

## SOME ANTHROPOMETRIC AND POWER CHARACTERISTICS OF ELITE JUNIOR HANDBALL AND BASKETBALL PLAYERS

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(Original scientific paper)

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### **Abstract:**

*The aims of this study were: a) to investigate some power and anthropometric characteristics of elite junior team handball and basketball players, b) to compare these characteristics of these two groups of young athletes c) to check correlation between all variables for whole sample. Participants were 20 team handball players, aged  $19.32 \pm 0.354$  years (group 1), members of male junior national handball team of former F.R. Yugoslavia, and 16 basketball players aged  $18.40 \pm 0.314$  years (group 2), members of male junior basketball national team of former F.R. Yugoslavia. All participants were done three power field tests: standing long jump test, standing triple jump test, and test run 20m. Also, there was making measurement of body height, body mass, and calculate body mass index (BMI). There was find significant differences between handball and basketball players in variables: standing long jump and standing triple jump. Handball players achieve better results: standing long jump – 257.60cm vs. 246.5cm, standing triple jump – 775.5cm vs. 739.2cm. Basketball players were significantly taller than handball players – 199.06cm vs. 191.02cm. Significant differences were not found in variables: run 20m and weight. Because of that BMI of handball players was greater. Height and weight had negative influence on results of all three power variables.*

**Key words:** *top athletes, measurement, tests, t-test correlation*

### **INTRODUCTION**

Handball and basketball are very dynamic team sports with worldwide popularity. Team sports usually involved a pattern of intermittent, dynamic and skilled movement activities and had complex demands that require a combination of individual and team skills. Matches in handball and basketball are characterized by repeated accelerations, sprints, jumps and rapid changes in moving directions (Rannou, Priou, Zouhal, & Gratas-Delmarche, 2001; Trninić, & Dizdar, 2000). In basketball, (McInnes, Carlson, Jones, & McKenna (1995), were found  $997 \pm 183$  actions per game, Abdelkrim, El Fazaa, & El Ati., (2007), were found  $1050 \pm 51$  actions per game after rule changes at 2004 – shorter attack (from 30sec. to 24sec.), shorter time spent on the backcourt (from 10sec. to 8

sec) and distribution of play time in four quarter instead two half times. Handball players make a lot of sprints and jumps and required great anaerobic capacities (Rannou, Priou, Zouhal & Gratas-Delmarche, 2001). Dufour, Rouard, Ponder & Maurin, (1987), observed that those handball players are able to exhibit high running velocities during a 20 m sprint. Besides of that there is a great amount of body contact among players, especially in team handball. Because of that, the short bursts of high intensity power production plays a very important role in the team handball and basketball performance.

Granados, Ibáñez, & Izquierdo, (2005), were find the differences between elite and amateur handball players in power and concluded that more muscular and powerful players are at an advantage

in handball. Mohamed, Vaeyens, Matthys, Multael, Lefevre, Lenoir, & Philppaerts (2009), were shown that height, running speed, and agility are important parameters for talent identification in team handball. The similar situation is in basketball. Because of this, coaches are advised to avoid using exercises lasting 730 seconds in their physical fitness programs, but instead to focus on short and intense activity and tests such as vertical jump, agility T test, sprints over very short distances (5 or 10 m) (Delextrat & Cohen, 2008).

In team sports the importance of tall stature is commonly accepted as it is well known that body height influences positively all body segment lengths and, in turn, athletic performance (Alexander, 1976).

A lot of children are involved in organized team handball and basketball activity. Naturally, power abilities are also important in youth team handball and basketball. Children develop a variety of fundamental motor skills during the childhood. Strength and motor performance generally improve with age during middle childhood and adolescence (Malina, Bouchard & Bar-Or, 2004). Running speed and jumping abilities improves from 5 to 18 years of age in boys, and data suggest an adolescent acceleration after 13 years of age. Agility performance improves between 5 and 8 years of age and then continues to improve at a somewhat lesser but more constant pace up to 18 years (Bompa, 2000).

The aims of this study were: a) to investigate some power and anthropometric characteristics of elite junior team handball and basketball players, b) to compare these characteristics of these two groups of young athletes, c) to check correlation between all variables for whole sample

## METHODS

### *Participants*

Participants were 20 team handball players (group 1), members of male junior national handball team of former F.R. Yugoslavia, and 16 basketball players (group 2), members of male junior basketball national team of former F.R. Yugoslavia. The mean age for handball players was 19.32 years ( $SD = .354$ ), and the mean age for basketball players was 18.40 years ( $SD = .314$ ).

### *Testing*

Testing was done after ending of clubs competition. So, all subjects were at the end of the regular season. *Stature (Height)* was measured with a stadiometer (Seca 220, UK), and *body mass (Weight)* was recorded using portable scale (Tanita BF683W,

GER). Variable *body mass index (BMI)* was derived from results of these two anthropometric measurements (weight divided by height squared).

Tests *20 m speed run (run 20m)* was done at the stadium. Time in seconds and hundreds of seconds was determined using an electronic timing system (OMEGA, Switzerland). The photocells were positioned over the start and finish lines at the athletes shoulder level. The subject had to start from a standing position placing his forward foot 70 cm before the first infrared photoelectric cell. The timing started as soon as the body of the player crossed the infrared beam of first photoelectric cell and ended when the player crossed the beam of the second photoelectric cell. Before testing, each subject performed submaximal or moderate sprints to familiarize himself with the test procedure. Tests standing jump and standing triple jump were done also at the stadium used classical athletic long jump measurement.

### *Data analysis*

The elementary descriptive parameters (means - AS, standard deviations -SD, maximum - Max. and minimum - Min.) were calculated. T-test was used for comparison between two groups of participant. Correlation between all variables was checked with the Pearson's correlation coefficient. Level of significance was set at  $p < 0.01$ . and  $p < 0.05$ . Statistical analysis was performed with SPSS 16 statistical program.

## RESULTS AND DISCUSSION

Table 1 shows descriptive parameters of all variables for both groups. Handball and basketball players were achieve greater results in standing long jump compare to ordinary population of same age (Malina, Bouhard, & Bar-Or 2004). There are no available studies which refer about results in standing long jump and standing triple jump of junior handball and basketball players. But, experiences from sport praxis told us that the results of varsity athletes are about 330cm in standing long jump, and 10m in standing triple jump. Compare with norms which gave (Chu, 1996), results in standing long jump of handball players are between 60 and 70% and basketball players between 50 and 60%. Standing long jump and, especially, standing triple jump request a lot of explosive power and coordination abilities. These jumps are not specific movements for both groups of players.

Results in run 20m of basketball players are very closer to norms (Stapff, 2000; Harley & Doust, 1997). Basketball players have almost identical height as Greek junior national players

Table 1. Descriptive parameters of all variables for both groups

Variable	Handball players (n=20)			Basketball players (n=16)		
	Mean±SD	Max.	Min.	Mean±SD	Max.	Min.
Standing long jump (cm)	257.60±14.0	283.00	233.00	246.5±14.4	277.00	225.00
Standing triple jump (cm)	775.5±53.2	864.00	655.00	739.2±38.4	802.00	680.00
Run 20m (s)	3.14±.150	3.38	2.90	3.13±.143	3.48	2.93
Weight (kg)	87.36±9.12	115.00	76.00	85.06±6.84	97.00	70.00
Height (cm)	191.02±6.52	202.00	182.00	199.06±6.12	208.00	187.00
BMI (%)	23.87±1.93	29.04	21.04	21.41±1.11	22.70	18.68

(Apostolidis, Nassis, Bolatoglou, & Geladas, 2004), but they have lower weight.

These results could be incorporated into a database against which talented junior handball and basketball players could be compared.

Table 2 shows results of T-test of differences between junior handball and basketball. There were found significant differences between handball and basketball players in variables: *standing long jump* (sig. = .027) and *standing triple jump* (.028). Handball players were made better results in both tests: *standing long jump* – 257.60cm vs. 246.5cm, *standing triple jump* – 775.5cm vs. 739.2cm. From the other side basketball players were significantly taller than handball players – 199.06cm vs. 191.02cm. That is expected because of that is well

Table 2. Differences between junior handball and basketball – T test

	t-test	Sig.	Mean difference
Standing long jump	2.39	.027	11.1
Standing triple jump	2.89	.028	36.3
Run 20m	.129	.898	.006
Weight	.836	.409	2.30
Height	-3.77	.001	2.75
BMI	4.52	.000	2.46

known that tall stature is the first criteria for selection in basketball, because basketball is activity of more than average tall people. Significant differences were not found in variables: *run 20m* and *weight*. Because of almost the same weights BMI of handball players was greater.

Correlations among all variables, for whole sample, are shown in table 3. Strong positive correlation between *standing long jump* and *standing triple jump* (.833) is expected. That means that these two actions belong to same abilities – explosive power.

There is, also, significant moderate correlation

between *run 20m* and jump variables and (-.501 with standing long jump and -.571 with standing triple jump). When the correlation coefficient is lower then 0.71 the common variance between the two tests is less then 50%. In this case the qualities measured can be said to be specific in nature (Thomas & Nelson, 1990). It is well know that run 20m is measurement of acceleration ability.

Weight and BMI are not in correlation with jump variables. Handball and basketball players were at the end of regular season and probably they had low percent of body fat. More accurate explanation and interpretation of these results request body composition testing.

For the other side height has a negative connection with results in all three power variables. This result is different from of few studies (Markovic & Jaric, 2004). It can be suppose that basketball players have a lower amount of muscle mass then handball players and probably they have some deficits in strength and power. Problems can be in coordination, bad technique in jumping tasks, especially according to great height of basketball players and relative complexion of tasks. It is well know that body dimensions have influence on manifestation of strength and power (Zatsiorsky, 1995). Technique of jumping of tall athletes asks a special attention, probably deeper biomechanics and kinematic researches. The aim of this investigation will be to create a specific model of jumping for tall athletes, which would help in practice.

## CONCLUSION

Team handball and basketball are characterized by a lot of accelerations, sprints, jumps and rapid changes in moving directions. Among a few factors (players abilities), which make influence on success in handball and basketball, power and anthropometric characteristics are very important. Elite junior handball and basketball players were achieved relative lower results in standing *long jump* and *standing triple jump* compare with norms

Table 3. Correlation among all variables for whole sample

	Standing long jump	Standing triple jump	Run 20m	Weight	Height	BMI
Standing long jump	1					
Standing triple jump	.833**	1				
Run 20m	-.501**	-.571**	1			
Weight	-.188	-.327	.545**	1		
Height	-.407*	-.371*	.424**	.449**	1	
BMI	.154	-.006	.212	.667**	-.361*	1

\*\*Correlation is significant at the 0.01 level

\* Correlation is significant at the 0.05 level

of world class athletes. In test *run 20m* basketball players were achieved similar results compare with world class junior basketball players. These results could be incorporated into a database because of comparison for others talented junior handball and basketball players.

Elite junior handball players were exposed significant better results in *standing long jump* and *standing triple jump* than basketball players. Basketball players were significantly taller than handball players and there was no difference in variables: *run 20m* and *weight*. Basketball players probably have some deficits in muscle mass and strength/power. For future similar investigation is necessary to make body composition testing and other strength/power tests.

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## АНТРОПОМЕТРИСКИТЕ КАРАКТЕРИСТИКИ И МОТОРНАТА СПОСОБНОСТ - СНАГА КАЈ ЕЛИТНИТЕ РАКОМЕТАРИ И КОШАРКАРИ ОД ЈУНИОРСКАТА ВОЗРАСТ

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(Оригинален научен труд)

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### Апстракт:

Целта на истражувањето беше: а) да се утврди состојбата на одделни антропометриски карактеристики и моторната способност – снага кај елитните ракометари и кошаркари од јуниорската возраст, б) да се споредат ракометариите и кошаркариите во наведените карактеристики и моторната способност, в) да се утврди корелацијата меѓу сите варијабли за примерокој на испитаниците. Примерокој на испитаниците го сочинуваа 20 ракометари на возраст од  $19,3 \pm 3,5$  години (група 1), и 16 кошаркари на возраст од  $18,40 \pm 3,1$  години (група 2). Сите испитаници беа членови на национални селекции. Применети се три моторни тестови: скок во далечина од место, проскок од место, и прчање на 20 метри. Исто така, се применети антропометриските мерки: телесна височина, телесна маса, а пресметан е и “боди мас индекс” (БМИ). Утврдена е значајна разлика меѓу ракометариите и кошаркариите во варијаблите: скок во далечина од место и проскок од место. Ракометариите постигнаа подобри резултати во скокој во далечина од место (257.6 см.) и во проскокој од место (775.5 см.), отколку кошаркариите, чии соодветни вредности беа 246.5 и 739.2. Кошаркариите беа значително повисоки (199.06 см.) од ракометариите (191,2 см.). Статистички значајни разлики не се утврдени во варијаблите: прчање на 20 метри и телесна маса. Затоа, како што беше и очекувано, ракометариите имаа и поголем “боди мас индекс” (БМИ). Телесната маса и телесната висина имаа негативно влијание врз резултатите на сите три варијабли за проценување на моторната способност – снага.

**Клучни зборови:** врвни спортисти, мерење, тестови, т-тест, корелација