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## Comparative studies on some physical characteristics and physiological variables among the girl football players of hilly region and plane region

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### Abstract

The physical characteristic and physiological variables plays an important role in the field of games and sports. The present study was conducted for finding the comparison between hilly region and plane region girls' football players in respect of the physical characteristic and physiological variables. Fifty eight girl football players from Hilly regions and 71 girl football players from plane regions were selected for the study. 't' test was applied to calculated the collected data at 0.05 of significant. From the data it has been found that the hilly region girls football players showed usually better in weight, height, upper arm length, upper leg length, thigh and calf circumference, shoulder diameter, foot breadth and lean body mass than the plane region girls football players. The systolic blood pressure and resting pulse rate were also significantly different in both the groups. It may be revealed from the analysis that physical characteristic and physiological variables were better in hilly region girls' football players than plane region footballers. However, with less percentage of body fat and with higher lean body mass of hilly region girl footballers showed better result than plane region.

**Keywords:** Physical characteristic, physiological variable, lean body mass, body fat, fat mass.

### Introduction

In the field of games and sports, performance variables depend not only upon sociological, psychological, and scientific training of the individual but physical characteristics and physiological variables also affect it considerably. In higher level of competition where training is given to all the individuals, suitable physique is of fundamental importance. The association of age, body size, and body composition with motor performance variables has been found to vary from low to moderate in children, depending on several characteristics of the investigation (Wear and Miller, 1962; Espenschade, 1963; Rarick and Oyster, 1964; Montoye *et al.*, 1972; Milne *et al.*, 1976; Bandyopadhyay, 2007; Saha, 2013) [2, 3, 5, 8, 9, 17, 21]. Slaughter *et al.*, (1982) [11]; Hebbelink, (1982) [10]; Chauhan *et al.*, (1987) [13]; Bharadwaj *et al.*, (1990) [14]; Bhatnagar *et al.*, (1990) [17]; Debnath and Bawa (1993) [16] all have attempted to identify the relationship between anthropometric variables and motor performance variables. Many Physical educationist and researchers have been studied on physical characteristics and physiological variables among the different sports events and found significant differences among the groups (Dey and Debray (2010) [18]; Nikolaidis and Karydis (2011) [20]; Lagunas *et al.* (2014) [22]; Dey *et al.* (2015) [23]. It is evident from the recent studies that physical characteristics and physiological variables are providing much additional information relating to two different region of school going girls' football players.

So far only a few studies in this area have been conducted in our country. Therefore, for more reliable information the present study attempted to find the comparison between the some physical characteristics and selected physiological variables among the Hilly region and plane region girls school going football players of West Bengal.

### Statement of the problem

The purpose of the study was to compare the some physical characteristics and Physiological Variables among the girl football players of Hilly region and Plane region

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## Methodology

For the present study 129 school going girls footballers (58 from hilly region and 71 from plane region) ranging in age between 15 to 18 years, were randomly selected from State school Subroto Cup football tournaments and West Bengal State school girls football championship. While selecting these subjects, it was made certain that they had participated in many football tournaments and did not suffer from any deformity and disease. Their participation in this study was on voluntary basis supported by their coach and manager's verbal consent to do so.

The physical characteristics (i.e., three linear measurement, two circumferences, two diameters,% of body fat, lean body mass and fat mass) and physiological variables (i.e., systolic blood pressure, diastolic blood pressure, resting pulse rate) were the criteria.

Adopting standard procedure weight, height, upper arm length, upper leg length of the subjects was recorded. All the circumferences (thigh and calf) were measured by flexible standard steel tape (to the nearest cm.); two diameters of the body i.e., shoulder diameter and foot breadth were measured by sliding caliper (to the nearest cm.); and Harpenden skinfold caliper was used to measure skinfold at biceps, triceps, subscapular and suprailliac (to the nearest mm.). Body composition of each subject were determined in terms of their percentage of body fat following the method of Durnin and Rahaman (1967) [6] by measuring skinfold thickness in millimeter at four selected morphological sites namely – biceps, triceps, subscapular and suprailliac. To calculate the% of body fat, the lean body mass and fat mass, a body fat calculator for men and women prepared by Durnin and Womersley Caliper Method was used.

Physiological variables of each subjects were measured by selecting certain attributes in terms of systolic blood pressure (SBP), diastolic blood pressure (DBP) and resting pulse rate (RPR). Blood pressure and resting pulse rate were measured by using the following standard techniques i.e. Automatic Electronic Blood Pressure Measuring Monitor (Omron HEM-7130L) employed by major sports physiologist, physical educationist and researchers of the world. All the tests and measurements were taken in almost identical conditions.

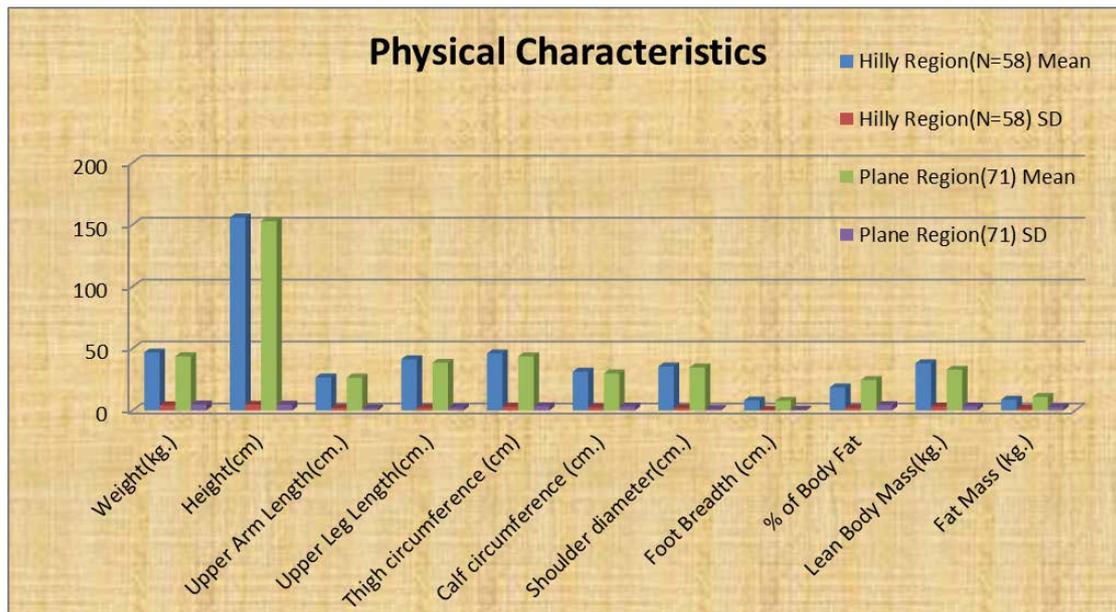
't' test was applied to calculated the collected data at 0.05 of significant.

## Result and Discussion

A total of 58 Hilly Region and 71 plane region school going girls football players were analyzed for their weight, height, upper arm length (UAL), upper leg length (ULL), thigh circumference (TC), calf circumference (CAC), shoulder diameter (SD), foot breadth (FB),% of body fat, lean body mass and fat mass. The results are presented in Table 1. From the data it was cleared that the mean weight, height, upper arm length, upper leg length, thigh circumference, calf circumference, shoulder diameter, foot breadth of school going girls footballer of hilly region were better than the girls footballer of plane region. The percentage of body fat (fat%) and fat mass (FM) is lower in hilly region than plane region. On the other hand, lean body mass (LBM) was higher in hilly region than plane region. Mean value and standard deviation of physical characteristics of hilly region and plane region girl's football players have been presented graphically in fig.1. By computing the 't' value for the difference in means of the two groups, it has been found that in each attribute of selected anthropometric variables and body composition, except upper arm length, the computed 't' were greater than the respective critical value of 't' at 5% level of significance (df 127,  $t_{0.5}=1.96$ ). The 't' value of the weight, height, upper arm length, thigh circumference, calf circumference, shoulder diameter, foot breadth,% of body fat, lean body mass and fat mass of hilly region and plane region girl football players were -3.799, -3.541,-7.184, -4.076, -2.779,-2.730,-2.239, 9.827, -9.056 and 5.868 respectively. The differences between the means of maximum attribute among two groups of school going girls' footballers were negatively statistically significant. On contrary, in case of body composition the mean differences of% of body fat and fat mass between the two groups are positively statistically significant at 0.05 level of confidence. The reason might be due to different sports training status, socio-economic status, health education and other environmental factors. The selected hilly region girls footballers in average were belong to hilly environment having hard working in nature and less recreational facilities. The poorer physique and body composition might be predicted as poor nutrition fed situation (Quaade, 1956; Harrison *et al.*, 1964; Lall, 1972 and Bhatnagar *et al.* 1987; Koley *et al.*, 2010; Nikolaidis and Karydis, 2011; Lagunas *et al.*, 2014)) [1, 4, 7, 12, 19, 20, 22].

**Table 1:** Comparison on Physical characteristics of Hilly Region and Plane Region girls' school going football players of West Bengal

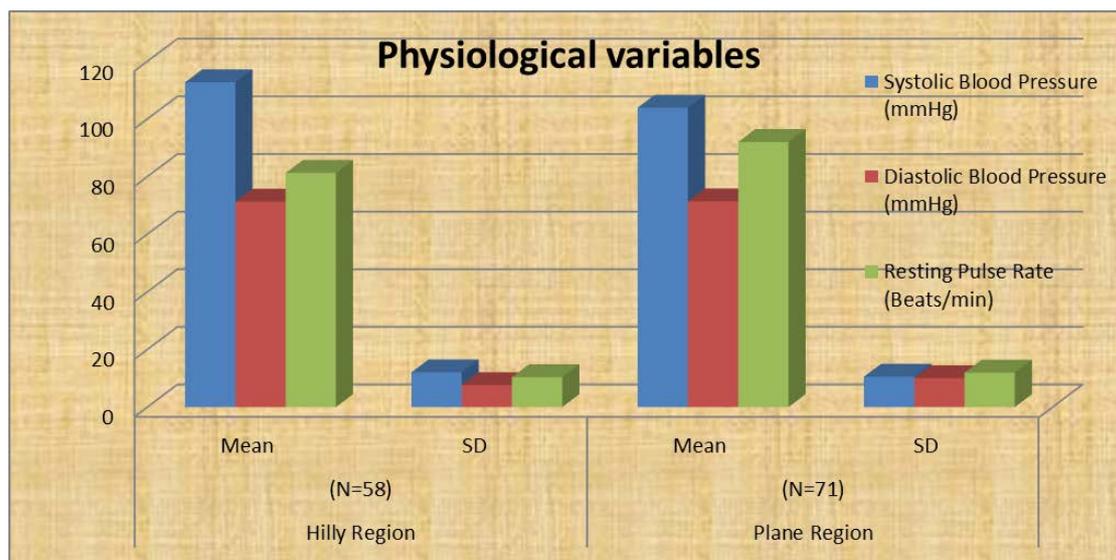
Physical characteristics	Hilly Region(N=58)		Plane Region(71)		SE <sub>D</sub>	t-value
	Mean	SD	Mean	SD		
Weight (kg.)	46.82	4.12	43.76	4.87	0.805	-3.799*
Height (cm)	155.76	4.66	152.82	4.72	0.830	-3.541*
Upper Arm Length (cm.)	26.73	1.96	26.55	1.75	0.327	-0.561
Upper Leg Length (cm.)	41.34	2.06	38.49	2.37	0.396	-7.184*
Thigh circumference (cm)	46.01	2.92	43.69	3.44	0.569	-4.076*
Calf circumference (cm.)	31.33	2.40	29.96	3.08	0.494	-2.779*
Shoulder diameter (cm.)	35.52	1.86	34.78	1.19	0.270	-2.730*
Foot Breadth (cm.)	8.08	0.46	7.85	0.64	0.100	-2.239*
% of Body Fat	18.60	1.95	24.61	4.30	0.611	9.827*
Lean Body Mass (kg.)	38.08	3.16	32.86	3.33	0.576	-9.056*
Fat Mass (kg.)	8.73	1.36	10.91	2.53	0.370	5.868*



**Fig 1:** Mean and Standard Deviation of Physical characteristics of Hilly Region and Plane Region girls school going football players

**Table 2:** Comparison on Physiological variables of Hilly Region and Plane Region girls’ school going football players of West Bengal

Physiological variables	Hilly Region (N=58)		Plane Region (N=71)		SE <sub>D</sub>	t-value
	Mean	SD	Mean	SD		
Systolic Blood Pressure (mmHg)	112.7	12.06	103.9	10.54	1.990	-4.415*
Diastolic Blood Pressure (mmHg)	71.34	7.6	71.41	10.05	1.597	0.040
Resting Pulse Rate (Beats/min)	81.28	10.40	92.04	11.97	1.997	5.389*



**Fig.2:** Mean and Standard Deviation of Physiological characteristics of Hilly Region and Plane Region girls school going football players

The Physiological variables in terms of systolic blood pressure, diastolic blood pressure and resting pulse rate were measured among the school going girls football players of two different regions. From the table-2, it has been observed that the mean value with Standard Deviation of systolic blood pressure, diastolic blood pressure and resting pulse rate of hilly region girls’ football players are  $112.7 \pm 12.06$ ,  $71.34 \pm 7.6$  and  $81.28 \pm 10.40$  respectively. In case of plane region it is  $103.9 \pm 10.54$ ,  $71.41 \pm 10.05$  and  $92.04 \pm 11.97$  respectively. Mean value and standard deviation of physiological variables of hilly region and plane region girl’s football players have been presented graphically in fig.2. Statistical analysis of ‘t’ value showed that the mean differences of systolic blood pressure is negatively significant ( $t=-4.415$ ) and resting pulse rate are positively significant

( $t=5.389$ ) at 5% level of confidence (df 127,  $t_{0.5} = 1.96$ ), whereas no significant between-group difference was found for diastolic blood pressure ( $t=0.040$ ). It may be predicted from the data (table 2) that the hilly region girls’ footballers showed better systolic blood pressure and resting pulse rate than the plane region girl football players. Fat deposition is minimum for the hilly region girls’ footballers perhaps they may be engaged regularly low to moderate with training program and by nature they are hard working. (Rajavelu, 2015; Dey *et al.* 2015; Saini, 2016) [24, 23, 25].

**Conclusion**

It may be concluded that these differences may be attributed to the usual tendency of heavier% of fat and fat mass in plane region school girl footballers to neglect vigorous activities or

training schedule, because they have to play or work against heavy body fat resistance, which may perhaps, causes fatigue quickly in comparison to hilly region school girl footballers who have better weight, height, upper leg length, thigh circumference, calf circumference, shoulder diameter, foot breadth and lesser% of fat, heavier lean body mass and lesser fat mass. It might be that percentage of body fat retard the some physiological variables by affecting the morphology, his to chemistry and biomechanics of the girls within the given environmental conditions.

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