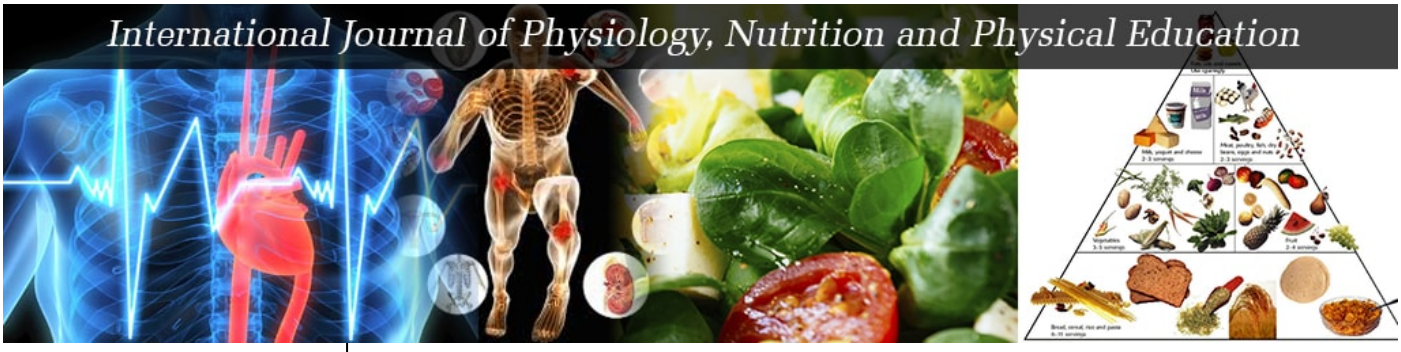

ISSN: 2456-0057
IJPNPE 2019; 4(2): 590-593

www.journalofsports.com
Received: 10-09-2019
Accepted: 15-10-2019

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Comparison of physical characteristics and physiological variables of Jungle mahal and plane region girl football players of West Bengal

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Abstract
Football is most popular game worldwide, although there is insufficient information available concerning the physical characteristics and physiological variables of girl football players. Number of scientific information on girl footballers is insufficient. The purpose of this study was to investigate the comparison of physical characteristics and physiological variables among jungle mahal & plane region girl football players of West Bengal. For this purpose 83 girl football players from jungle mahal and 71 girl football players from plane region were selected. An attempt has been made to investigate the various physical and physiological variables of girl football players from state school Subroto Cup football tournaments and West Bengal State School Girls Football Competition of West Bengal. Physical and physiological profiles were measured by standard procedures. 't' test was applied to calculated the collected data at 0.05 of significant. From the data it was noted that the jungle mahal girl footballers usually showed better in weight, height, thigh circumference, calf circumference, shoulder diameter,foot breadth and lean body mass than the plane region girl football players. The percentage of body fat is lesser in respect of lean body mass of jungle mahal girl footballers. On the other hand lean body mass is lesser in respect of percentage of body fat of plane region girl footballers. The mean difference between the groups in respect of systolic blood pressure and diastolic blood pressure were insignificant. Whereas resting pulse rate is negatively significant between the groups. It may be concluded from the data analysis that physical characteristics and physiological variables were better in jungle mahal girl footballers than plane region girl footballers.

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

Introduction
Football is most popular game throughout India and abroad. The most important factors for success in any game or sport are Physical characteristics as well as physiological variables. Many studies were available on male and female soccer players of different countries but little scientific information is available concerning physiological characteristics of women's football players in India. Some information is available concerning the amateur player (Bell and Rhodes,1975; Caru *et al*., 1970; Fardy,1969) [7, 5, 4]. Many physical educationists and researchers have been studied on physical characteristics and physiological variables among the difference sports events and found significant differences among the groups (Dey and Debray,2010 ; Nikolaidis and Karydis, 2011) [12, 17]. During the last few decades, great changes had been seen in the application of anthropometric characteristics and somatotyping in the area of health and wellness besides sports (Nikolaidis, 2010; Hazir,2010; Gravina *et al*., 2008; Gil *et al*., 2007; Gil, 2010) [16, 14, 11, 10, 13]. Kinanthropometric characteristics is an essential criteria to search information that could help coaches and players for success at highest level in sports (Sanchez, 2012) [18].
The present study will contribute in addressing the physical and physiological characteristics of girl football players of West Bengal which will help to conduct the advanced researchers in future.

Statement of the problem
The purpose of the study was to compare the physical characteristics and Physiological

Variables of Jungle Mahal and Plane region girl football players of West Bengal

Methodology

One hundred fifty four (154) school going girls footballers (83 from jungle mahal 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 for the present study. At the time of selecting subjects, it was observed that they had participated in many football tournaments and did not suffer from any deformity and disease. The data was collected on the basis of verbal consent by their coach and manager's.

The physical characteristics in terms of weight, height, upper arm length, upper leg length, thigh circumference, calf circumference, shoulder diameter, foot breadth, % of body fat, lean body mass and fat mass and physiological variables in terms of 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 suprailiac (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) [3] by measuring skinfold thickness in millimeter at four selected morphological sites namely – biceps, triceps, subscapular and suprailiac. 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

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 jungle mahal were better than the girls footballer of plane region. The percentage of body fat (fat %) is lower in jungle mahal than plane region. On the other hand, lean body mass (LBM) and fat mass (FM) was higher in jungle mahal than plane region. Mean value and standard deviation of physical characteristics of jungle mahal and plane region girls 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 item of selected physical characteristics except upper arm length, the computed 't' were greater than the respective critical value of 't' at 5% level of significance (df 152, $t_{0.5}$ =1.96). The't'value of the weight, height, upper arm length, upper leg length. thigh circumference, calf circumference, shoulder diameter, foot breadth, % of body fat, lean body mass and fat mass between jungle mahal and plane region girl football players were 3.447, 2.690, 0.566, 4.469, 4.263, 3.401, 3.381, 2.182, -0.797, 4.202 and 0.978 respectively. The differences between the means of maximum attribute among two groups of school going girls' footballers were positively statistically significant. The upper arm length was not statistically significant. And in case of body composition the mean differences of % of body fat and fat mass between the two groups are insignificant at 0.05 level of confidence. Socio-economic status, nutritional status, health education, different sports training schedule and other environmental factors may be the great reason for that.The jungle mahal girls footballers originally in average were belong to jungle mahal environment having hard working in nature, less recreational facilities and their daily life activity are different. 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; Bandyopadhyay, 2007; Dey and Debray, 2010; Koley *et al*., 2010; Nikolaidis and Karydis, 2011; Saha, 2013) [1, 2, 6, 8, 9, 12, 15, 17, 19].

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

Physical characteristics	Jungle Mahal (N=83)		Plane Region (71)		SE_D	t-value
	Mean	SD	Mean	SD		
Weight (kg.)	46.47	4.86	43.76	4.87	0.785	3.447*
Height (cm)	154.84	4.61	152.82	4.72	0.753	2.690*
Upper Arm Length (cm.)	26.72	1.9	26.55	1.75	0.396	0.566
Upper Leg Length (cm.)	40.5	3.07	38.49	2.37	0.448	4.469*
Thigh circumference (cm)	45.71	2.41	43.69	3.44	0.472	4.263*
Calf circumference (cm.)	31.45	2.37	29.96	3.08	0.439	3.401*
Shoulder diameter (cm.)	35.50	1.40	34.78	1.19	0.211	3.381*
Foot Breadth (cm.)	8.06	0.52	7.85	0.64	0.094	2.182*
% of Body Fat	24.17	2.41	24.61	4.30	0.552	-0.797
Lean Body Mass (kg.)	35.40	3.51	32.86	3.33	0.554	4.202*
Fat Mass (kg.)	11.06	1.87	10.91	2.53	0.356	0.978

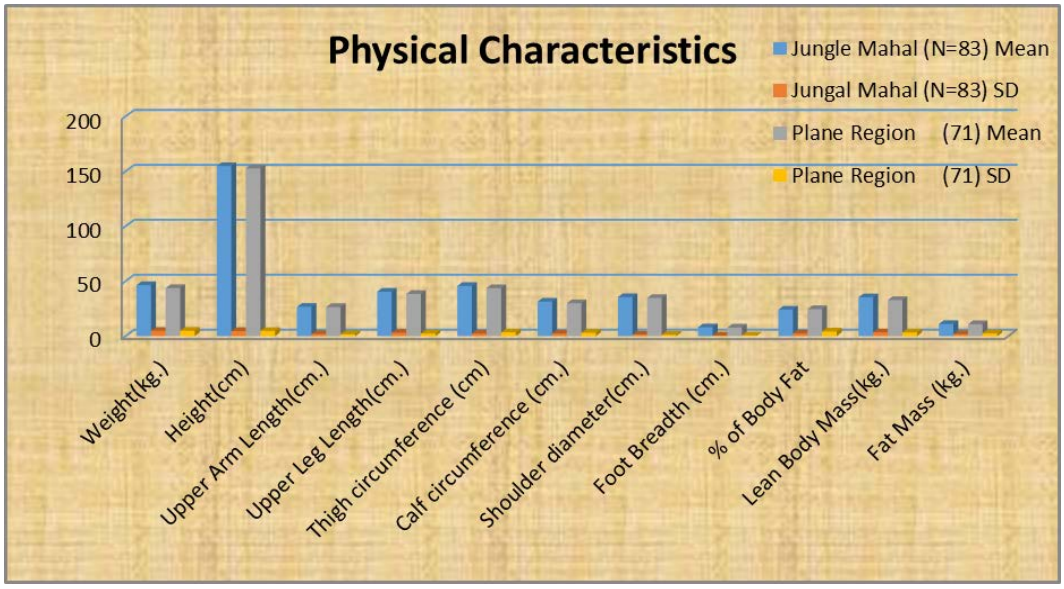

Fig 1: Mean and Standard Deviation of Physical characteristics of Jungle Mahal and Plane Region girls school going football players

Table 2: Comparison on Physiological variables of Jungle Mahal and Plane Region girls' school going football players of West Bengal

Physiological variables	Jungle Mahal (N=83)		Plane Region (N=71)		SE_D	t-value
	Mean	SD	Mean	SD		
Systolic Blood Pressure (mmHg)	107.5	12.04	103.9	10.54	1.868	1.922
Diastolic Blood Pressure (mmHg)	72.93	10.19	71.41	10.05	1.636	0.928
Resting Pulse Rate (Beats/min)	84.98	15.93	92.04	11.97	2.302	-3.067*

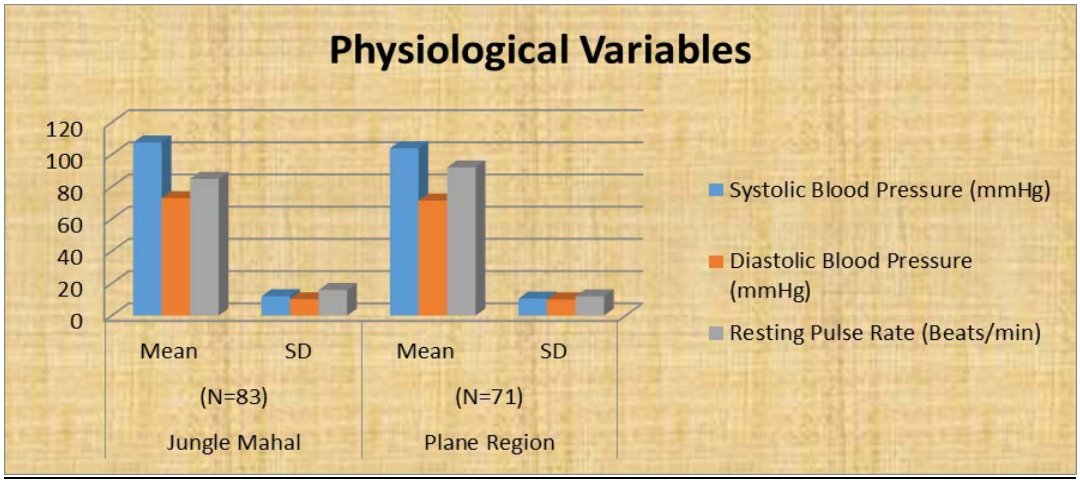

Fig 2: Mean and Standard Deviation of Physiological characteristics of Jungle Mahal and Plane Region girls school going football players

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 jungle mahal girls' football players are 107.5 ± 12.04, 72.93 ± 10.19 and 84.98 ± 15.93 respectively. In case of plane region it is 103.9 ± 10.54, 71.41 ± 10.05 and 92.04 ± 11.97 respectively. Mean value and standard deviation of physiological variables of jungle mahal and plane region girls football players have been presented graphically in fig.2. Statistical analysis of 't' value showed that the mean differences of systolic blood pressure and diastolic blood pressure is insignificant. On the other hand, the resting pulse rate are negatively significant (t=-3.067) at 5% level of confidence (df 152, $t_{0.5}$ =1.96). It may be predicted from the data (table 2) that the jungle mahal and plane region girls' footballers showed more or less same in systolic blood pressure and diastolic blood pressure. The resting pulse rate is better in jungle mahal than the plane region girl football players. The deposition of fat is minimum for the jungle mahal girls' footballers perhaps they may be engaged regularly low to moderate with training program and by nature they are hard working.

Conclusion

It may be concluded that these differences may be attributed to the usual tendency of heavier % of fat 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 jungle mahal school girl footballers who have better weight, height, upper leg length, thigh circumference, calf circumference, shoulder diameter, foot breadth and lesser % of fat and heavier lean body mass. It might be that percentage of body fat retards the some physiological variables by affecting the morphology,

histochemistry and biomechanics of the girls within the given environmental conditions. Genetic factors may be the cause of smaller body size of the subject .

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