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Age and sex variations in anthropometric characteristics of Muslim adolescents of North 24 Parganas, West Bengal

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ABSTRACT

The purpose of this study was to examine age and sex variations in anthropometric characteristics among Muslim adolescents of North 24 Parganas, West Bengal. Eight hundred and sixty school boys (n=416) and girls (n=444) aged from 10 to 15 years participated in this study. The subjects were classified into six yearly age groups: 10-10.9 years (n = 56, 62), 11-11.9 (n = 63, 73), 12-12.9 (n = 65, 82), 13-13.9 (n = 77, 79), 14-14.9 (n = 84, 78), 15-15.9 (n = 71, 70). All the anthropometric variables were measured by the following standard anthropometric procedure as recommended by Lohman et al (1988). Girls were taller and heavier than boys from 10 to 14 years. Thereafter the trend was reversed. Boys were significantly ($p < 0.05$) shorter and heavier than ICMR (1996) standards but girls were significantly ($p < 0.05$) taller and heavier than ICMR standards.

Key words: Bengalee; Muslim; Adolescents; Anthropometry

INTRODUCTION:

The World Health Organization (1995) identifies adolescence as the period in human growth and development that occurs after childhood and before adulthood, from ages 10 to19. It represents one of the critical transitions in the life span and is characterized by a tremendous pace in growth and change that is second only to that of infancy. During adolescence, body size and composition markedly change. These changes are strongly associated with the development of various physical performance characteristics. At the same time, anthropometry and body composition during adolescence are predictors of risk factors for cardiovascular disease, diabetes and many types of cancer and chronic diseases (Dietz WH1998 & Goran 2003) which occur in adults (Guo 1997, Katzmarzyk 2001). Anthropometry is the single most portable, universally applicable, inexpensive, and non-invasive method available to assess the size, proportions, and composition of the human body (WHO 1995). Anthropometric data have been extensively used in public health e.g. identification of significant growth retardation in children (Hop et al. 1997) and adolescents (Pawloski 2002). Measurements of HT and WT are important factors relating to growth and development, puberty, and nutritional status of children and adolescents (Bener and Kamal 2005). Jackson et al. (2010) studied Waist circumference percentiles for Kuwaiti children and Adolescents. They reported that male children had higher WC than female children. WC increased with age in both genders. Bamoshmosh et al. (2013) studied 3114 Yemeni children (1564 boys, 1550 girls) aged 6-19 years participating in the Hypertension and Diabetes. Average WC increased with age for both genders. Boys had a higher WC than girls until early adolescence and thereafter girls had higher values than boys. Singh et al. (2014) studied among 1545 (770 boys; 775 girls) Sonowal Kacharis of Dibrugarh District, Assam, Northeast-India. Age and sex-specific muscularity were found significantly greater among boys than girls ($p<0.01$), while adiposity was significantly greater among girls ($p<0.01$), particularly when they approached to puberty. The overall prevalence of low and below-average UAMAH was found to be 16.38% and 22.65% respectively. The overall prevalence of thinness was 23.69% (26.36% boys, 21.03% girls) ($p>0.05$). Thus, determining anthropometry during adolescence would also be used to predict performance, health and survival.

The purpose of this study was to examine growth pattern and age wise differences in anthropometry of Muslim adolescents of West Bengal within a single year.

MATERIALS AND METHODS:

The investigation was carried out among adolescent Muslim boys and girls in three secondary schools of Deganga block, North 24 Parganas, West Bengal. The schools are situated in a rural area approximately 38 km to the east from the heart of the city of Kolkata and approximately 17 km from the Barasat town. Barasat is the administratative headquarters of the district of North 24 Parganas, West Bengal, India. The studied schools were selected for operational and logistic convenience.

The students were mostly middle-class Bengalees who belonged to the Bengali speaking Muslim community of West Bengal. Eight hundred and sixty (860) school boys (n=416) and girls (n=444) participated in this study. The age range of the subjects was 10 to 15 years. The mean age of boys and girls are 12.68 (SD ± 1.66) years and 12.56 (SD ± 1.65) years. Official approval and ethical consent were obtained from the school authorities (Head Master and Secretary of the school managing committee) as well as from the parents prior to the commencement of the study. All the students were invited informing the purpose and procedures of this study and, however, a total of 860 students were spontaneously participated in present field survey.

A total of twelve anthropometric measurements were taken on each subject following standard protocols. However, only four measurements (height, weight, MUAC, chest circumference) are being reported in the present paper. . Height was measured to the nearest 0.1 cm using Martin’s anthropometer. Body weight was recorded to nearest 0.5 kg on a conventional weighing scale. Circumference measurements were made to the nearest 0.1 cm using a flexible inelastic steel tape measure.

Data are presented as mean, standard deviation (SD), t- test were calculated using the Statistical Package for Social Sciences (SPSS, Version 16).

RESULTS:

A comparative analysis of some anthropometric characteristics of present data of boys and girls aged 10-15 years were done with Indian Council of Medical Research (ICMR, 1996).

Comparative study of height (Table 1) revealed that the age-wise mean values of Bengalee Muslim adolescents of boys were lower at each age group except at 15 years to ICMR (1996) standard. Present mean values of Bengalee Muslim adolescents of girls were higher at each age group to ICMR (1996) standard. The mean differences of height between present studied boys and ICMR boys were statistically significant ($p < 0.05$) in the age group of 13 and 15 years. The mean differences of height between present studied girls and ICMR girls were statistically significant ($p < 0.05$) in the age groups of 12, 13 and 14 years.

Table 2 revealed that the age-wise mean values of weight of Bengalee Muslim adolescents of boys were higher at each age group except at 13 years to ICMR (1996) standard. Present mean values of Bengalee Muslim adolescents of girls were higher at each age group to ICMR (1996) standard. The mean differences of weight between Bengalee boys and ICMR standards were statistically significant ($p < 0.05$) in the age groups of 12, 13 and 15 years. The mean differences of weight between present studied girls and ICMR girls were statistically significant ($p < 0.05$) in each age group.

Comparative study of MUAC (Table 3) revealed that the age-wise mean values of Bengalee Muslim adolescents of boys were higher at each age group except at 13 and 14 years to ICMR (1996) standard. Present mean values of Bengalee Muslim adolescents of girls were higher at each age group to ICMR (1996) standard. The mean differences of MUAC between present studied boys and ICMR boys were statistically significant ($p < 0.05$) in each age group except 14 years. The mean differences of MUAC between Bengalee girls and ICMR standards were statistically significant ($p < 0.05$) in each age group.

Comparison of chest circumferences (Table 4) revealed that the age-wise mean values of Bengalee Muslim adolescents of boys and girls were higher at each age group to ICMR (1996) standard. The mean differences of chest circumferences between the Bengalee boys and girls and ICMR standards were statistically significant ($p < 0.05$) in each age group.

DISCUSSION:

Girls of present study were taller and heavier than boys from 10 to 14 years. Thereafter the trend was reversed. This is probably indicative of earlier maturation of girls compared to boys. Similar results have been reported in earlier studies of Sonowal Kachari children, Assam, Northeast India by Singh et al. (2014) and tribal school children of Paschim Mdinipur, West Bengal by Ganguly (2012).

Age wise height of the Bengalee boys was statistically ($p < 0,05$) lower than ICMR (1996) standard at the age groups of 13 and 15 years but age wise height of girls of present study was statistically ($p < 0.05$) higher than ICMR (1996) standard at the age groups of 12, 13 and 14 years.

Age wise weight of boys of our study was statistically ($p < 0.05$) higher than ICMR (1996) standard at the age groups of 12, 13 and 15 years but age wise weight of the Bengalee girls was statistically ($p < 0.05$) higher than ICMR (1996) standard at each age group.

Age wise MUAC of boys of our study was statistically ($p < 0,05$) higher than ICMR (1996) standard at each age group except 14 years but age wise MUAC of girls of the present study was statistically ($p < 0.05$) higher than ICMR (1996) standard at each age group.

Age wise chest circumference of boys and girls of our study was statistically ($p < 0.05$) higher than ICMR (1996) standard at each age group.

In conclusion, our study demonstrated that:

1. Girls were taller and heavier than boys of present from 10 to 14 years. Thereafter the trend was reversed.
2. Mean of height, weight, MUAC, chest circumference of boys and girls of the present study were higher than ICMR standard.
3. Boys were shorter and heavier than ICMR (1996) standard but girls were taller and heavier than ICMR standard.

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Table 1: Age variations in height (cm) of the subjects.

Age groups (years)	Boys			Girls		
	Present Study	**ICMR,1996**	**t- value**	**Present Study**	**ICMR,1996**	**t- value**
10.0-10.9	127.58(4.70)	128.40(6.70)	0.36*	127.71(4.59)	127.40(6.90)	0.73*
11.0-11.9	131.55(6.00)	132.60(7.20)	0.25*	133.28(5.34)	132.10(7.60)	0.19*
12.0-12.9	135.77(5.76)	137.10(7.90)	0.18*	140.95(6.04)	137.10(8.20)	0.00**
13.0-13.9	136.09(6.30)	142.10(8.70)	0.00**	146.80(7.45)	142.00(8.20)	0.00**
14.0-14.9	145.83(9.91)	147.60(9.40)	0.09*	149.45(5.82)	146.10(8.00)	0.00**
15.0-15.9	158.06(11.05)	152.60(9.90)	0.00**	150.56(5.46)	149.40(7.80)	0.22*

Standard deviations are presented in parentheses

*-not significant at 0.05 level **- significant at 0.05 level

Table 2: Age variations in weight (kg) of the subjects.

Age groups (years)	Boys			Girls		
	Present Study	**ICMR,1996**	**t- value**	**Present Study**	**ICMR,1996**	**t- value**
10.0-10.9	23.66(2.46)	23.30(3.30)	0.42*	23.90(2.89)	22.90(3.50)	0.03**
11.0-11.9	26.01(4.26)	25.20(3.70)	0.09*	26.34(4.89)	25.30(4.30)	0.04**
12.0-12.9	28.98(7.99)	27.60(4.60)	0.02**	30.54(6.19)	28.40(5.20)	0.00**
13.0-13.9	28.28(5.11)	30.60(5.40)	0.00**	37.09(6.84)	32.10(5.90)	0.00**
14.0-14.9	34.95(7.87)	34.40(6.50)	0.45*	39.59(6.24)	35.70(6.30)	0.00**
15.0-15.9	46.09(10.77)	37.90(7.00)	0.00**	43.27(7.88)	38.70(6.10)	0.00**

Standard deviations are presented in parentheses

*-not significant at 0.05 level **- significant at 0.05 level

Table 3: Age variations in MUAC (cm) of the subjects.

Age groups (years)	Boys			Girls		
	Present Study	ICMR,1996	t- value	Present Study	ICMR,1996	t- value
10.0-10.9	17.07(1.17)	16.30(1.30)	0.00**	17.49(1.36)	16.60(1.40)	0.00**
11.0-11.9	17.54(1.80)	16.90(1.40)	0.00**	17.98(2.10)	17.30(1.60)	0.00**
12.0-12.9	18.36(2.83)	17.60(1.60)	0.00**	18.82(2.23)	18.00(1.70)	0.00*
13.0-13.9	18.05(2.00)	18.50(1.80)	0.03**	20.57(2.20)	19.00(1.90)	0.00**
14.0-14.9	19.49(2.23)	19.50(2.10)	0.97*	21.49(2.46)	20.00(2.20)	0.00**
15.0-15.9	21.89(2.92)	20.70(2.30)	0.00**	22.17(2.69)	20.90(2.20)	0.00**

Standard deviations are presented in parentheses

*-not significant at 0.05 level **- significant at 0.05 level

Table 4: Age variations in chest circumference (cm) of the subjects.

Age groups (years)	Boys			Girls		
	Present Study	ICMR,1996	t- value	Present Study	ICMR,1996	t- value
10.0-10.9	61.72(3.72)	58.20(3.20)	0.00**	62.81(3.90)	57.40(3.30)	0.00**
11.0-11.9	64.24(5.24)	60.00(3.40)	0.00**	65.17(6.22)	59.30(3.80)	0.00**
12.0-12.9	66.04(7.90)	62.00(3.90)	0.00**	68.11(5.89)	61.60(4.50)	0.00**
13.0-13.9	65.43(5.26)	64.40(4.30)	0.04**	73.18(5.98)	64.30(5.20)	0.00**
14.0-14.9	70.40(7.00)	67.00(4.90)	0.00**	75.39(4.80)	66.90(5.80)	0.00**
15.0-15.9	78.89(8.46)	69.40(5.20)	0.00**	78.86(6.01)	68.50(6.30)	0.00**

Standard deviations are presented in parentheses

**- significant at 0.05 level