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Distribution of Training Loads in The Annual Cycle of Training of Highly Qualified Boxers

Usmonov Mansur

Termez University of Economics and Service, Termez, Uzbekistan
Correspondence: E-mail: mansur@terdupi.uz

ABSTRACT

With the acquisition of independence, great attention is paid by the Government and the President of the country to the development of elite sports. During the years of independence, athletes of the Republic of Uzbekistan have won medals of various denominations at the World Championships and the Olympic Games. To maintain the won positions at the upcoming Olympic Games, on 5 November 2021, a resolution of the President of the Republic of Uzbekistan "On the comprehensive preparation of athletes of Uzbekistan for the XXXIII Summer Olympic and XVII Paralympic Games held in the city of Paris (France) in 2024" was adopted. Over the past 10-15 years in martial arts, there have been significant changes in the competition rules, refereeing technology, competition calendar, the periodization system of sports training, etc. The noted changes in their unity determine the social and professional need for the scientific development of new pedagogical technologies for the training of qualified combatants at various stages of the annual cycle. This empirical research paper used mixed methods, qualitative and quantitative approaches, to enhance the quality of the paper. The research subject was the national boxing team of Uzbekistan, including world champions and Olympic game participants. This paper tries to differentiate between the ordinary and 52 weekly loaded training sessions on highly qualified boxers.

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1. INTRODUCTION

Improving the training system in martial arts attracts the attention of many scientists and practitioners. Some aspects of this problem were developed by scientists (Mansur, 2022; Halmukhamedov, 2022; Khalmukhamedov, 2009; Usmonov, 2019) however, modern requirements for the development of martial arts, characterized by high intensity of competitive actions, quick switching during the fight, power confrontations, a wide variety of techniques used, require further fundamental research and new approaches to the training of highly qualified athletes (Villa & Calixtro, 2022).

In addition, private issues also require solutions, for example, the features of operational control in various types of martial arts, the patterns of distribution of training loads in the annual cycle at the stages of preparation, taking into account the technical and tactical indicators of competitive activity, the development of special physical qualities that are adequate to modern requirements competitive activity (Rosete *et al*., 2022; Manosa, 2022; Morbo, 2021).

The solution to the above general problems would make a significant contribution to the development of such an important scientific area as the technology of training in martial arts. The purpose of the study is to study the patterns of distribution of training loads in the annual training cycle of highly qualified boxers. The task of the study is to determine the quantitative and qualitative characteristics of the training means used, taking into account their specialization, orientation, and coordination complexity.

2. METHODS

The object and subject of research are to identify the structure, content, and ratio of training means and training methods of highly qualified boxers. Research methods are the literature analysis data and experience of advanced sports practice; pedagogical observations of training activities; mathematical and statistical processing of research results.

3. RESULTS AND DISCUSSION

The planning of training loads in the annual training cycle is of exceptional practical importance and requires scientific justification, taking into account the specifics of various sports. Field observation illustrates that highly qualified boxers participate in 2-3 major competitions during the year. With this in mind, when planning training facilities, it must be remembered that the dynamics of multidirectional loads at various stages of the annual cycle preparation should be based on the principle that provides for the sequential imposition of more intense and more specific training effects on the adaptive traces left in the body by previous loads.

In addition, it is important to ensure not only a rational sequence of multidirectional training effects but also their optimal volume. Both insufficient and excessive amount of work in a certain predominant direction in the annual cycle adversely affects the effectiveness of the training process. **Table 1** presents the average values, standard deviations and the significance of the difference in the volumes of the main training means between the athletes of groups "A" and "B". Group A included athletes who performed successfully in the competitions of the 2021-2022 season, and group B consisted of boxers who showed low results in the same competitions.

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Specialized training exercises were distributed depending on their complexity: 1st group of exercises of maximum complexity, with CCL not lower than 0.8; group 2 with Xl from 0.8 and below.

Table 1. The main indicators of the volume of training facilities for highly skilled boxers in a yearly cycle (options "A" and "B").

Training Tools	Version «A»			Version «B»		
	X	δ	V%	X	δ	V%
Overall volume	8546	280	3,3	8377	751	8,9
The total volume of specialized exercises	4825	201	4,1	4722	373	7,9
Exercises of maximum complexity (Xl - more than 0.8)	1303	81	6,2	1445	128	8,9
Relatively simple exercises	3522	221	6,3	3277	344	10,5
Exercises of maximum specialization (Ksl - more than 0.8)	1305^{x}	80	6,1	1445^{x}	115	7,9
Exercises of high specialization (Ksl - up to 0.8)	972^{x}	43	4,4	1091^{x}	93	8,5
Exercises of average specialization (Ksl - from 0.5 to 07)	1310	45	3,4	1127	96	8,5
Exercises of low specialization (Ksl - 0.4 or less)	1239^{x}	80	6,5	1059^{x}	73	6,9
The total volume of non-specialized exercises	3721	253	6,8	3655	325	8,9
Gymnastic exercises	867	36	4,2	942	68	7,2
jumping exercises	1738^{x}	85	4,9	1377^{x}	123	8,9
Cross running	807	45	5,6	891	84	9,4
Sport games	309^{x}	22	7,1	445^{x}	38	8,5

Note: time in minutes. Degree of significance at P<0.05.

This article's objective is to analyze boxers' pulse oximeter and chronometry ability to perform during boxing. The observation took place in the boxing camp of the Uzbek national boxing team at Chirchiq Olympic College and the second part of the observation has been done at the Boxing school of the Surkhandarya region. The duration of field observation lasted for a year, the last 52 training sessions before the world cup in Russia. The data were collected through the latest IT apps using gadgets and pulse oximeters connected to boxers' bodies during the training.

It requires some time to investigate the boxer's capabilities and develop their strength, power, heartbeat, flexibility, and skills as well to obtain the initial results. The process for evaluating the obtained initial results is based on both empirical (such as observation, conversation, questioning, and checking heartbeats and strength and theoretical (such as studying the literature on the research topic, theoretical analysis, modeling, and others) methods, which are required to judge the reliability of empirical data. The author paid special attention to modeling boxers' training trajectories when dealing with movement and strength by developing the flexibility of the sportsmen. The second stage involved developing a theoretical disciplinary model that was aligned with the training sessions. The experience of enhancing the strength and their ability to perform high performance during competitions.

It has been established that significant differences (P<0.05) are observed between the annual volumes of performing exercises of maximum specialization, means of high and low specialization of the GPP and SPP means, significant differences (P<0.05) were found between the total annual volumes of jumping exercises. Athletes of group "B", who performed a large amount of work of high specialization (Ksl 0.7 and above) paid little attention to the development of speed-strength qualities, which negatively affected their sports results (Abdurazzok, 2021). Meanwhile, it is known that in the process of special physical training of an athlete, it is advisable to use such exercises that would ensure the correspondence of

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motor coordination structures to the parameters of a competitive exercise (Bakinde, 2022; Calixtro, 2021).

In addition, it must be remembered that the organization of training work in regimes with the use of a large volume of training exercises of high specialization and coordination complexity is accompanied by the accumulation in the body of a significant number of metabolic products that have an adverse effect on the athlete's performance, reduce the contractile activity of muscles, disrupt the coordination of movements, slow down the reaction and so on. The consequence of this process is an increased, compared with rest, oxygen consumption after work, called oxygen debt, which indirectly indicates the presence of lactic acid in the body. At the same time, the elimination of oxygen debt occurs only with the help of oxygen coming from the atmosphere during breathing.

The rate of lactic acid oxidation, and, consequently, the elimination of oxygen debt during such strenuous muscular activity, increases along with an increase in work power. The total amount of oxygen used by the body to oxidize lactic acid lactates sometimes reaches one-third of the maximum oxygen uptake (MIC). This ability of the organism is considered an important compensatory adaptation, separating the moment of onset of fatigue and increasing anaerobic productivity.

The ratio of annual volumes of specialized exercises has been investigated. In this case, the total annual volume of exercises of various specializations was taken as 100%: maximum, high, medium, and low for boxers of groups "A" and "B". Such an approach makes it possible to determine the differences in the ratio of volumes between the studied variants of training loads at various stages of the annual training cycle.

Attention is drawn to the fact that the volume of exercises of maximum and high specialization in boxers of group "A" is 3.3% lower than in boxers of group "B" (control), at the same time, the volume of special exercises of medium and low specialization is approximately one level and ranges from 26.3% to 25.7%. It should be noted that the volume of exercises of low specialization was used in the training process of the experimental group.

In general, it was possible to identify a tendency for highly qualified boxers to use training loads of maximum and average specialization at the final stages of the annual cycle. At the same time, special attention was paid to determining the optimal combination of training means of medium specialization.

Thus, the results of the conducted studies related to the volume of training facilities of highly qualified boxers in the annual cycle allow us to conclude that the effectiveness of their rational distribution is determined primarily by the total training effect. At the same time, the following feature was revealed: in the case of overestimated volumes of high-intensity exercises and maximum specialization, the training potential of the load tended to decrease. In our case, this methodological position is confirmed, evidence of which is the insufficiently successful performance of the athletes of group "B" in the most important competitions of the annual cycle.

The study of the ratio of the total annual volumes of training aids of different coordination complexity made it possible to establish that in both groups the volumes of relatively simple exercises predominate - the coefficient of specialization of which is less than 0.8 conventional units. In option "A" this indicator was 73.0% (3522 min), and in group "B" - 69.4% (3277 min). The volume of exercises of maximum coordination complexity looked like this: 27.0% (1303 min) and 30.6% (1445 min). Thus, it was found that athletes who successfully performed in competitions used a slightly smaller number of exercises of maximum complexity. It can be assumed that such an approach is appropriate since an overestimated volume of specialized exercises of increased coordination complexity requires the athlete to demonstrate the

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maximum functional capabilities of the body. Taking this into account, it is absolutely obvious that the structure and nature of the exercises listed above correspond to the maximum extent to the nature of the competitive activity. It is also important to note that the athlete during their performance experiences high mental stress, which negatively affects the acquisition of a sports form and the success of performance in specific competitions.

The effectiveness of building long-term training of highly qualified boxers involves ensuring such an organization of the training process, which would make it possible to significantly complicate the training program from one stage of preparation to another. In this case, it is possible to achieve a systematic growth of the athlete's physical and technical abilities, and an increase in his functional capabilities. Therefore, it is necessary to identify the directions in which the intensification of the training process should go throughout the entire path of sports improvement.

Analysis of the ratio of the relative annual volumes of general physical training facilities is shown in **Table 2**. Their values in the groups under consideration are different.

Table 2. The ratio of the relative annual volumes of funds of the total physical training (options "A" and "B").

OFP funds	Version «A» %	Version «B» %
The total annual amount of funds of the OFP	100	100
Gymnastic exercises	23,3	25,8
jumping exercises	46,7	37,6
Cross running	21,7	24,4
Sport games	8,3	12,2

In both groups, there is a predominance of volumes of jumping exercises, however, their value in percentage terms is much higher in successfully performing athletes, in other words, they pay more attention to means aimed at increasing the level of speed-strength fitness. In the rest of the GPP exercises, the difference between options "A" and "B" varies from 2.5% to 3.9% (P> 0.05).

The values of the coefficients of variation of the annual volumes of the physical training funds for the boxers of group "A" are relatively smaller and range from 4.2% to 7.1%, while in group "B" this indicator is higher (from 7.2% to 9.4%).

An analysis of the ratios of the total annual volumes of partial loads by intensity zones shows that the distribution of the volume of partial loads by intensity zones is unidirectional see **Table 3**.

Differences are observed in the quantitative values of relative indicators (%) and the values of the average relative intensity (ARI). It was revealed that the volumes of physical training means and specialized exercises with Xl - 0.4 or less are performed mainly with high and medium intensity (3rd and 4th intensity zones). However, some of these exercises are performed with high intensity to increase the level of development of speed-strength and speed characteristics of boxers. To speed up the recovery processes of athletes after hard work exercises with low and low intensity (1st and 2nd intensity zones) were used.

In the remaining groups of exercises, most of them were performed with high and maximum intensity (4th and 5th intensity zones). Therefore, the performance of these exercises by highly qualified boxers gives the greatest effect in increasing the level of special fitness. At the same time, it should be remembered that the training work performed in the zone of medium intensity pursues the goal of correctly fixing the most complex motor skills and individual technical and tactical actions. It was also possible to register a fairly large

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variability of exercises of the medium intensity of various sizes, specializations, and complexity.

Thus, the range of load indicators of the average intensity of the means of general physical education varies from 52% to 81%. It turned out that in the real conditions of training activity the highest volume - 85% is made up of exercises of medium intensity and maximum specialization. At the same time, a slight tendency to a decrease in intensity indicators after loads associated with the improvement of technical and tactical skill (TTM) of boxers was established.

Table 3. The ratio of the total annual volumes of partial loads by zones of intensity (in % of the annual volume) (options "A" and "B").

Exercise groups	Intensity zones											
	1		2		3		4		5		IOI	
	Load organization options											
	«A»	«B»	«A»	«B»	«A»	«B»	«A»	«B»	«A»	«B»	«A»	«B»
OFP	8	11	12	18	35	29	40	35	5	7	58	60
Low specialization (Kcl -0.4 or less)			9	18	30	26	53	49	8	7	69	62
Medium specialization (Xl-from 0.5 to 0.7)					8	4	49	50	43*	46	83	74
High specialization (Kcl - up to 0.8)					13		56	51	21	42	74	81
Maximum specialization (Kcl - 0.8 and above)							49	44	51	56	85	88

Note: AR is the average relative intensity.

An analysis of the results of pedagogical observations also showed that after performing such exercises as working with a trainer on the "paws", conditional fight, sparring, and shadow boxing, the intensity indicator ranged from 62 to 71%.

4. CONCLUSION

As a result of the research, it can be concluded that the rational organization of the training process of martial arts athletes (highly qualified boxers) in the annual cycle involves the use of various directions for intensifying their training.

The intensification of the training process at various stages of the annual cycle involves the allocation of the following main areas:

(i) systematic increase in the total volume of training loads of high and medium intensity and increased coordination complexity at the stage of pre-competitive preparation (Kcl from 0.8 and above);

(ii) systematic increase in macrocycles of training sessions with heavy loads;

(iii) a systematic increase in the training process of the number of selective classes, causing a deep mobilization of the body's functional capabilities;

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(iv) increase in the total number of major competitions, characterized by high psychological intensity, and fierce competition;
(v) the gradual introduction of additional funds that stimulate performance and accelerate recovery processes after intense loads, at the final stages of preparation.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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