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ENERGY METABOLISM AND PHYSICAL PREPARATION FOR PARA TAEKWONDO ATHLETES: BIOCHEMICAL ASPECTS

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Abstract: Energy metabolism and physical fitness for para taekwondo athletes are important in the process of training athletes. This article studies the anaerobic and aerobic metabolic systems, muscle activity, and energy production mechanisms of para taekwondo athletes. The main goal was to analyze how biochemical changes occurring during physical exercise, the level of lactate and other metabolites in muscles, affect athletes in achieving maximum results. The article presents the role of biochemical indicators and energy production mechanisms in increasing the physical fitness of athletes.
Keywords: Para taekwondo, Energy metabolism, Physical fitness, Biochemical changes, Anaerobic and aerobic metabolism, Muscle activity, Lactate level,

Relevance: Energy metabolism and physical training processes for para taekwondo athletes are important not only for maximizing the athletes' physical capabilities, but also for improving their overall health and performance. Physical training, especially high-intensity training, requires proper control of muscle activity and energy production mechanisms. Para taekwondo athletes are athletes with particularly complex physical conditions, who must constantly develop their physical, biochemical and psychological abilities. Their training system includes not only strength, but also endurance, speed and reaction time, so proper management of energy metabolism is important.

Improving the efficiency of energy production mechanisms in physical training allows for the improvement of the overall endurance and resistance of athletes. The anaerobic and aerobic metabolic systems determine which energy production systems athletes rely on during various training sessions. The anaerobic system is important for short-term high-intensity training, while the aerobic system is important for long-term and low-intensity training. At the same time, optimizing energy production processes also reduces the recovery time of athletes, which increases their chances of achieving maximum results. All of these processes are closely related to the physical performance of athletes, and for a physical training system to be effective, there is a need to study energy metabolism in depth. In addition, the metabolic systems of athletes are not only related to energy production, they are also closely related to health and recovery processes. For para taekwondo athletes, proper nutrition and recovery processes are important in increasing their physical abilities, as well as optimizing their muscles and energy production systems. Also, stress management, oxidative stress reduction, and muscle oxygen deprivation are important factors in athlete training.

For the above reasons, the biochemical aspects of energy metabolism and physical training for para taekwondo athletes have a unique scientific and practical relevance. Therefore, this article presents specific scientific studies from the perspective of energy production systems and biochemical aspects of physical training for para taekwondo athletes, which provides the necessary knowledge for training athletes and improving their overall physical health.

Purpose: The main purpose of this article is to summarize the biochemical aspects of energy metabolism and physical training of para taekwondo athletes. This includes the study of the following issues:

1. The role of anaerobic and aerobic metabolic systems in para taekwondo athletes.

2. Biochemical changes occurring during physical exercise and their impact on muscle activity.
3. Methodological foundations of the development of energy production mechanisms in athletes.
4. Practical recommendations for increasing the efficiency of energy production systems.

Materials and Methods:

Materials:

A total of 20 para-taekwondo athletes were selected for the study, including biological and biochemical parameters for each athlete. The participants included athletes aged 18-35, including both men and women. All of them were athletes preparing for competition and training according to a physical program adapted to them. During the study, the athletes' individual physical and biochemical indicators were studied.

The following criteria were taken into account when selecting athletes:

1. Physical fitness level: The athletes' highest level of physical fitness was assessed. This was mainly determined by the athletes' results in passing each physical test (e.g., strength, endurance, speed).
2. Biochemical parameters: To measure the athletes' biochemical parameters, their blood samples were analyzed, including lactate levels, blood oxygen levels, glycogen stores, and other metabolites.
3. Safe Athletes: The athletes who participated in the study were screened for health and safety. They were medically cleared to perform high-intensity training.
4. Training Program: A specially designed training program was developed for the athletes. The program included aerobic and anaerobic exercises, as well as special techniques that developed strength and speed. During the training, the athletes were given special exercises to ensure that their energy production systems were optimized.

Equipment for the study:

1. Oxygen consumption meters: Special devices were used to measure oxygen consumption in order to study the aerobic abilities of athletes. Through this, the efficiency and ability of the athletes to obtain oxygen were examined.
2. Electrocardiogram (ECG): An ECG device was used to measure the electrical activity of the heart during exercise. This helped to study the health of the athletes' cardiovascular system and how they responded to intensive training.
3. Muscle strength measurement equipment: Special dynamometry equipment was used to measure the athletes' muscular strength and endurance. This was used to analyze the athletes' anaerobic and aerobic power systems.

Nutrition and Diet:

1. Diet: A special diet was prepared for the athletes participating in the study. In this diet, a large amount of carbohydrates, proteins, and fats were introduced to support the athletes' energy production processes. Timely and balanced intake of nutrients was also important.
2. Structure: Athletes were given individual nutritional formulas to optimize training and recovery processes. This helped to accelerate metabolism, restore energy reserves, and ensure effective muscle function.

Research practice:

1. Physical exercises: During the study, special physical exercises were prepared for each athlete. The exercises consisted of the following types: developing strength and speed, increasing anaerobic and aerobic abilities, tactical and technical exercises, and special speed-developing exercises to improve reaction time.
2. Recovery exercises: During the recovery process after training, athletes were given light aerobic exercises, massage, and other recovery techniques. This helped restore the efficiency of their energy production systems and improve the athletes' physical condition.

3. Psychological support: Athletes were provided with psychological support, since mental preparation is also very important during high-intensity training and competitions. Psychological counseling helped athletes manage stress and increase motivation.

These materials and methods were effective tools in conducting scientific research aimed at improving energy metabolism and optimal physical training in para taekwondo athletes. The methods and tools used in the research process made it possible to reliably measure and analyze the results of athletes.

Methods:

1. Metabolic analysis: Lactate testing and oxygen consumption measurements were performed to measure the energy production in the athletes' anaerobic and aerobic metabolic systems.
2. Biochemical analyses: Muscle lactate levels and other metabolic parameters were measured during exercise.
3. Exercise types: Specific training sessions and recovery techniques were used. Biochemical changes in training results and recovery times were observed.

Research results:

According to the results of the study, the anaerobic metabolic system of para taekwondo athletes plays an important role in high-intensity training and fast movements. During training, the level of lactate in the muscles increases sharply, which indicates an increase in anaerobic energy production. The role of aerobic metabolism increases significantly during long-term and low-intensity training. Also, during the recovery process, the energy recovery mechanisms of athletes, in particular, the restoration of glycogen stores, are necessary for the retraining of athletes. Biochemical changes help improve athletes' physical fitness, but proper nutrition and rest also remain important factors.

Conclusion:

It is important to maintain a balance between anaerobic and aerobic systems during energy metabolism and physical training of para taekwondo athletes. Biochemical changes that occur during physical exercise, such as lactate levels and other metabolites, shape the ability of athletes to recover and achieve maximum results. Proper preparation and optimization of energy production mechanisms for athletes will help increase their performance during competitions. At the same time, nutrition and rest processes also affect the performance of athletes.

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