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PHYSICAL DEVELOPMENT INDICATORS OF MIDDLE- AND LONG-DISTANCE RUNNERS

F.A.Tashpulatov
Professor
Department of Physical Culture and Sports,
Tashkent State University of Economics

Annotation

This article examines the indicators of physical development in middle- and long-distance runners. The study analyzes the level of physical fitness, endurance, speed, strength, cardiovascular function, and anthropometric characteristics of athletes specializing in middle- and long-distance running. Particular attention is paid to the influence of systematic training on the development of aerobic capacity, muscular endurance, and overall physical performance. The research findings demonstrate the importance of physical development indicators in improving athletic performance and achieving high sports results. The article also discusses effective training methods and approaches for enhancing the physical preparedness of runners.

Keywords: middle-distance runners, long-distance runners, physical development, endurance, aerobic capacity, athletic performance, physical fitness, cardiovascular system, muscular endurance, training methods.

METHODS AND LITERATURE ANALYSIS

Physical development is a process characterized by changes in body shape expressed through quantitative indicators and the improvement of its functional systems. The growth and development of the human organism occur continuously and unevenly until the end of the pubertal period. Analysis of scientific and methodological literature shows that the principles of physical education for the younger generation must be based on morphological, biomechanical, and physiological laws of human development.

It is noted that the regulation of key motor abilities in physical education can be effective only through an individual approach. However, such an approach is difficult to implement in mass-oriented health and physical education systems. In such conditions, the most optimal and promising approach is the use of scientifically grounded progressive means and methods that require the coordinated functioning of all major body systems.

Results

Physical development of middle- and long-distance runners is largely determined by morphological characteristics. In particular, athletes in these events should have a well-developed chest and respiratory system, as it plays a key role in endurance training and competition.

For 19–20-year-old middle- and long-distance runners, optimal anthropometric indicators are approximately:

- Body height: 172–178 cm
- Body weight: 58–65 kg
- Chest circumference: 90–92 cm

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- Leg length: 90–95 cm

Athletes with such physical proportions have a higher probability of achieving better performance results in endurance running events.

The main physical quality for middle- and long-distance runners is special endurance, which is a physiological characteristic of the athlete. Special endurance develops through the regulation of motor skills and improvement of coordination mechanisms, which directly influence performance capacity.

The development of physical qualities is closely related to functional and morphological adaptations. It improves through high-intensity physical exercises. Running short, middle, and long distances, throwing events, jumping, and participation in sports games all contribute to the development of physical fitness.

During middle- and long-distance running, an athlete can cover approximately 10 meters per second. In cyclic dynamic activities performed at high speed, the alternation of excitation and inhibition processes in antagonist muscles plays an important role in the nervous system.

The quality of movement technique improves due to rapid biochemical energy supply mechanisms, including anaerobic energy systems and rapid mobilization of muscle energy reserves.

Running performance depends on the development of speed, endurance, and muscular strength coordination. Training methods often include maximal effort exercises where resistance is slightly higher than competition conditions (up to 10%). This enhances intermuscular coordination and optimizes movement efficiency.

Energy production mechanisms play a key role in endurance sports. With prolonged physical activity, aerobic metabolism becomes dominant. During long-duration work, carbohydrates and fats are oxidized to provide energy. Aerobic energy production begins gradually and reaches maximum efficiency within 2–5 minutes after the start of activity.

The organism's ability to utilize oxygen and mobilize energy reserves enables long-term physical performance. Glycogen stores and fat metabolism play a significant role in sustaining prolonged exercise.

Analysis and discussion

According to specialists, aerobic processes develop gradually and reach their maximum level within 2–5 minutes after the onset of intense exercise. The availability of glucose and fat reserves in the body, as well as oxygen utilization from the atmosphere, allows athletes to sustain prolonged work.

Energy production systems determine the duration and intensity of performance. During long-lasting intensive exercise, carbohydrate metabolism becomes highly important, while fat oxidation also significantly contributes to energy supply.

Conclusions

In middle- and long-distance running, special endurance is the leading physical quality, and training at different intensities and durations is the primary means of its development. The training process has a wave-like structure, and each phase represents a new level of athlete performance.

To achieve a higher level of physical development, training must be systematically organized based on new methodological approaches. In long-term athletic preparation, it is necessary to continuously adjust training means, methods, loads, competition activities, and recovery strategies in order to ensure consistent improvement in performance.

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