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Somatotype of non-athlete tribal school boys of West Tripura District, Tripura

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ABSTRACT

Anthropometric somatotype of non-athlete rural tribal school boys (aged 8+ to 16+ years) from west Tripura district of Tripura has been studied following the Heath-Carter's anthropometric somatotype method. Each individual was somatotyped using a set of ten anthropometric measurements. The calculated somatotypes are plotted on somatochart triangle to determine their physique. All the three ratings changes with age, but no regular trend has been seen and no distinctive change corresponding to adolescent growth spurt has also been observed. During these nine years there was an overall increase of 0.35 units in endomorphy, 0.81 units in ectomorphy, and 0.36 units in mesomorphy. Ectomorphy shows an increasing trend, while in case of endomorphy and mesomorphy no regular trend was observed. The somatoplot of mean somatotypes fell in the mesomorph-ectomorph sectors of the somatochart with a rating of 1.78-4.22-3.78. The somatotype categories ectomorphic mesomorph and mesomorph-ectomorph included the greatest proportion of these tribal boys. Thus the non-athlete tribal school boys of West Tripura district were predominantly mesomorphic.

Key words: Somatotype, mesomorphy, somatoplot, school boys, Tripura.

INTRODUCTION

The somatotype corresponds to the estimation of the corporeal shape and its composition, which is expressed in three numbers that correspond to the components obtained during the embryological development: endoderm, mesomoderm and ectoderm, altogether corresponding to the morphological characteristics of the subject as a whole (Carter, 1996). Independent of body size, a somatotype is a convenient shorthand descriptor of overall physique (Carter 1996). It reflects an overall outlook of the body and conveys a meaning of the totality of morphological features of the human body. The somatotype provides a general summary of body shape, from which estimates of body composition can be inferred (Bhasin & Jain, 2007).

Somatotypes vary between population groups as well as during growth in the same population (Kaul *et al.*, 1996). Apart from genetic factors, numerous other factors that affect somatotype of an individual are age & sex (Bhasin and Jain 2007), nutrition (Chakrabarty *et al.*, 2008), physical activity (Chandel and Malik 2012), and socio-economic differences (Singh 2011).

Tripura is the third smallest state of India, situated in the north-eastern corner. The state is inhabited by more than nineteen classified tribes and ethnic groups with diverse languages and cultures (Sarkar *et al.*, 2012).

The objective of this study is to determine the body composition of non-athlete tribal school boys from west Tripura district and to assess the somatotype changes with age among them and also to determine their status in relation to other populations studied elsewhere.

MATERIALS AND METHODS

The present cross sectional study is based on an investigation of 260 samples belonging to school boys of 8+ to 16+ years age group. The study was carried out on the tribes residing in the rural areas of West Tripura district of Tripura state. Samples are collected from the schools. For the purpose of analysis, the subjects were classified into yearly intervals. Those subjects who had completed 8 years of age but were less than 9 years even by one day were grouped under 8+ age group. Similar pattern was followed for other age groups as well. Our study boys were not participated in any regular physical activity or they are non-athletic. The anthropometric data were collected following the internationally accepted standards (Lohman *et al.,* 1988).

Informed consent was obtained from all of the participants prior to the beginning of the study.
The procedures followed were in accordance with the Helsinki Declaration of 1964, as revised in 2000 (Touitou *et al.,* 2004). The study was approved by the Institutional Ethical Committee, Tripura University. A questionnaire proforma was completed by the parents of the subjects to assess socio-economics status indicators: educational level, occupation and income of the parents, family size, other sources of family income and the quality of health care and access to medical services. Information regarding physical activities performed by the students was also collected.

Heath and Carter anthropometric somatotype method (Heath and Carter, 1967) was used to describe the body physique of the tribal school boys selected for the study. The data required for Heath-Carter ratings are height, weight, four skinfolds (triceps, subscapular, suprailiac and calf), two bone diameters (bicondylar humerus, bicondylar femur), two muscle girths (calf, flexed arm), height and weight. In this method the physique of subjects is expressed in a three digit sequential numerals, which are always recorded in the same manner.

The calculated somatotypes are plotted on somatochart triangle, where the two corners of the triangle base represent extreme endomorphy and extreme ectomorphy and the top represents extreme in mesomorphy. The three components of physique were plotted on a somatochart by calculating X and Y-axis values, according to Carter (2002).

RESULTS

Based on the household socio-economic survey all the tribal boys were considered as non-well-off. Frequencies of meals generally consumed by the subjects in a day have been categorized. Their normal diet includes higher intake of meats and vegetables and relatively lower intake of fats and oils. Descriptive statistics for somatotype variables are presented in Table 1. The mean somatotypes were found to be 1.66-4.19-3.36 at age 8+ years and 2.01-4.55-4.17 at ages 16+ years. During these eight years there was an overall increase of 0.35 units in endomorphy, 0.36 units in mesomorphy and 0.81 units in ectomorphy. Height and weight values show a regular increasing pattern with age. The mean height-weight ratio (HWR) shows irregular pattern, by and large, shows a general increasing trend from 43.63 at 8+ years to 43.78 at 16+ years. Somatotype attitudinal distance (SAD) shows a decreasing trend up to the age of 10+ years and then the trend reversed.

Mean ectomorphy shows an increasing trend with age, while no regular trend was observed in case of mean endomorphy and mesomorphy. The maximum mean values of endomorphic component have been seen at 16+ years (2.01) and the minimum at 8+ years (1.66). Maximum mean mesomorphic rating, 4.55, was found at 16+ years, and minimum rating of 4.03 at 9+ years. The tribal boys have shown ectomorphic values of 4.30 (the maximum) at 13+ years and 3.36 (the minimum) at 8+ years of age. Somatoplot of mean somatotypes ware in the

Table 1: **Mean and standard deviation (SD) of height, weight, height-weight ratio (HWR), somatotype attitudinal distance (SAD) and three components of somatotype in tribal school boys of west Tripura district.**

Age (years)	n	Statistics	Height (cm)	Weight (kg)	HWR	Endomorphy	Mesomorphy	Ectomorphy	SAD
8+	27	Mean	118.63	20.19	43.63	1.66	4.19	3.36	1.02
		SD	4.01	1.89	1.41	0.40	0.70	1.03	0.78
9+	30	Mean	126.13	23.48	44.14	1.78	4.03	3.73	0.87
		SD	5.18	3.03	1.01	0.52	0.49	0.74	0.52
10+	29	Mean	127.29	24.98	43.63	1.75	4.28	3.37	0.82
		SD	6.67	3.41	1.12	0.58	0.49	0.80	0.72
11+	30	Mean	131.69	26.53	44.27	1.70	4.07	3.84	0.87
		SD	5.64	3.86	1.29	0.39	0.48	0.91	0.65
12+	31	Mean	139.73	31.63	44.31	1.79	4.36	3.86	0.95
		SD	6.13	5.22	1.21	0.45	0.59	0.89	0.63
13+	30	Mean	149.40	37.18	44.92	1.70	4.12	4.30	1.16
		SD	8.52	6.46	1.31	0.40	0.83	0.97	0.64
14+	28	Mean	154.87	42.32	44.62	1.90	4.22	4.08	1.38
		SD	8.60	7.20	1.68	0.63	0.91	1.24	0.89
15+	28	Mean	158.64	45.11	44.68	1.75	4.20	4.13	1.03
		SD	6.31	6.23	1.15	0.45	0.75	0.84	0.61
16+	27	Mean	161.54	50.63	43.78	2.01	4.55	4.17	1.29
		SD	5.57	6.64	1.35	0.92	0.81	0.97	0.84
Total	T=260	Mean	140.88	33.56	44.22	1.78	4.22	3.78	1.13
		SD	6.29	4.88	1.28	0.53	0.67	0.93	0.7

Figure 1. Somatochart showing somatoplots of mean somatotypes of various age groups of tribal school boys of west Tripura district.

Table 2. Distribution of somatotype categories of tribal school boys of west Tripura district.

Age (yrs.)	Somatotype categories															
	1		2		3		4		5		6		7		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
8+	0	0	1	3.70	5	18.52	11	40.74	4	14.81	6	22.22	0	0	27	100
9+	0	0	1	3.33	1	3.33	10	33.33	12	40	6	20	0	0	30	100
10+	0	0	1	3.45	2	6.9	17	58.62	5	17.24	4	13.79	0	0	29	100
11+	0	0	0	0	2	6.67	10	33.33	13	43.33	5	16.67	0	0	30	100
12+	0	0	1	3.23	1	3.23	14	45.16	9	29.03	6	19.35	0	0	31	100
13+	0	0	0	0	2	6.67	8	26.67	6	20	14	46.67	0	0	30	100
14+	1	3.57	1	3.57	1	3.57	10	35.71	7	25	8	28.57	0	0	28	100
15+	0	0	0	0	0	0	8	28.57	10	35.71	9	32.14	1	3.57	28	100
16+	0	0	2	7.41	5	18.52	9	33.33	5	18.52	5	18.52	1	3.70	27	100
8+-16+	1	0.4	7	2.7	19	7.31	97	37.3	71	27.3	63	24.2	2	1	260	100

1 = Mesomorph-endomorph, 2 = Endomorphic mesomorph, 3 = Balanced mesomorph, 4= Ectomorphic mesomorph, 5 = Mesomorph-ectomorph, 6 = Mesomorphic ectomorph, 7 = Central. Underlined values indicate highest incidence of occurrence.

mesomorph-ectomorph region of the somatochart (Figure-1). The average somatotype for tribal school boys of west Tripura district was 1.78-4.22-3.78.

Somatotypes were grouped according to component dominance into different somatotype categories and are presented in Table 2. Due to non-availability of any individual, six somatotype categories, viz., endomorph-ectomorph, ectomorphic endomorph, balanced endomorph, mesomorphic endomorph, balanced ectomorph and endomorphic ectomorph have not been included.

DISCUSSION

Our study signifies a clear age related change of mean somatotype components in tribal school boys of west Tripura district aged 8+ to 16+ years. The three components of somatotype do not vary on regular basis with age; they may increase at one age and decrease at the other. Almost similar type of trend has been reported by some other studies (Longkumer, 2014, Bhasin and Singh, 1992, Kumar *et al.*, 1997). Sixty four percent of the tribal boys were either ectomorphic mesomorph or mesomorph-ectomorph, but the single highest category was the ectomorphic mesomorph in which 37% of the tribal boys fell. Three somatotype categories, viz., ectomorphic mesomorph, mesomorph-ectomorph and mesomorphic ectomorph, were found in all the age classes. Almost all of the somatotype categories ware in the field of somatochart where mesomorphy dominates (Fig. 1). This reflects the relative musculo-skeletal physique of non-athlete tribal school boys of west Tripura district.

Poor socio-economic conditions and protein rich diet may be the possible contributing factor for the mesomorphic physique among tribal school boys. These boys were compared with other studies reported from different parts of India. They were found more mesomorphic and less endomorphic than rural and urban Meitei boys of Manipur (Singh, 2011), but less ectomorphic and more mesomorphic than Mina tribes of Rajasthan (Bhasin & Jain, 2007) and more endomorphic & mesomorphic but less ectomorphic than Rajput boys (Ghosh and Malik, 2004). They are less ectomorphic and more mesomorphic, ectomorphic than Ao Naga tribal boys of Nagaland (Longkumer, 2014). This inter-population variation may be related to

individual differences in the time and speed of the adolescent growth spurt, sexual maturation, dietary pattern and physical activity level. Undertaking systematic physical activity may improve body composition in a characteristic way in non-athlete tribal school boys of west Tripura district.

CONCLUSION

From the above results it can be concluded that the non-athlete tribal school boys of west Tripura district were predominantly mesomorphic. The variations in the physical structures are determined by genetic as well as environmental factors. As the present study is examining somatotype among non-athlete tribal boys, more research would be helpful along with fitness and physiological variables to compare somatotype, involving both boys and girls among different ethnic groups of Tripura.

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