The Effectiveness of Movement Analysis and Education Strategies (Maes Therapy) in Gross Motor and Balance of Children With Spastic Diplegia.

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Abstract

Spastic diplegia is the second most common form of cerebral palsy. Various approaches for children with spastic diplegia aim to improve gross motor, speed and balance. The new approach Movement Analysis and Education Strategies (Maes Therapy) was developed by Jean Pierre Maes in 2013 and applies to children of all ages where a neurological problem is inhibiting the normal development. The basic belief in the approach is that persistence in short-term therapeutic effects has a negative impact on the long-term development of children. In the present study, 16 children with cerebral palsy-spastic diplegia, level GMFM I-II, who walked independently, without cognitive limitations, participated. (Age 7 ± 1.41, weighing 24.31 ± 4.24, 117.4 ± 9.42). The children were enrolled in an MAES approach program, with 2 sessions a week, one hour in duration. The duration of the intervention was 3 months. After intervention it was found that the gross motor improved: before 67.2 + 16.8, then after 71.0 + 17.3 t (15) = 5.216, p <0.005. On the other hand, there was no statistically significant difference in the results of the footplate for the right foot: 53.9 + 9.0 before 52.7 + 6.1.1 (14) = 1.387, p = 0.187. Similarly, there was no statistically significant difference in left foot scores: 46.0 + 9.0 before 47.3 + 6.1.1 (14) = 1.387, p = 0.187. Further research is recommended to assess the effectiveness of the method over time.

Keywords: maes therapy, cerebral palsy, gross motor, balance

Introduction

Cerebral palsy is the most common physical disability in childhood (Rosenbaum, 2003; Dimitrijević et al., 2007). Spastic diplegia is the second most common form of cerebral palsy and its etiology is congenital (Novak, 2014).

Physiotherapy constitutes a central role in managing the conditions, focusing on the function, movement, and optimal use of the child's potential possibilities. Many therapeutic interventions have been used to minimize the development of secondary and compensatory problems (normalization of muscle tone, increase of active range of motion), to improve muscle strength and mobility, to acquire functional motor skills and to encourage functional independence at home. , at school and in the community (Declerck, 2010).

The clinical symptoms of children with cerebral palsy are different and unique to each child. The therapeutic approach is designed based on the needs of each child based on the type of cerebral palsy and requires the close cooperation of specialized health professionals, such as pediatricians, physiotherapists, orthopedists, speech therapists, psychologists, occupational therapists and social workers. Given the absence of treatment for cerebral palsy in the sense of complete recovery, the efforts of health professionals aim to improve the clinical picture of patients and to develop their capabilities.

Traditionally, health professionals have focused on the weaknesses of the child with OP (Bly, 1991), where the therapist acted as the primary decision maker and the parents had a passive role (Bazyk, 1989). Since the 1980s the traditional model of treatment of children with OP has shifted and focused on the functional abilities of the child in his daily life. Therapeutic intervention is the set of manipulations, which concern specific positions and movements that are applied to the patient's body in order to achieve a specific motor goal. The therapeutic approaches applied to the treatment of cerebral palsy are many (HaddersAlgra, 2014; Levitt, 1962), with the best known and applicable one being developed by the Bobaths and described as neurodevelopmental therapy.

Neurodevelopmental therapy is an evolving approach to treating children with motor impairments due to either congenital or acquired neurological disorders. The Bobaths believe that the main problem of children with cerebral palsy is the lack of inhibition of reflex patterns of posture and movement, and that is where they base their assessment and treatment. They argued that inhibiting these reflex patterns and facilitating normal reactions would prepare the child for motor development (Bobath, 1980).

On the other hand, the technique Movement Analysis and Education Strategies (Maes Therapy) was developed by Jean Pierre Maes in 2013. MAES therapy is applied to children of all ages where a neurological problem is inhibiting the normal course of development. The basic belief of the technique is that therapeutic persistence in short-term results has a negative impact on long-term development. The activation path that the child chooses is often what the child's brain chooses as the easiest solution to get an immediate result, which can help in the short term, but it lacks quality and variety of movements and has a negative impact on long-term development.

Children with neurodevelopmental conditions spontaneously learn to do things in a certain way and that is why they often cannot do other things. Due to the dysfunction of the brain, the child has no choice but to follow a specific developmental path.

MAES Therapy does not focus on achieving goals in the short term. It focuses on reducing "informal" growth and diversity opportunities for better results. It aims to provide the child with an alternative experience and development that does not focus on short-term achievement. Instead, it tries to avoid short-term solutions and lay the groundwork to reduce "informal" growth (bad habits) in the long run. (JP. Maes., 2013)

Material and Methodology

All children and parents who participated in this study, after being informed in detail about all the procedures of the study, signed a consent form. The research protocol was implemented in accordance with the Helsinki Declaration (1975), as revised in 2000, and approved by the Ethics Committee of the School of Physical Education and Sports, University of Thessaly.

Participants

The study involved 16 children with cerebral palsy-spastic diplegia, level GMFM I-II, who walked independently, without cognitive limitations. (Age 7 ± 1.41, weight 24.31 ± 4.24, height 117.4 ± 9.42). The selection criterion of the sample was the absence of recent surgery or injection of sausage toxin.

Research Methodology.

The research was conducted after the summer break in the treatment programs. The children were enrolled in an intervention program with the MAES approach, 2 sessions per week, one hour long. The duration of the intervention was 3 months. The intervention focused on educating children to explore different ways to perform the same activity in order to develop their motor repertoire and to solve potential problems in a variety of alternative ways.

Children were assessed before and after intervention on gross mobility and balance. GMFM (Gross Motor Function Measure) was used to evaluate gross motor function. The Gross Mobility Performance Test was created to evaluate the gross mobility of children with cerebral palsy. The test comprises 20 trials for quality control of movement (Boyce et al., 1991).

Foot pressure scan was used to assess balance. The foot pressure plate performs static and dynamic analysis as well as kinetic gait analysis in a series of steps. Information on the high loads exerted on the lower legs and the balance of the children relative to their body weight center was used.

Children were evaluated before and after intervention by 2 examiners. The examiners were specialized pediatric therapists with years of experience. Evaluation was performed at about the same time, under the same conditions and in the same environment for the entire sample.

In assessing gross mobility, children were entitled to three trials for each trial. The final score was formed by the agreement of the two evaluators.

For the evaluation of lower extremity loading, 3 repetitive static measurement measurements were used on the pressure pad and the result of the 3rd measurement was used.

Statistical Analysis.

For the statistical analysis of the results, a paired t-test was used to identify differences before and after the intervention with a significance level of $p < 0.005$. The statistical package SPSS 20 (IBM SPSS Statistics 20) was used for the statistical analysis of the results.

Results

A paired t-test was used to detect changes in gross mobility and balance in children before and after intervention. The results were:

The gross mobility improved after intervention: before 67.2 + 16.8, while after 3 months was 71.0 + 17.3 t (15) = 5,216, p <0.005. (Table 1.1, Table 1.2)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	GMFMPRIN	67,225	16	16,7782	4,1946
	GMFMMETA	70,969	16	17,3392	4,3348

Table 1.1

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	GMFMPRIN - GMFMMETA	-3,7438	2,8712	,7178	-5,2737	-2,2138	-5,216	15	,000

Table1.2

There was no statistically significant difference in the results of the foot scan for the right foot after the intervention. Specifically, the change was: before 53.9 + 9.0, while after 52.7 + 6.1 t (14) = 1.387, p = 0.187. (Table 2.1, table 2.2)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. ErrorMean
Pair 1	PELMDEKSIPRIN	53,953	16	9,0520	2,3372
	PELMDEKSIMETA	52,693	16	6,1265	1,5818

Table 2.1

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PELMDEKSIPRIN - PELMDEKSIMETA	1,2600	3,5191	,9086	-,6888	3,2088	1,387	14	,187

Table2.2

Similarly, there was no statistically significant difference in the results of the podiatrist for the left foot after the end of the intervention: before 46.0 + 9.0, while after 47.3 + 6.1 t (14) = 1,387, p = 0.187. (Table 3.1, Table 3.2)

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PELMARISTPRIN	46,047	16	9,0520	2,3372
	PELMARISTMETA	47,307	16	6,1265	1,5818

Πίνακας 3.1

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PELMDEKSIPRIN - PELMDEKSIMETA	1,2600	3,5191	,9086	-,6888	3,2088	1,387	14	,187

Table3.2

Discussion.

The results of this study showed that after 3 months of intervention with the MAES approach, children with spastic diplegia improved their performance in the GMFM tests for gross mobility. The weight distribution in the right and left foot and consequently the balance did not make a statistically significant difference. There are reports in the literature about intervention in children with spastic diplegia and gross mobility only for other approaches.

In a 2018 Bessios I. Research on the effect of the NDT-Bobath method on children with cerebral palsy, children were found to significantly improve their performance on the GMFM scale between baseline and final measurement and maintained this improvement unchanged one month later. The study involved 20 children with cerebral palsy (7 with quadriplegia, 6 with diplegia and 7 with hemiplegia) and 20 adults (11 with multiple sclerosis and 9 with hemiplegia after stroke). The intervention program has had a significant impact on the GMFM scale, irrespective of the frequency of its implementation.

Adams et al., research, led to similar results regarding gross mobility and neurodevelopmental treatment. (2000), where gait was found to be improved, as well as that of Knox and Evans (2002), where there was a significant improvement in the GMFM test following a neurodevelopmental intervention program.

Tsorlakis et al. (2005) found a statistically significant improvement in the functional abilities of children in the GMFM test in two groups, one with an intensive program and one with a classic neurodevelopmental program, with a smaller proportion of the group receiving intensive NDT (5 times a week).

Vol. 4, No. 05; 2020

ISSN: 2581-3366

On improving the balance, Ozgirgin et al. (1998), in their study of 305 patients with cerebral palsy, found that postural balance and gait improved after 69 days of neurodevelopmental intervention.

Gonca and Mintaze (2017), studied forty children with bilateral spastic forms of CP, aged between 3 and 10 years, divided into two groups, one group where children did a classic physiotherapy program and the other with the Bobathconcept.

The treatment was 45 minutes, two days a week, for 6 weeks. There was a statistically significant effect on balance.

In the present study the balance was estimated by a foot-load analysis and center of gravity of the legs. The results showed that there was no statistically significant difference before and after the intervention. There are no corresponding studies on the MAES approach to assess whether these results are due to the type of treatment approach or the time period applied.

Conclusions.

It is well known that most approaches for people with cerebral palsy aim to improve weight bearing control, movement coordination, movement initiation, body alignment and muscle strength through functional activities. The MAES approach does not aim at short-term results but at limiting as much as possible the informal development of children and the variety of motor options. Further research is needed on the effect of the approach on both gross mobility and on the balance, speed, posture and long-term development of children with neurodevelopmental disorders.

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ISSN: 2581-3366

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