Journal of Physical Education and Sport ® (JPES), 14(1), Art 212, pp. 1340 - 1347, 2014
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Special physical training program in rhythmic gymnastics group exercises

LENYSHYN VICTORIA[1], SOSINA VALENTINA[2], OSADTSIV TARAS[3], RUDA IRYNA[4], PROTSENKO ULYANA[5]
[1,2,3,4,5] Lviv State University of Physical Culture, UKRAINE

Published online: December 28, 2016
(Accepted for publication December 20, 2016)
DOI:10.7752/jpes.2016.04212

Abstract:
Group exercises are the most difficult type of competitive gymnastics program because they differ from an individual ones by a number of specific features such as longer, more complex and dynamic composition that is simultaneously performed by five gymnasts; a variety of athletes' movement interactions; synchronous and asynchronous movements performance done by every team member; using two different forms of hand apparatus and others. Excellent results in group exercises are possible only in terms of maximum consistency of motor actions due to athletes' compatibility according to the basic parameters of technical and physical fitness. This distinguishes the process of preparing athletes who specialize in individual and group exercise program [1], hence the need to find scientifically grounded approach to the training system.
Key words: rhythmic gymnastic, group exercises, special physical fitness, compatibility.

Introduction

Group exercises are the most difficult type of competitive gymnastics program because they differ from an individual ones by a number of specific features such as longer, more complex and dynamic composition that is simultaneously performed by five gymnasts; a variety of athletes' movement interactions; synchronous and asynchronous movements performance done by every team member; using two different forms of hand apparatus and others. Excellent results in group exercises are possible only in terms of maximum consistency of motor actions due to athletes' compatibility according to the basic parameters of technical and physical fitness. This distinguishes the process of preparing athletes who specialize in individual and group exercise program [1], hence the need to find scientifically grounded approach to the training system. The problem of training athletes who perform individual programs in rhythmic gymnastics is rather thoroughly studied and described in the scientific and methodological literature (I. V. Tsepelyevych, 2007, Ye. V. Pavlova, 2008; V. Ye. Andrejeva, 2010, O. P. Vlasova, 2010), but the problem of improving the preparation process of gymnasts who specialize in group exercises is nowadays studied insufficiently. Preferably, these studies refer to the technical readiness of gymnasts in group exercises (N. A. Shevchuk, 2005; T. M. Miroshnichenko, 2006; I. S. Semibratova, 2007), the selection of athletes in teams on various parameters (T. V. Nesterova, O. S. Kozhanova, 2011), mental compatibility in the team (I. V. Bystrova, 2008; T. V. Nesterova, O. S. Kozhanova, 2010), sports selection and orientation of the gymnasts in group exercises during the initial and preliminary basic training (I. S, Sivash, 2012), athletes' special endurance (Ye. A. Pirozhkova, 2011). According to the research conducted by T. V. Nestyerova and O .S. Kozhanova, it was found that the most significant impact on the competitive group exercises result in a level of physical, technical and psychological preparedness, and for the selection of a team the factor of compatibility is of paramount importance.

In this regard, the issue of special physical training (SPT) improving in view of the factor of compatibility of gymnasts who specialize in group exercises is important.

Research methods

For the task were used theoretical analysis and synthesis, sociological methods (questionnaire, analysis of documentary materials), method of expert evaluation, pedagogical observation (testing of special physical fitness, individual indicators of technical training,, analysis of competitive activity, pedagogical observation in training) , methods of obtaining empirical data, pedagogical experiment, methods of mathematical statistics.

Results

Preparation of gymnasts for the competition according to the program of rhythmic gymnastics group exercises requires special consideration due to the specificity of both the exercises and technique of group interactions. Comparative analysis of refereeing of rhythmic gymnastics group and individual exercises allowed identifying the most significant differences in the evaluation of athletes' performances, hence the need for a differentiated approach to their training. An error of a single or several gymnasts leads to an imbalance in the

Corresponding Author LENYSHYN VICTORIA, E-mail: vikollena1991@mail.ru

whole composition, which in its turn leads to a fail of teamwork. In this regard the preparation of gymnasts specializing in group exercises special attention should be paid to the coordination of collective actions, and the achievements are associated with optimum athletes' compatibility in terms of physical, technical and other types of training.

Having carried out a survey of gymnastics coaches and skilled athletes who specialize in group exercises, we have obtained the data indicating the absence of a common approach to the methods of SPT gymnasts. The biggest differences among the coaches raise the questions about the time, place and means of SPT gymnasts. The responses of gymnasts deal with the major differences regarding the content, sequence and intensity of SPT systems performance and the need for individual approach to the development of individual SPQ. Analysis of coaches and qualified gymnasts' responses revealed leading SPQ in order of their significance (Table. 1). According to respondents' opinion, there are significant differences between the SPQ structures that determine athletes' performances in both individual program and group exercise program.

Table 1. Major SPQ that limit the success of the performances of gymnasts in rhythmic gymnastics group and individual exercises (based on a survey of qualified coaches and gymnasts)

	Group exercises		Individual exercises	
№	SPQ	Respondents' opinions consistency	SPQ	Respondents' opinions consistency
1	Coordination abilities	2.4%	Active flexibility	2.3%
2	Special endurance	2.6%	Coordination abilities	3.3%
3	Power-speed endurance	3.8%	Special endurance	4.7%
4	Active flexibility	3.9%	Jumping	4.7%
5	Speed	4.9%	Passive flexibility	4.8%
6	Passive flexibility	5.4%	Balance	5.3%
7	Jumping	6.3%	Power-speed endurance	5.7%
8	Balance	7.2%	Speed	5.9%
9	Static power	8.1%	Static power	7.7%

Note: n = 23; n = 34

The analysis of errors made by skilled athletes according to the performance results in four the most prestigious competitions of the season in 2013 shows that the largest number of errors - 60 and 62 (56.0% of total) is made by gymnasts in synchronized performance of motor interactions, then goes a drop of an object - 22 and 21 (19.7%), the third place is taken by rhythm fails - 17 and 24 (18.8%) and the least number of errors is associated with the loss of balance or disequilibrium - 6 (5.5%) in each type of program; (Table. 2).

Table 2. Types of errors made by world top gymnasts in the rhythmic gymnastics group exercises

Type of a program	Team Kind of an error (drops, fails)	RUS	BUL	BLR	ESP	SUI	UKR	AZE	ITA	Total
5× 	hand apparatus	5	2	2	2	2	3	4	2	22
	balance	1	0	0	1	0	1	2	1	6
	synchronicity	8	6	7	6	8	6	11	10	62
	rhythm	4	1	1	1	1	2	5	2	17
	errors total	18	9	10	10	11	12	22	15	107
3× 	hand apparatus	4	1	2	1	1	8	0	4	21
	balance	0	2	2	0	0	1	1	0	6
	synchronicity	5	7	9	4	8	10	10	7	60
2× 	rhythm	2	0	3	1	4	6	4	4	24
	errors total	11	10	16	6	13	25	15	15	111

To analyze the errors that qualified gymnasts commit in different parts of a composition the exercise was conditionally divided into 3 parts, duration of each part was 50 sec. The analysis of errors committed by world top gymnasts shows that the largest number of faults was recorded in the third part of the composition: the exercise with clubs - 47 errors (43.5% of total); 3 balls and 2 ribbons - 49 errors (44.1%); (Table. 3).

The analysis of errors committed by world top gymnasts in rhythmic gymnastics group exercises allowed us to say that almost all of them directly or indirectly are associated with the insufficient coordination abilities. The character and the total number of errors in three parts of the composition indicate insufficient expression of coordination and composition endurance, which is reflected primarily in the synchronization performance of motor interactions, precision while manipulations with an object, maintaining the rhythm of

performance, as well as performance quality of balance elements which significantly go down in the third part of the exercise.

Table 3. The types and number of errors committed by world top gymnasts in rhythmic gymnastics group exercises

Kind of an error (drops, fails)	Type of Program 5 × Part of the exercise			3 ×  2 ×  Part of the exercise			Number of errors (%)
	I	II	III	I	II	III	Σ
Hand apparatus	10	6	7	4	8	9	20.0
Balance	3	2	1	0	2	4	5.5
Synchronicity	13	20	29	17	18	24	55.3
Rhythm	3	4	10	5	8	12	19.2
Total	29	32	47	26	36	49	-

As a result of testing of SPQ level it was found that, in spite of high achievements of the athletes in the national team of Ukraine, some minor variations occurred (17.1%). The disturbing point is that the highest level of variation occurs during the performance of tests where a limb is not leading. The obtained data can be explained by the fact that the vast majority of technical actions are carried out in one direction with a leading arm or leg and causes a clearly expressed functional asymmetry (from 0% to 32%), as well it can be explained by the lack of corrective and preventive measures in the system of special physical training .

The analysis of the test conducted among gymnasts in group exercises in Lviv region allows us to mark a low level of SPQ (89.5% of the indices) with considerable variability of indices in the group (from 4.8% to 59.2%). Lack of compatibility among gymnasts connected with the development of main special physical qualities affects the synchronization of team motor coordination interactions and collective solving the problems.

The results of correlation analysis of technical and special physical fitness indices of athletes who specialize in group exercises show that the number of significant relationships (from $p \leq 0.05$ to $p \leq 0.001$) between the results of the technical performance of exercises with different objects and level of athletes' SPQ in the National team of Ukraine was 34 ones. Speed qualities and coordination abilities indices have the intense statistical correlation with the results of technical readiness. The number of reliable interconnections between the results of the technical action and the level of development of special physical qualities of Lviv region team gymnasts was 27 ones. The strong statistical correlation was found between the performance of technical actions with different forms of hand apparatus and indices of coordination abilities. As a result of the correlation analysis the greatest number of significant relationships were found between technical readiness indices and coordination abilities of athletes (in the National team of Ukraine - 15, Lviv region - 13), which confirms their importance for achieving high results in the competitive group exercises in modern rhythmic gymnastics.

To determine the leading indices of special physical training we used a factor analysis method. It was established that at the different stages of long-term training in rhythmic gymnastics group exercises, a special physical training structure is influenced by training and competitive pressure. The research allowed us to determine the factor structure of special physical training of athletes specializing in group exercises. During the preparation for higher achievements and to realize individual potential the factor structure of athletes' special physical training is represented by the following factors: "Ability to orientation in space and time" (42.1%); "Coordination and compositional stamina and anticipation" (15.5%) and "Flexibility" - (10.1% of the variance); (Tab. 4).

Table 4 Major indices of athletes' special physical training in the National team of Ukraine on rhythmic gymnastics group exercises

Stage of training for high achievements, stage of fulfillment of individual potential				**Stage of specialized basic training**			
F	%	Indices	r	F	%	Indices	r
F1	**(42.1%)**	Movement frequency in wrist joint	0.91	**F1**	**(38.8%)**	Movement frequency in wrist joint	0.84
		Sense of time	0.88				
		Sense of space	0.84			Dynamic strength of back muscles	0.82
		Reaction to moving object	0.83				
		Total frequency rate of backward bents standing on one leg, the other one up	0.69			Static equilibrium	0.81

		Passive mobility of the spine while unbending	0.62				
		Accuracy of ballistic movements	0.56			Total index of dynamic strength of leg muscles	0.81
		Endurance of abdominal muscles	0.51				
		Reaction expectance	0.87				
F2	**(15.5%)**	Coordination and composition stamina	0.71	**F2**	**(15.5%)**	Explosive strength of leg muscles	0.90
F3	**(10.1%)**	Total passive mobility of the hip joint (right)	0.72	**F3**	**(13.4%)**	Rhythm ability	0.84

At the stage of specialized basic training there are three factors. The first factor combines four indices and was called "Dynamic strength and coordination" (38.8%); the second factor (15.5%) included an index of explosive strength of leg muscles and got the same name; the third factor (13.4%) - "Rhythm ability" (Table. 4).

As a result of previously conducted studies, we developed the SPT program considering the factor of compatibility on the stage of specialized basic training in group exercise, where the structural elements are the goal, objectives, specific didactic principles of sports training and physical education, as well as factors that influence the effectiveness of its implementation. The program was the selection of appropriately designed measures, techniques and teaching methods aimed at ensuring a gradual and systematic improvement of athletes' special physical training. Solving the authors' program tasks covered three periods of athletic training:

preparatory, competitive and transition ones (Figure 1), [3].

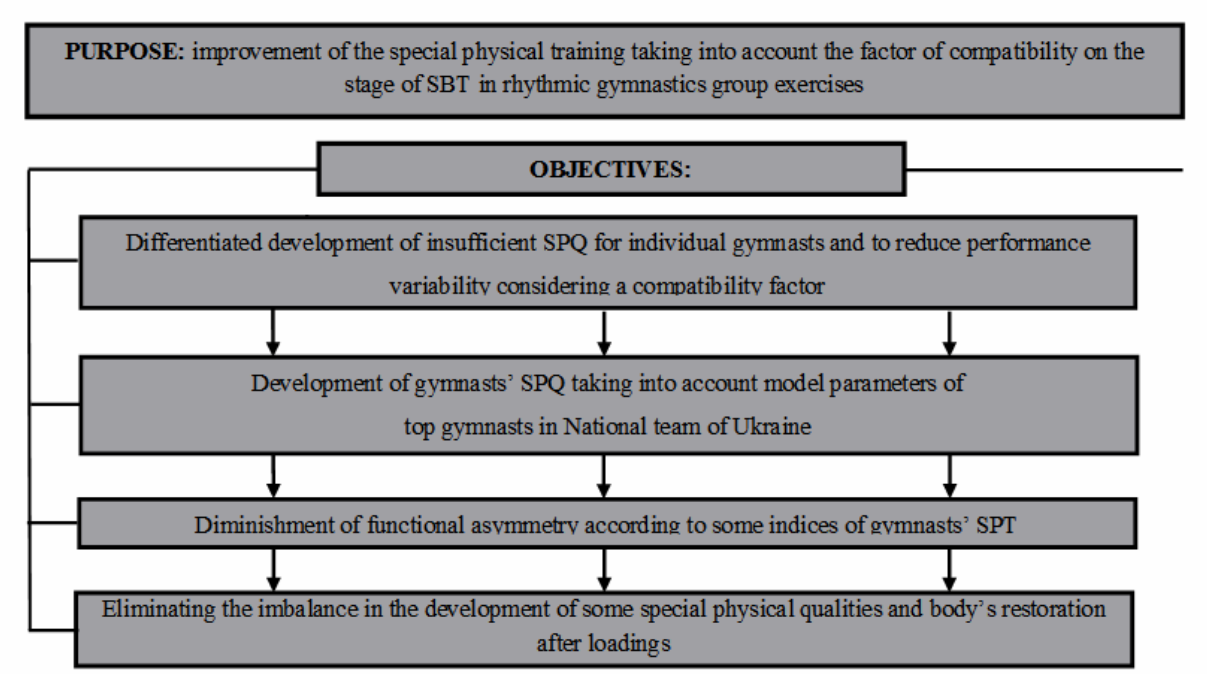


Fig. 1. The purpose and objectives of the special physical training taking into account the factor of compatibility on the stage of specialized basic training in rhythmic gymnastics group exercises

SPT at the general training phase was focused on the differentiated development of insufficient SPQ for individual gymnasts and to reduce performance variability considering a compatibility factor. For this purpose we defined SPQ levels for gymnasts of Lviv region team on group exercises and identified those levels that were of low and below the average ones. An individual SPT plan was developed for each gymnast, which included the selection of measures and techniques necessary for the differentiated development of insufficient SPQ. After individual work at insufficient SPQ (25-35 min.) gymnasts practiced a 10-minute collective exercise SPT. To check solving problems during the general training phase there was conducted stage monitoring of the SPQ level of the gymnasts in Lviv region team. Tasks solved in special training phase included the development of gymnasts' SPQ taking into account special physical readiness structure and model parameters of athletes in National team of Ukraine, and diminishment of functional asymmetry. At this stage, the group and circular methods of SPQ development were used that allowed to achieve collective interactions consistency. At this stage complex exercises were carried out 6 times a week, their duration was from 35 min. to 45 min.

During a special training stage the main attention was paid to the SPQ development based on the results of factor analysis. So in terms of one workout 15-20 min. were paid to indices included in the first factor F1 (42.1%), 5-7 minutes were devoted to indices belonging to the second factor F2 (15.5%), the third factor F3

indices (10.1%) took from 3.30 min. to 4.30 min. The rest of the time was devoted to the SPQ development considering compatibility factors (tab. 5).

Table 5 Duration of SPT complexes at a week microcycle of a special training phase

Day of a microcycle	**SPQ development**	**actor**	**SPT complex duration (min.)**	
			35 - 45 min.	
			Methods	
			Group	Circular
Monday	Power-speed qualities	F1	15 - 20	20 - 25
Tuesday	Active and passive flexibilities, and power qualities	F1+F3	18.30 -24.30	16.30 – 20.30
Wednesday	Coordination abilities and speed	F1+F2	20 - 27	15 - 18
Thursday	Coordination abilities	F1+F2	20 - 27	15 - 18
Friday	Comprehensive training to develop power qualities flexibility	F1+F3	18.30 – 24.30	16.30 – 20.30
Saturday	Special (coordination and composition) endurance	F2	5 - 7	30 - 38
Sunday	Day off, rest			

The solution of the program previous objectives continued during the competitive period. The number of training sessions according to SPT program reduced from 6 to 5 per week due to the control competition connected with technical training on the 6th day of a microcycle; the duration of exercises for SPQ was reduced to 15 - 20 min. The development of coordination and composition stamina in competitive period occurred in the course of technical training through multiple competitive compositions performance, with decreasing of intervals for rest, the implementation of dual compositions and more.

To solve the problems, which included the provision of proper rest and preparation to the next cycle of sports training, it has been developed a separate set of corrective and preventive exercises that were aimed at correcting of posture violations, elimination of pain in different parts of the spine, correcting the effects of asymmetrical workout, eliminating the imbalance in strength and flexibility, recovery of the body after exercises and prevention of injuries of the musculoskeletal system. The exercises were practiced 4-5 times a week (35 min. - 45 min.). It has been established credible scientific evidences that suggest the effective development of gymnasts' SPQ in experimental group (EG) in Lviv region team as a result of introduction in the training process the authors' SPT program considering the compatibility factor in rhythmic gymnastics group exercises at the stage of specialized basic training. The gymnasts of Lviv region team, who were included in EG (11 people), showed that 26 test indices out of 38 ones were not significantly different from those of the National team of Ukraine ($p>0.05$); the gymnasts in control group (CG) (11 people) showed 19 such indices.

The implementation of SPT program into EG athletes' training caused significant improvement in active and passive mobility of the various joints (Fig. 2)

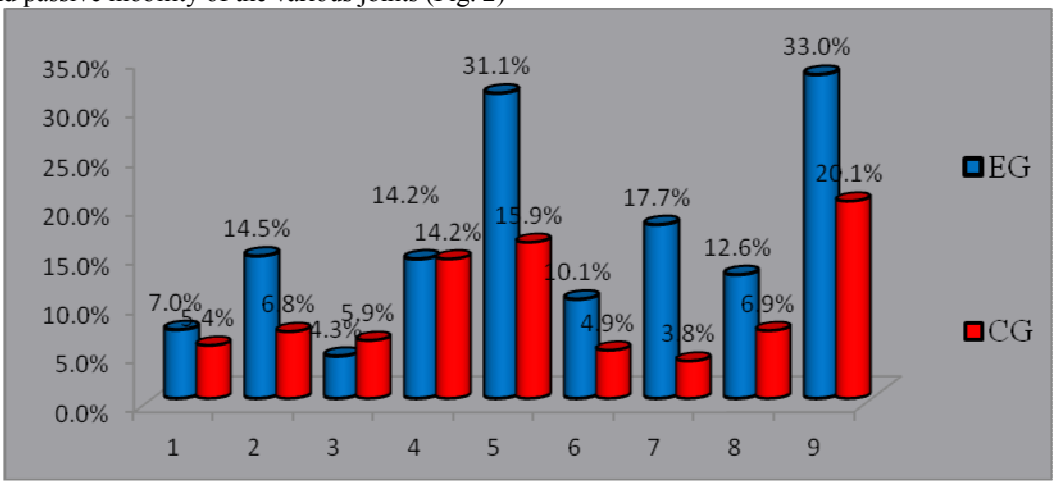


Fig. 2. Changes in indices of active and passive mobility of different joints of EG and CG gymnasts after the experiment (%).

Note: **1** - the average index of active mobility of hip joints of a right leg; **2** - average active mobility index of hip joints of a left leg; **3** - active mobility of the spine while bending; **4** - the mobility of the shoulder joints; **5** - passive mobility of the spine during unbending; **6** - the total passive mobility of hip joints (right split);

7 - the total passive mobility of hip joints (left split); **8** - the total passive mobility of hip joints (straight split); **9** - active mobility of the spine during unbending.

Changes in indices of coordination abilities of EG and CG gymnasts during the experiment are shown in Figure 3.

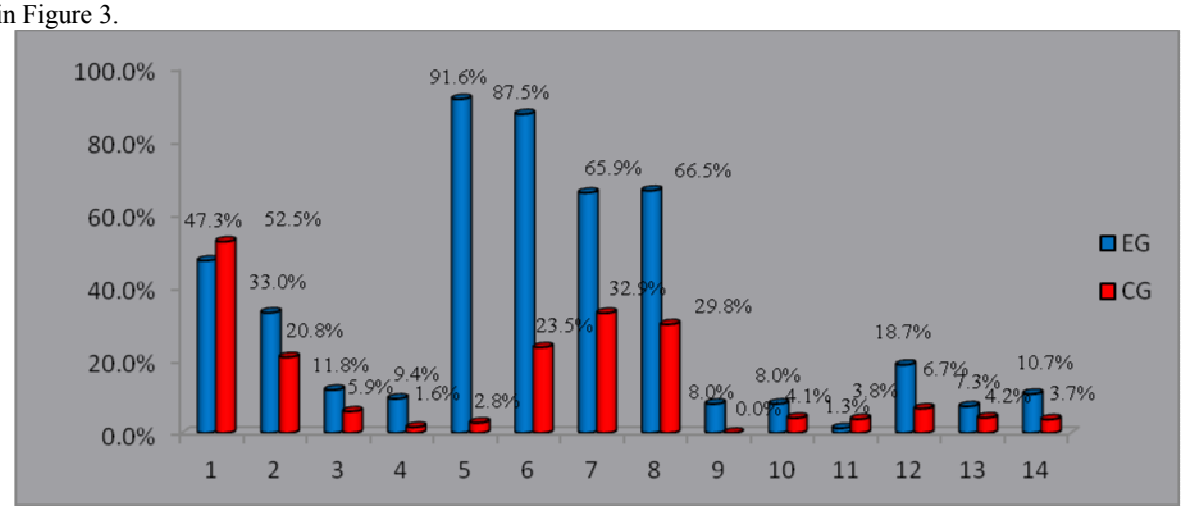


Fig. 3. Changes in indexes of coordination abilities of EG and CG gymnasts after the experiment (%).

Note: 1 - static equilibrium; **2** – static and kinetic stability; **3** – reaction of expectancy; **4** - rhythm ability; **5** - accuracy of ballistic movements by the left arm; **6** - accuracy of ballistic movements by the left arm; **7** - precision of spatial sensitivity (right arm cast); **8** - precision of spatial sensitivity (left arm cast); **9** - coordination and composition stamina; **10** - sense of time; **11** - simple reaction; **12** - reaction of "adjustment"; **13** - reaction to a moving object; **14** - sense of space

Advantages of the SPT program on the development of power-speed qualities are shown in Figure 4.

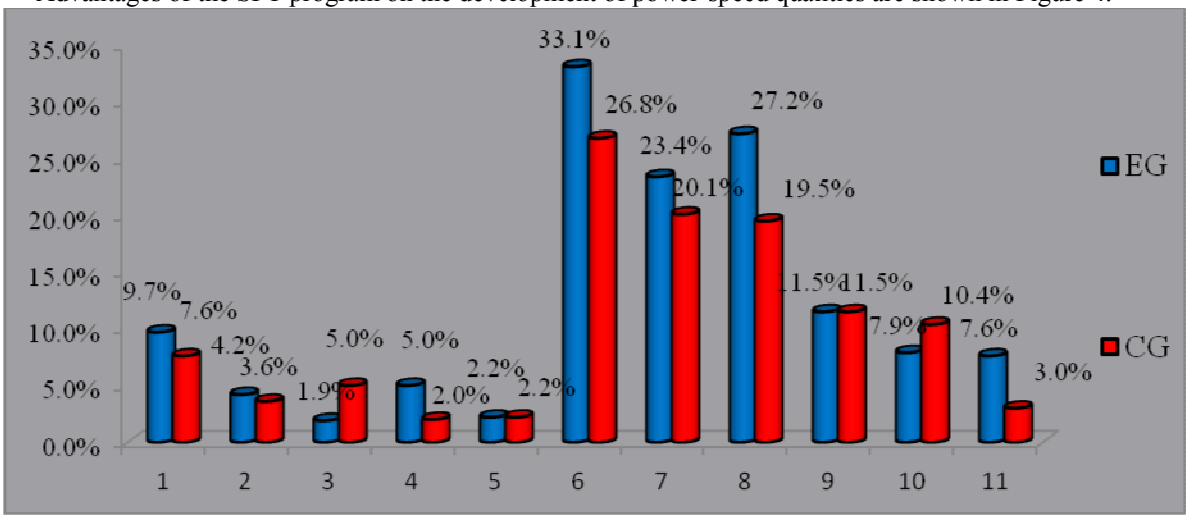
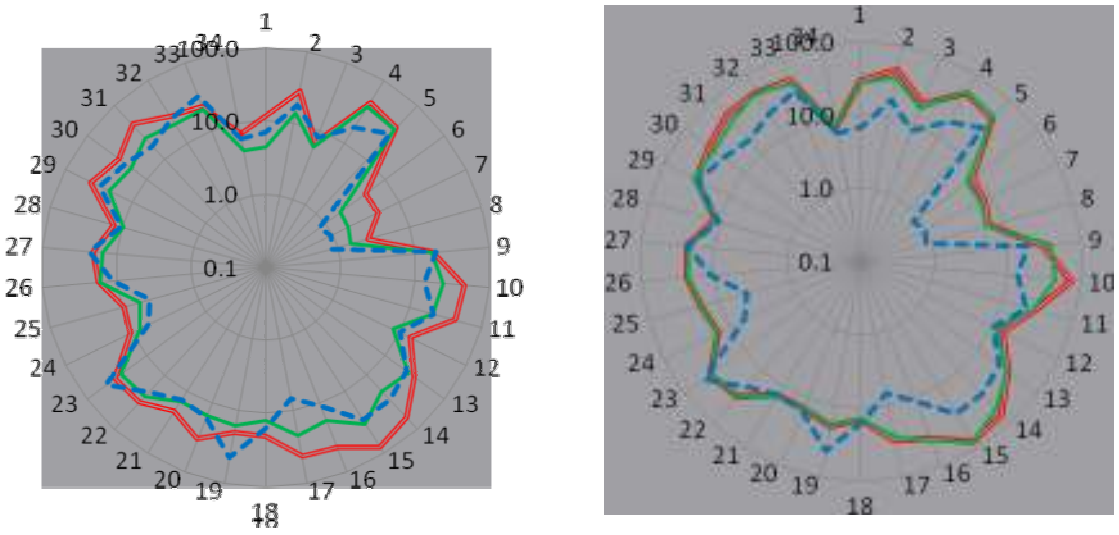


Fig. 4. Changes in power-speed quality indices in EG and CG gymnasts after the experiment (%).

Note: **1** - frequency of backward bents, standing on a left leg, a right one up; **2** - frequency of backward bents, standing on a right leg, a left one up; **3** - frequency of movements in wrist joints; **4** - dynamic power of arm muscles; **5** - dynamic power of back muscles; **6** - endurance of abdominal muscles; **7** - endurance of back muscles; **8** - dynamic power of abdominal muscles; **9** - dynamic power of a right leg; **10** - dynamic power of a left leg; **11** - explosive power of leg muscles

Use of the SPT program made it possible to reduce indices variation in special physical training of EG gymnasts in average from 27.1% (2.7% ÷ 78.6%) at the beginning to 16.6% (1.5% ÷ 37.5%) at the end of the experiment, which contributed to achieving compatibility of athletes as one of the factors of effective simultaneous, coordinated performance of motor interactions in rhythmic gymnastics group exercises. As a result of training by traditional methods in CG gymnasts' variability indices decreased from 31.2% (6.4% ÷ 78.1%) at the beginning of the experiment to 28.9% (5.9% ÷ 78.5%) at the end. Similar indices shown by the top gymnasts of the National team of Ukraine on rhythmic gymnastics group exercises were to 17.1% (Figure 5).



(a) (b)

Fig. 5. Variability parameters of special physical qualities of EG (a) and CG (b) athletes before and after the experiment, compared to model parameters of gymnasts in the National team of Ukraine:

Note: 1 □ active mobility of hip joints of the right leg; 2 □ active mobility of hip joints of the left leg; 3 □ active mobility of the spine while bending; 4 □ mobility of the shoulder joints; 5 □ passive mobility of the spine during unbending; 6 total passive mobility of the hip joints (right split); 7 □ total passive mobility of the hip joints (left split); 8 □ total passive mobility of the hip joints (straight split); 9 □ active mobility of the spine during unbending; 10 □ static equilibrium; 11 □ static and kinetic stability; 12 □ reaction expectancy; 13 □ rhythm ability; 14 □ accuracy of ballistic movements by the right arm; 15 □ accuracy of ballistic movements by the left arm; 16 □ precision of spatial sensitivity (right arm cast); 17 □ precision of spatial sensitivity (left arm cast); 18 □ coordination and composition stamina; 19 □ sense of time; 20 □ simple reaction; 21 □ - reaction of "adjustment"; 22 □ reaction to a moving object; 23 □ sense of space; 24 □ frequency of backward bents, standing on the left leg, the right one up; 25 – frequency of backward bents, standing on the right leg, the left one up; 26 – frequency movements in the wrist joints; 27 – dynamic power of arm muscles; 28 – dynamic power of back muscles; 29 – endurance of abdominal muscles; 30 – endurance of back muscles; 31 – dynamic power of abdominal muscles; 32 – dynamic power of the right leg; 33 – the dynamic power of the left leg; 34 – explosive power of leg muscles.

□ at the beginning of the experiment; □ at the end of the experiment; □ model indices

One of the purposes of the SPT program was to reduce severe motor functional asymmetry (MFA) as a factor that can lead to injuries and disorders of the musculoskeletal system [3]. Practical implementation of the integrated use of measures, methods and teaching techniques, as well as corrective and preventive measures offered by the program led to reduction in terms of AC indices: active (from 37.5% to 23.6%) and total passive mobility of the hip joints (from 9.1% to 2.2%), accuracy of ballistic movements (from 43.9% to 33.0%), precision of spatial and dynamic sensitivity (from 38.1% to 18.8%), frequency of backward bents (from 10.6% to 7.6%) and dynamic power of leg muscles (from 12.9% to 11.5%) and allowed to approach the model parameters, which ranged from 3.2% to 32.0% (Table . 6).

Table 6 MFA indices, according to the results of the tests performed by the right and left limbs, in gymnasts specializing in rhythmic gymnastics group exercises (AC%)

Indices		**CG**		**EG**		**Model indices**
		Before experiment	After experiment	Before experiment	After experiment	
Total passive mobility of the hip joints (ΣPMHJ)		9.1%	10.1%	9.1%	2.2%	3.2%
Active mobility of the hip joints (AMHJ)	forward	39.5%	40.0%	44.5%	23.6%	32.0%
	sideward	43.2%	41.1%	39.5%	27.3%	31.0%
	backward	46.1%	43.8%	28.6%	20.0%	9.3%
Accuracy of ballistic movements (ABM)		54.0	55.6%	43.9%	33.0%	26.7%
Precision of spatial and dynamic sensitivity (PSDS)		23.3%	27.7%	38.1%	18.8%	16.2%
Frequency of backward bents, standing on the one leg , the other one up (FB)		9.8%	12.6%	10.6%	7.6%	9.5%
Dynamic power of leg muscles (DPL)		17.7%	27.5%	12.9%	11.5%	23.0%

Use of the traditional methods of SPT, according to which KG gymnast were trained, indicates an increase in terms of AC: total passive mobility of the hip joints (from 9.1% to 10.1%), active mobility of the hip joints (from 39.5% to 40.0 %), accuracy of ballistic movements (from 54.0% to 55.6%), precision of spatial and dynamic sensitivity (from 23.3% to 27.7%), frequency of backward bents, standing on the one leg, the other one up (from 9. 8% to 12.6%) and dynamic power of leg muscles (from 17.7% to 27.5%), indicating the absence of specific measures aimed to the elimination of the effects of asymmetric training (see Table 6). The results obtained can be explained by the traditional specific training in group exercise where gymnasts perform a large number of synchronous and asynchronous actions with different forms of hand apparatus mainly by upper limbs. Lack of purposeful work that contributes to the improvement of performance, taking into account the factor of compatibility, affects not only the increasing variability of parameters, but also causes an increase in MFA.

Conclusions.

1. The research allowed us to determine the factor structure of special physical training of athletes in group exercises. At the stage of specialized basic training three factors were defined: "Dynamic power and coordination" (38.8%), "Explosive force of leg muscles" (15.5%) and "Rhythm ability" (13.4%). While preparation for high achievements and maximum realization of individual potential, the factor structure of athletes' special physical training was represented by the following factors: "Ability to orientation in time and space" (42.1%), "Coordination and composition stamina and anticipation" (15.5 %) and "Flexibility" (10.1% out of the variance). The data obtained indicate the difference between the structure of special physical training of gymnasts who are at the stage of specialized basic and further stages of long-term training in rhythmic gymnastics group exercises.

2. Authors' program of special physical training, taking into account the factor of compatibility on the stage of specialized basic training in rhythmic gymnastics group exercises, was adequately planned selection of measures, techniques and teaching methods that aimed to step-by-step SPQ development and included goals, objectives, specific teaching principles of sports training and physical education, as well as factors that influence the effectiveness of its implementation.

3. Use the authors' program of special physical training, taking into account the factor of compatibility on the stage of specialized basic training in rhythmic gymnastics group exercises, revealed significant scientific facts that demonstrate effective development of SPQ in EG gymnasts of Lviv region team. As the result of implementation of the authors' SPT program into EG gymnasts' training process we could observe:

- significant improvement in major SPQ; 26 test indices out of 38 ones were not significantly different from those of the National team of Ukraine in group exercises ($p>0.05$);
- reduction of indices variation in special physical training of EG gymnasts in average from 27.1% (2.7% ÷ 78.6%) at the beginning to 16.6% (1.5% ÷ 37.5%) at the end of the experiment, which contributed to achieving compatibility of athletes, at the same time CG gymnasts, who were training by traditional methods, the variability indices decreased from 31.2% at the beginning of the experiment to 28.9% at the end.

4. Practical implementation of the integrated use of measures, methods and teaching techniques, as well as corrective and preventive measures offered by the program led to a reduction of asymmetry coefficient in EG gymnasts and allowed to approach the model parameters. Using SPT traditional methods, according to which CG gymnasts were trained, shows an asymmetry factor increase that can explain by the specific traditional training in group exercise where gymnasts perform a large number of synchronous and asynchronous actions with different forms of hand apparatus mainly by a dominant limb.

References:

Nesterova T. V. Pryoritetnye napravlenija sovershenstvovanija tehniki grupovyh uprazhnenij v hudozhestvennoj gimnastike [The Major Trends in Improvement of Gymnastics Group Exercises Technique]. Science in the Olympic sport / T. V. Nesterova. - K .: Olympyyskaya literatura, 2000. - №2. - P. 31-39.

Platonov V. N. Obshchaja teorija podhotovky sportsmenov v olimpijskom sporte [General Theory of the thletes' Training in the Olympic Sports]: [Uchebnik dlja studentov vuzov fyzycheskoho vospitanija i sporta] / Vladimir Nikolayevich Platonov. - K: Olympyyskaya literatura, 1997 - 583s.

Ruda I. E. Profilaktyka travm i porushen' oporno-ruhovoho aparatu v hudoznij himnastytsi z vykorystannjam prohramy optymal'noho rozvytku hnuchkosti [Preventing Injuries and Disorders of the Musculoskeletal System in Gymnastics Program Using the Optimal Development of Flexibility]: Autoreferat Dis. na zdobuttja nauk. stupenja kand. nauk z fiz. vyh. i sportu: spec. 24.00.01 "Olympic and Professional Sport" / I. E. Ruda. - Lviv, 2012. - 20 p.