

Anthropometric Profile and Physical Performance of Rural School Girls

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ABSTRACT One hundred pre-adolescent girls in the age group of 10-12 years were selected for the study. The height, weight, mid-upper arm circumference and skin fold thickness of the subjects were measured by standard methods and then compared with standards of ICMR and NCSH. Physical performance was determined by Running test. Height and weight of the subjects were higher than the ICMR standards. Weight, mid-upper arm circumference and skin fold thickness were lower than the NCSH standard. A positive co-relation between distance covered with height ($r = 0.319$) and with weight ($r = 0.205$) suggests that the girls possessing proportionately higher height and weight had better physical performance.

INTRODUCTION

Nutritional anthropometry serves as a useful indicator of past and present nutritional status. Among various anthropometrical measures, weight, height, arm circumference and skin fold thickness are used to assess the nutritional status (Bhasin et al., 1990). The 10-12 years age group is a preparatory stage in the life cycle of an individual when body stores of nutrients are built up in preparation for second growth spurt in life i.e. adolescence. A well balanced diet is required during this phase to ensure normal growth and maintain physical and mental fitness (Kumari and Devadas, 1990). Hence utmost care must be exercised to promote their health and well being and more significantly for the female children because the health of the nation depends largely on the "Would be Mothers". It is a well known fact that prosperity of a nation depends upon the quality of its human resources. The young girls who are at the brink of womanhood constitute the most crucial segment of our population from point of view of the quality of our future generation (Kapil et al., 1993). There is direct relationship between body size and capacity to perform work. Nutritionally deprived individuals have smaller body sizes and body weights and they expend energy only proportionate to their body weight. Thus short stature due to under nutrition means lower level of productivity for sustained moderate to heavy physical work..

So considering this background in mind the present investigation was carried out to study the relationship between anthropometrics and physical performance of rural school girls.

MATERIALS AND METHODS

One hundred school girls of 10-12 years of age group from two govt. primary schools of *Daad* and *Phulanwal* villages of Ludhiana district (Punjab) were selected. A schedule was developed to collect the background information of the subjects. The height, body weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skin Fold Thickness (TSF) of the subjects were measured according to the methods of Jelliffe (1966). The anthropometry was then compared with the standards of ICMR (1984) and National Council Health Statistics (NCSH, 1974). Physical performance was determined by Running Test (Satyanarayana et al., 1990). The running test was performed on all the 100 subjects.

The physical performance of each subject was determined under standard conditions. The pulse rate and blood pressure of all the subjects were recorded before and after the exercise/ test. The results were statistically analyzed for the test of significance (Gupta and Saini, 1988).

RESULTS AND DISCUSSION

The subjects selected for the present investigation were classified according to their age into two groups:

- (i) Age Group (AG) I = 10+ years.
- (ii) Age Group (AG) II = 11+ years.

There were 68 and 32 subjects in AG I and AG II groups, respectively.

The weight of all the subjects ranged from 19 to 37 Kg. The mean $\pm$ S.E. of weight of the girls in the 10+ and 11+ age group was 26.1 ± 0.09 Kg and

27.8 $\pm$ 0.05 Kg, respectively which was 110.6% and 105.3% of the ICMR standards and 80.3% and 82.5% of the NCHS standards. Thus the body weight of the subjects (Table 1) was on the lower side as compared to NCHS standards but was higher than the ICMR standards. Mukhopadhyay et al. (2005) and Nayyar (2000) also reported that the height and weight of school children of 10-12 years of age was higher than NCHS standard.

The height of the subjects of 10-12 years ranged from 120 to 150 cm. The average height of the subjects was found to be more than the ICMR standard (Table 1) being 104% and 104.2% for 10+ and 11+ years girls, respectively. When compared with NCHS standards, it revealed that the average height of the subjects was 96.6% and 98% for 10+ and 11+ years age group., respectively. This showed that the mean height of the subjects was higher than the ICMR standards and in a close proximity of the NCHS standards. Ahmad et al. (1998) also reported that the mean height of school children was more than the ICMR standards and Bharati et al. (2005) reported that the height and weight of school children of Karnataka were lower than the NCHS standards.

The mid-upper arm circumference of the subjects ranged from 14 to 22 cm. The mean $\pm$ S.E. MUAC of the girls in 10+ years was 17.2 $\pm$ 0.04 cm (Table 1) and for 11+ years was 17.7 $\pm$ 0.02 cm being 81.5% and 79% of NCHS standards, respectively. The triceps skin fold thickness of the subjects ranged from 4 to 12.5 mm. The observed value for the girls in the age group of 10+ and 11+ years was 64.2% and 61.5% of NCHS

Table 2: Distance covered in 2 minutes by the girls in running test

Age Group	Distance covered (m)	't' value
10+ years (n=68)	365 $\pm$ 4.2	0.701 NS
11+ years (n=32)	377 $\pm$ 3.4	
Average value	371 $\pm$ 2.7	

NS- Non-significant

standards, respectively which was lower than the NCHS standards (Table 1). Bharati et al. (2005) also reported lower MUAC than standards but Rao et al. (1998) reported a higher value of MUAC and TSF than the standards.

The overall mean distance covered in 2 minutes in running test by the subjects was 371 $\pm$ 2.7 m. The mean score for distance covered by the girls of 10+ and 11+ years age group was 365 $\pm$ 4.2 and 377 $\pm$ 3.4 m, respectively (Table 2). With age, the distance covered also increased. A non-significant difference in increase over basal in blood pressure was observed among the subjects (Table 3). A significant ($p < 0.05$) increase over basal in pulse rate was observed among 10+ and 11+ years age group.

A positive correlation (Table 4) between height and distance covered ($r = 0.319$) and between weight and distance covered ($r = 0.205$) suggested that proportionately good height and weight had a direct bearing on running capacity of the girls as the distance covered increased with an increase in height and weight of the girls. Spurr et al. (1983) observed a depressed physical working capacity in the subjects who had low body weights.

Hence it can be inferred that the improved

Table 1: Anthropometrical measurements of the girls in comparison to ICMR (1984) and NCHS standards

Age Group	Observed values	NCHS* Standard	% NCHS Standard	ICMR Standard	% ICMR Standard
Weight (Kg)					
10+ yrs.	26.1 $\pm$ 0.09	32.5	80.3	23.6 $\pm$ 5.74	110.6
11+ yrs.	27.8 $\pm$ 0.05	33.7	82.5	26.4 $\pm$ 5.53	105.3
Height (cm)					
10+ yrs.	133.6 $\pm$ 0.15	138.3	96.6	128.4 $\pm$ 8.02	104
11+ yrs.	139.2 $\pm$ 0.04	142.0	98	133.6 $\pm$ 9.49	104.2
Mid -Upper Arm Circumference (cm)					
10+ yrs.	17.2 $\pm$ 0.04	21.1	81.5	-	-
11+ yrs.	17.7 $\pm$ 0.02	22.4	79	-	-
Triceps Skin Fold Thickness (mm)					
10+ yrs.	7.7 $\pm$ 0.01	12	64.2	-	-
11+ yrs.	8.0 $\pm$ 0.02	13	61.5	-	-

Values are Mean $\pm$ S.E.

*Source: ICMR (1990)

Table 3: Pulse rate and blood pressure of the girls before and after running Test

Factor	10+ years (n=68)	't' value	11+ years (n=32)	't' value
Pulse Rate (per minute)				
Before Running test	106±7.12		102±7.22	
After Running test	164±9.88		162±9.95	
Increase over basal	58	2.44*	60	2.38*
Systolic Bp Records (Mm/Hg)				
Before Running test	95±9.51		98±7.42	
After Running test	108±10.37		113±7.29	
Increase Over Basal	13		15	
Diastolic Bp Records (Mm/Hg)				
Before Running test	51±9.43		53±8.86	
After Running test	61±9.65		63±9.85	
Increase over basal	10		10	

't' value – p< 0.05

Table 4: Co-relation between anthropometrical parameters and physical performance of the girls

Test	Height	Weight	MUAC	TSF
Running Test (Distance Covered, m)	0.319*	0.205*	0.077	-0.129

* Significant at p=0.05

nutritional status will result in healthy physique of girls which in turn will have a strong positive impact on their physical work performance. So there is a need to impart nutrition education to the school children and to their parents as well to make them nutritionally aware.

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