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Modern going near setting of medical physical culture taking into account etiology, type, form, degree and clinical displays of scoliotic illness for children

Abstract. Authors in the article are consider the basic going near setting of medical physical culture at scoliotic illness of I–II degree for children taking into account a type, form, etiology, degree and clinical displays. **Purpose:** to describe the modern going near setting of medical physical culture taking into account etiology, type, form, degree and clinical displays of scoliotic illness for children. **Material and Methods:** analysis of the modern special literature on issue of physical rehabilitation of children at scoliotic illness; analysis of medical cards. **Results:** description of scoliosis is given on an etiologic sign, form, type, degrees and clinical displays. The features of methods of medical physical culture are presented taking into account the afore-named signs of scoliotic illness. **Conclusions:** setting of facilities and forms of medical physical culture at scoliotic illness depends on etiology, form and type of scoliosis, degree and clinical displays of disease.

Keywords: scoliosis; facilities; forms and methods of medical physical culture; correcting exercises.

Introduction. Scoliosis – is the most frequent orthopedic disease and in most cases has a good-quality current, stopping in the development on deformation of a backbone of I and II degrees. At the same time the development of deformation goes so promptly and uncontrollably at the progressing disease forms that it isn't possible to stop this process neither by an application of remedial gymnastics, nor a long carrying of a corset, and even an expeditious fixing of a backbone – spondylosyndesis [1].

Scoliosis – is a resistant side curvature of a spine column, developing mainly at girls at the age from 1 year till 15 years and causing considerable pathological changes in internals and other departments (segments) of the musculoskeletal device [5; 14]. Scoliosis doesn't leave any of systems of an organism without the influence.

All types of the side curvature of a backbone can be characterized as follows:

- the functional side curvature of a backbone relating to a vicious bearing;
- the fixed side curvature (contracture) of a backbone in the frontal plane without torsion and deformation of vertebrae (sciatic scoliosis, functional scoliosis, pre-scoliosis);
- scoliosis (kyphoscoliosis) – the fixed side curvature of a backbone in three planes with torsion and deformation of vertebrae of a different etiology.

Scoliosis is quite often considered only as an orthopedic disease and is reduced to deformation of a backbone in the frontal plane. In this regard efforts of experts go generally for the correction of an arch of a curvature and, in much smaller degree, – for the elimination of the accompanying violations of functions of internals at its treatment. Meanwhile these violations are just the main reason of disability, the reduced working capacity and the reduced resilience of sick children to an infection and catarrhal factors, the reason of premature lethal outcomes [3].

The treatment of scoliosis (scoliotic illness) – is a difficult and long process [4; 7; 10]. Conservative and quick methods are the main methods of treatment [12; 13; 26]. Physical rehabilitation of this contingent of patients also belongs to conservative methods of treatment which is applied and after an expeditious treatment to restoration of the broken functions of an organism of a sick child as owing to surgery, and the disease [23; 28].

Approaches to a purpose of various combinations of means of physical rehabilitation aren't unambiguous. One authors place the main emphasis on the medical physical culture (MPC) with an application of various corrective exercises in combination with massage [6; 20; 21]. Others take medical swimming as a basis [9; 6; 18; 22]. The third offer a combination of all these influences in a complex with physical therapy, diet-therapy, reflex-therapy, psychotherapy etc. [11; 15; 19; 25].

The positive experience of offices of MPC, specialized boarding schools testify to a need of the differentiated simultaneous influence by funds of medical physical culture for an organism of sick children with coverage of all main physiological functions taking into account an etiology, a type, a form, a degree and clinical manifestations of scoliotic illness.

Communication of the research with scientific programs, plans, subjects. The problem is developed according to the priority direction determined by the Law of Ukraine "About the priority directions of development of science and equipment" by a number 3.5 "Sciences about life, new technology prevention and treatments of the most widespread diseases" within the priority thematic direction 3.5.29 "Creations of standards, and technologies of introduction of a healthy lifestyle, technology of improvement of quality and safety of food" on the topic "Traditional and nonconventional methods of physical rehabilitation at diseases of different systems of an organism and damages of the musculoskeletal device at persons of different degree of fitness". Number of the state registration – is 0111U000194.

The objective of the research: to characterize modern approaches to a purpose of medical physical culture taking into account an etiology, a type, a form, a degree and clinical manifestations of scoliotic illness at children.

Research problems:

1. To analyze and generalize modern special literature on a problem of recovery treatment at scoliotic illness for systematization of the existing views of a role of medical physical culture at this pathology.
2. To make complexes of rational combinations of means of MPC taking into account an etiology, a type and a form of scoliosis, and also a degree and clinical manifestations of scoliotic illness for use in the conditions of the specialized boarding school.

Material and methods of the research: the analysis of modern special literature on a problem of physical rehabilitation of children at scoliotic illness; analysis of medical records.

Results of researches and their discussion. Scoliotic illness in modern understanding – is not the simply side curvature of a backbone, but the general disease involving all major systems of an organism in the pathological process. It is a difficult poly-etiological illness which reasons of the development aren't always clear. Numerous clinical, biochemical, physiological and radiological data convince that anomalies of the development of vertebrae and ribs, neuromuscular, metabolic violations and hereditary factors have the greatest value in the development of scoliotic deformation of a backbone. A division of scoliosis into groups on an etiology is presented in tab. 1.

Table 1

Division of scoliosis into groups (on J. Cobb [29])

I group	Myopathic scoliosis in which cornerstone weakness of the muscular-copular device is; it is scoliosis, for example, which developed because of rickets which causes dystrophic changes, both in a bone tissue of a skeleton, and in soft tissues.
II group	Neurogenic scoliosis caused by diseases of the central and peripheral nervous system (poliomyelitis, spastic paralysis, syringomyelia, radiculitis, lumbar ischialgia etc.)
III group	Dysplastic scoliosis which arose because of congenital anomalies of the development of vertebrae and ribs.
IV group	Scoliosis which is developing because of thorax diseases (pleural empyema, postburn hems etc.).
V group	Scoliosis of not clear etiology (idiopathic).

Neurodysplastic and idiopathic scoliosis meet most often at children. The last are found at 24,4–48% of patients, according to various authors [1; 2].

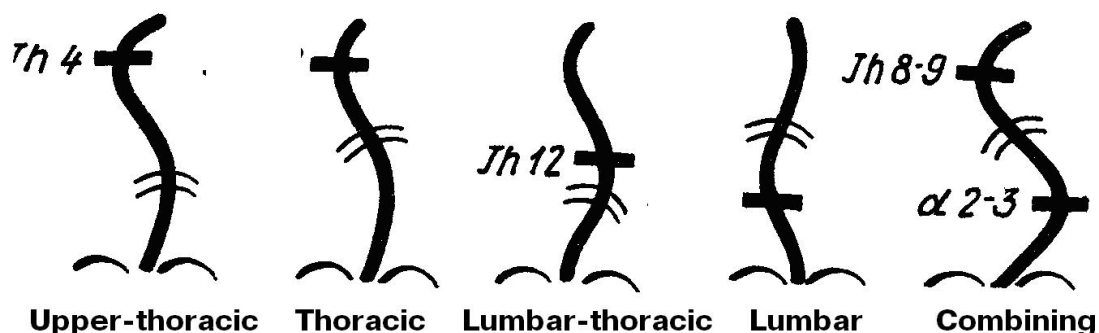
The pelvis curvature is noted, the mediastinum deposes, the position of heart changes, the vital capacity of lungs decreases, functions of cardiovascular and respiratory systems etc. are broken due to the curvature of a spine column and deformation of a thorax. Considering such prevalence, now it is accepted to call this pathological process as scoliotic or scoliosis illness [17].

The variety of forms of deformation of a backbone is characteristic for scoliosis. It often depends on a scoliosis etiology. The form of deformation can undergo known changes in the process of its development. All variety of forms of scoliosis can be reduced to the following:

- initially compensated S-shaped scoliosis;
- initially dorsal right-hand scoliosis with a deviation of a trunk and a secondary compensatory dorsal-lumbar anti-curvature;
- S-shaped dorsal-lumbar or lumbar curvatures with a trunk deviation;
- primary dorsal-cervical scoliosis;
- atypical forms of scoliosis.

The variety of forms of deformation created the representation that each patient with scoliosis has only his and an inherent form of scoliosis to him. Therefore the biggest stride forward in studying of scoliosis was allocation like the scoliosis determined by localization of the top of a curvature. It is necessary to notice that a type of scoliosis and a form of deformation are quite often confused. Meanwhile the scoliosis type doesn't change in the development while the form of a curvature can change. The importance of allocation of types of scoliosis is explained by that the type of a disease defines destiny of a patient and a method of treatment of a patient.

Several types of scoliosis are distinguished: cervical, cervical-thoracic, thoracic, lumbar-thoracic, lumbar, total, lumbar-sacral, S-shaped etc. (pic. 1).



Pic. 1. Types of scoliosis

The severity of scoliosis is defined depending on a curvature arch size in degree and twisting of vertebrae (torsion). There is a set of its clinic-radiological classifications, but the classification of V. D. Chaklin is the most widespread now [27] (tab. 2).

Table 2

The characteristic of degrees of scoliosis (according to V. D. Chaklin [27])

Degree of scoliosis	Characteristic
I degree	The almost inaudible curvature of a backbone in the frontal plane which is seen in a vertical position of a patient and which isn't disappearing completely in a horizontal situation. Asymmetry of muscles at the level of a primary arch which is more noticeable in the provision of an inclination of a patient is characteristic, and the muscular roller is formed in the lumbar department. Easy unstable asymmetry of shoulder girdle and shovels at chest localization of an arch and asymmetry of the line and triangles of a waist at a lumbar curvature. Signs of the torsion coinciding with the direction of clinically defined arch are outlined on the roentgenogram which is made in a prone position (contrary to "not physiological bearing"). An angle of scoliosis arch is in limits 5–10°.
II degree	The side curvature of a backbone is clearly noticeable, a costal hump is planned, and deformation is partially fixed and completely doesn't improve at pulling up of a patient. There are symptoms of structural scoliosis in the form of a clear expressed torsion and sometimes wedge-shaped deformation of vertebrae at the top of primary arch of scoliosis on the roentgenogram. The curvature edge makes 11–30°, determined by the roentgenogram which is made in a prone position. Early signs of a compensatory arch are outlined. This group of scoliosis demands special attention from the doctor and the methodologist of MPC.
III degree	As a rule, a deviation of a trunk towards the main arch is followed by a bigger or smaller degree, scoliotic deformation of a backbone is fixed and a correction is given in slightly. A costal hump height (in an axial projection) till 3 sm. At patients with the III degree of scoliosis the cardiovascular insufficiency which is shown the increase of pulse and breath at the slightest increase in loading already clinically comes to light (squatting, run, rise on a ladder). A curvature angle from 31 till 60°.
IV degree	It is characterized by sharply expressed fixed kyphoscoliosis with a considerable deviation of a trunk aside, by omission of costal arches before contact with crests of the iliac bones and even their immersion in a pelvis cavity. Compensatory arches and expressed lumbar lordosis have the fixed character. Patients note sometimes a backbone pain. Violations from heart and lungs are considerably expressed which are already irreversible. A curvature angle 61–90°.

Note. The special group is made by scoliosis which is complicated by neurologic frustration with clinical symptomatology. Allocation of the V degree to which some authors carry the complicated scoliosis, is inexpedient as complications depend on not a curvature degree, how many on a scoliosis etiology, neurodysplastic, neurogenetic and other factors.

The main symptom at scoliotic illness is scoliosis or kyphoscoliosis deformation of a spine column. The etiology of an illness is specified on the basis of data of the anamnesis, and also results of clinical and radiological researches. Usually patients complain of a deformation of a spine column, fast fatigue, weakness of back muscles, asymmetry of standing of shoulder girdle, shovels, etc. Symptoms are expressed more strongly at easy degree of scoliosis by the evening. In the morning when muscles have a rest, deformation corrects and disappears. Shoulders and a shovel on the convex party of chest scoliosis settle down above, than on the concave. On the part of camber the space between a side surface of a body and the lowered hand (a waist triangle) will be smaller, than on the part of concavity.

Torsion of vertebrae round a vertical axis is determined by the existence of a costal hump and a deviation towards spinal and cross shoots that is established clinically, and also at radiological inspection. At survey of such patients, especially with application of a plumb, it is paid attention to a curvature of a spine column, a distortion of a pelvis and deformation of a thorax. At early stages of the development of process, especially at the acquired scoliosis, a deformation is hardly noticeable. With the progressing of the process the curvature of a spine column gains more resistant character. At a trunk inclination forward, and also at a pandiculation for the head up deformation isn't eliminated or eliminated partially. A mobility of a spine column is considerably reduced.

Literary data testify that some violations of functions of respiratory and cardiovascular systems can already appear at initial extents of side deformation of a backbone [3; 17].

The treatment of scoliotic deformation – is difficult and far yet not solved orthopedics problem [15; 24; 28]. Possibility

of progressing of a deformation during the entire period of growth and development of a backbone demands a various approach to treatment depending on age, the revealed curvature and extent of its progressing. Now the conservative method of treatment occupies a prominent place in rehabilitation of patients with scoliosis which is understood as a complex medical, orthopedic, pedagogical, psychological and social order [26].

The essential value in this complex is played by medical physical culture, massage, methods of passive correction, orthopedic supporting corsets (at scoliosis of the II degree), physiotherapeutic procedures and vitamin therapy [15; 17].

From all aforesaid it is possible to define the purposes pursued at a conservative method of treatment of scoliosis: to stop the process of the development; to reach the possible correction and distortion; to consolidate the received results of a treatment.

Medical physical culture (MPC) is still the basic and the most effective link in conservative treatment of scoliosis [6; 18].

Clinic-physiological justification of application of MPC is a close connection of conditions of formation and development of the bone and copular device of a spine column with a functional condition of an organism. Physical exercises by means of the neurohumoral mechanism of regulation of functions in an organism have the all-stimulating and all-toning effect on a patient's organism, improve exchange processes and trophism of muscles of a back and spine column and by that create conditions for the stabilization and correction of the pathological process [15].

MPC can differ a little depending on degree of scoliosis. So, for example, MPC on loading is a little more saturated physical exercises at scoliotic illness of the I degree, than at scoliotic illness of the II degree, but the principles remain the same: this unity of the general and special impacts on a patient's organism, systematicity and regularity of carrying out classes of MPC, gradualness of increase of loading, complication of tasks and requirements to an organism of sick children, individualization of medical impact on their organism [18].

MPC is long and systematic impact on a child's organism by application of the all-strengthening and special exercises directed on recovery of the correct provision of a body that further can promote in some cases the necessary morphological changes in a skeleton. The main link in MPC is reorganization in the necessary direction of functional ratios in the neuromuscular device.

The main objectives of MPC which are defining a selection of physical exercises and a technique of their application are:

- creation of favorable physiological conditions for recovery of the correct provision of a body;
- stabilization of scoliotic process and correction of the available defects;
- education and fixing of a correct posture;
- normalization of functionality of the most important systems of an organism - respiratory, cardiovascular and others;
- increase of nonspecific protective forces of an organism.

Various forms and means of MPC are used for the solution of the above-mentioned tasks [6; 13; 20].

The fixed assets of MPC are specially organized physical exercises which are usually grouped in complexes which are carried out with music [25; 27].

The main objective of the physical exercises called corrective (symmetric, asymmetric, distortion), consists in that by regular training of muscles on the program providing continuous building of their main characteristics – force, endurance and working capacity, to reach their such development which would allow them to resist effectively to progressing of a deformation and even to its return development. The last is almost achievable only at early stages of its development.

Specially organized physical exercises which are used at scoliotic illness can be systematized as follows:

- exercises for education and training of the general and selective power endurance;
- exercises for increase or reduction of mobility of a backbone;
- exercises for education of the general coordination of movements;
- exercises for education and fixing of a correct posture;
- exercises for education of skills of a correct breath.

The forms of MPC are rather various, and their choice and combinations are made taking into account character of a disease, fortune of an organism of a patient and his age. The MPC main forms are morning hygienic exercises, outdoor games, elements of some sports and exercises, except remedial gymnastics, for the children of a preschool and school age having scoliosis, [23].

There are features of application of means of medical physical culture at various etiological forms of scoliosis.

So, the purpose of recovery treatment as A. F. Kaptelin [9] specifies, is not correction of a curvature, but increase of resistance of a backbone to static loading, maintenance of mutual steadiness between curvature, improvement of the general state and physical development *at congenital scoliosis*. The exercises conducting to increase of mobility of a backbone, asymmetric corrective exercises in crawling are contraindicated, in his opinion. Distortion movements have to be applied carefully and at dysplastic scoliosis [18]. The intensive extending exercises are excluded at congenital deformations. Only the extending exercises which are carried out in situation are admissible, lying. The volume of movements by a trunk in the course of treatment has to be limited, rate of these movements – slow, and tension of muscles is rather big. The all-strengthening, breathing exercises and exercises improving a bearing and strengthening muscles of a stomach and a back are used. The all-strengthening exercises are carried out in provisions, lying and on all fours. It is possible to use additional burdenings by dumbbells and resistance (expander) for the increase in tension of muscles.

Strengthening of muscles of a back and stomach is reached due to the movements by extremities. The exercises expanding a thorax have a symmetric character. Possibilities of a wide use are a little limited at scoliosis of a congenital etiology of elements of sport.

The application of means of MPC, as marks out L. V. Dyachenko [8], is defined by features of damage of muscles at

paralytic scoliosis of the I degree. The local symmetric or asymmetric exercises for muscles of a stomach and muscles of the lower extremities, passive exercises, the active movements with the help, active exercises with overcoming of gravity or resistance are used at damage of muscles of a stomach, one or two lower extremities. Besides, the static and dynamic breathing exercises, exercises improving coordination (without subjects, with subjects, on shells) and exercises in walking are applied. Outdoor games on a place and with movement, skis, elements of volleyball, table tennis, badminton, swimming, etc play here also a positive role.

L. V. Dyachenko [8] recommends symmetric and asymmetric exercises for muscles of a trunk and the lower extremities, exercises in walking – in the orthopedic device, a corset with a cane, with crutches *at scoliosis of the I degree which is connected with damage of muscles of a trunk and one or two extremities*. Together with these exercises sick children carry out also all above-mentioned exercises, without focusing attention to exercises for stomach muscles.

Symmetric and asymmetric exercises for hands are added *at scoliosis of the I degree arising because of incomplete paralysis of muscles of a trunk, the top and lower extremities*. Only games on a place and inactive games, and also swimming with the facilitating adaptations remain from elements of sport.

Features of MPC at scoliosis which aren't connected with changes of congenital and paralytic character were stated above.

There are a number of differences in application of physical exercises at various degree of a curvature of a backbone. For example, corrective, distortion exercises and exercises on extension of muscles of the concave party and reduction of muscles of the convex party are applied *at scoliosis of the II degree, unlike scoliosis of the I degree*. The technique of remedial gymnastics becomes more differentiated [18].

The nature of impact on a backbone of sick children by physical exercises depends also on type of scoliosis, localization and the direction of a curvature.

The corrective influences by the corresponding exercises are directed on the chest department of a backbone (a hand pulling from the concave party of a curvature, trunk inclinations with a hand anti-emphasis, walking on skis with shortening of one stick, etc.) *at chest scoliosis*.

The pelvis settles down in the slanting direction with its omission on the party of camber *at lumbar scoliosis*. A number of the special corrective exercises which are at the same time strengthening muscles are applied to its correction: "swallow", "attack", "stork", turns on skis through a foot to the right or to the left and others.

The exercises directed on the correction of arches of a curvature in chest and lumbar departments are combined at the same time *at the combined (S-shaped) scoliosis*. Swimming on one side, asymmetric breast-stroke and crawl were successfully applied at this type of deformation of G. G. Petrenko [22].

The opposite corrective movements in the direction a trunk and extremities take place *at right-hand and left-side scoliosis*.

The age of patients has a meaning for the correct use of physical exercises in treatment of children with initial degrees of scoliosis. Not progressing scoliosis of I and II degrees (especially of the I degree) are give in to correction most successfully if a complex conservative treatment with emphasis on MPC and elements of sport begins at early age and the long time with short breaks between courses of treatment proceeds.

The frequent performance of the all-developing and corrective exercises in house conditions, the strict accounting of individual growth rates and development of a child, the long visiting an office of MPC, etc. is important for receiving a lasting effect.

The technique of purpose of means of MPC also depends on extent of deformation of a backbone. The following tasks are generally resolved at scoliosis *installation and scoliosis of the I degree* at children: the creation of the general favorable physiological conditions for recovery of the correct provision of a body and the education and fixing of a correct posture by application of symmetric exercises. First of all that is the most important, it is necessary to study and bring correction in a habitual wrong statics of children carefully. The following habitual wrong provisions are observed:

- Standing: a) on one foot, another is bent; b) on both feet, but one is loaded more; c) with turn of a pelvis.
- Sitting: a) with asymmetric position of shoulders by the letter; b) with a bigger support on one half of a pelvis, shifting a trunk in the same party; c) at school for several years in the same side column, turning to the teacher and a board in the same party or on the school desk which isn't corresponding to growth.
- Lying: a) during a dream situation on one side; b) reading, lying on one side.
- Walking – a continuous carrying of a portfolio in the same hand.

It is necessary to fix attention of children and parents to all these as if the trifles having actually very essential value.

Only in that case when scoliosis of the I degree persistently doesn't give in to correction, special preparation by training of selective power endurance of muscles with application of asymmetric exercises is required. 1–2 asymmetric exercises with careful control are given for limited time.

Much attention is paid to special exercises for the purpose of correction of the available shortcomings and fixing of a correct posture *at scoliosis of the II degree* at children. Besides physical exercises auxiliary orthopedic actions are widely applied here: extension, corset, helmets etc. Special preparation for proper correlations in the provision of separate parts of a body is directed: a) on achievement of normal mobility of a backbone and b) on training of selective power endurance of muscles with application of asymmetric exercises.

Conclusions:

1. Scoliotic in modern understanding – is not simply a side curvature of a backbone, but the general disease involving all major systems of an organism in the pathological process. It is a difficult polyetiological illness which reasons of the development aren't always clear. Neurodysplastic and idiopathic scoliosis meet most often at children. The last are found in 24,4–48% of patients. Dysplastic scoliosis proceeds heavier, than idiopathic does. The forecast of scoliosis depends on the age of a child at whom the disease developed.

2. The conservative method of treatment which is understood as a complex of a medical, orthopedic, pedagogical, psychological and social order figures prominently now in rehabilitation of patients with scoliosis. The essential meaning in this complex is played by MPC, massage, methods of passive correction, orthopedic supporting corsets (at scoliosis of the II degree), physiotherapeutic and tempering procedures, vitamin therapy.

3. Cures of MPC for scoliotic illness are: exercises for the education and training of the general and selective power endurance, for the increase or reduction of mobility of a backbone, for the education of the general coordination of movements and fixing of a correct posture, skills of a correct breath; supportive orthopedic applications; the elements of sports tempering procedures. Special physical exercises (corrective) at scoliosis share on symmetric, asymmetric, distortion. The main forms of MPC at this pathology, except remedial gymnastics, are morning hygienic exercises, outdoor games, some sports and exercises, medical swimming.

4. The purpose of cure and forms of MPC for scoliotic illness depends on an etiology, a form and type of scoliosis, a degree and clinical manifestations of a disease, age of patients.

Prospects of further researches lie in the creation of the program of physical rehabilitation for children of middle school age with II– III degrees of a scoliotic illness for use in the rehabilitation center, and also in the conditions of a specialized boarding school.

References:

1. Abalmasova Ye. A., Luzina Ye. V. *Lecheniye vrozhdennykh i displasticheskikh deformatsiy oporno-dvigatel'nogo apparata u detey i podrostkov* [Treatment of congenital and dysplastic deformities of the musculoskeletal system in children and adolescents], Tashkent, 1979, 242 p. (rus)
2. Avramenko O. M., Peshkova O. V. *Visnik Ukrain'skoi medichnoi stomatologichnoi akademii «Aktualni problemi suchasnoi meditsini»* [Bulletin of the Ukrainian Academy of Medical Dental «Actual Problems of Modern Medicine»], Poltava, 2006, T. 6, Vol. 3 (15), p. 76–80. (ukr)
3. Avtandilov A. G. *Vestnik travmatologii i ortopedii im. N.N. Priorova* [Journal of Traumatology and Orthopedics N.N. Priorov], 2003, vol. 1, p. 21–23. (rus)
4. Aksonova L. V. *Likuvannya khvorob khrebt i suglobov* [Treatment of diseases of the spine and joints], Donetsk, 2009, 384 p. (ukr)
5. Bikovshchenko A. V., Kobivnikov V. S. *Do pitannya likuvannya skoliozu* [On the issue of treatment of scoliosis], Kiiv, 1994, p. 352–354. (ukr)
6. Yepifanov V. A. *Lechebnaya fizicheskaya kultura* [Healing Fitness], Moscow, 2002, p. 305–316. (rus)
7. Zhadenov M. I. *Lecheniye skolioticheskoy bolezni u detey i podrostkov* [Treatment of scoliosis in children and adolescents], L., 1980, 142 p. (rus)
8. Dyachenko L. V. *Sostoyaniye oporno-dvigatel'nogo apparata i lechebnaya fizicheskaya kultura pri paraliticheskikh skoliozakh u detey* : avtoref. kand. diss. [Status of the musculoskeletal system and therapeutic physical culture in paralytic scoliosis in children : PhD thesis], L., 1971, 21 p. (rus)
9. Kaptelin A. F. *Gidrokinetoterapiya v ortopedii i travmatologii* [Hydrocolonotherapy in Orthopedics and Traumatology], Moscow, 1986, p. 46–112, 122–126. (rus)
10. Mgoyam G. I., Gasparyan S. P., Moidlyan N. G., Sarkisyan O. A. *Nash doslid likuvannya skoliotichnoi khvorobi* [Our research scoliotic disease treatment], Kiiv, 1994, p. 377–379. (ukr)
11. Melnik N. G., Peshkova O. V. *Sposib fizichnoi reabilitatsii ditey z pershim stupenem skoliozu 20021210464 / Deklaratsiynyi patent na vinakhid vol. (11) 59841 A(51) 7 A01N1/00. Ministerstvo Osviti i nauki Ukraini, Derzhavnyi departament intelektualnoi vlasnosti, Byul. vol. 9, 15.09.2003* [The method of physical rehabilitation of children with first degree scoliosis 20021210464 / Patent for invention number (11) 59841 A(51) A01N1 7/00. Ministry of Education and Science of Ukraine, State Department of Intellectual Property]. (ukr)
12. Mishchenko N. I., Marasich G. Ya. *Aktualnyye voprosy lechebno-profilakticheskoy, diagnosticheskoy i uchebno-vospitatel'noy raboty* [Topical issues of medical and preventive, diagnostic and educational work], Odessa, 1991, p. 134. (rus)
13. Mikhaylovskiy M. V., Novikov V. V., Vasyura A. S. *Vestnik travmatologii i ortopedii im. N. N. Priorova* [Journal of Traumatology and Orthopedics N. Priorov], 2003, vol. 1, p. 3–10. (rus)
14. Movshovich I. A., Rits I. A. *Rentgenodiagnostika i printsipy lecheniya skolioza* [X-ray diagnosis and principles of treatment of scoliosis], Moscow, 1969, 391 p. (rus)
15. Mukhin V. M. *Fizichna reabilitatsiya* [Physical rehabilitation], Kiiv, 2009, p. 335–341. (ukr)
16. Bulgakova N. Zh., Morozov S. N., Popov O. I. *Ozdorovitel'noye lechebnoye i adaptivnoye plavaniye* [Revitalizing therapeutic and adaptive swimming], Moscow, 2005, 432 p. (rus)
17. Peshkova A. P. *Sostoyaniye dykhatel'noy i serdechno-sosudistoy sistem u detey s nachal'nymi stepenyami skolioticheskoy bolezni v svyazi s zadachami lechebnoy fizkultury* : avtoref. kand. diss. [Condition of the respiratory and cardiovascular systems in children with initial degree of scoliosis in connection with problems of physiotherapy : PhD thesis], Omsk, 1975, 22 p. (rus)
18. Peshkova A. P. *Lechebnaya fizicheskaya kultura pri nachal'nykh stepenyakh skolioticheskoy bolezni* [Therapeutic physical culture in the initial degree of scoliosis], Omsk, 1977, 74 p. (rus)
19. Peshkova O. V., Zhavad Yel Khamdaniya Slobzhans'kij nauk.-sport. visn. [Slobzhanskyi science and sport bulletin], Kharkiv, 2004, Vol. 7, p. 172–175. (rus)
20. Peshkova O. V., Zhavad Yel Khamdaniya *Materialy I Mezhdunarodnoy nauchno-prakticheskoy konferentsii «Aktualnyye problemy fizicheskoy reabilitatsii i adaptivnoy fizicheskoy kultury dlya raznykh sloyev naseleniya»* [Proceedings of the II International scientific and practical conference «Actual problems of physical rehabilitation and adaptive physical training for different sectors of the population»], Kharkov, 2004, p. 17–24. (rus)
21. Peshkova O. V., Avramenko O. M., Imad Berni *Tezisy dokladov III mezhdunarodnogo studencheskogo foruma «Obrazovaniye, nauka, proizvodstvo»* [Abstracts of III International Student Forum «Education, science and production»], Belgorod, 2006. (rus)
22. Polesya G. V., Petrenko G. G. *Lechebnoye plavaniye pri narushenii osanki i skolioze u detey* [Therapeutic swimming in violation of posture and scoliosis in children], Kiyev : Zdorov'ya, 1980, 113 p. (rus)
23. Potapchuk A. A., Didur M. D. *Osanka i fizicheskoye razvitiye detey* [Posture and physical development of children], SPb., 2001, 166 p. (rus)
24. Radcheiko V. A., Korzh N. A. *Praktikum po stabilizatsii grudnogo i poyasnichnogo otdelov pozvonochnika* [Workshop to stabilize the thoracic and lumbar spine], Kharkiv, 2004, 158 p. (rus)
25. Gross N. A. *Fizicheskaya reabilitatsiya detey s narusheniyami funktsiy oporno-dvigatel'nogo apparata* [Physical rehabilitation of children with disorders of the locomotor apparatus], Moscow, 2000, 224 p. (rus)
26. Fishchenko V. Ya., Uleshchenko V. A., Vovk N. N. *Konservativnoye lecheniye skolioza* [Conservative treatment of scoliosis], Kiyev, 1994, 188 p. (rus)
27. Chaklin V. D., Abalmasova Ye. A. *Skoliozy i kifozy* [Scoliosis and kyphosis], Moscow, 1973, p. 8–16, 44–152. (rus)
28. Shapkova L. V. *Chastnyye metodiki adaptivnoy fizicheskoy kultury* [Private method of adaptive physical training], Moscow, 2003,

464 p. (rus)

29. Cobb J. The problem of the primary curve / Cobb. J. // *J. Bone Jt. Surg.* – 1960. – Vol. 42–A. – P. 1413–1425.

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