



## COMPARATIVE ANALYSIS OF THE INCIDENCE OF SPINAL DISTORTIONS IN ADOLESCENTS FOR THE PERIOD 2009-2021

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### SUMMARY:

**Purpose:** The study objective is to monitor changes in the incidence of spinal distortions in adolescents in the school years 2008/2009 and 2019/2020 in schools within the territory of the town of Kazanlak. The report presents an overview of the manner and organization of preventive screenings of adolescents and options for subsequent treatment.

**Materials and methods:** The study was carried out by specialists in physical and rehabilitation medicine (PRM) in the school physicians' offices with the consent of the directors, class teachers, parents and the regional education inspectorate. The preventive screenings were carried out completely free of charge for the pupils, and the treatment of newly discovered spinal distortions was carried out in outpatient conditions and was taken over by the National Health Insurance Fund.

**Results:** The study outcomes showed no change in the incidence of spinal distortions of pupils in classes 1 to 4. However, among children from classes 5 to 10, there is a significant increase in the incidence rate over a period of 10 years.

**Conclusions:** The introduction of modern technologies in pupils' daily lives and their increasingly active lifestyles over the last 10 years has led to an increase in spinal diseases. PRM specialists are the physicians responsible for restoring preventive screenings for spinal distortions in schools. Our study with subsequent treatment and prevention of these conditions shows a successful approach to dealing with the increased number of scoliosis cases in the town of Kazanlak. Our team believes that this approach can be effectively implemented in each region by the PRM specialists and would have a strong social, economic and health effect in the long term for the population of the Republic of Bulgaria.

**Keywords:** scoliosis, spinal distortion, screenings, adolescents, rehabilitation,

### INTRODUCTION

Scoliosis is a spinal deformation at lateral curvature of the spine [1]. This disease is characteristic of the period of growth. Scoliosis affects children in good general health and progresses during the growth spurt as the child enters puberty. The frequency is 2-3% of the general population, affecting girls in greater percentages. [2,3]. An external criterion for the end of this process is the X-ray establishment of bone maturity or completion of bone growth.

### AIM

The study objective is to monitor the changes in the incidence of spinal distortions in adolescents over a period of 11 years. The study was conducted by means of preventive screenings in the 2008/2009 and 2020/2021 school years within the territory of the town of Kazanlak.

### TASKS

Establish what impact the introduction of smart phones after 2009 and the growing computerization have had on school age children.

Presenting an overview of the manner and organization of preventive screenings of adolescents and the options for subsequent treatment.

### MATERIALS AND METHODS

The screenings were carried out by specialists in physical and rehabilitation medicine (PRM specialists) in the physicians' offices of the respective schools. The study was conducted in 3 schools in the town of Kazanlak. The screenings were carried out with the written consent of the school principals, the class teachers, the parents and the regional education inspectorate. The screenings were carried out free of charge for the pupils. In the school year 2008/2009, they were conducted by Dr Yordan Gechev, and in 2019/2020, by Dr Stoimen Gechev and Dr Gergana Gecheva.

The preventive screenings were carried out through functional evaluation, checkup, palpation and anthropometric measurements. [4, 5] The screened pupils were from classes 1 to 10. In order to quickly systematize the screening outcomes, the pupils were generally distributed into 3 main groups [6, 7]:

- Without change
- Initial changes
- Manifested scoliosis

Changes in the objective status:

**Initial changes** include 1 or more of the following [8, 9]:

- Rigidity of PVM
- Minimum difference in the waist triangles
- Unilateral restriction of lateral flexion
- Functional bent forward posture
- Prominent scapula
- Flat foot (platypodia)

**Manifested scoliosis** include 1 or more of the following [10, 11]:

- Visible curvature of the spine in the frontal plane
- Significant rigidity of the PVM
- Significant difference in the waist triangles
- Unilateral or bilateral restriction of lateral flexion
- Kyphosis
- Higher position of the shoulder joint and scapula
- Flat foot (platypodia)
- Pelvis rotation, lower limb shortening
- Tenderness

#### Statistics

Peaks were noted in the incidence of spinal diseases in every 3 age groups.

In 2008/2009, the peaks were in classes 1, 4 and 7

In 2020/2021, the peaks were in classes 2, 5 and 8

Peaks shift by 1 age group over a period of 11 years but always remain at an equal interval of 3 age groups.

The increased incidence of spinal distortions in specific age groups over an equal interval can be explained by the cyclical growth of children in height and body weight. [12, 13]

Probably in the distortion rate peaks shown, a large proportion of children in the age group are in a period of increased height growth. [14, 15]

In 2008/2009, the percentage of pupils with spinal distortions was higher in the younger classes, 30% in classes 1 and 4.

In 2020/2021, the percentage of pupils with spinal distortions was higher in the older classes: 5 and 8, respectively 41 and 49% (nearly half of the children screened).

For the period of study, the high percentage of children with spinal distortions is found to shift from the young age group to the older pupils.

This change can be attributed to the greater dependence of older pupils on the smart phones introduced after 2009 and the growing computerization in their daily lives.

The overall incidence rate in screened pupils from classes 1 to 10 in 2008/2009 was 22%, and in 2020/2021, it increased to 28%

The percentage of manifested spinal distortion increased significantly, from below 1% in 2008/2009 to 5% in 2020/2021

The increase in the number of severely manifested scoliosis for the studied period can be explained by the lack of preventive screenings in schools or by general practitioners.

#### DISCUSSION:

Our proposal to the Association of Physical and Rehabilitation Medicine is to initiate a national campaign for the early detection of spinal distortions [16, 17]

Objectives:

1. Finding children with spinal distortions.
2. Early detection of children predisposed to spinal distortions.
3. Informing pupils and their parents about the importance and consequences of spinal distortions

We can divide the concept into several steps:

**FIRST STEP:** to carry out screening (preventive screening, preliminary inspection) of pupils, completely free of charge, jointly with school authorities and supported locally by public organizations such as:

- Syndicate of Bulgarian Teachers
- Bulgarian Red Cross
- Rotary Club Bulgaria
- Order of Knights Templars
- Inner Wheel Bulgaria etc.

Second step:

A/ the parents of all children with discovered spinal distortions or predisposed (at increased risk) should be informed through their class teachers.

B/ where parents show interest, a detailed examination by a PRM specialist with referral No 3, code 23, may be carried out by the general practitioner, and appropriate examinations may be prescribed for diagnosis.

Third step: where parents and the school authorities show interest, we can organize treatment sports groups throughout the school year to conduct the remedial gymnastics daily in the sports facilities of the school for a minimum fee.

Fourth step: these preventive screenings could be carried out every year, which would allow us to have direct control over high-risk pupils, and thus we could take into account the effect of the prevention and rehabilitation carried out.

Fifth step: on a national scale, a green "school for the back" in different resorts in the country.

#### CONCLUSION:

One hundred thirty-eight children received treatment at a medical centre. These children were examined in detail with anthropological measurements. Some of them underwent x-ray examinations and plantograms at the discretion of the physicians. [18, 19] Remedial gymnastic groups of 4 children were organized for general strengthening exercises for the children with initial changes. The patients were admitted with referrals for physiotherapy in outpatient conditions, which allowed the implementation of a 10-day treat-

ment course – completely free of charge for the children. The parents and children were informed in detail of the necessary hygiene measures in the daily and school regime, as well as of the need to regularly visit the physiotherapy centre at least twice a year for follow-up and treatment of the spinal distortion. The preventive screenings were carried out completely free of charge for pupils and schools. At the end

of the preventive screening in the respective school, we prepared an official list of children with initial changes and manifested scoliosis for each individual class. The list was submitted to school principals, and the parents of the children with spinal distortions were informed by the class teachers. Contact details of the physicians and the medical centre were provided in case the parents wanted to contact us.

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*Please cite this article as:* Gecheva-Fermezdzheva GY. Comparative analysis of the incidence of spinal distortions in adolescents for the period 2009-2021. *J of IMAB.* 2023 Apr-Jun;29(2):4932-4934. [Crossref - <https://doi.org/10.5272/jimab.2023292.4932>]

Received: 19/10/2022; Published online: 25/05/2023



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