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Physical Education, Sport and Kinetotherapy Journal

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APPEARS QUARTERLY
Year XII No.1 (43)
January-March 2016
ISSN (online) 2286 – 3702; ISSN–L 1454 – 3907
http://www.unefs.ro/discobolulmagazine.html

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CONTENT

STIMULATION OF TRIPLE EXTENSION TONE AND ORTHOSTATIC BALANCE IN THE CHILD WITH CEREBRAL PALSY THROUGH EXERCISES SPECIFIC TO MEDEK METHOD

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Abstract. *Regaining the stand position and also gait in the case of children with cerebral palsy in spastic form has become a really topical issue, considering that early re-education and advancements of surgical treatments (especially the minimally invasive one, as miofibrotomy) and pharmaceutical treatments have begun to offer substantial benefits regarding the increase in their quality of life. The hypothesis from which we started in the development of this research was that the systematic practice of MEDEK-type exercises (specific to the stage when locomotion and orthostatic balance reaction should occur), twice a day, for 45 minutes, individualized for each patient – age, neuromotor development, momentary availabilities, etc., significantly accelerates the appearance of two reactions – trunk and lower limb extension and orthostatic balance, even if the child has not shown before visible trends to manifest them. The research was conducted in the period 2014-2015, within the polyclinic S.C. Rosana Medical S.R.L, on two groups of children (7 in each group) aged between 2-4 years. The first group was applied the kinetic methods specific to neuromotor development stages (Bobath method), and the second group, exercises specific to MEDEK method. The research conclusions demonstrate the beneficial effect of exercises from Medek method on the rapid gain in orthostatic balance, as a result of good coordination between extensor muscle groups.*

Keywords: *orthostatic position, cerebral palsy, neuromotor development.*

Introduction

MEDEK method originates in Chile, its founder being the physical therapist Ramon Cuevas. Meanwhile, the method was renamed Cuevas Medek Exercises, but the term Medek is the most common at the moment (Pásztai, 2004: 229). This term represents the abbreviation of the phrase that can be translated into "dynamic method of motion stimulation" (*Cuevas Medek Exercises*, n.d.).

The purpose of this method is to allow children with motor development disorders of neurological cause to develop automatic motor reactions which they would not be able to develop on their own, because of neurological injuries. Ramon Cuevas, while developing his method, started from the postulate that, even if the child's brain is damaged, it can grow and progress forming other neuronal connections, which is nothing else but the neuroplasticity process. The first aspect supporting this method is represented by gravity and also the brain's ability to stabilize the body in the space. Thus, gravity is the first stimulus in the activation of neuromuscular system. Furthermore, the basic idea is to bring the brain in the situation of creating a postural control response, "surrounding" the damaged cerebral areas by new neuronal connections. This can be done by (Cuevas, 2011: 45):

- exposing the child to "progressive challenges", when he must fight gravity to avoid falling. This progressive balance acquisition allows the child to learn vertical control of the head and body (*CME - Cuevas Medek Exercices*, n.d.);
- an insignificant or no support from the therapist;
- practicing all the time through a sustained effort, because the brain registers the movements.

This method completely differs from traditional approaches in two aspects (Cuevas, 2011: 46-47):

- MEDEK method includes integrated dynamic stretches into functional exercises. Effectiveness is without doubt better than Bobath static stretches;
- hypertonicity of lower extremities does not avert from the stimulation of orthostatic position. In other words, MEDEK method challenges orthostatic position to develop vertical control of the body.

The limits of these methods are given by the child's height and weight, because the therapist must have a very solid body and a significant muscular mass.

Hypothesis. If children with cerebral palsy (in spastic form), who do not show the trunk muscle and lower limb extension and orthostatic balance reactions specific to the age when they should occur, are applied MEDEK therapy three times a week, twice a day, for 45 minutes per session, then these reactions will appear.

Materials and methods

The research was conducted within the polyclinic S.C. Rosana Medical S.R.L, in the period March 2014 - February 2015, on two groups of children aged between 2 and 4 years, suffering from cerebral palsy in spastic form. Each group was made up of 7 children, one for control and one for experiment. Progress was monitored every three months. As regards the level of muscular spasticity, we took into consideration the homogeneity of the two groups. For this, it was used the evaluation of muscular group spasticity according to the model described by Le Métayer (1999). This way, joint angles were evaluated through passive mobilization, firstly with slow speed and then with fast speed. After each passive (slow and fast) mobilization, we noted down the angle dimensions. Measurements were applied to muscular groups of lower limbs, mostly affected in cerebral palsy: triceps surae, hip adductors, ischiotibial muscles. Depending on those values, we selected the children and inserted them into the two groups.

The frequency of recovery sessions was 3 sessions/week, and the duration of a session was 45 minutes. Patient evaluation was made at the beginning and the end of the treatment, monitoring the following parameters: appearance of the body and lower limb extension and orthostatic balance reaction. Extreme grades, responsible for estimating progress, were the complete absence, respectively the total presence of the two followed-up reactions. Their quantification was made creating a scale with values from 0 to 4 for both the triple extension and orthostatic balance reaction.

Implementation of experimental design

1. *Control group*

This group was applied standard kinetic programs consisting of stretching, passive mobilizations, Bobath therapy.

2. *Experiment group*

For the children who, in terms of chronological age, were in the period when they should have adopted an orthostatic position, but they have not, we applied the following procedure: supporting the patient in balance at the leg level and with slight posterior support. Then, once kept in the air for few seconds, we made slight up and down oscillations. This way, we reflexively induced an increase in tone of the body extensors, but also of the lower limbs. Always from the same position, gait movements were imitated and also a lokomat. At the beginning, due to poor coordination between muscle groups, the child tended to go outside the support base and therefore we had to "run" following his center of gravity. The action is similar to the one when we try to maintain balance of a cane in the palm and we have to move our hands according to the cane's oscillation until we manage to regain balance.

The materials we used were three wooden boxes with the same dimensions (20cm x 40cm x 60cm), a bigger box, a wooden plate and two planks with the same dimensions (17cm x 80cm).

Boxes, together with the planks, were combined in different ways creating either a slide or a piano flap or a stair.

Once the child is able to stay in his feet supported by the hip, respectively the legs, using the boxes allows the therapist and parents all biomechanical functional possibilities in order to stimulate integrated stability reactions in orthostatic position and during gait. This type of reactions was used especially when the child managed to sustain his body while being supported at the ankle joint level. Through them, we offered the child different sensations from stand position and also a walking guidance. Materials had a substantial contribution to stimulate walking, because the child thought they were attractive.

Results

From the first sessions (approximately 8-10), we noticed a significant improvement of orthostatic postural tone (Fig. 2) and balance (Fig. 4) among the children being part of the group who was applied exercises specific to MEDEK method. We did not observe the same thing in the control group who was applied Bobath method, accompanied by classical exercises (Fig. 1 and Fig. 3). At the entire study timeframe, there were also periods "on the scene", when we did not have any visible progress with the experiment group. As far as it regards the control group, the progress was visibly slower.

To have a unitary record of the progress evolution, we expressed it in percentages, in relation to the manifestation level in the motor plane considered for that phase. We highlighted the obtained results in the following charts:

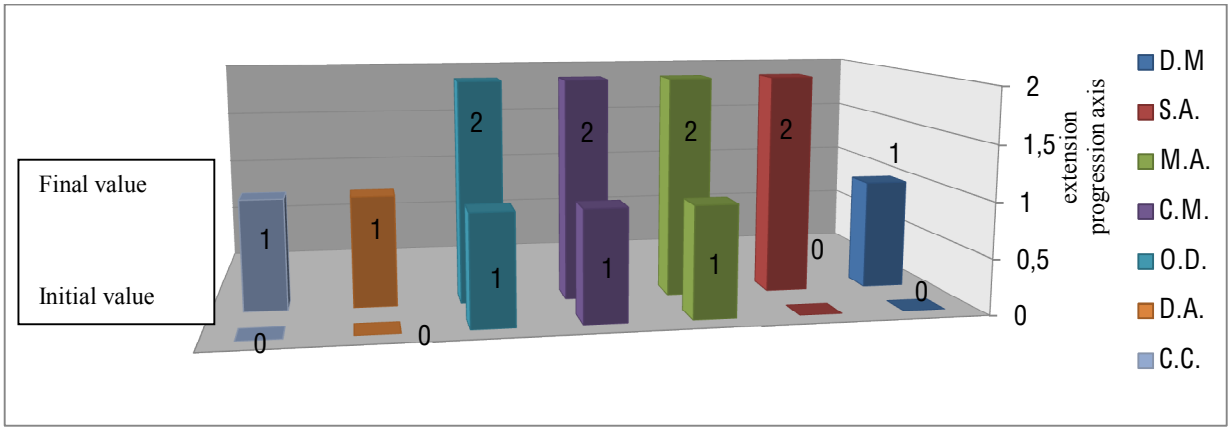

Fig. 1. Evolution of body and lower limb extension parameter, group I

For the body and lower limb extension parameter, we started from an average of 0.42, corresponding to a percentage of ~12.5%, and we reached an average of 1.577, corresponding to a progress rate of ~38%. At the initial evaluation, the limits were 0 and 1, describing the degree of absence, respectively presence of the reaction at the extension of body and lower limbs. At the final evaluation, the limits were 1 and 2.

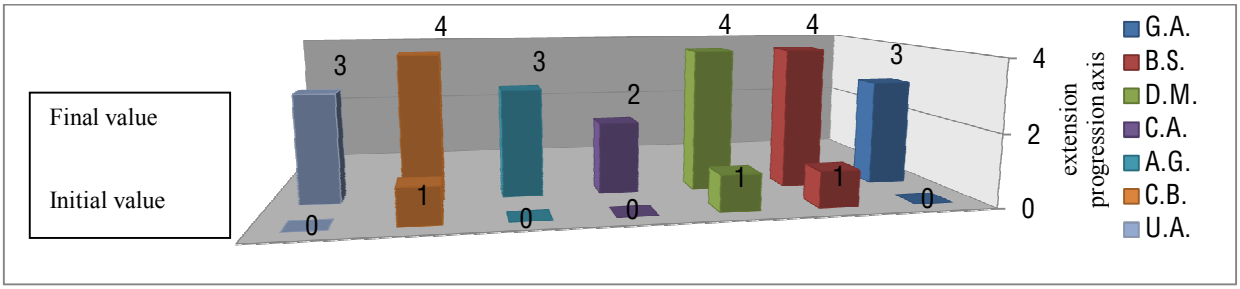

Fig. 2. Evolution of body and lower limb extension parameter, group II

For the body and lower limb extension parameter, we started from an average of 0.42, corresponding to a percentage of ~12.5%, and we reached an average of 3.28, corresponding to a progress rate of ~75%. At the initial evaluation, the limits were 0 and 1, describing the degree of absence, respectively presence of the reaction at the extension of body and lower limbs. At the final evaluation, the limits were 2 and 4. Effectiveness was ~74%. The limit when applying MEDEK exercises was 25% and was supported by individual particularities, respectively intelligence coefficient, degree of spasticity of the body and lower limbs, session frequency.

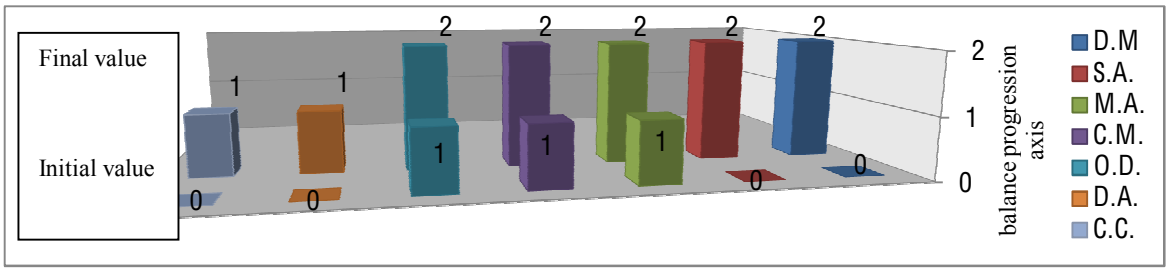

Fig. 3. Evolution of balance in orthostatic position parameter, group I

As shown in Figure 3, for the orthostatic balance parameter, we started from an average of 0.42, corresponding to a percentage of ~12.5%, and we reached an average of 1.71, corresponding to a progress rate of ~38%. At the initial evaluation, the limits were 0 and 1, describing the degree of absence, respectively presence of the orthostatic balance reaction. At the final evaluation, the limits were 1 and 2. Effectiveness of classical therapy was ~35%.

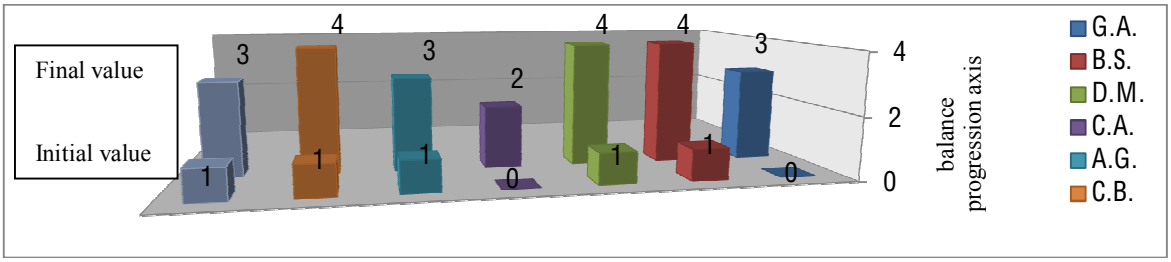

Fig. 4. Evolution of balance in orthostatic position parameter, group II

For the orthostatic balance parameter, we started from an average of 0.71, corresponding to a percentage of ~24%, and we reached an average of 3.28, corresponding to a progress rate of ~75%. At the initial evaluation, the limits were 0 and 1, describing the degree of absence, respectively presence of the orthostatic balance reaction. At the final evaluation, the limits were 2 and 4. Effectiveness was ~75%. The limit when applying MEDEK exercises was 25, being supported by individual particularities, respectively intelligence coefficient, degree of spasticity of the body and lower limbs, session frequency.

As can be seen from the charts, group II registered a significant progress rate in the development of the two reactions, compared to group I. Furthermore, the two reactions proportionally developed in relation to each other.

Conclusions

As regards stimulation of triple extension tone and orthostatic balance in children with cerebral palsy using MEDEK method, we can state with full conviction that the systematic application of an individualized exercise program specific to MEDEK therapy significantly accelerates the emergence and stabilization of these two reactions. This assertion relies on the fact that we started from relatively equal values of their presence and degree of manifestation in both groups (an average of 0.42 for trunk extension and 0.42 with 0.71 for orthostatic balance) and we reached an average value of 3.28 for the experimental group compared to 1.57 for the control group, which corresponds to a progress rate of about 75%.

In specialized literature, some studies have reported about the effectiveness of MEDEK therapy on the CUEVAS MEDEK EXERCISE website, the therapy being applied to a number of children with congenital cerebral hypoplasia, manifested through retardation in neuromotor development. The obtained results were surprisingly good, considering the degree of brain injury.

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DISCOBOLUL No.1/2015 (43)
January-March 2016
eISSN:2286 - 3702; pISSN: 1454 - 3907

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