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A COMPARISON OF THE ANTHROPOMETRIC PARAMETERS BETWEEN BASKETBALL PLAYERS, HANDBALL PLAYERS AND VOLLEYBALL PLAYERS

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Abstract:
The purpose of this study was to compare the anthropometric measurement to the professional players of the three different disciplines of basketball, handball and volleyball. . For each player anthropometric measurements such as weight, body height, waist circumference, BMI and skinfold calculation on different sports are performed. Differences in terms of anthropometric measurements were assessed by independent static tests and the differences for each variable for each sport were evaluated with the ANOVA method with the Post Hoc test. As a conclusion in this study, the results of this study showed that the anthropometric measurements of professional players of the three main sports varied among them, while there were no significant differences between sports for the measurement of biceps and suprailliac fat. According to this study, sports have different demands on anthropometric attributes, which are specific to each professional player of three basketball, volleyball and handball sports. Therefore, for this variety of outcomes, coaches need to create training programs according to the sport's specifications and every sportsman in the field.

Keywords: anthropometrics, weight, height, BMI, skinfold

1. Introduction

Basketball is mainly an anaerobic sports discipline, where most of the energy is required for a high-intensity activity, such as: start, stops, steering changes, strikers,

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throws, jumps and seizures from the table come from Phosphate Creatine System (CP) (Delextrat and Cohen, 2009; Meckell et al., 2009; Metaxas et al., 2009). During a basketball game, professional players run around 3500-5000 m (Janeira and Maia, 1998). Each player performs approximately 1,000 short actions, which change approximately every 2 seconds. Analysis of the time of movement has shown that these short activities are performed at different frequencies, according to the positions of the players during the game (Abdelkerim et al., 2007).

Some studies have presented different physical characteristics to players, according to different divisions or roles they have in the field of play. For example, Ostojic et al. (2006) has shown that a strong link exists between body composition, aerobic preparation, anaerobic power, and elite basketball positions. Sallet and et al. (2005) compared physiological characteristics in the first two levels of the French professional basketball league and linking them to player positions in the field and division levels. The results of the Sallet showed that the selection of players for the elite level does not only include morphological characteristics but also special physiological and technical profiles.

Talent discovery programs have traditionally focused on individual sports with discrete physical and physiological characteristics. Collective sports have been paid little attention. This study (Hoare 2000) carried out anthropometric measurements and physiological attributes of 125 male players and 123 females, under 16 years of basketball. In addition, experienced coaches assessed the effectiveness of the players during the championship. These appearances were compared along the playing positions and the effectiveness of the game (Best Against Others). Differences of anthropometric characteristics were observed in some positions of the game, both in men and women. The differences in speed and skill in different positions of the game were also evidenced. The best players were distinguished by the anthropometric and physiological characteristics of both females and males. The results of the regression analysis showed that testing parameters were significantly waning in both women (41.3%) and males (38.3%). The results of the full analysis showed a match of the test with the trainer's evaluation for the best player at 4/5 positions for the female 2/5 per male. Anthropometric and physiological characteristics may affect the selection procedures of small basketball players; however, the success factors are multifactorial.

2. Methods

The purpose of this study was to compare the anthropometric measurement to the professional players of the three different disciplines of basketball, handball and volleyball.

Forty-one (N = 41) male professional athletes (14 basketball players, 12 handball players, 15 volleyball players) voluntarily participated in this study. For each player anthropometric measurements such as weight, body height, waist circumference, and BMI calculations on different sports are performed. Differences in terms of anthropometric measurements were assessed by independent static tests and the differences for each variable for each sport were evaluated with the ANOVA method with the Post Hoc test.

Subjects were presented at the field at 8am. Measurements were performed for each subject for body height (cm), body weight (kg) and waist circumference. Body mass measurement was performed using a gradual stadiometer of up to 1 cm, while body weight and were determined by electronic scales with accuracy up to 0,1 kg. BMI was calculated using the usual formula taken from the measurement of body weight and height.

2.1 Statistical analysis

For each player, mean values and standard deviations are calculated for each measurement. The overall homogeneity test for the data of each group showed that there were no significant differences. A separate (independent) test is used to calculate comparisons by sports. The random variance analysis (ANOVA) on tests is performed to identify the differences for each sport. If there are significant average differences, Tukey procedures will be used to determine player positions for each player, which determine significant differences.

3. Results

Table 1 gives descriptive data for three anthropometric measurements (length, weight and waist circumference) and BMI calculation for athletes included in this study. From the table it is seen that the average body height of athletes is 188.8 cm (dev stand 9.5) and the minimum and maximum values (166 cm and 208 cm) while the average weight of athletes is 82.8 kg (dev stand 13.8) and minimum and maximum values (56 kg and 111 kg) and the average values for the waist circumference of the athletes is 83.8 cm (dev stand 6.3) and the minimum and maximum values (71.5 cm and 96 cm). The average BMI values of athletes are 23 kg / m2 (dev stand 2.4) and the minimum and maximum values (17.9 kg / m2 and 28.8 kg / m2).

Table 1: Descriptive statistics for anthropometrics in team games

	Minimum	Maximum	Mean	Std. Deviation
Height	166	208	188.769	9.5075
Weight	56	111	82.837	13.7658
BMI	17.9	28.8	23.039	2.4086
Waist_Circumference	71.5	96	83.826	6.3491

Table 2 gives descriptive data for three anthropometric measurements (length, weight and waist circumference) and BMI calculation for the three sports involved in this study. From the table it is seen that the average basketball player is 198.4 cm (dev stand 6.8) and the minimum and maximum (188 cm and 208 cm), while the average weight of the basketball players is 96.9 kg (dev stand 7.5) and minimum and maximum (87.6 kg and 111 kg) and the average values for the waist circumference of the basketball players is 88.9 cm (dev stand 3.2) and the minimum and maximum values (84 cm and 96 cm). Basketball BMI average values are 24.7 kg / m2 (dev stand 1.7) and minimum and maximum values (21.5 kg / m2 and 28.8 kg / m2).

Table 2: Descriptive statistics for anthropometrics by team games

Discipline		**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Basketball	Height	188	208.0	198.417	6.8285
	Weight	87.6	111.0	96.979	7.5607
	BMI	21.5	28.8	24.732	1.7744
	Waist_Circumference	84	96.0	88.908	3.2795
Handball	Height	166	192.0	181.75	8.4221
	Weight	56	92.7	73.258	12.4067
	BMI	17.9	25.7	22.108	2.7231
	Waist_Circumference	71.5	93	81.333	6.8102
Volleyball	Height	180	194	186.667	5.1223
	Weight	63.8	89	76.907	6.5691
	BMI	18.9	26.2	22.143	1.7969
	Waist_Circumference	76	94.5	81.607	5.6131

Table 3 provides data on the correlation between length, weight, BMI and waist circumference in sports (basketball, handball and volleyball). The length comparison is $p = 0.000$ ($F = 19.235$), weight $p = 0.000$ ($F = 27.115$), BMI $p = 0.003$ ($F = 6.948$), and waist circumference $p = 0.002$ ($F = 7.644$).

Table 3: ANOVA comparison for anthropometric between team games

ANOVA		Sum of Squares	Mean Square	F	Sig.
Height	Between Groups	1774.423	887.212	19.235	**0.000**
	Within Groups	1660.5	46.125		
Weight	Between Groups	4393.072	2196.536	27.115	**0.000**
	Within Groups	2997.322	81.009		
BMI	Between Groups	61.771	30.885	6.948	**0.003**
	Within Groups	164.475	4.445		
Waist_Circumference	Between Groups	453.449	226.724	7.644	**0.002**
	Within Groups	1038.065	29.659		

Table 4 provides data for a deep comparison between length, weight, sports (basketball, handball and volleyball) measurements. The basketball and handball comparison is p = 0.000 (med. Diff = 16.66; error std = 2.77), basketball and volleyball is p = 0.000 (midfth 11.75, std error 2.63), handball and volleyball p = 0.070 diff = -4.92; Errori Std = 2.63). The weight comparison between basketball and handball is p = 0.000 (med. Diff = 23.72; Errori Std = 3.54), basketball and volleyball is p = 0.000 (med. Diff = 20.07; Errori Std = 3.40); handball and volleyball p = 0.309 diff = -3.65; Errori Std = 3.54).

Table 4: Post Hoc LSD analysis for comparison on height and weight between team games

Multiple LSD	Comparisons						
	(I) Discipline	(J) Discipline	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Height	Basketball	Handball	16.6667*	2.7726	**0.000**	11.044	22.29
		Volleyball	11.7500*	2.6304	**0.000**	6.415	17.085
	Handball	Basketball	-16.6667*	2.7726	**0.000**	-22.29	-11.044
		Volleyball	-4.9167	2.6304	0.070	-10.251	0.418
	Volleyball	Basketball	-11.7500*	2.6304	**0.000**	-17.085	-6.415
		Handball	4.9167	2.6304	0.070	-0.418	10.251
Weight	Basketball	Handball	23.7202*	3.5408	**0.000**	16.546	30.895
		Volleyball	20.0714*	3.4019	**0.00**	13.179	26.964

					0		
	Handball	Basketball	-23.7202*	3.5408	**0.000**	-30.895	-16.546
		Volleyball	-3.6488	3.5408	0.309	-10.823	3.525
	Volleyball	Basketball	-20.0714*	3.4019	**0.000**	-26.964	-13.179
		Handball	3.6488	3.5408	0.309	-3.525	10.823

* The mean difference is significant at the 0.05 level.

Table 5 provides data for an in-depth comparison between BMI measurements and waist circumference in sports (basketball, handball and volleyball). The BMI comparison between basketball and handball is p = 0.003 (Mid of diff = 2.62; Errori Std = 0.82), basketball and volleyball is p = 0.002 (Mid difference = 2.59; Errori Std = 0.79), handball and volleyball p = 0.0967 diff = -0.35; Errors Std = 0.83). Comparison for the waist circumference between basketball and handball is p = 0.002 (middle diff = 7.57; error std = 2.22), basketball and volleyball is p = 0.002 (middle diff = 7.3, error std = 2.14), handball and volleyball p = 0.889 (Mean diff = -2.74; Errori Std = 2.14).

Table 5: Post Hoc LSD analysis for comparison on BMI and waist circumference between team games

Multiple Comparisons LSD	**(I) Dicipline**	**(J) Dicipline**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	Upper Bound
BMI	Basketball	Handball	2.6238*	0.8294	**0.003**	0.943	4.304
		Volleyball	2.5893*	0.7969	**0.002**	0.975	4.204
	Handball	Basketball	-2.6238*	0.8294	**0.003**	-4.304	-0.943
		Volleyball	-0.0345	0.8294	0.967	-1.715	1.646
	Volleyball	Basketball	-2.5893*	0.7969	**0.002**	-4.204	-0.975
		Handball	0.0345	0.8294	0.967	-1.646	1.715
Waist_Circumference	Basketball	Handball	7.5750*	2.2233	**0.002**	3.061	12.089
		Volleybal	7.3012*	2.1424	**0.00**	2.952	11.651

	1			2		
Handball	Basketball	-7.5750*	2.2233	**0.002**	-12.089	-3.061
	Volleyball	-0.2738	2.1424	0.899	-4.623	4.076
Volleyball	Basketball	-7.3012*	2.1424	**0.002**	-11.651	-2.952
	Handball	0.2738	2.1424	0.899	-4.076	4.623

* The mean difference is significant at the 0.05 level.

4. Discussion

The purpose of this study was to compare anthropometric measurements to professional players of three different disciplines of basketball, handball and volleyball. From this study we conclude that: weight, length, IMT (BMI), waist circumference and perimeter of the three main groups of basketball players were significantly higher (significant $p \leq 0.05$) than those of volleyball players and no significant differences between sports disciplines for biceps and suprailliac measurement. In addition, basketball players were significantly higher than volleyball players (+20 kg, $p \leq 0.05$) and handball players (+23.7 kg; $p \leq 0.05$) while volleyball and handball (+3.6 kg; $p > 0.05$).

Basketball players were significantly taller than volleyball players (+11.8 cm; $p \leq 0.05$) and handball players (+16.6 cm; $p \leq 0.05$) while volleyball and handball (+4.9 cm; $p > 0.05$). The basketball team's IMT was higher than the volleyball players (+2.6 kg / m2, $p \leq 0.05$) and the handball (+2.6 kg / m2; $p \leq 0.05$) while volleyball and handball (+0.0 3 kg / m2; $p > 0.05$) and the handball (+7.3 cm; $p \leq 0.05$) and handball (+7.6 cm; $p \leq 0.05$) volleyball and handball (+0.3 cm; $p > 0.05$) Moreover, basketball players had the highest perimeter of the three major group players than volleyball players and handball players; The perimeter of the wing - basketball players have higher values than volleyball players (+4.7; $p \leq 0.05$) and handball players (+5.4; $p \leq 0.05$) as well as volleyball players and handball players (+0.6; $p > 0.05$).

As a conclusion in this study, the results of this study showed that the anthropometric measurements of professional players of the three main sports varied among them, while there were no significant differences between sports for the measurement of biceps and suprailliac fat. According to this study, sports have different demands on anthropometric attributes, which are specific to each professional player of three basketball, volleyball and handball sports. Therefore, for this variety of outcomes, coaches need to create training programs according to the sport's specifications and every sportsman in the field.

Specific anthropometric and physical characteristics differ, mainly in male basketball players. These findings suggest that common physical and anthropometric characteristics should be included in any testing of the selection of sports discipline players. However, the selection should not be limited to anthropometric data, especially in younger ages, where maturation should be considered. The full measurement of the physical characteristics, in combination and with the specific tests of the game in the three disciplines (aiming for accuracy, passage, dribbling with slalom) should also be included in a selection procedure.

The ability to move with the ball, the ability to change the return speed, the ability to target the accuracy of the score, the ability to move around a triangular scheme (protection movement) are very important parameters and should be taken into account when trying players . The evolution of standard proofs that simulate game circumstances, together with the assessment of particular physical training abilities and anthropometric characteristics, are crucial to the future of a team.

The challenge is clear for trainers; develop special skills for various physical training tests, in combination with anthropometric features, to enable accurately measuring the skills and requirements of different positions during the game.

References

1. Abdelkrim NB, Fazaa SE, Ati JE. Time–motion analysis and physiological data of elite under-19-year-old basketball players during competition. *British Journal of Sports Medicine* 2007; 41: 69-75
2. Delextrat A, Cohen D. Strength, power, speed, and agility of women basketball players according to playing position. *Journal of Strength and Conditioning Research* 2009; 23(7): 1974–1981
3. Meckell Y, Casorla T, Eliakim A. The influence of basketball dribbling on repeated sprints. *International Journal of Coaching Science* 2009; 3(2): 43-56.
4. Metaxas TI, Koutlianos N, Sendelides T, Mandroukas A. Preseason physiological profile of soccer and basketball players in different divisions. *Journal of Strength and Conditioning Research* 2009; 23(6): 1704–1713
5. Ostojic SM, Mazic S, Dikic N. Profiling in basketball: Physical and physiological characteristics of elite players. *Journal of Strength and Conditioning Research* 2006; 20(4):740-744.

6. Hoare DG. Predicting success in junior elite basketball players: the contribution of anthropometric and physiological attributes. J Sci Med Sport 2000 Dec; 3 (4): 391-405
7. Janeira MA, Maia J. Game intensity in basketball. An interactionist view linking time-motion analysis, lactate concentration and heart rate. *Coaching and Sport Science Journal* 1998; 3:26-30.
8. Sallet P, Perrier, D, Ferret JM, Vitelli V, Baverel G. Physiological differences in professional basketball players as a function of playing position and level of play. *Journal of Sports Medicine and Physical Fitness* 2005; 45(3): 291-294
9. Hoffman JR, Tenenbaum G, Maresh CM, Kraemer WJ. Relationship between athletic performance tests and playing time in elite college basketball players. *Journal of Strength and Conditioning Research* 1996; 10:67–71.
10. Janeira MA, Maia J. Game intensity in basketball. An interactionist view linking time-motion analysis, lactate concentration and heart rate. *Coaching and Sport Science Journal* 1998; 3:26-30.