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Comparison of Anthropometrical And Physiological Characteristics of Indian University Female Soccer Players According to Their Playing Positions

KEYWORDS: Soccer, Playing-position, Anthropometry, Physiological characters

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ABSTRACT *The purpose of the study was to compare the anthropometric variables and physiological variables of Indian University female soccer players at different field positions. To execute the study, 238 female soccer players who have participated in the South-West Zone and All India Inter University Women Football Tournament were utilized. Playing Positions identical were goal keeper, defenders, mid- fielders, forwards. Anthropometric variables were standing height, thigh girth, calf girth; physiological variables were anaerobic power, aerobic capacity. Anthropometric variables were measured by stadiometer and non elastic measuring tape, physiological variables were assessed by the criterion test of 50 meter standing start fast run and 1500 meters run. ANOVA statistics was utilized to find out the difference if any. All 'F' values were significant at .000 levels. It was found that there exist significant difference between goal keeper, defenders, mid fielders and forwards on standing height, thigh girth, calf girth, anaerobic power, aerobic capacity. It was found that there exist difference in standing height, thigh girth, calf girth, anaerobic power, aerobic capacity between goal keepers, defenders, mid-fielders and forwards among the universities female soccer players. Goal keeper, defenders, mid fielders and forwards were different on anthropometric variables and physiological variables.*

Introduction
When considering what kind of sports are needed to induce people to participate and to improve their physical condition, Leo Weinskin (1961) former Stanford University Soccer coach cites the following prerequisites.

It should be of such nature as to permit constant participation by all who are playing , it should stress endurance and develop the entire body; it's rules should be simple; it should be require low-cost and lasting equipment ; it should be a sport that can be played all year around ; it should not require unusual physical height or weight.

Soccer meets all of the above mentioned qualifications. It accommodates large group in an organized activity. Football is the fast exciting game, played by two teams of eleven players, who may pass, throw, dribble and kick. The object of the game is to score the goals into the opponent goal post. The Federation International De Football Association (FIFA) is the organization which governs worldwide soccer.

Purpose of the Study
The purpose of the study was to compare the selected anthropometric and physiological variables of Indian University female soccer players at different field positions.

Objective of the Study
To find out whether the University level female Soccer players playing in different positions differed in the selected anthropometric and physiological variables.

Hypothesis
It was hypothesized that there will be no significant differences between playing positions Goal keeper, Defenders, Midfielders, and forwards on standing height, calf girth, thigh girth, aerobic capacity, and anaerobic capacity.

Methodology
Subjects
To execute the study, 238 female soccer players who have participated in the South-West Zone and All India Inter University Women Football Tournament organized by Periyar University, Salem, Tamilnadu , India during the year 2008-2009 were utilized. The subjects' age ranged between eighteen and twenty five years. The distribution of playing positions are goal keepers 20, defenders 74, mid fielders 64, and forwards 80.

Experimental Design
The purposive sampling technique was utilized. Data were collected during the rest time of Tournament. Dependent variables are standing height, thigh girth, calf girth, aerobic capacity and anaerobic power. Independent variables are goal keeper, defenders, mid fielders and forwards

Informed consent was obtained prior to participation individually. Instructions were standardized, since obtained scores may be influenced by changing test instructions (Nideffer, R.M., 1987 and Greenspen et al., 1988). To avoid socially desirable answers, subjects were told that the results were being used solely for research purposes. Psychological variables Multivariate analysis and Scheffe's post hoc test are use to find out the significance.

Subjects were told that the results were being used solely for research purposes. Anthropometric variables standing height measured by stadiometer, thigh girth and calf girth were measured by standard non elastic measuring tape.

The Physiological characteristics were assessed by the criterion test for 50 meters standing start fast run for anaerobic power, and 1500 meters run for aerobic capacity.

Descriptive Statistics
Descriptive statistics of standing height of universities female soccer players playing positions are furnished in table I.

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TABLE – I
DESCRIPTIVE STATISTICS ON STANDING HEIGHT OF GOAL KEEPER, DEFENDERS, MID FIELDERS AND FORWARDS OF UNIVERSITY FEMALE SOCCER PLAYERS

Playing positions	Mean	Standard deviation	N
Goal keeper	172.05	2.090	20
Defenders	166.36	2.982	74
Mid fielders	156.34	4.005	64
Forwards	161.60	5.238	80
TOTAL	162.57	6.274	238

ANOVA results
Between subjects' effects on standing height of goal keepers, defenders, mid fielders and forwards are presented in table II.

TABLE - II
COMPUTATION OF BETWEEN SUBJECTS EFFECTS ON STANDING HEIGHT OF PLAYING POSITIONS

Independent variables	Dependent variables	Between set sum of squares	df	Within set mean squares	F	Sig.
Standing height	Goalkeeper Defenders Mid fielders Forwards	5419.255	3	1806.418	108.115	.000

The obtained ' F ' ratio on standing height of goal keepers, defenders, mid fielders and forwards were 108.115. This ' F ' value was significant at .05 level of confidence. Hence the null hypothesis was rejected.

Pairwise comparison
As the between subjects effects on standing height was significant, to find out the difference among goal keepers, defenders, mid fielders and forwards Scheffe's post hoc test was computed to find out the significance. The pairwise comparison test (Scheffe's post hoc) on standing height among goal keepers, defenders, mid fielders and forwards are presented in the table-III.

The mean difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards were 5.685, 15.706, 10.450, 10.021, 4.764 and -5.256 respectively. The difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards are significant at .05 level, whereas no insignificant differences were observed between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards on standing height.

TABLE –III.
PAIRWISE COMPARISON TEST (SCHEFFE'S POST HAC) OF STANDING HEIGHT ON PLAYING POSITIONS

Playing positions				Means difference	Standard error	Sig.
Goal keeper	Defenders	Mid fielders	Forwards			
172.05	166.36	156.34	161.60	5.685	1.030	.000
				15.706	1.047	.000
172.05	166.36	156.34	161.60	10.450	1.022	.000
172.05	166.36	156.34	161.60	10.021	.698	.000
				4.764	.659	.000
				-5.256	.686	.000

Descriptive Statistics
Descriptive statistics of thigh girth of universities female soccer players playing positions are furnished in table IV.

TABLE - IV
DESCRIPTIVE STATISTICS ON THIGH GIRTH OF GOAL KEEPER, DEFENDERS, MID FIELDERS AND FORWARDS OF UNIVERSITY WOMEN SOCCER PLAYERS

Playing positions	Mean	Standard deviation	N
Goal keeper	42.950	2.064	20
Defenders	42.595	2.867	74
Mid fielders	44.078	2.880	64
Forwards	44.810	3.080	80
TOTAL	43.764	3.019	238

ANOVA results
Between subjects' effects on thigh girth of goal keepers, defenders, mid fielders and forwards are presented in table V.

TABLE - V
COMPUTATION OF BETWEEN SUBJECTS EFFECTS ON THIGH GIRTH OF PLAYING POSITIONS

Independent variables	Dependent variables	Between set sum of squares	df	Within set mean squares	F	Sig.
Thigh girth	Goalkeeper Defenders Mid fielders Forwards	207.219	3	69.073	8.281	.000

The obtained ' F ' ratio on thigh girth of goal keepers, defenders, mid fielders and forwards were 8.281. This ' F ' value was significant at .05 level of confidence. Hence the null hypothesis was rejected.

Pairwise comparison
As the between subjects effects on thigh girth was significant, to find out the difference among goal keepers, defenders, mid fielders and forwards Scheffe's post hoc test was computed to find out the significance. The pairwise comparison test (Scheffe's post hoc) on thigh girth among goal keepers, defenders, mid fielders and forwards are presented in table VI.

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TABLE - VI
PAIRWISE COMPARISON TEST (SCHEFFE'S POST HAC) OF THIGH GIRTH ON PLAYING POSITIONS

	Playing positions				Means difference	Standard error	Sig.
	Goal keeper	Defenders	Mid fielders	Forwards			
Thigh Girth	42.950	42.595			.355	.728	.971
	42.950		44.078		-1.128	.740	.509
	42.950			44.810	-1.860	.723	.088
	42.950	42.595	44.078		-1.484	.493	.031
		42.595		44.810	-2.216	.467	.000
			44.078	44.810	-.732	.486	.519

The mean difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards were.355, -1.128, -1.860, -1.484, -2.216, -.732 and -.732 respectively. The difference between defenders and mid fielders, defenders and forwards are significant at .05 level , whereas insignificant differences were observed between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, mid fielders and forwards on thigh girth.

Descriptive Statistics
Descriptive statistics of calf girth of universities female soccer players playing positions are furnished in table VII.

TABLE - VII
DESCRIPTIVE STATISTICS ON CALF GIRTH OF GOAL KEEPER, DEFENDERS, MID FIELDERS AND FORWARDS OF UNIVERSITY WOMEN SOCCER PLAYERS

Playing positions	Mean	Standard deviation	N
Goal keeper	31.900	3.160	20
Defenders	31.176	2.801	74
Mid fielders	31.375	2.498	64
Forwards	31.410	2.819	80
TOTAL	31.410	2.750	238

ANOVA results
Between subjects' effects on calf girth of goal keepers, defenders, mid fielders and forwards are presented in table VIII.

TABLE – VIII
COMPUTATION OF BETWEEN SUBJECTS EFFECTS ON CALF GIRTH OF PLAYING POSITIONS

Independent variables	Dependent variables	Between set sum of squares	df	Within set mean squares	F	Sig.
Calf girth	Goalkeeper Defenders Mid fielders Forwards	10.112	3	3.371	.442	.723

The obtained ' F ' ratio on calf girth of goal keepers, defenders, mid fielders and forwards were .442. This ' F ' value was insignificant at .05 level of confidence. Hence the null hypothesis was accepted.

Descriptive Statistics
Descriptive statistics of anaerobic power of universities female soccer players playing positions are furnished in table IX.

TABLE - IX
DESCRIPTIVE STATISTICS ON ANAEROBIC POWER OF GOAL KEEPER, DEFENDERS, MID FIELDERS AND FORWARDS OF UNIVERSITY WOMEN SOCCER PLAYERS

Playing positions	Mean	Standard deviation	N
Goal keeper	8.176	.127	20
Defenders	8.330	.132	74
Mid fielders	8.240	.116	64
Forwards	8.224	.160	80
TOTAL	8.257	.146	238

ANOVA results
Between subjects' effects on anaerobic power of goal keepers, defenders, mid fielders and forwards are presented in table X.

TABLE - X
COMPUTATION OF BETWEEN SUBJECTS EFFECTS ON ANAEROBIC POWER OF PLAYING POSITIONS

Independent variables	Dependent variables	Between set sum of squares	df	Within set mean squares	F	Sig.
Anaerobic power	Goalkeeper Defenders Mid fielders Forwards	.629	3	.210	11.056	.000

The obtained ' F ' ratio on anaerobic power of goal keepers, defenders, mid fielders and forwards were 11.056. This ' F ' value was significant at .05 level of confidence. Hence the null hypothesis was rejected.

Pairwise comparison
As the between subjects effects on anaerobic power was significant, to find out the difference among goal keepers, defenders, mid fielders and forwards Scheffe's post hoc test was computed to find out the significance. The pairwise comparison test (Scheffe's post hoc) on anaerobic power among goal keepers, defenders, mid fielders and forwards are presented in table XI.

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TABLE - XI
PAIRWISE COMPARISON TEST (SCHEFFE'S POST HAC) OF ANAEROBIC POWER ON PALYING POSITIONS

	Playing positions				Means difference	Standard error	Sig
	Goal keeper	Defenders	Mid fielders	Forwards			
Anaerobic power	8.175	8.330	8.240		-.154	3.471	.000
					-6.450	3.529	.344
				8.224	-4.888	3.444	.570
	8.175		8.240		8.986	5.351	.003
	8.175	8.330		8.224	.105	2.222	.000
		8.330	8.240	8.224	1.563	2.310	.928

The mean difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards were-.154, -6.450, -4.888, 8.986, .105 and 1.563 respectively. The difference between goal keepers and defenders, defenders and mid fielders, defenders and forwards are significant at .05 level , whereas insignificant differences were observed between , goal keepers and mid fielders, goal keepers and forwards, mid fielders and forwards on anaerobic power.

Descriptive Statistics
Descriptive statistics of anaerobic power of universities female soccer players playing positions are furnished in table XII.

TABLE - XII
DESCRIPTIVE STATISTICS ON AEROBIC CAPACITY OF GOAL KEEPER, DEFENDERS, MID FIELDERS AND FORWARDS OF UNIVERSITY WOMEN SOCCER PLAYERS

Playing positions	Mean	Standard deviation	N
Goal keeper	7.325	.202	20
Defenders	6.265	.186	74
Mid fielders	6.320	.237	64
Forwards	6.471	.333	80
TOTAL	6.438	.382	238

ANOVA results
Between subjects' effects on aerobic power of goal keepers, defenders, mid fielders and forwards are presented in table XIII.

TABLE - XIII
COMPUTATION OF BETWEEN SUBJECTS EFFECTS ON AEROBIC CAPACITY OF PLAYING POSITIONS

Independent variables	Dependent variables	Between set sum of squares	df	Within set mean squares	F	Sig.
Aerobic capacity	Goalkeeper Defenders Mid fielders Forwards	18.917	3	6.306	94.710	.000

The obtained ' F ' ratio on aerobic power of goal keepers, defenders, mid fielders and forwards were 94.710. This ' F ' value was significant at .05 level of confidence. Hence the null hypothesis was rejected.

Pairwise comparison
As the between subjects effects on aerobic power was significant, to find out the difference among goal keepers, defenders, mid fielders and forwards Scheffe's post hoc test was computed to find out the significance. The pairwise comparison test (Scheffe's post hoc) on aerobic power among goal keepers, defenders, mid fielders and forwards are presented in table XIV.

TABLE - XIV
PAIRWISE COMPARISON TEST (SCHEFFE'S POST HAC) OF AEROBIC CAPACITY ON PALYING POSITIONS

	Playing positions				Means difference	Standard error	Sig.
	Goal keeper	Defenders	Mid fielders	Forwards			
Aerobic Power	7.325	6.265	6.320		1.060	6.503	.000
					1.005	6.610	.000
				6.471	.854	6.451	.000
	7.325		6.320		-5.460	4.405	.674
	7.325	6.265		6.471	-.206	4.162	.000
		6.265	6.320	6.471	-.151	4.327	.008

The mean difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, defenders and mid fielders, defenders and forwards, mid fielders and forwards were 1.060, 1.005, .854, -5.460, ,-.206, and -.151 respectively. The difference between goal keepers and defenders, goal keepers and mid fielders, goal keepers and forwards, , defenders and forwards, mid fielders and forwards are significant at .05 level , whereas insignificant difference was observed between defenders and mid fielders on anaerobic power.

Findings
It was found that there exist differences in standing height, thigh girth, anaerobic capacity, and anaerobic power between goal keepers, defenders, mid-fielders and forwards, where as insignificant difference in calf girth among the university female soccer players.

Conclusions
1. Goal keeper, defenders, mid fielders and forwards were different in standing height, thigh girth, anaerobic capacity, and anaerobic power between goal keepers, defenders, mid-fielders and forwards. There is no difference among the playing positions.

Every single factor however small that may be, contribute to the total performance in sports competition that too at higher level. This study will provide coaches and physical educationist to identify the importance of anthropometry and physiological characteristics of athletes in sports setting.

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The coaches identified the player those who have much height to suitable for goal keepers, defenders, and average height forwards, and low height to suitable for mid fielders. The trainers identify the specific training schedule for improve thigh girth, calf girth to those who have need.

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