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INFLUENCE OF SPORTS ON PATHOLOGICAL CHANGES OF THE MUSCULOSKELETAL SYSTEM

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Abstract. *The paper demonstrates that the most spread among the diseases of the spine, acquired as a result of doing sport, is intervertebral osteochondrosis; the distribution of degenerative changes in the spine according to the type of sport was studied. It was found out that the leading position is occupied by high-skilled athletes – masters of sports, candidates for masters, first-grade sportspeople (75% of cases).*

Keywords: *spine, osteochondrosis, sport, prevention, rehabilitation.*

Topicality. Injuries and diseases of the musculoskeletal system in athletes is a major factor limiting the growth of athletic skill. Traumas and diseases lead to violations of the training cycle, decrease the sporting result, and sometimes cause athletes' disability. With a rational, planned approach to the training and competitive process, those processes that cause pathological changes in the musculoskeletal system are minimized. Modern sport is characterized by more and more increasing loads, and hence emerge the increased demands to the locomotor apparatus. The topicality of the paper is explained by the need to identify the distribution of degenerative changes in the spine and determine the anatomical and physiological features of the spine according to different sports. In recent years, the interest of specialists in sports medicine in the study of diseases of the spine has increased [1; 6; 8]. The authors note that degenerative changes in the spine are caused by irrational training, overload of the neuromuscular system, congenital anomalies that create an unfavorable situation in the disk-body segments of two adjacent vertebrae, against which the athletic load affects the development of pathological processes. Particular importance is given to chronic microtraumas [2, 7].

The spine is an important link in the human musculoskeletal system. It does not only protect the spinal cord, but also takes an active part in all complex and diverse movements, carries a large static and dynamic load [3]. For a correct understanding of those pathological processes that are possible in the spine, it is necessary to know its anatomical and physiological characteristics in general and in relation to an exact sport activity in particular.

The anatomical complex consisting of one intervertebral disk, two adjacent vertebrae with the corresponding joints and ligaments, is called the vertebral

segment. Each vertebra is articulated with the adjacent vertebra in three points: in two intervertebral joint articulations from behind and the bodies (with the help of the intervertebral disc) from the front. The joints between the articular processes represent the true joints. Arches and dorsal processes of adjacent vertebrae are connected by a system of ligaments: yellow, interstitial, supraspinous and interdigitum. Functionality of the spine can be considered only in the interaction of the ligamentous apparatus and the muscles of the trunk (back and abdominal press), flexors and extensors, which P. F. Lesgaft called “strong”. These muscles have an oblique direction of fibers, a large surface, capable of developing considerable strength [4].

Spine movements are carried out in three axes:

- 1) flexion and extension on the front axis,
- 2) lateral inclinations around the sagittal axis,
- 3) rotating around the longitudinal axis; circular movements are possible in all three axes.

The normal function of this complex system is possible due to the dynamic equilibrium of all structures. The main function during the movements of the spinal column is performed by the intervertebral disc, which has a complex anatomical structure and consists of two hyaline plates closely adhering to the terminal plates of the adjacent vertebral bodies, the pulpous nucleus and the fibrous ring. This complexity is conditioned by the variety of its functions, namely: the function of connecting and holding together the bodies of adjacent vertebrae, functions of the half-joint and functions of a perfect biological shock absorber, protecting the body of the vertebrae from permanent traumatization [7].

It should be emphasized that all these functions can be performed in full only by the unmodified disk. The turgor and the elasticity of the pulpous core are provided by a high content of water in it. The height of each disk individually and that of the spinal column as a whole is determined by the dynamic equilibrium of the effects of the pulpous nucleus and the fibrous ring, with the fibrous ring extensibility playing the leading role.

Human intervertebral disk is in the same conditions as the articular cartilage. Absence of ability to regenerate, insufficient blood supply and constant loads lead to early development of aging processes in the disk. People, at the age of 20 already have their hyaline plates beginning to thin out and being replaced in some places by connective tissue cartilage. The absolute majority of authors associate the occurrence of degenerative changes in disks with chronic overloads of the spine, but as Ya. L. Tsivyan points out [5], many young people have these lesions as a consequence of the acquired or constitutional inferiority of the spine, in which even the daily load is excessive.

The aim was: to determine the anatomical and physiological features of the spine in relation to practising certain sports.

Research methods. Analysis and generalization of scientific and methodological literature, the study of medical cards.

We analyzed 460 medical cards and medical histories of athletes who were undergoing a medical examination at the Odesa Regional Medical and Physical Culture Dispensary. 290 of them were active athletes and 97 – those who had been engaged in sports in the past. What is interesting, is the distribution of degenerative changes in the spine according to different sports:

1. complex coordination – 28.9%;
2. cyclic – 22,7%;
3. game sports – 9.3%;
4. speed and power – 17,9%;
5. martial arts – 11.2%.

The leading position is occupied by high-skilled athletes – masters of sports, candidates for masters, first-grade sportspeople (75% of cases).

One should mention the “rejuvenation” of the spine osteochondrosis in athletes. Signs of degeneration of intervertebral discs and paravertebral tissues appear at the age of 15-20, and spondylarthrosis and spondylosis occur more often in athletes aged 25-30.

The emergence of degenerative changes at an earlier age is not usually caused by the increase in physical activity, but by some inborn or acquired unfavorable features of the spine, with the presence of which the athletic load (inadequate to the physiological capabilities of this spine segment) can contribute to the development of lesions. Therefore, early detection and especially prevention of osteochondrosis in athletes is very important, especially in those types of exercises where the load on the spine is more significant (gymnastics, acrobatics, athletics – long, high jumps, sprint).

The common characteristics of gymnastics and acrobatics are hyperflexia and hyperextension of the spinal column, rotation, as well as large axial loads on the chest-lumbar area. Such extreme amplitude states cause micro-mobility in the motor segment, the intervertebral disk–the bodies of adjacent vertebrae, which subsequently leads to a state that is estimated in the literature as segmental instability.

The disk, as was mentioned above, has a high amortization ability and, until a certain point, copes with excessive physical load, then degenerative changes occur, therefore segmental instability is possible only with the development of pathological processes in the disk.

Among the athletes those who complain of back pain are often sprinters, long and high jumpers. Sprinters often unreasonably include in training exercises with weights, the performance of which exceeds the physiological capabilities of the lumbar spine apparatus. Often, the weights used by sprinters exceed the weights used by weightlifters, while the special strength training of sprinters is far behind that of weightlifters. Sometimes the principle of gradualism is

violated: intensive loads are applied after a long break, suffered injuries and diseases. This leads to overload of the neuromuscular system, the stabilizing function of the back muscles sharply decreases, as a result of which the load on the front and back ventral column complexes of the spine increases, the adaptation mechanisms fail.

Long jumpers often have a flexor-extensor mechanism when performing a jump. In the phase of the thrust and flight, a sharp overextension of the spine follows, the main load falls on the posterior bearing complex and partly on the anterior (articular processes, arches), the front longitudinal ligament stretches, the front half-ring of the disk overstretch, the disk nucleus is relatively displaced forward, muscles are actively involved – long back muscles strain, the muscles of the anterior abdominal wall stretch. At the time of landing, there is instantaneous redistribution of the load to the front parts of the spine (vertebral bodies, intervertebral disks), strain of the posterior longitudinal ligament, yellow and interstitial ligaments, tension of the capsule of the intervertebral joints, tension of the muscles of the anterior abdominal wall and relaxation of the extensors of the back. The body at the moment of landing in the pit slides by inertia forward, with fixed lower limbs, which contributes to the appearance of micro-mobility in the disk-body segment. In the future, it causes the development of persistent degenerative changes, which manifest themselves in a certain clinical picture (osteochondrosis, spondylarthrosis, spondylosis).

Conclusion. Analysis of medical history and cards of athletes showed that the most spread disease of the spine, acquired as a result of doing sports, is intervertebral osteochondrosis – an extensive degenerative process that affects intervertebral disks, the subcutaneous part of the bodies of adjacent vertebrae. In the future, the articular processes, nerve roots, and the muscular system are getting involved in this process.

The distribution of patients suffering from degenerative changes of the spine according to different sports is determined – complex coordination, cyclic, game sports, speed and power, martial arts.

The leading position is occupied by high-skilled athletes – masters of sports, candidates for masters, first-grade sportspeople (75% of cases).

Some anatomical and physiological features of the spine have been determined with respect to doing certain types of sports.

In further studies, the priority is given to the development and implementation of preventive and rehabilitation tools for athletes, not only to maintain a high level of athletic performance, but also to remove undesirable consequences in athletes' physical condition.

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