

Effectiveness of Specific Physical Exercises in Cases of Ataxic Cerebral Palsy

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Abstract:

Goal of the research was the effective use of physical therapy in cases of cerebral palsy, and improvement of functional independence of children with cerebral palsy by applying appropriately selected physical therapeutic exercises. Physical therapeutic exercises were divided according to various forms of cerebral palsy; we studied every movement of children with cerebral palsy (developed blocks and its causes) that gave us an opportunity to determine which movement habit interferes right development and causes formation of anomalous forms (postures, patterns).

The research was carried out in the Medical and Educational Center of Children Neurology and Neurorehabilitation of Tbilisi; 9 patients with a diagnosis of ataxic cerebral palsy participated in the research. Gross motor function assessment was made on the basis of GMFM scale. Conditions of patient # 1 was improved to 63.2 percent in comparison with the initial stage, in case of patient # 2 improvement reached 60.1 percent, in case of patient # 3 – 61.3 percent, for patient # 4 – 59.8 percent, for patient # 5 – 57.2 percent, for patient # 6 – 60.1 percent, for patient # 7 – 63.1 percent, in case of patient # 8 improvement was 61.9 percent and in case of patient # 9 – conditions improvement reached 60.6 percent.

Key words: pattern, tremor, nystagamus, dissymmetry

Introduction:

Ataxia is a type of cerebral palsy caused by the loss of cerebellar control. It is characterized by an unbalanced gait. An ataxia gait is often referred to as a drunken gait, as it resembles the walk of someone who is intoxicated.

According to Batshaw and Perret, "The cerebellum coordinates the action of the voluntary muscles and times their contractions so that movements are performed smoothly and accurately" (p.163)[1].

Ataxia is characterized with incoordination and balance dysfunction [3]. Usually ataxia is characteristic to full-term infants with early prenatal disorders. Clinically and etiologically it belongs to heterogenic group. Practically diagnosis of ataxia is made applying the method of exclusion; in this case it becomes necessary to exclude existence of slowly progressing neurodegenerative disease. In majority of cases, during babyhood it is expressed by hypotension and motor and speaking skills delay. Gradually, ataxia becomes weaker. Speech development depends on intelligence. Child having this type of disorder speaks slowly and in an irregular manner.

It is important to start physical therapy from the very early age, as early intervention enhances proximal control development [4]. Treatment should be carried out in accordance with individually planned program.

One form of ataxia in cases of cerebral palsy is very rare. Mixed types of ataxia are more common. For example:

- With spasticity
- With proximal hypertension
- With athetosis
- Expressed only in distal form

Ataxia characteristic features

- Low muscle tone – hypotonia
- Inability to hold a posture
- Absence of proximal stability in distal segments during movements
- Nystagamus

- Intentional tremor
- Dissymmetry
- Difficulties in movements against gravitation
- Uncoordinated movements
- Walking with legs kept aside for the purpose of increasing support

Resources and Methods:

The research was carried out in the Medical and Educational Center of Children Neurology and Neurorehabilitation of Tbilisi; Patients health assessment was made by neurologist who made diagnosis of children and determined level of cerebral palsy severity. These children underwent specific graded exercise therapy developed by us in accordance to the severity of illness. And parents were advised on recommended exercises that could be applied at home. We carried observations during 5 years. At every stage of observation we made motor assessment, by using GMFM scale and evaluated children's following skills:

- head control
- turning around
- sitting/sitting up
- standing in crawling position and moving around
- standing on knees and moving around
- standing up/standing
- walking

In case of ataxia we considered that we could have the following:

- increase of posture tone
- activation and normalisation of balance reactions as they in fact exist but are poorly coordinated
- improvement of coordinated movements
- difficulties in selective movements
- we should not cause intentional tremor

During treatment we paid attention to the following:

- body unity (by bending, unfolding, primitive)
- specific disease tone (in pelvis, shoulders, trunk, hands, legs)
- pattern of movements (raising head, turning on side, sitting, sitting up, standing up, standing, walking)
- factors interfering in movement (what is interfering in normal movements and why)
- pathological patterns (bending, unfolding)
- assessment

treatment included 4 courses a year and each course involved 20 procedures.

Results and conclusions:

The first group we selected involved 9 children who started treatment from the 8th to 12th month of their lives. For having homogeneity we selected children with ataxic cerebral palsy.

Table 1. Dynamics of results (percentile, GMFM) of treatment with physical exercises of nine patients having ataxia

Patient	Before Treatment	After 1Year	After 2 Years	After 3 Years	After 4 Years	After 5 Years
1	9.7%	20.1%	38.6%	45.2%	56.3%	63.2%
2	12.8%	28.1%	39.8%	47.8%	56.8%	60.1%
3	13.2%	30.2%	41.9%	48.3%	56.8%	61.3%
4	10.6%	28.4%	39.8%	44.1%	51.9%	59.8%
5	9.9%	21.5%	34.7%	43.9%	50.2%	57.2%
6	10.9%	25.9%	38.9%	49.8%	56.1%	60.1%
7	10.1%	28.9%	37.7%	50.2%	59.3%	63.1%
8	9.8%	27.8%	38.9%	45.1%	54.9%	61.9%
9	9.9%	27.8%	37.8%	46.9%	55.6%	60.3%

As it is seen from the Table 1, in case of patient # 3 the results of physical exercises were improved to 30.2 percent, from the initial stage (13.2 percent), in one year and to 61.3 percent in five-year period.

In case of patient # 1 the results were improved to 20.1 percent, from the initial stage (9.7 percent), in one year and to 63.2 percent in five-year period.

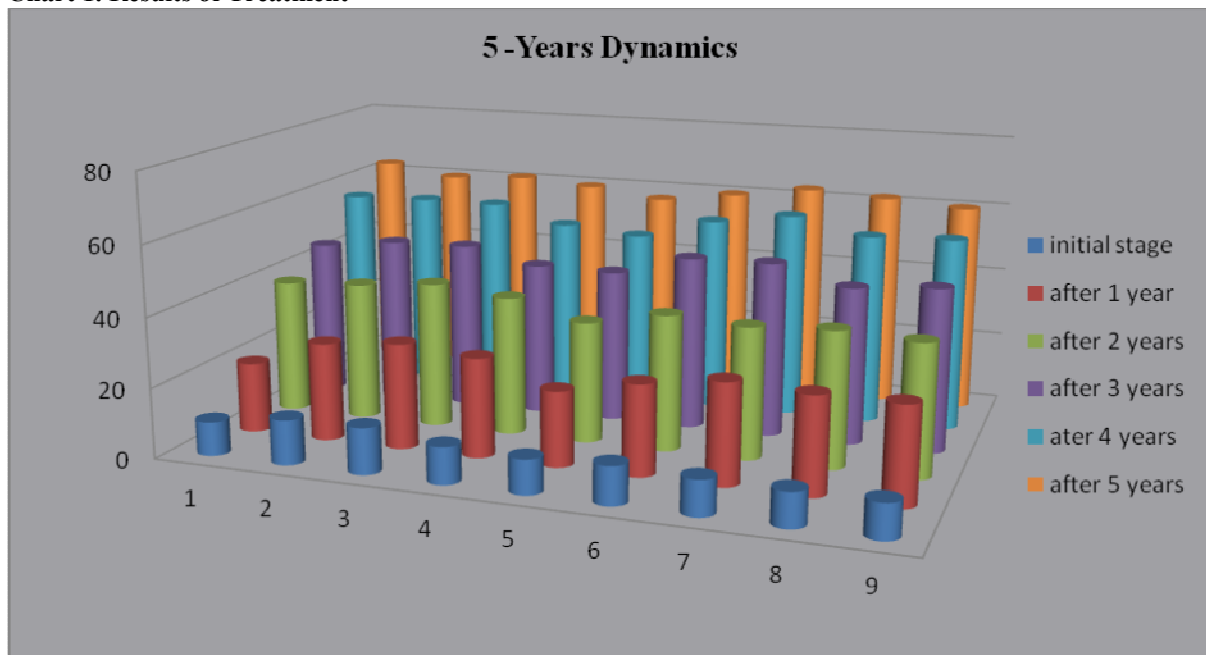
If we analyze mean percentile data of every next presented in the table, we will find that results were improved by 14.43 percent after one year of physical therapeutic exercises, by 13.24 percent after two years, and from 8 to 9 percent during third, fourth and fifth year of physical therapeutic exercises.

We received positive dynamics in all cases, though dissociative physical therapy was particularly effective in case of patient # 3. The lowest score was received in case of the patient # 1 who had the same disorder. We did not find statistically reliable difference in diagnosis. Results of the research show significant increase of GMFM-scale points in case of every child that makes the effectiveness of physical exercises evident; individual data of patients also become evident and it makes it possible to correct the amount of load.

Chart 1 presents dynamics of results received from physical exercises. The vertical axis presents **percentage of patients' functional improvement and horizontal axis indicates the cases of research; I – initial stage, II – after one year, III - after two years, IV – after three years, V – after four years, VI – after five years.**

As it is seen from the chart physical exercises have different results in every case and this difference is directly conditioned from the severity of disease and load of physical exercises.

Chart 1. Results of Treatment



Results of the research show that regular physical therapy improves motor skills of patients and consequently decreases inability. By decreasing inability it becomes possible to improve patients' life quality and social activities; decreasing disability also improves psychological and emotional conditions of the child and his or her family members and results in decrease economic expenditures.

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