

## **FEATURES OF REALIZATION OF THE SYSTEM OF PREPARATION OF BASKETBALL-PLAYER OF HIGH GUALIFICATION**

*Koryahin Viktor*

*National University “Lviv polytechnic”, Lviv*

**Annotation.** The work presents the study results of the technical and physical preparation level of highly qualified basketball players, as well as the level of development of their aerobic and anaerobic functions, taking into account play functions. According to the study results, the need was found out to increase the efficiency of the high-level players’ training system, as well as the fact that, despite positive changes, the training system used in basketball does not fully ensure any sufficient impact upon the energy functions of highly qualified basketball players.

**Keywords:** physical and technical functional training of highly qualified basketball players.

**Introduction.** The choice of the effective system of training highly qualified basketball players is very complicated, if it is not known, on the one hand, which requirements are put forward to the athletes by the play itself, and on the other hand, what level of their technical, physical and other types of preparation is and how it is implemented during the play [6, 9]. The most acute issue is the definition of requirements for technical, and especially physical and functional fitness of sportsmen in sports games [4]. The absence of a clear relationship between the indicators of technique, motor activity and functional changes in the body of sportsmen of these kinds of sports do not allow to fully proceed from the results of sports performances.

**Connection of work with scientific plans.** Research was conducted in obedience to the thematic plan of department of physical education of the National university Lviv polytechnic.

**The purpose of the work:** to study the technical and physical preparation of highly qualified basketball players, as well as to determine the level of development of their aerobic and anaerobic functions.

Task of research: 1. On the basis of analysis scientifically-methodical literature to investigate the state of question that is studied. 2. To define the level of technical and physical preparation basketball-players of high qualification, and also level of development of them aerobic and anaerobic functions.

**Material & methods.** 69 sportsmen took part in the experiment designed to determine the level of technical and physical preparation of the basketball players. All of them were honoured masters of sports and masters of sports of the international class. The examination program included 9 special tests [5, 6].

When conducting laboratory examinations on a cycloergometer, for the purpose of determining the level of aerobic and anaerobic possibilities of basketball players, measurements of the size of pulmonary ventilation, the level of oxygen consumption and the allocation of carbon dioxide, and the frequency of cardiac contractions (cardiology) were carried out. 74 honoured masters of sports and masters of sports of international class took part in this experiment.

**Results and discussion.** The study results of the physical preparation of the highly qualified basketball players are given in table 1. As it is seen, the running time of the 6-m running in the basketball players performing central functions is  $1.30 \pm 0.041$  s, which is lower than in the forwards ( $1.36 \pm 0.035$  s) and defenders ( $1.23 \pm 0.031$  s). But it should be borne in mind that the difference is only between the indicators of the centre players and defenders ( $p > 0,99$ ). This indicates that the starting speed of the defenders is better than the starting speed of the central players.

If one analyzes the data of the 20-meter running at 20, then it turns out that the forwards and the centre players are inferior to the defenders with a high level of reliability difference between the indicators. The maximum speed at the distance in the centre players is lower than that of the forwards and defenders. The increase in speed at the run from 6 to 20 cm in the centre players is  $1.5 \pm 0.104$  m/s, and it is  $1.7 \pm 0.124$  m/s in defenders ( $p > 0.98$ ). Thus, we see that tall basketball players,

especially those, who perform the functions of central players, are inferior to the defenders both in the initial acceleration and in the possibility of developing the maximum speed at the distance and in the results of 20-meter running.

However, it should be noted that in quite a number of indicators that characterize speed qualities of basketball players (35% of the total number), the difference is absent or insufficient. This suggests significant positive changes in the training system of speed qualities in highly qualified basketball players. The high jumping analysis revealed a low level of development of this quality in the highly qualified basketball player. The results of the jump height in the basketball players of different play functions, as evidenced by the results of the studies, are different. The defenders' jump height is  $57.7 \pm 2.71$  cm, which, on average, is by 8.2 cm higher than in the centre players and by 5.3 cm higher than in the forwards ( $p > 0.999$ ) and ( $p > 0.98$ ), respectively.

Table 1

**Results of the studies of physical preparation in highly qualified basketball players**

Indicators	Players' functions			Difference certainty
	Centre players (C)	Forwards (F)	Defenders (D)	
1. 20-metres running - 6-metres running time (s)	(n=15) 1.30±0.041 0.074	(n=17) 1.26±0.035 0.069	(n=20) 1.23±0.031 0.066	C-F < 0.95 C-D < 0.95 F-D < 0.95
- 20-metres running time (s)	3.30±0.082 0.149	3.13±0.049 0.097	3.04±0.027 0.074	C-F < 0.999 C-D < 0.999 F-D < 0.99
- maximum speed at a distance (m/s)	6.08±0.016 0.302	6.38±0.021 0.042	6.60±0.031 0.068	C-F < 0.999 C-D < 0.999 F-D < 0.99
- increase in speed from 6 to 20 m (m/s)	1.50±0.104 0.190	1.61±0.100 0.095	1.70±0.124 0.267	C-F < 0.95 C-D < 0.98 F-D < 0.95

Table 1 (continued)

Jump height: - height standing on tiptoes with the hand above the head (cm)	(n=27) 279.6±2.4 6.1	(n=15) 271.0±3.49 6.33	(n=27) 256.9±3.42 5.85	C-F < 0.999 C-D < 0.999 F-D < 0.999
- Absolute jump height (cm)	328.1±3.12 6.1	324.1±3.65 6.38	314.4±3.42 5.85	C-F < 0.95 C-D < 0.999 F-D < 0.98
2. Cooper test: Number of meters for 12 minutes of running	(n=17) 2845.3±91.4 178.9	(n=20) 3075.5±53.5 114.6	(n=21) 3087.9±71.5 157.5	C-F < 0.999 C-D < 0.999 F-D < 0.95
3. 3x40 m running after 1 min. rest: number of meters for 120 s of running	(n=12) 560.9±10.04 15.95	(n=15) 581.2±6.52 13.55	(n=21) 548.8±10.92 24.08	C-F < 0.99 C-D < 0.99 F-D < 0.95

The correlation analysis, carried out by us, between the height data and the jump height indicators in highly qualified basketball players showed that there is a rather high but negative dependence ( $t = -0.589$ ) between them.

The studies have shown that in terms of the development of general and special high-speed endurance in basketball players of high qualification, there are significant reserves, especially in the centre players. The average factor in the Cooper test in the centre players is  $2845.3 \pm 91.98$  meters; it makes up  $3075.5 \pm 53.55$  meters in the forwards, and it is  $3087.9 \pm 71.48$  meters in defenders ( $p > 0.900$  among all the indicators). The difference between the average indicators of the centre players and defenders is significant and makes up 242.6 m, whereas between the centre players and the forwards it is 239.2 m. It should be noted that the height of the forwards, as well as of the central players is above 200 cm.

The indicators of special high-speed endurance show the same results. During the test, the average indicator in the 3x40 m running is  $569.9 \pm 10.04$  m in the centre players,  $581.2 \pm 6.52$  m in the forwards and  $584.8 \pm 10.92$  m in the defenders. The difference between the indicators of the centre players and the forwards is 20.3 ( $p >$

0.99); it is 23.9 m ( $p>0.99$ ) between the centre players and defenders and 3.5 m ( $p>0.95$ ) between the forwards and defenders.

The analysis of the study results of the highly qualified basketball players' technical preparation (Table 2) has shown that the advantage of the defenders over the centre players and forwards is observed in all indicators, with the exception of two: the work time in the basketball shooting test and overall work ability in shots. This suggests that the level of technical preparation of tall players has significant reserves, especially in passing the basketball using one hand from the shoulder, which is performed using the "weaker" hand (usually the left hand), and in foul shot. It is known that during the match, tall players, and especially centre players, most often perform foul shots. But they have a lower scoring rate of  $25.15\pm 0.875$  (83.8%), while a scoring rate of defenders is  $26.5\pm 0.689$  (88.3%). The reliability of the difference between the indicators is high -  $p>0.89$  (Table 2).

A significant contribution to the problem of assessing the level of physical preparation may be the study of the functional capabilities of basketball players [1-3].

Table 2

### Results of studies of technical preparedness in basketball players of high qualification

Indicators	Players' functions			Difference certainty
	Centre (C)	Forwards (F)	Defenders (D)	
1	2	3	4	5
1. Movement in the defender's position 100 m (s)	(n=18) $35.31\pm 2.26$ 2.7	(n=19) $34.01\pm 1.21$ 1.58	(n=17) $32.27\pm 1.09$ 1.18	C-F < 0.95
2. Passing the ball to the wall within 30 seconds - number of times - "strong hand"	(n=25) $35.4\pm 0.892$ 2.89	(n=25) $38.7\pm 0.984$ 3.39	(n=25) $42.2\pm 0.915$ 2.14	C-F < 0.95 C-D < 0.99 F-D < 0.98
- "with a weak hand"	$32.0\pm 0.011$ 2.81	$35.2\pm 0.856$ 2.08	$38.8\pm 0.711$ 2.01	C-F < 0.95 C-D < 0.99 F-D < 0.95

Table 2 (continued)

- with two hands from the breast	34.0±0.815 2.35	37.9±0.372 1.39	41.2±0.912 2.13	C-F < 0.95 C-D < 0.999 F-D < 0.98
- "strong" - "weak" hand				C-F < 0.98 C-D < 0.999 F-D < 0.98
3. Foul shots from the distance of 30 m, number of hits	(n=15) 24.0±1.43 2.59	(n=20) 25.15±0.875 1.87	(n=28) 26.5±0.689 1.78	C-F < 0.999 C-D < 0.99 F-D < 0.98
4. Ball shooting in a jump from 40 m, the number of hits	(n=23) 25.95±1.45 3.37	(n=20) 27.04±1.62 3.66	(n=28) 29.96±1.35 3.30	C-F < 0.95 C-D < 0.999 F-D < 0.99
- percentage of hits	64.9±3.63 8.42	67.6±4.06 9.16	74.0 ±3.4 8.26	C-F < 0.95 C-D < 0.999 F-D < 0.99
- work time (min/s)	4.13±0.187 0.435	4.25±1.108 0.246	4.11 ±0.138 0.335	C-F < 0.95 C-D < 0.95 F-D < 0.95
- general work ability in ball shooting (s).	0.162±0.006 0.014	0.157±0.039 0.009	0.164 ±0.007 0.017	C-F < 0.95 C-D < 0.95 F-D < 0.95
- throwing technique efficiency of till the state of fatigue; number of hits for 1 s	0.105±0.008 0.0198	0.107±0.006 0.015	0.125 ±0.007 0.017	C-F < 0.95 C-D < 0.999 F-D < 0.999
5. Complex test 2x26 (m/s)	(n=18) 14.8±0.646 0.772	(n=19) 14.6±0.438 0.572	(n=18) 13.67±0.705 0.842	C-F < 0.95 C-D < 0.98 F-D < 0.98

As it is known, one of the most important indicators of physical work capacity, which characterizes the level of development of aerobic functions, is the maximum oxygen consumption. In basketball players of high qualification, this indicator reaches the value of 58.5±5.59 ml/kg/min. These values of the maximum O<sub>2</sub>

consumption are lower than the similar indicators of representatives of other types of sports.

It should be noted that in the representatives of cyclic sports, the maximum oxygen consumption reaches 70 ml/kg and above. Relatively small values are recorded in other indicators that characterize the level of development of aerobic and anaerobic performance of sportsmen. Average indicators of critical power in highly qualified basketball players made up 1741 kg/min., PANO-60.7%, PWS 170-1325 kg/min; the total “excess” of CO<sub>2</sub> emission is 4.86 l.

The analysis of the functional capability indicators of highly qualified basketball players, taking into account their game functions, showed that the reliable difference between them is observed in 25.9% of cases. The difference between the indicators of the central players and forwards is significant in 16.6% of cases, between centre players and defenders - in 55.5% of cases and between forwards and defenders - in 5.5% of cases.

**Prospects of further researches are in this direction.** Estimation of urgent effect of the special exercises of basketball-players. Research of cooperation of urgent effect of the special exercises of basketball-players.

### **Conclusions:**

1. The studies have revealed that in 20.2% of cases, there is no difference between physical preparation indicators or the difference is uncertain in players with different functions. In the technical preparation indicators, this percentage is 30.5. This shows, on the one hand, the certain progress in the system of training highly qualified basketball players, and the second hand, this shows the necessity to increase the efficiency of the training system of tall players, especially of the players performing functions of “centre players”.

2. The determination of the maximum of aerobic and anaerobic performance indicates that, despite positive changes, the system of preparation used in basketball, does not fully ensure sufficient influence upon the energy functions that form the basis of both general and special endurance. This is evidenced by the data obtained from basketball players of various game functions.

**Conflicts of interest.** The authors state that there is no conflict of interest.

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