

**INTEGRAL REHABILITATION PROGRAMME IN CHILDREN WITH
CEREBRAL INJURIES**

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Integral rehabilitation including kinesitherapy, ergotherapy and art therapy in children with neurological deficiencies has a beneficial effect on the physical status restoration, improved the neuro-muscular coordination, stimulates psycho-emotional development and assist in resocialisation. The purpose of the present study was to investigate and analysed the effects of integral rehabilitation treatment in children at an early age with regard to the proper and timely development of locomotion and correction of pathological locomotor stereotypes established in results of the cerebral injury. The study was conducted in children with cerebral injuries at the age of 4 to 7 years, impaired locomotor coordination, finding difficulties in daily living activities and hence, needing assistance. After the rehabilitation treatment, the locomotion of children has been improved. The muscle tone of legs was better, and the active movements of upper extremities and participation in everyday activities were improved. The participation of children in specialised occupations was stimulated. Playing games and art therapy stimulated the psycho-emotional and locomotor development of children in the survey.

Key words: cerebral injuries, art therapy, game therapy, everyday activities, individual programmes.

Introduction

The prevalence of cerebral palsy in Europe is 2.0-2.5/1000 newborn babies. It is significantly more frequent in the following groups of children: prematurely born, immature, intrapartum asphyxia, cerebral haemorrhage, periventricular leukomalacia, multiple pregnancy. The variety of residual damage after the cerebral injury determines the need from integral application of medical, educational, and social means for physical and mental rehabilitation of the small patient (Bozhinova V. I. Chavdarov, I. Milanov, 2014, 261-264).

The purpose of rehabilitation in the early childhood is to ensure a proper, timely development of locomotion and to correct the abnormal locomotor stereotypes occurring after the cerebral injury. The greatest effect is obtained when the programme begins during the infancy. At that time, stimulation of the coordination of movements of the suckling child using the method of Vojta and/or Bobath is recommended, with emphasis on the former. The knowledge of these methods and elements of techniques allows for a very differentiated approach to the needs of every patient. The variety of physical exercises is employed but most applied are the reflexes, passive, active exercises, with devices (items), either elementary or complex, applied locomotor etc. depending on the set goals and the tasks that should be solved (Karaneshv G., Sokolov B., Venova L et al. 1987, 308 p.).

The occupational and art therapy are important elements of integral rehabilitation of cerebral palsy. The *main goals* of this therapy in children with cerebral injuries are: development and strengthening of locomotor functions; development of cognitive abilities and the memory, development of psychic processes - perception, thinking, attention and training in activities of daily living (ADL) (Paskaleva R, S. Mihaylova, K. Mollova, M. Petrova. 2010; 346-348.). The latter are further divided into: activities for sitting in the bed, keeping balance while sitting; activities in the wheel chair – moving from the bed into the wheelchair and vice versa; opening and closing the doors, passing through doors, self-care tasks – personal hygiene (washing, combing etc.), dressing, feeding; activities with the hands – writing; activities for moving; activities for travelling (Paskaleva, R., 2012, 226- 231).

Ergotherapy is conducted in the form of a game, as a primary activity contributing towards their healthy development. Through it children build up their knowledge of the

environment, exhibit the proper reaction, acquire various habits and patterns. Playing provides rich opportunities for developing motor skills and for a general physical strengthening of the child (Koleva, I. 2009, 1-2, 53-58). Through various games, cognitive skills, spatial orientation, bimanual coordination, hand-eye coordination etc. are improved as well. Activities are conducted individually or in groups of 2-3 children. This kind of activities have a stimulating effect, build up skills, increase self-control, develop qualities of mutual help and accurate judgment (Topuzov, I, 2007, 309 p).

The PEOP (Person-Environment-Occupation-Performance) model is an ecological ergotherapeutic model representing the interaction between the person (the internal factor) and the environment (the external factor). The paedagogic capacity of the PEOP model is important in the process of integration and socialisation of children with special educational needs (Paskaleva, R. 2013; No. 2: 32 – 38).

The extent of application of ergotherapy procedures is determined by: the condition of the ill child (physical or psychological damage); the degree and severity of the damage; the child's age; the sought recuperative effect. Before the commencement of ET, it is advised to diagnose the current psycho-social and emotional development of the affected child. To this end, the verbal and non-verbal communication among the family members and the child is studied (Paskaleva, R. 2012, 120 p).

Art therapy has been used successfully in children and adolescents who have been depressed, shy, experienced family tragedies or various forms of physical and psychological violence. They need self-assurance from self-expression and positive experiences (Popov, T. 2004). Different forms and types of art therapy are also applicable for unruly, unrestrained or distracted children, as well as those that have trouble concentrating. The capabilities of art therapy as a means of upbringing, prevention and prophylaxis, however, have not been fully utilised yet (Popov, T. 2008).

Montessori therapy has been applied with great success in children with cerebral injuries. This is a therapy system for children with development problems in the following areas: preparatory material – development of fine motor skills, attention, cooperation, imitation; activities of daily living – undressing, dressing, pouring liquids, ordering items, using a spoon, ironing, cleaning the table, the room, etc.; sensory material – form, size, volume, surfaces, geometric shapes; language material – studying Bulgarian language, reading, writing per a special system; mathematics – math education with exemplary material based on counting to 9. *The primary work goals* integral to the Montessori therapy are: development of the rough and fine motor skills; improving concentration and attention span; developing independence and a sense of responsibility, improving the child's self-esteem. Activities of daily living – undressing, dressing, pouring liquids, ordering, using a spoon, ironing, cleaning the table, the room, etc. (Nikolova, R. 2012, p. 47).

Types of art used in art therapy work with children:

Drawing. Visual art has been used for decades in upbringing and therapy. The main reason is the children's desire to do something and draw. It is a pleasant occupation for older children, students and adults, has a beneficial effect on socialisation, resocialisation and rehabilitation (Popov, T. 2008).

Tale therapy. This form of therapy has a very good effect on children, youths, adults and elderly persons as well. It is used at kindergartens and schools, at rehabilitation centres for children and adults, for children with special educational needs, and adults with motor and psychological deficits.

Sand figure therapy. This form of art therapy has been used since ancient times and can be seen as therapy through playing with sand. It is successfully used in work with children for psychotherapy, psycho-stimulation and correction in the form of playing under various

climate conditions, along the sea and at special centres for work with children (Popov, T. 2008).

Character therapy. A relatively new but quite promising method, whose author is the renowned Russian art therapist Andrey Gnezdilov. He defines character therapy as a search for and incorporation of new roles. At its base is role-playing and the change of characters within the game. To this end, various costumes, accessories, makeup are used, with the participants changing clothes and playing various scenes, dramatisations, plays. They are completely free to improvise and fantasise (Popov, T. 2004).

Over the last few years, art therapy is being increasingly used in the treatment and rehabilitation of children with cerebral injuries. As a form of therapy, it is used in the social and paedagogic fields, finding applications in the training of students of various specialties – psychologists, paedagogues, rehabilitators, therapists, etc. (Paskaleva, R. 2013; No. 2: 32 – 38).

The aim of the present study was to investigate the analyse the effects of integral rehabilitation in children with cerebral injuries in early childhood with respect to the proper and timely development of movements and correction of pathological locomotor stereotypes resulting from the brain damage.

Material and methods

The study was performed with 7 children (from 4 to 7 years of age) with cerebral injuries, impaired locomotor coordination, difficulties in self-care and dependent on adult assistance.

The rehabilitation activities lasted 5 weeks, 5 times a week with a duration of 30-40 min during the clinical training of second- and third-year students in Medical Rehabilitation and Ergotherapy.

For obtaining more objective results from the kinesitherapy and ergotherapy, the children were examined twice (in the beginning and at the end of the programme) using specialised tests for evaluation of motor skills and activities of daily living test (ADL test) for children older than 3 years of age. The tests served to score the motor skills, moving in the environment and self-care with a 4-point scale: 0 – not able to perform a given activity, even assisted; 1 – performs the activity with assistance; 2 – able to perform the activity without assistance, but not correctly; 3 – able to perform the activity without assistance and correctly.

After the examinations, it was established that two 4-year-old children were with preserved mental capabilities. They were able to sit on their own, but walked with assistance. The motor skills of upper extremities was decreased when distal parts were moved, and the muscle tone of legs was increased. The other 2 children were 5-year-old, with impaired gait, but could walk with a walking frame. The muscle tone of legs was slightly increased, and movements of upper extremities were uncoordinated, with impaired fine motor skills. The other 2 children were 7-year-old, were able to walk alone, but exhibited disturbed balance, impaired muscle tone and activities of daily living.

Rehabilitation programmes including kinesitherapy, ergotherapy and art therapy were developed depending on the age and motor skills of children, with emphasis on special items and the game elements of occupations.

Rehabilitation programme for 4-year-old children with cerebral palsy:

1. *Kinesitherapy* – positional treatment for activation and improvement of head control by means of verticalizer and trunk stabilisation chair, relaxing massage of extremities, passive exercises for legs and active exercises for hands, respiratory exercises – static (gurgling) and dynamic, continuous stretching for prevention of contractures and deformities, relaxing

exercises, back-to-belly rolling, stimulation of crawling according to Vojta (Bozhinova V. I. Chavdarov, I. Milanov, 2014, 261-264), training in head lifting, exercises for balance and coordination with a PHYSIO ROLL ball, training for walk in a walking frame.

2. *Ergotherapy and art therapy* – game therapy in the dry pool, sensory activities, exercises of the grips and modelling.

For improvement of the stance of children, positional therapy was used. It allows maintaining a proper body position in children with various motor deficiencies and brings the following benefits: better participation and interaction with the environment, teachers and friends, which stimulates the social and cognitive development, prevention of deformities and alterations of muscles, joints and tendons via passive stretching or anatomical and neutral positions for the locomotor system. The positional therapy included various types of chairs and verticalizers according to individual needs of the children (Koleva I., 2009, 168 p.)

Rehabilitation programme for improvement of motor skills of 5-7-year-old children:

1. *Kinesitherapy* – positional therapy aimed at reduction of muscle tone, relaxing massage for legs, active exercises for upper extremities and the trunk, respiratory exercises – static and dynamic, stretching of legs, resistant band shoulder exercises; exercises on the Swedish ladder and with small devices for the distal parts, exercises for balance and coordination with PHYSIO ROLL ball, crawling as per Vojta, training in walking properly without aids.

2. *Ergotherapy* – game therapy in the dry pool, mobile games, Montessori therapy, art therapy (plasticine modelling, painting with different items, paper folding, tale therapy etc.).

Results and discussion. After the implementation of the rehabilitation programme, the motor skills of children were improved. The tone of legs' muscles was improved (Fig. 1), with predominant scores 1 in the beginning of the programme and assisted movements. By the end of the period, scores 2 were more prevalent, indicating increased locomotor activity.

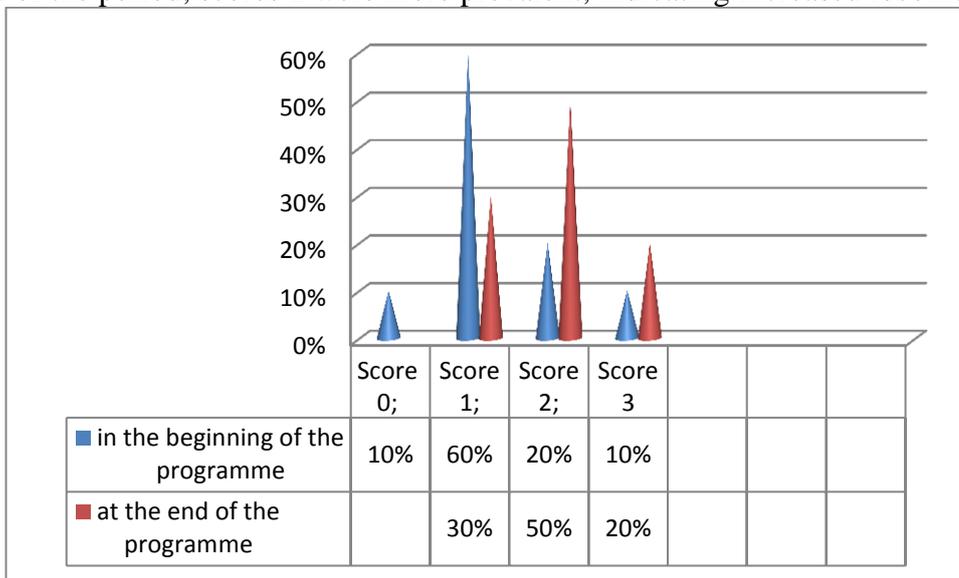


Fig. 1. Evaluation of the movements of legs

The comparison (Milkov, D. 1996) of results from Fig. 1 with respect to scores 2 and 3 using Pearson correlation analysis [8] showed a strong correlation between the groups ($r=0.71$; $p<0.05$). The applied programme of rehabilitation improved the motility of legs, the

equilibrium and contributed to a better body position while sitting.

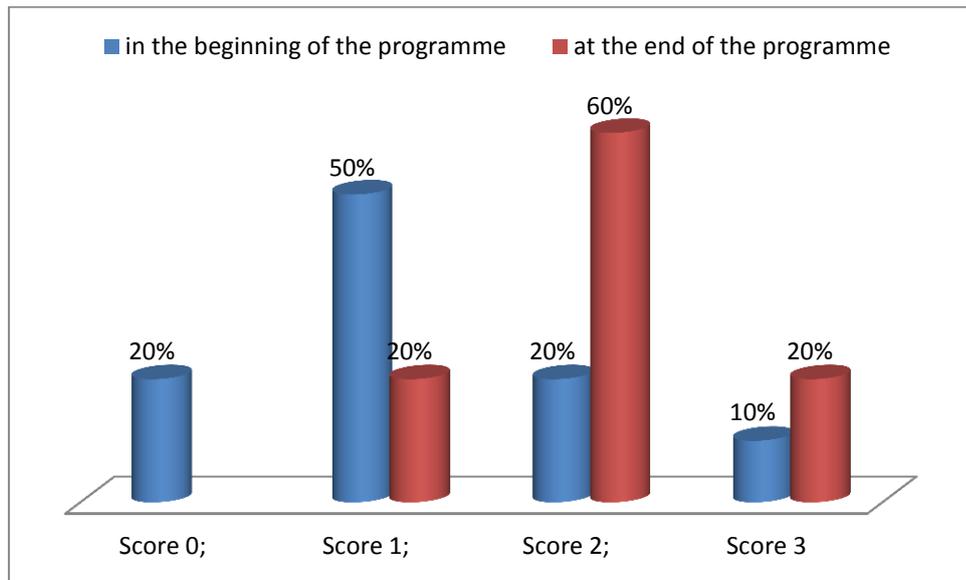


Fig. 2. Evaluation of the movements of hands

The active movements of upper extremities (Fig. 2) were also improved, with their involvement in daily activities. The results were better by the end of the programme with relative share of score 2 60% and of score 3 - 20%. The study results provide a proof for the good effect of occupational therapy and art therapy for stimulation of active movements of hands and fine motor skills.

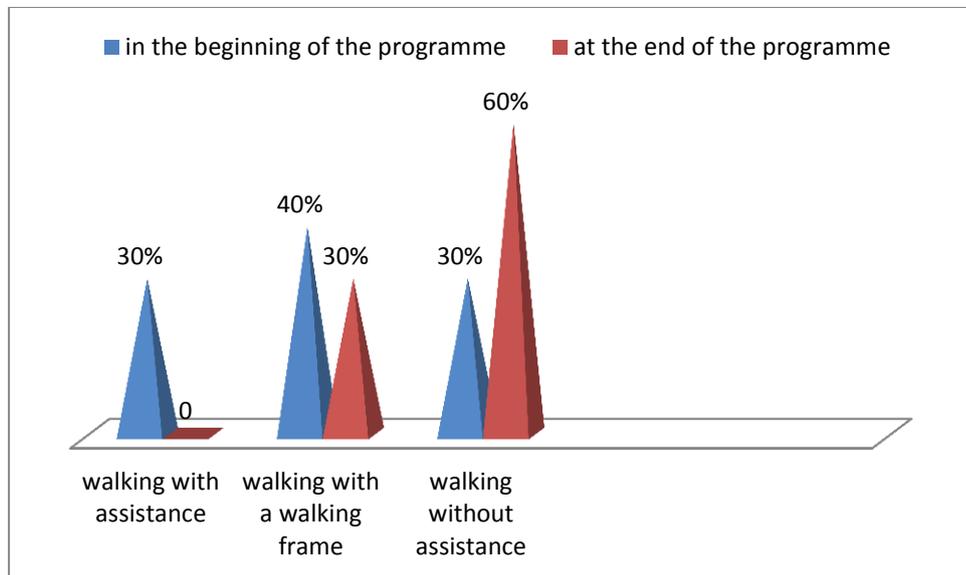


Fig. 3. Walking without and with aids

The gait, equilibrium, psycho-emotional tone and locomotor coordination (Fig. 3) were all improved. In the beginning of the programme, 30% of children were able to walk without assistance while by its end – their proportion was already 60%.

The comparison of relative proportions of scores 2 and 3 for the hands and the legs

(Fig. 1 and 2), the obtained values were $U = 2.32$ ($U > 2.13$; $\alpha = 0.05$). This allowed affirming that there was a statistically significant difference between compared scores. The movements of the upper extremities were considerably better influenced by the applied rehabilitation programme.

Conclusions and comments

- The various forms and content of art therapy are also applicable to unruly, unreserved, distracted children and in children with attention deficit. The potential of art therapy however as an educational, preventive and prophylactic means are not yet fully realised.
- The use of game playing and art therapy stimulated the psycho-emotional and locomotor development of studied children.
- Ergotherapy stimulated the locomotion and equilibrium reactions of children.
- The elaboration of individual programmes for home care compliant with the needs and abilities of the child at a given time is recommended. They are destined to involve parents in the educational process, as well as to automation of acquired skills.

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