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Features of manifestation of speed-force abilities by young gymnasts and acrobats

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Abstract

Purpose: To determine the necessity of using the system-structural approach in the development of speed-force abilities of athletes of complex-coordination sports taking into account the specificity of a particular type of sports activity.

Methods: Analysis and generalization of literature data, analysis of competitive activity using request monitoring methods, forecasting and modeling based on expert eval uation, instrumental research methods and methods of mathematical statistic.

Results: The level of technical fitness of female athletes in each type of gymnastics was assessed by 5 control and technical exercises that form the basis of basic technical training. Successful performance of each exercise was evaluated on a 5-point scale, taking into account the magnitude and number of errors made, determined in accordance with the rules of competition in a particular sport.

Conlcusion: There is a certain specialisation of speed-force abilities in accordance with the conditions of a particular sports activity. Therefore, emphasis on the most important types of abilities and selection of the 'minimum' that primarily affects the speed and quality of mastering speed-force exercises are required. This can be attributed to the second level of speed and strength training of female athletes. Such a two-level characteristic of speed-force training of female athletes is logical and reasonable for the organisation of special physical training in three types of gymnastics and presumably valid for a wide range of complex-coordination sports.

Keywords: training sessions, technical actions, technical actions, control tasks, structural complexity, physical qualities, ability.

Introduction

According to L.Y. Arkaev, N.G. Suchilin (1), V.N. Platonov (5), M.N. Umarov, A.K. Eshtaev (6), most complex-coordination sports are associated with the need to master a wide range of technical actions characterised by structural complexity and a variety of conditions for their performance. This, in turn, requires athletes to display appropriate physical qualities and abilities (2,3). At the same time, in the process of long-term sports training, the problem of 'time limit' is clearly indicated, which has two aspects. On the one hand, in the process of training sessions, a large number of pedagogical tasks are simultaneously solved, which complicates the training of athletes and increases the time of solving each task. On the other hand, when solving each task to minimise the efforts of the athlete and coach and improve the sports result it is necessary to apply effective and adequate means and methods, which ultimately can improve the organisation and methodology of the training process (2,3,4,5). In particular, as it seems to us, one of the important issues for sports theory and practice is the organisation of the process of physical training of athletes, which along with other factors provides a high sports result (1,2,3,4,5). For sports types of gymnastics the level of speed and strength training of athletes is of special importance, because gymnasts in a relatively short period of time need to master a large number of movements of this nature. The peculiarities of display of speed-force abilities by athletes of different types of gymnastics are connected with a great variety of technical actions, which are determined by the conditions of movement execution, structural characteristics, spatial orientation, the degree of functional tension, combinability and other features (1,6,7).

Results and discussion

In this connection, the research of speed-force abilities of 'wide profile' and peculiarities of their manifestation by young athletes of 10-12 years old in artistic and rhythmic gymnastics and jumping acrobatics was carried out. There were 25 female athletes in each group. The nature of their educational and training work was determined by the tasks of the stages of initial and advanced specialised training, namely the mastering of a wide range of speed and strength exercises. Skills of sportswomen in the process of pedagogical testing were evaluated according to the results of performing 10 motor tasks. They were grouped into four types of actions: 'single', "repeated", "combined" and "prolonged". In testing each type of actions, typical features were identified. For single and repeated actions - pushing off with hands and feet, bending and extending the torso

(tasks 2 and 5, 1 and 4, 3 and 6, respectively); for combined actions - combinations of hand movements with dumbbells weighing 0.5 kg, body link movements with a change in spatial orientation and a combination of tennis ball throwing movements with additional movements of different complexity (tasks 7, 8 and 9). 'Prolonged actions' in the test were represented by the maximum number of tempo jumps - "swoops and jumps from a 40 cm high mat slide".

The level of technical fitness of female athletes in each type of gymnastics was assessed by 5 control and technical exercises that form the basis of basic technical training. Successful performance of each exercise was evaluated on a 5-point scale, taking into account the magnitude and number of errors made, determined in accordance with the rules of competition in a particular sport. An indicator of the level of technical fitness of female athletes was the average value of allowances for the performance of all control exercises.

Table 1. Average indices of speed and strength abilities manifestation young athletes

Control tasks (actions)		Types of gymnastics		
		Sports	*Acrobatics*	*Rhytmic (artistic)*
"Singles" (cm)	1	38,2±0,48	37,9±0,81	31,7±0,66
	2	21,6±0,76	17,3±0,64	13,4±0,51
	3	79,1 ± 1,5	76,3 ± 1,9	52,0±1,3
"Repeaters" (count)	4	24,7±0,41	25,5±0,51	22,7±0,51
	5	21,9±0,66	18,7±0,66	14,2±0,61
	6	15,2 ± 0,41	12,6 ± 0,46	12,0±0,31
"Combined" (points)	7	4,0±0,20	5,5±0,25	5,9±0,20
	8	3,9±0,15	3,6±0,15	3,95±0,15
	9	4,9 ± 0,20	5,5 ± 0,20	4,1± 0,20
"The Longer ones" (sec)	10	77,5 ± 8,1	64,5 ± 1,34	84,9±1,8

Thefindings highlight the following salient points:

1. The gymnasts' performance of "single" actions according to the average values of the three tasks is noticeably higher than that of acrobats (by 8.1%) and artists (by 29.7%), with large variations in the values of each of the three tasks (Tables 1 and 2). The advantage of acrobats over female artists is observed in all cases (in three tasks) ranging from 16.0% (leg actions) to 31.8% (trunk actions) at a reliable level of significance.

For actions of the 'repeated' type, the differences in the success rates of the athletes of the three gymnastic specialisations are generally of the same nature as in the case of 'single' actions. The similar ratio of indicators is characteristic for all pair comparisons (actions of separate body parts), except for torso movements of acrobats and artists, where there are no reliable differences. In other words, in general, the advantage of gymnasts over acrobats and the latter over artists in the manifestation of abilities to perform speed-force actions of 'single' and 'repeated' types by different body parts, determined by the specificity of the sport, is confirmed.

2. Certain differences are observed in the performance of 'combined' actions by the athletes of the three types of gymnastics: a) the combination of movements of the arms with an aggravation is more successfully performed by gymnasts in comparison with other athletes: the error of accuracy of their performance of the task is 37.5% less than that of acrobats, and 47.5% less than that of artists; b) differences in the success rate of successive actions of flexion-flexion character with a change of spatial orientation in athletes of three types of gymnastics are less pronounced in comparison with the previous task (hand movements), but nevertheless the accuracy of acrobats is 7.7% higher than that of gymnasts and 9.7% higher than that of artists, with $p<0.05$; c) the accuracy of performing 'throwing' movements with a tennis ball is better in female artists: by 16.3% compared to gymnasts and by 25.4% compared to acrobats.

In other words, different types of 'combined' actions of speed-force character show the specificity of motor activity in one or another sports specialisation. The expediency of evaluation of these abilities in such actions requires the conformity of control tasks and the

Table 2. **Relative differences of speed-force ability indices of three types of gymnastics, %**

Control tasks (actions)		Types of gymnastics		
		Sports	*Acrobatics*	*Rhytmic (artistic)*
"Singles" (cm)	1	0,8 > 0,05	17,0 < 0,01	16,0 < 0,01
	2	19,9 < 0,01	37,9 < 0,01	22,5 < 0,01
	3	3,5 > 0,05	34,3 < 0,01	31,8 < 0,01
"Repeaters" (count)	4	3,2 > 0,05	8,1 < 0,01	10,9 < 0,01
	5	14,6 < 0,01	35,2 < 0,01	24,1 < 0,01
	6	17,1 < 0,01	21,1 < 0,01	4,8 < 0,05
"Combined" (points)	7	37,5 < 0,01	47,5 < 0,01	7,3 < 0,05
	8	7,7 < 0,05	1,3 > 0,05	9,7< 0,05
	9	12,2 < 0,05	16,3 < 0,05	25,4 < 0,01
"The Longer ones" (sec)	10	16,8 < 0,01	9,5 < 0,01	30,4 < 0,01

peculiarities of basic technical actions in one of the three gymnastic specialisations.

3. The results of performance of speed-force actions 'up to refusal' (prolonged work) testify that female artists are able to perform jumps longer than other sportswomen, and in comparison with gymnasts by 9,5%, and with acrobats by 30,4%. The advantage of gymnasts over acrobats in this indicator is 16.8%.

This type of motor actions allows to estimate one of the types of speed-force abilities manifestation and characterises functional capabilities of female athletes, i.e. this control exercise can be referred to the group of universal exercises. Possibilities of performance of speed -force actions with the setting on long-term work at sportswomen of three kinds of gymnastics are different and are determined first of all by time limits of motor activity, inherent to a concrete kind of sport. Therefore, the degree of significance of this type of abilities for female athletes of the compared gymnastics types is not the same: for artists - high, for gymnasts - average, and for acrobats - insignificant.

4. The level of development of speed-force abilities at performance of actions of different character correlates with a point estimation of a level of technical preparedness of athletes of three gymnastic specialisations. Positive correlation coefficients between these indicators confirm the existence of interrelation between all types of movements and each type of gymnastics (tab. 3).

At the general evaluation of abilities in each type of movements (by the average of 3 indicators) some specificity of connections is shown: a) for gymnasts, 'combined' actions are more significant (rank correlation coefficient 0.78) and 'single' actions are less significant, while 'repeated' and 'prolonged' have a low coefficient: 0.38 and 0.32 respectively; b) acrobats are characterised by a medium degree of correlation in 'single' and 'repeated' actions and low in 'combined' and 'prolonged': 0.39 and 0.34 respectively; c) for female artists, the degree of correlation is characterised by 'combined' actions due to the significance of 'throwing' movements (0.78), and the correla-

Table 3. **Correlations between the score assessment of technical actions of young female athletes and the average rank index of manifestations of speed and strength abilities**

Виды проявления способностей к действиям	Types of gymnastics		
	Sports	*Acrobatics*	*Rhytmic (artistic)*
"Singles" (cm)	0,48 0,05	0,56 < 0,01	0,36 0,05
"Repeaters" (count)	0,38 0,05	0,57 0,01	0,57 < 0,01
"Combined" (points)	0,78 0,01	0,39 0,05	0,74 0,01
"The Longer ones" (sec)	0,320,05	0,340,05	0,44 0,05

tion coefficients of 'repeated' and 'prolonged' actions are 0.57 and 0.44 respectively. Consequently, the presence of correlation between the level of technical fitness and the level of manifestation of speed and strength abilities by athletes of three types of gymnastics determines the overall high significance of these abilities for their technical improvement.

In addition, the specificity of interrelations in the estimation of average indices for typical motor actions (4 types) and for each control exercise (10 tasks) indicates a different degree of significance of varieties of speed-force abilities when performing movements with different body parts.

Conclusion

The analysis of peculiarities of manifestation of speed-force abilities by young sportswomen of three types of gymnastics allows to reveal some important regularities of their realisation at mastering of motor actions. The 'common basic basis' of the manifestation of speed-force abilities by athletes of three types of gymnastics with a wide profile of motor actions turns out to be significant. In other words, in gymnastics the complex evaluation of these abilities is important, regardless of the type of gymnastics, which can be conditionally called the 'first level' of speed-force preparation of female athletes.

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