COMPARATIVE ANALYSIS OF THE PHYSICAL DEVELOPMENT AND SPECIFIC EFFICIENCY OF STUDENTS-BASKETBALL PLAYERS FROM TURKEY

Ilkay Yazarer, Mariana Borukova, Asya Tsarova

Key words: students, dispersion analysis, basketball, university sports

Introduction

The universities in the Republic of Turkey which provide physical education and sport usually contribute to the development of the sport and public health in the country. In order to prepare specialists in this sphere the young students are given academic and pedagogical information so that they can gain the necessary skills (Yazarer, I., 2016).

The improvement of the education-training process of the groups of students from the different sports disciplines is closely related to the study of the peculiarities of the various motor activities. It is necessary that research be done constantly and the major factors and trends of this development be revealed, which is an objective premise for deeper understanding of the phenomenon and aims at improving young people's preparation and increasing the effectiveness of the training (Tzarova, A., L. Petrov, 2011).

At the universities, both in the Republic of Bulgaria and the Republic of Turkey, the sports disciplines (basketball in particular) are an excellent way of influencing students' physical development and physical capacity (Kasabova, L., A. Dimitrov, (2003), Kostov, K., Z. Zlatov, (2005), Nikolov, R., S. Tzankova, (2004), Tzarova, A. (2012), Yazarer, I. (2016).

Basketball is one of the most preferred sports among students and this makes it an object of a number of studies.

Abbas Bakurdju (2012) finds out that the plyometric exercises are efficient when applied in the development of the dynamic strength of the lower limbs in the weekly training program. They are considered to be efficient also in determining the intensity of the maximal load.

Fatih Okur et al. (2013) survey the relation be-

tween high jump and the teams' ranking. He determines that the winner's results from the high jump are higher than those of the other teams. The measurements of the last team in the ranking are lower in comparison with those of the other teams. The individual analysis of the players shows that basketball players who can jump higher do this on the basketball court as well.

In their research Sibel Tetik et al. (2012) want to establish whether the values of the anaerobic strength influence the amateur teams' ranking in the league.

Aliye Manevesh (2012) studies the anaerobic strength of basketball players depending on their position on the court – point guards, centers and forwards. The research was done among basketball players from university teams with over 5 years of experience. The anaerobic strength was evaluated through the participants' high jump measurements. The results show that there is a difference in the values of the high jump and anaerobic strength among point guards, shooting guards and centers.

Hamsa Kyuchuk et al. (2012) make a comparison of the physical capacity of the basketball players again in relation to their position in play. The aim of the research is to compare the bio-motor qualities of athletes and their position in play.

A comparison of physiological and anthropometrical values of university basketball and football teams was made by Shirzat Chogalil et al. (2002). The results from the measurements show that the values of the body fat in the region of scapula, chest, midaxilla and abdomen of basketball players are higher than those of the football players (respectively $p < 0.01$, $p < 0.001$, $p < 0.05$, $p < 0.001$). Besides, the strength of the lower limbs of football players is greater than that of basketball players ($p < 0.05$).

Revealing the peculiarities of the physical development and sports preparation among students who practice basketball at the universities in the Republic of Turkey will help the improvement of the education process in physical education and sport. The results from the comparison allow for drawing conclusions about the degree of influence of a certain factor (expressed on a nominal or ordinal scale) – in this case this is each group, on the researched indexes.

Methodology of the study

The aim of the research is to reveal the peculiarities of the physical development, physical preparation and the specific technical-tactical training of the students who practice basketball.

Subject of the research is the physical development and specific efficiency of the students-basketball players from the universities of the Republic of Turkey.

Object of the research is the symptoms of physical development, special physical and specific technical-tactical preparation of the students from the universities in Turkey who practice basketball.

The research was done among 69 students from 5 Turkish universities where basketball is practiced.

In order to fulfill the aim and the tasks of the research, we applied the following methods: *comprehensive study and theoretical analysis of the specialized literature, anthropometrics, and sports-pedagogical testing*.

The tests used were separated in 3 groups:

- for physical development – 9 indexes;
- for special physical preparation – 7 indexes;
- for specific technical-tactical training – 8 indexes.

To do the research we used the following **statistical methods**: *variation analysis, single-factor dispersion analysis and index method*.

It is known that due to the representativeness of the samples, the decisions taken when verifying the statistical hypotheses are of probable character [2]. The acceptance or rejection of the zero hypotheses is made at a certain level of security; at the same time, a statistical error is admissible.

After the applied variation analysis there are no deviations from the normal distribution of all indexes, as regards both asymmetry (As) and excess (Ex).

In order to check the zero hypotheses about the significance of the observed differences between the mean levels of the researched indexes in the different samples (student basketball teams from different universities in the Republic of Turkey), we applied single-factor dispersion analysis. We calculated the F-criterion of Fisher at high level of statistical reliability ($P \geq 95\%$). The results from the comparison allow for making conclusions about the degree of influence of a certain factor (expressed on a nominal or ordinal scale) – in this case this is each group, on the researched indexes.

The first step when using the single-factor dispersion analysis is connected with determining the number and character of the so called inner-group and inter-group dispersions along each index at the same degree of freedom, respectively $\kappa_1 = m - 1$ (where m is the number of researched samples) and $\kappa_2 = n - m$, on which base we calculated the values of F- criterion of Fisher and the corresponding levels of significance α and $P_{(F)}$.

The dispersion criteria, which we obtained when we compared the researched indexes, are shown in **Table 1**.

The analysis of the results shows that the calculated values for F-criterion of Fisher (F_{emp}) are higher than the critical value with most of the indexes ($F_{tabl} = 2.52$). This enables us to reject with high guarantee probability the zero hypotheses for these indexes and to accept the alternative hypotheses according to which the observed differences between the mean values of the researched indexes of the different teams are significant. This fact is confirmed by the level of significance α , which is below 0.05.

Table 1.

Dispersion criteria ($F_{tabl} = 2,52$)

Nº	Indexes	$F_{(emp)}$	Sig.	$P_{(F)}$
1.	Height	2,314	0,067	93,00
2.	Weight	3,171	0,019	98,00
3.	BMI (body mass index)	2,692	0,039	96,00
4.	Horizontal stretch	2,193	0,08	92,00
5.	Length of upper limb	22,621	0	100,00
6.	Length of lower limb	7,309	0	100,00
7.	Length of palm	4,762	0,002	100,00
8.	Length of foot	4,456	0,003	100,00
9.	Breathing difference	2,663	0,04	96,00
10.	Sprint 20 m	3,056	0,023	97,70
11.	Running between stands	10,066	0	100,00
12.	Vertical jump off	1,842	0,132	86,80
13.	Triple jump	2,524	0,049	95,10
14.	Throwing compact ball – backwards	2,824	0,032	96,80
15.	Sit-ups	3,974	0,006	99,40
16.	Shuttle running	2,016	0,103	89,70

17.	Eights with dribble	5,033	0,001	99,99
18.	Dribbling between hurdles	5,562	0,001	99,00
19.	Index of dribbling	1,931	0,116	88,40
20.	Moving in defence	5,398	0,001	99,00
21.	Shooting in motion – t	0,377	0,824	27,60
22.	Shooting in motion – coefficient	0,602	0,663	34,00
23.	Shooting from pass – % successful	3,217	0,018	99,20
24.	Free throws – % successful	12,842	0	100

As seen in *Table 1*, seven of the indexes here are an exception. The values of F range between 0.377 (in index 21 – shooting in motion – t) and 2.314 (in index 1 – height). And α is between 0.824 and 0.067.

This enables us to accept with high guarantee probability ($P_F \leq 95\%$) the zero hypotheses according to which the differences between the mean values of these indexes are not statistically significant and can be explained with fortuitous reasons. Therefore, there are no essential differences between the researched teams as regards:

- ✓ players' height;
- ✓ horizontal stretch;
- ✓ speed endurance;
- ✓ dribbling at high speed;
- ✓ explosive power of the lower limbs in vertical muscle strain;
- ✓ speed shooting in motion – speed and effectiveness.

There are statistically reliable differences between the groups' mean levels along all the other indexes.

In order to determine the exact differences between the different samples, we applied the second step of the dispersion analysis which is related to the calculation of the so called Tukey's Honestly Significant Difference. This allows us to compare each single pair of samples. The number of the possible combinations for every index is calculated with the formula: $A = n(n-1) / 2$. The number of the compared samples is 5; therefore the possible combinations here are 10.

The results from the comparison of the indexes, for which the alternative hypothesis is the valid one, are presented in special matrixes, where the rejection of the zero hypotheses is marked with a star (*).

As an illustration, in the group of the morph-functional indexes in table 2 and table 3, we present the existing differences between the mean values of indexes 5 and 6 (length of upper limb and length of lower limb) of the university teams.

Table 2.

Significant differences in the mean levels – length upper limb (index 5)

university	Amasya	Ataturk	Erciyes	Gaziosmanpasha	Gaziantep
1. Amasya	=====		*	*	*
2. Ataturk	*	=====	*	*	*
3. Erciyes	*	*	=====		
4. Gaziosmanpasha	*	*		=====	
5. Gaziantep	*	*			=====

Table 3.

Significant differences in the mean levels – length lower limb (index 6)

University	Amasya	Ataturk	Erciyes	Gaziosmanpasha	Gaziantep
1. Amasya	=====		*	*	*
2. Ataturk		=====			*
3. Erciyes	*		=====		
4. Gaziosmanpasha	*			=====	
5. Gaziantep	*	*			=====

As an illustration, in the group of indexes of special physical preparation in table 4, we present index 11 (running between hurdles) where there is statistically reliable difference between the university teams.

Таблица 4.

Significant differences in the mean levels – running between stands (index 11)

University	Amasya	Ataturk	Erciyes	Gaziosmanpasha	Gaziantep
1. Amasya	=====	*			*
2. Ataturk	*	=====	*	*	
3. Erciyes		*	=====		*
4. Gaziosmanpasha		*		=====	*
5. Gaziantep	*		*	*	=====

This index provides information about the students' abilities to move down the court fast without a ball. The analysis shows that the universities of Ataturk and Gaziantep significantly surpass the other universities as regards the level of development of this physical quality, but between the two of them there is no reliable difference in the achievements.

The analysis of the results shows that the greatest number of statistically significant differences is observed with the indexes connected with the technical-tactical training.

In *table 5* we illustrate the differences in the achievements along index 17 (eights with dribble).

Table 5.

Significant differences in the mean levels – eights with dribble (index 17)

University	Amasya	Ataturk	Erciyes	Gaziosmanpasha	Gaziantep
1. Amasya	=====				
2. Ataturk		=====	*	*	*
3. Erciyes		*	=====		
4. Gaziosmanpasha		*		=====	
5. Gaziantep		*			=====

The results show that the students from Ataturk significantly surpass all the others as regards their dribbling skills in one spot. There are no statistically significant differences among the other universities.

Conclusions

The analysis of the results and the inferences made in the text allow us to draw the following **conclusions**:

1. There are no exact differences between the mean values of the researched university teams in the Republic of Turkey as regards both physical development and special physical and specific technical-tactical training of the basketball players:

- the students from “Gaziosmanpasha” have the highest level of development of their speed abilities;
- the competitors from “Amasya” have high level of speed when moving down the court without a ball, combined with a constant change in the direction of the movement;
- the boys from “Ataturk” have the highest level of development of the explosive power of lower limbs in vertical muscle strain;
- as regards the level of development of the explosive power of lower limbs in horizontal muscle strain, the differences are in favor of the teams of “Gaziosmanpasha” and “Erciyes”;
- the boys from the teams of “Erciyes” and “Gaziosmanpasha” have the highest level of development of the explosive power of

upper limbs in muscle strain backwards and upwards;

- among the last ones, as regards the level of development of the core muscles, we should include the team of “Gaziantep”.

2. There are no exact differences between the researched teams as regards:

- ✓ players' height;
- ✓ students' horizontal stretch;
- ✓ speed endurance;
- ✓ dribble with high speed;
- ✓ explosive power of lower limbs in vertical muscle strain;
- ✓ speed shooting in motion – speed and effectiveness.

Recommendations:

1. The efforts, aimed at increasing the functional capacity of the chest, will influence positively the whole process of sports preparation and will lead to a training-process of higher quality.
2. In the future, special attention should be paid to the preparation of those players who have problems with their dribbling down the court with high speed. In addition, the individual approach should be applied when working for the development of this skill.

Literature

Kasabova, L., A. Dimitrov, (2003). Изменения в някои основни показатели на физическата дееспособност

при студенти, прекъснали редовни занимания по ФВС, "Физическото възпитание и спорта в образователната система", НК – Благоевград/ Changes in some major indexes of physical capacity among students who have dropped their P.E. classes, NK – Blagoevgrad

Kostov, K., Z. Zlatev, (2005). Физическото възпитание във висшите училища – реалност и възможност, С&Н, С., Изв.брой 1./Physical education at universities – reality and possibility, S&N., S. Extra Issue 1.

Mavrudieva, N., Y. Yangos, P. Mavrudiev, (2011). Физическо развитие и дееспособност на студенти от Република Кипър, Кинезиология`2011, Ай анд Би, В. Т. 233–239 /Physical development and capacity of students from the Republic of Cyprus, Kineziology 2011. I&B, p.233–239.

Nikolov, R., S. Zankova, (2004). Анализ на основните антропометрични показатели на студентите, участващи в заниманията по баскетбол от СА "Д.А. Ценов" – гр. Свищов, С&Н, Изв. брой 2, стр.45–51/Analysis of the main anthropological indexes of the students practicing basketball at University of Svishtov, S&N, extra issue 2, p. 45–51.

Tzarova, A., K. Vasileva.(2006). Оценка на физическото развитие и специфичната работоспособност на отбора по баскетбол на Техническият университет – София, участник в Националната студентска група, С&Н, С., Изв. брой 3стр.108–115/Evaluation of the physical development and specific efficiency of the Technical University basketball team in Sofia, participant in the national students group, S&N, S. extra issue 3, p.108–115.

Tzarova, A. (2012). Влияние на различни видове двигателна активност върху физическата дееспособност на студенти, Дисертационен труд, Велико Търново/Impact of different kinds of physical activities on the physical capacity of the students. Dissertation, Veliko Turnovo.

Tzarova, A., L. Petrov, (2011). Промени във физическото развитие и дееспособност на студенти от ТУ-София, под влияние на специфичните тренировъчни въздействия със средствата на баскетбола, С&Н, С., Изв. брой 2, стр. 186–195/ Changes in the physical development and efficiency of students from the Technical university in Sofia, influenced by specific training with the means of basketball, S&N, S. extra Issue 2, p.186–195.

Bakurdjur, A., Kulunch, F. (2012) Impact of the applied combined trainings during the preparatory period on the achievements of the university basketball team. Journal for research in sport and sports achievements.

Chogalil, Sh., Kischal, F, Bash, M. (2002). Üniversite basketbol ve futbol takımlarının fizyolojik ve antropometrik değerlerinin karşılaştırılması. Spor ve spor araştırmaları dergisi, pages 22–25/ Comparison of physiological and anthropometric values of university basketball and soccer teams. Journal of sports and sports research, pages 22–25.

Kyuchuk, H., Doğan, E., Tashkemtepigil, M. Yalchan (2012). Basketbol oyuncularının başarılarıyla ilgili fiziksel uygunluğun, oynadığı yere göre karşılaştırılması. Spor ve spor araştırmaları dergisi- pages 65–71/ Comparison of physical fitness of basketball players according to their achievements. Sports and Sports Research Journal – pages65–71

Menevesh, A. (2012). Anaerobik gücün oyunun konumuna göre karşılaştırılması. Spor ve spor araştırmaları dergisi, pages 33–37 Comparing anaerobic power according to game position. Journal for research in sport and sports achievements, pages 33–37

Okur, F., Thetic, S., Koch, H., (2013). Basketbolcularda yarış sırasında yüksek atlama ve performans arasındaki bağlantıyı keşfetmek. Spor ve spor araştırmaları dergisi/ Survey of the connection between high jump and competitive performance of basketball players. Journal for research in sport and sports achievements, pages 111–12.

Yazarer, I. (2016). Особености на физическото развитие на студенти-баскетболисти от Република Турция, С &Н бр.5/6 стр. 221–232, С. /Peculiarities of the physical development of students-basketball players from the Republic of Turkey, S&N, issue 5, Sofia, p. 221–232.

Yazarer, I. (2016). Система за контрол на физическото развитие и специфичната работоспособност на студенти-баскетболисти от Република Турция, Дисертационен труд, София/System of control of the physical development and specific efficiency of students-basketball players from the Republic of Turkey, Dissertation, Sofia

Correspondence address:

Chief ass. Mariana Borukova, doctor – NSA

"Basketball, volleyball, handball" dept.

marianaborukova@gmail.bg

1700 Sofia, Studentski grad (Students' city)