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Comparative Study of Anthropometric Profile of Height Weight Matched Young Adult Female Students of Hill and Plain Regions

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Abstract

Height and weight are the major two determinants for various anthropometric properties at any age in life. People of different racial origins and geographical locations have specific anthropometric features. Purpose of this study was to compare the anthropometric profiles of height-weight matched young-adult female students of hill and plain regions, towards their health. The study point towards female young-adult students of hill region being healthier than the plain students of the similar height and weight according to the anthropometric measurements.

Keywords: Anthropometric Profile, Height-Weight Match, Young-adult, Female student, Plain and Hill Region.

Introduction

Height and weight are the major two determinants for various anthropometric properties at any age in life. People of different racial origins and geographical locations have specific anthropometric features. Human beings can be classified in many ways. Each and every people have certain unique characteristics in their form, action and their thought. Researchers, who are keen to focus their work in determining and understanding those characteristics are to know the highest form of the living being in a better way. several studies have revealed that there exists differences between the Plain and hill people. These differences are due to the life style pattern of the groups.

Anthropometric and morphological parameters are the sensitive indicators for sport persons and people of all walks of their life in terms of their physical growth and nutritional status.[1] These indicators depend largely on genetics, correlated with age, sex, socio-economic status, ethnicity, altitude, nutritional status, personal hygiene and exercise practice. Proper evaluation of these parameters projects the quantification of morphological characteristics of elite athletes which can be vital in relating the body structure and sports performance.[2]

Anthropometry comprises techniques that readily contribute to a more in-depth understanding of body composition and nutritional status, allowing the quantification of observations and the changes with time. Championship performances no longer occur at random or as a result of chance alone. International sports performance in various

[1] S Chatterjee, P Chatterjee and A Bandyopadhyay, 'Skin-fold thickness, body fat percentage and body mass index in obese and non-obese Indian boys', Asia Pact, 15, 2006, pp. 232-235.

[2] WD McArdle, FI Katch, VL Katch, *Exercise Physiology Energy, Nutrition and Human Performance* (fourth edition), Williams and Wilkins, Baltimore, 1996.

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disciplines is influenced by many factors, such as, level of physical, physiological and psychological abilities. Body measurements help to talk about nutritional status and highlight the changes due to physical activities.[3]

Methodology

A total of 60 young-adult female students 30 from each of Hill (Kalingpong and Kurseong) and Plain (In Nadia District) area and the age between 18-25 years with similar height and weight were selected as the subjects of this study. All the subjects were sedentary because they were not habituated with any sport or vigorous physical activity in their day to day lives. Height range of the subjects was 157.5 to 162.5 cm and weight of the subjects was between 52.5 to 55.5 kg.

The seven skin-folds were - biceps, triceps, sub-scapular, supra-iliac, medial calf, mid-thigh and abdomen. Six body circumferences considered were shoulder, chest, abdomen, thigh, fore-arm and wrist. Three body composition variables were - body mass index (BMI), waist-to-hip ratio (WHR) and body fat percentage (%BF). BMI was derived from height-weight ratio (weight in kg/height in m2). WHR is predicted from waist circumference divided by hip circumference. Body fat percentage was calculated through skin-fold method. [4]

The tools used for this study to measure different dimensions of anthropometric measurements were as follows: for height and circumferences - anthropometric tape; for weight - weighing machine and for skin-folds - skin-fold caliper.

Measurements were taken following international standards for anthropometric assessment. Mean, standard deviation (SD) and independent t- test were the statistics used in this study for data interpretation. Level of significant difference between two groups was set at $p<0.05$.[5]

Results and Discussion

Table-1 represents the means, SDs and t-values of height, weight and the four body composition variables on two groups of subjects. As the subjects of this study were selected within the specific sample of height and weight, consequently, no difference was observed in group mean height, weight and BMI of two groups.

BF% of this group did not differ and it was within 21-24% range. However, the LBM did differ between the two groups, and with similar body weight hill female students

[3] HV Heyward, and DR Wagner, *Applied Body Composition* (second edition), Human Kinetics Publishers, Champaign, IL, 2004.

[4] AS Jackson, and ML Pollock, "Generalized equations for predicting body density of men", In *British Journal of Nutrition*, 40, (1978), 487-504.

[5] M Marfell-Jones, T Olds, A Stewart, and L Carter, *International Standards for Anthropometric Assessment* (Revised), International Society for the Advancement of Kinanthropometry, University College of Learning, New Zealand, 2006.

(39.23 kg) were having greater LBM than the Plain students. WHR of the Plain girls were higher (0.80) than the Plain girls (0.77). Therefore, in body composition aspect the hill young adult female students were in better health status than their Plain counter parts.

Table-1: Mean, SD and t-value on height, weight and body composition variables

Variables	Group	N	Mean + SD	t- value
Height (cm)	Plain	30	155.99 + 3.59	0.697NS
	Hill	30	155.42 + 2.59	
Weight (kg)	Plain	30	50.73 + 3.01	0.778NS
	Hill	30	50.12 + 3.09	
BMI (Kg/m2)	Plain	30	20.88 + 1.46	0.354NS
	Hill	30	20.75 + 1.24	
% BF	Plain	30	24.89 + 4.33	0.978NS
	Hill	30	21.63 + 3.65	
LBM (Kg)	Plain	30	37.98 + 2.41	3.149*
	Hill	30	39.23+ 2.31	
WHR	Plain	30	0.80 + 0.07	2.040*
	Hill	30	0.77 + 0.15	

*Significant at the .05 level, t 0.05 (58) =1.645, NS = Not significant

Table-2 represents means, SDs and t-values of the seven skin-fold sites. Significant difference between two groups' skin-fold sites were observed at triceps, sub-scapular, supra iliac, abdomen and calf sites. However, at the remaining skin-fold sites i.e., biceps and thigh there was no difference between the two groups.

Table-2: Mean, SD and t-value of seven skin-fold sites

Variables	Group	N	Mean + SD	t - value
Biceps	Plain	30	7.07 + 2.02	1.512NS
	Hill	30	6.25 + 2.16	
Triceps	Plain	30	13.27 + 3.30	2.359*
	Hill	30	11.42 + 2.75	
Sub-scapula	Plain	30	17.57 + 4.31	2.449*
	Hill	30	15.09 + 3.47	
Suprailliac	Plain	30	25.45 + 7.07	3.541*
	Hill	30	19.80 + 5.13	
Abdomen	Plain	30	25.60 + 6.35	4.757*
	Hill	30	18.95 + 4.27	
Thigh	Plain	30	25.48 + 5.08	1.575NS
	Hill	30	23.40 + 5.17	
Calf	Plain	30	13.53 + 3.10	2.500*
	Hill	30	11.62 + 2.83	

*Significant at the .05 level, t0.05 (58) =1.645

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Fig.-I representing the clear picture of the comparison of the status of the two groups on skin-fold thickness of the seven sites.

So, from the skin-fold distribution it is seen that the plain young-adult female students were having greater amount of subcutaneous body fat deposits at most of the sites than the hill female students of similar height and weight.

Fig-I: Graphical representation of skin-fold sites

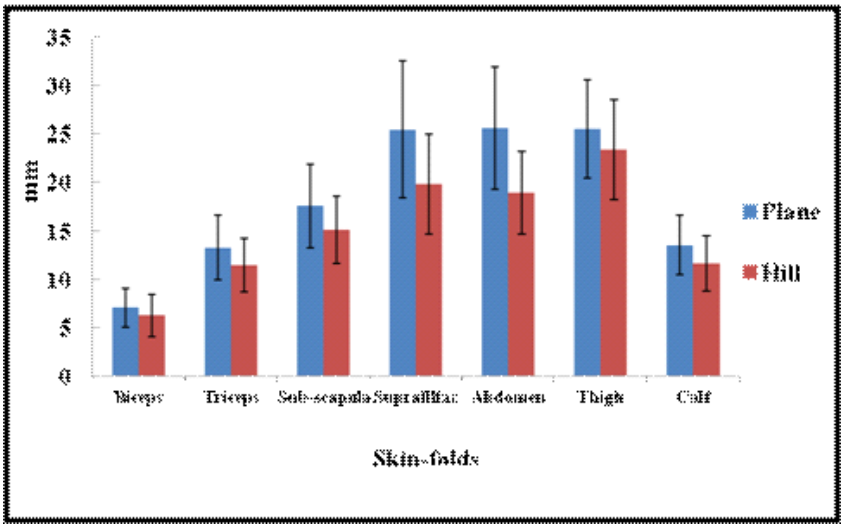


Table-3 represents the six girth measurements of the two groups in the form of mean, SD and t-value. It is observed that out of these six circumferences significant difference existed at shoulder, abdomen and forearm region.

Out of the three sites Plain students were superior in shoulder and abdomen circumferences but the hill group was superior in forearm circumference. For the remaining three circumference measurements, i.e., chest, thigh and wrist, the two groups did not differ.

Table-3: Mean, SD and t-value of six girth sites

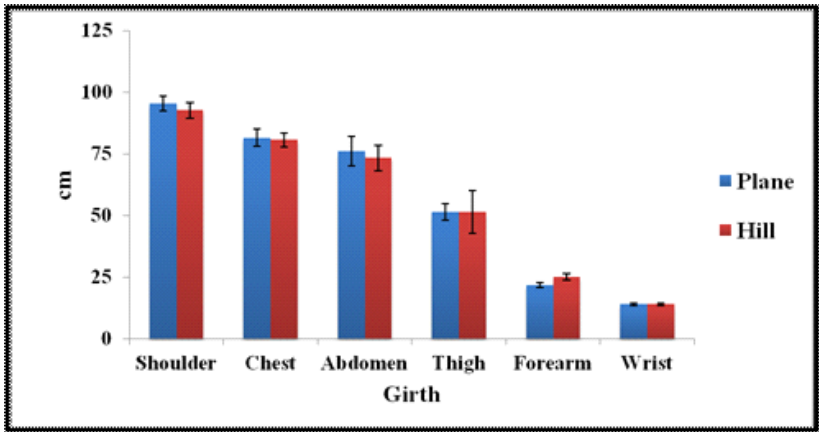
Variables	Group	N	Mean + SD	t - value
Shoulder	Plain	30	95.35 + 3.07	3.271*
	Hill	30	92.71 + 3.17	
Chest	Plain	30	81.61 + 3.56	1.148NS
	Hill	30	80.65 + 2.88	
Abdomen	Plain	30	76.07 + 5.99	1.941*
	Hill	30	73.29 + 5.07	
Thigh	Plain	30	51.35 + 3.31	.000NS
	Hill	30	51.35 + 8.70	

Forearm	Plain	30	21.76 + 0.89	10.983*
	Hill	30	25.14 + 1.43	
Wrist	Plain	30	14.06 + 0.43	0.740NS
	Hill	30	13.98 + 0.44	

*Significant at the .05 level, t0.05 (58) =1.645

Fig.-II representing the comparison of the status of the circumferences in pictorial form. It reveals from the findings that with similar height and weight in young-adult female students the Plain female students were superior in the two trunk circumferences and the hill female students were superior at one of the upper extremity circumferences.

Fig-II: Graphical representation of body circumferences



Conclusion

Sixty 18-25 years female students, thirty from each of the hill and plain localities were the subjects. Their height was 157.5 - 162.5 cm and weight was 52.5 - 55.5 kg. Seven skin-folds, six body circumferences and three body composition measures, namely - body mass index (BMI), waist-to-hip ratio (WHR) and body fat percentage (%BF), derived from respective anthropometric measurements, all were the variables of the study. Out of seven skin-folds, plain subjects were significantly higher (P>0.05) at triceps, sub-scapular, supra-iliac and medial calf but no difference existed at biceps and mid-thigh. Among six body circumferences, both groups were at par in chest, thigh and wrist circumferences, however, at shoulder and abdomen the plain subjects and at forearm circumference the hill subjects were superior. Among three body composition measures, only %BF was higher in plain subjects and LBM was greater in hill group, however, BMI and WHR of the two groups did not differ. The young adult female students of hill region with similar height and weight to the plain students were higher in LBM with less %BF. Both the groups were having greater value in the selected anthropometric measurements; yet, the anthropometric profile of the hill students were towards the healthy category than the plain students.

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The study may have many limitations in terms of number of subjects, sophisticated tools and many other aspects related to matching of the two groups of subjects of two different geographical locations. Considering all these limitations the following conclusions can be drawn.

1. Lean body mass of the hill female students were more than the plain students;
2. Waist-to-hip ratio of the Plain students are more than the hill students with similar body fat percentage;
3. Plain students were superior at triceps, supra iliac, sub-scapular, abdomen and calf skin-folds; and
4. In girth measurements Plain students were superior at shoulder and abdomen but the hill students were superior at forearm circumference.