

# **ABSTRACT OF THE DOCTORAL THESIS**

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**TITLE THESIS:**

***THE INFLUENCE OF MIDDLE DISTANCE AND LONG DISTANCE  
EVENTS TO BODY POSTURE AT JUNIOR II ATHLETES***

**Key words:** body posture – athletes – junior – middle distance – distance events

## **Theoretical background**

There has always been concern for the harmonious physical development of the athletes and their appearance before the crowd since antiquity and has been expressed through harmonic and aesthetic ideals.

The problem of correcting posture deficiencies has been approached mainly in the primary and secondary school rather than in the youth involved in physical activities such as juniors II who practice middle distance events.

Track and field is considered a benefic parameter for health and has a good influence on the body's posture during grow and development period.

Running middle and long distances involves balanced and strong moves in deaden and hitch stage. In some cases, runners have underdeveloped muscles and the lack of coordination when starting the action can lead to less efficient moves, overdemand and lack of compensatory moves.

Taking into consideration these imbalances deficiencies of the spine such as kyphosis, lordosis and kypholordosis appear.

## **Preliminary research**

The first aim of the research was to analyze a series of biomechanical and technical aspects of the middle distance running on junior athletes. Seven junior volunteer athletes (five males and two females) with age between 16-17 years who training for middle distance running events in Sport High School from Iași,

Romania took part at the test. Different types of running were recorded during the training using a Sony video camera (Sony HVR-HD 1000 P, capable to recording 1080 high definition footage, with 2000 frames on second), virtual dub software for capture and editing image, a Micro Image Analysis Software for measurements and a SPSS Software for analysis. The camera was placed at a 90 degrees angle from the recorded subject. The video was used for a kinematics analysis of running stride for every participant. The kinematics analysis covers a 10 m distance, after which the measurement calibration was done.

The following aspects were taken into consideration: running velocity, stride length and angles and the distances for every phase of running.

After the kinematics analysis of junior athletes we draw the following conclusions: the plant is close to the vertical projection of the center mass of the body which means that the velocity generates as little deceleration as possible; On the middle distance, the body's mass center is at the minimum distance to the ground and the ankle and the knee are at their maximum flexion; the maximum extension of the ankle and knee is obtain on the toe-off; the highest point of the body's mass center is on the float phase; the vertical displacement is 0,18 m, more than the other middle distance runners.

The second aim of the research was to underline the opinions of former high performance athletes in middle and long distance events regarding the relation between training and their body posture. I considered that the body's posture during training remained the same after their retreat and they were objective in evaluating their body posture.

The body's posture investigation was made using the mirror test (lateral and frontal examination) recommended by the American Chiropractic Association. The results generated as a consequence of the self evaluation determined to continue our research and use the means of track and field in order to favor the correct body posture and the obtain sportive results at the same time.

## **Main research**

In the third part of the research I started from the following hypotheses:

1. If taking action by using both the specific and non-specific means of track and field, designed for spine deficiencies, we could correct body posture in junior II athletes, middle-distance trials, without affecting their sports performance.
2. The program of physical exercises envisioned in order to correct postural deficiencies, which has been introduced in the training of junior II middle-distance trials, could influence both muscular strength and somatic and functional values.

To our experimental study participated 22 junior II athletes, middle-distance runners previously diagnosed with dorsal kyphosis, lumbar lordosis and kypholordosis. They were divided in an experimental group and a control group.

In order to ensure complete and objective measurements to all research subjects, we used the following measurement:

- general anthropometric - height, weight, bust, arm span, biacromial diameter and bitrohanterian diameter;
- special anthropometrics - cervical and lumbar arrows;
- somatic and functional values - thoracic elasticity and abdominal tonicity;
- physiological parameters – vital capacity, resting heart rate and heart rate after exercise;
- test of the muscular strength - strength in abdominal and dorsal muscles.

The experiment took place in a time-span of 8 months, 2-4 times a week, according to each sportsman's stage of preparation.

The exercise program designed to correct spine deficiencies was implemented by the experimental group during the warm-up part, which is fundamental, or at the end of the sessions, depending upon the lesson-objectives included in the scholar curriculum and the middle-distance team's training plan.

The means used within the experiment were systemized in the following four exercise categories, specific to middle-distance trials: exercises meant to prepare the body for effort, walking and running exercises, exercises to develop strength (such as walking, jumping, exercises for developing the muscles which sustain the spine and the bones), exercises destined to developing coordination abilities.

The athletes from the control group have done training session in according with the plans made by the coach and approved by the leaders of the high school.

The investigational methods used in this research were: the study of bibliography, the observation, the experiment and statistic methods and representation. For all the parameters taken into account, we calculated the average and the standard deviation, both before (initial testing) and after the implementation of the program of athletic exercises, in order to correct spine deficiencies (final testing). We used SPSS 15.0 programme to statistically interpret the values, and we calculated the t test for equality of means and t-test for paired differences. We also considered  $p < 0,05$  to be the mark of signification.

The results obtained after the general anthropometric measurements and physiological parameters, both initial and final, were statistically insignificant for both groups.

The initial special anthropometric evaluation presented means values in both groups, statistically insignificant, similarly to the initial results. The subsequent evolution, statistically significant, was influenced by the introduction of the differentiated program for the experimental group, which included both

specific and non-specific exercises, in order to correct spine deficiencies, which confirms our first hypothesis. We should also mention that the exercises program put into practice did not negatively influence sports performance, since sportsmen from both groups registered significant progress from one competitive year to the other.

The implementation of the spine deficiencies correction program in junior II, middle-distance runners from the experimental group had a benefic effect upon somatic and functional values. Also, these specially-designed exercises had a positive influence upon improving the dorsal and abdominal muscles strength, which confirms our second hypothesis.

### **Suggestions**

- The training session should include various means and combined exercises from the school walking, running, jumping and throwing in order to prevent the appearance the lack of focus on maintaining the right body posture.
- Including the *mirror test* as a method of self evaluating the body's posture for the athletes who are part of the middle and long distance run group at the beginning of each competition year with the possibility of extension to other athletic events and sports.
- Creating brochures and leaflets showing the negative factors influencing body posture and some recommendations such as simple exercises that can be practiced individually at any time of the day in order to prevent spine deficiencies.
- Medical visits need to be done interdisciplinary by including in the team a physiotherapist whom to detect the existence of deficiency, if there is the case, and their predisposition to occur.

### **Elements of originality**

- the kinematics analysis study of the launched step of middle distance run at junior athletes II.
- the use of the mirror test for self-posture examination both from the front and lateral side;
- the methodology of implementing the specific and nonspecific means of track and field (physical exercise) in the training session of junior athletes II – middle distance run in order to correct spine deficiencies;
- exercise programs to correct spine deficiencies (kyphosis dorsal, lumbar lordosis, kypholordosis) applied training lesson on parts.