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POSITON-WISE ANANLYSIS ON ANTHROPOMETRIC CHARACTERISTICS AND PERFORMANCE RELATED VARIABLES AMONG INTER-COLLEGIATE BASKETBALL PLAYERS

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Abstract

The objective of the study was to identifying the most important contributing factors among anthropometrical and skill related variables of Tamilnadu State level Inter-collegiate basketball players with special reference to their playing positions towards performance.To achieve the objective of this study, 30 intercollegiate basketball players (Men) representing Madras Christian College, Chennai, Loyola College, Chennai, GRD College of Arts & Science, Coimbatore & PSG College of Arts & Science, Coimbatore achieved Winner, Runner, Third and Fourth place respectively in the 39th State Level Inter-collegiate Basketball Tournament for PSG Trophy, organized by PSG college of Arts & Science, Coimbatore on 14th to 16th Feb, 2012, during the year 2011 - 2012.To test the significance of the mean difference among the players of various positions namely guard, forward and post on criterion measures of selected anthropometric variables: standing height, body weight, arm span, palm width, arm length, arm girth and calf girth, & performance related variables: field goal, assist, rebounds and steal, one – way analysis of variance was used. In case of significance of mean difference observed on the criterion measure, to find out which pair of group is high among the others, as post – hoc test, the Schefee's test was applied.It was found that mean values of guard, forward and center were compared - the center players have maximum values in all the parameters followed by forward players and then the guard players.

Key Words: Anthropometry, Basketball and Performance

Introduction

Basketball is a sport that has become increasingly popular world-wide. In basketball for optimal performance during play at an elite level, a variety of areas must be addressed. Sports Anthropometry is one of the areas and Anthropometric characteristics of athletes determine the success in particular sports events in various ways. The knowledge of these characteristics is necessary to establish their importance for the success in competitive sport. The research on the influence of these characteristics in sporting games is of particular complexity, because the success in the game depends, among other factors, on how the individual characteristics of some players fit into the whole, thus creating a coherent team. Basketball is one of the complex technical team based games and performance differences between players of varying ability levels are different (Bayios, et al., 2007). Specifically speaking the role played by the player in relation to the position in which he played is different from others. Further on, basketball is the game where size, shape and body composition play an important part in providing distinct advantage for specific playing positions.In the current basketball scenario, the purpose of the study was to analysis the contributing factors of anthropometrical and skill related variables on the performance of Inter-collegiate State level basketball players with special reference to their playing positions according to the Tamilnadu State context.

Methods and Materials

To achieve the purpose of this study, 30 intercollegiate basketball players (Men) representing Madras Christian College, Chennai, Loyola College, Chennai, GRD College of Arts & Science, Coimbatore & PSG College of Arts & Science, Coimbatore achieved Winner, Runner, Third and Fourth place respectively in the 39th State Level Flood-lit Inter-collegiate Basketball Tournament for PSG Trophy, organized by PSG college of Arts & Science, Coimbatore on 14th to 16th Feb, 2012, during the year 2011 - 2012. The subjects were selected on the basis of their performance assessed by the Software named FIBA live stat (Jacek, et al., 2010). The selected subjects were divided into three groups as according to their field positions in which they play in this competition namely guard (**G**), forward (**F**) and Post (**P**). Their ages ranging from 18 to 25 years with mean age of 21.04 years. The variables selected for this study are shown in the table – 1. Sega Stadiometer, Sega Weighing Machine, Harpendens Skinfold Caliber, Campbell small bone caliber and Lufkin anthropometric tape used in this study were found to be accurate enough to serve the purpose of the study. All the instruments used were available in the Human Performance Laboratory, Dr. Sivanthi Aditanar College of Physical Education, Tiruchendur. The software FIBA Live Stat's calibration was checked before each match in the tournament. To test the significance of the mean difference among the players of various positions namely guard, forward and post on criterion measures of selected anthropometric variables: standing height, body weight, arm span, palm width, arm length, arm girth and calf girth, & performance related variables: field goal, assist, rebounds and steal, one – way analysis of variance was used. In case of significance of mean difference observed on the criterion measure, to find out which pair of group is high among the others, as post – hoc test, the Schefee's test was applied.

Table – I

Selection of Variables

Anthropometric Variables	*Height*	
	Weight	
	Skinfold	*Biceps, Subscapular, Triceps, Supraspinale, Abdominal, Illiac Crest, Front Thigh and Medial Calf*
	Length	*Arm span, Arm length, Palm span, Leg length*
	Girth	*Forearm, thigh and Calf girth*
Performance Related Variables	*Field Goals*	
	Rebounds	
	Assists	
	Steals	

Analysis and Discussions

Table – II

Analysis of Variance between the Playing positions of Inter-collegiate Basketball players on Height & Weight

Variables	Group of Sets	Sum of Squares	df	Mean Square	F
Height	Between Groups	1327.133	2	663.567	52.762*
	Within Groups	339.567	27	12.577	
Weight	Between Groups	710.467	2	355.233	15.856*
	Within Groups	604.900	27	22.404	

***** $p < 0.05$ Table F, df (2,27) (0.05) = 3.35

In table – II, the results of one-way analysis of variance on Height and Weight parameters among the three groups namely Post (P), Forward (F) and Guard (G) were presented. From the table it can be seen that the calculated F value of 52.762 for height and 15.856 for weight among the three groups was greater than the table value of 3.35 indicating that it was significant ($p < 0.05$) for the degrees of freedom (2, 27) at 0.05 level of confidence.

Table – III

Analysis of Variance between the Playing positions of Inter-collegiate Basketball players on Skinfold Measurements

	Variables	Group of Sets	Sum of Squares	df	Mean Square	F
Skinfold	Subscapula	Between Groups	11.084	2	5.542	1.446
		Within Groups	103.451	27	3.832	
	Triceps	Between Groups	17.388	2	8.694	1.028

		Within Groups	228.382	27	8.459	
	Biceps	Between Groups	20.859	2	10.430	1.913
		Within Groups	147.196	27	5.452	
	Illac Crest	Between Groups	57.487	2	28.743	1.031
		Within Groups	752.708	27	27.878	
	Supraspinale	Between Groups	6.732	2	3.366	.236
		Within Groups	385.323	27	14.271	
	Abdominal	Between Groups	61.830	2	30.915	1.200
		Within Groups	695.322	27	25.753	
	Thigh	Between Groups	7.362	2	3.681	.223
		Within Groups	446.550	27	16.539	
	Calf	Between Groups	1.855	2	.927	.085
		Within Groups	282.438	26	10.863	

***** $p < 0.05$ Table F, df (2,27) (0.05) = 3.35

Table – IV

Analysis of Variance between the Playing positions of Inter-collegiate Basketball players on Length Measurements

Length Measurements	Arm Span	Between Groups	1962.075	2	981.037	29.386*
		Within Groups	901.392	27	33.385	
	Arm Length	Between Groups	393.617	2	196.808	14.787*
		Within Groups	359.350	27	13.309	
	Palm Span	Between Groups	1.707	2	.854	4.568*
		Within Groups	5.045	27	.187	
	Leg Length	Between Groups	291.675	2	145.838	9.861*
		Within Groups	399.292	27	14.789	

***** $p < 0.05$ Table F, df (2,27) (0.05) = 3.35

From the table – III, it can be seen that the calculated F value of 1.446 for subscapula; 1.028 for triceps; 1.913 for biceps; 1.031 for iliac crest; 0.236 for supraspinale; 1.2 for abdominal; 0.223 for thigh and 0.085 for calf – all among the three groups was lesser than the table value of 3.35 indicating that it had no significant difference in their respective mean differences ($p < 0.05$) for the degrees of freedom (2, 27) at 0.05 level of confidence. Regarding the length parameters in the table - IV, calculated F value of 29.386 for Arm Span; 14.787 for Arm Length; 4.568 for palm span and 9.861 for leg length among the three groups was greater

than the table value of 3.35 indicating that it was significant ($p < 0.05$) for the degrees of freedom (2, 27) at 0.05 level of confidence.

Table – V

Analysis of Variance between the Playing positions of Inter-collegiate Basketball players on Girth Measurements

Girth Measurements	Forearm	Between Groups	19.617	2	9.808	5.714*
		Within Groups	46.350	27	1.717	
	Thigh	Between Groups	968.900	2	484.450	1.029
		Within Groups	12709.567	27	470.725	
	Calf Girth	Between Groups	133.512	2	66.756	.930
		Within Groups	1937.454	27	71.758	

***** $p < 0.05$ Table F, df (2,27) (0.05) = 3.35

From the table – V, denotes that the calculated F value of 1.029 for thigh and 093 for calf – all among the three groups was lesser than the table value of 3.35 indicating that it had no significant difference in their respective mean differences ($p < 0.05$) for the degrees of freedom (2, 27) at 0.05 level of confidence. The only parameter forearm girth, had F vale of 5.714, showed significant mean difference between the post, forward and guard players at 0.05 level of confidence.

Table – VI
Analysis of Variance between the Playing positions of Inter-collegiate Basketball players on Performance Related Variables

Variables	Group of Sets	Sum of Squares	df	Mean Square	F
Playing Ability	Between Groups	849.305	2	424.652	.305
	Within Groups	37596.862	27	1392.476	
Rebound	Between Groups	112.152	2	56.076	.469
	Within Groups	3230.148	27	119.635	
Field Goals	Between Groups	1392.086	2	696.043	1.089
	Within Groups	17264.614	27	639.430	
Assist	Between Groups	477.152	2	238.576	2.873
	Within Groups	2242.214	27	83.045	

***** $p < 0.05$ Table F, df (2,27) (0.05) = 3.35

In table – VI, the results of one-way analysis of variance on performance related parameters namely playing ability (0.305); rebounds (0.469); field goals (1.089) and assist (2.873) – all among the three groups namely Post (P), Forward (F) and Guard (G) were lesser than the table value of 3.35 indicating that it had no significant difference in their respective mean differences ($p < 0.05$) for the degrees of freedom (2, 27) at 0.05 level of confidence.Significance of mean difference was observed on the criterion measure, namely Height, Weight, Arm Span, Arm Length, Palm Span, Leg Length and Forearm Girth. To determine which pair of group of guard, forward and post players, is high among the others, as post – hoc test, the Schefee's test was applied.

Table – VII

Scheffe's Post-hoc test for Mean differences between the Post (P), Forward (F) and Guard (G) Inter-collegiate Basketball Players on Selected Criterion Variables

Variables	P	F	G	Mean Difference	CI
Height	188.66	178.90		170.76 *	5.096
		178.90	172.50	6.90 *	
	188.66		172.50	15.16 *	
Weight	74	70		4	6.80
		70	62	8 *	
	74		62	12 *	
Arm Span	196.4167	184.2000		12.267*	8.304
		184.2000	176.8750	7.325	
	196.4167		176.8750	9.541*	
Arm Length	86.2500	81.8000		4.45	5.243
		81.8000	77.2500	4.55	
	86.2500		77.2500	9*	
Palm Span	9.6500	9.2000		0.45	1.965
		9.2000	9.1250	0.7	
	9.6500		9.1250	0.52	
Leg Length	101.4167	98.5000		2.92	5.526
		98.5000	93.6250	4.87	
	101.4167		93.6250	7.79*	
Forearm Girth	25.7500	24.7000		1.05	1.883
		24.7000	23.7500	0.95	
	25.7500		23.7500	2*	

From the table – VII, it can be clearly noticed that there was a significant mean difference between the pair either P & G; F & G; or P and G, in which one having the maximum values among the other pair of positionswill yield best pair mean differences on the selected criterion variables. Regarding the height of the positions, among all the pair of positions showing significant mean difference, but Post and Forward having the maximum mean difference

(170.76) than the other positions, signifies post and forward are not alike while considering the selection of positions to the players.

On weight, post and forward did not differ in the body mass significantly, but forward and guard as well as guard and post differ significantly. And also the general trend was confined that guard and post players having maximum pair of mean differences (12) on weight. On arm span, the pair of mean differences between post and forward & post and guard had significant differences expect forward and guard. On arm length, leg length and forearm girth, the only pair of mean difference of post and guard players had significant mean difference. On palm span, no pair of group had significant mean difference among them.

For most of the basketball game, centers play near the basket where size is advantageous. This inside basketball play involves considerable contact that requires substantial weight to maintain stability in stationary position as well as executing a skilled movement pattern. The lowest values of Standing height, body weight, arm length, arm span were recorded in guards, who differed significantly from the centers regarding those variables. When mean values of various anthropometric characteristics were computed for different field positions, it was found that the center players have maximum values in all the parameters followed by forwards and then the guards. There was a significant mean difference between the playing ability with anthropometric variables in terms of standing height, body weight, arm length, forearm girth, arm span, palm span, femur breadth and leg length.

Each position demands certain playing characteristics according to the role played by the players. In basketball it is well known that the guards have to be very good in dribbling and passing to enhance the game in a controlled manner. That's why they are called play makers and have to be short height, low weight while comparing to other positions in general. The forward players in basketball should be able to handle the ball efficiently as well as be a best outside shooter. They have to collect the ball while rebounding and penetrating in to the restricted area near the basket. For all, the height and arm length is very essential. For being a center player, plays very near to the basket, has to collect rebound as well as preventing the opponent's attempt towards the ring near to the basket especially the defensive side. For that arm span for quick reach and cover wider area, arm length for shooting, stealing the ball, lay – up shot and rebounding, adequate weight, height as well as calf girth, all are provides a distinct advantages for playing the game basketball. The result of this study was also in accordance with the study of Alberto, et al., 2010; Haris, et al., 2009 &Roberto & Laura, 2012.

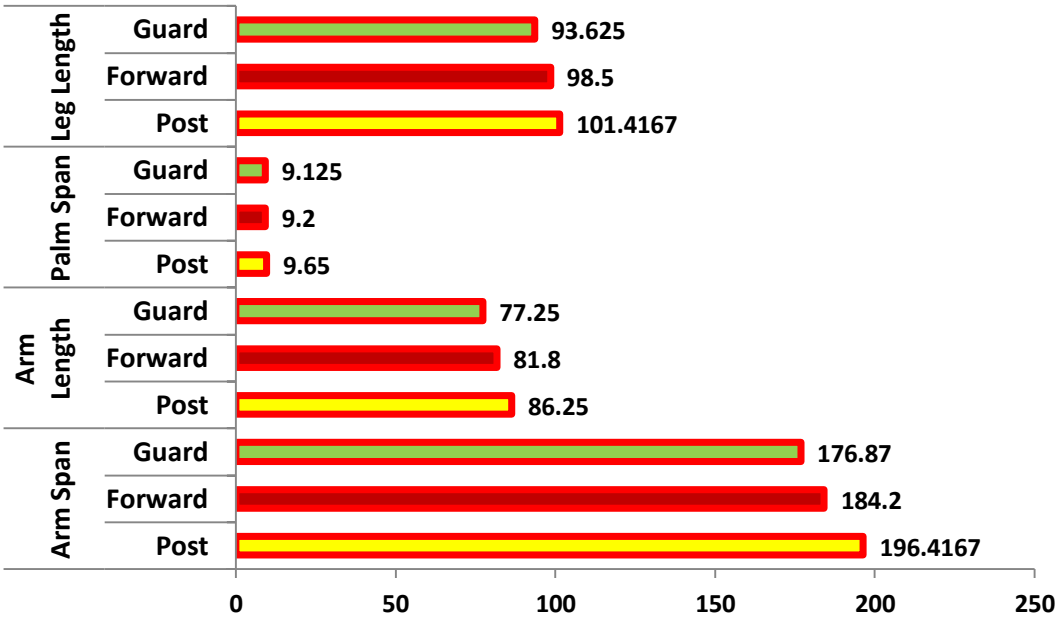

Fig – I
Mean Score of Length Parameters among Guard, Forward and Post Players

Conclusions

From the analysis of the data, the following conclusions were drawn.

1. The performance related characteristics of inter-collegiate basketball players with reference to their playing positions (post, forward and guard) have no variance on performance related variables namely number of steals, rebounds, field goals and assist.
2. The results reveals that there was significant difference exist among intercollegiate basketball players pertaining to their field positions namely guard, forward and center and their playing ability on selected anthropometric characteristics.
3. It was found that mean values of guard, forward and center were compared - the center players have maximum values in all the parameters followed by forward players and then the guard players.

References

Jacek Dembinski, Ilona Kopocinska and Boleslaw Kopocinski. (2010). Two tests for synergy of player in basketball games. International Journal of Computer Science in Sport, Vol-5(1), pp: 541-549.

Bayios IA, Bergeles NK, Apostolidis NG, Noutsos KS, Koskolou MD. (2007). "Anthropometric, body composition and somatotype differences of Greek elite female basketball, volleyball and handball players". The Journal of Strength and Conditioning Research: Vol. 20, No. 4, pp. 740–744.

Alberto Lorenzo, Miguel Ángel Gómez, Enrique Ortega, Sergio José Ibáñez and Jaime Sampaio (2010). Game related statistics which discriminate between winning and losing under-16 male basketball games. Journal of Sports Science and Medicine, vol- 9, 664-668.

Haris Pojskić, H, Vlatko Šeparović and Edin Užičanin. (2009). differences between successful and unsuccessful basketball teams on the final olympic tournament. Acta Kinesiologica, vol-3, issue - 2: pp - 110- 114.

Roberto Theron and Laura Casares. (2012).Visual Analysis of Time-Motion in Basketball Games. Retrieved April, 25, 2012, from http://usal.academia.edu/RobertoTheron/ Papers/278657/Visual_Analysis_of_Time-Motion_in_Basketball_Games.