

# Features of content of competitive activity of highly skilled players of different functional classes in basketball on wheelchairs

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**Purpose:** to define features of performance of the main technical-tactical actions in competitive activity by players of different functional classes in basketball on wheelchairs.

**Material & Methods:** 62 official protocols of the Basketball World Cup on wheelchairs are analyzed; game indicators of 189 sportsmen are analyzed, from which representatives of functional class 1–1.5 made 47 players, 2–2.5 – 41 players, 3–3.5 – 46 players, 4–4.5 – 55 players.

**Results:** features of performance of technical-tactical actions are established on the basis of the analysis of competitive activity, which need to be considered when training sportsmen of different functional classes in basketball on wheelchairs.

**Conclusions:** specifics of basketball on wheelchairs consist in the dominating functions on the platform of players of different functional classes in the course of competitive activity when performing of the attacking and protective actions by them.

**Keywords:** basketball on wheelchairs, technical-tactical actions, competitive activity.

## Introduction

The qualitative and quantitative analysis of competitive activity in sports gives the important theoretical, methodical and practical information which needs to be realized in the course of training of players. It is one of the most urgent problems of modern sports training in basketball [3; 13].

The competitive activity of each basketball team has the specific features that demands carrying out special researches and pedagogical observations [14]. Number of authors considers that one of the urgent directions of researches in basketball is the definition of key components of realization of competitive activity by players of high qualification [1; 15].

The assessment of the main technical-tactical actions is carried out for the definition of efficiency of competitive activity of basketball players. Despite of universalization of technical-tactical actions in modern basketball, players of different roles have distinctions in the content of competitive activity and its efficiency [2; 6].

The competitive activity has even more difficult character in wheelchair basketball, which is caused by the presence of players with different extent of violations of the musculoskeletal system [23]. It complicates the process of assessment of competitive activity and demands the search of the criteria of definition of its efficiency, adequate to complexity and multi-factor of competitive fight of players of different functional classes. The objective assessment of actions of players has to have complex character which would consider various aspects of game and feature of competitive activity which assessment is expedient to carry out following the results of the whole competitive tournament, but not separately taken game [2].

## Communication of the research with scientific programs, plans, subjects

The research was carried out according to the Consolidating plan of research works in the sphere of physical culture and sport for 2011–2015 of the Ministry of family, youth and sport of Ukraine on the subject: 1.4 “Theoretic-methodical principles of development of sport of disabled people” (number of the state registration is 0111U006470).

## The purpose of the research

To define features of performance of the main technical-tactical actions in the competitive activity by players of different functional classes in wheelchair basketball.

## Material and Methods of the research

The analysis of technical-tactical actions of 189 sportsmen of which representatives of functional class 1–1.5 has made 47 players, 2–2.5 – 41 players, 3–3.5 – 46 players, 4–4.5 – 55 players, making the list of official statistical protocols of games of the World Cup among men, which was taking place under the auspices of the international federation of wheelchair basketball (IWBF), has been carried out. In total protocols of 62 games have been analyzed, from which: 24 protocols of games of the preliminary tour, 24 protocols of games of the second circle, 6 protocols of games for 5–16 place, 4 protocols of games of the quarterfinal, 2 protocols of games of the semi-final, 1 protocol of the game for the 3rd place and 1 protocol of the final game. Standard methods of statistical data processing were applied to the analysis and the arithmetic average and standard deviation was defined.

## Results of the research and their discussion

Twenty game indicators of technical-tactical actions, which can conditionally be divided into two main groups, were used for the detection of specifics of competitive activity of players of different functional classes: 1) throwing indicators; 2) active game actions in defense and attack (tab. 1).

The analysis of indicators of game actions has allowed defining the domination of players of functional class 3-3.5 and 4-4.5 that, in our opinion, is connected with the smaller extent of functional defeats of organism in comparison with classes 1-1.5 and 2-2.5.

Results of statistical processing of materials demonstrate that average effectiveness of players fluctuates from 1,79 to 7,52 scored points for one game. At the same time the smallest effectiveness is shown by players of functional class 1-1.5 (1,79), and the highest players of class 3-3.5 (7,23) and 4-4.5 (7,52) as sportsmen of these functional classes, as a rule, play positions of forwards and center.

Indicators of throws from the game were more informative. So, sportsmen of functional class 1-1.5 carry on 1,97±0,56 2-point and 0,02±0,015 3-point on average for the game,

players of class 2-2.5 – 3,38±0,87 and 0,45±0,32, and respectively players of class 3-3.5 – 6,50±1,34 and 0,79±0,44, and class 4-4.5 – 6,89±1,24 and 0,58±0,30. Considerable differences in indicators of quantity of throws from the game demonstrate more effective actions of players of class 3-3.5 and 4-4.5 which owing to rather bigger motive mobility compensate the weak game of sportsmen of class 1-1.5 and 2-2.5.

The analysis of 2-point and 3-point throws has shown that the priority in the attack of rim from average and near distance is traced at players of all functional classes. So, 8 attacks by 2-point throw are the share of one attack by 3-point throw in classes 2-2.5 and 3-3.5, and in class 4-4.5 12 attacks from average and near distance are the share of one attack from the long range. Therefore, the quantity of 2-point throws and their effectiveness (1-1.5 – 0,85±0,29, 2-2.5 – 1,43±0,46, 3-3.5 – 2,90±0,64, 4-4.5 – 3,12±0,65) has the direct dependence on the number of scored points for the game. It is confirmed by almost identical indicators of percent of effectiveness of 2-point throws and percent of productive throws from the game. Players of functional class 1-1.5 have 33 2-point % and 32% from the game, 2-2.5 – 38% and 36%, 3-3.5 – 43% and 42%, 4-4.5 – 41% and 40% respectively.

**Table**

**The comparative analysis of efficiency of realization of technical-tactical actions of basketball players of different functional classes on average for the game,  $\bar{X} \pm m$**

Technical-tactical actions	Functional class			
	1-1.5 (n=47)	2-2.5 (n=41)	3-3.5 (n=46)	4-4.5 (n=55)
Number of the scored points for the game (points)	1,79±0,62	3,51±1,30	7,23±1,63	7,52±1,57
Quantity of 2-point throws for the game (quantity of times)	1,97±0,56	3,38±0,87	6,50±1,34	6,89±1,24
Quantity of productive 2-point throws (quantity of times)	0,85±0,29	1,43±0,46	2,90±0,64	3,12±0,65
Percent of effectiveness of 2-point throws (%)	32,64±6,96	37,66±6,36	43,39±5,30	41,38±3,86
Quantity of 3-point throws for the game (quantity of times)	0,02±0,015	0,45±0,32	0,79±0,44	0,58±0,30
Quantity of productive 3-point throws (quantity of times)	0,003±0,005	0,10±0,09	0,21±0,13	0,16±0,11
Percent of effectiveness of 3-point throws (%)	16,6±2,12	22,69±3,73	26,84±5,52	27,58±5,79
Quantity of free throws for the game (quantity of times)	0,21±0,12	0,66±0,35	1,38±0,33	1,44±0,31
Quantity of productive free throws (quantity of times)	0,08±0,06	0,35±0,27	0,81±0,21	0,79±0,22
Percent of effectiveness of free throws (%)	39,47±6,99	54,69±10,46	58,97±9,39	56,33±8,01
Percent of productive throws from the game (%)	32,47±6,95	36,44±6,10	41,61±5,29	40,31±3,73
The number of assists for the game (quantity of times)	0,29±0,9	0,82±0,27	1,89±0,54	1,39±0,43
The number of rips for the game (quantity of times)	0,30±0,08	0,36±0,10	0,70±0,19	0,67±0,16
The number of blockings for the game (quantity of times)	0,019±0,023	0,042±0,025	0,08±0,04	0,09±0,03
The number of rebounds for the game (quantity of times)	1,11±0,24	1,76±0,51	3,60±0,66	4,51±0,90
The number of rebounds for the game on the board (quantity of times)	0,67±0,14	1,24±0,40	2,74±0,52	3,48±0,73
The number of rebounds for the game on others board (quantity of times)	0,44±0,14	0,52±0,14	0,86±0,20	1,02±0,21
Quantity of the fouls, which are made by the player for the game (quantity of times)	1,25±0,23	1,12±0,25	1,38±0,24	1,39±0,23
The number of turnovers of the ball for the game (quantity of times)	0,54±0,12	0,83±0,24	1,34±0,29	1,19±0,28
The time spent of the player for the platform for the game (min)	9:54±1:48	10:51±1:40	10:31±1:12	10:21±1:26

Indicators of performance of free throws in many respects depend on activity of players on others board and efficiency of defensive actions of the rival. Players of class 3–3.5 and 4–4.5, in comparison with others, carry out more throws from the line of free throw ( $1,38 \pm 0,33$  and  $1,44 \pm 0,31$ ), at the same time players of class 3–3.5 have their best realization (59%). Features of tactics of attack in wheelchair basketball lead to the fact that the main quantity of the fouls, which are made by the rival, is carried out on players of class 3–3.5 and 4–4.5. It is also necessary to mark out players of class 2–2.5 who carry out on average 0,7 throws from the penal line, but at the same time show rather high precision of free throws, making 55%.

Exact and timely assist of the ball to the partner – characteristic of basketball. The number of passes in attack which have ended with productive throws in rim at players of class 1–1.5 and 2–2.5 is averaged 0,3 and 0,8 for the game, and at players 3–3.5 and 4–4.5 – 1,9 and 1,4 for the game respectively.

Estimating complex of defensive actions at players of different functional classes, it should be noted what higher quantitative indices of players of class 3–3.5 and 4–4.5 in this game component is explained by the direct proximity of players to board at the time of realization of the attacking actions of the rival and higher functionality of organism in comparison with classes 1–1.5 and 2–2.5.

The analysis of average indicators of rips of the ball has shown that players of functional class 3–3.5 and 4–4.5 have notable advantage at players of class 1–1.5 and 2–2.5. Players of class 1–1.5 and 2–2.5 on average for the game do 0,3 and 0,4 rips, and players of class 3–3.5 and 4–4.5 – 0,7. Distinctions in indicators are connected generally with impossibility of sportsmen of class 1-1.5 and 2-2.5 to carry out lean pressing sideward, and sometimes turn from behind damages of functions of spinal cord.

Now the design of basketball wheelchair gives the chance to certain high quality players, to apply block shots in the game. In general basketball players on wheelchairs carry out this technique only episodic what low average values for game testify to (class 1–1.5 – 0,02, 2–2.5 – 0,04, 3–3.5 – 0,08, 4–4.5 – 0,09).

The essential distinctions, which are connected with specifics of functional points of players, are revealed by the efficiency of number of rebound for the game. Rebound of the ball on personal and others' boards is generally provided with players of class 3–3.5 (3,6) and 4–4.5 (4,5), and here their superiority over class 1–1.5 (1,1) and 2–2.5 (1,8) is indisputable. Players of functional class 4–4.5 rebound in defense on average 3.5 rebounds, and in attack – 1. These indicators are respectively equal 2,8 and 0,9 rebounds at players of class 3–3.5. The specific feature of position of players of class 1–1.5 and 2–2.5 in basketball wheelchair, which is directed to the increase in mobility of sportsmen, demands the decrease in their maximum height that influences fight for the jumped aside ball. Rebound of the ball by players of these classes on the board fluctuates ranging from 0,7 to 1,2, and on the rival 0,4–0,5.

Active defensive actions and high intensity of motive activity in wheelchair basketball lead to violation of the rules both from forwards, and from defenders. The mistakes, which are caused by technical defect, when players incorrectly technically carry out game techniques in competitive activity of bas-

ketball players of different functional classes, meet almost equally. So, on average for the game, players of class 2–2.5 receive 1,1 personal remarks, and sportsmen of classes 1–1.5, 3–3.5 and 4–4.5 – from 1,3 to 1,4. The standard deviation from average values of fouls in all functional classes is in limits  $\pm 0,23$ –0,25. It demonstrates that the level of technical preparedness at the best players of the world, independently on functional point, does not differ significantly.

The intense and intensive game in wheelchair basketball leads to turnover of the ball. Indicators of number of turnovers of the ball on average for the game, which are ranging from 0,5 to 1,3, are also confirmed by the high level of technical preparedness of players in wheelchair basketball. The minimum quantity of turnovers –  $0,54 \pm 0,12$ , is made by players of class 1–1.5 that first of all is connected with small time of possession. The greatest number of turnovers of the ball is made by representatives of class 3-3.5 ( $1,34 \pm 0,29$ ) which is connected with the fact that many sportsmen when landing in wheelchair place emphasis on the maximum height to the detriment of stability of trunk. Sportsmen of class 2–2.5 and 4–4.5 lose the ball on average 0,83 and 1,19 of times for the game respectively.

The analysis of the time spent of players for the platform has not revealed essential differences at sportsmen of different functional classes that are connected with specifics of competitive activity in wheelchair basketball, on the basis of the rule of balancing of the team (rule limit of 14 points), demanding existence on the platform of players of different functionality. In general players of different functional classes are on the platform on average for one game: class 1–1.5 –  $9:54 \pm 1:48$  minutes, class 4-4.5 –  $10:21 \pm 1:26$ , class 3-3.5 –  $10:31 \pm 1:12$ , class 2-2.5 –  $10:51 \pm 1:40$ .

The quantitative analysis of game activity in the conditions of competitions has allowed defining specifics of performance of the main technical-tactical actions of players of different functional classes.

Functional classification in wheelchair basketball is of great importance [21]. Coaches have to have a clear idea of functionality of sportsmen and understand basic provisions of classification [10; 17; 18; 24]. Each player is capable to perform the certain operations, which are based on its functionality [9; 12]. As number of experts specifies [19; 22], it is necessary to control constantly functionality of the sportsman, that is as the player is capable to perform various physical actions inherent in wheelchair basketball. Therefore, the coach has to be guided in functional distinctions of players that will allow training the sportsman taking into account ability to perform motor actions [7; 8]. Sportsmen, in turn, have to realize clearly the functionality and, thus, use all possible muscular groups for performance of motor actions [11].

Researches of native experts [4; 5] note the importance of problem of individualization of training of players in basketball. This perspective is important more in wheelchair basketball. It is connected with the extent of defeats of the musculo-skeletal system and distinction of functionality of the players, playing in one team. For improvement of quality of the training process, the coach of wheelchair basketball has to approach planning of means and methods of training which are oriented on group of the sportsmen, having different functionality [25] creatively. According to foreign authors [16; 20] as much as

possible to use the potential of each sportsman, it is necessary to consider distinctions in functional features of sportsmen and to consider them within context of training and development of the sportsman.

## Conclusions

Players of different functional classes have to perform game operations, specific to them, during the game in wheelchair basketball.

So, players of functional class 1-1.5 perform generally defensive operations on the platform and provide the organization of team game in attack. The tactical role of these players consists in blocking of the rival, and also performance of large number of screens, giving help to the partners in counteraction to the rival's resistance, and at the same time carries out many short breakthroughs on the platform.

Players of class 2–2.5 provide appropriate conditions of the organization as attacking, and defensive actions of the team on the platform. Due to the features of design of basketball wheelchair and landing in it, players of this functional class, as a rule, are more high-speed. Players very often apply breakthroughs and enter the power antagonism, first of all, which is

connected with rebound of ball, thanks to speed.

Players of functional class 3–3.5 provide communication of back and forward attacking line which is traced in performance by them of the greatest number of assists, rips and throws from the average and long distance. Also players of this class participate actively in blocking of players of the rival, in fight for rebound of ball on their or others board and counteract the attacking actions of players of the rival.

Players of functional class 4–4.5 are «goal-scorers» of teams that is traced in performance by them of the greatest number of throws, the number of scored points and movements in the course of competitive activity. Feature of players of this functional class is that they, according to the functionality, use basketball wheelchair with the maximum height, which is allowed by the existing rules. In this regard, these players most effectively act on the near distance from rim and in zone of 3 seconds.

**Prospects of further researches** consist in the development of programs of training of players taking into account their functional class for the improvement of quality of the training process.

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## References

1. Bezmylov, N. N. (2015), "Comparative analysis of efficiency of competitive activity of male and female basketball teams of high qualification", *Slobozans'kij naukovno-sportivnij visnik*, No 1(45), pp. 23–28. (in Russ.)
2. Bezmylov, N. (2011), "Evaluation of competitive activity of basketball players of high qualification in the games season", *Nauka v olimpiyskom sporte, Olimpiyskaya literature*, Kiev, No 1–2, pp. 45–52. (in Russ.)
3. Doroshenko, E. Yu., Gorbulya, V. B., Gorbulya, V. A. & Kirichenko, R. A. (2004), "Features of competitive activity in attack for the players of high qualification", *Pedagogika, psikhologiya ta mediko-biologichni problemi fizichnogo vikhovannya i sportu*, Kharkiv, No 23, pp. 63–70. (in Russ.)
4. Kozina, Zh. L. (2009), Individualizatsiya podgotovki sportsmenov v igrovykh vidakh sporta: Monografiya [Individualization of training athletes in team sports: Monograph], Tochka, Kharkov, 396 p. (in Russ.)
5. Kozina, Zh. L., Grin, L. V. & Yefimov, A. A. (2010), "The application of the system of aims, means and methods of individualization of training athletes in team sports in the structural elements of the annual training cycle", *Fizicheskoe vospitanie studentov*, No 4, pp. 45–52. (in Russ.)
6. Lynets, M. M., Zubrytskyi, Ia. Ia. & Voitovych, I. P. (2009), "The Content of competitive activity of basketball players of super League", *Visnyk Chernihivskoho derzh. ped. un-tu, seriia: Pedagogichni nauky, Fizychno vykhovannia ta sport*, Chernihiv, Vol. 64, pp. 225–229. (in Ukr.)
7. Mishin, M. V. (2012), "Features of application of the technical elements of owning a sports wheelchair in competitive activity of players of different functional classes in wheelchair basketball", *Sostoyanie i perspektivy tekhnicheskogo obespecheniya sportivnoy deyatel'nosti: sbornik statey*, Minsk, pp. 48–52. (in Russ.)
8. Mishin, M. V. (2010), "Elements of the technique of owning a basketball wheelchair", *Slobozans'kij naukovno-sportivnij visnik*, No 2, pp. 64–67. (in Russ.)
9. Perederiy, A., Borisova, O. & Briskin, Y. (2006), "General characteristics of the classification in disabled sports", *Nauka v olimpiyskom sporte*, No 1, pp. 50–54. (in Russ.)
10. Pityn, M. (2006), "Classification differences of athletes in wheelchair basketball", *Suchasni problemy rozvytku teorii i metodyky sportyvnykh i rukhlyvykh ihor: zb. nauk. st.*, Lviv, Vol. 1, pp. 43–49. (in Ukr.)
11. Pityn, M. P., Kovtsun, V. I. & Mishyn, M. V. (2007), *Sylova pidhotovka basketbolistiv na vizkakh: Metod. posib.* [Power training basketball players in wheelchairs: Method. manual.], Lviv, 148 p. (in Ukr.)
12. Pityn, M. P. (2004), "Functionality performing technical-tactical actions in wheelchair basketball", *Ozdorovcha i sportyvna robota z nepovnospravnyymi*, Lviv, pp. 41–44. (in Ukr.)
13. Platonov, V. N. (2013), *Periodizatsiya sportivnoy trenirovki. Obshchaya teoriya i ee prakticheskoe primenenie* [Periodization of sports training. The General theory and its practical application], Olimpiyskaya literature, Kyiv, 624 p., ISBN 978-966-8708-66-4. (in Russ.)
14. Sobko, I. N. (2013), *Analiz rezultatov vystupleniya vedushchikh komand basketbolistov s narusheniyami slukha na mezhdunarodnykh sorevnovaniyakh* [Analysis of the results of the performance of the leading teams in basketball with hearing impairments at the international competition], *Obrazovaniie i sotsializatsiya cheloveka v sovremennykh usloviyakh: materialy mezhdunarodnoy nauchno-prakticheskoy konferentsii, Blagoveshchensk*, pp. 170–173. (in Russ.)
15. Sushko, R. O., Mitova, O. O. & Doroshenko, E. Iu. (2014), *Zmahalna diialnist vysokokvalifikovanykh hravtsiv u basketboli: navch. posibnyk dlia studentiv vyshchyykh navchalnykh zakladiv fizychnoi kultury i sportu* [Competitive activity of highly skilled players in basketball: proc. a manual for students of higher educational institutions of physical culture and sports], NVP Interservis, Dnepropetrovsk, 162 p. (in Ukr.)
16. Doll-Tepper, M., Kroner, G. & Sonnenschein, W. (2001), *Vista '99-New horizons in sport for athletes with a disability*, Proceedings of the international Vista '99 conference, Meyer, Koln, pp. 355–368.
17. Crespo-Ruiz Beatriz M., Del Ama-Espinosa, Antonio J. & Gil-Agudo, Enge M. (2011), "Relation Between Kinematic Analysis of Wheelchair

- Propulsion and Wheelchair Functional Basketball Classification", *Adapted Physical Activity Quarterly*, No 28, pp. 157–172.
18. Curtis, K. A., Kindlin, C. M., Reich, K. M. et al. (1995), "Functional reach in wheelchair users: the effects of trunk and lower extremity stabilization", *Arch. Phys. Med. Rehabil.*, Vol. 76, pp. 360–367.
19. Gil-Agudo, A., Del Ama-Espinosa, A. J. & Crespo-Ruiz, B. (2010), "Wheelchair basketball quantification", *Quality of life in physical medicine and rehabilitation clinics of North America*, Elsevier, Nueva York, Vol. 21, No 1, pp. 141–156.
20. Goosey, V. L., Fowler, N. E. & Campbell, I. G. (1997), "A kinematic analysis of wheelchair propulsion techniques in senior male, senior female, and junior male athletes", *Adapted Physical Activity Quarterly*, Vol. 14, pp. 156–165.
21. Labanowich, S. (1998), *Wheelchair Basketball*, River Front Books, New York, 48 p.
22. Malone, L. A., Gervais, P. L. & Steadward, R. D. (2002), "Shooting mechanics related to player classification and free throw success in wheelchair basketball", *Journal of rehabilitation, Research & Development*, Vol. 39, No 6, pp. 701–710.
23. Molik, B. & Kosmol, A. (2003), "Physical ability and playing skills criteria for classifying basketball wheelchair players", *Wychowanie fizyczne I sport*, Vol. 3, No 46, pp. 256–261.
24. Molik, B., Laskin, J., Kosmol, A., Skučas, K. & Bida U. (2010), "Relationship between functional classification levels and anaerobic performance of wheelchair basketball athletes", *Research Quarterly for Exercise and Sport*, Vol. 81, No 1, pp. 69–73, ISSN 0270–1367.
25. O'Connell, D. G. & Barnhart, R. (1995), "Improvement in wheelchair propulsion in pediatric wheelchair users through resistance training: a pilot study", *Archives of Physical Medicine and Rehabilitation*, Vol. 76, No 4, pp. 368–372.

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