

Original Articles

Arm Girth and Calf Girth of Government Primary School Children in Dhaka City

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Abstract

Context: Body circumference measurements such as upper arm girth and calf girth are useful public health indices. Upper arm girth and calf girth can be used as an important measurement tool to assess growth of an individual. The present study was planned to determine differences in upper arm girth and calf girth between boys and girls of primary schools.

Materials & Methods: A cross-sectional analytical type of study was conducted in the department of anatomy, Dhaka Medical College, Dhaka, from January 2012 to December 2012. The present study was performed on 400 government primary school children. Out of 400 children, 200 were boys and 200 were girls. The study population was divided into three groups A, B, C according to age and sex of the subject. Group A include age 9+ years, group B include age 10+ years and group C include age 11+ years old children. Each group was again subdivided into A₁, B₁ and C₁ for boys and A₂, B₂ and C₂ for girls. The subjects of this age group were the students of class III to class V. With the help of a standardized flexible ribbon tape measurements were recorded in cm. Arm girth was measured at the midpoint of upper arm and the maximum calf girth was measured around the calf.

Results: Upper arm girth of group A₁ were significantly higher ($P < 0.01$) than group A₂. Upper arm girth of group B₂ were significantly higher ($P < 0.05$) than group B₁. There was no significant difference in upper arm girth between group C₁ and group C₂ ($P = 0.092$). Calf girth of group B₂ and group C₂ were significantly higher ($P < 0.05$) than group B₁ and group C₁. But no significant difference in calf girth was observed between group A₁ and group A₂ ($P = 0.146$).

Key words: Upper arm girth, calf girth, School children

Introduction

Measurements of upper arm girth and calf girth can be performed to detect alterations from physiological growth. It reflects inadequate or excess food intake, insufficient exercise and disease. Upper arm girth and calf girth measurements are also used in determination of somatotype¹ which has a relatively long tradition in human biology, including changes during growth and maturation.² Several factors such as age, sex, nutrition, physical activity are responsible

to vary girth measurements of an individual.³ It is possible to assess an individual's health and physical performance by using upper arm girth and calf girth.⁴

There is marked changes in relative proportions of muscle, fat and bone during puberty resulting in typical male-female differences. Gonadal steroid hormones and growth hormone are responsible for the increase in bone mineral content and muscle mass and also the deposition of fat. Testosterone plays an important role in increase growth of bone and muscle and a simultaneous loss of fat in the limbs.⁵

Information available through the study has also been applied in the fields of exercise, sports and growth.⁶ Body circumference measurements such as upper arm girth and calf girth are useful in public health indices. Skill of players and the tactics of the team depend on the physical abilities of the players.

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Measurements of upper arm girth and calf girth may be helpful to evaluate these physical abilities.⁷

Materials & Methods

The study population was selected purposively from four government primary school in Dhaka city. The subjects of this age group were the students of class III to class V. Out of 400 children, 200 were boys and 200 were girls. The guardian of the study population was either small entrepreneur or third and fourth class employee of government and non-government organization. The monthly income of parents/ father/ mother/family was ranged from 15,000/- to 20,000/-. Each student was provided with an ID no. and a data sheet of personal informations was filled up for each student. So, there was no scope of repetition of students participating in the study. Informed written consent was taken from the headmaster of the respective school and also from parents of the students for data collection. Date of birth of subjects was taken from the birth certificates which were collected from the office of the respective school. If birth certificates were not available from the school, then the date of birth of the students were collected from the parents. Age and sex wise distribution of sample is given in Table I. Those subjects who had completed 9 years of age but were less than 10 years even by one day were grouped under 9+ age group. Similar pattern was followed for other age groups as well. To take measurement of upper arm girth and calf girth proper exposure was needed. Before exposure privacy was maintained. The measurement

was taken in closed door room with the presence of an attendant (aya) of the respective school.

Upper arm girth was measured by a standardized flexible ribbon tape in cm. The subject was asked to flex the shoulder to 90 degrees and the elbow to 45 degrees. Then the subject was asked to clench the hand and maximally contract the elbow flexors and extensors. Then midpoint of upper arm was determined and upper arm girth was measured.⁸

Calf girth was measured by a standardized flexible ribbon tape in cm. The subject was asked to stand with feet slightly apart. Then maximum calf girth was measured around the calf.⁸

Table I
Distribution of sample by age and sex

Group	Age limit (yrs)	No. of sample	Total
A ₁ (Boys)	9 ⁺	68	136
A ₂ (Girls)	9 ⁺	68	
B ₁ (Boys)	10 ⁺	66	132
B ₂ (Girls)	10 ⁺	66	
C ₁ (Boys)	11 ⁺	66	132
C ₂ (Girls)	11 ⁺	66	
Total			400

Ethical clearance

The study was approved by Ethical Review committee of Dhaka Medical College.

Results

Results are showing in Table II and Figure 1, 2.

Table-II
Upper arm girth and calf girth of boys and girls of government primary school

Group	Upper arm girth (cm) (Mean±SD)	Calf girth (cm) (Mean±SD)
A ₁ (n=68)	19.10±1.41(16.00-23.50)	23.98±1.34(20.00-27.00)
A ₂ (n=68)	18.46±1.38(15.00-22.00)	24.38±1.85(20.50-29.00)
P value	0.008**	0.146 ^{ns}
B ₁ (n=66)	19.04±2.09(16.00-28.00)	24.77±2.08(21.00-31.00)
B ₂ (n=66)	19.80±2.07(15.50-26.00)	25.54±2.39(20.50-33.00)
P value	0.037*	0.049*
C ₁ (n=66)	19.78±1.62(17.00-24.00)	25.39±1.93(21.00-29.00)
C ₂ (n=66)	20.37±2.30(15.00-27.00)	26.20±2.53(21.00-33.00)
P value	0.092 ^{ns}	0.039*

Figures in parentheses indicate range. Comparison between boys and girls done by unpaired Student's 't' test, ns = not significant, * = significant at P<0.05, ** = significant at P<0.01

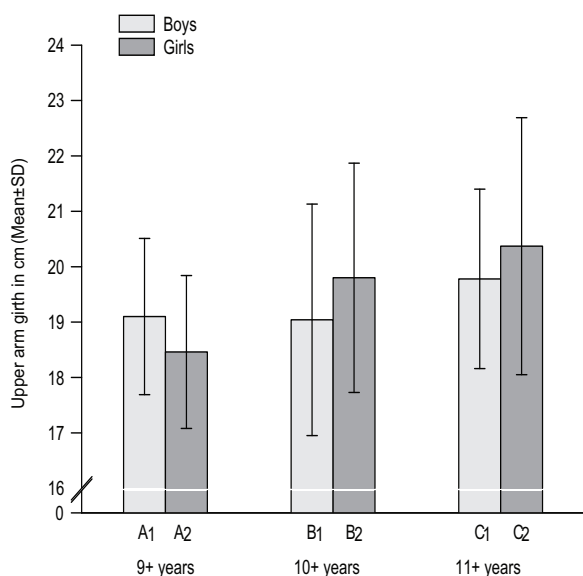


Fig-1: Upper arm girth of boys and girls of government primary school

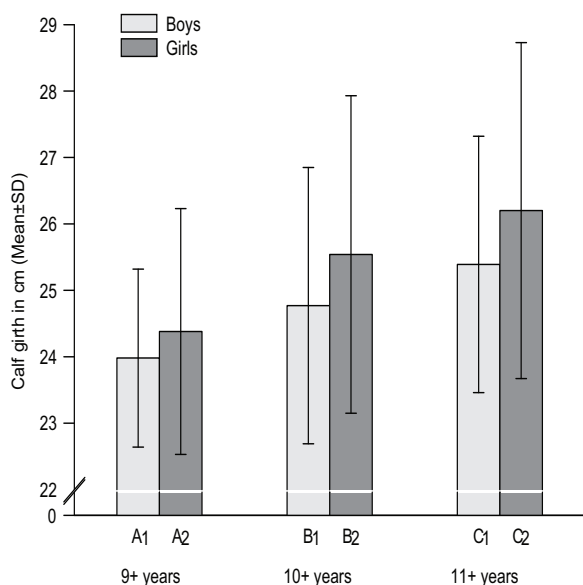


Fig-2: Calf girth of boys and girls of government primary school

Discussion

In the present study, upper arm girth of group A₁ were significantly higher ($P < 0.01$) than group A₂. Upper arm girth of group B₂ were significantly higher ($P < 0.01$) than group B₁. But no significant difference was observed in upper arm girth of group

C₁ and group C₂. The findings of Bhasin and Jain⁹ were significantly lower than the findings of the present study ($P < 0.001$). The findings of Yeung and Hui¹⁰ and Ostrowska, Domaradzki and Ignasiak¹¹ were significantly higher than the findings of the present study ($P < 0.001$). In the present study, no significant difference was observed in calf girth of group A₁ and group A₂. Calf girth of group B₂ and group C₂ were significantly higher ($P < 0.05$) than group B₁ and group C₁. The findings of Bhasin and Jain⁹ were significantly lower than the findings of the present study ($P < 0.001$). The findings of Ostrowska, Domaradzki and Ignasiak¹¹ were significantly higher than the findings of the present study ($P < 0.001$). Dissimilarities of the findings of the present study with the findings of the other researchers may be due to the selection of study population of different age group, different socio-economic status and different categories such as Bhasin and Jain⁹ carried out their study on 8⁺ to 18⁺ years old Indian tribal (Mina) boys and girls and Ostrowska, Domaradzki and Ignasiak¹¹ conducted their study on young swimmers aged 11 and 12 years old.

Conclusion

The present study reveals that there were significant differences of upper arm girth in between group A₁ and A₂, B₁ and B₂. Calf girths were significantly different in between group B₁ and B₂, C₁ and C₂. As this study included only four government primary schools, more schools are recommended to get more precise picture. Studies with different category of people like sportsman, industrial worker, day laborer are also recommended.

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