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Article

The Importance of Functional Fitness in Athlete Training

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Abstract: This article examines the significance of functional fitness in the modern system of athlete training. It analyzes the growing role of sports science in optimizing training methodologies and highlights the increasing demands placed on athletes due to intensified competition and higher performance standards. The concept of functional fitness is defined as a comprehensive characteristic of the body's life-support systems that ensure energy supply, metabolic regulation, adaptation, and recovery during training and competition. The structural components of functional fitness, including cardiovascular, respiratory, nervous, endocrine, immune, digestive, and excretory systems, are discussed. The article also outlines key indicators and testing methods used to assess athletes' functional capacities. It is emphasized that a high level of functional fitness enhances competitive readiness, improves performance outcomes, and reduces the risk of injury and disease. The development and scientific substantiation of functional training approaches are identified as essential conditions for preparing highly qualified athletes.

Keywords: functional fitness, athlete training, sports science, functional systems, neuromuscular apparatus, adaptation, recovery, cardiovascular system, respiratory system, training load, performance optimization, physiological indicators.

Introduction

In the early years of the new century, sports science emerged as an independent discipline from the theory and methodology of physical culture. The objective reasons for this development lie in the expansion of scientific research, theoretical advancements, and practical recommendations in the field of sport. These achievements have significantly broadened the theoretical and applied foundations of sports training and contributed to the continuous improvement of athletic performance [1, 2].

At the present stage of sports development, several distinctive features exert a substantial influence on the athlete training process. They pose increasingly complex tasks for both coaches and athletes and require the search for the most effective forms and methods of organizing training [3, 4]:

- To further elevate the already high performance standards achieved by modern athletes, it is necessary to improve training methodologies for highly qualified athletes and to comprehensively refine long-established organizational and methodological approaches [5].
- Due to the steady growth of results achieved at major international competitions, competitive rivalry has intensified considerably. This increases demands on athletes' technical and tactical mastery, consistency, and stability, as well as on their moral-volitional and psychological preparedness under the pressure of successive high-responsibility competitions [6].
- Highly qualified athletes have reached such an elevated level of special physical preparedness that further progress has become extremely difficult. Consequently, it is necessary to search for additional reserves to enhance the effectiveness of special physical training and to introduce innovative methods within the overall training system [7].
- The volume and intensity of training loads have increased to such an extent that their rational distribution within the annual cycle and its individual phases has become a critical issue. This requires determining the optimal ratio between different types of preferentially oriented loads and developing new methods of training organization based on the precise relationship between energy expenditure and recovery processes, ensuring optimal adaptation of the athlete's organism [8].
- The role of science in solving methodological issues has grown substantially. The preparation of highly qualified athletes is directly related to the targeted influence on life-supporting functional systems of the body and elevating them to a high level of activity. Modern athlete preparation cannot rely solely on intuition or practical experience; it requires scientifically grounded methodological support [9].

Until the end of the previous century, athlete preparation focused primarily on theoretical, general physical, technical-tactical, and psychological components. These constituted the structural basis of sports training and were developed through specific methods and tools inherent to each type of preparation [10].

Methodology

In recent years, the concept of *functional fitness* has become firmly established within sports science theory and methodology. According to specialists such as Zhelyazkov Kholodov and Sergey Kuznetsov, as well as V. Vasylkov, functional fitness represents an essential component of sports training. It encompasses the provision of energy to the neuromuscular apparatus, stimulation of its activity, supply of plastic (building) materials, and the removal of metabolic by-products from the organism.

Functional fitness determines the efficiency and optimality of movement execution and ultimately exerts a direct influence on athletic performance outcomes.

An athlete's functional fitness is reflected in the organism's adaptability, reactivity, and resistance to physical and psychological stress during training and competition.

The term *function* (Latin *functio* – execution) refers to:

1. duty, scope of activity, or role;
2. a specific manifestation of the activity of biological cells, tissues, organs, and the organism as a whole.

Results and Discussion

Functional fitness characterizes the performance of body organs and systems, the provision and functioning of the neuromuscular apparatus, and certain specific aspects of its activity.

The functional systems that ensure performance include:

Primary support systems:

- Cardiovascular system
- Respiratory system
- Thermoregulatory system

- Nervous system
- Endocrine system

These systems provide the neuromuscular apparatus with essential substances during activity [11].

Secondary support systems:

- Digestive system
- Excretory system

These systems reduce their activity during intense muscular work and become more active during rest.

The functions of these systems include supplying nutrients necessary for neuromuscular activity, eliminating metabolic waste products, maintaining energy reserves and buffer capacities for high-intensity work, and ensuring tissue regeneration and synthesis following exertion [12].

Main Characteristics of Functional Fitness

1. Indicators of the specific activity of cardiovascular, respiratory, humoral, thermoregulatory, excretory, protective, and other systems during motor activity.
2. Degree of adaptation to physical loads.
3. Recovery time after exertion.
4. Efficiency of functional systems during physical activity.
5. Types of nervous system responses (normotonic, hypertonic, hypotonic, dystonic, stepwise).
6. Strength and resilience of bone, muscle, and connective tissues.

It is important to note that physical and functional fitness develop, improve, and recover at different rates (heterochrony) [13].

Monitoring the organism's functional systems involves assessing adaptive capacities of the cardiovascular, respiratory, endocrine, immune, nervous, and neuromuscular systems. The onset of "critical tension" periods, fatigue, and distress (pathological stress) under certain intensity zones is determined through hemodynamic studies and repeated testing [14].

Indicators commonly used to evaluate functional capacity include:

- Heart rate (HR)
- Arterial blood pressure (BP)
- Respiratory rate (RR)
- Ruffier-Dixon index
- Kerdo index
- Universal cardiorespiratory index
- Cardiac output index
- Cardio-pulmonary apnea test
- Mean dynamic blood pressure
- Pulse acceleration percentage
- Oxygen consumption coefficient

To assess functional capabilities, graded exercise tests are widely used, such as:

- Orthostatic–clinostatic test
- Martine test (20 squats in 30 seconds)
- Letunov test
- Harvard Step Test
- PWC150 and PWC170 tests

The provision of energy sources, plastic materials, and the removal of metabolic breakdown products in the neuromuscular system depend on the coordinated functioning of the organism's functional systems (cardiorespiratory, nervous, endocrine, immune, digestive, and excretory). The improvement of their activity forms the essence of functional fitness [15].

Conclusion

Functional fitness directly affects competitive readiness and the growth of sports results. Insufficient functional preparedness may lead to injuries and illnesses. Modern sport requires the

comprehensive development of athletes – physically, intellectually, and morally – as well as adequate preparation in physical, technical-tactical, psychological, and functional aspects. In conclusion, functional fitness constitutes a fundamental component of contemporary athlete training and serves as a decisive factor in achieving high-level and sustainable sports performance.

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