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CONTRIBUTIONS TO THE STUDY OF THE APPLICATION OF THE IN REHABILITATION OF WALKING AND BALACE TO CHILDREN WITH CEREBRAL PALSY (CP)

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Abstract: Cerebral palsy - describes a group of disorders of the development of movement and posture, which causes limited activity. CP motor disorders are often accompanied by sensory, perception, cognitive, communication, and behavioral disorders, epilepsy, and secondary musculoskeletal problems. The injury does not involve direct damage to the muscles or peripheral nerves, but is an inability of the brain to control the muscles. 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 a complex recovery program. Material and methods: The study included 15 patients, 8 girls and 7 boys, organized in three groups, Group I - consisting of 4 patients treated with Bobath therapy, group II - 3 patients treated with Vojta therapy, and group III - 8 patients where the recovery program consisted of a combination of Bobath therapy and Vojta therapy for 6 weeks. The children's assessment included: muscle tone assessment, Ashworth Scale, joint mobility assessment, Berg Scale. The selection of patients included in the study was according to some essential criteria for conducting the research: patients diagnosed with cerebral palsy, age 1-12 years, motor deficit in one or both lower limbs, understand the commands and execute them.

Keywords: neuromuscular coordination, gait reeducation, cerebral palsy

Introduction

Cerebral palsy (PC) – describes a group of motion and posture development disorders that limit activity permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that are occurred in the developing fetal or infant brain. One of the most basic functions of living organisms is the ability to control and move the body in space. Damage to the central nervous system cause disorders in neuromuscular, musculoskeletal and sensorial systems which leads to major motor disability PC motor disorders are often accompanied by sensational disorders, perception, cognition, communication and behavior, epilepsy and secondary muscle-skeletal problems.

Children with spastic cerebral paralysis have tonus increased in the muscles and there is spasticity in a group of muscle. Physical therapy interventions we can use to manage brain paralysis are neurological development, force training, functional training against induced motion therapy training, body-supported treadmill training and conductive education. There is lesion in the brain image in the cerebral palsy. For control of body movements and patterns, the brain has motor zones. These engine areas control muscle movements. Newborn babies are under influence neonatal reflexes during six months of life. After 6 months most reflexes begin to integrate and the body begins to control the movements. In the cerebral paralysis reflex is not absent and persists like causes delay in the development of the reference steps and the body can learn wrong patterns due to reflective activity in the abnormal brain. If physiotherapy treatments are being administered that stop reflex activity then children can learn skills and movements, which it can help their everyday work. Children with cerebral palsy have persistent reflections that are not integrated due to cerebral lesion. Early life-time reflexes play vital role in the development of tone, posture and skills (Thibaut A, 2013)

The injury does not involve direct damage to the muscles or peripheral nerves, but represents a failure of the brain to control the musculature. In literature, various rehabilitation approaches are available to improve postural control and balance, Bobath therapy, Vojta therapy, physiotherapy. The physio-motor particularities of the brain paralysis child always relate to normal, and what changes them are the specific defects of cerebral paralysis.

In order to really understand pathologies or injuries in human locomotive, we must first understand how the patient must move. Walking is usually considered the way in which motion from point A to point B. Assessment of changes in the center of gravity and lower limbs loading helps to understand asymmetries . The benchmark for delineating gait abnormalities in children with CP in terms of joint kinematics and kinetic is gait analysis, as well as temporal-spatial gait parameters such as velocity, step length, percentage single limb support in the gait cycle, percentage stance in the gait cycle, and step width which reflect functional severity of gait abnormalities parameters are more easily recorded in the clinical setting and often used as a metric for measuring gait improvement. Assessment of SCALE in relation to lower limb gait kinematics and TS parameters may clarify how SMC impacts gait and can help researchers and clinicians better understand the functional implications of impaired SMC in children with spastic CP. Here, we examine the influence of impaired SMC on gait kinematics and parameters in children with bilateral spastic CP, including knee flexion, step length, velocity and step

width. Achieving a normal step length requires the ability to fully extend the knee in terminal swing, when the hip is flexed, a movement that requires intact SMC. In contrast, achieving full knee extension in midstance, when the hip is extended, does not necessarily require normal SMC. Therefore, we hypothesized that the severity of impaired SMC as measured by SCALE would correlate to magnitude of knee flexion at IC and to step length. (J.Y. Zhou, 2019)

During a movement or posture change, the distribution of exciter processes and inhibitors in the central nervous system reflects the state of the body muscle, which controls the closing and opening of synaptic connections. These considerations are based on the two "principles of the treatment of neuro-motor development": - inhibition of response characteristic of abnormal reflex models", responsible for hypertonia, a phenomenon called "reflex inhibition"; "Facilitation of superior integrated normal postural reactions, normalization of postural tone and activation of repricing and balancing reactions" with changes in normal functional skills. (Bobath B, 1984)

Bobath therapy is the most widely used therapy for children with CP. The Bobath concept focuses on observation and analysis current functional performance of the patient and identify clear objectives of therapy

Within the context of Vojta therapy, an attempt is made to introduce automatic coordination of the position of the body, with well-defined angles of the upper and lower limbs relative to the torso and vice versa, as well as the different parts of the body between them, in a regular and reciprocal manner (alternately on both left and right sides of the body), with the change of center of gravity position, as is customary with every movement.

Reflex Locomosion - foundations of the Vojta therapy – the therapeutic use of the reflex locomotive allows the basic patterns of movement in patients with the central nervous system and the affected locomotor system to be restored once again - at least in part become accessible again.

Although there are studies in literature on Bobath therapy and Vojta therapy, they focus much on research, rather than on the clinical application of recovery programs. From personal practice we have obtained that the neuropathy recovery of children with infantile cerebral palsy, must have rigorous knowledge and attention to the design of recovery programs according to individual specificities and a combined program of the two therapies is much more effective.

The purpose of this study is to demonstrate that by a combination of Bobath therapy and Vojta therapy, children with cerebral palsy can benefit from the elaboration of a complex recovery program with obvious results in the rehabilitation of walking and balance.

2. METHODS

The study included 15 patients, 8 girls and 7 boys, aged 3-4, organized in three lots, lot I - made up of 3 patients treated with Bobath therapy, lot II – 4 patients treated with Vojta therapy, and lot III – 8 patients where the recovery program was a combination of Bobath therapy and Vojta therapy for 6 weeks. The assessment of children included: muscle tonus assessment, Ashworth scale, articular mobility assessment, Berg scale.

The selection of patients included in the study was carried out according to key criteria for conducting the research: patients diagnosed with cerebral palsy, aged 1-12, motor deficit in one or both lower members, understand the controls and perform them. The main pathological changes of patient locomotion were made to the idea and the therapeutic objectives were selected. The muscle tone assessment – Ashworth scale - is a 6 points scale. Assessment-quantification of the spasticity of affected muscles using the modified Ashworth scale (Ashworth Modified scale) for the cerebral palsy child is performed at spastic muscle level – thigh adductors, knee flexors (ischio-gambniers), planning flexors (sural triceps). Place the patient in a supine position. If testing a muscle that primarily flexes a joint, place the joint in a maximally flexed position and move to a position of maximal extension over one second. If testing a muscle that primarily extends a joint, place the joint in a maximally extended position and move to a position of maximal flexion over one second.

Berg scale – is a list of 14 actions similar to the day-to-day activities the patient must perform. The items are marked on a 5-point scale as each one is marked 0-1-2-3-4 (0 = unable to execute and 4 = persorm without any difficulty). Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height.

Joint Mobility assessment – performed using the goniometer, measuring the articular mobility of the hip, on flexion, extension, abduction and adduction movements, knee joint mobility on flexi and extension movements, and ankle joint mobility on flexi, extension movements. For this study, we have chosen to measure the hip extension bilateral. The measurement was taken from the prone position with the knee in flexion, the extension motion was passive.

The aim and objectives of the study were to analyze the evolution of the three lots of children in terms of their response to the three kinesthetic programs by targeting them using functional rating scales.

The objectives of the recovery program were: to reduce back-office spasticity, to combat abnormal posts, to improve mobility, to reeducation of proprioception and sensory stimulation, to reeducate walking and balance and to improve rebalance responses, to defend and recover.

The recovery program used for 6 weeks for each lot was:

Lot I - for the 4 patients included in lot I with diagnosis of spastic tetra-paresis , the treatment plan consisted of exercises for the muscles of the upper and lower limbs : passive styling and mobilization exercises, active exercises performed prone, which consisted of repetitive sensor-motor exercises using existing function of the affected extremity in task-oriented training and movements used during daily activity, passive movements of the limbs, trunk strengthening exercises, goal directed movements and mobilization including gait training.

Lot II - for the 3 patients included in batch II, with diagnosis of spastic hemiparesis, where Vojta therapy was applied by activating 10 different areas that are available to stimulate the motor models of reflex locomotive. Vojta therapy was implemented by stimulating the chest zone, which is located between the 7th and 8th rib, use of additional zones was allowed to support the activation.

Lot III - composed of 8 patients with diagnosis of spastic tetra-paresis - 3 patients , left spastic hemiparesis - 2 patient, right spastic tetra-paresis - 2 patient and paraparesis - 1 patient, the treatment plan was made up of exercises for muscle stimulation of the lower and upper limbs, exercises of supine position, ventral decubitus, seated, quadruped and standing, for 40 minutes daily, and after the completion of the Bobath exercise program, we continue with 30 minutes of Vojta therapy, three-position stimulation: supine position, decubitus lateral and reflex creeping.

Conclusions:

These results are in correlation with what Butler and Darrah Claim (2001), which examined the effect of Bobath therapy in the treatment of cerebral paralysis, proving by the results obtained as Bobath therapy developed postural control and balance. (Butler C, 2001).

Despite the widespread use of Bobath therapy, there is a lack of rigorous research into its clinical efficiency. Thus, in connection with our study, we found that Erdogan Kavlak (2018) in the article was aimed at analyzing the effects of Bobath therapy on the balance and walking for children with infant cerebral palsy for 8 months. After each patient has been assessed, individualized Bobath therapy programs have been established. Bobath therapy was applied 2 days a week for 8 weeks.

A therapy session took about 60 minutes. The program included the following: activities for tone adjustment, work that supports sensorial engine perception and development, activities that facilitate regular movement, balance and functional capability. After the 8 weeks, the results showed a significant improvement in motor function, functional level: Skill scores and balance. (Kavlak, 2018).

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