

# Choreographic training optimization of female gymnasts aged 8–11 years in aerobic gymnastics

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**Purpose:** optimization of choreographic training of gymnasts 8–11 years old.

**Material & Methods:** analysis of video materials; expert evaluation method; methods of mathematical statistics.

**Results:** defined parameters choreography preparation for initial training stage.

**Conclusion:** defined parameters that have a significant impact on the aesthetic component of movement activity athletes in aerobic gymnastics at initial training stage. Dynamics of improvement of choreographic preparedness in the experimental group confirms the advantage of the chosen technique with the use of the developed model of choreographic training of gymnasts aged 8–11 years.

**Keywords:** choreographic training, aerobic gymnastics, initial training, criteria for choreographic preparedness.

## Introduction

The initial training phase lasts 3-4 years on average. It is during this period that special attention should be paid to the method of teaching the elements of choreography, since at this stage the basis for further development of the of the athlete skill [5–7]. Most specialists (V. Boloban, 1988, V. N. Kurys, 1994, N. K. Menshikova, 1998; V. Smolevsky, Yu. K. Gaverdovsky, 1999, etc.). It is believed that the beginning of regular gymnastics classes, acrobatics (including aerobics) between the ages of 6-7 years. It is possible and an earlier start of sports activities, that is, from 4-5 and even from 3 years [2]. However, there are many skeptics and even opponents of this practice, especially among doctors. In our opinion, this contradiction can be solved if we consider not so much the age of the beginning of the class as the literacy of the approach to organizing and conducting classes in choreography at the initial training in aerobic gymnastics.

## The relationship of research with scientific programs, plans, themes

The work was carried out in accordance with the theme of the research work "Theoretical and methodological fundamentals of managing the training process and competitive activities in the olympic, professional and adaptive sport" in accordance with the LSUPK plan for 2016-2020. (Number of state registration: 0116U003167).

## The purpose of the research

Optimization of choreographic training of gymnasts 8–11 years old.

### Objectives of the study:

1. To develop a model of choreographic training at the stage of initial training for gymnasts.

2. Identify the dynamics of the level of choreographic preparedness in the process of implementing the model of choreographic preparation.

## Material and Methods of the research

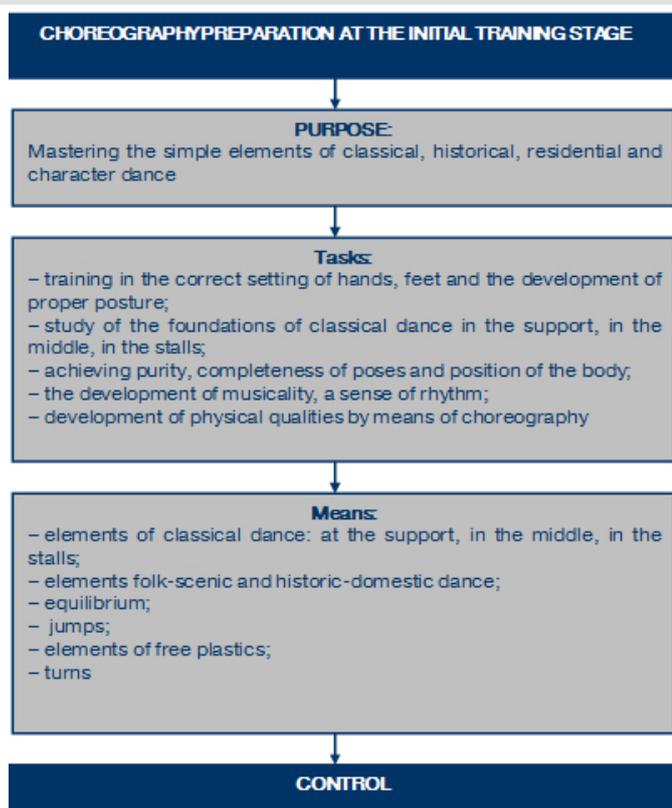
59 gymnasts were examined from Odessa and Odessa region aged 8–11 years. The study was carried out on the basis of the Federation of Aerobic Gymnastics, School No. 81, School No. 111, Youth Sports School No. 10, Youth Sports School No. 1, Complex Sports School No. 3 (Odessa). To determine the level of choreographic preparedness, methods of expert assessments, methods of mathematical statistics.

## Results of the research and their discussion

To achieve this goal, we developed a model of choreographic training for beginners (Fig. 1).

To control the choreographic preparedness, a group of five sports specialists (choreographers and trainers in aerobic gymnastics). The experts were offered a set of criteria for choreographic preparedness with a detailed description of each of them: posture, reversibility and tension of the legs, stability, accuracy of movements of hands and feet, completeness, ease and fusion of movements, musicality, and dance, illustrative and emotional expressiveness. All criteria were evaluated taking into account the requirements for the technique of performing "choreographic elements" in the aspect of the requirements of competition rules [1; 3; 4].

For a more accurate and differentiated assessment, a five-point scale was added to each of the criteria, according to which the score of "0,5 points" was raised if the criterion was very poorly formed; "1 point", if the criterion is not formed enough to successfully master the program of choreographic training; "1,5 point", if the criterion is formed sufficiently to successfully master the program of choreographic training;



**Fig. 1. Model of choreographic preparation of gymnasts at the initial training stage**

“2 points”, if the criterion is formed well; “2,5 points”, if the criterion is formed flawlessly.

To simplify the presentation and interpretation of factual information, the boundaries of a low, sufficient and high level of athletes' choreographic preparedness. For this purpose, the index of choreographic readiness ( $I_{CR}$ ), is calculated as the arithmetic mean ( $M=1,52$ ) and the standard deviation ( $SD=0,21$ ) of the individual choreographic readiness of all participants in the test and certain intervals of estimates that are the basis for the author's scheme for interpreting the results: low level (less than 1,2 points) – the prevalence of serious errors in the performance of most of the choreographic elements; sufficient level (1,3–1,7) – athlete assumes execution details malfunctioning equipment, reduces the effectiveness of the whole; optimal level (more than 1,8) – faultless execution of an athlete most basic choreographic elements [9].

A total of 59 athletes were trained – gymnasts of the III–I category at the age of 8–11 years (Odessa Regional Federation of aerobics) wishing to become members of approbation, which based on previous expert evaluation were assigned to the experimental group (30 participants) – EG and control (29 participants) – CG. Since the equivalence of groups by composition at the beginning of the experiment is an important condition for the reliability of its results, important detailed qualitative analysis and statistical comparison of the formation of the choreographic preparedness of athletes in these groups.

If we turn to individual data characterizing the formation of the criteria for the choreographic preparedness of the athletes of the EG at the stage of initial preparation prior to the begin-

ning of the experiment, it can be noted that among them there are no such individuals who, according to an individual index of choreographic readiness, reach a high level. Half of them have a low level of formation of this criterion, and estimates of 50% of gymnasts correspond to a sufficient level. Accordingly, the average arithmetic value of this indicator in the group is on the verge of low and sufficient levels ( $I_{CP}=1,21$ ).

The formation of individual criteria, on the basis of which the determination of this index was made, which we presented in the table 1.

Analysis of the obtained data made it possible to identify the criteria that significantly reduce the level of choreographic preparedness: “posture” – in 93,3% of gymnasts EG was formed at a low level and only 6,7% on sufficient; “accuracy of legs movements” – a low level is inherent in 93,3%; “accuracy of arm movements” – experts rated 96,7% of the athletes as low as average and 3,3%, “dance” – a low level of 76,7% and sufficient – 23,3% of gymnasts; “completeness of movements” – a low level was detected in 76,7%, sufficient – in 16,6% and high – in 6,7% of tested. Also, predominantly low values were obtained on the basis of the criteria of “mobility” (in 70% of tested), “reversibility” (in 70% of tested), “lightness” (66,6% of tested), “leg stiffness” (63,4% tested). Approximately half of the gymnasts were assessed by experts as having a low level of formation according to the criteria of “stability” (56,7%), “musicality” (56,7%) and “illustrative expressiveness” (50%). And only on the criterion of “emotional expressiveness” was determined mainly the sufficient formation of the choreographic preparedness of the gymnasts of the experimental group (in 66,7% of female athletes), in 23,3% it was at a high level and only 10% at a low.

Summarizing the results of the analysis of individual data of formation criteria choreography experimental group of athletes on the initial stage of preparation before the experiment it can be determined that the majority of the analyzed criteria, most of the participants had a low level of preparedness of the choreographic skills, however, according to individual indices of choreographic preparedness, only half of gymnasts showed a low level, and the rest – sufficient. That is, in the part of athletes insufficient formation of certain criteria was compensated by a high level of manifestation of other. This fact clearly demonstrates that the absence of the system in the choreographic preparation leads to averaging the results in the gymnasts and inhibits the growth of their skill.

As we see, the distribution of the results of expert evaluation of gymnasts from the control group into a much similar distribution in the experimental group. This is both an individual index of choreographic preparedness, and the formation of the criteria for “posture”, “accuracy of legs movements” “accuracy of arm movements” “completeness”, “lightness” and “reversibility”. At the same time, on these and other criteria, there are certain insignificant differences in the distribution. Based on the data on the importance of group indices of formation ( $I_{gr}$ ) of choreographic preparedness, it was revealed that in the experimental group this index is only 0.01 points higher than the control. In this case, the calculated value of Student's t-criterion ( $t=0,28$ ) does not reach the critical value ( $t_{cr}=2,01$ ), at which differences between groups can be considered statistically reliable.

The experiment lasted 11 months, in continuation of which

Table 1

Formation of the criteria for the choreographic preparedness of the athletes of the experimental and control groups at the initial preparation stage prior to the start of the experiment (%)

Criteria	Experimental group			Control group		
	Levels of criteria formation					
	low	sufficient	high	low	sufficient	high
Posture	93,3	6,7	0	82,8	17,2	0
Reversibility of legs	70,0	16,7	13,3	69,0	17,2	13,8
Leg stiffness	63,4	23,3	13,3	72,4	17,2	10,4
Sustainability	56,7	26,7	16,6	65,5	20,7	13,8
Accuracy of arm movements	93,3	6,7	0	86,2	13,8	0
Accuracy of leg movements	96,7	3,3	0	86,2	13,8	0
Completeness of movements	76,7	16,6	6,7	82,8	3,4	13,8
Lightness	66,6	26,7	6,7	75,9	20,7	3,4
Mobility of movements	70,0	23,3	6,7	86,2	3,4	10,4
Musicality	56,7	26,7	16,6	65,5	20,7	13,8
Dance	76,7	23,3	0	72,4	20,7	6,9
Illustrative expressiveness	50,0	50,0	0	44,8	51,8	3,4
Emotional expressiveness	10,0	66,7	23,3	10,3	75,9	13,8
$I_{cp}$	50	50	0	51,7	48,3	0

the model of choreographic training was introduced into the training process of the EG, and the CG was engaged in the traditional program of the Youth Sports School [8]. After completing the formative pedagogical experiment, the formation of the choreographic preparedness of the athletes EG and CG was reevaluated by the same experts, while the evaluation procedure remained unchanged. Thus, a comparison of these estimates with the results of the preliminary assessment will follow the dynamics of the level of choreography preparedness of sportsmen of these groups during the experiment. Individual data characterizing the formation of the criteria for the choreographic preparedness of the athletes of the experimental group at the stage of initial training at the end of the experiment indicate that among them there are none who, according to the individual choreographic preparedness index, have a low level. Most of them (70% of the tested) demonstrate a sufficient level, the rest (30% of gymnasts) reach a high level. The average arithmetic value of this indicator in the group corresponds to a sufficient level ( $M=1,64$ ). The study of the distribution of subjects according to the levels of the formation of choreographic preparedness according to certain criteria indicates that the majority of athletes at the final stage of the experiment have achieved sufficient or high levels of choreographic readiness (tab. 2).

For example, only 3.3% of the gymnasts of the experimental group remained choreographed by the criterion of “reversibility”, at a low level, in 66,7% – it corresponded to a sufficient level of formation, and in 30% – to a high level, by the criterion of “accuracy of leg movements”, a low level corresponds to 6,7% of individual estimates, sufficient – 73,3% and high – 20%. According to the criterion «completeness» low evaluation experts predict only 10% of athletes, sufficient – 50% and high – 40%. By the criterion of “mobility”, a low level is inherent in 3,3% of gymnasts, sufficient – 60% and high – 36,7%. By the criterion of “musicality” a low level was found only in 6,7%, sufficient – in 50% and high – in 43,3% of tested. A few of the subjects with a low level of choreographic preparedness were determined by the criterion “leg stiffness” (13,3% gymnasts) at a sufficient level of its manifestation in 50% and high – 36,7% in athletes, the criterion of “stability” (16,7%) at a sufficient level – 30% and a high – in 53,3% of athletes,

the criterion of “lightness” (16,7%) at a sufficient level – 40% and high – in 43,3% of gymnasts, according to the criterion of “dancing” (13,3%), with a sufficient level – 43,3% and high – 43,3% of athletes and “ Illustrative expressiveness” (13,3%) at a sufficient level – in 36,7% and high – in 50% of the athletes. An even more significant proportion of subjects with a low level of choreographic preparedness was determined by the criterion of “posture” (23,3% of gymnasts) with a sufficient level of its manifestation in 56,7% and high – in 20% of athletes and by criterion “accuracy of arm movements” (33,3%) at a sufficient level – 36,7% and high – in 30% of female athletes. Separately, we note that according to the criterion of “emotional expressiveness”, the predominantly high degree of choreographic preparedness of the gymnasts (63,3% of athletes) was determined, 36,7% at a sufficient level, and low values are absent.

Generalization of the results of analysis of individual data of formation criteria choreography experimental group of athletes at the initial training stage at the end of the experiment gives the basis to determine, that for individual indices of choreographic preparedness and for most of the analyzed criteria, the majority of participants demonstrated an increase in choreographic preparedness from low to sufficient and even high levels. At the same time, according to certain criteria (posture, accuracy of hand movements, stretched legs, firmness, lightness, dance, illustrative expressiveness), a part of the athletes lacked the formation of choreographic readiness. Consequently, the introduction of the developed model of choreographic training into the training process of gymnasts at the initial preparation stage, although it can not guarantee all athletes attaining a high level of choreographic readiness, but can lead to a positive dynamics of its improvement.

The statistical confirmation of this conclusion was made by comparing the arithmetic mean values based on the results of the expert evaluation of the formation of the criteria for the choreographic preparedness of the athletes of the experimental group before and after the experiment using the Student’s t-criterion to determine the degree of reliability of the indicated changes.

**Table 2**

**Formation of the criteria for the choreographic preparedness of athletes experimental and control groups at the stage of initial training at the end of the experiment (%)**

Criteria	Experimental group				Control group	
	Levels of criteria formation					
	low	sufficient	low	sufficient	low	sufficient
Posture	23,3	56,7	20	62,1	37,9	0
Reversibility of legs	3,3	66,7	30	27,6	65,5	6,9
Leg stiffness	13,3	50	36,7	44,8	48,3	6,9
Sustainability	16,7	30	53,3	37,9	44,8	17,3
Accuracy of arm movements	6,7	73,3	20	69	27,6	3,4
Accuracy of leg movements	33,3	36,7	30	65,5	31,1	3,4
Completeness of movements	10	50	40	41,4	55,2	3,4
Lightness	16,7	40	43,3	44,8	51,8	3,4
Mobility of movements	3,3	60	36,7	51,8	44,8	3,4
Musicality	6,7	50	43,3	44,8	48,3	6,9
Dance	13,3	43,3	43,3	48,3	34,5	17,2
Illustrative expressiveness	13,3	36,7	50	44,8	20,7	34,5
Emotional expressiveness	0	36,7	63,3	17,3	72,4	10,3
$I_{cp}$	0	70	30	6,9	93,1	0

The data on the value of the group formation index ( $I_{gr}$ ) of the choreographic readiness presented in the table show that during the period from the beginning to the end of the experiment in the experimental group this index increased by 0,43 points. In this case, the calculated value of Student's t-criterion ( $t=13,77$ ) significantly exceeds the critical value ( $t_{cr}=3,47$ ), at which these changes can be considered statistically reliable at the level  $p<0,001$ .

At the same time, relying on these results, we can not say that the model developed by us has certain advantages over the traditional method of choreographic preparation, and consequently, these changes can be explained not only by the specifics of the experimental impact, but by the fact of systematic training of gymnasts during the year, under any circumstances, could lead to an increase in the level of their choreographic preparedness. Therefore, to test this assumption, it was considered advisable to conduct a similar analysis of changes in the level of choreographic preparedness of female athletes CG during the experiment.

So, referring to the individual data characterizing the formation of the criteria for the choreographic preparedness of the athletes of the control group at the stage of initial training at the end of the experiment, one can see that among them there are no those who, according to the individual index of choreographic preparedness, have a high level. Most of them (93,1%) demonstrate a sufficient level of the formation of this criterion, the rest (6,9%) have a low level. The average arithmetic value of this indicator in the group is also at a sufficient level ( $M=1,32$ ).

As we see, the distribution of the results of expert evaluation of gymnasts from the control group at the stage of initial training at the end of the experiment on individual indices of choreographic preparedness and for most of the analyzed criteria has a definite shift towards a sufficient level. At the same time, in a significant part of the athletes, the insufficient formation of the choreographic preparedness was preserved according to certain criteria (accuracy of the leg movements, accuracy of the arm movements, posture, movement, dancing, illustrative expressiveness, leg stiffness, lightness, completeness,

and musicality). This suggests that the conduct of training sessions on the traditional method at the initial stage of training also contributes to the growth of the level of choreographic preparedness, but most of them does not allow to reach a high level of choreographic skill.

Statistical testing changes in the formation of choreographic training of athletes in the control group after the experiment showed that in the same period of training, during which gymnasts from the experimental group achieved significant positive dynamics in the formation of choreographic preparedness; athletes from the control group demonstrated only a tendency to increase the level of its formation.

So, proceeding from the data on the value of group indices of formation ( $I_{gr}$ ) of choreographic preparedness, we will determine that after the experiment in the experimental group this index became 0,32 points higher than the control. In this case, the calculated value of Student's t-criterion ( $t=10,37$ ) significantly exceeds the critical value ( $t_{cr}=3,47$ ) for a high level of reliability ( $p<0,001$ ), and consequently the differences between the groups for the group index formation choreography readiness at the final stage of the experiment is statistically significant.

### Conclusions

1. The created model of choreographic preparation, which allows to significantly increase the level of choreographic preparedness of young gymnasts.
2. It was determined that for the period of training according to the program, constructed in accordance with the model of choreographic training, the athletes experienced an increase in the level of choreographic preparedness from low (50%) and sufficient (50%) to a sufficient (70%) and high (30%), that in determining the group formation index ( $I_{gr}$ ) of the choreographic readiness, its value is expressed from 1,21 points (low level) to 1,64 points (sufficient level), which is statistically significant ( $t=13,77$ ) at the level  $p<0,001$ .

During the same period of training under the traditional initial

training program, the athletes experienced an increase in the level of choreographic preparedness from a low (51,7%) and sufficient (48,3%) to a sufficient (93,1%) and low (6,9%), that in determining the group formation index ( $I_{gr}$ ) of choreographic preparedness is expressed in a certain upward trend, its value from 1,2 points (low level) to 1,32 points (sufficient level), can not be considered statistically reliable ( $t=1,93$ ;  $p<0,1$ ).

3. It was statistically confirmed that athletes in the EG, who demonstrated the state of choreographic readiness before the beginning of the experiment, the same as the gymnasts of the control group ( $t=0,28$ ), after the experiment ended, they differed by a much higher level of formation of the choreo-

graphic readiness ( $t=10,37$ ;  $p<0,001$ ).

Thus, it has been experimentally proved that at the stage of initial training provided that training is conducted in accordance with the proposed choreographic preparation, gymnasts can achieve a significant increase in choreographic skills than when organizing classes in accordance with the traditional form of sports training in aerobic gymnastics.

**The prospect of further research** is to determine ways to improve the choreographic training at the initial training stage.

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