

# STRENGTH DEVELOPMENT IN THE 400M HURDLES EVENT

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*The author presents a two phase strength and power development program for advanced 400m hurdlers, both men and women, recommending a widely diverse range of jumping and weight exercises to avoid stagnation from relatively standardized programs. The article is a slightly edited translation from Lehkaya Atletika, USSR, No. 7, July 1990. Re-printed with permission from Modern Athlete and Coach.*

An analysis of the training plans of highly qualified 400m hurdlers, both men and women, as well as sport sciences information and personal experiences, allows to make recommendations on how to approach effectively strength development for this event. A year's strength development program is usually made up from two major phases. The first phase (November-December) is set aside for the development of absolute strength and explosive power. The second phase (March-April) mainly for the development of strength endurance. Both phases have the task to establish a firm base for the following preparation procedures that concentrate on the development of speed, specific endurance and hurdling technique.

## FIRST PHASE

It can be recommended that the first strength development phase (autumn-winter) employs training means in the following sequence:

1. "Long" jumping exercises (bounding) with moderate intensity. For example, stepping (alternate leg takeoffs) in up to 200m in series. The task of these exercises is to strengthen the support system of the hurdler. The exercises are performed on grass with explosive forward driving takeoffs and active landings, similar to triple jumpers. It is advisable to execute the jumping exercises at regular intervals with 400 to 800g ankle weights for additional resistance. After the removal of the extra resistance the stride length can increase by up to 4cm, a factor particularly important in the 400m hurdles.

Each series of jumping exercises is in a training session followed by a close to maximal speed 100 to 200m sprint. The number of repetitions and series depends on the athlete's capacity to perform the jumps without any reduction of the movement speed. The total volume of "long" jumping exercises in this training phase is expected to be 4 to 5km for women and 7 to 9km for men.

2. Weight training exercises to develop absolute strength and explosive power are executed with resistances (weights) about 70 to 80% from the athlete's maximum. Exercises for the development of strength endurance, on the other hand, with resistances not exceeding 30%. Strength and power exercises are performed at moderate speed, strength endurance exercises fast. The total expected volume is 12 to 15 tonnes for women and 30 to 40 tonnes for men.
3. "Short" jumping exercises, made up from standing jumps and repetitive jumps over different height hurdles, aim to develop maximal muscular power. The expected volume of these exercises is around 100 to 150 takeoffs a week for women and 200 to 250 takeoffs a week for men.

The basic volume of running training at this stage is made up from mixed aerobic-anaerobic runs (80 to 90% from the maximal speed). Most of the longer distance aerobic training runs with an intensity below 80% should be performed before the first phase of specific strength development. This allows exploiting the supercompensation effect after the conclusion of the first phase of strength training.

Emphasis in January February shifts in the running training on loads directed to the development of speed capacities and the improvement of hurdles technique. Most of the technique work is based on running over hurdles placed nonstandard distances apart.

It should be noted that strength training is not completely eliminated from the program during the period of winter competitions. However, the aim is to maintain the strength and power level by employing exercises that are as closely as possible related to the biomechanical structure of the event. The monthly strength and power development volume at this stage is around 5% from the whole year's volume.

## SECOND PHASE

A slightly different sequence of training means is recommended for the second strength development phase in the spring (March-April):

1. Weight training exercises to develop absolute strength and explosive power are executed with resistances around 70 to 80% from the athlete's maximum. The task is to improve further the strength potential and the total expected volume of this phase is 8 to 10 tonnes for women and 10 to 15 tonnes for men.
2. "Short" jumping exercises are combined with fast performed weight and resistance exercises for maximal power development. The weight training exercises employ resistances in the 20 to 25% range from the maximum. The expected volume of jumping exercises is around 500 to 700 takeoffs.

3. "Long" jumping exercises that emphasize maximal performance speed. The aim is to cover a certain distance, taking into consideration the number of jumps and the performance time. The "long" jumping exercises assist in the development of repetitive muscular contractions that have similarity with the muscular mechanism in the running between the hurdles. Also effective during this phase are uphill running and bounding workouts. These are executed over 100 to 200m distances with an emphasis on very active takeoffs. An average uphill training session includes 2 to 3 series of 3 to 5 repetitions. Recoveries are 5 to 8 min between the repetitions and up to 15 min. between the series.

The clearance of hurdles forces the participating muscles of the athlete to switch from the lengthening shock absorbing action to the shortening work producing processes under a maximal dynamic load. It is therefore effective to employ in the training of highly qualified hurdlers a variety of explosive power development means. Among these are jumps over different height obstacles and depth jumps. Depth jumps are usually performed from a height of 0.7 to 1.2m once or twice a week. The number of jumps is around 30, performed forward-upward and using alternate single leg takeoff rebounds.

#### FINAL REMARKS

Specific exercises, that are directed towards the improvement of the stride rhythm between the hurdles and the development of specific endurance, takes place mainly in May-June. The total training volume is during this phase reduced. The accepted training method is running over 5 to 8 hurdles, placed normal competition distances apart. The reduction of the total work volume at this stage allows to exploit the improved movement potential that makes it possible to increase stride length and maintain it longer.

Finally, it is a well-known fact that the organism of an athlete adapts itself after a while to continuous, relatively standardized, training programs. As a result the chosen training means may fail to produce the desired effect. This must be taken into consideration in the planning of strength and power development processes of 400m hurdlers by the employment of widely diverse training means.