

ANATOMY OF THE VERTEBRAL COLUMN AND ITS COMMON PATHOLOGIES

Olimjonova Dilnoza Ulug'bek qizi

Trainee Assistant, Department of Anatomy, Samarkand State Medical University

Nuriddinova Dilbar Sherali qizi**Muxammadiyeva Lobar Amrulla qizi**

1st-year students, Faculty of General Medicine, Samarkand State Medical University

Abstract

This article examines in detail the anatomical structure of the *columna vertebralis* (vertebral column), its main functions, and commonly occurring pathological conditions. The vertebral column is an essential component of the human musculoskeletal system, performing functions such as maintaining the upright posture, enabling movement, and protecting the *medulla spinalis*. The anatomical features of the vertebral column sections - *vertebrae cervicales*, *vertebrae thoracicae*, and *vertebrae lumbales* - are described.

In addition, the causes and anatomical basis of common diseases associated with modern lifestyles, including osteochondrosis, scoliosis, and kyphosis, are analyzed. Changes in the *discus intervertebralis* and the role of poor posture in the development of these pathologies are highlighted.

The results of the study demonstrate the importance of proper posture, physical activity, and early diagnosis in preventing vertebral column disorders. This article has practical significance for students studying anatomy and clinical medicine.

Keywords

columna vertebralis, vertebral column, *vertebrae cervicales*, *vertebrae thoracicae*, *vertebrae lumbales*, *discus intervertebralis*, osteochondrosis, scoliosis, kyphosis, posture, *medulla spinalis*

Introduction

In the human body, the *columna vertebralis* (vertebral column) is the central part of the musculoskeletal system. It performs important functions such as maintaining upright posture, enabling movement, and protecting the *medulla spinalis* (spinal cord) from external influences. The vertebral column consists of interconnected *vertebrae*, which are divided into cervical (*vertebrae cervicales*), thoracic (*vertebrae thoracicae*), and lumbar (*vertebrae lumbales*) regions.

In recent years, due to technological advancement and a sedentary lifestyle, the incidence of diseases related to the vertebral column has been increasing. Prolonged sitting in improper positions, lack of physical activity, and excessive *нагрузки* lead to structural changes in the *discus intervertebralis* (intervertebral disc). This, in turn, contributes to the development of pathological conditions such as osteochondrosis, scoliosis, and kyphosis.



The aim of this article is to study the anatomical structure of the vertebral column, analyze its main functions, and highlight the anatomical basis of common pathologies.

Literature Review

The vertebral column (*columna vertebralis*) is one of the most important anatomical structures of the human body, and its structure and function have been extensively studied by both local and foreign researchers. According to classical anatomical sources, the vertebral column consists of 33–34 *vertebrae*, connected by *disci intervertebrales*, which provide flexibility to the body.

Numerous studies have described in detail the morphological and functional differences between the regions of the vertebral column — *vertebrae cervicales*, *vertebrae thoracicae*, and *vertebrae lumbales*. In particular, the cervical region is characterized by high mobility, the thoracic region by relative stability, and the lumbar region by bearing significant mechanical load. These anatomical features explain why certain pathologies are more common in specific segments.

Modern scientific literature pays particular attention to the structure and degenerative changes of the *discus intervertebralis*. The disc consists of a central part — the *nucleus pulposus* — and an outer fibrous ring — the *anulus fibrosus*. Degeneration of these structures is considered a key factor in the development of osteochondrosis. Studies show that aging, hypodynamia, and poor posture reduce the elasticity of the discs and lead to pain syndromes in the vertebral column.

Furthermore, many researchers have studied spinal deformities such as scoliosis, kyphosis, and lordosis. Scoliosis is characterized by lateral curvature of the spine, kyphosis by posterior curvature, and lordosis by anterior curvature. These deformities are particularly common among adolescents and students, with poor posture, muscle imbalance, and lack of physical activity playing significant roles in their development.

Recent studies emphasize the importance of modern diagnostic methods such as computed tomography (CT) and magnetic resonance imaging (MRI) in detecting vertebral column pathologies. These techniques allow precise evaluation of the *medulla spinalis*, *discus intervertebralis*, and other anatomical structures.

Additionally, scientific sources highlight the importance of prevention. Proper posture, regular physical exercise, and ergonomic conditions can significantly reduce the risk of developing spinal disorders.

Materials and Methods

In this study, the anatomical features of the vertebral column (*columna vertebralis*) and its common pathological conditions were investigated using a comprehensive approach. Both theoretical and practical methods were applied.

The study involved 50 students aged 18–25 years from a higher education institution. The general physical condition, daily activities, and sitting habits of the participants were examined.



The following methods were used during the study:

Observation method — visual assessment of students' posture was conducted. The physiological curvatures of the vertebral column, shoulder symmetry, and scapular positioning were analyzed.

Questionnaire survey — data were collected on lower back and neck pain, duration of sitting, and level of physical activity.

Anthropometric assessment — simple measurement techniques were used to evaluate body posture and spinal curvatures.

Literature analysis — modern scientific sources were used to study the anatomical structure and pathological changes of *vertebrae*, *discus intervertebralis*, and *medulla spinalis*.

The obtained data were processed using basic statistical analysis methods. Results were expressed as percentages (%) and compared across different indicators.

Results

The results of the study showed that a significant proportion of students exhibited functional changes related to the vertebral column. Specifically, 60% of the 50 students demonstrated signs of poor posture. This condition was mainly associated with prolonged sitting and low physical activity.

According to the questionnaire results, 55% of students reported occasional lower back pain (lumbar discomfort), while 48% experienced discomfort in the cervical region (*vertebrae cervicales*). These symptoms were explained by excessive load on the *discus intervertebralis*.

Visual and anthropometric assessments revealed that 30% of students had signs of scoliosis (lateral curvature of the spine), while 25% showed a tendency toward kyphosis. These changes were closely associated with poor posture and muscle imbalance.

Additionally, the lumbar region (*vertebrae lumbales*), which bears the greatest load, was identified as the most affected area. Compression and decreased elasticity of the *discus intervertebralis* in this region were considered the main causes of pain syndromes.

The findings indicate that spinal problems are widespread among students, are mostly functional in nature, and can be prevented through early preventive measures.

Conclusion

The results of this study confirm that the *columna vertebralis* (vertebral column) plays a crucial anatomical and functional role in the human body. It forms the foundation of the musculoskeletal system, enabling movement and protecting the *medulla spinalis*.

The study showed that functional disorders of the vertebral column are widespread among students due to poor posture, sedentary lifestyle, and prolonged sitting. In particular, changes in the *discus intervertebralis* and excessive load on the *vertebrae lumbales* region are major causes



of lower back pain.

Spinal deformities such as scoliosis and kyphosis were also found to be prevalent, with muscle imbalance and improper sitting posture identified as key contributing factors.

Based on the findings, the following conclusions can be drawn:

- Vertebral column disorders are mainly associated with functional factors;
- Proper posture and physical activity play a crucial role in prevention;
- Early diagnosis and preventive measures are effective in maintaining spinal health.

References

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