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Somatotype Changes in Adolescence Among Mentally Retarded Athletes

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INTRODUCTION

Somatotyping has proved to be a good descriptive and classification system for learning about relative shape and body composition and their variation in populations. Change and stability of somatotype appears to be function of nutrition, exercise and health status (Carter and Heath, 1990). A large variety of somatotype studies have yielded much useful information about human physique and characteristics associated with somatotypes. Most of the existing studies have dealt with somatotype distribution of different populations, with changes of somatotypes in growth and ageing and somatotypes in sports and physical performance, but very little information has been obtained about the role of somatotypes in mental and growth disorders (Buday and Eiben, 1982; Tanner and Whitehouse, 1982; Anderson, 1985; Eiben et al., 1985). This relationship between growth disorders and somatotype needs serious investigation. Therefore, the present study has been an attempt to evaluate the somatotype changes during adolescence among mentally retarded athletes.

MATERIAL AND METHODS

The present findings are based upon 95 mentally retarded adolescent athletes (51 boys and 44 girls), ranging in age from 11 to 15 years and had participated in special Olympics National Games held between 25th Sept. to 29th Sept., 1998 at Panjab University Ground, Chandigarh. The cross-sectional sample consisted of only those individuals who had no neurological, metabolic and chromosomal cause for their low I.Q. The present sample was diagnosed as mentally retarded with unknown aetiology. The date of birth of each subject was provided by the respective teachers accompanying them and was cross-checked from their data cards. The decimal age of each individual was calculated from the date of birth to the date of examination using the decimal age calendar (Tanner et al., 1966).

The anthropometric measurements included weight, height, four skinfolds (triceps, subscapular, supra-iliac, calf), two girths (biceps and calf) and two diameters (humerus and femur bicondylar) taken by using the standard anthropometric techniques given in Weiner and Lourie, 1969. Somatotypes were estimated using the Heath-Carter Anthropometric Method. Somatotype attitudinal distance (SAD) and Somatotype attitudinal means (SAM) were calculated according to Carter et al. (1983). Student's t-test was used to find out the sex differences for each somatotype component at various ages.

RESULTS AND DISCUSSION

Table 1 presents mean and standard deviation of somatotype components and $Ht/\sqrt[3]{wt}$ (HWR) of mentally retarded boys and girls according to age. The maximum adolescent velocity is seen during 14-15 year age interval for sample boys and girls. The Ht / Wt ratios increase in case of boys from 11 to 12 years and decrease thereafter till 14 years, after which the maximum value of this ratio is obtained at 15 years (45.62). Girls show a general decline in this ratio with age. The maximum value of this ratio is observed at age 11 years (45.01) and the minimum at age 14 years (41.99).

The mean somatotype of mentally retarded boys at 11 years is 2.67-2.33-3.70 and at 15 years in 3.00-2.92-4.53. Ectomorphy remains dominant throughout the growing phase followed by endomorphy and mesomorphy and there is no major change in component dominance during the age range considered. The magnitude of increase has been maximum in ectomorphy (0.83 units) followed by mesomorphy (0.59 units) and minimum for endomorphy (0.33 units) respectively. Average somatotype of boys lie in the balanced ectomorph sector of the somatochart (2.90-2.45-3.74).

Mentally retarded girl athletes report similar pattern of dominance uptill 13 years as that of the

Table 1: Mean and standard deviation of somatotype characteristics of mentally retarded athletes

Age (in yrs.)	*Sample (N)*	*Statistics*	*Height(cm)*	*Weight (kg)*	*HWR*	*Endomorphy*	*t-Value*	*Mesomorphy*	*t-value*	*Ectomorphy*	*t-value*	*SAM (SADi/N)*
11	B=15	$\bar{X}$ ±S.D.	135.14±8.75	29.11±4.92	44.05±1.83	2.67±0.75	(0.02)	2.33±1.32	(0.13)	3.70±1.36	(0.33)	1.68±1.05
	G=6	$\bar{X}$ ±S.D.	136.70±4.57	28.53±5.78	45.01±1.91	2.66±0.98		2.25±0.69		4.00±1.16		1.35±0.77
12	B=13	$\bar{X}$ ±S.D.	137.80±6.83	29.78±4.29	44.59±1.93	2.53±0.38	(2.73)**	2.38±0.58	(2.06)**	4.00±1.47	(0.38)	1.42±0.69
	G=9	$\bar{X}$ ±S.D.	138.04±2.86	31.90±7.04	43.88±2.50	3.22±0.75		3.00±0.77		3.75±1.33		1.35±0.93
13	B=12	$\bar{X}$ ±S.D.	140.45±5.97	34.85±4.76	43.12±1.69	3.20±0.66	(0.60)	2.00±0.37	(3.30)***	3.00±1.17	(1.55)	1.28±0.38
	G=11	$\bar{X}$ ±S.D.	141.89±9.74	32.73±5.54	44.49±1.81	3.36±0.55		2.58±0.44		3.80±1.19		1.20±0.58
14	B=7	$\bar{X}$ ±S.D.	144.65±8.45	36.78±3.19	43.56±3.17	3.12±1.14	(1.75)	2.62±1.49	(0.74)	3.50±1.66	(1.20)	2.20±0.80
	G=9	$\bar{X}$ ±S.D.	143.03±6.74	40.44±7.51	41.99±2.92	4.05±0.85		3.16±1.22		2.33±1.92		1.94±1.28
15	B=4	$\bar{X}$ ±S.D.	155.90±6.10	40.75±7.11	45.62±3.21	3.00±0.48	(2.28)**	2.92±0.48	(0.10)	4.53±2.40	(1.32)	2.11±0.54
	G=9	$\bar{X}$ ±S.D.	148.93±9.65	41.40±4.07	43.08±2.70	3.66±0.43		2.88±0.61		2.80±1.78		1.42±1.21

* $P < 0.05$ (Significant) ** $P < 0.01$ *** $P < 0.001$ (Highly Significant)

boys i.e. Ectomorphy remains dominant followed by endomorphy and mesomorphy but after 13 years there is a change in component dominance. Balanced ectomorph component which is dominant uptill 13 years moves to mesomorphic-endomorph and balanced endomorph at 14 and 15 years respectively.

The endomorphic ratings increase with age and the maximum value for this component has been recorded as 4.05 units at 14 years. Sample girls are least mesomorphic at 11 years (2.25 units) and register the maximum value of 3.16 units at 14 years. Ectomorphic values record almost similar rating upto 13 years, beyond which there is seen a decrease in mean values with age. The magnitude of increase has been maximum in endomorphy (1.00 unit) followed by mesomorphy (0.63). Ectomorphy registers an overall decrease of 1.20 units in girls during adolescence. The average somatotype of girl athletes are distributed in the endomorph-ectomorph sector (3.37-2.77-3.33) (Fig. 1).

Sexual dimorphism clearly indicates that boys are more ectomorphic than girls at all age levels except for 11 and 13 years where girls exhibit more value for this component. However, statistically non-significant sex differences have been obtained at all ages in this component. Sample girls exhibit almost similar mean values for mesomorphy as that of boys uptill 11 years whereafter, they show considerably higher values for mesomorphy till 14 years but at 15 years they report almost similar values as that of boys. T-values reveal significant sex difference for mesomorphy at 12 and 13 years only. Boys and girls show similar endomorphic rating at 11 years after which girls report more value for this component at all ages under study. Statistically significant results have been obtained at 12 and 15 years respectively as is evident from the t-values.

Thus it emerges from the above results that there are clear differences between male and female somatotype components. The dominance of endomorphy over mesomorphy is the characteristic of females, whereas dominance of ectomorphy over endomorphy is the characteristic of sample males. The somatotypes of males lie in the balanced ectomorph sector (2.90-2.45-3.74) and that of females in endomorph-ectomorph sector (3.37-2.77-3.33) of the somatochart. Inte-

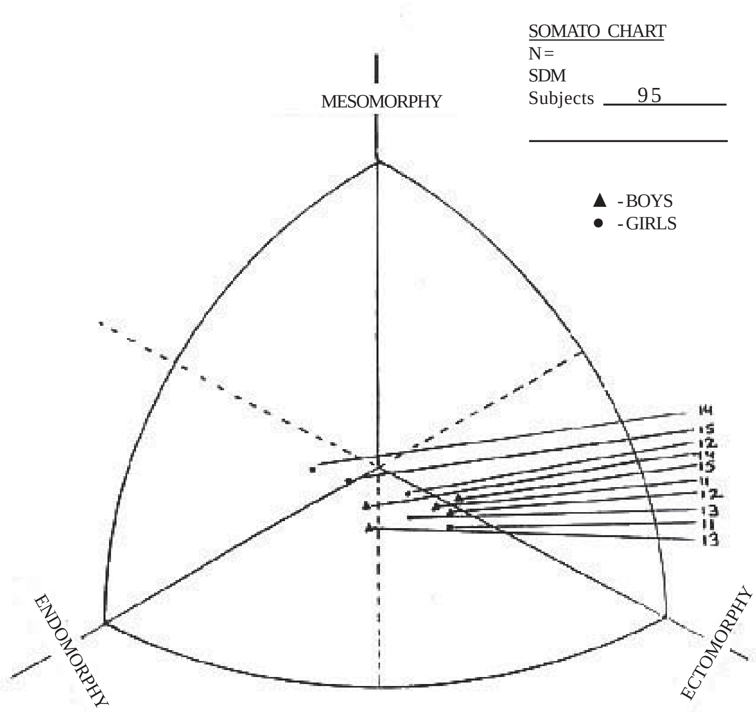

Fig. 1. Mean somatotype of mentally retarded athletes (11 to 15 years)

restingly boys do not show a major change in component dominance with age. The present findings are in line with Tanner's (1970) and Singh and Bhasin (1990) which conclude that there is not much change in somatotype rating during growth phase. However, sample girls show a definite change in component dominance. This finding receives support from many studies conducted on adolescent girls (Hunt and Barton, 1959; Heath and Carter, 1971; Walker, 1978; Singh and Sidhu, 1980; Singh and Bhasin, 1990; Singal et al., 1990; Talwar et al., 1994).

These differences in the somatotype of boys and girls athletes are presumably due to genetic factors, dietary patterns, differential physical activity and other socio-cultural or environmental factors, since this Olympic sample in particular consisted of mixture of caste groups. More over they were trained for Olympic games for the last one year only. As expected girls showed an overall better growth. On the contrary boys lacked in muscular development. It may be due to lack of mental power or power associated with normal intellectual development which may result in an inability of the individual to function fully or adequately in every day life and it eventually leads to motor retardation. Boys seemed to be more affected by it than the girls. However, carefully designed studies on mentally retarded non-athaletes need to be undertaken to get a clear picture of differences between their somatotypes.

KEY WORDS Somatotype. Mentally Retarded Athletes. Adolescence.

ABSTRACT The present study aims to evaluate age changes in somatotypes of 95 mentally retarded adolescent athletes (51 boys and 44 girls) ranging in age from 11 to 15 years and had participated in Special Olympics National Games, 1998. The cross-sectional sample includes only those individuals, who had been diagnosed as mentally retarded with unknown aetiology for their low intelligence. Each individual was somatotyped by the Heath-Carter Anthropometric Method. Average somatotype of male and female sample positions itself on the balanced ectomorph (2.90-2.45-3.74) and endomorph-ectomorph (3.37-2.77-3.33) sectors respectively. Sexual dimorphism clearly indicates that males are more ectomorphic and less endomorphic than their female counterparts and fail to show a change in component dominance during adolescence.

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