The Effects Of Physical Rehabilitation On The Dynamics Indices Of A Trunk Muscle Strength Tolerance In Iranian Children With Scoliosis

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ABSTRACT: Scoliosis is one of the most common orthopedic diseases. Its frequency according to different situations varies widely from 0.5 to 20%. Development of rehabilitation programs for the correction and prevention of scoliosis, generally in the educational institutions, was established according to the increasing number of children with scoliosis in recent years. The aim of this research was to study the effect of physical rehabilitation programs for primary school age children with incorrect posture in the frontal plane, and scoliosis in first and second degree in educational institution of Iran, on the strength endurance of trunk muscles. The sample of 165 primary school age children who got the incorrect posture in the frontal plane, and scoliosis first and second degree, living in Iran from 6 to 8 years. At the beginning and the end of the pedagogical experiment trunk muscle strength endurance was evaluated. Results showed that the methodological approaches used in the classroom of physical education and physiotherapy, have contributed to leveling of the functionality of the back muscles on either side of the spine, which affected the increase in the level of development in main group children. During the period of the pedagogical experiment increase strength endurance of the back muscles in the control group number one was 7.2 sec (13.8%), in the main was 17.8 sec (35%), the differences were significant (p <0.05), the increase in the static trunk muscle endurance important to use an effective exercise in view of the functional status during the course. Health studies of individual orientation constructed taking into account the natural propensity of children of primary school age to speed work and endurance work. Keywords: scoliosis, children, rehabilitation

INTRODUCTION

there is a high percentage of children with posture disorders and scoliosis in the world and it is one of interests among specialists as a pediatricians, orthopedists, rehabilitation specialists, educators and physicians to work on them (Adobor et al., 2011; Fong DY et al., 2010; Fu KM et al., 2011; Goñi-Zaballa et al., 2012). Investigations of Iranian experts indicate that only in the capital of Iran, Tehran, 86% of school children have abnormalities of posture (Karachalios et al., 1999) combined with changes in various organs and systems such as cardiovascular, respiratory and digestive system. In a survey, 90% of boys in high school had spinal diseases. The largest number of posture violations was recorded in children of primary school age (Goñi- aballa et al., 2012; Ran et al., 2011).

Scoliosis is one of the most common orthopedic diseases. Its frequency according to different situations varies widely from 0.5 to 20%. During the intensive growth the most rapid progression of the curvature in scoliosis was shown in 7 to 8 and 11 to 13 years in girls while it was reported in 8 to 10 and 13 to 15 years boys (Goñi-Zaballa et al., 2012).

Some studies reported that non-fixed posture disorders in the frontal plane and scoliotic deformities have negative impacts on the quality of the functioning leading organs and systems of the body (Goñi-Zaballa et al., 2012). Headache, impaired learning and getting tired quickly is usually reported in children with scoliosis because of reduced ventilation, insufficient supply of oxygen and disrupted the cardiovascular function which is due to poor posture and the presence of spinal deformity (Ran et al., 2011).

Development of rehabilitation programs for the correction and prevention of scoliosis, generally in the educational institutions, was established according to the increasing number of children with scoliosis in recent years. This way is able to decrease the impact from school risk factors and relief process in the early stages of development. (Adobor et al., 2011; Fong DY et al., 2010).

The aim of this research was to study the effect of physical rehabilitation programs for primary school...
age children with incorrect posture in the frontal plane, and scoliosis in first and second degree in educational institution of Iran, on the strength endurance of trunk muscles.

METHODS

The sample of 165 primary school age children who got the incorrect posture in the frontal plane, and scoliosis first and second degree, living in Iran from 6 to 8 years, who were divided into the following groups:

- First main group had children 6 years old (33 children; 13 girls and 20 boys).
- Second main group had children 7 years old (33 children; 19 girls and 14 boys).
- Third main group had children 8 years old (29 children; 18 girls and 11 boys).
- First control group had children 6 years old (24 children; 12 girls and 12 boys).
- Second control group had children 7 years old (23 children; 12 girls and 11 boys).
- Third control group had children 8 years old (23 children; 14 girls and 9 boys).

Distribution of children on a main and a control group was carried out by random sampling.

The present hypothesis work is done according to the plan of scientific research of the Physical Rehabilitation Department in National University on physical education and sport of Ukraine (NUPESU), consolidated plan of research in the field of physical culture and sports in 2006-2010 years. Tags: 4.1.5. "Modern principles of prevention and rehabilitation of disorders in the motor system", NO 0106U010793 and on topic: 4.3.1. "Improvement of recreation and rehabilitation programs for the prevention and correction of dysfunctions caused by disturbances in the different body systems", NO 0106U010794. The author carried out the section, devoted to the physical rehabilitation of school children 6-8 years old with impaired posture and scoliosis.

At the beginning and the end of the pedagogical experiment trunk muscle strength endurance was evaluated . The dynamics of the strength endurance of trunk muscles was evaluated in terms of growth performance, calculated on the basis of pedagogical testing described I. Loveiko, V.A. Kashuba, T.Yu. Krutsevich (Fong DY et al., 2010; Stolinski and Kotwicki, 2012).

Classes were conducted in accordance with the laws adopted in the territory of Iran. Girls and boys were engaged separately.In the control groups, special preventive measures were taking for forming and posture correction from scoliotic deformities, were held to the same extent as in the main groups. Organized physical activity of children consisted of physical education, the school planned program of Iran, morning hygienic gymnastics lessons, physiotherapist visiting two times per week, moving change we can see on the program «Ergo Therapy». In all groups, was using traditional fixing skill correct posture (standing in front of the mirror with the support of the wall),Children in the main and control group recommended homework through exercises for building and consolidating the correct posture skills for 10-15 minutes daily, with mandatory supervision by parents for their implementation.

The children of a main and control groups during the school year in addition the above activities were carried out fitness breaks. The program was adjusted to the physical education lesson plans, planned school program. Therapeutic exercises lesson held two times per week in school hours. Physiotherapy session’s duration was 45 minutes.

Classroom training. Clarification of the pathology essence in an accessible form for preschoolers and a brief explanation of the goals, objectives and activities held by the rehabilitator.

Health corrective gymnastics classes as described I. Loveiko and M.I. Fonareva (1988), aimed at preventing posture violations. The course is taught in the main groups of corrective gymnastic exercises were symmetrical nature, breathing exercises (BE) and outdoor games.


Exercises in a balancing platforms, pillows and tracks for proprioception in the S.P. as a standing and sitting for the formation, as a proper muscular and dominant optimal movement patterns (included in the middle of the main part of the activity of TE, for 5-10 min).

Automyorelaxation sessions was done at the conclusion of each session of Physical Education to prevent muscle tension and restore their function. The uses of such exercises were recommended to perform well on the weekend with parents.

Exercises on a balancing platforms in the main and control groups used regularly during the course, mainly for training muscular on the affected side. In the control group were used orthopedic balls to strengthen and relax the muscles.

RESULTS

Results showed that the methodological approaches used in the classroom of physical education and physiotherapy, have contributed to leveling of the functionality of the back muscles on either side of the spine, which affected the increase in the level of development in main group children.
During the period of the pedagogical experiment increase strength endurance of the back muscles in the control group number one was 7.2 sec (13.8%), in the main was 17.8 sec (35%), the differences were significant (p <0.05).

Strength endurance increasing of the abdominal muscles in the control group was 30.3 seconds (39.4%) in the study group number one was 18.5 seconds (14.1%). The differences between the control and the main group were not significant (p>0.05).

Statistical analysis of the testing results has identified annual growth level of muscle strength endurance side of the trunk. In the control group number one increasing the strength endurance of these muscles by increased functionality was 6.13 seconds, on the opposite side - 8.08 sec., it compared to the results identified at the beginning of the pedagogical experiment. The difference of indicators of strength endurance of the high functionality of the body of the main group was significantly increased compared with the original data: as a 14.85 seconds - 56.09 seconds at the beginning of the pedagogical experiment and 70.94 seconds at the end of the experiment (p <0.05).

On the part of the reduced functionality of the muscle side of the trunk there was a significant difference between the control group and the main number 1 (p <0.05). In the main group (Fig 1.1) rate was 48.67 seconds at the beginning of the pedagogical experiment and 71.18 seconds at the end of the rehabilitation course. The increase amounted to 22.5 seconds. In the control group, the figures were 49.4 sec and 57.5 sec, respectively.

In the main group number 2 increase strength endurance on the part of higher functionality side of the trunk muscles was 14.1 seconds from low functionality - 22.4%.

We can state the fact that the static muscle endurance side of the body with the low power capabilities of 7 years old children in the main group almost equaled the performance of a stronger hand. A difference on 0.61 seconds. The significance of differences (p ≥ 0.05).

In the control group number 2, static muscle endurance side indicators from the low power capabilities accounted for 62.26 seconds at the beginning of the pedagogical experiment and 69.52 seconds at the end of the rehabilitation course. Indicators of static muscle endurance side of the body increased the power

![Bar chart](image)
capabilities, it were on a 69.65 seconds and 77.57 seconds respectively. The difference of indicators of strength endurance on the right and the left half of the body was compared with the original data: as a 7.29 seconds was at the beginning of the pedagogical experiment, and 7.92 seconds was at the end of the experiment, the differences were not statistically significant (p> 0.05). However, the main goal - the alignment of muscle tone, has not been achieved. The findings suggest that the positive dynamics of power endurance of muscles in all groups of subjects.

![Bar chart](image)

**Figure 2.** Indices of muscle strength endurance side of the body in the 8 years old children: HFPCb – muscles on a high functional power capability before rehabilitation course; LFPCb - muscles on a low functional power capability before rehabilitation course; HFPCa - muscles on a high functional power capability after rehabilitation course; LFPCa - muscles on a low functional power capability after rehabilitation course.

**DISCUSSION**

Comparative analysis of the results before and after the pedagogical experiment revealed the dynamics of power endurance of back muscles during the period of the school year for children 7 and 8 years old. In the second and third test group showed a significant increase in strength endurance of the back muscles compared with the results shown at the beginning of the pedagogical experiment (20.5 seconds - the second main group and 25.8 seconds - the third main group). The differences were significant (p <0.05). In the control group in terms of power endurance of back muscles at the end of the pedagogical impact of identified growth at 7.3 seconds in the second group and 8 seconds in the third compared with the original data, the differences were significant (p> 0.05). Mathematical processing of test results revealed significant differences between the control and the major groups at the end of the pedagogical experiment (p> 0.05).

Similar patterns were observed in the second and third main group when testing endurance strength of the abdominal muscles. Compared with the effects observed at the beginning of the pedagogical experiment, rates have increased by 22 seconds - the second main group and 29.8 seconds - the third main group. The differences were significant (p <0.05). In the control group of indicators of strength endurance of the abdominal muscles at the end of the rehabilitation course showed an increase of 8 seconds in the second group and 6.4 seconds in the third compared with the original data, the differences were significant (p> 0.05). Mathematical processing of test results revealed significant differences between the control and the major groups at the end of the pedagogical experiment (p> 0.05).
CONCLUSIONS

Based on the foregoing, it can be argued that the increase in the static trunk muscle endurance important to use an effective exercise in view of the functional status during the course. Health studies of individual orientation constructed taking into account the natural propensity of children of primary school age to speed work and endurance work, contributed a big boost of power endurance of trunk muscles compared to the traditional use of standard-standard method.

Recommendation

In further work is planned to develop physical rehabilitation programs for children with combined motor disabilities.

REFERENCES


