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Physical Education

BODY COMPOSITION, BODY GIRTH AND BONY BREDTH OF RURAL   SCHOOL GOING GIRLS – A CORRELATIONAL STUDY

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ABSTRACT

The purpose of the present study was to establish relationship amongst body composition, body girth and bony breadth measurements of school going adolescent girls belonging to Bardhaman and Birbhum districts of West Bengal, India. 115 girl students ranging the age between 15 and 17 years were selected as the subjects of this study. Percentage of body fat (%), lean body weight (kg); girth measurements (cm) at the sites of forearm, waist and calf; Biacromial breadth (cm), Epicondyler humerus breadth (cm) and femoral epicondylar breadth (cm) were selected parameters of the study. Results of the present study revealed that 68.66% adolescent subjects of the study belong to underweight category, the mean body mass index being 17.45. Lean body mass and body weight are significantly correlated to various body girths and bone diameters. However, significant relationships were not noticed in cases of biacromial breadth while related to calf and waist girths of adolescent girls.

I. Background

A good physique and proper functioning of physiological systems are symbols of physical fitness. It may be demonstrated by a proportionate stature, body circumferences or bony structures. Adolescent period is considered the healthiest period in human life. However, it is observed that in rural Bengal underweight children are dominating in all stages of school life. It seems that it is essential to emphasize proper nutrition and balanced physical activity programmes that they might not receive. A good body built should be emphasized from early childhood and develop health-related fitness improving stamina, immune system, and maintaining good body composition. Body built is a simple term with a wide meaning and the researchers intended to observe this status in rural girls and correlate the parameters thereof.

II. Materials and Methods

One hundred fifteen (N=115) school going girls, were selected from West Bengal, India as the subjects of the study. They were ranging between 15 to 17 years of age.

In the present study, chosen anthropometric parameters were height (cm), body weight (kg), BMI (kg/m²), LBM (kg), body fat (%); forearm girth (cm), calf girth (cm), waist girth (cm); and bony breadth (cm) of bi-acromial (cm), epicondyle of humerus (cm) & femoral epicondyle (cm).

Each subject underwent a one-day testing session from 2:30 p.m. to 4:30 p.m. in the afternoon. Height was measured using a stadiometer to the nearest 0.1 cm while body weight was obtained to the nearest 0.1 kg using a calibrated weighing machine (Omron). BMI was calculated as weight (kg) / height (m)². Girls were considered underweight and normal based on BMI reference guidelines (WHO, 2004). Waist-girth was measured using a Gulick anthropometric tape at the level of the narrowest point between the lower costal border and the iliac crest. Skinfold thickness at four sites was obtained using a Harpenden skinfold caliper. The skinfold site was abdominal, triceps, thigh and suprailiac. The landmarks were identified and the percentage of body-fat was determined according to Jackson A S and Pollock, M (1985). Bone breadths of three sites were measured by using anthropometric caliper (Eston and Reilly, 2009).

Statistical analysis

To assess the status of selected parameters of the subjects, descriptive statistics was run on all the parameters and to establish relationship of the parameters, Pearson's product moment method of correlation was employed. The level of significance was set at 0.05.

III. Findings and Results

The findings pertaining to descriptive statistics of personal data of the subjects has been presented in table 1.

Table 1: Descriptive Statistics on Personal Data of School Going Rural Girls

Parameters	Mean	Standard Deviation	Standard Error of Mean	Minimum	Maximum
Height (cm)	150.39	4.38	0.41	134	160
Weight (kg)	39.51	4.88	0.46	30	52
BMI (kg/m²)	17.45	1.89	0.18	13.74	21.22

Table 1 described the status of body stature and Body composition of adolescent girls, the mean height, body weight and body mass index being 150.39±4.38 cm, 39.51±4.88 kg, 17.45±1.89 kg/m². It reveals that 68.69% rural girls under study belong to underweight category.

Table 2 : Descriptive Statistics on Selected Girth and Bone Breadth Measurements of Subjects

Parameter	Mean	Standard Deviation	Standard Error of Mean	Minimum	Maximum
Lean body mass (kg)	36.85	4.45	0.41	27.72	48.45
Body fat (%)	6.71	0.89	0.08	4.87	8.73
Forearm Girth (cm)	20.28	1.21	0.11	18	23
Calf Girth (cm)	27.47	2.60	0.24	16	33
Waist Girth (cm)	62.37	4.71	0.44	54	72
Biacromial breadth(cm)	28.50	1.77	0.16	24.5	32
Epicondyles of Humerus (cm)	6.20	0.58	0.05	5.5	8
Femoral Epicondyles (cm)	8.58	0.60	0.06	8	10

Table 2 showed that the mean % body fat and lean body weight of subjects were 6.71±0.89 % and 36.85±4.45 kg respectively. Further, the mean forearm girth, calf girth, and waist girth of the girls were 20.28±1.21 cm, 27.47±2.60 cm and 62.37±4.71 cm

respectively. The mean biacromial bony breadth of girls was 28.50±1.77 cm, while epicondyles of humerus and femoral epicondyles breadth were 6.20±0.58 cm and 8.58±0.60 cm respectively.

The Correlation matrix on all selected parameters is presented in Table 3 to established relationships with each other:

Table 3: Correlation on Selected Parameters of School Going Girls

	Height	Weight	BMI	LBM	Body Fat	Forearm Girth	Calf Girth	Waist Girth	Biacromial	Epicondyles of Humerus	Femoral Epicondyles
Height	1										
Weight	0.507*	1									
BMI	0.040	0.880*	1								
Lean body mass	0.512*	0.997*	0.874*	1							
Body fat %	0.097	0.344*	0.341*	0.273*	1						
Forearm Girth	0.405*	0.660*	0.542*	0.658*	0.223*	1					
Calf Girth	0.366*	0.519*	0.412*	0.526*	0.036	0.573*	1				
Waist Girth	0.122	0.531*	0.546*	0.534*	0.141	0.168	0.362*	1			
Biacromial	0.347*	0.400*	0.276*	0.393*	0.206*	0.441*	0.438*	0.186*	1		
Epicondyles of Humerus	0.158	0.415*	0.378*	0.410*	0.194*	0.245*	-0.051	0.108	-0.046	1	
Femoral Epicondyles	0.232*	0.218*	0.114	0.222*	0.008	0.346*	0.044	-0.096	0.234*	0.532*	1
r0.05 (115) = 0.180								*. Significant at 0.05 level			

Table 3 shows that (i) body weight is significantly correlated to all selected parameters i.e. lean body mass, % body fat, forearm girth, calf girth, waist girth, biacromial breadth, epicondyles of humerus breadth and the breadth of femoral epicondyles. However, height did not relate significantly with the waist girth and epicondyles of humerus breadth of adolescent school girls; (ii) lean body mass has significant positive correlation with height, body weight, % fat; all selected girths i.e. forearm, calf and waist; all selected bony breadths i.e. biacromial, epicondyles of humerus and femoral epicondyles; (ii) calf girth is significantly correlated with forearm and waist girths, while no significant relationship is established between forearm and waist girths; (iii) biacromial bony breadth is significantly related to all selected girth sites and femoral epicondyle breadth; however, no significant result is observed in relationships of epicondyles of humerus and femoral epicondyles with calf girth and waist girth.

The positive significant relationship between lean body mass and % body fat might be due to the morphological characteristics of the group belonging to 68.69% underweight and 31.31% normal weight category. Further, the result is supported by the study of N. V. Moses (2013) who found 90% of Indian adolescent girls are underweight.

IV. Conclusion
Within the limitations of the study, it may be concluded that the prevalence of underweight among rural school going adolescent girls in West Bengal is as high as 68.69%. Lean body mass and body weight are directly proportional to % body fat, body girths and bony breadths. Lower social standing of Indian adolescent girls is well-versed so far as proper nutrition is concerned. There are many factors that can contribute to underweight among girl children; this study emphasizes the need for developing good

physical structure of adolescent girls through regular activity programmes that may demand proper diet to prevent the underweight trend.

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