Improving the aerobic and anaerobic capacity of kickboxers through polarised training

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Abstract

Objective of the study is to determine the effectiveness of polarised training for kickboxers during the preparatory period, based on the integrated development of the athletes' aerobic and anaerobic capacities.

Methods and structure of the study. During the preparatory period, prolonged low-intensity exercise was combined with the execution of techniques at high speed. Following five training sessions aimed at developing general endurance, speed-strength training was conducted to maximise the speed and power of punches and kicks. The following parameters were measured: maximum and anaerobic power; power decline index; and maximum oxygen consumption (MOC).

Results and conclusions. Polarised training improves kickboxers' anaerobic capacity to a greater extent, whilst aerobic energy supply mechanisms improve to a lesser extent. When planning further training, greater attention should be paid to developing kickboxers' aerobic capacity.

Keywords: *elite kickboxers, maximum oxygen consumption, polarised training, training process.*

Introduction. When planning a training programme for kickboxers, it is essential to take the competition calendar into account, as this allows for the training of athletes to be tailored to the different phases of the annual training cycle. Athletes must be in peak physical condition in April–May, as this is when the season's most important competitions take place, as well as in September ahead of the European and World Championships. Selection for the national team takes place after the completion of each macrocycle [1].

The preparatory period, during which the foundations of general and specific physical fitness are laid, plays a decisive role in an athlete's annual training cycle [2]. The body's basic capacity for adaptation, acquired during the preparatory period, determines the nature of tolerance to specific training and competitive loads, the informative indicators of which are individual physiological parameters providing information on the athlete's current condition. For effective planning of subsequent training periods, it is advisable to carry out systematic monitoring of physiological indicators and the dynamics of their changes during the preparatory training period [4].

As the season's main competitions approach, the demands on a kickboxer's speed-strength qualities increase significantly. High-intensity and high-volume speed-strength training loads can cause excessive fatigue in athletes [3]. Polarised training, which allows for the inclusion of individual high-intensity sessions against a background of large volumes of low-intensity training as early as the general physical stage of the preparatory period, optimises the tolerance of physical exertion without reducing the effectiveness of the development of speed-strength qualities in kickboxers.

Objective of the study is to determine the effectiveness of polarised training for kickboxers during the preparatory period, based on the integrated development of the athletes' aerobic and anaerobic capacities.

Methods and structure of the study. 16 highly qualified kickboxers, specialising in the full-contact

and low-kick ring disciplines, took part in the study. 8 athletes formed the experimental group, and 8 formed the control group.

During the preparatory training period, prolonged low-intensity workouts were combined with high-speed training techniques. Following five training sessions aimed at developing general endurance, speed-strength training was conducted with a partner of greater body mass to maximise the speed and power of punches and kicks. As the athletes' fitness improved, the duration of the speed-strength training sessions was increased.

Standardisation of the training conditions was achieved by ensuring that the total training volume, recovery periods, daily routine and diet were identical for participants in both the experimental and control groups.

The participants' anaerobic capacity was determined using a 30-second Wingate test on a Monark-894E cycle ergometer. The following parameters were measured: maximum power (Pmax); average anaerobic power (Pavg); and the power decline index at 30 seconds of exercise.

Aerobic capacity was determined by the maximum oxygen consumption (MOC).

The level of physical fitness was assessed based on the results of the standing long jump, 4 10 m shuttle run and 1000 m run.

Results of the study and discussion. An analysis of the study results shows that the greatest improvement in anaerobic capacity was observed in the experimental group, whose maximum power output was 11.8±2.7 W/kg, with an average value of 8.6±0.9 W/kg. In the control group, the indicator under study increased to 8.2±3.7 W/kg, with an average value of 6.9±0.7 W/kg.

When comparing the results of the participants at the end of the study, it can be noted that the participants in the experimental group achieved the best results. The most significant differences were observed in the indicators of anaerobic capacity in the athletes of the experimental and control groups.

Maximal oxygen uptake indicates significant differences between athletes in the experimental and control groups. The best results were demonstrated by the kickboxers in the experimental group, whose VO2max was 63.8±8.2 ml/kg/min. The maximum oxygen consumption in the control group was 51.6±9.1 ml/kg/min.

Based on the comparative analysis, it can be concluded that the dynamics of aerobic capacity among the experimental group participants, as assessed by VO2max, surpasses in both absolute values and dynamics the results of the control group athletes, in which the kickboxers achieved lower VO2max values. The inclusion of prolonged low-intensity exercises in the polarised training programme facilitated the activation of aerobic mechanisms supporting muscular activity. In particular, the peak values recorded in the 1000 m run by athletes in the experimental group are associated with an increase in functional capacity during the late stage of the preparatory period.

In tests of anaerobic capacity, participants in the experimental group showed better results than those in the control group. The results of the anaerobic tests performed by athletes in the EG are due to an increase in maximum and average anaerobic power, and stabilisation of the power decline index. Consequently, the objectives of polarised training during the preparatory period of the annual macrocycle are achieved on a new functional basis – through the strengthening of

Table 1. Indicators of physical and functional fitness in kickboxers

Indicator	EG	CG	t
Maximum power, W/kg	11,8±2,7	8,2±3,7	5,8
Average anaerobic power, W/kg	8,6±0,9	6,9±0,7	4,2
Power decline index, %	41,3±7,7	50,6±9,7	2,6
MOC, ml/min/kg	63,8±8,2	51,6±9,1	3,7
Standing long jump, cm	243,5±42,7	239,6±36,5	2,9
4 × 10 m shuttle run, s	9,4±0,5	10,5±0,2	5,2
1000 m run, s	225,4±51,4	231,1±43,6	3,1

established links between power, speed and the tempo of kickboxers' striking actions.

The results of other tests improved as fitness levels increased, which attests to the effectiveness of the training process. The greatest progress was observed in shuttle runs and the standing long jump, which is achieved through the polarised intensity of training by means of focused and short-term exposure to high-intensity loads as early as the initial stage of the preparatory period.

Conclusions. A training programme that is rationally planned and implemented during the preparatory phase of the annual macrocycle enables the effective improvement of both aerobic and anaerobic energy supply mechanisms for muscular activity in kickboxing.

Polarised training increases kickboxers' anaerobic capacity to a greater extent, whilst aerobic energy supply mechanisms improve to a lesser extent. When planning further training sessions, greater attention should be paid to developing kickboxers' aerobic capacity.

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