

MEDICAL EXAMINATIONS OF ATHLETES AND INDIVIDUALS ENGAGED IN PHYSICAL CULTURE, THE CONCEPT OF PHYSICAL DEVELOPMENT, AND METHODS OF ITS DETERMINATION AND EVALUATION

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Abstract. This article examines the types of medical examinations required for athletes and individuals engaged in physical culture, their significance for health and performance, and the concept of physical development along with methods of its determination and evaluation. Drawing upon sports medicine, physiology, and hygiene, the paper highlights the importance of systematic medical monitoring in preventing injuries, optimizing training loads, and enhancing athletic performance. The article also provides a comprehensive overview of anthropometric, functional, and diagnostic methods used to assess physical development.

Keywords: sports medicine, medical examination, physical development, anthropometry, functional tests, physiology of sport.

Introduction

Athletes are exposed to high levels of physical stress, which places significant demands on their bodies. For this reason, systematic medical examinations and the evaluation of physical development are essential components of sports medicine. These procedures not only safeguard the health of athletes but also ensure that training processes are scientifically grounded and performance-oriented [1].

Medical examinations serve as a preventive measure, identifying potential health risks before they manifest as injuries or chronic conditions. At the same time, the assessment of physical development provides objective data on an athlete's morphological and functional state, which is crucial for tailoring training programs to individual needs [2].

1. Types of Medical Examinations for Athletes

Medical examinations in sports medicine are classified into several categories, each serving a distinct purpose [3].

Initial (pre-participation) examination. Conducted before an individual begins systematic training or competitive activity. Its purpose is to identify contraindications and assess baseline health status.

Periodic (routine) examination. Performed once or twice a year to monitor the athlete's health dynamics over time. This type of examination helps detect early signs of overtraining, chronic fatigue, or latent illnesses.

Pre-competition examination. Conducted shortly before competitions to evaluate readiness and ensure that the athlete can safely withstand the expected physical load.

Emergency (unscheduled) examination. Required after injuries, illnesses, or sudden changes in health status. It determines whether the athlete can resume training or competition.

In-depth medical examination (IME). A comprehensive evaluation involving laboratory tests, functional diagnostics, and sometimes imaging techniques. It provides a detailed picture of the athlete's physiological reserves and adaptive capacity [4]. These examinations are not merely formalities; they form the foundation of medical supervision in sports, ensuring both safety and performance optimization.

The concept of physical development

Physical development refers to the totality of morphological and functional characteristics of the human body, shaped by genetic, environmental, and lifestyle factors [5]. It reflects the degree of biological maturity and the body's ability to adapt to physical loads.

Key indicators of physical development include:

- Anthropometric parameters such as height, weight, chest circumference, and body proportions.
- Muscular strength and endurance.
- Functional capacity of the cardiovascular and respiratory systems.
- General physical preparedness and motor abilities.

Physical development is not static; it evolves throughout life and is influenced by training, nutrition, rest, and environmental conditions. In sports, it serves as a critical determinant of performance potential [6].

Methods of determining and evaluating physical development

The evaluation of physical development employs a wide range of methods, combining morphological, functional, and diagnostic approaches [7].

Anthropometry. Measurement of body dimensions such as height, weight, body mass index (BMI), chest circumference, and limb proportions. These data are compared with normative values for age and sex.

Somatoscopy. Visual assessment of body build, posture, and muscular development. It provides qualitative information about physical constitution.

Functional tests. Evaluation of cardiovascular and respiratory responses to exercise, including heart rate, blood pressure, and vital capacity. Step tests, Harvard test, and Cooper's test are commonly used.

Dynamometry. Measurement of muscular strength using handgrip or back dynamometers.

Spirometry. Assessment of lung function, including vital capacity and forced expiratory volume.

Complex evaluation. Integration of anthropometric and functional data to form a holistic assessment of physical development. This often involves percentile charts, regression scales, and standardized indices [8].

Modern sports medicine increasingly employs advanced diagnostic tools such as echocardiography, electrocardiography under load, lactate threshold testing, and VO₂ max measurement. These methods provide deeper insights into the athlete's physiological reserves and adaptation mechanisms [9].

Practical significance

The practical value of medical examinations and physical development assessment is multifaceted. First, they serve as preventive measures, reducing the risk of injuries and overtraining. Second, they allow for the individualization of training loads, ensuring that athletes train within safe and effective limits. Third, they contribute to long-term athlete development by monitoring growth, adaptation, and recovery processes. Finally, they provide scientific data that can be used by coaches, physicians, and sports scientists to optimize performance strategies [10].

In youth sports, these examinations are particularly important, as they help identify developmental anomalies, ensure safe participation, and guide talent identification programs. In elite sports, they are indispensable for fine-tuning training regimens and extending athletic careers.

Expanded discussion

The integration of medical examinations with physical development assessment represents a holistic approach to athlete health management. While medical examinations focus on detecting pathologies and contraindications, physical development assessment emphasizes the

optimization of performance potential. Together, they form a dual system of protection and enhancement.

Recent trends in sports medicine highlight the importance of personalized monitoring. Wearable technologies, continuous heart rate monitoring, and biochemical markers of fatigue are increasingly incorporated into athlete supervision. These innovations complement traditional methods and provide real-time data for decision-making.

Moreover, the concept of physical development is expanding beyond morphology and physiology to include psychological resilience, recovery capacity, and even genetic predispositions. This broader perspective reflects the complexity of modern sports, where success depends on the integration of multiple factors.

Conclusion

Regular medical examinations and systematic evaluation of physical development are indispensable for athletes and individuals engaged in physical culture. They ensure health preservation, injury prevention, and performance optimization. By combining traditional diagnostic methods with modern technologies, sports medicine provides a comprehensive framework for athlete monitoring.

Ultimately, the synergy between medical supervision and physical development assessment not only safeguards athletes but also maximizes their potential, contributing to both individual success and the advancement of sports science.

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