

Analysis of body composition among adolescent school boys

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■ ABSTRACT

In modern society, the adolescents do not participate in physical activities more and concentrate on studies. Physical activity is a significant ingredient in the quality of life, because it increases energy and promotes, physical, mental, sociological and psychological well being in addition to conferring health benefits. To achieve this purpose 800 boys from various schools of Tamil Nadu (TN) were selected as subjects at random. Their age ranged from 13 to 16 years (studying 8th to 11th standard). Body composition (Body density (BD), Lean body mass (LBM), fat free mass (FFM) and per cent body fat (% BF) were selected as criterion variables. Skin fold techniques measured with slim glide caliper were used and the measuring sites were pectoralis major, rectus abdominis and quadriceps femoris. Criterion variables were calculated. (Jackson and Pollock, 1978). The collected data were analyzed by using independent 't' test. Among the groups analysis of variance was used and if any significant difference between groups scheffe's post hoc test was used. The confidence level of significance was fixed at 0.05. The results showed that 13 years Tamil Nadu boys were better in BD, LBM, FFM and per cent body fat. But at the age of 14, Puduchery adolescent boys were showing better BD level and no difference was found on LBM and FFM. However, per cent BF was in favour of TN boys. At the age 15, TN adolescent boys were better in LBM and FFM and per cent BF. At the age of 16, the result was surprisingly reverse, i.e. no. difference between TN and PU boys on BD and per cent BF, but PU adolescent boys were between in LBM and FFM than TN boys.

■ **Key Words :** Body composition, Body density (B.D), Lean body mass (LBM), Fat free mass (FFM), Per cent body fat (%BF)

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Life styles affect people's health with eating habits and regular physical activity being the two most influential factors (Panagiotakos *et al.*, 2004). Irrespective of sex, age or country of residence (Yusuf *et al.*, 2004). Body composition that relates to the relative amounts of muscle, fat, bone and other vital parts of the body. Sports and games provide an ideal time to introduce the concept of wellness to young children. A healthy body produces effective performance and allows the child to get maximum enjoyment. Physical fit children generally have better memory concentration and energy levels. They tend to be healthier and more inclined to carry their healthy life style in adulthood. If fails to physical activity that leads major problems in

individuals. Such as obesity, diabetes, hypertension (Going, 1988). Current study focuses that school going adolescents are facing health hazard problems that leads to physical, physiological and psychological problems. Basic data on education employment are reproductive health among adolescents which show that they are not receiving adequate physical activities and capacity building to equip them for the future. Studies need to conduct in India to high light various areas of concern with respect to adolescent life style (Sidra, 2009). The primary aim of the study was to compare Tamil Nadu and Puduchery state adolescent boys on body composition (body density, lean body mass, fat free mass and per cent body fat). The secondary purpose was to analyse the

body composition between different age groups.

to find out the difference between means.

METHODOLOGY

To achieve this purpose (n = 800) boys from various schools of Tamil Nadu (TN) (n= 400) from Cuddalore, Chennai, Pudukottai and Salem districts and Puduchery (PU) (n =400) from Puduchery, Karaikkal, Mahe and Yanam districts of South India were selected as subjects at random. Their age ranged from 13 to 16 years (studying in 8th to 11th standard). Body composition (body density, lean body mass, fat free mass and per cent body fat) selected were criterion variables. Skin fold measured with slim glide caliper and the measuring sites were pectoralis major, rectus abdominis and quadriceps femoris. Criterion variables were calculated by following the procedure Jackson and Pollock (1978). The collected data were analyzed by using independent ‘t’ test and the level of confidence was fixed at 0.05. Between the groups ANOVA were used and the obtained ‘F’ was significant Scheffe’s post hoc test was used

OBSERVATIONS AND DISCUSSION

Table 1 clearly indicates that 13years boys were differ on BD,LBM,FFM, and 14 years boys were differ on BD and per cent BF , 15 years boys were differ on LBM, FFM and per cent BF and 16 years boys were differ on LBM and FFM . Hence, it was concluded that TN and PU adolescent boys significantly differed with age on body composition.

The result of ANOVA (Table 2) show that, irrespective of age and state, LBM and FFM were significantly different for adolescent boys of TN and PU states.

Table 3 shows that 13,14,15 and 16 years boys were significantly different in LBM and 13 and 14 years boys were having significantly lesser FFM than 16 years boys. It was concluded that, when age progresses during adolescence LBM and FFM increase significantly.

From the result it was clear that adolescent boys of TN

Table 1 : The descriptive and ‘t’ value among Tamil Nadu and Puduchery adolescent school boys on body composition

Age	State	B.D		‘t’	LBM		‘t’	FFM		‘t’	% BF	
		\bar{X}	$\pm \sigma$		\bar{X}	$\pm \sigma$		\bar{X}	$\pm \sigma$		\bar{X}	$\pm \sigma$
13	TN	1.0784	±0.00677	2.39*	34.86	±7.56	2.06*	3.06	±2.36	1.97*	7.84	±4.91
	PU	1.07520	±0.011878		32.85	±6.18		2.54	±1.18		7.18	±2.87
14	TN	1.0776	±0.00653	2.24*	36.67	±5.63	0.28	3.12	±1.48	1.81	7.78	±3.10
	PU	1.0756	±0.006407		36.41	±7.40		2.74	±1.49		6.88	±2.95
15	TN	1.0764	±0.00938	1.69	42.30	±6.20	6.94*	3.65	±2.48	4.24*	7.50	±3.65
	PU	1.0780	±0.004020		37.28	±3.73		2.54	±0.84		6.42	±2.11
16	TN	1.0760	±0.00943	1.91	42.20	±6.86	2.17*	3.22	±1.48	1.98*	7.86	±3.64
	PU	1.0780	±0.005685		43.97	±4.38		3.81	±2.59		7.80	±3.66

*Significant at 0.05 level table value 1.96 with df 798. Level of significant at 0.05 level

Table 2 : Irrespective state of mean and S.D. and ANOVA of adolescent school boys on body composition

Variable	13 years	14 years	15 years	16 years		Sum of squares	df	Mean square	‘ F’
Mean	1.0768	1.0766	1.0772	1.0770	B	0.0318	3	0.0106	
B.D.									
S.D.	0.00978	0.00653	0.00724	0.00783	W	39.8	796	0.050	0.212
Mean	33.86	36.54	39.79	43.10	B	9617.802	3	3205.934	
LBM									
S.D.	6.96	6.56	5.69	5.81	W	31356.869	796	39.393	81.383*
Mean	2.80	2.93	3.09	3.52	B	58.555	3	19.518	
FFM									
S.D.	1.88	1.49	1.93	2.13	W	2788.229	796	3.503	5.572*
Mean	7.51	7.33	6.96	7.83	B	78.410	3	26.137	
% BF									
S.D.	4.02	3.05	3.03	3.64	W	9536.441	796	11.980	2.182

*Significant at 0.05 level table value 2.62 with df 3 and 796. Level of significant at 0.05 level

Table 3: Scheffe's post hoc test for significant difference among the different age groups on body composition

Variable	13 Vs 14 years	13 Vs 15 years	13 Vs 16 years	14 Vs 15 years	14 Vs 16 years	15 Vs 16 years	C.I
L.B.M.	2.68*	5.94*	9.24*	3.25*	6.56*	3.31*	1.76
F.F.M.	0.13	0.29	0.72*	0.16	0.59*	0.43	0.52

and PU states were significantly different on body composition (BD, LBM, FFM and %BF). Further, it showed when age progressed during adolescence, LBM and FFM increased significantly.

Many physical educators and coaches work with individuals between the ages of five and eighteen years, especially in public and private schools. Because children's interest and participation in competitive sports has increased dramatically in recent years. So, the professionals must be knowledgeable in the areas of normal growth and development as well as effects of exercise on young competitors.

Childhood is defined as the time between the first birthday and puberty and is characterized by steady growth and maturation with particular rapid progress in motor development (Malina and Bouchard, 1991). The relatively stable rate of growth makes childhood a good time for the introduction and development of motor skills. The adolescent growth spurt normally occurs between 14.5 to 16 years of age in male (Brooks *et al.*, 1985). Difference in maturity is manifested in dramatic difference in strength, sports skill and performance.

In males, the circulating level of testosterone is an indicator of puberty. During adolescence, the testosterone concentration increases 10 to 20 fold from the childhood value. This raised level of hormone may induce the muscular system to increase the LBM and FFM in the adolescent age (Eriksson *et al.*, 1973).

Puberty, in both genders, can also be indirectly assessed based on the level of development of secondary sex traits. The additional procedures for assessing the timing of the adolescent growth spurt are called peak height velocity and peak weight velocity (Tanner *et al.*, 1966). The result of the present study also shows the same for LBM and FFM. Further, the result reveals, the adolescent growth spurt, males exhibit a dramatic increase in LBM and FFM and an increased rate of development in fat free weight (Bailey *et al.*, 1978).

Per cent body fat increases dramatically during infancy for both genders. Throughout childhood and adolescence, however females remain stable an increase slightly in per cent body fat, while males decrease gradually (Fournier *et al.*, 1982).

Physically activity has beneficial effects on body composition characteristics (Jacobson *et al.*, 1989). In general, active children and adolescents have lower level of per cent body fat and fat weight, but more fat free weight than their inactive peers (Pfeiffer and Francis *et al.*, 1986). Thus, exercise can positively impact athletic performance by aiding in the

development of optimal sport specific body composition characteristics as well as potentially decreasing the health risks associated with obesity.

A study of 609 normal boys and girls, 7.5 to 20.5 found no gender differences in fat free mass prior to adolescence when FFM was expressed per unit of height (Forbes, 1972). At ages 12 to 13, the FFM to height ratio in females begins to plateau, but in males it continues to increase to age 20. FFM peaks at age 15 to 16, but male FFM doesn't peak until age 18 to 20.

Body density data are somewhat consistent with these findings. Females typically have lower total body density values at all ages, including pre-adolescence which would normally indicate a higher relative body fat. But from age 7 to age 25, the density of the fat free mass in females is consistently lower than in male (Lohman, 1986).

Fat mass increases through adolescence in girls, which it appears to reach a plateau or to change only slightly near the time of the adolescent spurt in boys about 13 to 15 years. The decline in relative fat mass during male adolescence is a function of the adolescent spurt in fat free mass, more specifically muscle mass (Malina and Bouchard, 1991).

The age trends in body density, lean body mass and fat free mass results were in conformity with Kansal (1981) and Giri (1990). The per cent body fat result was in line with Goind (1988), Dutt (2005) and Bhavani Gopinath (2010). Gutin *et al.* (2002) observed that, obese adolescents with two physical training programmes showed favourable changes in percentage body fat and visceral adipose tissue.

Conclusion :

In response to population momentum, adolescents constitute a major share to total population of India. Adolescence, a dynamic period of physical and psychological growth, presents young people with a variety of developmental challenges that can have a significant impact on health related behaviours. Because adolescents exhibit distinct patterns of morbidity and mortality and health practitioners are focusing increased attention on their unique health care needs.

At the early stage (13 years) Tamil Nadu adolescent boys were better in BD, LBM, FFM and per cent BF. But at the age of 14 Puduchery adolescence boys were showing better BD level and no. difference was found on LBM and FFM. However, per cent BF was in favour of TN boys. At the age of 15, TN adolescent boys were better in LBM and FFM and per cent

BF. At the age of 16, the result was surprisingly reverse, *i.e.* no difference between TN and PU boys on BD and per cent BF, but PU adolescent boys were better in LBM and FFM than TN boys.

Therefore, low educational status and economic conditions with young age make valuable. To rise age at marriage and education will provide quality of care through target oriented programme to adolescents, especially awareness of health related physical fitness may improve the status of adolescents in our country.

Implications :

Some reasonably well established facts regarding the characteristics of physical activity or exercise that contribute to an improvement in health related physical fitness (body composition) or clinical status. Physically active people at all ages exhibit fewer health problems, than the very sedentary. Some of this difference may be due to self selection or associated health habits. Thus, the entire difference may not be caused by physical activity. Both observational and experimental data are available to support the casual role for exercise in both improved health related fitness and decreased clinical manifestations of selected disorders.

It is important to be able to identify the onset of puberty because normal growth patterns as well as responses to exercise training are substantially different in children than they are in adolescents. Coaches, athletes and physical educators should have very different expectations for training programme depending on the level of maturation of the individuals involved.

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