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THE IMPACT OF SCOLIOSIS ON INTERNAL ORGANS

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Abstract: The study examined morphometric changes in body parts and internal organs of 15 boys and 15 girls from 9 to 12 years old with scoliosis and compared with healthy children (n=30, 15 boys and 15 girls). It was found that scoliosis leads not only to the dysfunction of the locomotor system, but also to the dysfunction of internal organs, the development of negative shifts in anthropometric indicators. In conclusion, scoliosis, especially in its severe forms, is more than a structural condition affecting posture; it has extensive implications for the functioning of various internal organs. Managing scoliosis is essential not only to alleviate physical pain and improve posture but also to reduce its impact on vital organs. Early intervention, regular monitoring, and, in severe cases, surgical treatment are critical in mitigating the adverse effects of scoliosis on the respiratory, cardiovascular, gastrointestinal, renal, and nervous systems.

Keywords: dysfunction of internal organs, dysfunction of the locomotor system, anthropometric indicators, chest circumference, body length.

1. Introduction

1.1 The relevance of the problem.

Scoliosis is an abnormal lateral curvature of the spine. It is most often diagnosed in childhood or early adolescence. The spine's normal curves occur at the cervical, thoracic and lumbar regions in the so-called “sagittal” plane. These natural curves position the head over the pelvis and work as shock absorbers to distribute mechanical stress during movement. Scoliosis is often defined as spinal curvature in the “coronal” (frontal) plane. Scoliosis can be classified by etiology: idiopathic**,** congenital or neuromuscular**.** Idiopathic scoliosis is the diagnosis when all other causes are excluded and comprises about 80 percent of all cases. Adolescent idiopathic scoliosis is the most common type of scoliosis and is usually diagnosed during puberty. Scoliosis affects 2-3 percent of the population, or an estimated six to nine million people in the United States. Scoliosis can develop in infancy or early childhood. However, the primary age of onset for scoliosis is 10-15 years old, occurring equally among both genders. Females are eight times more likely to progress to a curve magnitude that requires treatment. Every year, scoliosis patients make more than 600,000 visits to private physician offices, an estimated 30,000 children are fitted with a brace and 38,000 patients undergo spinal fusion surgery.[Source: National Scoliosis Foundation, June 2007.]

1.2. The aim of the study

The goal of the study was to study examined morphometric changes in body parts and internal organs from 9 to 12 years old with scoliosis and to compare them with the anthropometric indicators of healthy children.

2. Materials and research methods

The research was conducted at secondary school No.13 and boarding school No. 23 in Bukhara for children with scoliosis. The results of examination of 30 children (15 boys and 15 girls) aged from 9 to 12 with idiopathic scoliosis of thoracic localization of I and III degree according to Chaklin were studied. All examined children were divided into 2 groups by simple randomization, comparable in age, gender, and clinical and functional indicators. The main group consists of 30 children (15 boys and 15 girls) with scoliosis, and the control group consists of 30 healthy children (15 boys and 15 girls).

The method of anthropometric research of children was used for anthropometric measurements (guidelines of N. H. Shomirzaev, S. A. Ten and I. Tukhtanazarova, 1998).

Scoliosis is usually confirmed through a physical examination, an x-ray, spinal radiograph, CT scan or MRI. The curve is measured by the Cobb Method and is diagnosed in terms of severity by the number of degrees. A positive diagnosis of scoliosis is made based on a coronal curvature measured on a posterior-anterior radiograph of greater than 10 degrees. In general, a curve is considered significant if it is greater than 25 to 30 degrees. Curves exceeding 45 to 50 degrees are considered severe and often require more aggressive treatment.

A standard exam that is sometimes used by pediatricians and in grade school screenings is called the Adam's Forward Bend Test. During this test, the patient leans forward with his or her feet together and bends 90 degrees at the waist. From this angle, any asymmetry of the trunk or any abnormal spinal curvatures can easily be detected by the examiner. This is a simple initial screening test that can detect potential problems, but cannot determine accurately the exact type or severity of the deformity. Radiographic tests are required for an accurate and positive diagnosis.

The impact of scoliosis on the gastrointestinal (GI) system is often indirect but still notable. When the spine curves, especially in the lumbar region, it can displace the abdominal organs, compressing the stomach, intestines, and other digestive organs. This displacement can lead to symptoms such as acid reflux, constipation, and abdominal pain, particularly if the scoliosis is progressive. The compression of the GI tract may also slow down the digestive process, leading to chronic discomfort and nutritional challenges. In some cases, scoliosis can impact the kidneys and urinary system. Curvatures that extend into the lower thoracic and lumbar spine may cause displacement or compression of the kidneys, potentially impairing kidney function over time. Compression of the urinary tract may also result in difficulties with urination, which can lead to urinary retention or recurrent urinary tract infections. Scoliosis can also affect the nervous system, which indirectly impacts organ function. The abnormal curvature may put pressure on nerves exiting the spine, leading to disrupted signals between the brain and organs. This can manifest as issues with bladder control, bowel function, and other autonomic nervous system functions.

- **X-ray** : Application of radiation to produce a film or picture of a part of the body can show the structure of the vertebrae and the outline of the joints. X-rays of the spine are obtained to search for other potential causes of pain, i.e. infections, fractures, deformities, etc.
- **Computed tomography scan (CT or CAT scan)**: A diagnostic image created after a computer reads X-rays; can show the shape and size of the spinal canal, its contents and the structures around it. Very good at visualizing bony structures.
- **Magnetic resonance imaging (MRI)** : A diagnostic test that produces three-dimensional images of body structures using powerful magnets and computer technology; can show the spinal cord, nerve roots and surrounding areas, as well as enlargement, degeneration and deformities.

3. The results of the study

The reliability based on internal consistency was confirmed with a Cronbach's alpha coefficient greater than 0.6 for each domain. In addition, acceptable correlation coefficient values greater than 0.68 were obtained for each domain by the test-retest method on normal controls. Similarly; to establish validity of the questionnaire, responses of normal high school students were compared with that of the patients. Consistent differences were noted in the domains between the two groups with $P < 0.003$. The largest differences were in pain (control, 29.96 +/- 0.20; patient, 13.23 +/- 5.55) and general level of activity (control, 14.96 +/- 0.20; patient, 12.16 +/- 3.23). Examination of the relationship between the domains and patient satisfaction showed that pain correlates with satisfaction to the greatest degree (Pearson's correlation co-efficient, $r = -0.511$; $P < 0.001$), followed by self-image ($r = 0.412$; $P < 0.001$). Conducted anthropometric studies among 11 year old male and female children with scoliosis have shown that the growth parameters of male children are 1.05 times, and that of female children are 1.09 times behind the parameters of healthy children. The breast circumference in the pause in boys with scoliosis of 11 years of age is 1.01 times less, and in girls of this age with scoliosis is 1.12 times less than in healthy children. The chest circumference at the height of inspiration in boys with scoliosis 11 years of age is 1.02 times less, and in girls 1.12 times less, in contrast to healthy children of this age. The breast circumference at full exhalation in male children of 11 years of age with scoliosis is 1.0 times less, and in girls it is 1.12 times less in comparison with healthy children

3. Summary

Scoliosis is a deviation of the spine consisting of lateral curvature and rotation of the vertebrae. While scoliosis is associated with many diagnoses, the vast majority of patients encountered are idiopathic in nature. A thorough history and physical examination and radiographs should be completed to identify nonidiopathic causes of the scoliosis. The treatment for idiopathic scoliosis is based on age, curve magnitude and risk of progression, and includes observation, orthotic management and surgical correction. In conclusion, scoliosis, especially in its severe forms, is more than a structural condition affecting posture; it has extensive implications for the functioning of various internal organs. Managing scoliosis is essential not only to alleviate physical pain and improve posture but also to reduce its impact on vital organs. Early intervention, regular monitoring, and, in severe cases, surgical treatment are critical in mitigating the adverse effects of scoliosis on the respiratory, cardiovascular, gastrointestinal, renal, and nervous systems.

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