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ANNUAL TRAINING STRUCTURE FOR ATHLETES SPECIALIZED IN HURDLE RACING

Talipov G. A.
Named After Mirzo Ulugbek National University of Uzbekistan Teacher
talipovgulomjon306@gmail.com

Abstract
Hurdling is a complex and technically sophisticated discipline that requires careful and systematic preparation. Developing an optimal structure for year-round training will enhance the effectiveness of the training process and reduce the risk of injury.
This work summarizes and analyzes the latest scientific research in the field of physical training for hurdlers, and proposes new methodological approaches based on modern understanding of running physiology and biomechanics. The results of this research can be used by coaches and athletes in developing individual training programs, improving athletic performance, and achieving high results in competitions.

Keywords: Annual training, barrier run, sports cycle, preparatory period competitive period, physical training, technical training.

Introduction

Hurdle racing competitions are held at the following distances:
- for men - 110 m and 400 m, in winter - 60 m indoors;
- for women - 100 m and 400 m, sometimes 200 m, in winter - 60 m indoors.

Hurdle height for short distances: men - 106.7 cm; women - 84.0 cm. For 400 m: men - 91.4 cm, women - 76.2 cm.

The distance between hurdles: for men's 110 m - 9.14 m; for women's 100 m - 8.50 m; for 400 m - 35 m for both men and women. For 400 m - 9.14 m; for 100 m for women - 8.50 m; for 400 m for men and women - 35 m.

Hurdle racing is one of the most technically challenging events in track and field. It places high demands on the athlete's physical fitness and technical skills. The combination of speed, jumping ability, flexibility, and high coordination of the sprinter's movements allows athletes to achieve outstanding results in this event.

Hurdle racing technique can be conventionally divided into:
- start and initial acceleration to clear the first hurdle;
- running between hurdles;
- finishing.

To achieve good results in the 110 m hurdles, the start is of great importance. The runner's main task is to use optimal technique for the starting acceleration, including the start and

clearing the first hurdle. This technique lays the foundation for achieving high results. Its execution allows the athlete to concentrate on the rhythm of running between hurdles and actively clearing subsequent hurdles.

Athletes start from a crouch start position, which is the same as sprinters' starts, with the only difference being the hurdlers' positioning relative to the starting line. This depends on how many steps the athlete takes to reach the first hurdle. If the runner clears it in 8 running steps, they will need to move slightly further back from the starting line to maintain optimal stride length. If the runner reaches the first hurdle in 7 running steps, they position themselves as close as possible to the starting line. Such runners are usually tall with long limbs.

For 400-meter hurdlers, the annual training cycle includes several key periods, each with its own specific tasks and training methods. Below is a table reflecting the structure of annual training.

Preparation period	**Duration**	**Main tasks**	**Percentage distribution of loads**
Preparatory	3.5 - 4	Enhancing athletic fitness	Strength exercises 70%
(autumn-winter)	months October	Developing strength, speed, and special endurance	Speed exercises 20%
		Improving the technique of barrier running	
Competitive (winter)	January	Participation in smooth and barrier-based competitions	Strength exercises 30%
Preparatory (spring)	1 - 1.5 months February	Improving physical fitness	Speed exercises 70%
Competitive (summer)	3 months March	Main Hurdling competitions	
Transitional	May		

When running 8 steps, the hurdler places the takeoff leg on the first starting block and the lead leg on the second. In a 7-step run, the lead leg is placed on the first block, and the takeoff leg on the second. In other words, with an odd number of steps, the first step should be taken with the takeoff leg; with an even number, with the lead leg. The leg that attacks the hurdle, that is, the first to clear the obstacle, is called the lead leg, while the leg that pushes off on the last step, that is, the second to clear the obstacle, is called the takeoff leg.

At the "Set!" command, the hurdler raises their hips slightly above or level with their shoulders. At the "Go!" command, the athlete begins an active sprint, but unlike sprinters, the straightening of the body occurs at the 4th or 5th step of the starting acceleration. It is necessary to approach the last step before the hurdle with a high position of the center of mass.

The run to the first hurdle is performed quickly and freely, with optimal body lean, placing the feet on the front part of the sole. The smaller the difference between the heights of the more effective the step over the hurdle and the more efficient the running steps between hurdles. A hurdler should approach the obstacle from a higher position, not squatting on the last step, but rising and attacking the hurdle from above. The last step before the hurdle is slightly shorter,

with the leg performing a "pawing" motion backward. Movements should be directed not upward, but forward toward the hurdle. On the last step, the distance from where the foot is placed to the hurdle should be no more than 2 m, that is, the distance should be 1.5 times the length of the leg. As the level of mastery and physical fitness increases, this distance increases to optimal sizes, but pushing off from a greater distance also has its drawbacks.

Clearing a hurdle consists of three stages: 1) attacking the hurdle; 2) clearing the hurdle; 3) landing after the hurdle.

The attack on the hurdle begins with the movement of the lead leg after completing the vertical passage. The movement starts at the hip, with the shin bent at the knee joint, as in a typical running step.

Then the thigh moves up and forward to a horizontal position, the lower leg straightens forward, attacking the hurdle with the heel.

The hurdler takes a "split" position over the hurdle. Simultaneously with the movement of the lead leg, the torso leans forward, and the arm opposite the lead leg also stretches towards the toe of the lead leg. The movements of the body, arms, and lead leg should be quick and rhythmical. The athlete's gaze is directed forward. After the takeoff leg leaves the ground, the next phase begins - passing over the hurdle.

When crossing the barrier, the lead leg continues to move forward, and after passing over the barrier, the knee joint gradually lowers. After leaving the ground, the trailing leg is bent at the knee joint, the hip is moved away from the hip joint, and the ankle is fully extended. The thigh should be higher than the lower leg and foot. In this position, the bent leg moves forward from the side. The lead arm, bent at the elbow, is stretched backward. When passing the vertical above the barrier, as the lead leg begins to move forward, the arms meet at the torso. The movement of the arm opposite to the lead leg resembles a side-to-back scooping motion, while the other arm performs the same simple movement as in running. When the lead leg makes contact with the ground behind the barrier, the final phase of clearing the barrier begins.

Landing from the barrier. A highly skilled hurdler places the lead leg on the ground from the toe without touching the heel.

The lead leg is straightened at the knee joint, while the trailing leg moves forward with the thigh slightly higher, and the angle at the knee joint between the thigh and lower leg increases to 90° or more. After landing from the barrier, the athlete takes the first step from a high position of the center of gravity. The distance from the barrier to where the lead leg is placed ranges from 130-160 cm. The torso inclination remains the same as at the beginning of the barrier attack. Leaning the torso backward when landing from the barrier is considered the most serious error in hurdling technique. Swinging the torso back while descending from the obstacle is the most serious mistake in the technique of clearing the barrier.

Running the distance consists of clearing barriers and performing running steps between barriers. The technique of clearing barriers was discussed above; now let's focus on the technique of running between barriers.

Between barriers, athletes perform three running steps, which are slightly different from sprint running steps. The first step is usually the shortest, the second is the longest, and the third is 15-20 cm shorter than the second. The body's inclination is slightly greater than in normal

running. The athlete must deliberately make the last step shorter, as if "stepping" onto the barrier, which contributes to quickly bringing the lead leg forward. An athlete's run between barriers should be powerful and at the same time free, fluid, and without tension. The optimal combination of rhythm in clearing the barrier with the rhythm of running between barriers helps the athlete achieve high results.

After clearing the last, tenth hurdle, the finishing phase begins. The finishing technique involves an active transition to a fast, smooth sprint after clearing the last hurdle. The hurdler should cover the 14-meter distance to the finish line while focusing on the pace and length of their strides. Excessive forward leaning should be avoided, as it leads to a decrease in movement speed and shortens the stride length.

Sports master Bondarenko, V.A, through his research, identifies three styles of hurdlers based on their movement technique: swing, running, and pushing.

Tall and fast runners perform leg movements with maximum activity, facilitated by a relatively large and intentional body lean during the hurdle attack phase. The lead leg is bent at the knee joint when crossing the hurdle surface. This style is called "stepping." Athletes with optimal morphofunctional qualities perform rhythmic movements with less emphasis on the lead leg. When the athlete's foot crosses the hurdle surface, the lead leg is fully extended. Their body lean is closer to a running position compared to athletes using the stepping style. Overall, the athlete's lead leg movement appears from the outside as a natural continuation of the previous step in the inter-hurdle run. Specialists refer to this style as the running style. Runners with low morphological but high functional indicators are less sensitive to external resistance of the lead leg movement compared to athletes using the previous style. They have a longer lead leg movement time, so they complete this movement fully up to the hurdle. Their lead legs are straightened and maintain this position. However, since their takeoff point is further from the hurdle, they direct their push towards the hurdle. Their body lean differs slightly from the running position, and the toes of their lead leg are pulled "towards themselves." This style is called the pushing style (14).

Typically, the stepping style is characteristic of athletes with 100m sprint times of 10.5 seconds or faster, who are 187 cm tall or taller. The running style is observed at the same speed in athletes 186-187 cm tall, or in taller athletes with slower running speeds. The pushing style is most noticeable in athletes who are 175 cm or shorter but can achieve speeds of up to 10.5 seconds in the 100m sprint. Overall, the athlete's leg movement from the outside looks like a natural continuation of the previous step in the obstacle course. This style is what specialists call running style.

Athletes with low morphological, but high functional indicators are less sensitive to the external resistance of the leg movement than athletes of the previous style. They have a longer leg movement time, so they perform this movement completely up to the barrier. Their swinging legs are straightened and maintain this position. However, since they have a repulsion point away from the barrier, they direct the repulsion towards the barrier. Their body inclination differs slightly from running one, the soles of their legs are drawn "on themselves." Such a style is called thrust (14).

As a rule, the step style is characteristic of athletes with a speed of 10.5 s and above 100 m, who have a height of 187 cm and above. Running style is observed at the same speed in athletes with a height of 186-187 cm or taller athletes, but with a lower running speed. The push-style is most noticeable in athletes who are 175 cm and below, but show a speed of up to 10.5 s per 100 m.

Conclusion

Multi-stage preparation: The annual training cycle includes several main periods - preparatory, competitive, and transitional. Each of these periods has its own specific objectives and training methods that enable athletes to develop the necessary physical qualities and technical skills, as well as adapt to competition requirements.

Dual-peak planning: Training for 400-meter hurdlers is based on the principle of dual-peak planning. This includes winter and summer competitive periods. Such an approach allows for optimal load distribution and focus on specific aspects of preparation depending on the season.

Development of physical qualities: In the initial stages, the most important tasks are the development of strength, speed, and general endurance. In subsequent stages, special attention is paid to specific physical qualities such as speed endurance and special endurance. This is crucial for successfully clearing hurdles.

Technical preparation: Perfecting hurdle running technique is a key element of the training process. Athletes must not only develop physical qualities but also master the correct technique for clearing hurdles. This requires significant time and effort.

Individualization of training: It is important to apply training approaches that correspond to the individual needs of each athlete, taking into account their biological age and individual characteristics. This includes adapting the volume and intensity of workloads based on the level of preparedness and health status.

Recovery and maintenance of form: Transitional periods play an important role in the recovery of athletes after intense training and competitions. During this period, it is important not only to restore physical condition but also to prepare the body for new loads.

Thus, the structure of annual preparation for hurdlers to achieve high athletic results requires a comprehensive approach, including the development of physical qualities, technical preparation, and individualization of the training process.

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