ТЕОРЕТИКО-МЕТОДИЧНІ АСПЕКТИ СПОРТИВНОГО ТРЕНУВАННЯ

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CHARACTERISTICS OF A COMPETITIVE MICROCYCLE IN PAIR-GROUP ACROBATICS AT DIFFERENT STAGES OF LONG-TERM PREPARATION

Rapid growth of sport achievements, non-stop complication of competition programs lead to the increase in the level of results, further improvement of technical skills of sportsmen. In this regard, it is necessary to find new, improved programs to increase the results of competitive performance, particularly in pair-group acrobatics (Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257; Purnell M., Shirley D., Nicholson L., Adams R., 2010, pp. 40-46; Андреева Н., 2014, с. 46).

The increase of efficacy of competitive performance is influenced by different factors which are notable for particular difficulty in acrobatics. Some factors are: kinds of activity, individual, pair, group work, infraspecific differentiation, regular renewal of competition programs (compositions), sport categories, the role of top, middle, bottom partner, acquisition of big amount of complicated elements, specific character of refereeing etc. (M. Pilyuk, 2000).

The analysis of specific scientific and methodical literature shows that a

number of specialists contributed to the development of the theory and method of acrobatics: the analysis of performance technique of acrobatic jumps and method of learning, development of methods of learning, evaluation of physical and technique training in acrobatic jumps, defining the effective ways and training intensity, construction and implementation system of competitive performance of highly experienced acrobats and gymnasts (Кобзарь Л. В., 1996, с. 123; Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257; Purnell M., Shirley D., Nicholson L., Adams R., 2010).

The list above is added by some foreign specialists (Батиева Н. П., 2014, с. 3; Антонова О. А., Врублевський Є. П., 2014, с. 8; Литвиненко Ю. В., Садовский Ежи, Нижниковский Томаш, Болобан В. Н., 2015, с. 46; Потоп В. А., Град Рафаль, Омелянчик О. А., Бегайло М., Болобан В. Н., 2014, с. 23 etc.).

Experimental reasoning for the selection criteria of acrobats on the basic and specialized levels of preparation, elaboration of the development levels and model characteristics of testing indexes, correlation between the amount and intensity of trainings on pre-competition level of preparation of male acrobatic pairs, improvement method of special physical training of acrobats on the basic levels of sport specialization, the method of teaching throwing exercises in pair acrobatics on the basic level of specialized training of pair-group exercises are described in works of V. M. Boloban (Marian C., Ion M., 2012, p. 4165; Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257; Purnell M., Shirley D., Nicholson L., Adams R., 2010, pp. 40-46 etc.).

The authors mentioned above as well as some others have made a substantial contribution to the development and scientific solution of important problems and directions in acrobatics. However, considering fast-growing complexity and spectacularity of competition programs, increasing amount and intensity of acrobats' training, changes and improvement of refereeing, it is necessary to create new and up-to-date approaches in efficient construction of training and competitive sports activity on all the levels of long-term preparation.

The purpose of the work is to study the indexes of intensity of competitive microcycles on all the levels of long-term preparation in pair-group kinds of acrobatics (acrobats aged between 9 and 24 years old) with the help of methods of chronometry and analysis of result cards, defining the average numbers of basic intensity parameters of 4-week competitive microcycle of highly qualified acrobats.

Statistic processing of the results was performed with the help of license applied programs STATISTICA (6.1). Authenticity of differences between indexes with account of type of distribution were defined with the help of Student's t-test. Pierson's correlation analysis was used in order to establish the connection between factors. The lowest observed level of statistical significance of results is $p < 0,05$.

Based on the analysis of a number of works (Пиллюк Н. Н., 2000, с. 43; T. Pozzo, C. Studeny, 1987, p. 45) it is possible to differentiate several levels

in the structure of competitive activity: 1) long-term competitive activity, the criteria of which are indexes that show the speed of progress or regress of sport result according to the year of studying; 2) competitive activity itself in the annual cycle of preparation. The criteria of efficiency are progress indexes both as an absolute value of sport result and improvement of the results, the place on the standings, stability of competitive activity; 3) competitive actions, the process of sportsmen performing single exercise, the effectiveness of which is shown by the obtained result (or score); 4) general structure of an integral competitive exercise to model different individual variants of competitive actions of sportsmen; 5) specific elements of competitive activity, the efficiency of which is measured by biomechanic indexes (Bachinskaya N. V., 2015, p. 4; Антонова Е. А., Врублевский Е. П., 2014, с. 10; Потоп В. А., Град Рафаль, Омелянчик О. А., Бегайло М., Болобан В. Н., 2014, с. 25; Zaporozhanov V. A., Kochanowicz A., 2014, p. 3).

The basis of technical preparation in gymnastics and acrobatics is formed by the number of specific structure elements (Мкртчян В. Н., Болобан В. Н., Коркин В. П., 1993, с. 42; Sadowski J., Boloban V., Wisniowski W., Mastalerz A., Niznikowska E., Niznikowski T. (2005, p. 839; Bachinskaya N. V., 2015, p. 3).

In sport acrobatics there are external and internal factors of competitive activity (Савчин С., 2000, с. 236; Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257; Purnell M., Shirley D., Nicholson L., Adams R., 2010, pp. 40-46).

The effectiveness of competitive activity of gymnasts and acrobats (internal factors) includes performance quality of a competition exercise, reliability of the performance, competitive actions, level of readiness, peculiarities of motivation and level of physical preparation and functional condition (E. Antonova, 2014; V. Smolevskiy, Y. Menhin, V. Silin, 1979; M. Pilyuk, 2000). External factors depend on the peculiarities of competition organization, conditions of its functioning, specifics of refereeing, subsystem of competition (Пиліук Н., 2000, с. 8; Griggs G., McGregor D., 2012, p. 225; Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257).

The peculiarities of competitive activity of hard coordination sports form the elements of high-level difficulty groups, presence of the hardest elements in the program, coefficient of difficulty, artististry etc. (Кобзарь Л., 1996, с. 123; Marian C., Ion M., 2012, p. 4160; 1996, с. 23; etc.).

There was made a correlation analysis of the competition results (total score in points) with the index of total number of elements, number of compositions, total time of training process, number of training days, difficulty of competition program, intensity according to the indexes of intensity (II): highly informative ($r=0,698-0,846$). Number of sets, reliability, stability (correlation between total quantity of elements performed and number of ones without falls and serious mistakes) are indexes which show middle level of correlation ($r=0,422-0,688$). Other indexes show low level of correlation

($r=0,12-0,320$).

M. Pilyuk, 2000, S. Malynovskyi, 2000, etc. presented data about the fact that rating of training and competitive load is an important element of the competitive process. Therefore, the examination of indexes of competitive load allows us to form the system of competition as precisely as it is possible.

In sport acrobatics, a competitive microcycle consists of several days, depending on participating in the final day of a competition (Савчин С., 2000, с. 236; Pérez-Soriano P., Llana-Belloch S., Morey-Klapsing G., PerezTurpin J. A., Cortell-Tormo J. M., Van den Tillaar R., 2010, p. 252). While the 1st day of a microcycle is an arrival day (trial of the venue); the 2nd day: first and second optional exercises; the 3rd day of a microcycle: third combined exercise; the 4th day of a microcycle: first and second final exercises.

The analysis of questionnaire details of 38 trainers in Ukraine, pedagogical observations, chronometry, method of expert estimation allow us to accurately research the parameters of acrobats' competition load. The study was carried out during Ukrainian Championship, Ukrainian Cup in sport acrobatics. The subjects of observation were the trial day (arrival), the competition day (general or final program) (Савчин С., 2000, с. 235; Sadowski J., Boloban V., Wisniowski W., Mastalerz A., Niznikowska E., Niznikowski T., 2005, p. 839).

The results obtained according to indexes of an arrival day and trial of the venue are given in the Table 1.

Table 1

The indexes of the load of acrobats' competitive microcycle of sport improvement group on the 1st year of study in pair-group acrobatics (arrival / trial day) ($\bar{X} \pm S$)

Basic indexes	Female pairs	Male pairs	Mixed pairs	Female groups	Male groups
	n=12	n=10	n=12	n=10	n=6
Total time of training	45,23±6,12	50,44±5,16	42,54±6,56	52,34±5,82	56,58±4,23
Total number of elements	88,24±3,65	94,13±5,25	90,56±4,88	68,78±5,12	58,26±4,68
Sets (amount)	44,62±3,02	40,36±2,82	50,98±3,44	42,48±3,12	26,72±2,14
Compositions (amount)	3,36±0,89	4,68±0,68	3,96±1,02	4,12±0,88	3,88±0,79
II, standard units	1,84±0,26	2,42±0,32	2,12±0,29	1,80±0,24	3,08±0,22

The results of the research show that there is a small difference in competition parameters in different kinds of pair-group acrobatics except for

male group exercises. It is explained by the specifics of pair-group activity, differences in competition regulations, level of qualification (Marian C., Ion M., 2012, p. 4161; Pérez-Soriano P., Llana-Belloch S., Morey-Klapsing G., PerezTurpin J. A., Cortell-Tormo J. M., Van den Tillaar R., 2010, p. 253).

It is necessary to point out that the total number of elements is lower in competitive microcycles than in conditions of actual preparation for the competition. Depending on the participation or non-participation in the final of a competition, total number of elements may vary in different acrobatic groups or pairs.

The biggest number of elements is performed during the trial and warming-up periods (general and according to the kind of compositions), not during actual performing for the score.

It is known that specific training loads are performed on a pre-competition stage in hard coordination kinds of sport. Their content and mode are formed with account of the conditions of a competition (Marian C., Ion M., 2012, p. 4162; Андреева Н., 2014, с. 50).

We used a 4-week competitive microcycle. Maximum loads were applied no later than a month before the main competition. Later, loads were gradually lowering. The planning of loads of a pre-competition stage is a key element in the structure of an annual cycle as the future model of a competition is developed and implemented.

Table 2

Average data of basic load parameters on a pre-competition stage of preparation (4-week competitive microcycle) of female and male pairs of high qualification SIG 2nd-3rd year and HSQG

Load parameters (number)	Female pairs				Male pairs			
	№ Microcycle							
	4	3	2	1	4	3	2	1
Training days	6	5	5	5	6	5	5	5
Training classes	11,82	10,65	8,43	6,38	11,78	10,36	9,28	7,96
Training hours	21,62	19,56	16,24	14,22	22,57	20,56	18,62	16,64
Pair elements	120,34	112,65	96,62	84,42	180,92	166,42	144,83	128,42
Individual elements	65,24	56,37	48,62	40,82	102,28	90,82	78,62	64,92
Pair elements in total *p≤0,05	1018,63	905,83	810,72	698,56	1372,74	1224,92	1116,98	994,54
Compositions	8,67	7,02	6,18	5,86	9,92	8,27	7,69	6,28
II, standard units	2,28	2,12	1,88	1,80	2,69	2,52	2,44	2,26

Data indicated above shows that on a pre-competition level in a 4-week microcycle the highest indexes of the volume and intensity were planned in

the 4th microcycle (from 4th till 1st closest to the competition) with a gradual decrease of the volume and intensity. According to the indexes of the total number of performed compositions, there is an opposite tendency to increase their total number in the course of proximity of the competition.

It is expected that the conditions of future competitions are formed exactly in integral compositions. Apart from that, technical mastery is worked out alongside with artistry of the performance. As well as other kinds of sport, sport acrobatics has different types of competition: basic, preparatory, model, leading, additional, control, selective. Nevertheless, major competitions are the main objective (Pérez-Soriano P., Llana-Belloch S., 2010, pp. 245-257; Purnell M., Shirley D., Nicholson L., Adams R., 2010, pp. 40-46; Андреева Н., 2014, с. 47). The duration of competitive microcycles in acrobatics is between 3 and 4 days and is determined by the fact that competitive microcycles include both additional load components (arrival day - probation of the venue) and actual competition load (three days of general and final program). Participation in the competition finals is possible starting with a specific basic preparation stage while acquiring elements of higher difficulty groups. General load of a competitive microcycle is added by competitive exercises.

We carried out a correlation analysis in order to determine the most significant indexes of competition loads with the competition results (score). The most significant ones (strong and middle interconnections) in different kinds of acrobatics on different stages of sport development are presented in Tables 3, 4 (credible coefficients of correlation are given).

Table 3

Characteristics of the correlation of main sport load indexes with sport and technical result (score) in pair-group kinds of acrobatics (based on the general program on the long-term preparation stages)

Basic indexes	Female pairs	Male pairs	Mixed pairs	Female groups	Male groups
	ETG 1st-2nd years	ETG 3rd-5th years	SIG 1st year	SIG 2nd-3rd year	HSQG
Duration of sport actions (min)	–	–	0,446	0,496	0,568
Total number of elements	0,422	0,646	0,528	0,524	0,846
Sets (quantity)	–	–	0,468	0,425	0,545
Compositions (quantity)	0,524	–	0,449	0,545	0,635
II (standard units)	–	0,568	0,688	0,698	0,745

**note: ETG – educational training groups, SIG – sport improvement groups, HSQG – highest sport quality groups.*

Informational capacity was shown by the leading indexes, depending on the kind of acrobatics and the stage of the long-term preparation.

Table 4

Characteristics of the correlation of main sport load indexes with sport and technical result (score) of male acrobatic pairs on particular stages of the long-term preparation

Basic indexes of competition load	Male pairs		Mixed pairs		
	ETG 1st-2nd years	ETG 3rd-5th years	SIG 1st year	SIG 2nd-3rd years	HSQG
Duration of sport actions (min)	–	0,524	0,582	–	0,626
Total number of elements	0,643	0,566	0,728	0,824	0,688
Number of sets	–	0,543	0,587	–	0,602
Number of compositions	0,585	–	0,688	0,743	0,824
II (standard units)	–	0,628	0,732	0,825	0,694

** note: ETG – educational training groups, SIG – sport improvement groups, HSQG – highest sport quality groups*

Due to the research, it is possible to state that in the performed study the information from different authors was proved and specified. That is the fact, that a subsystem of competitive loads can be a separate element of a general sport and technical structure of preparation of acrobats as well as functional and psychological (Пилюк Н. Н., 2000, с. 5; Мкртчян В. Н., Болобан В. Н., Коркин В. П., др., 2000, с. 45; Бачинська Н. В., 2014, с. 6; Потоп В. А., Град Рафаль, Омелянчик О. А., Бегайло М., Болобан В. Н., 2014; р. 5; Zaporozhanov V. A., Kochanowicz A., 2014, р. 3).

Conclusions.

1. Basic (leading) components of the structure of competitive microcycles on all the stages of long-term preparation in pair-group kinds of acrobatics were determined and elaborated.

2. Authentic correlating interconnections were revealed and they show high ($r=0,69-0,98$) and middle ($r=0,48-0,58$) levels of interconnection of basic load indexes with sport and technical result.

3. The information of several authors was proved and specified. It states that a subsystem of competitive loads might be a separate element of a general sport and technical structure of acrobats' preparation alongside with other kinds of preparation.

4. The data received can add and contribute to effective planning and managing of training and competitive process, help to control and make necessary amendments to pre-competition preparation of acrobats.

Further research is planning to be carried out in the direction of study of the intensity of educational and training activity on all the stages of long-term preparation in pair-group acrobatics.

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**Лопуга Г. В., Михайленко Ю. М., Решетилова В. М.
Характеристика змагального мікроциклу в парно-груповій
акробатиці на різних етапах тривалої підготовки**

Мета: вивчити показники навантажень змагальних мікроциклів на всіх етапах багаторічної підготовки в парно-груповій акробатиці, визначення усереднених даних основних параметрів навантаження 4-тижневого змагального мікроциклу (МСС) висококваліфікованих акробатів. *Матеріал:* структура змагального мікроциклу за видами парно-групової акробатики на всіх етапах багаторічної підготовки, усереднені дані основних параметрів навантаження 4-тижневого змагального МКК висококваліфікованих жіночих і чоловічих пар. *Результати:* Представлені результати середніх показників змагальних навантажень в різних видах парно-групової акробатики. Навантаження вивчалися в день тестування (приїзду), змагальний день (довільна програма та / або фінальна програма). Кореляційний аналіз зв'язку результатів змагань (в балах) з показником загальної кількості елементів, кількості треків, загального часу тренувального процесу, кількості тренувальних днів, індексу інтенсивності. Виявлено достовірні кореляційні зв'язки, які свідчать про високу ($r = 0,698-0,846$) і середньої ($r = 0,422-0,688$) ступеня взаємозв'язку основних показників навантаження зі спортивно-технічним результатом. Наведено усереднені дані основних навантажувальних параметрів 4-тижневого змагального передзмагального етапу підготовки МКК на прикладі жіночих і чоловічих пар висококваліфікованих груп спортивного вдосконалення другого і третього року підготовки і груп вищої спортивної підготовки. *Висновки:* в рамках дослідження виявлено достовірні кореляційні зв'язки основних показників навантаження зі спортивними й технічними результатами; підтверджені і уточнені дані ряду авторів про те, що підсистема змагальних навантажень може бути включена як окремий елемент загальної спортивно-технічної структури підготовленості акробатів, може дозволити доповнювати і ефективно планувати, управляти тренувальним та змагальним процесом, внести необхідні корективи в передзмагальну підготовку акробатів.

Ключові слова: парно-груповою акробатика, змагальний мікроцикл, багаторічна підготовка.

**Лопуга А. В., Михайленко Ю. Н., Решетилова В. Н.
Характеристика соревновательного микроцикла в парно-групповой
акробатике на разных этапах многолетней подготовки**

Цель: изучить показатели нагрузок соревновательных микроциклов на всех этапах многолетней подготовки в парно-групповой акробатике, определение усредненных данных основных параметров нагрузки 4-недельного соревновательного микроцикла (МСС) у

высококвалифицированных акробатов. **Материал:** структура соревновательного микроцикла по видам парно-групповой акробатики на всех этапах многолетней подготовки, усредненные данные основных параметров нагрузки 4-недельного соревновательного МКК высококвалифицированных женских и мужских пар. **Результаты:** Представлены результаты средних показателей соревновательных нагрузок в различных видах парно-групповой акробатики. Нагрузки изучались в день тестирования (приезда), соревновательный день (произвольная программа и/или финальная программа). Корреляционный анализ связи результатов соревнований (в баллах) с показателем общего количества элементов, количества трюков, общего времени тренировочного процесса, количества тренировочных дней, индекса интенсивности. Выявлены достоверные корреляционные связи, свидетельствующие о высокой ($r = 0,698-0,846$) и средней ($r = 0,422-0,688$) степени взаимосвязи основных показателей нагрузки со спортивно-техническим результатом. Приведены усредненные данные основных нагрузочных параметров 4-недельного соревновательного предсоревновательного этапа подготовки МКК на примере женских и мужских пар высококвалифицированных групп спортивного совершенствования второго и третьего года подготовки и групп высшей спортивной подготовки. **Выводы:** в рамках исследования выявлены достоверные корреляционные связи основных показателей нагрузки со спортивными и техническими результатами; подтверждены и уточнены данные ряда авторов о том, что подсистема соревновательных нагрузок может быть включена как отдельный элемент общей спортивно-технической структуры подготовленности акробатов, может позволить дополнять и эффективно планировать, управлять тренировочным и соревновательным процессом, внести необходимые коррективы в предсоревновательную подготовку акробатов.

Ключевые слова: парно-групповая акробатика, соревновательный микроцикл, многолетняя подготовка.

Lopuha H., Mykhailenko Yu., Reshetylova V. Characteristics of a Competitive Microcycle in Pair-Group Acrobatics at Different Stages of Long-Term Preparation

The purpose: to study the indicators of loads of competitive microcycles at all stages of long-term preparation in pair-group acrobatics, determination of the average data of the main parameters of the load of a 4-week competitive microcycle (MCC) of highly qualified acrobats. *Material:* the structure of the competitive microcycle by the types of pair-group acrobatics at all stages of long-term preparation, the average data of the main parameters of the load of the 4-week competitive MCC of highly qualified women's and men's pairs. *Results:* The results of average indicators of competitive loads in various types of pair-group acrobatics are presented. The loads were studied on the day of testing (arrival), the competitive day (an arbitrary program and / or the final

program). Correlation analysis of the connection between the results of the competitions (in points) with the indicator of the total number of elements, the number of tracks, the total time of the training process, the number of training days, the intensity index. Reliable correlation relationships were revealed which showed a high ($r = 0,698-0,846$) and average ($r = 0,422-0,688$) degree of interrelation between the main load indicators and the sporting and technical result. The average data of the main load parameters of a 4-week competitive MCC pre-competition stage of preparation on the example of women's and men's pairs of highly qualified sports improvement groups of the second and third years of training and groups of higher sports skills were developed and presented. *Conclusions:* within the framework of this study, reliable correlation relationships of the main load indicators with sports and technical results were revealed; confirmed and refined data of a number of authors about the fact that the subsystem of competitive loads can be included as a separate element of the overall sports and technical structure of acrobats' readiness, can allow to supplement and effectively plan, manage the training and competitive process, make the necessary adjustments to the pre-competition training of acrobats.

Key words: pair-group acrobatics, competitive microcycle, long-term preparation.

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