

Identification of Responsible Measures to Determine the Proper Anthropometrical Stature of School Boys

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Abstract

After birth growth, development, maturation and readiness takes place in a well co-coordinated manner. Physical movements add the potentialities and act as booster in this growth and development process. The degree of intensity and the quality of movements mainly depends upon the different genetic factors such as the different anthropometric measures, internal physiological functioning of the body etc. in the childhood and later it can take a new shape through some external affairs. In case of talent identification, it is a burning question that which factors are responsible to select a specific child having sound physical stature. 366 (three hundred sixty six) school going boys of class VI of age 11 year and 365 (three hundred sixty five) boys of class VII of age 12 year were considered as the subject of the present investigation. Anthropometric measures were Weight, Standing height, Sitting height, Lower Limb Length, Thigh Circumference, Chest circumference and Abdomen circumference. It has found that except chest and abdomen circumference all the other measures of the students of class vii were higher than that of class vi students. The standing height, weight, thigh circumference and chest circumference were identified as the four responsible anthropometric measures to detect a specific future performer having proper stature.

KEYWORDS: Growth, Development, anthropometric measures, stature, potential healthy adolescents

INTRODUCTION

'Anthropometry' the measurement of size and proportion of the human body mostly guided by the Endowment factors. The different traits, which can be transferred to the next generation are height, weight, length and width of the different body parts, types of muscles, muscle mass, body composition. For general growth pattern the different measures of Anthropometry have an impact and influence the normal stature of the body. The general anthropometric measures are depending upon the genetic factors, one inherited from his ancestors also influence the athletic performance a lot.

Lu et al. (1962), studied on 128 children from three to eight years and concluded that the three factors, the height, the chest girth and the calf girth are satisfactory in determining the weight for the children. Bremerg (1966) concluded about the existence of relationship between the anthropometrical measures, motor ability and reaction time movement variables. Teeple and Massey (1976) observed that the mean weight of 11 and 12 years old boys were as 39.5 and 44.3 kg. Slaughter et al. (1982) have shown that the average body weight of 10.0 – 10.9 and 11.0 – 11.9

years old American boys as 37.8 and 40.0 kg respectively. Teeple and Massey (1976) has shown that the average height of 11 and 12 years old boys were 147.6 and 152.4 cm. Slaughter *et al.* (1982) have shown that the mean height of the 10.0 – 10.9 and 11.0 – 11.9 years of American boys were 144.1 and 147.8 cm. Teeple and Massey (1976) has shown that the mean sitting height of 11 and 12 years old boys were 77.0 and 79.2 cm. Bhatnagaret *al* (1990) observed that the average sitting height of 11 and 12 year old boys as 64.24 and 64.70 cm. Croney (1981) has shown that the average lower limb length of 11 and 12 years London boys as 66.04 cm. and 68.58 cm..Slaughter *et al.* (1982) observed that the mean thigh circumference of 10.0 – 10.9 and 11.0 – 11.9 years old American boys were 42.6 and 43.9 cm and the mean chest circumference were 66.8 and 68.4 cm.

As there were several other studies regarding this simple relations of effectivity of different anthropometric measures and activity, fitness, performance etc. in abroad as well as India also, the present researcher was very much intended that whether there were any responsible measures among different anthropometric measures which influence the composite effect of these proportional body parts.

SUBJECTS

366 (three hundred sixty six) school going boys of class VI (S_N), completed 10 years but not cross over 11 years of age and 365 (three hundred sixty five) boys of class VII (S_X) completed 11 years but not cross over 12 years of age were taken from 17 schools in the district Bankura as the subject of the present investigation. The students were voluntarily accepted the stress of the process. Students were habituated in engaging themselves in natural playing but even not regularly. Some of them have got some coaching / training. As sampling was random some of them were also sedentary. Measurements were taken one by one in the classroom. Data were taken from a single school in a day and the total time taken was near about 4½ to 5 hours daily. Within 1½ - 2 months total data were collected.

CRITERIA MEASURED

Anthropometric measurements were the criteria. The anthropometric measures were the measurements of different body parts. The anthropometric measurement procedures were taken from the “Practical measurements for evaluation in physical education” by Johnson & Nelson.

Anthropometric measures:-

- a. Weight (in kg.)
- b. Standing height (in m.)
- c. Sitting height (in m.)
- d. Lower Limb Length (in m.)
- e. Thigh Circumference (in m.)
- f. Chest circumference (in m.)
- g. Abdomen circumference (in m.)

RESULTS AND DISCUSSIONS

The collected data were analyzed statistically to arrive into definite conclusions. These results after statistical calculations were presented in this part with due analysis and discussions. The values after statistical calculations of the anthropometric measures are presented in the table-1.

Table-1: Mean, S.D. and comparison of means of various relevant measures.

Measures	Mean \pm S.D.	Mean \pm S.D.	“t” value	‘t’ tab
	S _N	S _X		
Weight (kg.)	32.35 \pm 7.06	34.04 \pm 6.87	3.30*	1.96
Standing Height (m.)	1.43 \pm .09	1.47 \pm .09	5.52*	1.96
Sitting Height (m.)	.71 \pm .05	.73 \pm .06	4.43*	1.96
Lower Limb length (m.)	.72 \pm .05	.74 \pm .05	5.02*	1.96
Thigh Circumference (m.)	.38 \pm .05	.39 \pm .04	2.93*	1.96
Chest circumference (m.)	.65 \pm .06	.66 \pm .05	1.03	1.96
Abdomen circumference (m.)	.57 \pm .07	.58 \pm .05	.43	1.96

*Significant at 0.05 levels.

After critical analysis of the data of table-1 of the different anthropometric measures it has appeared that so far the stature and structural peculiarity are concerned, the subject of the two classes were almost homogeneous, with some significant differences in case of weight, standing height, sitting height, lower limb length & thigh circumference and the students of class VII of age 12 years bearing the higher values than the students of class VI of age 11 years in those measurements. Only in case of chest circumference and abdomen circumference there were no significant differences.

Factor analysis for identification of responsible factors

After conducting the “t” test among the different factors the researcher thought to undertake factor analysis to identify responsible factors in this two age group, which may be helpful in identifying the proper anthropometric stature.

S_N group(class VI)

Table No. -2: Total variance explained (anthropometrical measures) for S_N group.

Component	Initial Eigen values		
	Total	% of variance	Cumulative %
1	4.894	69.911	69.911
2	0.954	13.626	83.537
3	0.520	7.423	90.960
4	0.277	3.958	94.918
5	0.213	3.037	97.955
6	0.139	1.990	99.945
7	0.004	0.055	100.00

Extraction method: Principal component Analysis.

From the table no.2, where the total variance explained, in case of anthropometric measures the initial Eigen values considered only for the 1st component since the cumulative % of variance at the 1st component was 69.911%.

Table No. -3: Component matrix (a) (anthropometric measures) for S_N group.

Measures	Component – 1
Chest cir.	0.887
Abdomen cir.	0.725
Lower limb length	0.731
Sitting height	0.862
Standing height	0.906
Weight	0.903
Thigh cir.	0.818

Extraction method: principal component analysis a 1 component extracted

From the component matrix table (no. 3), it may be seen that all the seven (7) factors secured score more than 0.7, as the matrix values over 0.7 were only considered and the range varies from 0.725 to 0.906 in the 1st component. It means that all these anthropometric parameters were responsible for determining the total anthropometric stature of the subjects of the study, studying in class VI.

S_X Group (class VII):

Table No.- 4: Total variance explained (anthropometric measures) for S_X group.

Components	Initial Eigen values		
	Total	% of variance	Cumulative %
1	4.855	69.358	69.358
2	0.828	11.825	81.183
3	0.592	8.451	89.634
4	0.327	4.677	94.311
5	0.255	3.642	97.953
6	0.143	2.047	100.00
7	1.852 E-05	0.000	100.00

Extraction Method: principal component analysis.

In case of anthropometric measures the initial Eigen values considered only for the 1st component since the cumulative % of variance at the 1st component was 69.358% (Table No. 4).

Table No. -5: Component matrix (a) (anthropometric measures) for S_X group

Measures	Component – 1
Abdomen cir.	0.692
Chest cir.	0.847
Lower limb length	0.723
Sitting height	0.870
Standing height	0.935
Weight	0.931
Thigh cir.	0.799

Extraction Method: principal component analysis a 1 component extracted

From the component matrix table (no.5) it may be seen that all the Six (6) factors except abdomen circumference secured score more than 0.7 and the range varies from 0.723 to 0.935 as the matrix values over 0.7 were only considered in the 1st component. However the abdomen circumference (0.692) was closely related. It means that almost all of these anthropometric parameters were responsible for determining the total anthropometric stature of the subject of the study studying in class VII.

DISCUSSION

The Childs growth and development includes an inter-related expression of physical, cognitive, social, psychological and motor aspects. Several studies reported that severe nutritional restriction experienced currently by many children in third world countries, particularly in terms of protein calories, result in significant reduction in height and weight as well as muscle mass and bone density compared to children of high socio-economic status. While all young children exhibit an inherent orderly sequence of events in postural and locomotors development, the time that each occurs varies considerably. In case of boys running, jumping and throwing performances increase throughout the period of adolescence and is associated with continued growth in height and body weight and an increase in the proportion of lean weight to body weight.

According to Barray and Cureton, 1961; Parizkova, 1961; Montoye *et al.*, 1972 and Cureton *et al.*, 1975, the association of age, body size and body composition with physical performance has been found to vary from low to moderate in children, depending on several characteristics of investigation. A number of researchers have demonstrated that body size and body composition are major aspects of physique, related to physical performance in pre-pubescent children (Boileau *et al.*, 1977 and Slaughter *et al.*, 1982). Morphological characteristics are fundamental to successful performance of sports activities.

Lu *et al.* (1962), studied on 128 children, 56 boys and 72 girls, aged from three to eight years and concluded that three factors, the height, the chest girth and the calf girth are satisfactory in determining the weight for children. Wear and Miller (1962), worked over 300 junior high school boys aged from 11 years 11 month to 16 years 9 month and observed that the subjects who were medium in physique and normal in development were the best performers. Subjects of heavy physique (over weight) were the poorest performers.

CONCLUSIONS

From the above discussion, it was clear that the standing height, weight, thigh circumference and chest circumference are the four factors, which were most responsible anthropometric measures to detect a specific performer having proper stature. Considering all these aspects, and the views of the leading researchers it may safely be concluded that during adolescence to adulthood, the potential healthy adolescents having proper anthropometric stature is very much dependent to some selected anthropometric measures.

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