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COMPARISONS OF THE BASIC MOTOR ABILITIES, ANTHROPOMETRIC CHARACTERISTICS AND SOMATOTYPE COMPONENTS, WITH BASKETBALL PLAYERS AND NON-ATHLETES

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Abstract

Through regular practice of the sport of basketball, over a longer period, it affects the optimal development of athletes, improves the psychosomatic condition, and affects the anthropometric and motor dimensions of athletes. The purpose of our study is to compare the basic motor skills, anthropometric characteristics, and components of Somatotype in basketball players and non-athletes 17-18 years old, which are at the end of the maturation phase. The research was conducted on 100 males' subjects 17-18 years, basketball players (B = 50) and non-athletes (N = 50). The pattern of the anthropometric measures is defined by ISAK (International Society for the Advancement of Kinanthropmetry), except variables: body mass index (BMI), body fat percentage (BF %) and lean body mass (ALBM), which is calculated according to the methodology During Womersley. For determining the differences between the two groups of respondents is applied T-test for independent samples, while for the establishment of the somatotype is used a method by Heath-Carter with 10 anthropometric measurements.
Based on the obtained results of measurements from both groups respondents, was proved that: comparisons of the results in the motor and functional space of basketball players and non-athletes aged 17-18 years old, where we can reach conclusions from a total of 9 variables of motor space and functional, statistically significant differences result in 6 variables. In anthropometric measures we find statistically significant differences in 6 variables, in 11 no such difference was found. In the classifications of somatotype components, we can see that only in the mesomorphic component they have statistically significant differences, while in the endomorphic and ectomorphic component those differences do not exist. Based on our study, in the group of basketball players the somatotype component is the central type with the values 3.57-4.07-3.17 and the group of non-athletes represent the mesomorphic endomorphic component with the values 3.47- 4.96-2.67 to which they belong.

Keywords: Motor abilities, anthropometric characteristics, somatotype, basketball, non-athletes

1. Introduction

By analyzing physical education in schools, which is inadequately represented by the number of lessons in the school curriculum, the teaching approach is realized with a low-energy component, which is a major problem in the implementation of program tasks (Višnjić, 2006). For this reason, there is an increase in the number of children involved in the training process in sport clubs or sections of physical education in schools (Sallis, et al., 1997). Human growth is under the control of genetic and environmental influences. There is a significant difference between populations in height and weight, which is a result of genetic diversity, exposure to many different environmental factors and changes in socio-economic status as well as the profile of the respective sport. (Kułaga, et al., 2011). Every sport and sport discipline possesses certain specificity, but with this there is an expressed need for continuous research and in practice by checking the specificities of certain sports, including primarily the genetic conditionality of the individual anthropological abilities and characteristics, then their hierarchical value in sports, as well as their structure and development under the influence of certain training means, methods and loads (Kostovski, Đukanović, Kostovska-Petkovska, & Saiti, 2017).

Basketball is a team sport, there are several individual skills you can improve by practicing alone. Passing, shooting, and dribbling are some of the skills you can practice anytime. The key to getting the most out of your individual workout is to push yourself and move as quickly as you would during a game (Waldo, 2018). A basketball team uses five players on the court at different positions, allowing athletes of various body shapes and skill sets to work together as one team. However, while no two players are exactly alike in size, shape or skill level, players can always improve their on-court performance by developing key physical abilities (Reiner, 2011). Performance in basketball depends on many factors, with the most important one being players' somatic build, as well as technical, tactical, motor, physiological, and psychological preparation. A basketball coach must supervise balanced development of players, i.e., physique, visual and motor coordination improvement, and development of necessary motor abilities, considering evolutionary processes connected with the pace of growth and maturation of players (Gryko, Kopiczko, Mikołajec, Stasny, & Musalek, 2018). In basketball, an individualized approach and diagnosis of basic motor skills, anthropometric characteristics and somatotype components are key elements of the selection process and the development of a long-term sports career (Hůlka, Lehnert, & Bělka, 2017).
Through regular practice of the sport of basketball, over a longer period, it affects the optimal development of athletes, improves the psychosomatic condition, and affects the anthropometric and motor dimensions of athletes (Milovan, Danilo, Dragan, Aldijana, & Nina, 2020). Hence the purpose of our study is to compare the basic motor skills, anthropometric characteristics, and components of Somatotype in basketball players and non-athletes aged 17-18, which are at the end of the maturation phase.

2. Methods

The research was conducted on 100 male subjects 17-18 years + 6-month, 50 basketball players and 50 non-athletes. In this research we applied 26 variable, 17 anthropometric and 9 motor variables, of which 13 variables were measured by-ISAK (International Society for the Advancement of Kinanthropometry), body height (AVT), body mass (AMT), triceps skinfold (AKNT), biceps skinfold (AKNB), abdomen skinfold (AKNA), supraspinal skinfold (AKNS), subscapular skinfold (AKNG), femur skinfold (AKNN), calf skinfold (AKNP), upper arm girth (AON), calf girth (AOP), breadth of the humerus (ADL), breadth of the femur (ADK), except the variables: body mass index (BMI), body fat percentage (BF%) and lean body mass (ALBM), which were calculated according to the methodology of During Womersley, while the variable Height-Weight ratio calculation (HWR) derives from the software program somatotype 1.2., while the evaluation of the somatotypes was done according to the methodology by Heath-Carter with 10 anthropometric measurements. Variables for evaluation basic motor skill are defined by battery of Euro FIT testing: Flamingo balance test (MFT), Plate tapping (MTR), Sit and reach (MDPS), Standing broad jump (MSDM), Hand grip (MDSH), Sit-ups (MPTL), Bent arm hang (MVZN), Shuttle run: 10 x 5 m (MSHR10x5) and Endurance shuttle run test (MFBT20m). For the data processing we used the software program SPSS20 for Windows. To determine the significant differences between arithmetic averages of each group, we used a student t-test, while the determination of somatotypes and their difference was made by the software program somatotype1.2. This procedure determines somatotypes for each subject individually, according to the methodology of Heath-Carter.

3. Results and discussion

Table 1. T-test in basic motor abilities between basketball players and non-athletes

Variable	Basketball (N=50)		Non-athletes(N=50)				
	Mean	S. D.	Mean	S. D.	F	t	p
MFT	14.36	6.22	16.02	6.92	1,56	-1,26	0,21
MTR	11.53	1.19	11.85	2.03	15,53	-0,96	0,34
MDPS	29.06	8.96	28.05	8.06	1,01	0,59	0,55
MSDM	210.48	19.4	185.64	26.64	8,01	5,33	0,00
MDSH	35.34	5.46	32.68	7.23	6,45	2,08	0,04
MPTL	23.66	3.72	20.94	3.41	0,02	3,81	0,00
MVZN	31.63	19.29	23.83	19.54	1,28	2,01	0,05
MSHR10x5	20.04	1.21	21.95	2.22	24,56	-5,35	0,00
MFBT20M	38.93	4.07	35.49	5.74	9,52	3,46	0,00

Legend: MFT – flamingo test; MTR- Plate tapping; MDPS- Sit and reach; MSDM - Standing broad jump, MDSH – Hand grip, MPTL- Sit-ups, MVZN - Bent arm hang, MSHR10x5 – shuttle run 10x5 meters; MFBT20M – beep test endurance shuttle run; M - The arithmetic mean; SD - Standard deviation; F - F test; t – t test; p - Probability.

Analyzing Table 1 in which they are presented through t-test we made comparisons of the results in the motor and functional space of basketball players and non-athletes aged 17-18 years old. From there we can reach conclusions that from a total of 9 variables of motor space and functional, statistically significant differences result in 6 variables: MSDM - Standing broad jump, p= 0,00; MDSH – Hand grip, p=0,04; MPTL- Sit-ups p= 0,00; MVZN - Bent arm hang p= 0,05; MSHR10x5 – shuttle run 10x5 meters p= 0,00; MFBT20M – beep test endurance shuttle run 20m p= 0,00. While in the 3 variables MFT – flamingo test; MTR- Plate tapping; MDPS- Sit and reach; no statistically significant differences were presented. This shows us that throughout the motor and functional space in the study subjects between basketball players and non-athletes, the statistically significant differences in the presented variables result in better values in the basketball subjects.

Table 2. T-test in anthropometric characteristics between basketball players and non-athletes

Variable	Basketball (N=50)		Non-athletes(N=50)				
	Mean	S. D.	Mean	S. D.	F	t	p
AVT	184.46	6.96	173.77	6.94	0,27	7,69	0,00
AMT	78.42	13.55	68.5	10.92	1,77	4,03	0,00
BMI	22.99	3.45	22.54	2.96	1,00	0,70	0,49
BF%	16.66	5.77	16.19	6.02	0,02	0,39	0,70
ALBM	64.69	7.79	56.75	6.91	0,85	5,39	0,00
AKNT	13.56	7.09	12.9	6.37	0,76	0,49	0,63
AKNB	6.3	3.64	5.78	2.89	0,81	0,79	0,43
AKNA	16.26	10.09	15.72	7.9	2,47	0,30	0,77
AKNG	11.7	6.41	11.36	4.84	0,55	0,30	0,77
AKNS	14.58	9.9	11.78	6.57	6,90	1,67	0,10
AKNN	14.84	6.09	15.3	6.79	0,65	-0,36	0,72

AKNP	15.2	7.94	11.8	5.85	4,06	2,44	0,02
AON	28.52	3.69	27.1	3.08	2,76	2,09	0,04
AOP	38.08	3.53	36.09	2.9	1,35	3,08	0,00
ADL	7.6	0.62	7.73	0.85	2,54	-0,86	0,39
ADK	10.35	0.79	10.18	0.78	0,01	1,11	0,27
HWR	43.31	2.07	42.65	1.82	0,62	1,70	0,09

Legend: AVT - Body height; AMT - Body mass; AKNT - Triceps skinfold AKNB - Biceps skinfold; AKNA - Abdomen skinfold ; AKNS - Supraspinal skinfold; AKNG - Subscapular skinfold AKNN - Femur skinfold; AKNP - Calf skinfold ; AON - Upper arm girth ; AOP - Calf girth ; ADL - Breadth of the humerus ; ADK - Breadth of the femur ; BMI - Body mass index; BF% - Body fat percentage ; ALBM - Lean body mass ; HWR - Height-weight ratio ; M - The arithmetic mean ; SD - Standard deviation ; F - F test ; t – t test; p – Probability.

According to the presented results in Table 2, which refer to the anthropometric measures of basketball players and students aged 17-18, we can see that out of a total of 17 applied anthropometric variables, in 6 statistically significant differences were found, in 11 no such difference was found. Statistically significant differences were found in the variables AVT, AMT, ALBM, AOP, at the level of Sig. = 0.00, AKNP at the level of Sig. = 0.02 and AON at the level of Sig. = 0.04. All the differences indicate that taller and heavier basketball players also have higher values of upper arm and lower leg circumference compared to non-athletes.

Table 3. T-test in somatotype components between basketball players and non-athletes

Variable	Basketball (N=50)		Non-athletes (N=50)				
	Mean	S. D.	Mean	S. D.	**F**	**t**	**p**
ENDO	3.57	1.79	3.47	1.5	0,66	0,29	0,78
MESO	4.07	1.65	4.96	1.58	0,16	-2,74	0,01
ECTO	3.17	1.42	2.67	1.25	0,57	1,86	0,07

Legend: ENDO – Endomorph; MESO - Mesomorph; ECTO - Ectomorph; M - The arithmetic mean; SD - Standard deviation; F - F test; t – t test; p - Probability.

To better reflect the differences, we are presenting the distribution of somatotype components through the somatochart below, figure 1.

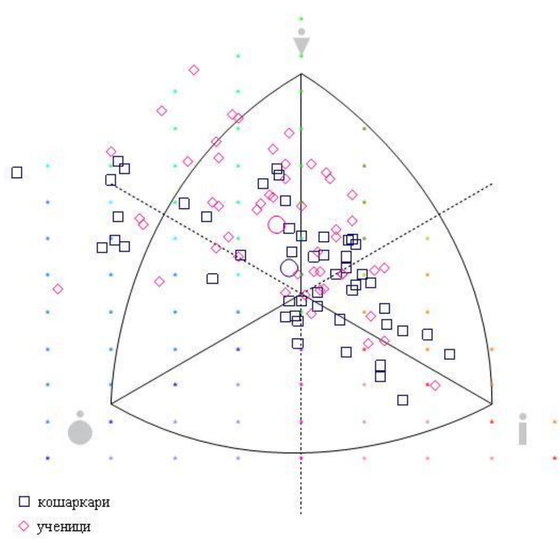

Fig 1. Distribution of the somatotype categories in basketball players and non-athletes

According to the results presented in Table 3 which refer to the components of somatotype in basketball players and non-athletes 17-18 age old, we can see that only in the mesomorph component they have statistically significant differences, while in the endomorphic and ectomorph component those differences do not exist. This indicates that in non-athletes the mesomorph component is more pronounced.
To make it clearer, following somatoplot (Figure 1) which shows the distribution of the somatotype of the somatochart among the respondents, basketball players and non-athletes, we can observe that in both groups the mesomorph component is dominant. Basketball players present the group of components of mesomorph balanced somatotypes with average values of 3.57-4.07-3.17.
While in non-athletes is presented the group of components of endomorphic mesomorph somatotypes with values 3.47- 4.96-2.67.

4. Conclusion

Based on the data of the research so far, the working methodology, the results, and the discussions in our study, we can reach the conclusions that: out of a total of 9 variables of motor and functional space, statistically significant differences result in 6 variables, in anthropometric measurements we find statistically significant differences in 6 variables, in 11 no such difference was found. In the classifications of somatotype components, we can see that only in the mesomorph component they have statistically significant differences, while in the endomorphic and ectomorph component those differences do not exist. Based on our study, in the group of basketball players the somatotype component is the central type with values 3.57-4.07-3.17 and the group of non-athletes represents the mesomorph endomorphic component with values 3.47- 4.96-2.67.
In general, we find that basketball players, in the motor and functional space, generally come out with better results than non-athletes, and this leads us to recommend starting the most massive organization of sports teams and possibly participation in competitions, as is the school sport in our country, so that the organization is carried out at even more professional levels than before.
Analyzing the parameters of anthropometric characteristics, components of somatotypes and body composition, we see that in the variables of body height, diameter and perimeter, the best results are presented to basketball players, which given the characteristics of the sport which has its specifics compared to non-athletes, were expected.
Meanwhile adipose tissue parameters present higher values in basketball players compared to non-athletes. This result was not expected, but seeing the situation on the ground, the non-athlete subjects taken in the study, come from rural areas. Their routine is full of daily physical activities, but also their social status justifies the results of adipose tissue. For the same reasons, the presence of the mesomorph component in the group of non-athletes is higher than in basketball players.

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