

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Evaluation of the effectiveness of the complex rehabilitation of children with oligophrenia in the degree of imbecility, who underwent fracture of the lower limb.

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ABSTRACT

In children with imbecile, traumatic injuries of the lower limbs and, especially, the ankle joint can often occur. They can lead to a prolonged fixation of the joint in a certain position, which always weakens the muscles and creates a need for rehabilitation. The authors evaluated the effectiveness of the method of physical rehabilitation of children with imbecility after fracture of the ankle joint. The applied technique was realized in three stages: preparatory (2 weeks), basic (4 weeks) and final (2 weeks). It consisted of the application of restorative and relaxing exercises, including exercises with elements of dance. Evaluation of the results of the application of the developed method of physical rehabilitation showed that its effectiveness surpassed the results of the traditional scheme of rehabilitation after an ankle injury. It is shown that this method of physical rehabilitation with the use of dance elements allows to accelerate and improve the efficiency of restoring the function of an injured ankle in children with imbecile. Its use prevents atrophy of the calf muscles and increases the ability to support the damaged limb. The effectiveness of the evaluated methodology allows authors to recommend it to a wide application of rehabilitators in their practical activities.

Keywords: children, imbecility, limb lowering, ankle joint, fracture, physical rehabilitation.

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INTRODUCTION

The development of the society is accompanied by a gradual accumulation of medical knowledge [1,2,3], improvement of treatment options for various pathologies [4,5] based on clinical [6] and experimental [7,8,9] studies. In modern civilization, non-infectious diseases have a high prevalence [10], rehabilitation after which has always been given great attention [11,12]. Considering that children with genetic pathology are one of the most vulnerable category [13], the methods for their treatment and rehabilitation are being developed most actively [14]. In recent decades, there has been a fairly high birth rate of children with oligophrenia. It is known that these children often have injuries of the musculoskeletal system [15]. In this case, lesions of the lower extremities in them are among the frequently occurring conditions [16]. Anatomical and functional features of the ankle create a large number of variants of its ankle, most of which are intraarticular [17]. Therefore, in order to restore the function of the lower extremity, it is necessary not only to accurately reposition fragments with complete restoration of the joint surface and all bone-ligament elements, but also subsequent competent physical rehabilitation [18]. This is due to the fact that long fixation of this joint after trauma leads to atrophy of initially weakened muscles, making the rehabilitation process in children with Down's syndrome complicated in all respects [19]. Traditionally, in rehabilitation after injuries of the lower extremities, children are treated in a complex way using therapeutic gymnastics, therapeutic massage and physiotherapy. This makes it possible to accelerate the recovery process and minimize the consequences of fracture [21]. At the same time, the complex physical rehabilitation of children with oligophrenia with trauma to the lower limb is not always satisfactory in all cases, preventing in all cases the complete restoration of the limb function [22,23]. In this regard, it seems relevant to continue to search for effective options for physical rehabilitation and development of methods for restoring ankle damage for children with oligophrenia who have undergone fracture of the ankle joint.

The purpose of the work: to evaluate the possibilities of the complex rehabilitation of children with oligophrenia from the stage of imbecility, who underwent fracture of the lower limb.

MATERIALS AND METHODS

The conducted research has been approved by local ethical Committee under Russian state social University on the 15-th September 2016 (protocol No. 9). The specialist examined 52 children 4-6 years with imbecility (average age of $5,1 \pm 0,28$ years), who have endured a fracture one of the two talocrural joint without displacement of a bone. The given children underwent successful children underwent successful conservative treatment resulted in adhesion of bone's all breaks off. The research was conducted on the base of Russian State Social University in Moscow.

Goniometry with all the examinees was provided. The standard of flexion in the talocrural joint was equal to: 20-30 degrees dorsal flexion; plantar flexion equal to 45-50 degrees.

Adduction of foot is combined with supination; adduction is combined with pronation and supination. Supination and pronation are measured in the initial position – standing one. Supination equals to 30 degrees, pronation equals to 20 degrees.

Motion amplitude was determined is difference between extension of maximally possible and flexion in the joint.

The linear measurements were conducted with centimeter band: length and circumference were determined as for a damaged extremity as for unaffected one [24].

We also estimated a circumference as a damaged extremity as unaffected one in the course of measuring in the symmetric places at a definite distance from the bony identical points with measuring the grips of calf, coverage malleolus - plus an oblique [24].

The following test in supportability for a damaged lower extremity was conducted be means of leg dynamometer (ground type scales). The following parameters were measured in kgs: a patient placed his/her damaged leg on scales maximally pressing with the whole foot on the scales surface up to a level of threshold

of algesthes is and magnitude was recorded in kgs. Measurement of one and the same motion was recorded three time, a maximal/ the best weight was final one [25].

All the examines children with imbecile were divided into two groups: control (25 children) and experimental (27 children). The control group had its generally accepted programmer of physical rehabilitation. The experimental group its author's programmers of physical rehabilitation with three stages for realization.

1. Physical rehabilitation of children at the preparatory stage.

Performance of physical exercises for all muscular group including static and dynamic ones for attention, coordination of movements and body posture [24].

On following the principle of scattered muscular load the active exercise with static tension and relaxation were alternated. Each exercise was repeated 3-4 times the duration of one lesson is 25 min. Three session held a week. Procedures of curative massage were held after every session of therapeutic gymnastics. Duration of a procedures was up to 25 minutes. Cervical region, thoracic and lumbar sections of spine column plus unaffected extremity were massaged. The massage manipulation such as stroking and rubbing were used [25]. The preparatory period lasted 2 weeks.

2. Physical rehabilitation of children at the basic stage

Activity of physical exercises is raising in this period. Physical load increased for all groups of muscles: (a) introducing new special exercises with choreographic emphasis, (b) performance of rhythmic movements with musical accompany, (c) teaching the choreography bow, (d) familiarizing and teaching classical positions of arm and legs, (e) performance of classical elements at the choreographic barre exercises, (f) stand on the half tolls holding barre-exercises. (g) Studying the dancing elements, (h) parterre gymnastics (gymnastic elements, exercises for relaxing and stretching of muscles), (i) walking along a straight line, zigzag walking, diagonal walking; walking with stepping on artificial small "Islands", (k) slow light Jogging, (k) fun and move games for attention and consolidation of the studied choreography programmer.

Each exercise was repeated 4-6 times [26]. Duration of sessions was 30 minutes in the course of basic period of physical rehabilitation. They were held three times a week, and they lasted four weeks. Therapeutic massage was applied just after sessions of medical gymnastics. Duration of a massage procedure was up to 30 minutes in this period. The cervical zone, thoracic and lumbar regions of backbone, unaffected extremity and the sick, damages extremity were massaged. But a moderate, light regime manipulation was specially used for the sick, damaged extremity. The following massage manipulation such as stroking, rubbing, kneading were applied [25].

3. Physical rehabilitation of children at the closing stage

In the course of the given period of rehabilitation physical exercise were being performed with an increasing for all groups of muscles. All the previous exercises, increasing the dance ones were repeated. Real dance performance was created on the base of special parameters: (a) perfected excellent performance of each movement, (b) stand of half toes without support, (c) walking about the hall, application of movement with resistance, standing on one leg, running,; ride a bike, light jumping. The dance item was performed on count and to music accompaniment [26]. Each exercise was done 6-8 times. In the closing period of physical rehabilitation duration of session was 35 min. They were held 3 times a week and they lasted 2 weeks. After each session, the massage procedures were held, they lasted up to 40 minutes with applying all the massage manipulations in normal regime. These massage manipulation were applying on unaffected extremity and damage one as well plus cervical zone, thoracic and lumbar regions. The following massaged manipulations such as stroking, rubbing, kneading and vibrations [25].

In order to process the gathered information we used the methods of mathematical statistics with calculating an arithmetic mean (\bar{X}) standard deviations from the mean (σ), St'udents criterion (t) at confidence level $p < 0,05$.

RESULTS OF THE RESEARCHES AND THEIR DISCUSSION

We achieved more preferable indices of morphological and functional abilities a of damaged extremity clue to applying author's variant of physical rehabilitation with the children with imbecility who have endured fractures of the talocrural joint (Table 1).

Table 1: Dynamics of morpho functional indices of the lower limb after fracture in children with imbecile on the background of rehabilitation

Indices	The beginning of the experiment M±m		After rehabilitation M±m	
	Control group, n=25	Experimental group, n=27	Control group, n=25	Experimental group, n=27
The circumference of calf muscle, cm	20.6±0.14	20.5±0.12	21.8±0.16	24.2±0.12 p<0,05
The circumference of the ankle, cm	16.1±0.32	15.6±0.30	17.1±0.19	18.8±0.15 p<0.05
The circumference of the tibia, cm	13.5±0.26	13.7±0.25	14.3±0.28	17.7±0.34 p<0.05
Oblique pass, cm	19.6±0.30	19.8±0.27	20.8±0.28	24.2±0.32 p<0.05
Dorsal extension	15.1±0.44	15.2±0.49	19.2±0.58	24.6±0.39 p<0.01
Planter extension in degrees,	35.3±0.29	36.0±0.31	40.0±0.34	46.9±0.38 p<0.01
Force of support, kg	8.1±0.25	7.6±0.38	14.9±0.31	20.0±0.33 p<0.01

Conventional symbols: p - reliability of differences of rehabilitating results in the control and the Experimental group (we did not detects significant discrepancies between our groups)

The best anthropometric parameters have been achieved as a results of rehabilitation according to author's programmers. Significances of gastrocnemius muscle's circumference, malleolus's circumference, crus's circumference exceeded the significances of the control[27].The achieved results should be with more active stimulating influence of author's methodic on the osteo muscular and nervous system of an extremity [28].Probably the basis of achieved result is also explained by enhancing the trophicity of tissues in damaging zone simultaneously with enhancing synthesis of ATF and protein at the expense of activating blood flow and stimulating the neurotrophic influences [29, 30].

In the experimental group more marked evident positive results of goniometry pointed out to intensification the anabolic processes in tissues of damaged joint at the expense of enhancing the transcribed and transmitted processes in the joint's tissues [31].

From the data presented it becomes clear that the rehabilitation complex developed by the authors, including special choreographic exercises aimed at training the muscles of the foot and shin, have a complex strengthening effect on all tissues of the lower leg of children with imbecility. This is confirmed by the achieved increase in the indices of the ability of the previously injured limb, the level of which exceeded the values of the control group.

CONCLUSION

With children with imbecility different damages of talocrural joint cause not infrequently a long restriction of mobility in the lower extremity, exert negative influence on the lauding physical systems of organism and general level of health. The authors have worked out the methods of physical rehabilitation with

applying the choreographic elements. Such a methodic was being realized during the three periods of rehabilitation: preparation (2 weeks), basic (4 weeks) and closing (2 weeks). As a result of application the worked out methodic we have determined its high effectiveness. This effectiveness has exceeded the traditional variant of rehabilitation. The author's method of physical rehabilitation with applying the choreographic elements has enables us to achieve more marked improvement of the considered anthropometric indices, support ability too of having been damaged lower extremity with children with imbecility. Effectiveness of the worked out methodic enables author's to attract attention of a circle of experts in rehabilitation and to recommend it for application by the profile specialists in their work.

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