

## VOJTA AND BOBATH COMBINED TREATMENT IN THE REHABILITATION OF BALANCE IN CHILDREN WITH CEREBRAL PALSY

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<https://doi.org/10.52846/jskm/39.2022.1.5>

**Abstract:** The aim of the present study is to demonstrate that through a combination of Bobath therapy and Vojta therapy, children with cerebral palsy can benefit from the development of a complex rehabilitation program with obvious results in gait and balance rehabilitation. The study included 15 subjects, 8 girls and 7 boys, with an average age of 3-4 years, organized in three groups. Group I - consisting of 3 subjects treated with Bobath therapy, Group II - 4 subjects treated with Vojta therapy, and Group III - 8 subjects where the therapy program consisted of a combination of Bobath therapy and Vojta therapy for 6 weeks. Evaluation of children included: muscle tone assessment, Ashworth Scale, joint mobility assessment, Berg Scale. The results of the evaluations show an improved evolution of the subjects studied following the combined Bobath and Vojta therapy. After the rehabilitation programme, the subjects with the diagnostic of cerebral palsy demonstrate an increased hip and ankle joint range of motion, an increased coordination and improved balance. This study highlights the need for a combined therapeutic approach of Bobath and Vojta therapies.

**Keywords:** cerebral palsy, children, Bobath therapy, Vojta therapy, balance

### Introduction

Cerebral palsy (CP) - describes a group of developmental disorders of movement and posture that cause activity limitation. Motor disorders of CP are often accompanied by disturbances in sensation, perception, cognition, communication and behaviour, by epilepsy and by secondary musculoskeletal problems. This definition highlights the complexity of cerebral palsy and the fact that it is not a single disorder but a group of disorders with different causes. The lesion does not involve direct damage to peripheral muscles or nerves, but represents an inability of the brain to control muscles. In the literature, various rehabilitation approaches are available to improve postural control and balance, namely, Bobath therapy, Vojta therapy, physiotherapy, hydrotherapy. (Kiebzak et al., 2016)

The psychomotor peculiarities of the child with cerebral palsy are always related to normal, and what change them are the specific deficiencies of cerebral palsy. The assessment includes a neurological examination and a complete physical examination. The assessment is a complete analysis of the subject's morpho-functional status, which forms the basis for the strategies and balancing reactions" with the development of normal functional abilities (Bobath, 1984).

programmes needed to rehabilitate these conditions. (Căciulan, 2016).

In order to understand pathologies or injuries in human locomotion, we must first understand how the subject must move. Gait is usually considered the way in which movement from point A to B occurs. Assessing the change in centre of gravity and lower limb loading helps to understand specific asymmetries related to how we move, and this assessment can be done using kinetic (force) and kinematic (spatial/temporal) information. A standard gait assessment requires at least one complete gait cycle. (Knox et al., 2002)

During a movement or a change in posture, the distribution of excitatory and inhibitory processes in the central nervous system reflects the state of the body's musculature, which controls the closing and opening of synaptic connections. The two 'principles of neuromotor development treatment' are based on these considerations (Bobath, 1984): "Inhibition of responses characteristic of abnormal reflex patterns", responsible for hypertonia, a phenomenon called "reflex inhibition"; - "Facilitation of normal upper integrated postural reactions, normalization of postural tone and activation of the resetting and The main goal of Bobath therapy is to facilitate controlled motor activity and inhibit pathological

symptoms of hemiplegia such as spasticity, associated reactions, and mass movement. In Vojta therapy, an attempt is made to introduce an automatic coordination of body position, with well-defined angles of the upper and lower limbs in relation to the trunk and vice versa. The same coordination occurs with different parts of the body to each other, in a regular and reciprocal way (that alternate on both sides of the body, left and right), with a change in the position of the centre of gravity, as it happens with each movement. (Osugi et al., 2014)

Although there are studies in the literature on Bobath therapy and Vojta therapy, they focus more on research, and less on the clinical application of rehabilitation programs. From personal practice, we have observed that the neuromotor rehabilitation of children with infantile cerebral palsy requires rigorous knowledge and attention to design rehabilitation programs according to the particularities of each individual and a combined program of the two therapies is much more effective. (Reimunde et al., 2010)

Therefore, the aim of this study is to demonstrate that through a combination of Bobath therapy and Vojta therapy, children with cerebral palsy can benefit from the development of a complex rehabilitation program with obvious results in gait and balance rehabilitation. (Andrzejewska et al., 2021)

### Material and methods

The study included 15 subjects, 8 girls and 7 boys, with an average age of 3-4 years, organized in three groups, Group I - consisting of 3 subjects treated with Bobath therapy, Group II - 4 subjects treated with Vojta therapy, and Group III - 8 subjects where the recovery program consisted of a combination of Bobath therapy and Vojta therapy for 6 weeks. Evaluation of children included: muscle tone assessment, Ashworth Scale, joint mobility assessment, Berg Scale. The selection of subjects included in the study was made according to essential criteria for conducting the research: subjects diagnosed with cerebral palsy, age between 1-12 years, and motor deficit in one or both lower limbs understand commands and execute them.

The main pathological locomotor changes of the subjects were idealized and therapeutic goals were selected. Muscle tone assessment - Ashworth Scale - is a 6 point scale. Assessment or quantification of spasticity of affected muscles using the Ashworth Modified Scale for the child with cerebral palsy is performed on the spastic

muscles - thigh adductors, knee flexors (hamstrings), plantar flexors (sural triceps).

Berg scale represents a list of 14 actions similar to activities of daily living that the subject must perform. The items are marked on a 5-point scale according to how they are performed each is scored 0-1-2-3-4 (0 = unable to perform, and 4 = perform without any difficulty).

Assessment of joint mobility was performed using the goniometer, measuring joint mobility of the hip, on flexion, extension, abduction and adduction movements, joint mobility at the knee on flexion and extension movements, and joint mobility at the ankle on flexion, extension movements. For this study, we chose to measure the extension angle at the hips bilaterally. The measurement was performed from the prone position with the knee in flexion; the extension movement was passive.

The aim and objectives of the study were to analyse the evolution of the three groups of children, in terms of their response to the three kinetic programs, by objectifying them using functional assessment scales.

The objectives of the rehabilitation program were reducing spasticity, combating abnormal postures, improving mobility, re-educating proprioception and sensory re-education, re-educating of gait and balance and improving of rebalance, defence and recovery reactions.

The therapeutic programme used was the following 6 weeks for each batch:

Group I included 3 subjects, having the diagnoses of spastic tetraparesis (one subject - B1), and left spastic hemiparesis (2 subjects - B2, B3), the treatment plan consisted of exercises for the muscles of the upper and lower limbs. Namely, stretching exercises and passive mobilizations, active exercises performed prone, seated, on the knees and standing depending on the objective and the subject's ability to perform the specific movement. Exercises included assistive devices such as chair, stepladder, treadmill, Bobath ball, balance board and treadmill. Therapy was performed every day for 40 minutes (Figure 1).

Group II included 4 subjects, with the diagnoses of spastic tetraparesis (1 subject - B1), left spastic hemiparesis (1 subject - B2) and right spastic hemiparesis (2 subjects - B3, B4), where Vojta therapy was applied by activating 10 different areas that are available to stimulate reflex motor patterns of locomotion. Gentle pressure was applied to certain stimulation areas (muscles or bones) from 3 positions: supine, lateral decubitus and reflex crawling, every day, 30 minutes (Gajewska et al., 2017) (Figure 2).

Group III include 8 subjects, diagnosed with tetraparesis (3 subjects -A1, A2, A3), left hemiparesis (2 subjects - A4, A5), right hemiparesis (2 subjects - A6, A7) and paraparesis (1 subject - A8). The treatment plan consisted of exercises to stimulate the muscles of the lower and upper limbs, exercises in supine, prone, sitting, prone and orthostatic position, for 40 minutes daily, and after finishing the Bobath exercise program, 30 minutes of Vojta therapy, stimulation in three

positions: supine, lateral decubitus and reflex crawl.

**Results**

Evaluation results using the Berg and Ashworth scales after testing joint mobility are presented in Tables 1 and 2 for the two moments of the evaluation: moment T1 (Table 1) and after 6 weeks of therapy moment T2 (Table 2).

Table 1. Assessment tests before the start of therapy - moment T1

Group	Berg test	Joint mobility		Ashworth Test	
		lLL	rLL		
Group I	B1	15	7°	9°	3
	B2	43	8°	15°	2
	B2	40	10°	17°	2
Group II	V1	41	6°	5°	2
	V2	37	9°	17°	3
	V3	35	5°	20°	3
	V4	42	20°	14°	2
Group III	A1	20	5°	7°	3
	A2	18	6°	7°	3
	A3	22	10°	12°	2
	A4	34	9°	18°	3
	A5	32	11°	19°	3
	A6	43	20°	15°	2
	A7	37	15°	11°	3
	A8	45	12°	13°	2

Table 2. Results of subjects assessment after 6 weeks of therapy - moment T2

Group	Berg test	Joint mobility		Ashworth test	
		lLL	rLL		
Group I	B1	18	8°	10°	3
	B2	45	10°	16°	2
	B3	41	12°	19°	2
Group II	V1	43	8°	8°	2
	V2	38	12°	20°	3
	V3	37	8°	22°	3
	V4	45	20°	19°	2
Group III	A1	29	10°	14°	3
	A2	24	12°	15°	3
	A3	30	15°	17°	2
	A4	40	13°	25°	3
	A5	40	16°	23°	3
	A6	49	24°	19°	2
	A7	45	21°	19°	3
	A8	50	19°	18°	2

Note: lLL – left lower limb (translator’s note) and rLL – right lower limb (translator’s note)

The results of the evaluation show an improvement in the evolution of the subjects studied, in terms of the evaluation scales, as it

follows. During the six-week treatment with either Vojta or Bobath therapy, an improvement of 2°-3° on average of the hip joint extension (B1- 2°, B2 -

2°) is observed in groups I and II, B3 - 2°, V1-3°, V2-3°, V3-3°, V4-4° - Table 1,2). Following the evaluation of the Berg Scale an improvement of 2-3 points on average is observed (B1 - 3 points, B2- 2 points, B3- 1 points, V1- 2 points, V2- 1 points, V3- 2 points, V4 - 3 points). The third group of subjects showed a greater improvement in the degree of hip extension, averaging 5°- 6°, (A1-5°, A2-6°, A3-5°, A4-4°, A5-5°, A6-4°, A7-7°, A8-7°), Berg scale. Thus, it can be seen that subjects were able to perform some movements better, the scale score improved on average by 7-8 points (A1-9 points, A2- 9 points, A3- 8 points, A4- 6 points, A5- 8 points, A6- 6 points, A7- 8 points, A8- 5 points).

Whereas, the results of the Ashworth scale assessment in the three groups did not indicate a significant improvement, but muscle tone was reduced by an increase in hip joint range of motion and an increase in the Berg Scale score (Table 2).

### Discussion

In this study, a semi-effective improvement in balance and gait was observed during the combined Bobath and Vojta therapy program applied for 6 weeks, comparing pre- and post-treatment scores (Tables 1, 2).

These results are in correlation with the findings of Butler and Darrah (2001), who examined the effect of Bobath therapy in treating cerebral palsy, proving that Bobath therapy developed postural control and balance (Butler & Darrah, 2001).

Although many therapists use Bobath therapy for the cerebral palsy child, rigorous research into its clinical effectiveness is lacking. Thus, related to our study we found that Erdogan Kavlak et al. (2018) aimed to analyse the effects of individualized Bobath therapy on balance and gait for children with cerebral palsy. Bobath therapy was applied in sessions of 60 minutes, 2 days a week for 8 weeks. Their individualized program included activities aimed to regulate tone. The normal muscular tone will improve perception and motor development and facilitate movement, also will improve balance and functional capacity for the child with cerebral palsy. After the 8 weeks, the results showed a significant enhancement in motor function, functional level, also according to the authors' independence and balance scores were improved (Kavlak et al., 2018).

In addition, the findings of the study conducted by Lim & Kim (2013) on a group of 3 children diagnosed with spastic diplegia and treated with Vojta therapy for 8 weeks indicate, "Vojta therapy may play a good role in improving spatial-

temporal gait parameters in children with spastic diplegia" (Lim & Kim 2013).

Tayati Watcharin et al. (2019) concluded that performing once a week a 30-minute session of Vojta therapy, performed for three weeks, can improve walking in spastic people (Tayati et al., 2020).

Better balance improves the quality of gait, which allows children with cerebral palsy to move more easily, thus helping them to achieve independence in daily activities. There are not enough evidence-based studies in the literature regarding the combine Bobath and Vojta therapies in children with infantile cerebral palsy. (Jung et al., 2017)

### Conclusions

After the 6 weeks of treatment, the following can be observed. Group I present an improvement in joint range of motion and coordination, group II present an improvement in muscle tone, an increase in joint range of motion. Group III present a significant improvement in coordination and balance, an increase in hip and ankle joint range of motion, and an improvement in cognition and communication.

The results indicated that following the combined Bobath and Vojta therapy rehabilitation programme, the subjects improved muscle tone, increased hip and ankle joint range, increased coordination and improved balance. This study highlights and recommends a combined therapeutic approach of Bobath and Vojta therapies for the child diagnosed with cerebral palsy.

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