

SUBSTANTIATION OF KINEZILOGICAL METHODS OF REHABILITATION OF CHILDREN SUFFERING FROM SCOLIOTIC DISEASE

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Annotation. Shows the results of screening studies of the frequency and severity of violations of scoliotic spine. It is noted that this pathology occurs in any population, regardless of the race, and geographic location of its location. Installations constant manifestation of this disease in the range of 0.5% -3% by weight of observations. This indicates that these morphologic variations in the total population of three sigmoid zone are deviations from the average functional characteristics oscillation growth period. In order to ensure early diagnosis and prevention organization corrective measures necessary to systematically monitor physical development, physical fitness and physical condition of the controlled population. Diagnosing the predisposition of children makes it possible means of prevention kinesiology scoliotic prevent violations of I - II degree.

Keywords: screening, monitoring, idiopathic scoliosis, kinesiology, endothelium, epithelium, dysfunction.

Introduction

Modern requirements to organization of physical education's state system are based on need in consideration of individual peculiarities of physical level and ensuring of physical condition, adequate to every age period of life that will make possible prevention from constitutional diseases, which include scoliosis as one of their forms. Scoliosis means deformation of backbone, which results in abnormalities in body structure and normal location of internals. Up to the present time, since Hippokrat's first mentioning of clinic backbone deformation's description, millenniums have passed, but there has not been yet unanimous opinion about origin of idiopathic scoliosis and it still remains unclear, while scoliosis treatment is still one of the most complex medical problems.

At VIII Congress of pediatricians of Russia (2003) there was noted that recent years first positions among pupils' diseases had been taken by disorders of supporting motor system, first of all – functional abnormalities of posture (sway, flat, sway-flat back, scoliotic posture). However, up to the present time many doctors have thought that children's abnormalities of posture shall not be paid attention to, because they completely disappear with children's being older without any medical control or treatment [5].

At the same time there is an opinion that different disorders of posture in childhood are preconditions of adult backbone diseases that cause too early disability, worsening of physical condition. Information about different changes, caused by children's and teenagers' posture disorders, which limit their functional abilities and worsen physiological characteristics of their organisms, make it necessary to change such opinion and attract attention to formation of healthy person in educational activity with maximally possible realization of somatic, physiological, social, moral and mental potentials. Such discrepant state of the problem is explained by the quantity of persons, suffering from scoliosis in general population.

Coming from theory of J. Sevactik, the trigger mechanism of idiopathic scoliosis progressing is dysfunction of endocrine and nervous systems. In the base of these disorders there is dysfunction of sympathetic nervous system, connected with disturbed symmetry of ribs' growth, which results in strong deformation of chest and backbone. Abnormalities in ribs cage are primary in relation to scoliosis. Most authors, who studied this problem, attract attention to sex differences of this disease. Girls suffer from scoliosis much oftener than boys. It is also noted that sex deformations become stronger with increasing of disease's intensity [10].

At present, there are still problems, connected with treatment of backbone deformations and with prevalence of this pathology among population, with its progressing in different age periods, with diseases, resulting from backbone deformation.

Of scoliosis can be evaluated only by results of screening examinations of population, because verbal complaints of those, who come for consultation, can not create reliable picture of this disease's prevalence. By the results of chest screening conducted by A. Shands and H. Eisberg (1955) [11] with sample of 50000 patients older than 14 years old it was found that 1,4% had deformation of 10 and more degrees; 0,5% has scoliosis of 20 degrees and more. As per materials of screening, fulfilled by M. Duhaime (1976) [7] with sample of 14896 patients of 14 years old age scoliosis was found in 1,1%; A. Toolit (1969) [14] found 1.52% of scoliosis cases among persons older than 14 years old, screening sample of 22089 persons. L. Skoglund and A. Miller (1978) screening of 52500 persons older than 6 years old of Norwegian county Finnmark discovered scoliosis of more than 10 degrees in 1% of cases. The same examinations were carried out in USA, Australia, Greece, Japan, Northern Norway, Latin America, Jerusalem, Sweden and showed that percentage of found in the world scoliosis cases is relatively constant and varies from 0,5% to 4,1% [12].

The results of different authors' researches are various but their differences depend on criteria of diagnostics. The essence of appearing discrepancies is in how backbone deformation is understood in relation to common variants of norm.

W. Kane points that if to regard scoliosis of 5 degrees as significant then its statistical indicators are much higher than with diagnosing of 10 degrees' deformation. In this case, there appear a question, what limit of deformation can be considered a variation of norm. In this respect W. Bunnell thinks that if backbone deformation does not exceed 10 degrees, it is purposeless to regard it as scoliosis. With it, he stresses that this opinion is commonly accepted [8].

The difficulty of positive answer to this question is in the fact that all materials of the fulfilled screenings have rather wide geography, in which specificities of climatic-geographic conditions, significantly influencing on body formation, were not considered. The data of different authors were presented without clear division by age groups and in most cases cover the range of "school" age: more than 14 years old. All these significantly complicate introduction of age indicators of admissible backbone deformation, which could be considered normal and out of which it would be purposeful to prognosticate progressing of scoliotic deformation. In this case individual peculiarities of somatic type's development play undoubtedly significant role, because for somatic type such deformations are reflections of constitutional aptitude to scoliosis progressing, that, unfortunately, was not considered in the fulfilled screenings. All these to large extent determine correctness of prognostication of scoliotic deformation's progressing.

Main and the most important problem of prognostication of scoliotic deformation's progressing is determination of its progressing rate and the reasons of this phenomenon. At present there is only one approach to evaluation of scoliotic deformation's progressing, which was offered by R. Perdriolle and J. Vibal, and is based on measuring of vertex vertebra's torsion, Cobb's angles and specific rotation. This approach permitted to find evaluation criteria for every of mentioned measurements for different age groups. R. Perdriolle and J. Vibal think that prognostication of pathology is possible in any age group. Such approach permitted to define a number of prognostication factors by their significance [9].

Criteria of little significance include family anamnesis, index height-weight, value of sway back and lumbar lordosis, abnormalities of lumbosacral backbone section, body balance. Significant prognostication characteristics include sex, type of deformation, value of arch, earlier deformations, Risser's test. The most significant and confident prognostication factors are residual potentials of growth and value of deformation.

Patients with scoliosis at early stages of backbone deformation practically do not need to limit their motion activity and shall not scare of this activity's facilitating the disease's progressing. Z. Milinkovich et al. (2000) on the base of fulfilled examinations notes that gymnastic exercises and outdoor games are not cunter-indicated for patients with idiopathic scoliosis, but with it, he does not mention what, in this case, is a border between pathology and norm. Such situation is explained by the fact that determination of border between pathology and norm is most theoretical problem in biology and medicine [13].

The problems, accompanying patient with backbone deformation, are connected with reduction of lungs function, pain, neurologic deficit, dissatisfaction with own appearance. In medico-social aspect people with scoliosis, especially with strong deformations, have low workability. 90% of such patients complain on pain in thoracic or in lumbar spine.

The mentioned above data, which were obtained as a result of screenings, witness about importance of existing problem, which is equally peculiar for all world. The fulfilled by different authors screening researches discovered its essence, but they do not permit to clear up the mechanisms of originating of morpho-functional processes, which result in different forms of backbone deformations, reflecting one of existing pathologic directions of human organism's development.

For understanding of any process's progressing, it is necessary to carry out systemic observations, analysis and evaluation of what happens, in order to register the changes of object's controlled state in relation to previous, for possible prognostication of the assumed picture that would ensure possibility of monitoring.

The present work has been fulfilled as per the topic of combined plan of scientific researches in the field of physical education and sports of Ukraine on problem "Theoretical-methodic and applied principles of construction of physical development, physical training and physical condition's monitoring of the examined contingent". State registration number 0113U001206. In fulfillment of the topic the author is a participant.

Purpose, tasks of the work, material and methods

The purpose of the research is to ground the necessity of monitoring of pre-school and school age children in the context of pre-nosological diagnostics of scoliotic diseases.

The tasks of the researches:

1. Carry out analysis of literature sources, related to the regarded problem.
2. On the base of adequate semantic spaces present the structure of somatic types of the examined contingent.
3. Generalize the presented material.

Materials and method. In the course of processing of the research materials the following methods were used: analysis of scientific-methodic literature, method of clinical anthropometry, method of differentiated semantic spaces.

Results of the researches

Correction of extremely difficult forms of backbone deformation is usually fulfilled with the help of surgery, which is connected with application of mechanical means, compensating results of disease. Difficulty of surgery intervention requires long and complex rehabilitation process, which includes TPC means, massage and other non-medical means. There appears a natural question about possibility of prevention of progressing of backbone deformation with the help of kinesiologic rehabilitation's methods applied to children, having scoliotic disease of 1st and 2nd degree.

For purposeful movements' influence of shaping function of physical development of morpho-functional body structures it is necessary, on the one hand, to have a system of arranged ideas about the regarded structures and, on the other hand, to know peculiarities of the trophic processes' progressing under influence of different physical loads. The validity of efficiency of motion activity's application as a purposeful influence on formation and development of body structure comes from its role in phylogeny of this process [6]. Full analogy is observed in ontogenesis as well, in which for every stage of biological age, for full fledged development certain admissible motion activity is required.

Regarding backbone as forming structural block, we can represent its osteochondrous relations in appropriate semantic space as follows (see fig.1):

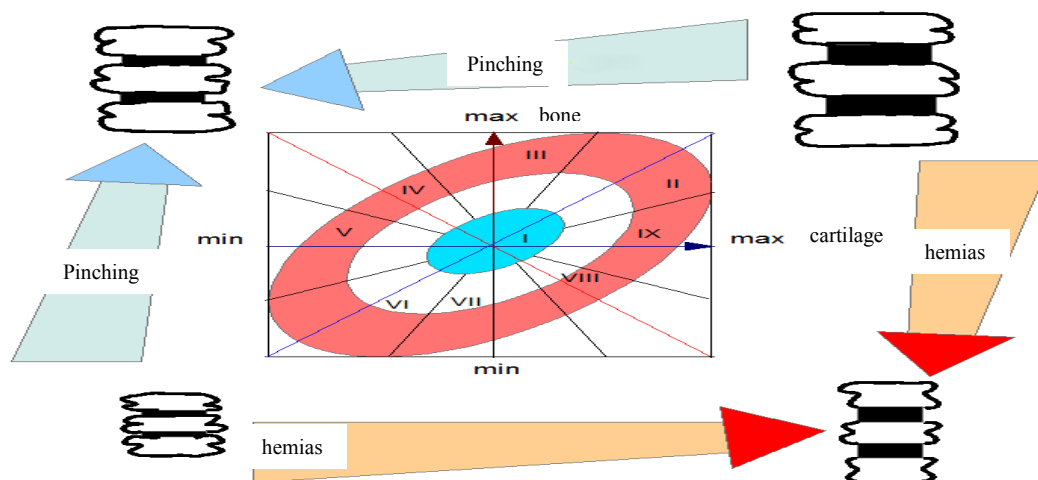


Fig.1. Structure of osteochondrous relations of backbone. The second and fourth of coordinate plane quarter are zones of increased aptitude to structural abnormalities, which are especially obvious in the third segment of every sector

The structure of building of such space is in reflection of inter-conditioned relations of cartilage and bone tissue as two orthogonal processes, which flow in certain limits from some extreme minimum to mostly possible maximum. With static accumulation of material peculiarities of its manifestation subordinate to normal distribution low and it determines existence of three zones with different density of the observed material's presence: the first zone is characterized as population norm and covers sigma-deviations from mean-statistic value; the second zone reflects different variants of manifested pre-pathologies and is two-sigma-deviation; The third zone includes all variants of osteochondrous three-sigma-deviations, reflecting the kinds of existing pathologies.

In this space, besides coordinate axes, there are two diagonals, which together divide all semantic space into eight sectors, while zones of sigma-space division divide it into three segments that permit to introduce quantitative reflection of qualitative changes of backbone's structural organization. One of the diagonals reflects uniform intensity of intensity of backbone structure's development and the second reflects diametrically oriented dihotolic allometry of its development. With introducing of the third dimension with analogous distribution of activity zones and with introducing of its manifestation's variations within these zones, we can obtain complete reflection of any appearing deformation of backbone. Such strains can appear with asymmetry of muscular tonus of static strain of muscles, keeping posture.

The presented semantic space of osteochondrous relations in backbone structure and their distribution in relation to mean statistic characteristic of the examined population change in relations of height and diameter of disk to vertebral body, keeping general structure of distribution, in the process of age growth; it requires introducing of new coordinate – time. Projection of dispersion field on the plane of foundation in such three dimensional space will make the following picture (see fig.2):

Osteochondrous relations in different age

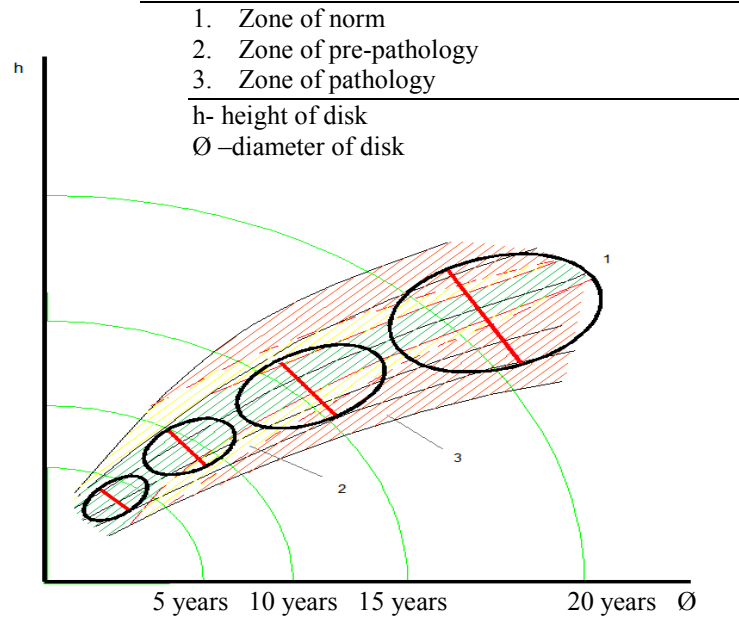


Fig. 2. Dynamics of osteochondrous relations of backbone as per years of somatic type's development. Legend corresponds to fig.1, concentric lines in the presented system of coordinates mean years of physical development

Share relation of backbone sectors in its general structure is also rather important information for understanding of aetiology of idiopathic scoliosis. Their relation is closely connected with share intensity of endocrine system and those forms of pathologic deviations, which are observed with it. This connection was established and grounded by M.Ya. Brateman in his work "Clinical semiotics and differentiated diagnostics of endocrine diseases" [1]. The diagrams of these relations are presented in fig. 3.

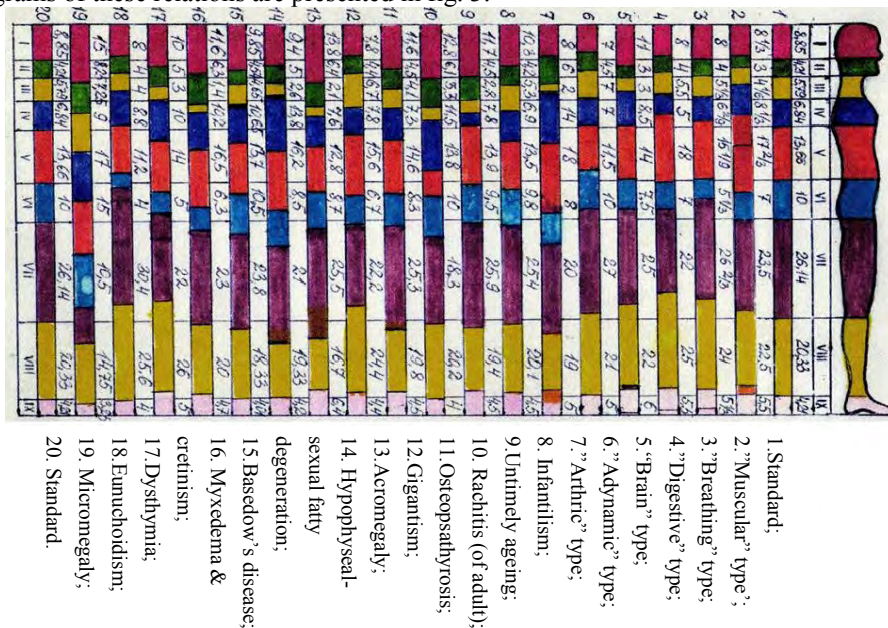


Fig.2. Anthropometric proportions with different types of endocrine relations in estimation of pre-nosological aptitude to different types of constitutional diseases.

Any morpho-functional transformations in organism are directly connected with their provision of current metabolism that, in its turn, substantially depends on architectonics of vascular system in every sector of body. In last decade a lot of works, paying special attention to researching of endothelial epithelium' function, has appeared. Dysfunction of endothelial epithelium is always accompanied by pathologic changes. It is explained in the light of up-to-date ideas that endothelium is not only a semipermeable membrane, which ensures nonwettability of vessels, but also it is an active endocrine organ, the largest in body and is dispersed over all tissues in diffuse manner [4].

With local disorder of blood circulation, caused by vessels' contraction and insufficient tonus of nonstriated muscles, which are located between inner and external elastic membranes, there happen changes of regeneration processes' activity and it breaches formation in appropriate parts of tissue [2].

The only mean, that can adapt nonstriated muscles to pressing influence of static strain of skeleton muscles, is purposeful control of this regime of influence. Practically any motion activity, provided by skeleton muscles, is fulfilled against the background of static strain of muscles, which keep working posture, required for realization of appropriate motion's kinematics with demanded dynamic forces, connected with its fulfillment. Static component of this motion is the most significant factor of tiredness, and it is very important to consider, dealing with children [3].

On the base of these assumptions in arsenal of kinesio-therapeutic methods there appeared technical means of "pressing-vacuum" therapy. Duration and force of such influence are selected empirically on the base of intuitional understanding of the influence's effect. Introduction of objective evaluations of "pressing-vacuum" therapy's influence, or kinesio-therapy of static forces would be the base of successfulness of their application, as means of directed rehabilitation process or as means for prevention of pathologic changes, which could result in idiopathic scoliosis. As differentiated mean of purposeful influence, which is used with improvement of respiratory muscles and formation of torso, breathing in closed space with regulated content of gas mixture and baro-complexes are widely used. Combined influence of "pressing-vacuum" therapy and baro-complexes with regulated content of gas mixture is the most perspective mean of kinesiology for prevention and rehabilitation of scoliosis of 1st and 2nd degree.

Summary

1. Results of screening researches of prevalence and heaviness of scoliotic abnormalities of backbone point at the fact that this pathology is available in any population and do not depend on race or geographic position.

2. Constant character of this pathology's manifestation within 0.5%-3% from all scope of examinations witnesses that these morphological abnormalities in the structure of population's development are in three-sigma zone of deviations from mean statistic characteristic of functional fluctuations, which appear in the period of growing.

3. Deviation of backbone in total length of body from the standard of growth development and share part of every its sector in its total length is a substantial diagnostic factor, which determines scoliotic pathologies in backbone structure.

4. For ensuring of in time diagnostics and organization of correcting prevention measures, oriented on prevention from idiopathic scoliosis as well as from other aptitudes to constitutional diseases, it is necessary to carry out systemic monitoring of physical development, physical level and physical conditions of the controlled contingent. This direction of researches is stipulated by topics of scientific researches of academy in compliance with subject No.0113U001206 of combined plan of scientific & research works in the field of physical education and sports of Ministry of education, youth and sports of Ukraine for 2011-2015, in realization of which department of sports medicine and physical rehabilitation participates.

Further prospects of the research imply more profound study of reasons of children's scoliotic pathologies' origin.

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