
Research of the coordination abilities in rhythmic gymnastics

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Abstract

The research is aimed at studying some components of coordination abilities – coordination in rhythm and agility among 72 students from Coach Department of the NSA “Vassil Levski” in Sofia. Four tests were used to assess the coordination in rhythm (Frontal feet and hands hitting against a wall, Feet and hands hitting (in a corner), Jumps in four squares, Cross jumps in four squares) and two tests for assessment of agility (Sideward running 10x5 meters, “T” test). The results from the tests – Jumps in four squares and Cross jumps in four squares – correlate to a great extent with the gymnasts (.707**) and moderately with the athletes practicing other kinds of sports. The results from the tests for agility correlate with gymnasts to a great extent (.702**), and moderately with the athletes practicing other kinds of sports (.684**). The coefficients of correlation with the tests for agility do not show any dependence on the tests for coordination in rhythm with both groups of subjects.

Keywords: Coordination, rhythmic gymnastics, other sports

INTRODUCTION

The contemporary rhythmic gymnastics is a complicated coordination sport. Its mastery is displayed through learning the exercises and the ability to convey not only the general nature of the movements but also their details.

In the gymnasts' routines, according to the requirements of the code of rules of FIG, the number of actions performed in unexpected situations is significantly increased and the gymnasts are supposed to show resourcefulness, fast reaction, and concentration. When performing with apparatuses (rope, hoop, ball, clubs, and ribbon), the gymnasts have to switch over their attention, their spatial, time and dynamic accuracy of movements and their biomechanical rationality (Gantcheva, 2017).

The coordination abilities in gymnastics are known to be an automatic flow of specific processes for management and diversity of the movement (Hadjiev et al., 2011). Authors distinguish the following five components of coordination abilities, which can be fully applied in rhythmic gymnastics:

- Ability for reaction;
- Rhythmical ability;
- Balance ability;
- Ability for spatial awareness;
- Kinesthetic ability for differentiation.

Bompa (2006) believes that coordination is a complex motor ability necessary for the perfect execution of the exercises and routines. In this case, rhythmical abilities are defined as an ability to coordinate and determine the level of perfect connection of the motor characteristics, which in turn are determined by factors such as age, transition level of acquired motor abilities, the choice of kind of sport, sports experience, etc.

Most often, authors determine the manifestation of coordination abilities according to different factors and recommend their taking into consideration as early as the stage of the children's selection for a particular sport and the assessment of their motor-coordination abilities (Dimitrova, 2015). The abilities for correct analysis of the movements, the activity of the motor analyzer, and the complexity of motor tasks are key components of the manifestation of the coordination abilities in rhythmic gymnastics (Hafe, 2016). The level of development of other physical abilities (speed abilities, dynamic power, flexibility, etc.), the diversity of the motor skills and habits, are considered to be important prerequisites for the successful performance in a certain motor activity (Jastrjembuskaja and Titov, 1999).

In rhythmic gymnastics special attention is paid to the balance abilities since they are one of the main parts of coordination abilities and also because they are a specific motor ability and a technical requirement for the exercises and routines (Macovei, 2006). The author views balance in three directions: as a specific motor ability, as a technical group of body exercises, as a criterion for evaluation of the execution of balances, jumps, and spins.

Other authors (Karpenko, 2003) present coordination in rhythmic gymnastics in close relation to agility, and namely to the abilities of fast learning of new movements and readjusting one's motor activity according to the requirements of the changing environment.

There is one major trend in the competitive programs of the gymnasts – execution of complex motor activities of the body together with exercises with apparatuses. Due to the necessity of using exercises from different structure groups (steps, waves, balances, spins, jumps, acrobatic and pre-acrobatic

exercises), requiring higher level of development of balance abilities, as well as rhythmical abilities related to the performance with musical accompaniment, sports physical preparation emphasizes on the perfection of the different components of coordination abilities. These qualities are known to facilitate to the greatest extent the quality performance of the competitive program (Viner-Usmanova, 2003).

METHOD

The research was done among 72 female first- and second-year students – 35 of them with major “Rhythmic gymnastics” and 37 – with different majors at the Coach Department (athletics, wrestling, tennis, basketball, etc.).

In order to fulfill the aim of the research we used tests recommended by Damjanovska et al. (2013) and tried out in rhythmic gymnastics (Damjanovska et al., 2015):

1. Four tests for assessment of coordination in rhythm were used and the results were recorded in number of cycles made in 20 sec.:
 - Frontal feet and hands hitting against a wall,
 - Feet and hands hitting (in a corner),
 - Jumps in four squares,
 - Cross jumps in four squares.
2. Two tests for agility were used and the results were given an account of during the execution:
 - Sideward running 10x5 meters,
 - „T“- test.

Each test was executed three times. We allowed for a short elaboration of the movements in the beginning. However, we did not let the subjects learn them well. The results from all tests were recorded in a preliminarily prepared individual form for each participant in the research. In the end, the best achievement was highlighted.

Math-statistical methods:

Correlation analysis

Mean, SD and d – for statistical significance of the differences.

RESULTS

In order to establish the statistically significant relations between the variables for coordination in rhythm and agility we used a correlation analysis.

The results and the growth are shown in table 1. The coefficients of correlation between the results from the applied tests are shown in Tables 2 and 3.

Table 1. Results of the two groups – gymnastics and other sports

Test	group	N	Mean	SD	d	Z (U)	Sig.
Frontal feet and hands hitting against a wall	gymnastics	35	10.2	3.16	5.79	6.673	0.000
	other sports	37	4.41	2.047			
Jumps in four squares	gymnastics	35	7.23	1.896	0.34	0.953	0.341
	other sports	37	6.89	1.696			
Cross jumps in four squares	gymnastics	35	7.09	2.092	0.66	1.161	0.246
	other sports	37	6.43	2.544			
Feet and hands hitting (in a corner)	gymnastics	35	10.6	3.031	2.36	2.806	0.005
	other sports	37	8.24	3.345			
ILINOIS	gymnastics	35	22.32	2.29	1.587922	2.563	0.01
	other sports	37	20.73	2.11			
t_6	gymnastics	35	14.28	1.06	-0.10573	0.868	0.386
	other sports	37	14.39	1.29			

Table 2. Correlation analysis between the indexes of coordination in rhythm and agility – gymnastics

Female gymnasts	Frontal feet and hands hitting against a wall	Jumps in four squares	Cross jumps in four squares	Feet and hands hitting (in a corner)	ILINOIS	t_6
Frontal feet and hands hitting against a wall	1					
Jumps in four squares	0.267	1				
Cross jumps in four squares	0.175	.707**	1			
Feet and hands hitting (in a corner)	.423*	.441**	.465**	1		
ILINOIS	0.315	-0.109	-0.108	0.08	1	
t_6	.378*	-0.021	-0.172	0.22	.702**	1

Table 3. Correlation analysis between the indexes of coordination in rhythm and agility – other sports

Female athletes – other sports	Frontal feet and hands hitting against a wall	Jumps in four squares	Cross jumps in four squares	Feet and hands hitting (in a corner)	ILINOIS	t_6
Frontal feet and hands hitting against a wall	1					
Jumps in four squares	-0,139	1				
Cross jumps in four squares	,563**	,468**	1			
Feet and hands hitting (in a corner)	0,306	,401*	,500**	1		
ILINOIS	-0,004	-0,007	0,166	-0,165	1	
t_6	0,058	0,08	0,105	0,033	,684**	1

DISCUSSION

The mean values of the results show the gymnasts' tendency to perform better in coordination in rhythm tests. There are more significant differences in the tests where the movements are executed

simultaneously with legs and arms regardless that both the rhythm of movements and the sequence of movements change. In the test – Frontal feet and hands hitting against a wall, $d = 5.79$ ($d > 0.8$, Sig. < 0.05) and in the test feet and hands hitting (in a corner) $d = 2.36$ ($d > 0.8$, Sig. < 0.05). The achieved 10.2 cycles for 20 sec. are indicative of good and accurate execution of the movements, because one cycle consists of 8 steps and actually, this result shows that the gymnasts make about 81.6 quick steps, and their peers from the other sports manage to make about 35.28 steps. In one of the tests the arm movements are twice as quick as those of the legs and with smaller amplitude, which corresponds to half a note and two following quarters of notes, according to the musical symbols. The gymnasts have perfected such exercises typical for rhythmic gymnastics mostly in the play with apparatuses when the combination of body and apparatus exercises require broader movements with bigger amplitude (jumps, travelling, broad steps) and quicker movements with smaller amplitude with the apparatus (small circles, spins, snakes, spirals, and windmills). The athletes practicing other kinds of sports show lower results in the tests requiring execution of movements with different rhythmical structure with lower and upper limbs. The results from the correlation analysis support this finding – with the gymnasts the correlation between these two tests is moderate 0.423.

The results from the other two tests for coordination in rhythm – Jumps in four squares and Cross jumps in four squares – correlate to a very great extent with the gymnasts (.707**) and moderately with the athletes from the other sports. The different kinds of running in athletics and locomotion in basketball, tennis and volleyball correspond to the inner rhythm of the athletes, but the execution of a number of rhythmical steps with musical accompaniment in competitive routines definitely helps the gymnasts' perfection of the coordination in rhythm. Rhythmical steps and musical accompaniment are two fixed components of rhythmic gymnastics imposed by the competitive rules. Music, in turn, is the only means which measures time accurately and enables to determine the duration of the different phases of gymnastics exercises in the same way during each performance. The everyday use of musical accompaniment in the education-training process, in our opinion, is one of the reasons why the gymnasts' rhythmical execution of movements with legs is better than that of their peers from the other sports.

The results from the test feet and hands hitting (in a corner) – correlate moderately with the other tests for coordination in rhythm with the gymnasts (.423*, .441**, .465**), and in the other group of researched individuals – only with two of the tests (.401*, .500**).

The results from the tests for agility correlate with each other with the gymnasts to a great extent (.702**), and moderately with the athletes practicing other kinds of sports (.684**).

The coefficients of correlation of the tests for agility do not show any dependence on the tests for coordination in rhythm with both groups of subjects. The moderate correlation dependence between the tests frontal feet and hands hitting against a wall and_6 with one of the groups – those practicing rhythmic gymnastics (.378*) is an exception.

Rhythmic gymnastics as motor activity belongs to sports disciplines based on an original way of interpretation of preliminarily set or familiar motor sample (Miletić et al., 2007). In conclusion, we can say that rhythmic gymnasts do not find much difficulty in the tests applied. That is why, in order to assess the coordination in rhythm and agility with gymnasts, we should look for additional factors (anthropometric data, sports experience, etc.) which will enrich the research.

References

- Bompa, T. (2006). Total training for Young Champions. *Human Kinetics*, p.43.
- Damjanovska, M., Gontarev, S. & Radisavljevic, L. (2013). Determination of measurement characteristics for rhythmic skills assesment tests. *Conference proceedings, Effects Of Physical Activiti Application to Anthropological Status With Children, Youth and Adults*. Univezrzitet u Beogradu, Fakultet sporta I fizickog vaspitanja, 11-12 decembar, Beograd.
- Damjanovska, M., Gontarev, S., Rhedzepe, A. & Gantcheva, G. (2015). Comparing reliability and validity of some tests with classic and image model of assesment rhythmic ability. Sborník příspěvků z mezinárodní vědecké conference. *Evropské Pedagogické Fórum*, 23-27.11. Vol. V. ISBN 978-80-87952-11-5 Hardek Králové, Česká Republika.
- Dimitrova, B. (2015). Coordination abilities and selection in gymnastics. *Activities in Physical Education and Sport*. Vol. 5, No.2, pp. 214-243.
- Gantcheva, G. (2017). Survey of the difficulty-composition relation with the ensembles in Rhythmic gymnastics, *Research in kinesiology, International Journal of Kinesiology and Other Related Sciences*, Federation of the Sports Pedagogues of the Republic of Macedonia, Skopje, 7-9.
- Hadjiev, N. at al. (2011). *Gymnastics – physical preparation*, NSA PRESS, Sofia, pp. 101-115.
- Hafe, R.A. (2016). Impact of coordination abilities program on accuracy and speed in rhythmic gymnastics. *Science, Movement and Health*, Vol. XVI, ISSUE 16 (2), 141-146.
- Jastrjembkaja, N. & Titov, Y. (1999). *Rhythmic Gymnastics*. *Human Kinetics*, UK.
- Karpenko, L.A. (2003). *Rhythmic Gymnastics. Textbook*. Russian Federation of Rhythmic Gymnastics (RFRG), State Academy of Physical Culture, St. Petersburg (SPGAFK) “P. F. Lesgaft”, Moscow.
- Macovei, S. (2006). Balance – technical requirement and specific motor quality – from theory to practice. *International Meeting on Rhythmic Gymnastics: identity and sports issues*. Torino. Italy. pp. 46-55.
- Miletić, Đ., Jeličić, M. & Oreb, G. (2007). The effects of a visual model and knowledge of performance on dance skills, *Kinesiologia, Slovenica*, 13(1), pp. 31-40.
- Viner-Usmanova, I.A. (2015). *Theory and methods of rhythmic gymnastics – artistry and its development*. SPORT, Moscow.