DEVELOPMENT OF PLAYER´S AGILITY IN BASKETBALL

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ABSTRACT

The term agility we understand as complex psychomotor skills, the development of which requires a high degree of neuromuscular coordination. Agility training is one of the most effective and the most advanced forms of performance improvement in basketball. The work deals with the creation and experimental verification the program of development agility of player in basketball. On a group of 14 basketball players we verify the effectiveness of development funds agility. The results indicate the existence and character of the effect observed indicators. The results confirm the effectiveness differentiated means in both groups. The experimental group achieved better results in four tests (Illinois Agility, T - test Agility, Run after 6 - polygon P and jumping into a square) and the other two was not demonstrated significant efficacy compared with the control group.

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INTRODUCTION

In connection with the definition of agility we face with considerable problems. Apart from the linguistic correctness of the concept (SAV, 2011) is the term understood differently. The concept of agility understands Šimonek (2013) as a complex psychomotor ability, whose development involves a high degree of neuromuscular specificity. Draper - Lancaster (1985) define it as the ability to change direction of body quickly and according to them it is the result of a combination of strength, speed and coordination abilities. Some authors (Moreno, 1995; Foran - Pound, 1994) include agility between speed capabilities. According to them, agility is ability to perform quick movements in different planes and directions, which presents a combination of acceleration ability, explosiveness and reaction speed while maintaining balance and body control. The above definition implies that the speed of movement consists of cognitive and reaction-speed capabilities and explosive acceleration. If this movement can be identified by the following ability, then we would have to accept the thesis that agility is a component of the speed capabilities. Moreno (1995) Sheppard - Young (2006) argue that speed and agility are separate motor abilities and therefore their development requires a high degree of neuromuscular stimulation. Baker (1999) don´t find significant correlation between jogging speed and agility. As we can see at present, there is no a precise definition of the concept of agility (Labudová - Peráček (2013).

In developing these skills play an important role in perceptual components, which include also the anticipation and decision-making processes (Šimonek, 2013). The concept of agility is understood as the ability to maintain and control proper body position while quickly change direction through a series of movements (Twist - Benický, 1995). Football player changes direction every 2-4 seconds, and makes changes direction 1200-1400 (Bernier, 2003) during the game. In senior basketball, where about the victory decides details, is the dominant the question of the quality, individualization and specialization of training process (Ivanka, 2009). The same situation is in other sports games (especially indoor games).

When preparing speed and agility training for basketball should be taken the questions of biomechanical specificity. In sports games there is a strong effort to improve the quality of physical training of players with respect to the specificities of a particular discipline (Dobrý, 2003). However, the development of agility and conditional abilities must be synchronized in relation with the periodization (Brown-Feringo, 2005). Agility training is one of the most important aspects of training already in the preparatory period. A high level of agility is one of the basic assumptions for successful performance of a player in the game. It allows the player to react optimally (in terms of speed of response and choice of solutions to game situations) to changing conditions in the movement of players and ball. Therefore considers the dispute Sporis et al, (2012), like Craig (2004) in response to stimulus as part of the performance in agility. Agility of player in sports games always occurs in response to game situations. This means that the combination of perception-action and decision-making are critical elements the application of agility in match conditions.

Diagnosis agility is measured most often running tests that use rapid changes in direction of movement, stopping, acceleration and sudden maneuvers forward, backward or sideways. Nevertheless, testing of agility is problematic. We meet with the problems of validity and reliability of tests. Good scores in these tests may mask weaknesses in some aspects of agility. The literature generally recognizes running tests agility and agility tests involving not only motor component, but also has an element of decision-making.

METHODS

Research was realized in the basketball team of BKM SPU Nitra in the period from 22.10.2012 to 21.12.2012. We experimentally verified the effectiveness of the applied program development agility (Table 1) in the categories of U10. The average age of players was 9.14 years, average body height 141.97 cm and average body weight of 36.19 kg. The training process was carried out 3 times a week for a period of 60 min. Filed players were divided into experimental file (E_g) and control group (K_g). At the beginning and end of the period in both groups, we performed testing of agility. Our program to develop agility was realized only in the experimental group. In the control group were made standard exercises.

Used agility tests (http://www.topendsports.com/testing/agility.htm):

1. Illinois Agility Test
2. T-test Agility
3. Hexagon test (left and right)
4. Quadrant Jump Test (left and right)
5. Side – Step Test
6. Basketball Line Running Test

The results were processed by mathematical - statistical methods: Tests of significance of the difference between the two variances (two selections F - test for variance) with levels of importance 95% and 99%. Statistically significant difference between the median two dependent files we investigated by the non-parametric Wilcoxon test. In sports training E_g we realized the following program resources development agility. It contains 8 groups of exercises, which were made on each practice as planned (tab. 1).

Table 1 Agility training plan development

№	Exercises / weeks	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
		series/repetitions/minutes							
1.	Exercises on the line (skips)	2/40/3		2/40/3		2/40/3		2/40/3	
2.	Exercises on coordination ladder	4/4/5	4/4/5	4/4/5		4/4/5	4/4/5	4/4/5	
3.	Exercises with medicine ball		3/20/4		3/20/4		3/20/4		3/20/4
4.	Exercises on the stairs	8/10/5		8/10/5		8/10/5		8/10/5	
5.	Exercises with a swing		3/50/5		2/50/5		2/50/5		2/50/5
6.	Exercises on the bench	3/8/5		3/8/5		3/8/5		3/8/5	
7.	Exercises with an obstacle		4/4/6		4/4/6		4/4/6		4/4/6
8.	Exercises with expander				5/5/7	5/5/7	5/5/7	5/5/7	5/5/7
Amount ∑		17/ 24/ 18	14/ 78/ 20	17/ 62/ 18	14/ 79/ 22	23/ 67/ 25	18/ 83/ 27	23/ 67/ 25	14/ 79/ 22

RESULTS

Illinois Agility Test

In The E_g we have seen improvement on average 3.88s after applying the proposed development agility exercises. In the K_g we had improved by an average of 0.89 without exercises to develop agility. In the E_g we have seen an improvement in average of 2.4s better than in the K_g. Based on the findings of statistical significance can be noted that the experimental group has improved the significance level of 5%, not in K_g (Table 2, 3).

Table 2 F-test - Illinois Agility Test

F-test for variance		
	Input values (E_g)	**Output values (K_g)**
Median	23.24856	22.66511
Variance	2.51933	1.334623
F	1.8879	
P(F<=f) (1)	0.2295	
F krit (1)	5.8194	**F < F krit**

Table 3 Wilcoxon test - Illinois Agility Test

selection	W	p- value	significance level 1%	significance level 5%
(E_g)	2.366432	0.017961	p > 0.01	p < 0.05
(K_g)	2.197401	0.27993	p > 0.01	p > 0.05

Test Agility

E_g in the entrance test had a better time at an average of 0.67 compared with the K_g. We have found an improvement by an average of 2.39s after application of us exercises. In the control group we observed an average improvement of 0.33s without application of exercises (Table 4). Based on the findings of statistical significance can be noted that, unlike K_g occurred in E_g improve the significance level of 5%. The significance level of 1% in both groups has not improved (Table 5).

Table 4 F–test for T-test Agility

F-test for variance		
	Input values (E_g)	**Output values (K_g)**
Median	11.842	12.52
Variance	0.629	0.612
F	1.027	
P(F<=f) (1)	0.4873	
F krit (1)	5.819	**F < F krit**

Table 5 Wilcoxon test for T – test Agility

Selection/ Left side	W	p- value	significance level 1%	significance level 5%
(E_g)	2.366	0.017	p > 0.01	p < 0.05
(K_g)	1.85	0.062	p > 0.01	p > 0.05

Hexagon test (left and right)

E_s file was in the entrance test on the right side better time to an average of 0.82s than in the K_g. On the left side of the entrance test was better K_g on average from 0.14s to E_g. In our group E_g we had found an improvement values on the right side by an average of 2.85s and 2.01s on the left side of the application of prepared exercises.

Table 6 F-test – Hexagon test (left and right)

F-test for variance (Right)		
	Input values (E_g)	Output values (K_g)
Median	19.78571429	20.6028571
Variance	17.1588619	11.9731905
F	1.433106902	
P(F<=f) (1)	0.336611329	
F krit (1)	5.819756579	**F < F krit**

F-test for variance (Left)		
	Input values (E_g)	Output values (K_g)
Median	18.05285714	17.9142857
Variance	7.865190476	2.40049524
F	3.27648659	
P(F<=f) (1)	0.087208036	
F krit (1)	5.819756579	**F < F krit**

Table 7 Wilcoxon test –Hexagon test (Right side)

Selection/ Right side	**W**	**p- value**	**significance level 1%**	**significance level 5%**
(E_g)	2,366432	**0,0175**	p > 0,01	**p < 0,05**
(K_g)	2,197401	0,0273	p > 0,01	**p < 0,05**

Based on the table 6, 7 and 8 we conclude that the test on the Hexagon test on the right and left side confirmed the significance level at 5% in E_g and K_g. At 1% level of significance was not confirmed in both files. However, it is clear that E_g achieve better results.

Table 8 Wilcoxon pared test – Hexagon test (Left side)

Selection/ Left side	**W**	**p- value**	**significance level 1%**	**significance level 5%**
(E_g)	2.3662	**0.017961**	p > 0.01	p < 0.05
(K_g)	2.366432	0.017961	p > 0.01	p < 0.05

Quadrant Jump Test (left and right)

The experimental group was in the entrance test on the right side better point's average of 0.29 from the control group. On the left side of the entrance test has been improved E_g average of 0.07 points from the K_g. In the experimental group we had improved values on the right side by an average of 2.36 points and to the left by 1.93 points after application of us exercises designed to develop agility. Based on the results (Tables 9 and 10), we note that in the test-Jumps to the square confirmed the significance level on the right side to 5% in the experimental and control group. On the left side was confirmed only in the E_g. At 1% level of significance was confirmed by both files to the right and left side.

Table 9 F-test - Quadrant Jump Test (Right and Left)

F-test for variance (Right)		
	Input values (E_g)	Output values (K_g)
Median	4.5712	4.2881
Variance	1.0355	1.6546
F	1.6258	
P(F<=f) (1)	0.2917	
F krit (1)	5.1718	**F < F krit**

F-test for variance (Left)		
	Input values (E_g)	Output values (K_g)
Median	4.642857143	4.571428571
Variance	2.30952381	1.369047619
F	1.686956522	
P(F<=f) (1)	0.270555184	
F krit (1)	5.819756579	**F < F krit**

Table 10 Wilcoxon test - Quadrant Jump Test (Right side)

Selection/Right side	**W**	**p- value**	**significance level 1%**	**significance level 5%**
(E_g)	2.366432	**0.017961**	p > 0.01	**p < 0.05**
(K_g)	2.201398	0.027709	p > 0.01	**p < 0.05**

Table 11 Wilcoxon test- Quadrant Jump Test (Left side)

Selection/Left side	**W**	**p- value**	**significance level 1%**	**significance level 5%**
(E_g)	2.366432	**0.017961**	p > 0.01	**p < 0.05**
(K_g)	1.782084	0.074736	p > 0.01	p > 0.05

Side-step test

In the E_g we had improved on average by 2.43 points after application of us exercises designed to develop agility. The K_g we had improved by an average of 0.86 points, which is a comparison of the two sets improvement of 1.5 points in favor of E_g. Based on Table 12, we note that in the test side-step test confirmed the significance level at 5% in E_g and K_g. At 1% level of significance was not confirmed in both files.

Table 12 F-test – Side-step test

F-test for variance		
	Input values (E_g)	**Input values (K_g)**
Median	4.428571429	4.53312
Variance	1.03714286	0.7529
F	1.380952381	
P(F<=f) (1)	0.352540339	
F krit (1)	5.819756579	**F < F krit**

Table 13 Wilcoxon test – Side-step test

Selection	W	p- value	significance level 1%	significance level 5%
(E_g)	2.366432	**0.017961**	p > 0.01	**p < 0.05**
(K_g)	2.201398	0.027709	p > 0.01	**p < 0.05**

Basketball line running test

We had improved in the experimental group (E_g) by an average of 2s after applying the proposed development agility exercises. In the control group (K_g) we have seen deterioration in the average of 0.06s. In comparing the two files we recorded an average improvement of 2.71s in favor of E_g (table 14).

The results confirm that the test Basketball line running test confirmed the positive changes at the significance level of 5% in the experimental group, not at 1% level of significance (table 15).

Table 14 F-test Run the lines basketball court

F-test for variance		
	Input values (E_g)	**Input values (K_g)**
Median	17.96285714	18.60857143
Variance	5.05862381	4.339447619
F	1.165729893	
P(F<=f) (1)	0.428538512	
F krit (1)	5.819756579	**F < F krit**

Table 15 Wilcoxon test Run the lines basketball court

Selection	W	p- value	significance level 1%	significance level 5%
(E_g)	2.366432	**0.017961**	p > 0.01	**p < 0.05**
(K_g)	0.338062	0.735317	p > 0.01	p > 0.05

DISCUSSION

On the basis of the obtained results we assess the program for the development of agility as an effective. The comparison and evaluation of the results of the both groups are the statistically significant changes (5%), we've seen in the experimental group in all 6 tests of agility (the Illinois Agility Test, T-test, Agility, Running after 6-(left and right), square (left and right) leaps into Side-Step Test and Basketball line running test).

We assess the K_s from the perspective of the significance of the changes as an average level. We've seen significant changes just in the Hexagon test (left and right side); Jumping into a square (left side); and in the Side-step test. Means for the development of agility in preparation period were not intensive enough, and probably in this file has not been a sufficient volume of load. We haven't seen the positive changes at the level of significance of the 99%.

CONCLUSION

The results of the work confirm the reasonableness of the proposed exercises on development of agility in the experimental group (E_g). The significance of the changes has been exclusively on the level of the significance of 5%. The higher the relevance of (1%) for the nature of the research is probably too sensitive and its use does not produce the relevant evidence.

The implementation of special means for the development of agility in this category is appropriate and likely to be more effective than the standard stimuli of the game preparation. It is therefore limited to the complex structure of motor abilities, mainly coordination abilities, and it also conditioned a number of neurophysiological mechanisms. In this context, however, the question remains whether the agility is practiced skill or sensory - motor ability unanswered.

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