Analysis of pedagogical experiment results in determining the level of general physical preparedness of amateur boxers

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Abstract

This study aimed to determine and assess the level of general physical fitness of amateur boxers, as well as to conduct a comparative analysis of the differences between the indicators of the experimental group (EG) and control group (CG) participants. The relevance of the research is determined by the need to develop scientifically based methods for effectively improving general physical qualities during the process of preparing amateur boxers for competitions and implementing these methods in practice. The study involved 24 amateur boxers (aged 18-20, with 2-4 years of sports experience). They were randomly divided into EG (n=12) and CG (n=12) groups. The athletes' level of general physical fitness was assessed through various test exercises: pull-ups on a horizontal bar, dips on parallel bars, push-ups, and a 1000-meter run. Measurements were recorded at the beginning and end of the study. For statistical analysis, the arithmetic mean (M), standard deviation (σ), coefficient of variation (V, %), Student's t-test (t), and significance level (p) were used. The results showed significant improvement in general physical fitness indicators in the experimental group. Specifically, the number of pull-ups increased from 18 to 23 ($p<0.05$), push-ups increased from 27 to 35 ($p<0.01$), and the 1000-meter run time decreased from 4.07 minutes to 3.97 minutes ($p<0.01$). Although some positive changes were also observed in the control group, they were not as substantial as in the experimental group and were statistically less significant. Based on the research results, it was established that the training sessions developed and applied using pedagogical experience serve as an effective factor in increasing the level of general physical fitness of amateur boxers. These scientific findings provide a basis for developing important methodological recommendations to optimize the training process of amateur boxers, enhance physical qualities, and ensure thorough preparation for competitions.

Keywords: Amateur boxers, general physical preparation, pedagogical experiment, control group, experimental group, test trials, statistical analysis, sports training.

Introduction

Amateur boxing is currently one of the most popular and rapidly developing sports in the global sports system. This sport not only demands a high level of physical qualities but also requires complex preparation from athletes, including endurance, speed, strength, coordination, agility, and psychological stability. Therefore, in the process of preparing amateur boxers for competitions, general physical training plays a particularly important role. Recent studies conducted on boxing in Uzbekistan and foreign countries show that, alongside the technical and tactical training of athletes, significant attention is being paid to the development of physical qualities (Goncharenko V.M., 1990; Karimov A., 2019; Abduvaliyev K., 2020). According to researchers, achieving high results in competitive activities of amateur boxers directly depends on their level of general physical fitness. However, the effectiveness of training may be insufficient if a scientifically based methodology for preparation is not developed. While many scientific studies have proposed methodological approaches for developing boxers' special physical qualities, comprehensive assessment of general physical training and experiments aimed at its development have not been adequately addressed. Particularly in working with young amateur boxers, determining effectiveness through comparative analysis of control and experimental group indicators remains a pressing issue. Thus, the relevance of this study is determined by the need to assess the level of general physical fitness of amateur boxers, evaluate it based on various test trials, and scientifically and statistically substantiate the effectiveness of experimental training sessions. The results of this study will serve as an important scientific and practical foundation for optimizing the training process of amateur boxers, enhancing the effectiveness of sports training, and achieving high results in competitive activities.

The aim of the research is to determine and comparatively evaluate the level of general physical preparedness of amateur boxers based on pedagogical experimentation.

Research objectives:

1. To determine the level of general

physical fitness of amateur boxers through test trials and conduct a statistical analysis.

2. To perform a comparative study of the experimental and control groups' indicators and substantiate the effectiveness of training methods.

Research methodology:

The study involved 24 amateur boxers to determine their level of general physical fitness. The participants were 18-20 years old, with 2-4 years of sports experience. They were randomly divided into two groups: the experimental group (EG, n=12) and the control group (CG, n=12).

The experimental group followed a specially developed training program, while the control group trained using traditional methods.

The study was conducted over a 12-week training period.

The level of general physical fitness was assessed using the following tests:

Pull-ups on a horizontal bar (repetitions) - to measure upper body muscle strength and endurance.

Dips on parallel bars (repetitions) - to evaluate the strength of triceps, chest muscles, and shoulders.

Push-ups (repetitions) - to assess overall strength and muscle endurance.

1000-meter run (minutes) - to evaluate general endurance and cardiovascular system function.

Tests were conducted at the beginning of the study (initial measurement) and at the end of the study (final measurement).

Statistical analysis included calculations of arithmetic mean (M), standard deviation (σ), coefficient of variation (V, %), Student's t-test (t), and confidence level (p). The obtained results were processed using Microsoft Excel and SPSS statistical software, and a comparative analysis of the experimental and

Table 1 Comparative results of the statistical characteristics of test outcomes determining the level of general physical fitness among amateur boxers in the experimental group (EG) and control group (CG) at the conclusion of the pedagogical study

№	Group	The start of the investigation			Conclusion of the study			t	P
		$\overline{X}$	σ	V, %	$\overline{X}$	σ	V, %		
Pull-ups on a horizontal bar (repetitions)	NG (n=12)	15	2,83	8,78	18	3,06	9,44	1,77	>0,05
	TG (n=12)	18	3,08	9,96	23	3,15	9,15	2,78	<0,05
Dips on parallel bars (repetitions)	NG **(n=12)**	20	2,33	10,67	21	2,49	10,41	2,12	<0,05
	TG **(n=12)**	24	2,36	10,97	27	2,56	10,12	3,74	<0,01
Push-ups (repetitions)	NG **(n=12)**	24	0,74	8,68	29	0,66	8,42	2,10	<0,05
	TG **(n=12)**	27	0,77	8,94	35	0,62	8,13	3,75	<0,01
1000-meter Run (min)	NG (n=12)	4.82	0,74	8,68	4.22	0,66	8,42	2,10	<0,05
	TG (n=12)	4,07	0,77	8,94	3,97	0,62	7,13	4,35	<0,01

Note: CG - control group; TG - research group; x̄ - arithmetic mean of the indicators; σ - standard deviation; V, % - coefficient of variation; tkr - Student's t-value; p - confidence level

control groups' indicators was performed.

The results presented in the table clearly reflect the changes in general physical fitness indicators of amateur boxers in the experimental group (EG) and the control group (CG). According to the pull-up exercise results, CG participants showed a slight increase from the initial 15 to 18 repetitions. However, the reliability of this change is low ($p>0.05$), indicating the possibility of it being random. In the EG, this indicator increased significantly from 18 to 23 repetitions ($p<0.05$), demonstrating the high effectiveness of the training methods used in the EG. For the parallel bar dip exercise, CG participants showed an increase from 20 to 21 repetitions, with minimal statistical significance ($p<0.05$). In the EG, the indicator increased from 24 to 27 repetitions, showing high reliability ($p<0.01$) and effectiveness. In the push-up exercise, CG results increased from 24 to 29 repetitions ($p<0.05$), indicating a slight improvement. EG participants' results increased significantly from 27 to 35 repetitions ($p<0.01$). The 1000-meter run results also showed significant differences between groups. In the CG, the running time decreased from 4.82 minutes to 4.22 minutes ($p<0.05$). In the EG, this indicator improved from 4.07 minutes to 3.97 minutes, confirmed with high reliability ($p<0.01$). Overall, the table analysis shows that while positive changes were observed in the control group, they can be attributed more to natural adaptation. The experimental group achieved significant and reliable improvements across all test indicators. This confirms the effectiveness of the experimental program and underscores the necessity of using scientifically-based methods in developing general physical fitness for amateur boxers.

Results and discussion

The results of the conducted study revealed that the level of general physical fitness of amateur boxers showed different changes in the experimental group (EG) and the control group (CG). According to the analysis of the data, although some positive changes were noted in certain indicators among CG representatives, their statistical significance was low, with $p>0.05$ in some cases. In contrast, EG participants demonstrated significant improvements in all test exercises ($p<0.05$; $p<0.01$). The pull-up exercise results showed that CG participants increased from 15 to 18 repetitions, indicating limited development in muscle strength and upper body muscle endurance. In the EG, the indicator increased from 18 to 23 repetitions, with the result confirming a statistically significant difference ($p<0.05$). This suggests that the training methods used in the EG effectively developed strength qualities. The parallel bar dips exercise also revealed significant differences. In the CG, the indicator increased from 20 to 21 repetitions, showing a slight improvement ($p<0.05$). In the EG, the indicator rose from 24 to 27 repetitions, with the result showing high statistical significance ($p<0.01$). This indicates that EG participants achieved high effectiveness in the training process. EG representatives also demonstrated superior results in push-ups. While the CG increased from 24 to 29 repetitions ($p<0.05$), EG participants improved from 27 to 35 repetitions ($p<0.01$). This indicator suggests effective development of muscle strength and endurance in the EG. The 1000-meter run results, an important criterion for overall endurance, showed that CG participants improved their time from 4.82 minutes to 4.22 minutes ($p<0.05$). However, this result was lower compared to the EG. In the EG, running times improved from 4.07 minutes to 3.97 minutes, with this change being highly significant ($p<0.01$). These results demonstrate that the special training methods used in the experimental group effectively developed the general physical fitness qualities of amateur boxers. Strength, endurance, speed, and muscle functional capabilities significantly increased. Although the control group achieved some positive shifts through natural adaptation to traditional training, their effectiveness was considerably lower compared to the experimental group. When comparing these results with scientific literature, they align with previous studies. For instance, research conducted by Abduvaliev K. (2020) on the physical training of amateur boxers also revealed the positive influence of special training on general fitness qualities. Similarly, Karimov A. (2019) noted in his research on developing speed and agility that systematic training effectively improves athletes' physical qualities. In conclusion, the obtained results confirm the necessity of applying scientifically based methodological approaches to develop general physical fitness in amateur boxers. This not only enhances the effectiveness of sports

training but also expands the potential for athletes to achieve high results in competitive activities.

Conclusion

The conducted pedagogical research once again confirmed that the level of general physical fitness of amateur boxers is a decisive factor in the process of preparing athletes for competitions. During the study, the indicators of the experimental group (EG) and the control group (CG) were compared, and the results were analyzed. According to the table results, although positive changes in some physical qualities were observed in the control group, they were limited and statistically insignificant. In the experimental group, all test indicators improved significantly and reliably ($p<0.05$-0.01). Specifically, the number of pull-ups on the horizontal bar, dips on parallel bars, and push-ups increased significantly, and the results of the 1000-meter run also improved. This indicates effective development of strength, endurance, speed, and muscular functional capabilities. The study showed that scientifically based training methods are an effective tool for improving the general physical fitness of amateur boxers. These results justify the need to enrich traditional methods with modern methodological approaches in the process of training amateur boxers. Additionally, the systematic and phased development of general physical fitness expands the potential for athletes to achieve high results in competitive activities. The results of this study have scientific and practical significance for developing methodological recommendations in organizing sports training, and optimizing the process of selecting and preparing amateur boxers for competitions.

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