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Relationship between anthropometric variables and coordination ability of male football players

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ABSTRACT

The purpose of the present investigation was to establish the "Relationship between Anthropometric variables and Coordinative variables of football players". A sample of 64 male football players from four universities ranging in ages between 20 to 25 years were selected as subjects for the present investigation. All the subjects were tested in anthropometric variables i.e. General body measurement (Body weight and height), Skeletal diameter (Shoulder, hip, elbow, knee, and ankle width), Circumferential measurements (Chest, thigh and calf circumference), Skin-fold measurements (Biceps, triceps, sub-scapular, suprailiac, thigh and calf skin-fold) and Scott obstacle race test. In order to find out the significance of differences among male football players, the mean, standard deviation, F-ratio and product moment coefficient correlation were computed by using SPSS 16.0 version. The results of the study revealed that statistically significant difference existed among male football players in their height and Coordination ability. Similarity was observed in their body weight. The significant relationship was not found between anthropometric variables and coordination ability except calf circumferential measurement. It is recommended that a proper training program must be prepared and implemented to develop the coordination ability of football players.

Keywords: All India, Coordination ability, Anthropometric Characteristics, Football Players

INTRODUCTION

The performance structure for different games and events is being worked out. The general physical fitness of top-ranking athletes has been evaluated. Proposals are coming up for the selection of potential athletes with the designs of test and the body size predictions. Human physique growth and performance are also in important field in this regards. There seem to be various unchangeable characteristics in the human body. For example, if the game of Basket ball needs the players to be tall than those who are shorter cannot be made more tall under normal conditions.

Further if the sport of gymnastics needs the players to be short, then those growing taller cannot be made shorter. Similarly the length of arms, legs, etc. cannot be changed. To excel in a physically competitive sport, the player must possess such dimensions of body characteristics which suit the most in his/her sports. It is therefore because of this reason, the anthropometric characteristics are known to be of fundamental importance for individual development to achieve various high level performance in a sports. The physique

which includes the evaluation of size, shape and form of an individual is of prime importance as to know how far an individual can succeed in becoming a top athlete.

Considerable research by different researcher have been done in India and abroad , which have the direct or indirect relationship with this investigation. Sidhu, Grewal and Verma [1] showed that players differ in physique and body composition according to the field positions, in which the players specialize. Dey and Dey [2] concluded that defensive players in football have significantly higher leg length, thigh girth, height, weight and crural Index than those at offensive players. Adhikari [3] indicated that anthropometric variables namely weight, standing height, sitting height, foot length, fore leg length, leg length, calf girth, trunk length, have distinct potential for achieving higher level of skills in Soccer. Bhatnagar [4] observed that athletes and volleyball players of Assam are heavier and taller than the athletes and volleyball players of Madhya Pradesh. Bose & Banerjee [5] indicated the significant difference between national champions and school footballers in their morphological profile. Significant differences were also observed in morphological profile among the champion groups. Ozkan [6] revealed an average height and weight for male high school soccer players. Cassell [7] showed the difference in motor abilities and physical characteristics between some of the positions of collegiate soccer players. Amusa [8] concluded that the experience is the best single predictor of playing ability. Weight and height are considered good predictor's of playing- ability. Hebbelink [9] found that male Olympic athletes in seven sports winners were heavier and taller than most other sportsmen. Bala and Drid [10] proved that the young male and female judoists significantly better than their untrained males and females in whole-body coordination. Kostic et.al. [11] showed the insignificant relationship between the anthropometric characteristics and coordination skills for the males. Ljah & Sokolkina [12] concluded that the effects of the environment are responsible for a sequence of defining influences in the change in coordination skills. Juras, Waskiewicz & Raczek [13] concluded that spatial orientation was a specific coordination skill and that it possessed a complex inner structure, in addition to precision and speed, which are its most significant aspects. Katic, Srhoj, and Pasanin [14] showed the significant difference between anthropometric characteristics and coordination skills among girls..

Theory of motor coordination therefore is the basis for understanding the nature of co-coordinative abilities. For each coordinative ability, the motor control and regulation processes function in a definite manner. When a particular aspect of these functions is improved then the sportsmen is in a better position to do a certain group of movements which for their execution depend on this type of CNS functioning pattern. Motor coordination is a part and parcel of action regulation and is hence closely linked with the processes of regulation of cognitive, psychic motive, drive etc. and movement execution aspects of an action Kansal [15].

Coordination may be defined as “ the ability of the performer to integrate types of body movements into specific pattern Singh [16].

Coordination skills are a complex motor skill which can be further developed by means of exercise. During exercise, complete movement structures are repeated, in which the movement of all the body parts or just certain sections of the body are connected. Neuro-muscular activity represents the basic function in all forms of physical activity and is used to harmonize the movement of the body and all its parts in time and space. Considering the fact that physical exercise practice has pointed to the fact that the relations between anthropometric characteristics and coordination skills differ during various growth periods, it is necessary to scientifically prove that there are significant relations between anthropometric characteristics and coordination skills.

The purpose of the present study was to investigate of speed, general body co-ordination, & agility of All India level male football players. It was also hypothesized that there would be significant difference among All India level male football teams in their agility, coordination ability and speed ability.

MATERIALS AND METHODS

Selection of Subjects:

Sixty male football players of All India Inter-university level belong to four universities of East-zone were selected for the purpose of study to serve as the subjects for this study. The sample consisted of sixteen male football players from Nehu, Vidhya Sagar, Kalyani and Guru Ghasidas Universities. The Sixteen players were selected from each University. The mean age and SD of male football players were 24.26 ± 2.71 respectively. The training age of male football players ranged 03 to 07 Years.

Selection of Variables:

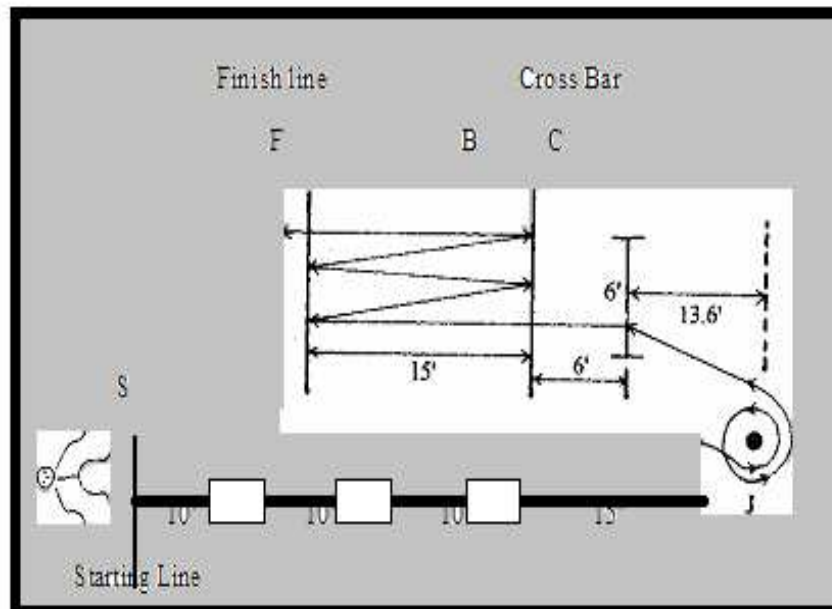
1. Anthropometric Measurements: Weight, Height, width :Hip, Shoulder, Elbow, Knee, and Ankle; Circumference: Chest, Thigh and Calf; Skin-fold: Biceps, Triceps, Scapular and Calf Skin
2. Coordinative variable : Speed, General body coordination, and agility.

Instrumentation:

The test of anthropometric measurements were administered physically on all the subjects, which were generally carried out by the skin-fold caliper, anthropometric rod, weighing machine, and measuring tape etc. for the analysis purpose. For the measurement of co-coordinative ability, the Scott obstacle Race Test was conducted separately to measure the Speed, agility, and general body coordination, which are discussed as below :

Scott Obstacle Race Test: This test is used to measure simultaneously speed, general body co-ordination and agility. The test is satisfactory for both boys and girls aged 13 years and above.

Equipment and Facilities: A jumping standard, one crossbar 6 feet long with its supports, a stopwatch, a measuring tape, chalk or marking tape and a floor area of at least 55 feet by 12 feet. 'S' Starting line, 'R' three rectangles of 12" x 18" each marked on the floor at a distance of 10' apart, 'J' -jumping standard 15' from the third (last) rectangle, 'C' Crossbar 18" high & 6' long. See below:

**Scott Obstacle Race Test Course**

Test Administration: During the demonstration full instructions are given with the help of a trained helper to a group of 10 to 15 subjects. The tester then asks one of the subjects to lie down on his/her back on the floor so that the heels of the subject are at the starting line and gives the command Ready, Steady, Go! AT the command Go, the tester or the timer presses on the stopwatch and the subject gets up and runs fast towards the jumping standard (J) via the three rectangles marked on the floor (R). The subject is told before hand that she/he has to step on each rectangle with both feet. On reaching the jumping standard, the subject is to go round it one and a half circle so that he/she crosses the farther side of the jumping standard twice (as shown by the test course as below). After completing these rounds, the subject is required to run towards the crossbar to crawl under it and to raise to run across the first line 'B' and touch with her/his hand the finish line 'F'. While touching the finish line 'F' the subject turns around to return to the first line 'B' and shuttles between these lines until she/he touches the line 'B' twice after which she/he sprints fast to cross the finish line 'F' without any slowing down before aching the finish line. As soon as the subject chest crosses the finish line, As soon as the subject chest crosses the finish line, the tester/timer stops the stopwatch to record the time.

Scoring : The subject is given only one trial and the time taken from start to the finish, accurate up to one-tenth of a second is the final score. It may be noted that if the subject happens to bump and dislodge the crossbar as he/she passes under it, this is not to be considered any foul.

RESULTS

In order to find out the significance of differences among male football player teams, the means, standard deviations, and F-ratios were computed for obtained data by using SPSS 16.0 version. The level of significance was set at .05 level and data pertaining to this have been presented in Table 1 to 6 .

TABLE 1 DESCRIPTIVE STATISTICS OF VARIOUS ANTHROPOMETRIC PARAMETERS AND COORDINATION ABILITIES OF MALE UNIVERSITY FOOTBALL PLAYERS OF EAST ZONE

Test variables	Universities							
	Nehu Uni. (N=16)		Vidhya Sagar Uni (N=16)		Kalyani Uni (N=16)		G.G. D. Uni (N=16)	
	M	SD	M	SD	M	SD	M	SD
Weight(Kg.)	53.13	4.65	55.63	5.50	54.93	5.15	52.18	4.48
Height	1.60	0.05	1.66	6.38	1.67	6.30	1.64	6.51
Hip width	40.69	2.27	41.50	1.86	11.25	2.69	36.69	1.96
Shoulder width	45.19	2.29	45.18	2.61	45.13	4.44	44.63	2.99
Elbow width	6.16	0.23	6.50	0.38	6.21	0.37	6.20	0.29
Knee width	8.31	0.39	8.18	1.09	8.21	0.41	8.16	0.44
Ankle width	6.67	0.83	6.95	0.29	6.91	0.32	6.93	0.27
Chest circumference	80.25	3.17	83.00	3.78	80.75	4.04	80.31	2.79
Thigh circumference	15.94	1.77	47.38	3.28	45.94	2.05	44.75	2.27
Calf circumference	33.81	3.02	32.19	2.46	32.13	1.41	32.13	1.45
Biceps skin-folds	4.95	7.48	3.46	1.01	3.08	0.16	63.06	0.12
Triceps skin-folds	3.59	0.21	3.63	0.34	3.75	0.32	3.49	0.16
Scapular skin-folds	3.46	0.36	3.80	0.25	4.09	0.34	3.84	0.27
Supra-iliac skin-folds	3.41	0.12	3.41	0.18	3.57	0.29	3.59	0.35
Thigh skin-folds	3.51	0.20	3.57	0.35	3.62	0.48	3.64	0.26
Calf skin-folds	3.46	0.25	3.24	0.23	3.50	0.27	3.45	0.18
Scott Test	20.96	1.79	17.66	1.02	19.71	1.48	20.58	1.43

The mean scores of various components of anthropometric characteristics, and coordination ability of All India level male football players have been presented in above table.

TABLE 2 ANALYSIS OF VARIANCE FOR PHYSICAL MEASUREMENT OF EAST ZONE INTER-UNIVERSITY MALE FOOTBALL TEAMS

Variables	Source of Variance	df	Sum of Squares	Mean Square	F-ratio
Weight	Between Groups	3	103.79	34.59	1.36
	Within Groups	60	1495.69	24.93	
Height	Between Groups	3	352.56	117.52	3.09*
	Within Groups	60	2276.38	37.94	

Significant at .05 level
 $F_{.05}(3, 60) = 2.76$

From Table 2, It is evident that the statistically significant difference did not exist among East zone inter-university male football teams in their weight, as the obtained F-value of 1.36 and was lesser than the required $F_{.05}(3, 60) = 2.76$. But significant difference was found among East zone inter-university male football teams in their height, as the obtained F-value of 3.09 was higher than the required value to be significant.

As the F-ratio was found to be significant, Scheffe's Test of Post-hoc comparison was applied to study the significance of differences among East zone inter-university male football teams in their height and the data pertaining to this have been presented in Table 3.

TABLE 3 SIGNIFICANCE OF DIFFERENCES AMONG MALE FOOTBALLER OF FOUR DIFFERENT UNIVERSITIES BETWEEN ORDERED PAIRED MEANS ON HEIGHT MEASUREMENT

Mean Scores					
Nehu	Vidhya Sagar	Kalyani	G.G. D	Paired mean difference	Confidence Interval (C. I.)
1.60	1.66			0.06	6.25
1.60		1.67		0.07	
1.60			164	0.04	
	1.66	1.67		0.01	
	1.66		164	0.02	
		1.67	164	0.03	

**Insignificant at .05 level*

It is quite obvious from the table 3, that there were no significant differences among East zone inter-university male football teams in their height between Nehu university – Vidhya sagar University followed by Kalyani university and Guru Ghasidas University; between Vidhya sagar University-, Kalyani university followed by Guru Ghasidas University and between Kalyani university- Guru Ghasidas University, as the paired mean differences of 0.06, .07, 0.04, 0.01, 0.20, and 0.03 respectively were much lesser than the confidence interval (C.I.) of 6.25.

Table 4 ANALYSIS OF VARIANCE FOR COORDINATION ABILITY OF MALE FOOTBALL PLAYERS BELONG TO FOUR DIFFERENT UNIVERSITIES

Source of Variance	df	Sum of Squares	Mean Square	F-ratio
Between Groups	3	103.62	34.53	16.31*
Within Groups	60	127.05	2.11	

Significant at .05 level

F.05 (3, 60) = 2.76

From Table 4, It is evident that the statistically significant difference existed among East zone inter-university male football teams in their coordination ability, as the obtained F-value of 16.31 was much higher than the required $F.05 (3, 60) = 2.76$.

As the F-ratio was found to be significant, Scheffe's Test of Post-hoc comparison was applied to study the significance of differences among East zone inter-university male football teams in their coordination ability and the data pertaining to this have been presented in Table 5

TABLE 5 SIGNIFICANCE OF DIFFERENCES AMONG MALE FOOTBALL PLAYERS OF FOUR DIFFERENT UNIVERSITIES BETWEEN ORDERED PAIRED MEANS ON COORDINATION ABILITY

Mean Scores					
Nehu	Vidhya Sagar	Kalyani	G.G. D	Paired mean difference	Confidence Interval (C. I.)
20.96	17.66			3.30*	1.47
20.96		19.71		1.25	
20.96			20.58	0.38	
	17.66	19.71		2.05*	
	17.66		20.58	2.92*	
		19.71	20.58	0.87	

**Significant at .05 level*

It is quite obvious from the table 5, that the significant differences existed among East zone inter-university male football teams in their coordination ability between Nehu university – Vidhya sagar University, between Vidhya sagar University-, Kalyani university followed by Guru Ghasidas University, as the paired mean differences of 3.30, 2.05 and 2.92 respectively were higher than the confidence interval (C.I.) of 1.47. They had no significant differences in their coordination ability between Nehu university-Kalyani university, followed by Guru Ghasidas University and between Kalyani university- Guru Ghasidas University, as the paired mean differences of 1.25, 0.38, , and 0.87 respectively were lesser than the confidence interval (C.I.) of 1.47.

TABLE 6 RELATIONSHIP BETWEEN ANTHROPOMETRIC VARIABLES AND COORDINATION ABILITY AMONG MALE FOOTBALL PLAYERS

Test Variables	Correlations
Weight V/S Coordination Ability	.024
Height V/S Coordination Ability	.231
Hip width V/S Coordination Ability	-.010
Shoulder width V/S Coordination Ability	.001
Elbow width V/S Coordination Ability	.017
Knee width V/S Coordination Ability	-.206
Ankle width V/S Coordination Ability	.033
Chest Circumference V/S Coordination Ability	.119
Thigh Circumference V/S Coordination Ability	-.075
Calf Circumference V/S Coordination Ability	-.273*
Biceps Skin-fold V/S Coordination Ability	-.041
Triceps Skin-fold V/S Coordination Ability	.016
Scapular Skin-fold V/S Coordination Ability	.201
Supra-iliac Skin-fold V/S Coordination Ability	.053
Thigh Skin-fold V/S Coordination Ability	.195
Calf Skin-fold V/S Coordination Ability	-.144

*Significant at .05 level,
r.05 (62)=.250*

It is quite obvious from the table 6, that the coordination had insignificant correlations with all anthropometric variables except calf circumference among East zone inter-university male football teams, as the obtained correlation coefficient (r) of .024, .231, -.010, .001, .017, -.206, .033, .119, -.075, -.041, .016, .201, .053, .195 and -.144 respectively were lesser than the required $r.05(62)=.250$.

DISCUSSION

Physical activities and sports have an important role not only in proper growth and maturation of the child but may also delay the physical frazzle which might occur with advance of age.

Football is an endurance game and requires potential stamina to excel the performance. The game is gaining tremendous popularity worldwide. There are various studies concerning the effect of sports on anthropometric measurement and physical status of the human body. In this study, researcher has tried to find out the relationship of anthropometric variable with the coordination ability of male football players.

The results of One Way Analysis of Variance for All India level male football teams on general body measurements, and coordination ability expressed significant difference in their height and insignificant difference in their weight. The Scheffe's Test of Post-hoc comparisons showed that male football players of vidhyasagar university were heavier than their counter parts. Whereas, the football players of kalyani university were taller than male football players from the rest of three universities.

The results of one way analysis of variance (ANOVA) expressed significant differences among players of male football teams in their coordination ability. The Scheffe's Test of Post-hoc comparisons showed that male players of Vidhyasagar university football team were found have better coordination ability followed by kalyani university, Guru Ghasidas university and Nehu university.

To established the relationship between coordination ability and general body measurement The results of product moment coefficient correlation indicated the insignificant correlations between coordination ability and general body measurement of All India level male footballer of four different universities.

CONCLUSION

Within the limitation of the present study, following conclusions are enumerated:

1. The players of Vidhya sagar university were found heavier than their counter parts.
2. The players of Kalyani university were found taller than their counter parts.
3. The players of Vidhya sagar university were found have more coordination ability than their counter parts.

4. The players of Nehru university were found have more Speed, General body coordination, and agility than their counter parts.
5. The significant relationship was not found between anthropometric variables and coordination variables except calf circumferential measurement.

Practical Application

Data presented in the present study carry immense practical application and should be useful in future investigation on players selection, talent identification and development of training program for football players.

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