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POSTURAL DISORDERS AND SPINAL DEFORMITIES IN CHILDREN AT PRIMARY SCHOOL AGE. SYSTEM FOR SCREENING, EXAMINATION, PREVENTION AND TREATMENT

(Professional paper)

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Abstract

Bad posture of our children is not insignificant aesthetic drawback that disappears by time. This is a serious health disorder, which often leads to a permanent reduction of capability in career and in life. Postural disorders and spinal deformities are among the most common diseases in the period of childhood and adolescence. During long period of time, the problem with postural disorders and spinal deformities took alarming proportions. The reason for such situation is reduced physical activity, long standing in front of the computer from early childhood , bad posture at school, heavy backpacks, improper diet, increased number of traumatic injuries , congenital spinal anomalie, decreased sports hours, etc. Undetected and untreated in time, they can lead toward adverse changes in posture and body. Current therapeutic issues that must be solved are voluminous and complex. With the beginning of school year for children remains fever time for games and entertainment, and sports remain meager physical education classes. Unfortunately, the problems of postural disorders and spinal deformities were definitely ignored after the reform in the health system. Disorganization and lack of school doctors to monitor various medical problems in children and adolescents was unfavorable for frequent postural problems.

Keywords: *physical activity, physical education, school doctors, rehabilitation, somatoskopy, functional tests of postural disorder, Body Mass Index, correctional gymnastics*

EXPOSURE

Effects of postural problems and spinal deformities affect, directly or indirectly, both the spine and other systems activities, especially on the respiratory and cardiovascular system. This in turn means difficulties for the delivery of oxygen to the growing organism, leading to a significant performance reduction and lack of oxygen at the level of the central nervous system leads to severe disorders of the memory and from here to difficulty in absorbing of the knowledge.

Frequent anomalies and diseases of the spine require its precise study as well as creating of new methods for testing, treatment and rehabilitation. Increased attention to the study of postural disorders and spinal deformities is needed also because of the growing number of spinal deformities in recent years among the students. Due imperceptible start, slow and painful course, low severity of clinical symptoms in children with poor posture leads to delayed diagnosis and treatment. (Ryazkova & Kirova (Рязкова, М., & Кирова), 2002). Increasing demands that the school place in front of the children make this issue even more urgent.

The aim of this report is to present a summary screening system for examination, which will significantly facilitate early diagnosis and help prevent the distortion.

Postural and spinal disorders

Stand depends on correct anatomical bone and signaling structure of the spine, chest, shoulder girdle, lower extremities, the normal function of the muscles around the spine, abdominal muscles and fabricated motor habit. Normal morphologically-static maintenance of the spine requires minimal muscle strength. Any deviation from the physiological curves is associated with increased muscular effort (Debruner & Hep, 1999).

Postural disorders consists of motor habit stand. Initially changes in normal posture have functional character, but the absence of proper correction lead

to permanent structural changes, especially in the spine. (Popov, 2006). Structural scoliosis is caused by asymmetric bending, which can progress – in slope forward scoliosis curve remains, the variance is constant and the spine can not return to neutral position.

Spinal deformities are permanent deviations from normal shape of the spine. Curvature of the spine in a lateral direction (scoliosis) may be deviations from the midline to the left or right depending on in which direction is the projection of the curve (Popov (Попов), 2006).

Reasons for appearance of postural disorders and spinal deformities

Incorrect posture, improper sitting at the desk or chair.
Wearing school bag in one hand or on one shoulder.
Talking on the phone to one ear only.
Granting one leg when we stand straight.
Insufficient sleep and improper posture while sleeping.
Fast growing of children organism.
Common functional weakness, decreased muscle tone.
Mental fatigue.
Shortsightedness
Infectious diseases, etc.

Meaning of early diagnosis of postural disorders and spinal deformities

Early diagnosis of postural disorders and spinal deformities, can be achieved through an ective screening system (Tregubova (Трегубова), 1998).

Periodic monitoring of the stand is an inherent requirement to timely detection of deviations. Many authors have reported that the early onset of conservative treatment can prevent the development of severe deformity and avoid surgery (Focarile, Bonaldi, & Giarolo, 1991; Haher, Merola, & Zipnick, 1995; Halm, Castro, Jerosch, & Winkelmann, 1995).

Serious problem of the violated posture in children and adolescents due to the fact that there is no immediate correction of static deformation, which is a predisposing factor for the development of structural changes in the spine and diseases of the internal organs, which are a reason of reduced disability in middle age. (Craze (Крейз), 1999; Vasilyeva & Mikhailova (Васильева && Михайлов), 2002; Abolishin & Cickishvily Аболишин & Цицкишвили (2006).

For the prognosis of scoliosis the essential elements are: the child's age, the etiology of the disease, the degree of distortion anatomical features, location and other factors that may enhance spinal deformity. This requires the use of various methods of treatment, starting with physical therapy and undergo orthopedic treatment with different corsets, to arrive at the failure to surgical correction and stabilization. In order to achieve a good final result, it's necessary early started and conducted competently the treatment. (Vladimirov, Djerov & Ivanov (Владимиров, Джеров, & Иванов), (2000).

Toward the diagnosis and determination of rehabilitation treatment it is necessary to take medical history, to perform inspection, palpation, to measure the lower limbs plantograma of the feet, test the shorten muscles, explore the mobility of the spine and apply other special tests.

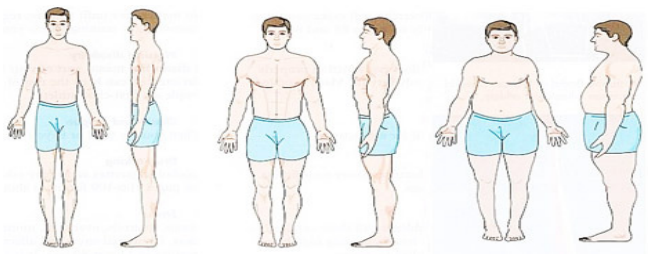
Appearance of the significant differences in the estimates of bad posture and spinal deformities in children, many authors attribute toward the lack of a unified methodology of research and clear criteria for diagnosis. As a result, the frequency of pathological

Methods for diagnosing postural disorders

Anamnesis:

Name:
Age:
Dominated hand:
Anthropometric data - height (cm).
Anthropometric data - weight (kg).
Routine motor activities:
Presence of pain:
Existence or illness / health:
Presence of the disease in the family:

1. First we offer to set children's somatotype.

Inspection – posture		
		
Asthenic (ectomorph) type	Athletic (mesomorph) type	Pyknic (Endomorph) type

lesions in school-age ranged from 1.8% to 87%. All this greatly "blurs"the border of normal and pathological conditions and a clear identification of children at risk.

System for screening exposure in children of primary school age

To detect postural disorders we offer screening to be systemized by the following way:

- Anamnesis
- Somatoskopy (view)
- Functional tests for guidance on the level of postural disorder
- Research on the foot
- Body mass index (BMI)

Somatoskopy (view): - the study is conducted in the morning at daylight, ventilated and heated room. Children are stripped underwear. Perform a view to the starting position standing – behind, in front and in profile.

Stages of inspection:

Prevention, and information of spinal deformities

Application of systematic screening is an essential element prevention, early detection and successful in the conservative treatment of spinal deformities.

Proper physical development requires adequate movements. During the period of rapid growth should be avoided the overloading and excessive spared. It is necessary alternating stress and rest of the training sessions and games.

Preventive measures should be strengthened

2. Inspection in front, in profile and behind

Inspection – in front		***Beginning***
Position of head and neck	In the centre of shoulder girdle Tilted to the left Tilted to the right Rotate Prolonged	
Shoulder loop	Symmetrical (equal) Asymmetric (higher left shoulder) Asymmetric (higher right shoulder)	
Mamily-sternum *(symmetrical or asymmetrical distance).*	V.B. Left – cm. Right – cm.	
Waist triangles	V.B. Left…….cm. Right …..cm.	
Iliac crests *(distance from the floor)*	V.B. Left……..cm. Right……..cm.	
Position of the valgus angle	V.B. Geno valgum Geno varum	

Inspection – sidelong		**Beginning**
Shoulder joints	V.B. Prolonged (slack)	
Chest	V.B. Plati pectus – flat chest Pectus carinatum – bird chest Pectus excavatum – shoemaker GK	
Thoracic portion	Normal rounded chest department Kiphosis deformation of the chest department	
Girdle department	Normally curved lumbar Strongly concave lumbar	
Position of the knee joints	V.B. Hyperextension Flexion	

Inspection – Behind		Begging
Shoulder lines	Horizontal and symemetrical shoulder lines Asymmetrical (higher left shoulder) Asymmetrical (higher right shoulder)	
Position of the scapulas	V.B. Asymmetrical (higher left down angle) Asymmetrical (higher right down angle)	
Spine	Straight spine Scoliosis spine	
Hip thistle	Horizontal slats Raised sides – left Raised sides – right	
Gluteal folds	V.B. Higher (left) gluteal fold Higher (right) gluteal fold	
Position of the ankle joints	Normally positioned foots Supination Pronation	

Functional tests for concerning the degree of postural disorder

№	Name	Units of measure
1	Test ADAMS (B.O; Corection in straight stand; Corection while bending; Does not correct while bending; Rib gibus).	
2	Test of Matthiass to define tenacity while holding right stand.	Centimeter
3	Tetragon of Moshkov	Centimeter
4	Mobility on the test Ott - general mobility	Centimeter
5	Testing the Schober	Centimeter
6	Test for flexibility SG (lateral inclination of the trunk)	Seconds
7	Strength endurance dorsal musculature	Seconds
8	Strength endurance of abdominal muscles	Centimeter
9	Mobility of the chest by Hirts	

Examination of the foot

Foot-print		Alignment	
Normal arch High arch Flat arch		Neutral supinated pronated	

Body Mass Index

Condition	BMI	
Underweight	< 18,5	
Severe malnutrition	< 16,0	
Average malnutrition	16,0 - 16,99	
Mild malnutrition	17,0 - 18,49	
Normal weight	18,5 - 24,99	
Over weight	≥ 25,0	
Obesity	≥ 30,0	
Obesity I degree	30,0 - 34,99	
Obesity II degree	35,0 - 39,99	
Obesity III degree	≥ 40,0	

especially in the pre-school period. In the children's homes should be organized an active exercise routine, filled with exercises and games that trained the musculature of the body (Sokolov & Markova – Stareyshinska (**Соколов, & Маркова-Старейшинска**, 1991).

School conditions could be one of the predictors toward the occurrence of the distortions. Child changes its way of life, remaining a long time in a static position, often on uncomfortable and inappropriate desks. It compels him to take a wrong posture. When the posture is repeated, it distort muscle balance, leading to postural disorders and spinal deformities.

Rank must meet the following requirements:

1. Correspond in their dimensions to the growth of the child.

2. Do not push the chest and abdomen.

3. The child can be positioned freely on it and ¬ without tension of the muscles, but steady.

4. Rank must allows the child's body to be placed properly on its base points.

5. To facilitate the work of the eye.

The unilateral body burden of heavy school bags and handbags, is also a prerequisite for spinal deformities to children.

Korovessis, Koureas, & Papazisis, (2004) and associates investigated the dependence of wearing (gravity) of the backpack and the formation of frontal spinal deformities and intense sports activities and pain in the lumbar region with the students. 3441 students were tested from 9 to 15 years. With gradually increasing weight of the backpack, the authors identify the most severe pain in the lumbar region in girls at 11 years (71%) and boys 15 years (21%). Fatigue and pain in the back most frequently occurring within the period of puberty, are most common scoliosis manifestation, but it is more common in girls who are engaged in active sports as well as in the smaller children (Korovessis, et al., 2004).

According to the American Academy of orthopedic surgeons, the weight of school bag should not exceed 10-15% of the weight of the child, this is a preventive measure to reduce the incidence of spinal deformities

School bag should retain its shape when it is lifted. Placed on the back, the bag must not be wider than the shoulders to protrude above them or fall below the waist. Having two wide well padded adjustable shoulder straps, solid backs and multiple pockets for better distribution of weight in it. Belt and shoulder straps of the bag must be tight enough to fit into the back safely, preventing its free movement.

Preventive measures at home include providing work space for the student with normal and good light falling onto suitable for the age of the child table and chair, making correct posture and maintain it in the preparation of lessons, upright and stiff head posture, shoulders on the same level, it`s back leaning against the chair, chest away from the edge of the table (which is up

Weight of child (kg).	Maximum weight of the backpack (kg).
18 - 23	2,2 - 2,8
24 - 28	2,9 - 3,4
29 - 33	3,5 - 4,0
34 - 38	4,1 - 4,6
39 - 43	4,7 - 5,2
44 - 48	5,3 - 5,8
49 - 53	5,9 - 6,4
54 - 58	6,5 - 7,0

to the xiphoid process of the sternum), forearms parallel placed on the table, feet flat on the floor (or mat) and bent at right angles in Tasso-bedrennite and knee joints. Reading recommended position lying on a bed with a firm foothold on the elbows (Sokolov & Markova- Stareyshinska (Соколов, & Маркова-Старейшинска), 1991); Langova, Stoykova & Gradinarova (Лангова, Стойкова, & Градинарова,, 1999).

One of the basic disorder prevention are physical exercises that have big influence on the central nervous system, the muscles and the musculoskeletal system as a whole. Exercises are balancing processes in the cerebral cortex and are decreasing mental tensions, which is important for students (Sokolov & Markova Stareyshinska (Соколов, & Маркова-Старейшинска), 1991).

Preventive health aspects of physical education and grassroots sport are expressed mainly in the fact that the sports activities meets the increased movements needs of children, especially in the last decade or two, with the appearance of computer games in the lives of adolescents but it supports and directs motor ontogenesis as a whole in the right direction, stimulates higher nervous activity, helping to build the optimal possibilities for normal type of body constitution.

Furthermore, previous studies of Kostov and Karaneshev (Костов, & Каранешев), found that systemic targeted work with specially selected gymnastic exe-

rcises with correctional nature, which essentially are the following exercises: passive or active flexibility and strength training primarily with isometric rate of muscle activity led to significantly reducing both the absolute proportion for the pupils with scoliosis (from 50.0 % in the experiment for the 28.8 % at the end), as well as notably systemic activities with those sessions lead to significantly reduced rate of spinal deformities (Kostov & Karaneshev (Костов & Каранешев,, 2003).

In recent years, a significant prophylactic therapeutic effect of swimming is evidenced, especially when combined with a properly selected correctional gymnastics complex.

Swimming is a great preventation for poor posture and spinal deformities. The horizontal position of the swimming body takes the water on such way which helps to unload the spine.

In Russia, children with disturbances in the stand are included in the periodical classes in remedial gymnastics. They are organized by the polyclinic in cooperation with the school. In Germany is introduced an overtime classes in gymnastics in schools by performing different exercises twice a week in the school gym under the guidance of a physiotherapist.

CONCLUSION

The global problem of postural disorders and spinal deformities required to take a good classification and a unified methodology of research and prediction. Protective measures must play a leading role in the fight against spinal deformities. Regular, competent inspections conducted in the schools and detailed documentation of the identified deviations toward later comparisons have a decisive influence. All endangered children should be directed to conduct special gymnastic exercises. In more severe deviations, a help from an orthopedic specialist must be considered as a necessary solution.

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