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## **EARLY DIAGNOSIS OF POSTURE DISORDERS IN ATHLETES WITH THE HELP OF THE OPTICAL ANALYSIS SYSTEM « DIERS » FORMETRIC »**

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**Abstract.** The article describes an objective method of optical analysis of the human spine and posture, which allows increasing the range of examinations for scoliotic and kyphotic posture disorders, and pelvic misalignments, and also enables early diagnosis and detection of posture disorders in athletes. Based on the results of a survey of 89 athletes, and representatives of 3 sports, a comparative analysis of two methods of examination (calculation of the shoulder index and optical analysis of the spine and posture) was carried out.

**Keywords.** Athletes, optical analysis of the spine, shoulder index, posture disorders.

### **Introduction.**

According to world statistics, in the structure of morbidity, disorders of the musculoskeletal system are the most frequent deviations in the state of health of athletes [1], today 82% of adolescents have a curvature of the spine, to one degree or another. ODA pathology accounts for 43% of the total morbidity of athletes ( Mironova Z.S., Chermit K.D. ), in the structure of which among young athletes, posture disorders in the frontal and sagittal planes make up 70%, in 47% of cases there is a syndrome of connective tissue dysplasia, 7% - scoliosis, 45% - flat feet, 35-40% - juvenile osteochondrosis and instability of the cervical spine [4] .

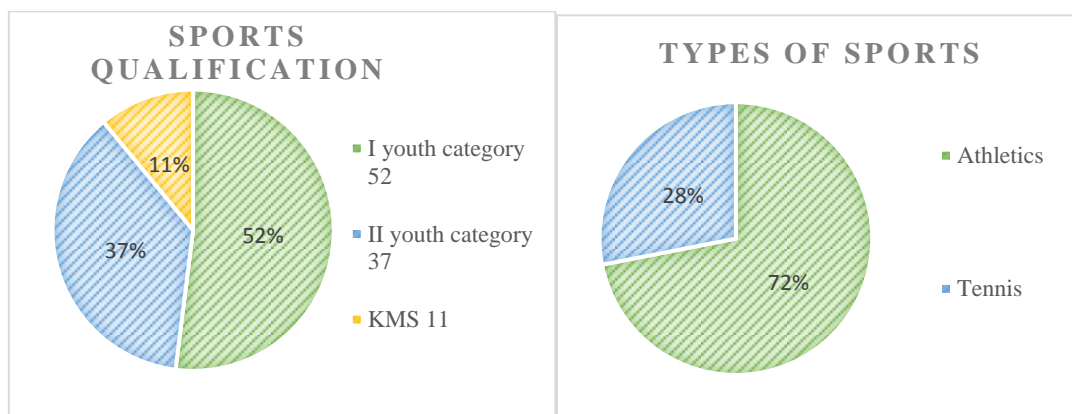
In athletes with scoliotic and other spinal deformities, studies in assessing the shape of the back are an important component in the clinical examination [2]. As you know, an x-ray image provides direct information about the shape and deviations of various parts of the skeleton in a two-dimensional projection, a three-dimensional shape can be obtained by stereo x-rays or computed tomography. In order to reduce the radiation dose, German scientists created " Diers Formetric is a non- beam , safe, light-optical method for measuring the surface of the back with subsequent reconstruction of the shape of the spine, which allows functional testing, postural analysis, body statics and posture, as well as scoliotic and other forms of spinal deformity in less than a minute [3]. Due to the fact that postural disorders negatively affect the functioning of various systems of the athlete's body and the functioning of the body as a whole, the relevance of this study is beyond doubt.

**Purpose of the study:** To study the possibility of early diagnosis of various disorders of the musculoskeletal system using the optical analysis of the spine and posture of the Diers system Formetric " in adolescent athletes.

### **Materials and methods of research:**

In the study group of 122 athletes, based on the results of an in-depth medical examination in the winter period, conducted by the teenage dispensary in the city of Tashkent, athletes belonging to the I health group without external signs of scoliotic anomalies of posture were selected according to the examination by an orthopedist by calculating the shoulder index , in the amount of 89 young athletes , male and female, involved in athletics (running, jumping, javelin and discus), tennis, the average age of

which was  $13.6 \pm 2.4$  years, the experience in sports was  $4.23 \pm 2.45$  years ( picture 1). All young athletes underwent an additional examination using the method of optical analysis of the spine and posture in the center of alternative and holistic medicine " BIO LIFE "(Tashkent city, Mirzo-Ulugbek district). For the optical analysis of the spine and posture of athletes, the system " Diers Formetric ”, which allows to conduct research with maximum speed and accuracy [5] .



**Fig.1 Analysis of the studied contingent**

During the examination, the athletes were in a natural upright position at a distance of two meters in front of the scanning device, without outerwear, swimming trunks lowered, hair collected, foreign elements (chains, bracelets, kinesiotapes ) removed. Light and sound insulation was observed throughout the procedure. Each measurement procedure lasted about 40 seconds.

**Research results:**

According to the results of the examination and the conclusion of the orthopedist of the in-depth medical examination, the presence of good posture was observed in the majority of male and female athletes specializing in such types of tennis and athletics. However, posture disorders were identified, in particular, the presence of a stoop-normal posture (Table 1).

Table 1.

Assessment of posture according to the values of the shoulder index of the examined athletes of both sexes in %

Kind of sport	Number of examined, n		Posture frequency in %	
			Normal	stoop-normal
Athletics	w	23	22	8
	m	41	74	26
Tennis	w	14	82	18
	m	11	71	29

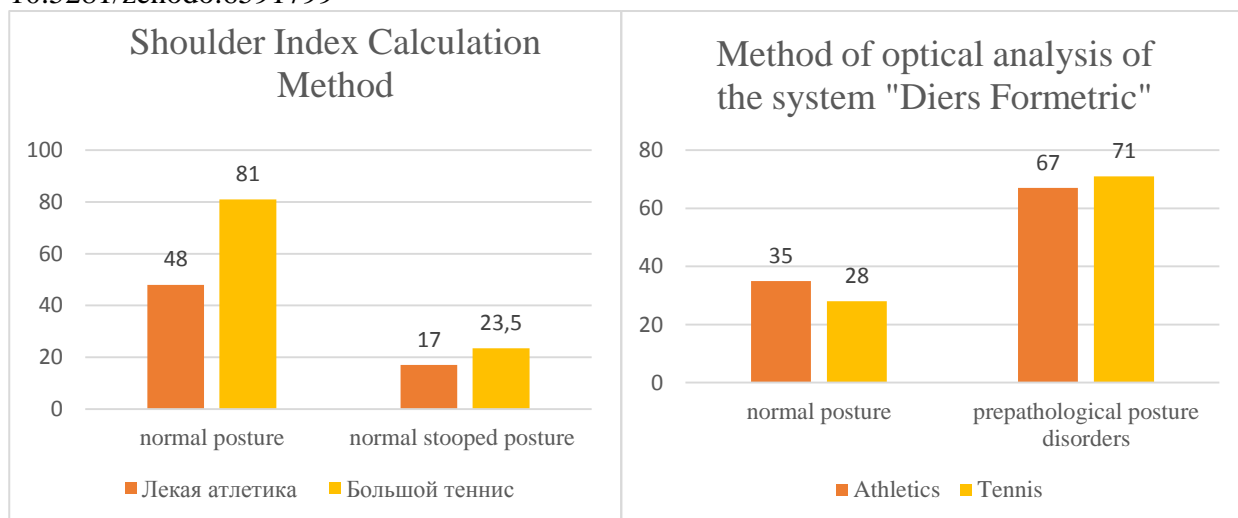
The frequency of occurrence of a stoop-normal posture in male athletes is 26%, and in girls - 8%. A similar posture was also found in young men who specialize in

tennis (29%) and girls (18%), which is apparently associated with increased unilateral development of the muscles of the neck and back. The formation of a stoop-normal posture in athletes can be explained by the strong development of muscles that provide movement in the shoulder joints.

**Table 2.**  
**The results of the optical analysis of the spine and posture of the examined athletes in %**

Indicator		Athletics		Tennis	
		m	and	m	and
Frontal plane, tilt	2°	62	68	57	62
	2-4°	38	32	43	38
Lateral deviation to the axis of the spine, up to	5mm	59	72	28	36
	5-7mm	41	28	72	54
Twisted pelvis, up to	4 mm	69	67	52	53
	4-10 mm	31	33	48	47
Rotation of the spine (to the right, to the left), up to	4°	72	74	65	63
	4-6°	28	26	35	37
Kyphosis angle	47-50%	56	58	48	50
	51-55%	44	42	52	50
Lordosis angle	38-42%	64	62	60	61
	43-47%	36	38	40	39
Lateral deviation of the spine (to the right, to the left), up to	5 mm	67	64	48	51
	5-10 mm	33	34	52	49

After analyzing the studied contingent in two sports by the method of optical analysis of the spine and posture, significant differences are observed (Table 2) in all parameters of athletes of both sexes. Thus, 62 (69.5%) athletes with posture disorders were identified, among them a large proportion were tennis players. To confirm the high rates of pre- pathological conditions of the spine of the examined athletes, a comparative analysis of two examination methods was carried out (Fig. 2).



**Figure 2. Comparative analysis of the methods of the shoulder index and optical analysis of the data of examination of the spine and posture of the studied athletes, %.**

Thus, when evaluating the data of the primary examination of athletes by the method of calculating the shoulder index, normal posture was observed on average in 64.5%, by the method of optical analysis - 31.5, normal-stooped posture was noted in 20% of athletes (according to the shoulder index), while in 69% are observed prepathological disorders of the spine and posture for a number of indicators identified by the method of optical analysis of the system " Diers Formetric ". The results of the conducted studies suggest that large uneven physical activity leads to the predominant development of certain muscle groups or muscles of one half of the body, thereby leading to various posture disorders.

**Conclusions:**

Conducted examinations of athletes using the system " Diers Formetric » makes it possible to detect functional and structural changes at an early stage of detection in cases of absence of symptoms from the musculoskeletal system, which is an important element in the diagnosis of pre- pathological conditions. One of the conditions to prevent pre-pathological changes in the spine (scoliotic and kyphotic posture disorders, pelvic tilt) is the improvement of the training process management technology by expanding the use of alternative methods , as well as dynamic control of the correction of functional and structural disorders of the musculoskeletal system.

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