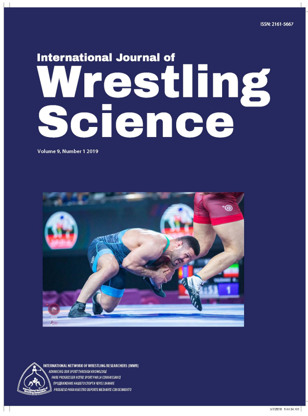

International Journal of Wrestling Science

ISSN: 2161-5667 (Print) 2161-3524 (Online) Journal homepage: http://inwr-wrestling.com

Review Paper

SPECIFIC FEATURES OF PLANNING TRAINING LOADS IN THE MACROCYCLE OF PRE-COMPETITION TRAINING OF HIGHLY QUALIFIED WRESTLERS

Victor V. Shiyan

Published online:June 2019.

To cite this article:
Victor V. Shiyan (2019) SPECIFIC FEATURES OF PLANNING TRAINING LOADS IN THE MACROCYCLE OF PRE-COMPETITION TRAINING OF HIGHLY QUALIFIED WRESTLERS. International Journal of Wrestling Science, 9:1, 7-18.

SPECIFIC FEATURES OF PLANNING TRAINING LOADS IN THE MACROCYCLE OF PRE-COMPETITION TRAINING OF HIGHLY QUALIFIED WRESTLERS

Victor V. Shiyan

Russian State University of Physical Education, Sport, Youth and Tourism (Moscow)

shiyanvv@mail.ru

ABSTRACT

The results of the performances of wrestlers in major competitions are largely determined by the quality of the construction of the final stage of preparation, providing for the achievement of the peak of fitness by the time of participation in major competitions. This condition is largely determined by the dynamics of the level of special endurance possessed by the wrestlers. As a result of the research, it was found that the main limiting factor determining the level of special endurance of wrestlers are the anaerobic abilities of athletes. In sports practice, the proportion of training loads that purposefully develop the anaerobic abilities of wrestlers is negligible. The rational distribution of training loads, ensuring the predominant improvement of anaerobic performance, will significantly increase the level of special endurance of wrestlers and create a solid foundation for the full implementation of the technical and tactical capabilities of athletes in competitive fights.

Keywords. Special endurance, aerobic and anaerobic abilities, training loads, training cycles.

When preparing wrestlers for the major competitions of the season (Olympic Games, World Championships), experts always have one main question: How to take the wrestler to the peak of sport performance before the start of the competition? With the traditional, long-standing practice and the results of special scientific research, the approach to planning pre-competitive training of wrestlers (Gruznih, 1972; Igumenov, & Shiyan, 1998; Platonov, 2004; Sariev, 1991; Shepilov & Klimin, 1979; & Shiyan, 1998), the position of the primacy of competitive activity in relation to training is put forward as a basic position. This approach assumes that in the conditions of training activities, athletes should make full use of specific means and training methods that can ensure the achievement of the peak of a sportsman's uniform at the time of participation in the main competitions of the season.

To solve this problem, at the final stage of preparation for the competitions, trainings are often used that simulate the most difficult conditions encountered during responsible competitions. As a guideline for the model load, you can use the results of studies of the biochemical reaction of wrestlers to the load of a competitive match, obtained during the competition (Olympic Games, World Championship, Russian Championship). Studies have shown (Shiyan, 1998) that individual athletes, after the end of the fight, had blood pH values of up to 6.85 units, (lactate - up to 25-30 mmol / L). Such high values of the studied biochemical parameters indicate the maximum activation of anaerobic glycolysis. This is explained not only by the fact that the load of the wrestlers' competitive bout is a high-intensity repetitive work of a variable nature, but also because it takes place against the background of considerable emotional arousal.

This condition, as is known (Viru & Kyrge, 1983), is accompanied by an increased release of catecholamines into the blood, which significantly increases the energy cost of exercise. This, in turn, leads to an increase in the share of anaerobic energy supply in the overall energy balance of the work performed due to the fact that athletes react to the usual load more acutely than in normal conditions.

In this regard, at the final stage of preparation for competitions, as a rule, the use of large volumes of high-intensity specific tasks, which contribute to the formation of system structural traces of adaptation to anaerobic loads, is provided. Such training should ensure the achievement of the peak of fitness at the time of participation in the main competition of the season. As a main criterion, evaluating the effectiveness of solving this problem, as a rule, an assessment of the athlete's special endurance level (Karaganov, Sariev & Shiyan, 1991; Shiyan, 2012) is applied.

The results of earlier studies (Shiyan, 1998; Shiyan, 2011)) allows one to standardize the testing procedure and the method of quantitative assessment of the wrestlers coefficient of special endurance (CSE). The absolute level of CSE in the range from 5 to 10 conventional units is a reliable marker of the athlete's special readiness for effective competitive activity. This situation is explained by the fact that with such absolute CSE values, the load of a competitive match does not lead to pronounced changes in pH or lactate.

This conclusion is based on the results of studies of the relationship between the absolute level of special endurance of adult highly skilled judoists (Shiyan, 1998) and the results of the evaluation of the blood pH after the end of a competitive bout. In summary, the results of this study are presented in Figure 1.

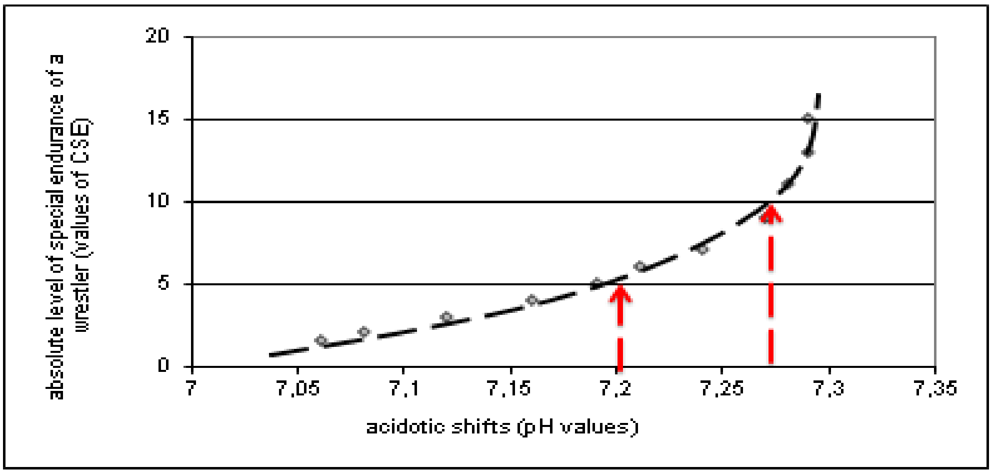

Fig. 1 Influence of the absolute level of special endurance of a wrestler (values of CSE) on the amount of acidotic shifts (pH values) after competitive fights (η = 0.98).
On the abscissa - pH values (cond. units); ordinate - values of CSE (cond. units);

Based on the results of the study, we can draw a number of conclusions:

- The program of pre-competitive wrestler training should be focused on achieving a level of special endurance exceeding the CSE limit value over 5 units. This is explained by the fact that at lower values of CSE, in response to the load of a competitive match, the state of decompensated metabolic acidosis will develop.
- The optimal level of physical readiness for responsible competitions is ensured by the achievement of a CSE indicator exceeding 5 units. With such a level of special endurance, the load of a competitive match does not lead to a pronounced activation of anaerobic glycolysis. The pH values after the bout will be in optimal values (7.2-7.27). It is known that it is against this background of physical exhaustion that the most stable performance of wrestling techniques is observed.
- The state of the peak of the sport performance, which allows you to successfully perform at important competitions, can be achieved at CSE values ranging from 7 to 10 units.
- Building training programs for wrestlers training aimed at achieving CSE values exceeding 10 units is not rational. This is explained by the fact that higher CSE values will not lead to qualitative changes in the nature of the athletes' biochemical response to the load of a competitive match.

Summarizing the presented results, it is possible to identify the main problems that require the scientific and experimental substantiation of the system of physical training planning of highly skilled wrestlers, focused on the preferential education of special endurance athletes.

Within the framework of this problem, it is advisable to elaborate on the following particular issues:

1. How to determine the optimal amount of training work necessary to reliably solve the problem of improving the special endurance of wrestlers to the optimum level?
2. What metabolic functions require preferential improvement with the focused training of special endurance of fighters?
3. How to evaluate (and plan) training loads, which have a predominant effect on the improvement of the individual metabolic functions of wrestlers?
4. How to distribute the training loads of different physiological nature of the impact on the individual stages of pre-competitive training of wrestlers (in the structure of training macrocycles, mesocycles, microcycles and individual occupations)?

Let us try, based on the results of many years of research, to consistently answer the questions posed. When solving the problem of finding the optimal parameters for the volume of training work, we relied on the fundamental dependence described in works (Platonov, 2004; Volkov, 1990; Volkov, 2000) between the growth rates of the training function and the volume of the training stimulus (training work). In the most general form, this dependence is presented in Fig. 2

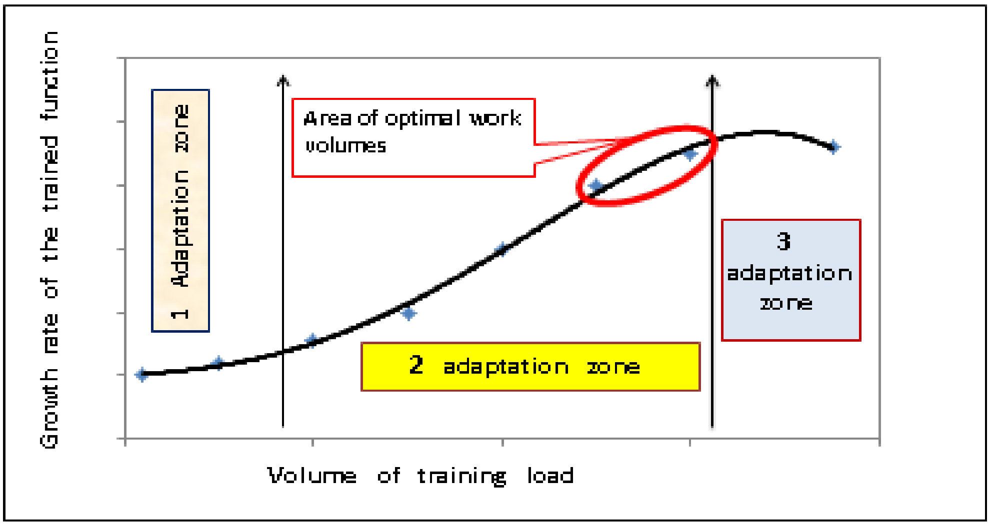

Fig. 2 The dependence of the growth rate of the function being trained on the value load performed
Zone 1 - ineffective amounts of training work;
Zone 2 - effective amounts of training loads;
Zone 3 - the zone of limiting and exorbitant loads.

From the presented data, it is clearly seen that, depending on the size of the completed training work, regular changes occur in the growth rates of the trained function. Based on these data, we can formulate four main conclusions for coaches who solve the problems of optimizing the training process of pre-competitive wrestler training:

1. With insufficient total amounts of training work, there is no significant increase in the trained function (1 adaptation zone). This suggests that one-time (non-systemic) training work will not lead to positive changes if the total amount of such work is insignificant.
2. During system work (with sufficient volumes of the same type of training work) there is an almost linear relationship between the volume of work performed and the increase in the trained function (2 adaptation zones).
3. In the upper part 2 of the adaptation zone, the zone of optimal training loads can be distinguished. The skill of the trainer is to reasonably select the parameters of training loads at the border between 2 and 3 adaptation zones.
4. Parameter 3 of the adaptation zone, in which there is no increase in fitness of an athlete, are of practical importance. This indicates that it is impossible to greatly increase the volume of the same type of training work. The will be no benefits of such training, and the possibility of overtraining and injuries is great.

The results of earlier studies (Shiyan, 1998) showed that the optimal duration of the macrocycle pre-competition training of wrestlers should be in the range from 100 to 140 days. With such a duration of focused training, you can achieve a pronounced growth of trained qualities and ensure the achievement of the peak of fitness.

Using the methodology for analyzing the effectiveness of long-term training programs (see Fig. 2), we conducted an experiment to study the relationship between the rate of increase in the level of special endurance of wrestlers and the total amount of training work performed during the macro cycle of pre-competition training. The parameters of the training loads were determined as follows:

- Completed training work was expressed in minutes of work (only the actual execution of the task was taken into account, without taking into account the rest intervals between the series of exercises or fights);
- Since the duration of the macrocycle of preparatory training varies in the range from 15 to 20 weeks, the training programs performed were averaged over the conditional weekly microcycle.

In summary, the results of this study are presented in Fig. 3

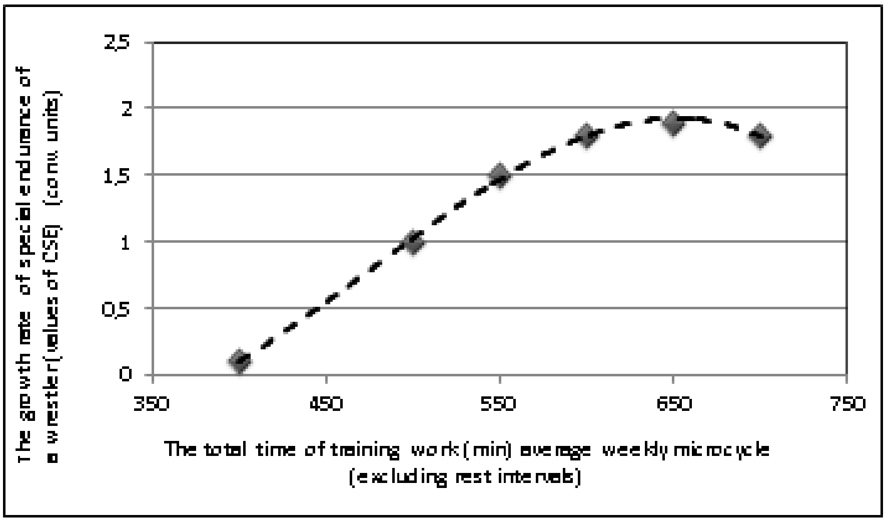

Fig. 3 Dynamics of the increase in the level of special endurance of highly qualified judoists depending on the total amount of training work of the conditional weekly microcycle of pre-competitive wrestling training.
On the abscissa - the total time of the work of the conditional weekly microcycle (min.);
on the ordinate - the value of the increase in CSE (conv. Units)

From the results of the study, it can be seen that the optimal level of the total weekly load, expressed in minutes of work (excluding rest intervals) should be approximately 600-650 minutes. With a very rough recount, this is about two, two-hour workouts per day with five training days per week.

However, the established fact of the total optimum load does not answer the question about the content side of the training program of the macrocycle of the pre-competitive training of wrestlers. A reasonable answer to this question can only be obtained on the basis of studying the significance of individual metabolic factors for the development of the special endurance of wrestlers.

In the special literature (Andreev, Matveeva, Sytnik, Ratishvili, 1975; Bondareva, 2010; Gruznih, 1972; Igumenov & Shiyan, 1998; Novikov, 1987; Sagiyan, 1972; Shepilov& Klimin, 1979; Tumanyan & Martirosov, 1976) one can find scattered data on this issue. Most scientists noted the special importance of anaerobic abilities as a factor determining the effective performance of technical and tactical tasks during the competitive fight of wrestlers. In particular, the well-known textbook on the physiological fundamentals of physical education Fox & Mathews (1981) provides a quantitative description of the significance of various bioenergy functions for performing specific competitive activity in wrestling. According to these authors, the contributions of the bioenergy systems for wrestlers varies as follows:

- 90% - anaerobic abilities (ATP-PC and Lactic Acid),
- 10% - mixed aerobic-anaerobic abilities (Lactic Acid & Aerobic Respiration)
- 0% - aerobic capacity

Very similar results were obtained in our research (Shiyan, 1998; Shiyan, 2012), devoted to the study of the contribution of individual metabolic functions to the level of special endurance of wrestlers. According to these data, the contributions of the bioenergy systems varies as follows:

- 14.5% - the effect of alactic anaerobic abilities
- 78.2% - glycolytic anaerobic abilities
- 7.3% - aerobic capacity

Summarizing these data, we can conclude that the need for targeted improvement of the anaerobic abilities of wrestlers as the main means, aimed at developing the special endurance of athletes. The importance of anaerobic training work was confirmed by the results of histochemical studies of the muscular composition of the adult elite judo team of the USA (Callister et. al., 1991). According to this research, the share of slow muscle fibers in judoists is about 1/3 of the volume of the broadest thigh muscle (35.7%). This suggests that in the process of many years of specialized training in this sport there was a natural selection of the most adapted to this type of activity of athletes with predominantly fast (anaerobic) muscle fibers. The proportion of type IIA fibers was 37.1%, while the proportion of type IIB fibers was 26.8%. As a consequence of these results, it was concluded that the predominantly anaerobic nature of the specific activity of judoists and the need to train fast muscle fibers. At the same time, it was suggested that it is necessary to develop training programs focused on the separate improvement of the functional capabilities of both subtypes (IIA and IIB) of fast muscle fibers.

Unfortunately in sports practice, the recommendations of scientists are often ignored. As shown by a retrospective analysis of training programs of pre-competitive training of highly skilled wrestlers (Shiyan, 1998), such physiological loads are used in practice extremely rarely. This fact can be explained by a number of objective and subjective factors.

For athletes:

- The need for maximum motivation to re-run a series of short-term work with maximum power;
- The need to perform repeated training tasks, with maximum work power, against the background of extreme physical exhaustion (at maximum lactate concentrations).

For coaches:

- The need for continuous monitoring and correction of all basic parameters of the training task (intensity of work, duration of a single load, the number of repetitions in a series, the number of series, intervals and nature of rest in a series of work and between series of exercises, etc.). At the same time, it is necessary to conduct a constant correction of the external parameters of the training tasks using biochemical methods for an objective assessment of the nature of the immediate training effects of the work performed.
- The need to overcome the psychological barrier associated with the desire to use all the time allotted for training to perform special tasks. For individual workouts (for example, to improve alactate anaerobic abilities), the time spent actively completing a task and resting can reach a ratio of 1:20. This means that with a total workout time of 100 minutes, 95 minutes will be spent on warm-up and rest intervals between basic tasks of 5 minutes of maximum work for the entire workout.

It is likely that it is for this reason that anaerobic exercise is used extremely rarely in the practice of training wrestlers. This makes the problem of physiologically correct accounting and planning of training tasks performed by fighters, extremely relevant, of great practical importance.

In the physiology of sport (Farfel,1960; Platonov, 2004; Volkov, 2000) it is customary to single out four physiological systems based on their the biochemical nature, and use zones of training loads, causing a predominant effect for the improvement of the targeted system to provide energy to the working muscles.

In practical work, the most justified is the separate planning of the volume of training work, providing for the allocation of the following physiological zones of training loads:

- Predominantly aerobic character;
- Mixed (aerobic-anaerobic) character;
- Anaerobic glycolytic character;
- Anaerobic alactate character.

With this approach to planning training tasks, it is possible to predict the growth rate of fitness level, based on an analysis of the fundamental relationship between the amount of work done of a particular physiological focus and the gain of the trained function.

The first attempts at a practical solution to this problem were made in the USSR in the mid-70s. As a result of exploratory research (Andreev, Matveeva, Sytnik & Ratishvili, 1975; Farfel,1960), it was found that the pulse rate of the special training work is closely correlated with the indicators of the energy value of the load performed. On this basis, the gradation of loads was developed, providing for the allocation of 8 zones of intensity of training tasks used in wrestling and judo ((Andreev, Matveeva, Sytnik & Ratishvili, 1975). From this point on, the determination of pulse reactions to the training loads of athletes-martial artists has become (and remains so until now) the main criterion for assessing the physiological orientation of the means and training methods used. Many years of experience and the results of more recent studies (Igumenov & Shiyan,1998; Shiyan, 1998) cast doubt on the appropriateness of using pulse criteria for assessing the physiological nature of specific training tasks in the preparation of highly skilled athletes in combat sports.

To assess the prognostic significance of the use of pulse estimates of the intensity of specific training tasks, we conducted a special experiment on the athletes of the main team of the Olympic team of Russia in karate. Under conditions of centralized collections, a pair-wise assessment of maximum values of heart rate and capillary blood lactate concentration was carried out after performing three standardized special training tasks:

-Training task mainly speed direction.

Five series of special tasks of predominantly alactate anaerobic character (five options for performing attacking actions). Tasks were performed with a maximum intensity for 10 seconds. Rest between the series of special tasks - 1 min.

-Model load competitive match.

Athletes consistently performed three standard tasks.

- 1 task: positional maneuvering in place, every 10 seconds - any single hand attack.
- 2 task: positional maneuvering on the spot, every 15 seconds - any combined two-tem attack by hand - foot.
- 3 task: positional maneuvering on the spot, every 15 seconds - any three-tempo attack by hand - foot - hand.

The total load: for women - 2 min, for men - 3 min.
Rest between tasks: for women - 2 min, for men - 3 min.

Competitive fights with judging:
To assess physical fitness for competitive activity, competitive activity modes (two fights) were modeled in accordance with the rules of karate competitions. A summary of the results of the study are presented in Fig.4.

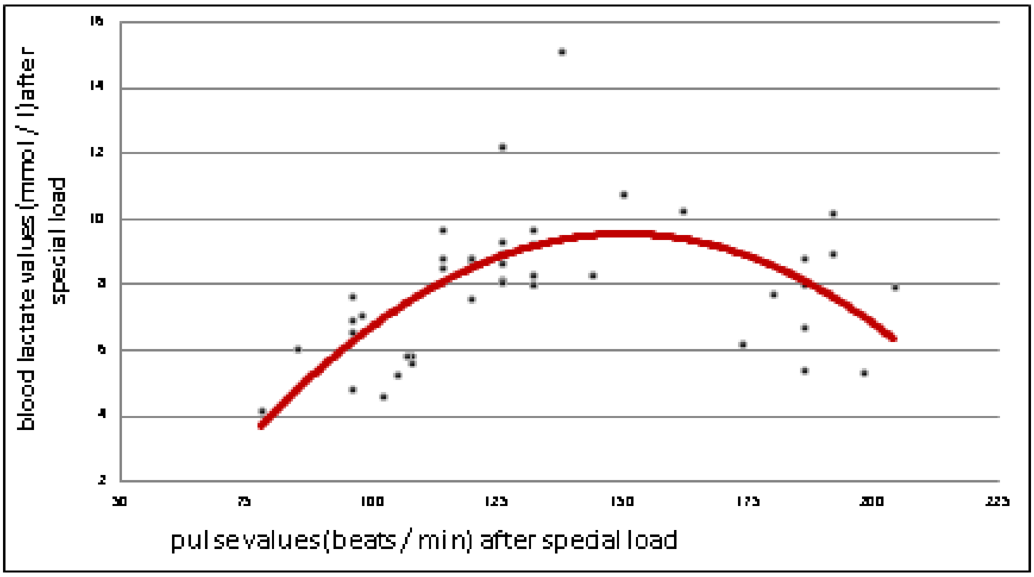

Fig. 4 Correlation field of interrelation of values of pulse and biochemical criteria of an urgent assessment of the intensity of a specific load among highly qualified athletes in sports karate. (r = 0.22)

The study showed that between the values of heart rate and lactate in the blood, after performing a highly specialized intensive load used in karate, there is no reliable relationship (r = 0.22). Based on these data, we can conclude that the use of pulse criteria for assessing the physiological nature of training loads is not suitable for practical use in karate and other types of martial arts. Most likely, this is due to the specificity of competitive activity in which repeated high-intensity series of short-term load are characteristic of attacking or defensive actions.

An explanation of this fact can be easily found when analyzing the known data (Volkov, 1990) about the features of the change in the rate of energy production in various metabolic processes depending on the power of the work performed. It is well known (Fox & Matthews, 1981; Volkov, 1990; Wilmorew & Costill) that the sequential inclusion of various energy sources allows you to exercise in a very large range of power load (from 0 to about 10 MMR units).

At the same time, it is widely known (Fox & Mathews, 1981; Volkov, 2000; Wilmore & Costill, 1997) that the linear nature of the dependence of HR on the power of the work performed is in a rather narrow pulse range - approximately from 120 to 170 beats / min. Two sub-maximal tests for assessing the overall performance of athletes based on this phenomenon were the PWC170 and the Harvard step test. This indicates that the range of linear increase in heart rate values, depending on the power of work performed, is in the range from 0.2 to 0.7 MMR units.

On this basis, it can be concluded that the use of pulse criteria for assessing the intensity of training exercises reliably evaluates only 5% of the entire possible range of power training loads used in the practice of training highly qualified athletes. This mainly refers to long-term cyclical exercises with relatively low intensity of work (up to the level of critical power). In martial arts, the work of such a low intensity is used only in the study of new techniques, their combinations or tactical schemes for constructing a duel. When training highly qualified wrestlers for major competitions of specific training tasks with such power (up to 0.7 MMR units), it is not used in practice.

This suggests that most of the training tasks used in the practice of training highly qualified athletes-combatants, aimed at improving the special performance of athletes on the pulse criteria are not evaluated. To solve practical problems of building a full-fledged program of pre-competitive training of wrestlers, trainers need a convenient and understandable algorithm for determining the preferential physiological nature of the impact of the tools and training methods used.

This problem can be solved by taking into account and strictly regulating the main external signs of the training work being done. As an example of the practical implementation of this approach to the rationing of external parameters of the load. Table 1 presents the main parameters of the training tasks that require precise rationing and monitoring.

Table 1. Approximate scheme of rationing external signs of training tasks for load planning with a predetermined physiological nature of the predominant effects.

Physiological character of the load	load intensity work	Time work	Quantity repetitions, series	Rest time (min.) Character rest (cyclical work)
Anaerobic Alactate	maximum	up to 6-10 seconds.	6-7 reps in the series 5-6 series	1-2 between repetitions 3-5 between series
Anaerobic Glycolytic	submaximal	from 0.3 to 2 min.	one-time work	-
	submaximal	from 0.3 to 2 min.	3-4 repetitions in the series 2-3 series	reduced in series 5, 3, 2 min. 10-15 between series
Mixed Aerobic-Anaerobic	big	10-20 sec.	2-4 reps in a series 5-6 series	0.2-0.5 between repetitions up to 3 between series
	big	0.5-1.5 min.	over 10 repetitions 5-6 reps per series 2-4 series	0.5-1.5 between repetitions 0.5-1.5 between repetitions up to 6 between series
	big	3-10 min.	to 6 reps	a large 3-10 is not limited to full recovery
	variable	up to 30 min.	single job	
Aerobic	moderate	1-3 min.	over 10 repetitions	0.5-1.5 between repetitions
			5-8 reps in a series up to 8 series	0.5-1.5 between repetitions up to 5 between episodes
	moderate	3-10 min.	6-8 repetitions	unlimited
	variable	over 30 min.	one-time work	-

* Intensity of work was determined by the classification of training loads proposed by Farfel (1960).

It is necessary to understand that this is only the most general (principal) scheme for taking into account the main components of the training task, which solves the problem of a reasonable prediction of the main physiological orientation of the upcoming training work. It is necessary to clearly understand that this concept should be constantly adjusted and take into account the current state of the athlete, his level of fitness, body weight, etc.

This approach to planning and accounting training loads will allow to solve two important tasks:

- Allow the coach to reasonably consider and plan two equivalent parts of the training task:
  - the active part - the content, intensity and duration of the implementation of training exercises;
  - the passive part - the nature, content and duration of the intervals of rest between individual tasks and series of work;
- Planning of the athletes training program, taking into account the prevailing nature of the work performed, will allow for separate planning (and accounting) of the volume of work performed in each of the four

physiological zones of training loads. This will allow a quantitative analysis of the effectiveness of the work done on the basis of the relationship between the volume of work performed and the growth rate of athletes' fitness (see the data in fig.2).

However, the solution of this problem is only the first step for the development of a scientifically based program of rational distribution of training loads in the framework of training sessions of the entire macrocycle of pre-competitive training. Within one article it is impossible to cover the whole range of issues that require scientific substantiation and experimental verification. We will try to focus on the problem of rational construction of the training microcycle at the pre-competitive stage of training highly skilled wrestlers. As the main element requiring special reflection, the structural features of the distribution of anaerobic loads will be discussed. This approach is due to the results of a study on the effect of anaerobic glycolytic loads on the dynamics of special endurance and aerobic performance of wrestlers (Sariev, 1991). In summary, the results of this study are presented in Fig. 5.

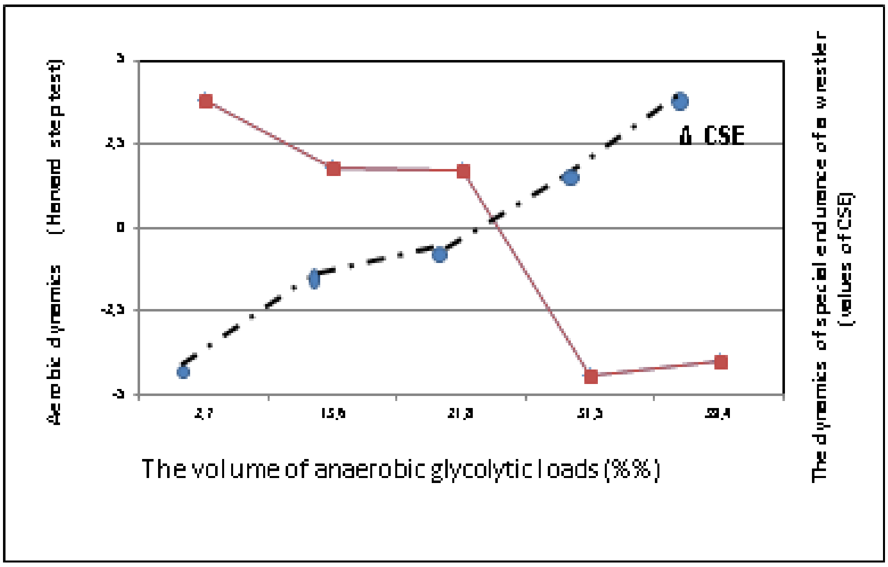

Fig. 5 Influence of the structural features of the distribution of glycolytic anaerobic loads on the dynamics of special endurance
-Δ (values of CSE) ( ) (r= 0,76)
- Aerobic dynamics (Harvard step test) ( ) (r= --0,36)

Summarizing the results of this study, we can draw two conclusions of practical importance:

- The pace of increase in special endurance of wrestlers reliably depends on the amount of training loads of glycolytic anaerobic nature (r = 0.76) performed at the final stage of preparation;
- At the final stage of preparation for responsible competitions, as the level of special endurance of a fighter increases, there is an unreliable decrease in aerobic capacity (r = - 0.36). This indicates a low predictive value of control over the dynamics of aerobic abilities of wrestlers before a competition.

These conclusions are supported by the results of experimental studies (Shiyan, 1998) which showed that with insignificant differences in the level of aerobic capabilities of the wrestlers encountered in an in-person duel (maxVo2 48 ± 5 ml / min / kg), there were significant differences in their response to the load of the competitive duel between them. In some cases, the difference in the reaction of athletes was about 0.2 pH units (the winner had a pH of 7.25-7.35, and the loser had 7.05-7.15). These differences in the reaction of athletes to the full-length duel between them are reliably related only to the indicator characterizing the level of special endurance (h = 0.76) and do not depend on the level of aerobic capabilities of wrestlers (Shiyan, 1998).

All of these facts convincingly indicate the need for special planning of anaerobic training loads that ensure the priority development of special endurance in wrestlers. In this case, it is necessary to take into account the fact that the initial level of development of the special endurance of wrestlers should be taken into account when developing training plans for pre-competitive training. This conclusion is based on the results of the study (Shiyan, 1998) which found that:

- for wrestlers with a low level of special endurance, a significant increase in special endurance (ή = 0.94) is observed in the range of training loads of glycolytic anaerobic nature from 3 to 40 %% of the total workload (ή - non-linear correlation coefficient);

- in wrestlers with a high initial level of special endurance, a significant increase in special endurance (ή = 0.98) is observed only after performing training loads of a glycolytic anaerobic nature (over 20% of the total workload). At the same time, the maximum increase in the level of special endurance for this category of athletes can be achieved when performing loads of this kind up to 50-60 %% of the entire training work of the pre-competitive mesocycle of training.

Without denying the high importance of aerobic capabilities that determine the basic level of fitness of an athlete, it should be noted that the specifics of the pre-competitive preparation of highly qualified wrestlers should be built with an emphasis on improving the special endurance, ensuring the reliable manifestation of technical and tactical capabilities in competition.

An effective solution to this problem is achieved only in the case of the use of large volumes of specific training loads of a predominantly anaerobic nature. Such a construction of training provides not only an increase in functional capabilities, but also contributes to the formation of stable motor skills, manifested in conditions of intense muscular activity, a characteristic of the duel of wrestlers.

According to Wilmore and Costill (1997), the effectiveness of the specialized anaerobic training, which underlies the proposed pre-competitive training of wrestlers, is manifested in two main factors:

1. A significant increase in the buffer capacity of the muscles involved in the performance of work. In particular, according to Sharp, et al. (1986) after an eight-week anaerobic training of athletes, their buffer abilities are increased by 12-50% from the initial level.
2. Improving the efficiency of performing complex movements, manifested in reducing energy costs due to greater consistency in the work of the main muscle groups involved in a particular exercise. In addition, it was discovered (Shiyan, 1998) that the improvement of techniques for performing techniques against the background of acute physical fatigue, characteristic of anaerobic loads, leads to a significant improvement in the quality of the implementation of motor skills performed against the background of fatigue of a competitive match.

In sports practice, the training session of wrestlers, as a rule, includes the execution of a series of repeated loads of different physiological bases. With such an application of traditional training tasks, it is necessary to take into account the nature of the interaction of required training effects, differences in orientation, and loads used in training. In theory and methodology of sports training, it is customary to single out three possible options in combination of the required training effects of exercises of different physiological orientations:

a) positive interaction effect. With the right combination of training tasks of various physiological orientations, the functions are significantly enhanced, which indicates a significant increase the effectiveness of training.
b) the neutral nature of the interaction of the immediate training effects of the exercises used does not affect the total value adaptive changes of the trained function.
c) negative interaction effect. With the wrong combination of training tasks of different physiological orientation, a significant decrease in the overall adaptive effect of training is observed. In some cases, such a combination of different tasks may provoke a state of overtraining.

Due to the insufficient theoretical and experimental elaboration of the problem of taking into account the required training effects of loads applied in one lesson, it was decided that a unidirectional construction of a workout would be useful. With this approach to load planning, the main principle is the primary physiological focus of the workout of the entire training session. To solve the main task of a particular training session, tasks with predetermined external and internal signs will be selected, which allow solving the set task to the maximum extent. In some cases, when planning loads of one training session, combinations of exercises of various physiological nature were allowed.

With this construction of training, we relied on the experimental data of Volkov (1990, 2000), recommending the following possible combinations of required training load effects:

a) when educating alactate anaerobic abilities, it is advisable to use a small amount of aerobic exercise, after which the main work is performed using training tasks of alactate anaerobic nature;
b) in the upbringing of glycolytic anaerobic abilities, the positive effect of the interaction of urgent training effects is achieved in the case of consistent application of loads of alactic anaerobic exposure, after which the main work is performed using training tasks of glycolytic anaerobic nature;
c) when educating the aerobic capabilities of wrestlers, it is allowed to perform a small amount of anaerobic (alactic or glycolytic) exercises before the main training work of an aerobic nature.

Thus, when building a model of the training and training process of wrestlers, when describing a separate lesson, it was decided to use the principle of unidirectional impact of the training tasks used in the main part of the lesson.

The results of previous studies (Shiyan, 1998; Volkov, 1990) convincingly show that the magnitude of the urgent training effects of the load performed by athletes is significantly affected by the presence of the so-called delayed training effect. In other words, the effect of the same training load will vary significantly depending on the conditions of its performance by the athlete, or rather, on what background the recovery from the previous training sessions is found in the athlete.

The problem of combining immediate and delayed training effects is most acute when considering the issue of rational construction of training microcycles for training athletes. Summarizing the experimental data on this problem, obtained as a result of observations of athletes in various sports allows us to make some generalizations:

a) After three training days with any combination of training loads conducted in a row, there is a significant background of incomplete recovery. Such a condition of an athlete leads to the effect of negative interaction of applied training loads. In sports practice, this provision manifests itself in the form of an unloading training day, introduced after three training days of the microcycle training.

b) The distribution of loads of various physiological directions in the structure of the training microcycle took into account the effects of heterochronic recovery of various functions, which provide sufficient time for the supercompensation phase to manifest in the dominant function. On the other hand, when developing the structure of the distribution of training loads in the microcycle of preparation, it is necessary to take into account the nature of the interaction of the delayed training effects of previous occupations with the urgent training effects of subsequent work.

In developing the concept of the distribution of training loads in the micro cycle of training wrestlers, we relied on the results of previous studies (Shiyan, 1998; Volkov, 2000), which showed that:

- It is advisable to apply the loads of alactate anaerobic nature against the background of full recovery after a series of previous training loads, i.e. at the very beginning of the microcycle preparation.
- The effectiveness of the application of glycolytic anaerobic loads is reduced if this kind of work is done after an aerobic training session.

Summing up all the above facts, we have developed a schematic diagram of the distribution of training loads in the conditional weekly micro cycle of the final stage of the pre-competitive training of highly skilled wrestlers.In developing the concept of constructing a conditional weekly microcycle, the following premises were based on:

1. Training loads of an individual training should have the same type of physiological effect. Each training session is dedicated to solving one priority task. All other training tasks are background, ensuring maximum implementation of the main task.
2. In developing the training program, the principle of a double week microcycle was implemented in which, after three training days, a rest day (or a fasting day with a small amount of aerobic work) was given, then two training days, a sauna and a rest day were planned. As a rule, two workouts were conducted per day.

The proposed scheme of building a training microcycle is of fundamental nature and can be partially modified depending on the individual characteristics of athletes (initial level of fitness, the manner of conducting a competitive match, weight category of a wrestler) and specific tasks at various stages of preparation for competitions. Only the coach, armed with basic knowledge of the physiological mechanisms underlying the training of highly skilled athletes, can fully take into account all the individual characteristics of an athlete.

IMPLICATIONS AND PRACTICAL ADVICE FOR COACHES

For the accentuated education of special endurance of wrestlers, you can use both specialized training tasks with a partner or a dummy as well as non-specific exercises (running or circuit training), of a anaerobic glycolytic nature.

Using a non-specific (running) task, it is possible to recommend repeated performance of 3–4 repetitions in series of a 400-meter race with shorter rest intervals (3, 2, 1 minute of rest) after each race. A new series of work begins after a rest lasting from 7 to 15 minutes and start with a pulse of about 130 beats per minute. The total number of series of such work in one workout can vary from three to ten and depends on the level of fitness of the athlete.

An example of a specific training task of this nature, it is possible to to use 3–7 series of special loads consisting of:

-loads of 15 throws of the wrestling dummy at the maximum intensity;
-loads from a minute struggle with a rested partner.

In one series of such combinations of a series of throws of a wrestling dummy at the maximum intensity and a minute struggle with a rested partner can be from three to five (each time it is important to provide your athlete with a new, rested sparring partner). Readiness for a new series of such work can be determined by the dynamics of the recovery of the pulse to 130 beats per minute.

When performing such training tasks, it is important to assess the readiness of the athlete to continue training work. To do this, it is necessary to constantly monitor the speed of recovery of athletes from series to series and stop its continuation at the first signs of overwork.

REFERENCES

Andreev V.M., Matveeva E.A., Sytnik V.I., RatishviliG.G. (1975) Planning training loads in weekly cycles of pre-competitive wrestler training. // Wrestling. Yearbook M., FiS, 16-17.

Bondareva E. A. (2010) Four polymorphic genetic systems Association (ACE, EPASI, ACTN3, NOS3) with sports success in struggle of Sambo-wrestling / Bondareva E.A., Godina E. Z., Shiyan,V. V., Spitsyn V. A.// Bulletin of Moscow University. Series XXI 11 Anthropology. 1, P. 36 - 45

Callister R., et al. (1991) Physiological characteristics of elite judo athletes. International Journal Of Sports Medicine, 1991, 12 (2), P/ 196-203.

Dill D.B., Robinson S., Ross J. (1967) A longitudial study of 16 champion ranners. Sport Med. Phys. Fitnes, № 7, p/ 4 –27.

Farfel V.S. (1960) Physiology of sport. Essays. - m. : Physical Education and Sports, 384p

Fox E. L., Mathews D. K. (1981) The physiological basis of physical educatuon and athletics . - Philadelphia , Pa. : Saunders College , 677 p

Gruznih G.M. (1972) Experimental study of endurance and methods of its improvement in athletes. Abstract dis. ... Cand. ped. M., 23 p.

Igumenov V. M., Shiyan V. V. (1998) Problem of pre-competition preparation planning in wrestling / Theory and practice of physical culture. Ne 5. P. 61.

Karaganov B. K., Sariev K. S., Shiyan, V. V. (1991) Effect of anaerobic exercise on the dynamics of performance indicators of qualified judoists // Theory and practice physical culture-N 4- P. 19-20.

Novikov S. P. (1987) Educational tests and criteria for ongoing assessment efficiency of judoists of heavy weight / / Theory and practice of physical culture 1987 6 - p. 39 – 40

Platonov V.N. (2004) The system of training athletes in the Olympic sport. General theory and its practical applications. - Kiev, Olympic literature, 808 p.

Pulkkinen W. J. (2001) The sport science of elite judo athletes, Pulkinetics Inc., 93 p.

Sagiyan B.Z. (1972) Group features of physical training of fighters of light, medium and heavy weight categories: Abstract of thesis. ... Cand. ped. sciences. - M., 21p

Sariev K.S. (1991) Planning of the pre-competitive stage of training qualified judoists ... Abstract of a dis. ... Cand. ped. Sciences, Moscow, 21 p.

Sharp R.L et al. (1986) Effects of eight weeks of bicycle ergometer sprint training on human muscle buffer capasity. International Journal Of Sports Medicine, 1986, 7, p. 13-17

Shepilov A.A., Klimin V.P. (1979) Endurance wrestlers M., FiS, 127 p.

Shiyan V. (1998) Theoretical and methodological foundations of special endurance training of highly qualified wrestlers / dissertation Doctor. ped. Science / M., 217 p.

Shiyan V.V. (2011) A method for estimating special endurance in wrestlers/ International Journal of Wrestling Science, 2011, Vol. 1 Issue 1, p. 24 –27.

Shiyan V.V. (2012) Bioenergetic factors determining the development of special endurance of wrestlers/ International Journal of Wrestling Science, Vol. 2 Issue 1, p.17 – 20

Tumanyan, G.S., Martirosov, E.G. (1976) Build and sport. - m. : Physical Education and Sport, 237 p.

Viru A.A., Kyrge P.K. (1983) Hormones and sports performance. M., FiS, 159 p.

Volkov, NI, Shiyan, VV (1983) Anaerobic capabilities judoka and their relation to competitive activities / / Theory and Practice of Physical Culture. - 1983. - № 3. - P. 23 - 25.

Volkov NI (1990) Bioenergy intense muscular activity of the person and how to improve performance of athletes, Dr. Sci. ... Dr. biol. Sciences in the form of scientific. The report. - M., 101p.

Volkov N. I. (2000) Biochemistry of muscular activity / Nessen E.N., Osipenko A.A., Korsun S.N. // Kiev, Olympic literature, - 503 p.

Wilmore J., Costill D. (1997) Physiology of sport and motor activity. Kiev, 503 p.