.3±1.0                       | 32.8±2.0       |
| Chest circumference(cm)   | 27.1±2.3  | 31.4±1.8                     | 32.1±2.0                       | 30.2±2.8       |
| Abdominal girth(cm)       | 25.0±2.2  | 28.8±1.9                     | 29.1±1.9                       | 27.7±2.6       |
| Calf circumference(cm)    | 8.8±0.9   | 10.7±0.9                     | 10.7±0.9                       | 10.1±1.2       |

### Discussion

The prime concern of the present study was to identify some anthropometric parameters on our newborn infants. Mean birth weight irrespective of sex was  $2507 \pm 580$  gm in this study. Here, occurrence of LBW and VLBW newborns were 46.6% and 5% respectively. Mean birth length irrespective of sex was  $48.1 \pm 3.1$  cm. The value of term neonate ( $2770 \pm 402$  gm) coincides with Islam and Ali's [15] (BW 2720 gm), Kalam and Talukder [16] (BW 2800 gm), Das and Khanam [14] findings. Higher birth weight of neonates was observed in other studies of Bangladesh [17,18]. Birth weight among male babies was higher than female babies in present study like that of others [14-18]. A WHO multicenter study reported that the average birth weight was 2630 gm, 2780 gm and 3840 gm for newborns in India, Nepal and Sri Lanka respectively [19]. The difference may be due to study on neonates of different characteristics of population. The average length of term babies was  $48.1 \pm 3.1$  cm. The mean birth length in present work for male and female neonate was  $48.3 \pm 3.4$  cm and  $47.9 \pm 2.5$  cm respectively. This was nearer to 48.80 cm and 48.35 cm in Khan and Talukder [16], 46.83 cm and 46.30 cm in Islam and Ali [15], 48.13 cm and 47.1 cm in Nahar N [20], 48.34 cm and 48.14 cm in Das and Khanam [14], 47.22 cm and 47.02 cm in Hossain et al [17] study respectively. Length of male of present work was slightly higher (0.40 cm) than length of female baby which was similar to other study in Bangladesh.

The mean mid-arm circumference for male and female newborn was almost same ( $9.0 \pm 1.3$  cm and  $9.0 \pm 1.1$  cm respectively). The value was slightly lower than the value observed by Das and Khanam.

This difference may be due to inclusions of considerable percentage of lower weight babies from specialized neonatal care unit. The mean head circumference of  $32.8 \pm 2.0$  cm in present work was very close to the value of 32.79 cm reported by Ratnayake and Wikramanayake [21] but was lower than the value observed by Hossain et al [17]. The mean values for abdominal girth and chest circumference were  $27.7 \pm 2.6$  cm and  $10.1 \pm 1.2$  cm respectively. These values showed no significant difference in relation to sex of neonate. But gestational age wise difference was seen.

### Conclusion

Anthropometric parameters at birth are considered to be of great value. Time to time study on these parameters is of immense value to have an idea on size of neonates. This also reflects health status of the population. Again, these parameters may help in development of treatment strategy on neonatal health. Different anthropometrical parameters have been carried out in this work. Hopefully, such work may help to bring a positive effect on neonatal health in this area.

### Disclosure

The author declared no competing interestes.

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