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PHYSICAL EDUCATION MEANS USED IN PRESCHOOL CHILDREN SPINE DISORDERS PROPHYLAXIS

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CONTENT

CONCEPTUAL LANDMARKS OF RESEARCH

The topicality and importance of the approached problem. The situation created in the physical education system of preschool children dictates the need to seek and apply modern methods and means, with low difficulty, but very effective, which contribute to the timely development of physical and psychomotor abilities in order to strengthen health and the accumulation of their motor experience.

However, practice shows that a large number of preschool children face various problems related to the musculoskeletal system, more specifically the condition of the spine, which is the mainstay of the human body. The age of 6-7 years is one where the skeleton of the human body is growing, and specialists in the field of physical education and sports must take into account a number of physiological and anatomical laws specific to that age.

Specialists in the field [1, 2, 10, 11, 13, 17] come with a series of recommendations in this regard, but these, in most cases, are medical, ie the application of various medical equipment and very rarely is based on the application of the means taken over in the field of physical education and sports [6, 14, 16, 19, 23, 24].

Unjustly in this case the role of physical exercises for the prophylaxis of diseases related to the spine of preschool children is diminished. It is this aspect, which is related to the prophylaxis of spinal deficiencies, that has been of particular interest to us in our research and which we consider quite current and absolutely necessary for the field of physical education of preschool children.

Description of the situation in the field of research and identification of research problems. In recent years, both in Romania [3, 8, 9, 13, 14, 18] and in other European countries [5, 22, 24, 26, 27], quite often it has been and is treated the issue of the training and physical development of children in preschool institutions. In this sense, the specialists come up with a series of organizational solutions, either in sports activities, which are mandatory in kindergartens, or in other forms of organizing physical education such as morning refreshments, active breaks, competitions with dynamic games etc.

At the same time, very little research is devoted to the study of musculoskeletal disorders, including the spine in preschool children. The need to study this problem stems from the fact that the results of several studies [1, 5, 11, 12, 16, 17, 19, 23, 25] have shown that there is an impressive number of children in the primary school, ie those who come from preschool institutions, with various difficulties of the human skeleton, and among these the most common are those of the spine. Among the most common difficulties of the spine are scoliosis, kyphosis and lordosis. Specialists [5, 6, 12,15, 19, 23, 25] propose in this regard, the widespread use of the means of physical education, ie physical exercises, for the prophylaxis and treatment as far as possible of these defects.

The vast majority of specialists [1, 2, 6, 10, 12, 16, 21, 26, 27] consider that these difficulties are easier to prevent than to be treated later, which can be quite difficult to do, and if this is done, it can only be done medically.

Starting from the confirmations of several authors made above, we can mention that at present there is no well-argued scientific methodology that would propose a way to prevent scoliotic diseases of the spine in preschool children, more specifically those of 6-7 years.

Research hypothesis. It was assumed that the predominant application of physical exercise complexes in different forms in the process of physical education of preschoolers, with a well-defined purpose, will contribute to:

- prophylaxis of spinal deficiencies,
- reducing spinal deficiencies,
- increasing the level of motor training,
- increasing the level of physical development,
- increasing the level of functional training.

The aim of the research is to investigate the effectiveness of applying the means of physical education in the prophylaxis of spinal deficiencies in preschool children.

Research objectives:

1. Analysis and generalization of the specialized literature on the problem of organizing physical education with preschool children.
2. Assessment of the level of motor training and physical development of children in preschool education at national level.
3. Research on the difficulties of the spine in preschool children.
4. Experimental argumentation of the efficiency of the application of physical exercise complexes on the reduction and prophylaxis of spinal deficiencies in preschool children.

The experimental basis is the sports buildings of kindergartens in Bucharest, Romania, as well as their equipment, materials, sports facilities.

The novelty and scientific originality of the research consists in the elaboration and theoretical and scientific substantiation of the experimental methodology for the application of physical exercise complexes in the prophylaxis of spinal deficiencies in preschool children. Such a methodology applied in practice will contribute to the optimization of the physical education process of preschool children, as well as to the optimization of their health, in this case with reference to the condition of the spine of children aged 6-7 years.

The theoretical significance is represented by the fact that complexes of physical exercises have been developed, as well as the methodology of their application for the prophylaxis of spinal deficiencies in preschool children in physical education activities. A system of complex exercises has been developed that can be successfully applied by the teacher in the process of physical education with preschool children.

The applicative value of the paper denotes the possibility of applying in practice the experimental methodology for the application of physical exercise

complexes for the prophylaxis of spinal deficiencies in preschool children in physical education. The proposed experimental methodology can be successfully applied both in physical education in preschools and by parents at home.

Main scientific results submitted for support:

1. The application of the means of physical education in the process of physical education of preschool children will have a positive impact on the state of health, on the condition of the skeleton of the bone, especially of the spine, in preschool children aged 6-7.

2. The level of development and the functional training, must be in accordance with the model of the preschool children.

3. The model of prophylaxis of spinal deficiencies must contain adequate means and methods for preschool children aged 6-7 years, based on their morpho-functional features.

4. The application of the experimental program in the process of physical education with preschool children aged 6-7 will positively influence the level of functional training, and consequently will ensure the prophylaxis of spinal deficiencies of children included in the pedagogical experiment.

Implementation of scientific results. The research results were implemented in the process of physical education with preschool children from several institutions in Bucharest, Pitești, Brașov, Galați, (Romania). They can be applied as a methodological guide for physical education teachers in preschool institutions, as well as by students of higher education institutions, who are to work in preschool institutions.

Framing the research results in practice. The experimental methodology proposed in the given research was approved and implemented in the training process in the discipline of "physical education" of children in preschool educational institutions in several institutions in Bucharest (Romania). Some of the research materials were presented in the form of articles and reported in a number of 12 papers. The results of the researches on this topic were communicated at various specialized domestic and international scientific sessions. During the research activity, scientific papers were published at the international scientific conferences in Chisinau (2017, 2018); as well as at scientific sessions organized by the Faculties of Physical Education and Sports from Galați (2017, 2018); Pitesti (2017); Brasov (2018).

Thesis structure and volume. The thesis includes: introduction, 3 chapters, conclusions, practical-methodical recommendations, bibliography, and annexes. The thesis volume contains 116 pages, of which 116 basic text, 10 tables, 22 drawings, 4 figures and 4 annexes. The bibliography consists of 186 sources; of which 164 in Romanian, and 58 in other foreign languages.

Keywords: preschool children, physical education, prophylaxis, deficiencies, spine, physical training, physical development, functional training.

THESIS CONTENT

1. Theoretical-methodical concepts regarding the organization of physical education with preschool children aged 6-7

Physical education is a priority part of education, which aims at the harmonious development of the human body, strengthening health and cultivating physical qualities necessary in daily life, the formation of motor skills and abilities characteristic of sports and intellectual activity. This is an important field of education, which has an influence on the body and which has the task of ensuring the necessary conditions to allow the timely maturation of natural functions and the optimal development of the human personality.

Thus, a good development of the child can be conceived only within favorable environmental and social conditions, which in their interrelation ensure an optimal physical and mental state and good ability to adapt to environmental conditions in continuous transformation, adaptation, conditioning the growth and development of the individual.

Specialists in the field [8,14, 20, 24, 26] claim that the contemporary is characterized by a very rapid technological development, which has diminished the share of physical effort in the activities of individuals, has led to the fact that people lead a lifestyle predominantly sedentary, which coupled with stress and excess nutrition leads to the biological and mental evolution of the human being. This leads us to the fact that physical education, from an early age, in addition to shaping the physical development of children, must train skills, develop knowledge and techniques of independent action on their own body, forming them gradually, absolutely necessary attitude and responsibility towards their own health and multilateral development.

The preschool period is described under different names, depending on the context in which it is analyzed. One thing is certain, that this age corresponds to the beginning of school, where children enter a new educational circuit. The specialized literature [5, 6, 18, 24, 27] refers to the specifics of this stage of development, but also to the aspects of adaptation to the new activities that the children will carry out.

In a social context, a transition from kindergarten to school should be ensured as stress-free as possible, this being considered as a transition from one group, where the play activity is dominant, to another group where the systemic learning activity predominates.

It is very important that preschool children be prepared for a new form of relationship than in pre-school institutions, as it is more focused on learning tasks. Thus, the evaluations and competitions between children establish other relationships than those in preschool institutions, like establishing hierarchies between them. At a young school age, relationships between children, such as hierarchy and status, are formed according to school results. The duration of adaptation after kindergarten for each child is different and depends on a number of aspects such as: the child's previous

educational experiences, family relationships, level of school performance, behavior, teacher performance, characteristics of the group of children and others.

In the vast majority of cases, the outward appearance of the person highlights relevant indications of their health. The normal attitude of the body in different actions, either static or dynamic, the usual and unusual positions, formed during the growth and development of the body, have a great significance for human health, both physically and aesthetically. There is a legitimacy when we say that the child's internal organs must be in the correct position for him to feel well. The normal development of the body begins with the first year of life, of course here the genetic factor persists. Finally, the normal physical development of any individual is determined by their motor regime [2, 4, 6, 9, 13, 14, 18, 22].

It should be mentioned that the most affected in this regard are children aged between 5 and 7 years, where, according to the literature [5, 6, 10, 16, 19, 23], various diseases of the skeleton appear and the most serious being scoliosis of different types.

In the literature [5, 6, 11, 17, 19, 23, 25] scoliosis, kyphoses and lordosis are disorders that represent certain pathological changes of the spine in different periods of life. The highest frequency of pathological deviations of the spine are recorded in children, which are estimated by specialists in a proportion of over 50% of the total number of children evaluated in different communities. However, in most cases, with age, they are devoid of pathological significance, and scoliotic attitudes are represented in a smaller number and represent about 2-3% of the total number of children examined.

Kyphoses represent [5, 11, 13, 19] certain deviations of the spine in the vertical plane through the curves of the spine, these being exaggerated, more pronounced (Fig.1.).

Fig. 1. Kyphoses

This type of kyphosis is expressed by the rather expressive curvature of the front spine, in the thoracic region, causing the so-called "hump", expressed by a strong curvature expressed before, being characteristic of the cervical and lumbar areas, while having the mission to maintain the static and dynamic balance of the spine.

Another type of deviation from the normal spine is Scoliosis [5, 11, 13, 19, 23, 25], which represents certain structural changes of the spine, primarily in the frontal plane. They are characterized by the rotation of the vertebrae vertically, rotations that involve both the vertebrae and the ribs, causing a hump on the covex side. The given position of the spine leads to a change in the position of the shoulders and shoulder blades, which naturally lead to the formation of a back with certain vertical changes (fig.2.).

Fig.2 Scoliosis

The next type related to the deviations of the spine with the previous connections, appeared by exaggerating the normal curves of the spine, are the so-called lordosis. Due to the increased tone of the psoas muscle and the weakening of the tone of the abdominal muscles, the pelvis is pushed forward, after which the lumbar curvature becomes very pronounced, as a consequence of those mentioned above (fig.3.).

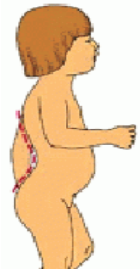

Fig. 3. Lordosis

As mentioned by medical specialists [7, 10, 11, 12, 13], most often, spinal deficiencies are accompanied by various changes in bone structures in the chest, including the ribs and shoulder blades, shoulders and muscle surfaces. When we focus on the deficiencies of the spine we actually refer to such disorders as scoliosis, kyphosis, lordosis, in some cases they are of the combined type - kyphoscoliosis, kypholordosis, and others.

In pedagogical practice there are also a number of ways of prophylaxis and treatment of the diseases mentioned above. For example, medical gymnastics treatment aims to stop the evolution of scoliosis, to correct the deviations of the spine and to maintain this correction, to reduce functional disorders and secondary asymmetries of the body.

Another way would be the systematic practice of physical exercise, both in the preschool and in the family, under the direct control of parents, having a well-defined program in this regard.

2. Research methodology. evaluation of the content of physical education at the level of preschoolers

The basic direction of the research was the study of the level of motor training, physical and functional development of children in preschool education. We were particularly interested in the problems related to the condition of their locomotor system and first of all of the spine, where according to the data of several specialists in the field [1, 5, 6, 11, 17, 23, 25], namely at this age, for several reasons, there are a number of problems related to the appearance of children.

Thus, in the first stage, observation and questionnaires were used among teachers and parents. This phase of the research allowed us to determine the degree of knowledge and use of exercise and dynamic games in the prophylaxis of spinal deficiencies in preschool children, as well as the opinions of teachers and parents, regarding the content of our research. A fact-finding experiment was undertaken to assess the level of somatic development, physical and functional training of preschool children in Romania, compared to the national scales for these indicators.

Also in this stage we selected a series of complex exercises and dynamic games for the prophylaxis of spinal deficiencies in preschool children. An experimental program was also implemented to implement these means in the process of training preschool children, both in kindergartens and at home.

The experimental groups from several kindergartens in Bucharest had as orientation materials for the training process the thematic planning made by us based on the application of complex exercises and dynamic games with special purpose (prophylaxis of spinal deficiencies). The final testing was performed at the end of the 2017-2018 school year. The volume of exercise complexes and dynamic games in sports activities was approximately 18'-20 '(65-70%) during them. Throughout the experiment, an academic hour of physical education with specialized content was organized daily, according to the experimental program. All the kindergartens involved in the pedagogical experiment have a sufficient material basis for organizing the training process in the discipline "physical education".

Early diagnosis and prophylaxis are the only methods to reduce the incidence of growth and developmental deficiencies. For this, the level of knowledge and awareness of the problems that may arise in the growth and development of children must be known and continuously improved.

For this, in our research we used the method of opinion poll and conducted a survey, using the questionnaire in Annex 1 of the thesis.

The survey involved 206 people, aged between 22-60 years and who can fall into the following categories: graduate of physical therapy, parent, educator, teacher of physical education in preschool education.

The purpose of this survey is to assess at national level, the level of knowledge and awareness of problems that may arise in the growth and development of children, among people who can influence in their interaction with children, the values of the parameters considered.

The questionnaire was distributed both in physical format, where possible (physiotherapy offices for children, kindergartens, parents), and online, on social platforms, in groups of common interest in the field of preschool education, pediatric physiotherapy, profile universities, etc.

The results of the survey showed that specialists in the field believe that:

- the level of physical education in Romania at the age of preschool children is low - 79.6%,
- preschools do not pay enough attention to sanitation - 90%,
- the skeletal system of children is most affected - 82.5%.
- from the skeletal system the most affected is the spine - 35%,
- most of the respondents do not know what are the diseases of the spine at that age - 81.6%,
- parents rarely or not at all check the condition of the spine in children - 84.0%,
- sports activities within preschool institutions can optimize the prophylaxis of the spine in preschoolers - 72.2%.

Physical education in preschool institutions, comes to solve a series of educational tasks [2, 8, 9, 14, 18, 27] this being organized in different forms characteristic of kindergartens, where the age peculiarities of the age will be constantly taken into account. them. The same authors claim that the maximum use of physical exercises organized in different forms will contribute to the harmonious physical development of children, as well as to the elimination of hypodynamics and their sedentary way of life.

Research conducted by several specialists [5, 6, 10, 11, 13, 16,19, 25] has shown that at the age of 6-7 there are many problems related to the spine of children, these are often referred to as its physical deficiencies.

That is why, in this context, we conducted a nationwide research experiment, where over 500 children aged 6 to 7 years were tested. In fact, we are interested in what is currently the level of physical development of children aged 6-7 years nationally, this could ultimately be a consequence of various diseases related to the human skeleton, primarily referring to to the spine, which at a given age is just beginning to take shape and take on a certain shape.

In the experiment, four factors were analyzed, according to us, the most important in children's development, these being the height, weight, strength of the right hand and the strength of the left hand. These data were collected in Bucharest (Romania) between September 2015 and May 2016, and the results were statistically processed and are presented in Table 1.

Table 1. The results of the physical development of children aged 6-7 at national level

No.	Parameters	Gender	National average	National standard	Difference, u.c.	Difference, %
1.	Height, cm	B	119,00	120	1,00	0,83
		G	118,32	120	1,68	0,98
2.	Weight, kg	B	22,29	21	1,29	1,06
		G	21,12	20	1,12	1,06
3.	Strength of the right hand, kg	B	6,16	8	1,84	0,77
		G	6,59	7	0,41	0,94
4.	Strength of the left hand, kg	B	5,94	7	1,06	0,85
		G	4,96	6	1,04	0,83
5.	Thoracic perimeter, cm	B	54,32	56	1,68	0,97
		G	53,23	55	1,77	0,96

In general, according to the data recorded in the physical development department, based on the results of the ascertaining experiment, it is very clear that they are not very varied and do not differ significantly from the national standards for age, both for boys and girls. Only an indicator related to body weight, the results of the contingent tested, prevails over the standards for that age. The other results are below the standards, but do not represent significant differences in this respect, ie it can be confirmed that children of a given age, boys and girls, have a normal level of development, and the recorded data can not be significantly improved through the application of means. from physical education. For example, body weight is the result of maintaining or not maintaining a balanced diet and of course the limited amount of time given to exercise.

Speaking of body height, this is an indicator that is totally related to the genetic predisposition of the body and cannot be too much influenced by applying different technical procedures, or using different means, even in the field of physical education and sports.

As a conclusion to this subchapter it should be noted that physical education teachers in preschool education will take into account the age peculiarities of preschool chi;;dren, in this case, aged 6-7 years, where they will not abuse the exercises of force. for boys and girls, instead, they will be able to use other means for the normal physical development of children and to prevent their body weight gain. Moreover, the age of 6-7 years is a very favorable age to improve several parameters of physical development such as body weight, chest circumference and others.

One of the particular tasks of our research was to highlight the level of motor training of 6-7 year old preschool children in the urban regions of Romania, mainly in Bucharest.

According to the curriculum for the discipline "physical education" in preschool education in the field of motor training, several indicators are stipulated. In order to assess the level of their motor training, we applied several tests that include all the motor aspect of the children, these are: push-ups (from the support position lying on the gym bench), abbs (lifting the torso from the face lying position), spine flexibility on the mattress, long jump from the spot, shuttle running 3x10 meters.

Over two thousand children, boys and girls, aged between 6 and 7, were subjected to these tests. The results were statistically processed and are represented in the table below and in the form of figures for each test. In addition, in order to be able to draw some conclusions about the assessment of the level of motor training of children aged 6-7 in Romania, all results were compared with national standards at all parameters for this age. All results were statistically processed and are presented in Table 2.

Tabelul 2. The level of motor training of children aged 6-7

No	Test	Gender	National average X±m	National standard	Difference, u.c.	Difference, %
1.	Push-ups, no, rep	B	6,55±0,11	8	1,45	81,88
		G	3,37±0,12	8	4,63	42,13
2.	Abbs, no. rep.	B	10,22±0,17	15	4,78	68,13
		G	9,22±0,11	15	7,78	61,47
3.	Spine flexibility, cm	B	0,29±0,04	+5	4,71	5,8
		G	0,82±0,12	+5	4,18	16,4
4.	Long jump , cm	B	96,01±0,04	140	43,99	68,58
		G	101,27±0,69	130	28,73	77,90
5.	Shuttle running 3x10 m, s	B	10,11±0,06	9,4	0,71	83,18
		G	11,03±0,05	9,6	1,43	87,04

Analyzing the results of the ascertaining experiment, regarding the appreciation of the level of motor training of preschool children, we can make some general conclusions. First of all, it has been shown that the vast majority of children have a fairly low level of motor training in all indicators researched. All the results from the tests applied to preschool children are below the national scales for this age. The closest to the national scales are the tests of strength and strength-speed, and the weakest in this respect are the tests of speed and flexibility. If the spine flexibility at that age can be

developed quite easily and this is even indicated, then the speed and force-speed ones require an artificial maintenance, so that at the age of 9-10 years to reach the sensitive period where they can be quite easily developed.

It is indisputable that according to the results of several studies [3, 4, 8, 14, 20, 24, 26], all motor qualities are genetically predisposed to one individual or another, but there are sufficient methodologies for developing one or another quality, depending on the objectives set before the specialist, the contingent of children they work with, their age, their level of training and others.

Finally, we were particularly interested in the situation related to the sanitary aspect and first of all, of the existing spinal deficiencies in those in the experimental group, the research being carried out with children from several preschools in Bucharest, children who were subsequently included in the basic pedagogical experiment (Table 3.).

Table 3. Analysis of spinal deficiencies of children in Bucharest

No. of examined children	Gender	Spinal deficiencies (scoliosis)				
		Thoraco-Lumbar	Thoracal	Lumbar	Cervical-Thoracal	Total
255	B	14	15	12	23	**64**
267	G	12	17	10	27	**62**
Total - 522	-	**26**	**32**	**22**	**50**	**126**

A total of 522 children from 4 preschools in Bucharest were included in the ascertaining experiment, of which 255 boys and 267 girls, aged between 6 and 7 years. The traditional way was not used, where the children were to be divided into control and experiment groups, but the initial and final testing of a fairly large number of children was carried out. In fact, we were interested in both the total number of deficiencies of the children's spine and the specifics of each of them, ie the difficulty being related to lordosis, kyphosis or others.

From the centralization of the collected data, we notice that almost a third of the examined children were detected with different deficiencies of the spine, mostly of these being scoliosis of different types.

The results of this research can be implemented in the process of physical education of preschool children in Romania and beyond. It requires the development of methodological guides for physical education teachers in preschool institutions, as well as for students of higher education institutions, who are to work in these institutions.

There is also the possibility of applying in practice an experimental methodology of complex exercise exercises for the prophylaxis of spinal deficiencies in preschool children during physical education classes. The experimental methodology can be successfully applied both during physical education classes in preschool institutions and by parents at home.

The process of improving the physical education system in preschool institutions can and must contribute to increasing its efficiency by prophylaxis of motor deficiencies, in this case of the spine of children, which, as has been shown, remain constant for fifteen years, on the third place in the top of diseases dispensed among children and young people in Romania.

3. Experimental argumentation of the efficiency of the program application on the prophylaxis of spinal deficiencies in preschool children

According to the plan for organizing and conducting research planned in the first stage, a fact-finding experiment was organized, which aimed to highlight the level of training and physical development of preschool children in Romania in terms of physical education activities in preschool institutions.

Also at this stage, the situation regarding the number of children with spinal deficiencies was analyzed, these, according to the specialized literature data [1, 5, 13, 16, 19, 23], appear at the age of 6-7 years, ie at the end of the preschool period.

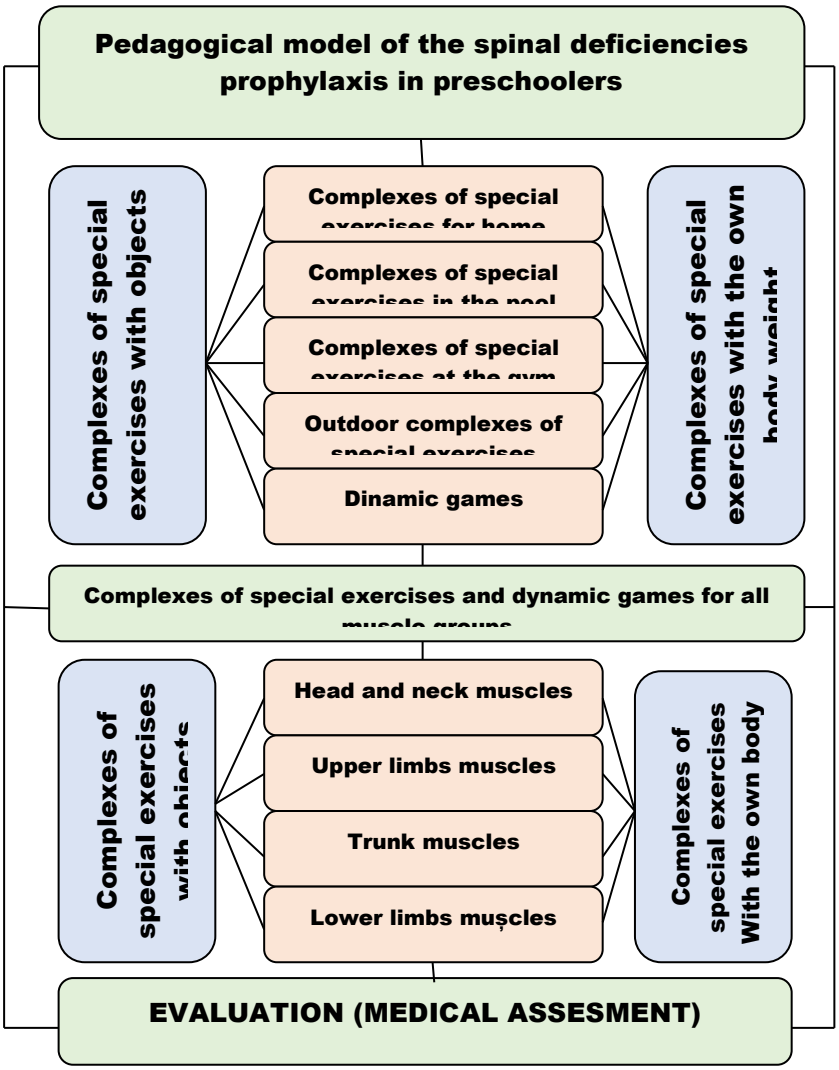

Fig. 4. Pedagogical model of the spinal deficiencies profylaxis in preschool children

The above mentioned directed us to look for effective ways to improve the situation in this regard, referring primarily to the prophylaxis of spinal deficiencies of preschool children by applying the means of physical education in their training. In this sense, a pedagogical model of application of the means of physical education within the physical education with the preschool children of 6-7 years was made (fig. 4.).

In fact, the given model focuses on three general compartments, these being the place of sports activities, the destination of the means proposed for application in the training process and the assessment of the spine of children following the application of the means described in the model. Both block one and block two of the given model focused on two large groups of means, these being the exercises with objects and the exercises without objects. The objects can be the most diverse and available to the school. Objectless exercises are those with your own body weight, many of them already known by children and parents.

It is worth mentioning that this model was applied in the training process of children from preschool education institutions in Bucharest for a period of one year (basic pedagogical experiment). The children from the given institutions carried out daily physical education activities, the duration of each being 30 minutes.

The exercise complexes were made up in time, either in written form or in graphic form (fig.5.) And changed, depending on the objectives of the physical education activities, once a week or, at least once every two weeks.

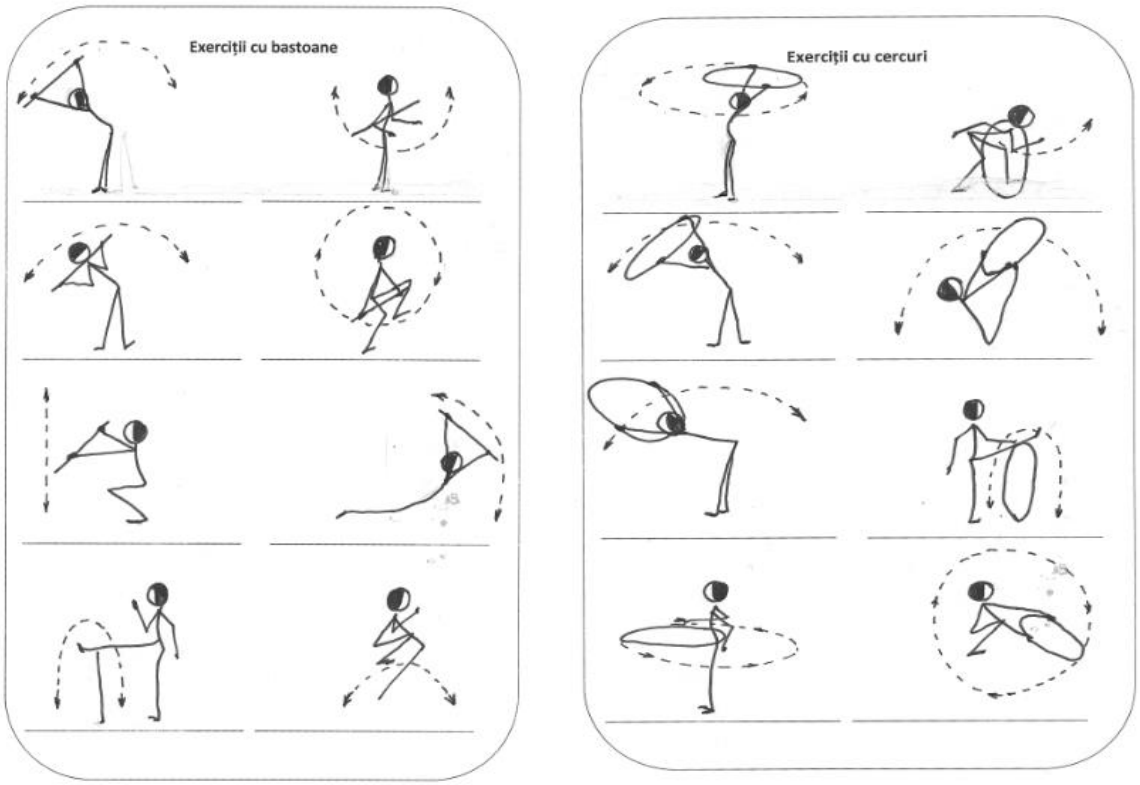

Fig. 5. Spine deficiencies prophylaxis exercises with objects

All physical education activities, within preschool institutions, were carried out under the strict control of the specialized teacher. If we look at the pedagogical model, it is clear that the basic activity of physical education is carried out in specialized lessons, as a basic and compulsory form in preschool institutions. The way of performing the exercise complexes was quite simple where the teacher carried out an exercise complex, and at the end of the sports activity a dynamic game was organized with concrete tasks, based on the objectives of the lesson.

However, the children permanently received some individual tasks so that they could be performed at home under parental control. The content of each task was strictly specified by the teacher indicating the number of repetitions for each exercise, ie the dosage of physical effort. The parents were informed at the beginning of the study year about the purpose of the experiment. In this sense, there are several ways to transmit the exercise complexes to the children's parents, and one of them was to post the complexes on the parents' e-mail addresses, and they were to carry them out at home.

Speaking about the methodology of applying the complexes of exercises for the prophylaxis of spinal deficiencies in preschoolers, here the teacher will take into account the following aspects:

- age,
- gender,
- level of motor training,
- level of physical development,
- health state,
- the place where the sports activities take place,
- available inventory,
- part of the day (morning, noon, evening).

These methodological moments will also be taken into account during the performance of exercise complexes at home under the supervision of parents. These complex exercises are not only for the prophylaxis of children's spinal deficiencies, but are quite beneficial for improving the level of motor training, functional training, which in turn will positively influence the general health of children.

In order to verify experimentally the efficiency of the practical application of the pedagogical model for prophylaxis of spinal deficiencies, as well as the experimental program developed by us, we performed a pedagogical experiment lasting one year with children from preschool institutions in Bucharest (Romania), who are 6-7 years old. Both at the beginning and at the end of the pedagogical experiment, all the children were tested on four basic indicators that were of particular interest to us. This is about the dynamics of children's motor training, indices of physical

development, functional and well-understood training, the evolution of spinal deficiencies of the children examined.

We will examine them separately, and further we will present the evolution of the indices of motor training of the children involved in the pedagogical experiment, these being presented in Table 4.

Table 4. The results of the physical training of the 6-7years old children involved in the pedagogical experiment

No.	TESTS	Gender	National standard	Initial test $\bar{X} \pm m$	Final test $\bar{X} \pm m$	t	P
1.	Push-ups, no, rep	B	8	5,16±0,17	6,02±0,16	3,91	< 0,001
		G	8	2,48±0,15	3,35±0,15	4,35	< 0,001
2.	Abbs, no. rep.	B	15	7,04±0,20	8,11±0,19	4,11	< 0,001
		G	15	6,45±0,19	7,24±0,19	3,16	< 0,01
3.	Spine flexibility , cm	B	+5	0,30±0,09	0,59±0,09	2,42	< 0,05
		G	+5	0,31±0,10	0,60±0,09	2,23	< 0,05
4.	Long jump , cm	B	140	76,12±1,27	80,04±1,25	3,14	< 0,01
		G	130	72,08±1,49	77,13±1,47	2,58	< 0,05
5.	Shuttle running 3x10 m, s	B	9,4	12,16±0,09	11,84±0,09	2,67	< 0,01
		G	9,6	13,08±0,11	12,66±0,10	3,00	< 0,01

Note: B - n = 255 P - 0,05 0,01 0,001 r - 0,124
f - 254 t - 1,969 2,596 3,330
G - n = 272
f - 271 t - 1,966 2,591 3,320 r - 0,120

According to table 4, in what concerns the motor training, five indicators were subjected to research, which largely assess the level of motor training of children in the pedagogical experiment, these being Push-ups (test to assess the level of development of arm strength), abbs (test to assess the level of strength abdominal muscles), bending forward (test for assessing the level of development of Spine flexibility), long jump from the spot (test for assessing the level of development of explosive force) and running shuttle (test for assessing the level of development of skill).

Analyzing the evolution of the tested motor parameters, it is very clear that at the end of the pedagogical experiment, both boys and girls essentially improved their results on all indicators subject to analysis. This was also confirmed by statistical calculations, which showed that the difference between the two tests in both cases is statistically significant (P <0.05, 0.01).

Therefore, analyzing the results of the level of motor training of preschool children aged 6-7, it is obvious that the experimental program proposed and applied in the pedagogical experiment lasting one year was quite effective in their motor training. Even though they did not reach the

national scales in the vast majority of the indices tested, the children improved in all cases their initial results. According to the recorded data, the most eloquent results were found in the development of arm strength and abdominal strength, as well as in the development of skill. Although, visible progress has been made in the development of other motor skills, however, the most conservative are the speed and power-speed tests, where even if significant progress has been made the results have not had a very high rise as in other tests. mentioned above.

At preschool age, basic indicators of children's health are the indicators of physical development. In the ascertaining experiment it was shown that the level of physical development of preschool children aged 6-7 in kindergartens in Romania have a fairly modest level of development compared to national standards for these indicators. We were particularly interested in how these indicators evolved in the pedagogical experiment, where during a year of study an experimental pedagogical model was applied focused on complexes of physical exercises and dynamic games, which the children were to fulfill both in the cart of sports activities within the kindergarten, under the guidance of the teacher, as well as at home under the supervision of the parents.

To assess the effectiveness of applying the experimental model, both at the beginning and at the end of the experiment the children involved in the research were tested on a number of indicators, including: Height, weight, strength of right and left hands and Thoracic perimeter. At the end of the experiment all results were statistically processed and are presented in Table 5.

Table 5. The results of the physical development of children aged 6-7 involved in the pedagogical experiment

No.	TESTS	Gender	National standard	Initial test $\bar{X} \pm m$	Finaal test $\bar{X} \pm m$	t	P
1.	Height, cm	B	120	116,22±1,31	119,03±1,27	1,95	> 0,05
		G	120	115,51±1,32	118,88±1,31	1,94	> 0,05
2.	Weight, kg	B	21	20,69±0,57	22,32±0,49	2,29	< 0,05
		G	20	20,32±0,59	22,07±0,55	2,33	< 0,05
3.	Strength of the right hand, kg	B	8	6,56±0,13	7,09±0,12	3,12	<0,01
		G	7	6,16±0,15	6,70±0,14	2,84	< 0,01
4.	Strength of the left hand, kg	B	7	6,08±0,15	6,50±0,15	2,10	< 0,05
		G	6	4,95±0,16	5,41±0,15	2,30	<0,05
5.	Thoracic perimeter, cm	B	56	53,42±0,85	55,65±0,83	2,01	< 0,05
		G	55	52,37±0,87	54,64±0,86	1,97	< 0,05

Notă: B - n = 255 P - 0,05 0,01 0,001 r - 0,124
f - 254 t - 1,969 2,596 3,330
G - n = 272
f - 271 t - 1,966 2,591 3,320 r - 0,120

Analyzing the table above we notice that in the vast majority of indicators tested there were quite obvious changes, this being confirmed by

statistical calculations, where only the first indicator (Height) did not have a statistically significant increase (P> 0 , 05), although the children registered an increase of over 3 centimeters and came very close to the national standards for this indicator.

Thus, analyzing the results of the physical development of the children included in the pedagogical experiment, we notice that not in all cases the teacher can intervene to improve all the indicators subjected to testing. In this case, it is possible to intervene significantly in the case of directing the children's body weight, the changes that take place in terms of muscle strength and thoracic perimeter. The other indicators show a natural increase and can hardly be influenced, including by using the means of physical education.

Next, we will analyze the results of the functional training of 6-7 year old children in preschool education institutions in the formative experiment (table 6.).

Table 6. The results of the functional training of 6-7 year old children in preschool education institutions in the formative experiment

No.	**Spine deficiencies**	**Gender**	**I.T**	**F.T**	**Difference, u.c.**	**Difference , %**
1.	Lordotic Atitude	B	184	21	163	88,59
		G	86	30	50	65,12
2.	Kyphotic Atitude	B	160	35	125	78,13
		G	82	-	82	100,00
3.	Scoliotic Atitude	B	45	5	40	88,89
		G	133	45	88	66,17

In order to highlight the evolution of their level of functional training, all children were subjected to three tests, these being: The value of the pulse in pause, the Ruffier Test and the Sergeant Test, the last two indicating the children's work capacity.

Following the analysis of the functional parameters, it was demonstrated that the applied methodology had a decisive impact on the level of functional training of the preschool children included in the pedagogical experiment. All indicators subjected to research increased significantly at the end of the pedagogical experiment, this fact being confirmed by statistical calculations.

Finally, one of the main objectives of our research was to highlight the effectiveness of the application of physical education in the prophylaxis of spinal deficiencies in children in the pedagogical experiment. The means of physical education were to be applied daily in sports activities organized by teachers, as well as at home under parental supervision. Both at the beginning

and at the end of the pedagogical experiment, where all children were analyzed with the help of specialized medical staff from preschool institutions, who were to assess the number of people and the deficiencies of the spine (Table 7).

Tabelul 7. The results of the functional training of 6-7 year old children in the formative experiment (B=255, G= 267)

No.	Tests	Gender	I.T. $\bar{X} \pm m$	F.T. $\bar{X} \pm m$	t	P
1.	Puls, b/min	B	82,56±0,29	80,44±0,31	5,05	<0,01
		G	87,78±0,21	85,63±0,34	5,32	<0,01
2.	Ruffier Test, u.c.	B	11,40±0,31	13,52±0,29	5,04	<0,01
		G	11,58±0,14	12,47±0,17	2,54	<0,05
3.	Sergent Test, u.c.	B	17,89±0,29	19,12±0,26	3,15	<0,05
		G	17,31±0,16	18,33±0,18	4,25	<0,01

According to the literature, at the age of 6-7 years, children still do not outline spinal deficiencies such as scoliosis of various types, here appear the so-called lordotic, kyphotic, or scoliotic attitudes. If we analyze the initial results, it is clear that more than a third of children aged 6-7 are prone to such attitudes, the most prominent being the lordotic and kyphotic.

After the implementation of the experimental program we notice that their number, both among girls and boys, has decreased considerably. For example, for boys with a lordotic attitude, their number decreased by 88.59%, and for girls with a kyphotic attitude, it even reached 100%. The results were quite significant in the other cases, where children reduced the number of spinal deficiencies on average to 60-70%.

Thus, the recorded results clearly showed that by applying the means of physical education in preschool and at home institutions can intervene and prevent a large number of children who may later have major problems related to the appearance and development of various deficiencies or abnormalities of their spine.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

Following the organization of scientific research on the possibilities of prophylaxis of spinal deficiencies in preschool children by applying the means of physical education in the form of special exercises and dynamic games in preschool institutions and at home, the following conclusions were drawn:

1. The analysis of the literature highlighted the fact that very few researches, including in Romania, are dedicated to the physical education of preschool children of different ages, and the existing ones are mostly dedicated to researching the level of their development and physical training and very little is devoted to the analysis of children's health;

2. At the age of 6-7 years, children's bodies have a very rapid rise in somatic, morphological and functional development, where it undergoes radical changes in the skeletal system, as well as the muscular system, where body segments suddenly increase and mass increases as well;
3. Morphological changes that take place in children's bodies often lead to various deficiencies of the spine in different regions of it, and the age of 5-7 years is the most appropriate, where you can act to avoid further medical intervention or even the surgical one for their treatmen;.
4. The vast majority of specialists surveyed claim that the age of 6-7 years is a beneficial one for the prevention of deficiencies of the children's bone system, in general and of the spine, in particular. The research of statistical data and reports on the health of children in Romania, clearly showed that at the age of 6-7 years the most common problems related to spinal deficiencies occur, both in boys and girls.
5. Research on the level of physical development and motor training of preschool children has shown that the vast majority of indicators tested are below national standards, which inevitably leads to bone disorders, including various spinal deficiencies, especially in children aged 6-7 years;
6. Analyzing the indicators of physical development of preschool children in the pedagogical experiment, it was shown that they can be influenced by the widespread use of physical education tools, such as exercises and dynamic games. Thus, following the training experiment, the strength of the right hand in boys increased from 6.56 to 7.09 kg, in girls correspondingly from 6.16 to 6.70 kg ($P < 0.05$), the thoracic perimeter in boys at the initial test was 53, 42 cm, at the final test - 55.65 cm. The girls at the initial test recorded an average of 52.37 cm, and at the final test - 54.64 cm ($P < 0.05$). However, there are some indicators that are more hereditary or genetically predisposed and it is very difficult to intervene in increasing the level of their development, among them being the height, the length of body segments and others;
7. In order to improve the indices of motor training of preschool children, a system of means of physical education was developed, which was successfully applied in a pedagogical experiment lasting one year of study, both in sports activities in kindergarten, under the supervision of teachers, as well as at home under parental supervision. Among the motor indicators, the most easily influenced are those that represent mobility and skill, these being very close to the national standards for this age. Thus, when testing spine flexibility, both boys and girls recorded an average of +5.30 cm, so that at the end of the experiment both groups improved this indicator by recording an average of +6.59 cm in boys and 6.50 cm in girls ($P < 0.05$). Motor qualities such as strength and speed can be less influenced, as they are more conservative in this respect. the long jump from the spot ”in the initial test the boys recorded an average of 76.12 cm, and in the final test - 80.04 cm ($P < 0.01$). The girls in the initial test showed an average of 72.08 cm, reaching 77.13 cm at the final test ($P < 0.05$).;

8 The results of the training experiment highlighted the fact that the widespread application of the means of physical education contributes to increasing the level of functional training of preschool children. One of the most objective indicators in this regard is the heartbeat for a minute. According to the data recorded at the initial test, the poor recorded 82.56 pulses in one minute, and at the initial test the given indicator decreased to 80.44 pulses ($P < 0.01$). The girls at the initial test had an average of 87.78 heartbeats, and at the final test this indicator reached 85.63 beats per minute ($P < 0.01$). The same trend is observed in the case of the two tests, the Ruuffier Test and the Sergeant Test, which also indicate the level of functional training of preschool children, registering favorable results at the end of the pedagogical experiment, both for boys and girls ($P < 0.05$);
9. The age of 6-7 years is quite sensitive, when it comes to the appearance of various deficiencies of the skeleton of the bone and first of all of the spine. At this age it is much easier to focus on preventing spinal deficiencies than to cure them in various ways, including medical ones. The most effective means in this regard are the widespread use of exercise complexes in sports activities in kindergartens, as well as the practice of physical exercises in various forms at home, under the supervision of parents. The formative experiment demonstrated the efficiency of applying the means of physical education in the prophylaxis of spinal deficiencies occurred in preschoolers aged 6-7 years. Thus, the most effective proved to be in the case of prophylaxis of kyphotic attitudes, where 100% of girls and 78.13% of boys eliminated the symptoms of their appearance. In the case of lordotic attitudes in girls, 65.12% were eliminated, in boys - 88.59%. Analyzing the scoliotic attitudes in girls were eliminated in proportion of 66.17%, in boys - 88.89%;
10. According to the results of the pedagogical experiment with preschool children aged 6-7, where the experimental model of prophylaxis of their spinal deficiencies was applied, it was shown that they were recovered on average 80-82%, both for boys and girls, and the applied experimental methodology can be recommended as a methodological guide for teachers in preschool education.

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Analyzing the results of the pedagogical experiment regarding the implementation of the experimental model within the physical education with the 5-7 years old preschool children, we formulated the following prectico-methodical recommendations:
1. The experimental model will focus on the targeted use of the means of physical education, to be applied both in the preschool and at home, the latter being presented in two forms:

- exercise complexes, with and without objects,
- dynamic game complexes, with and without objects.

2. The exercise complexes and dynamic games applied in physical education with preschool children in kindergarten, will be organized and monitored by the specialized teacher.
3. The complexes of exercises applied in physical education with preschool children at home, will be organized and monitored by parents.
4. The exercise complexes will be developed by the teacher, who will take into account:

- anatomical and physiological features of children aged 5-7,
- difficiencies of children's spine,
- the material conditions of the kindergarten,
- the level of their motor training,
- age and gender of children.

5. Only one dynamic game will be used in the physical education activities, this being carried out at the end of the activities.
6. Exercise complexes and dynamic games will be selected according to the anatomical principle, which will take into account the possibilities of prophylaxis of the entire bone system of children, especially their spine.
7. In order to detect the deficiencies of the spine appeared in preschool age, children will be subjected to the medical examination, performed by the specialized teacher and the medical one, not less than once in two months.
8. The parents of the respective children will also be notified about the detection of spinal deficiencies in preschoolers.

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ADNOTARE

Buciu Daniela ”*Profilaxia deficienţelor coloanei vertebrale la preşcolari prin aplicarea mijloacelor educaţiei fizice”*. Teză de doctor în ştiinţe pedagogice, specialitatea 533.04 – Educaţie fizică, sport, kinetoterapie şi recreaţie. Chişinău, 2021.

Structura tezei: introducere, 3 capitole, concluzii generale şi recomandări, bibliografie (186 titluri), 115 pagini text de bază, 4 anexe, 35 figuri, 22 tabele. Rezultatele obţinute sunt publicate în 8 lucrări ştiinţifice.

Cuvinte-cheie: *preşcolari, educaţie fizică, profilaxie, defficienţe, coloana certebrală, pregătire fizică, dezvoltare fizică, pregătire funcţională.*

Scopul cercetării constă în cercetarea eficienţei aplicării mijloacelor educaţiei fizice în profilaxia deficienţelor coloanei vertebrale la preşcolari.

Obiectivele cercetării: 1.Analiza şi generalizarea literatutii de specialitate pe problema organizării educaţiei fizice cu preşcolarii. 2. Aprecierea nivelului pregătirii motrice şi dezvoltării fizice al copiilor din învăţământul preşcolar la nivel naţional. 3. Cercetarea dificienţelor coloanei vertebrale la copiii din învăţământul preşcolar. 4. Argumentarea experimentală a eficienţiei aplicării complexelor de exerciţii fizice asupra deminuării şi profilaxiei deficienţelor coloanei vertebrale la preşcplari.

Noutatea şi originalitatea ştiinţifică a cercetării constă în elaborarea şi fundamentarea teoretică şi ştiinţifică a metodologiei experimentale de aplicare a complexelor de exerciţii fizice în profilaxia deficienţelor coloanei vertebrale la preşcolari. O astfel de metodologie aplicată în practică va contribui la optimizarea procesului de educaţie fizică a preşcolarilor, precum şi la optimizarea stării sănătăţii acestora, în cazul dat cu referinţă la starea coloanei vertebrale a copiilor de 6-7 ani.

Rezultatele ştiinţifice principial noi demonstrează eficienţa optimizării procesului de educaţie fizică cu copiii de vârstă preşcolară (6-7 ani). Aplicarea în practică a metodologiei experimentale propusă va contribui la sporirea nivelului pregătirii motrice, precum şi la profilaxia deficienţelor coloanei vertebrale al preşcolarilor de 6-7 ani.

Noua direcţie de cercetare prevede abordarea problemei perfecţionării sistemului de educaţie fizică din instituţiile preşcolare, care poate şi trebuie să contribuie la sporirea eficienţei acestuia prin profilaxia deficienţelor de ordin motric, în cazul dat al coloanei vertebrale a copiilor, aceasta fiind destul de des afectată cu diferită gravitate.

Semnificaţia teoretică este reprezentată de faptul că au fost elaborate complexe de exerciţii fizice, precum şi metodologia aplicării acestora pentru profilaxia deficienţelor coloanei vertebrale la preşcolari în cadrul activităţilor de educaţie fizică. A fost elaborat un sistem de complexe de exerciţii care poate fi aplicat cu succes de către cadrul didactic în procesul de educaţie fizică cu preşcolarii.

Valoarea aplicativă a lucrării denotă posibilitatea aplicării în practică a metodologiei experimentale de aplicare a complexelor de exerciţii fizice pentru profilaxia deficienţelor coloanei vertebrale la preşcolari în cadrul educaţiei fizice. Metodologia experimentală propusă poate fi aplicată cu success, atât în cadrul educaţiei fizice în instittţiile preşcolare, cât şi de către părinţi la domiciliu.

Implementarea rezultatelor ştiinţifice. Rezultatele cercetării au fost implementate în procesul de educaţie fizică cu copiii preşcolari din mai multe instituţii de acest gen din Bucureşti, din judeţele Piteşti, Braşov Galaţi, (România). Acestea pot fi aplicate în calitate de ghid metodologic pentru cadrele didactice de educaţie fizică din instituţiile preşcolare, precum şi de către studenţii instituţiilor de învăţământ superior de educaţie fizică şi sport, care urmează să activeze în instituţiile preşcolare.

АННОТАЦИЯ

Бучиу Даниела «*Профилактика деформации позвоночника дошкольников с применением средств физического воспитания”*. диссертация на степень доктора педагогических наук, специальность 533.04 – Физическое воспитание, спорт, кинетотерапия и рекреация. Кишинёв, 2021.

Структура диссертации. Диссертация состоит из введения, 3 главы, общих выводов и рекомендаций, библиографии из 186 наименований, 115 страниц основного текста, 4 приложений, 35 фигур, 22 таблицы. Полученные результаты опубликованы в 8 научных работах.

Ключевые слова: дошкольники, физическое воспитание, профилактика, деформация, позвоночник, физическая подготовленность, физическое развитие, функциональная подготовка.

Цель исследования состоит в исследование эффективности применения средств физического воспитания для профилактики позвоночника дошкольников.

Задачи исследования: 1. Анализ и обобщение литературных источников по проблеме организации физического воспитания с дошкольниками.

2.Выявить уровня физической подготовленности и физического развития детей дошкольного возраста на национальном уровне.

3.Исследование уровня деформации позвоночника у детей дошкольного возраста.

4.Экспериментальное обоснование эффективности применения средств физического воспитания для профилактики деформации позвоночника дошкольников.

Научная новизна и оригинальность состоит в разработке и научном обосновании экспериментальной методики по применению средств физического воспитания для профилактики деформации позвоночника дошкольников. Применение на практике данной методики будет способствовать оптимизации процесса физического воспитания дошкольников, а также будет способствовать улучшению их состояния здоровья, в данном случае состояние позвоночника детей 6-7 лет.

Принципиально новые научные результаты данной работы демонстрируют эффективность оптимизации процесса физического воспитания с детьми дошкольного возраста (6-7 лет). Применение на практике предложенной экспериментальной методики будет способствовать улучшению уровня физической подготовки, а также будет способствовать профилаксии деформации позвоночника дошкольников 6-7 лет.

Теоретическая значимость данной работы заключается в разработки комплексов физических упражнений, а также методика их применения при профилаксии деформации позвоночника дошкольников в процессе занятий по физическому воспитанию. Была разработана система комплексов физических упражнений, которая успешно может быть использована преподавателями в процессе физического воспитания с дошкольниками.

Практическая значимость работы объясняется возможностью применения на практике экспериментальной методики по применения средств физического воспитания для профилактики деформации позвоночника дошкольников в процессе физического воспитания. Разработанная экспериментальная методика может быть успешно применена, как в процессе физического воспитания в дошкольных учреждениях, так и на дому под наблюдением родителей.

Внедрение научных результатов. Результаты исследования были использованы в процессе физического воспитания с дошкольниками в ряде городов и жудецов Румынии как Бухарест, Питешты, Брашов, Галаць,. Они могут быть использованы в качестве методической разработки для педагогических кадров работающих в дошкольных организаций, а также в процессе профессиональной подготовки студентов высших физкультурных учебных заведений которым предстоит работать в дошкольных учреждениях.

ANNOTATION

Buciu Daniela *"Physical education means used in preschool children spine disorders prophylaxis"* PhD in Pedagogy Thesis_degree 533.04 – *Physical education*, sports, kinesiology and recreation. Chișinău, 2021.

Thesis structure: The work consists of introduction, 3 chapters, general conclusions and recommendations, the bibliography which includes 186 sources, 115 pages of basic text,4annexes, 35 figures, 22 tables. The results are reflected in 8 scientific papers.

Key words: preschool children, physical education, prophylaxis, spine disorders, physical training, physical development, functional training

The research aim is to consists of researching the efficiency of the physical education means in preschool children spine disorders prophylaxis.

Objectives of research: 1. Specialized literature analysis and generalization in what concerns physical education for preschool children. 2.Assessing the physical training and physical development levels of the preschool children in Romania. 3. Spine disorders in preschool children study.
4. Experimental argue for the efficiency of the physical exercise in preschool children spine disorders prophylaxis and recovery.

Scientific novelty and originality of the research consists of developing the experimental scientific evidence based methodology for physical exercises use in the preschool children spine disorders prophylaxis. Practicing such a methodology will help to improve the physical education process as well as to optimize the preschool 6-7 years children state of health in what concerns the condition of their spine.

Scientific evidence based results demonstrate the preschool children physical education process improvement effectiveness. The practical application of the proposed experimental methodology will contribute to the motor training level increase, as well as to the spine disorders prophylaxis for 6-7 years preschool children.

The new research orientation addresses the issue of physical education curricula in the pre-school institutions, in order to be able and to do contribute to its efficiency by preventing motor disorders, such as spine ones, which are the most common.

The theoretical significance of the research consists in the fact that physical exercises complexes were developed, as well as the methodology of their application for the prevention of the spine deficiencies in preschool within the physical education activities.
A system of exercises complexes has been developed and can be successfully applied by the didactic framework in the physical education process with preschool children.

The practical value of the investigation reveals the real possibility of practicing the experimental methodology of physical exercises complexes during physical education classes for preschool children spine disorders prophylaxis. The proposed experimental methodology can be successfully applied both in preschool settings physical education classes and by parents at home

Implementation of the scientific results was achieved in several preschool institutions from Bucharest, Pitești, Brașov, Galați, (România). These can be applied as a methodological guide for physical education teachers in preschool institutions as well as students of higher education institutions to work in pre-school institutions.

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PHYSICAL EDUCATION MEANS USED IN PRESCHOOL CHILDREN SPINE DISORDERS PROPHYLAXIS

Speciality code: 533.04 – Physical education, sports, kinesiology and recreation:

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