https://doi.org/10.52449/1857-4114.2022.39-1.11
CZU: 615.825:616.8-053.2

A POSITIVE IMPACT OF COMPLEMENTARY THERAPIES IN RECOVERY OF PRESCHOOL CHILDREN WITH CEREBRAL PALSY

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Abstract. *Cerebral palsy is a chronic condition that presents problems of abnormal development of the brain during pregnancy or immediately after birth. The CNS (Central Nervous System) lesions limit the individual physical and emotional independence through life. Both, the family and the community in which this child will grow up and live, must engage with all responsibility and sensitivity to ease the frustrations and limitations in his / her daily activity.*

The aim of this study is to encourage the expert therapists in the field to consider the importance of other therapies that should be applied in parallel with classical methods of recovery in CP. The Aquatic therapy and Hipotherapy proved to be very effective in achieving objectives in this study, especially facilitating postural control by \improving the balance and stability, including decrease of spasticity. The approach of alternative medicine and adapted therapies, hydrotherapy and a multitude of other therapies applied in parallel, all of them, contribute to the improvement of the quality of life of the sick child. Individual independence, as years go by and the child grows up, it is also beneficial to all who are around that child. Trust and awareness, " awakening" and reeducating other abilities, especially communicating and sensitizing to those around the child, and care to assure as long as possible their optimal conditions for long term treatment, all of them, are objectives, essentials in the recovery of a child with CP. The positivity, patience and sensitivity of those recovering these children are very important, given the high physical and emotional disabilities, they will gain more confidence in their own strengths and will be encouraged to develop new skills that may have been neglected or have not responded to previous treatments. And last but not least to mention, the enthusiasm and joy of these children as an emotional response to something new and unique that gives them pleasure and makes them forget pains and frustrations due to the handicap of functional limitations.

Keywords*: aquatic therapy, hypotherapy, functional limitation, new abilities, postural control, individual independence.*

Cerebral palsy (CP) is a chronic condition that has a central non-progressive motor neuron deficit representing encephalopathy sequelae of prenatal and infant brain damage while prenatal period. These lesions of the brain limit the individual independence, both physically and emotionally.

The aim of this study was to highlight the positive impact of other therapies used in conjunction with conventional recovery, such as aquatic therapy and hipotherapy on static and dynamic balance and coordination. The hipotherapy through rhythmic movements improve muscle tone, diminishing it and produce global relaxation in spastic forms, in

forms with hyper-laxity due to hypo-tonicity, they increase stability in sitting positions and orthostatic. Aquatic therapy due to its multiple properties creates new motion skills leading to an increase in functional skills, mobility and self esteem.

Material and method

The study was conducted between July 2017 - July 2018 on a group of three children diagnosed with spastic CP forms and hypotonic form, aged 4-6 years from the entry into study, selected from a group of 11 children with various clinical forms of CP.

In parallel with the neurological-motor classical recovery the children benefited of aquatic therapy 2 times a week for 10 weeks and once a week, hipotherapy for 10 weeks, with a duration of 50-60 minutes per session.

Table 1 Analyzed subjects

Number	Initials	Diagnosis	Age	Gender
1	B.T.	Spastic paraparesis. Deficits in walking	4 years	M
2	S.A.	Left hemiparesis	4 years	F
3	G.M.	Spastic paraparesis	6 years	F

BT, 4 years old, Diagnosis: Spastic paraparesis. Right foot-equinus varus; this foot had orthopaedical treatments; **left foot-talus valgus**; **deficits in walking.** The initial assessment presents: at the UL vicious position of the hand "in the swan-neck" deformity; in the LL, stiffness in the ankle joint performing the movements of dorsi- flexion, plantar-flexion and rotation, genu-valgus, flat feet, muscle weakness in the UL and LL, dorsal kyphotic attitude and lumbar compensatory hyperlordosis. Regarding the balance presents light deficits in static and dynamic balance, deficits in motor coordination, diminished muscle strength.

S.A., 4 years, Diagnosis: Cerebral palsy, Hemiparesis left side; At initial assessment: Left sides - UL/LL spasticity; UL-left side, in flexion adduction, tight fist; Predominant contractures -on flexor muscles; LL in maximum extension, walking on the tips of the toes, knee in higher hyperextension-more at LL left side. Is moving in orthostatic; walking specific to hemiplegic walking; It is a compensatory hyperlordosis for walking on the tips.

G.M. 6 years old, Spastic paraparesis. Initial assessment: has decreased joint mobility in the ankle joint, equine foot, Achilian tendon shortened, more pronounced on the left LL; Static and dynamic balance with mild disturbances.

Proposed objectives:

- Decrease of the spasticity and lower the contractures of spastic muscles.
- Increase AROM in dorsal flexion of the foot;
- Normalization of the joint mobility;
- Increased tonus and muscle strength in the hypotonic limbs;
- Reeducation of static balance in orthostatic and of dynamic balance;
- Increasing stability in different positions;
- Reeducation of walking

Posture and balance disorders are specific to children with CP, which is why specialists will need to direct their therapies to new and individually adapted methods and means, depending on the particularities of each case, in order to efficiently maximize their abilities and the "awakening" of new skills. These methods and activities will stimulate the equilibrium system.

Hipotherapy through the rhythmic movements of the horse, in this case the pony, stimulates the equilibrium reactions. Children with CP, are experiencing difficulty in the rhythmic movements, which limits the ability to change the direction of movement. Experts believe that the movement of a horse,

accompanied by the warmth of its body, have a positive influence for the general relaxation of a child; and that will lead to reduced spasticity in the case of hyper-tonicity and improving the stability, increasing the range of motion, flexibility and strength in the forms of hyper-laxity due to hypo-tonicity. It also improves the balance, posture, and socially improves communication with others. It has a positive impact that this activity takes place outdoors and the child does not feel the constraints of making a classical boring treatment session. Hipotherapy is not perceived as a therapy but rather as a form of divertissement. This form of therapy begins with a complex and complete evaluation of the child and its results will lead to the design of a therapeutic plan with short and long term goals. This therapy focuses on exploring child's resources and works on various areas of development as needed. After applying the treatment plan, another assessment is made to find out the results obtained, what resources are, what needs to be adapted or changed if necessary to continue the sessions. In order to produce results, the following factors are considered: active and conscious participation of the young patient at the session, developing a set of exercises and increasing their complexity over time, and combining with other forms of therapy and methods of treatment is also very important.



Also, **the aquatic therapy** experiences other opportunities, such as decreasing spasticity in spastic type CP. By immersing the body in the water, the internal temperature increases which leads to decreased gamma muscles fibers activity, resulting in decreased spasticity, the relaxation produced will increase the range of motion, and implicitly improves the posture. Also, static and dynamic balance improves.

In the aquatic therapy, there were adapted various interactive exercises. Conditions are various in those pools; where it is possible, two parallel bars may be installed or a single bar; those bars are helping the facilitation in performing water exercises: various types of walking through the water and balance. The child improves the self-esteem and confidence and safety; The more it repeats, the better; Different types of walking with aid device or a person, or none of the above; with the feet contacting the bottom of the pool, as for example the repetition of rhythmic walking, with small and large steps, bypassing soft, fixed objects; sight, walk cu aquatic shoes or inflatable attractive colored wings and for sensory and visual stimulation. walking to the left and to the right, active exercises with the balls of different sizes for the joints of the shoulders and arms; exercises of gripping different sizes of balls; exercises to stimulate attention such as throws of the balls at distance; even in the form of games throwing balls to the inside of floating rings to stimulate directional orientation; exercises changing the positions, slower or faster turns, twists and rotations; funny and commanded by numbers or names as games stimulate the equilibrium

and stability, next the floating with the arms stretched out and the body lying straight on the water, in ventral or dorsal decubitus sustained by the therapist or aids. It may be approached o multitude of stimulating exercises, relaxed with long breaks in which may be repeated the lerned exercises to stimulate the memory and attempts of individual executions to improve the self confidence; And not to be forgotten, also that the therapists must appreciate verbally any success and encourage the children when loosing at the first exercise; It was demonstrated that the perseverance and the positivity around the child with CP, is beneficial. Even insisting, repeating or the slow motions will encourage the child to try again and most of the time succeeds. And so the program goes on with diversity and so avoid it the tiredness and boring feelings. Generally, an aquatic program of therapy is one hour long and for the beginning it may be 40 minutes in sessions of 3 to 4 a week. Also the massage, under water is very beneficial befor e or after exercises, or during the session. The PROM or RROM when ther is the case for some joints, those relaxing the segments that were solicited or accidentally muscles cramps may appear, and the intervention is rapid with passive stretching done by the therapist. The actions of participation of many therapists, which may supervise and help when needed if there are 2 or 3 children. The students of the Kinesiology Bachelor programs, are encouraged to attend those sessions, being useful learning and helping the aquatic programs to be optimally performed.

That's why it is encouraged the participation of many persons at this program, and even the family members; many parents, go after that to the smaller pools with free programs and try to repet together, exercises and interactive games with balls or other inflatable objects colored and attractive to stimulate the vision and attention. Many pools have platforms that rise till the wanted level, and so optimal conditions are created with the controlled deepness to offer support to the body of the child who fights for gaining the balance, stability and equilibrium, finally the aim is to realize the individual independence for daily activities. The inclined plans and the controlled stairs, also the aid bars that are adjustable for side or frontal support, may be installed before the therapy to start.



Results and discussions

The complex functional evaluation of the balance is done using the Berg Balance Scale (Berg-Berg).

As can be seen in the complex balance evaluation calculated at the Berg Balance Functional Scale, higher values were noted in the subject **G.M.,** at which static equilibrium is improved, maintaining its orthostatic position with equal support on both legs with very slight imbalances. It is followed by the **B.T.** subject**,** which shows an improvement in static and dynamic balance and greater movement precision. The most severe balance disorder presenting **S.A.**

Table 2. Balance evaluation Berg-Berg (Berg Balance Scale) functional scale.

Scala Berg	**B.T.**				**S.A.**				**G.M.**			
	initial		final		initial		final		initial		final	
equilibrium	score	%	score	%	score	%	score	%	score	%	score	%
	2. 3	**0.41**	**34**	**0.67**	**16**	**0.28**	**2. 3**	**0.41**	**38**	**0.67**	**43**	**0.76**

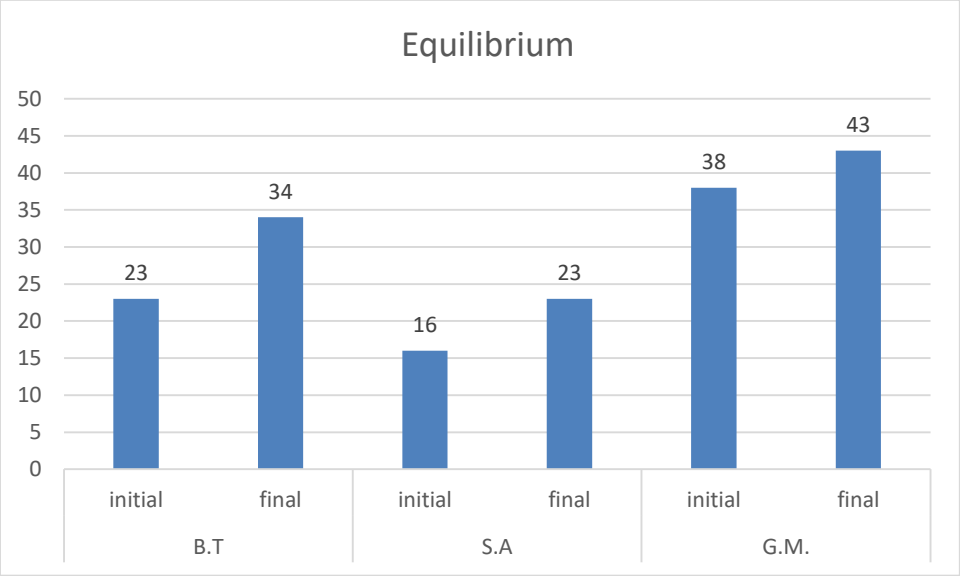

Fig. 1. Graphic representation of balance according to the Berg-BBS Functional Scale (Berg Balance Scale).

Global motor functional evaluation is done using the EMFG or GMFM Scale. Since the children in the studied group purchased the walk, only the evaluation C, D and E regarding the kneeling position, orthostatic, walking and running are evaluated.

Table no. 3 Global Functional Assessment EMFG or GMFM Scale

The position	BT		SADDLE		GM	
	initial	final	initial	final	initial	final
Cockpit on the knee	50	51	75	85	88	95
D.Ortostatism	51	52	78	88	82	94
E. Running jump	30	37	38	56	68	84
Total score	131	140	191	229	238	273

For children studied with CP, the percentage score of the three sections was: initial C (on knees) 71 (±19,3), final 77 (±23,06), initial D (orthostatic) 70,3 (±16,8) final 78 (±22,7), initial E (run) 45.3 (±20,03), final 59 (±23,64318); Evaluation of the total percentage score (%) of GMFM in children with study PCs indicated the lowest values in **BT** child, a child with muscular hypotonia. An improvement in postural control on the knees, orthostatic, coordination of movements and static and dynamic balance is noted in all children.

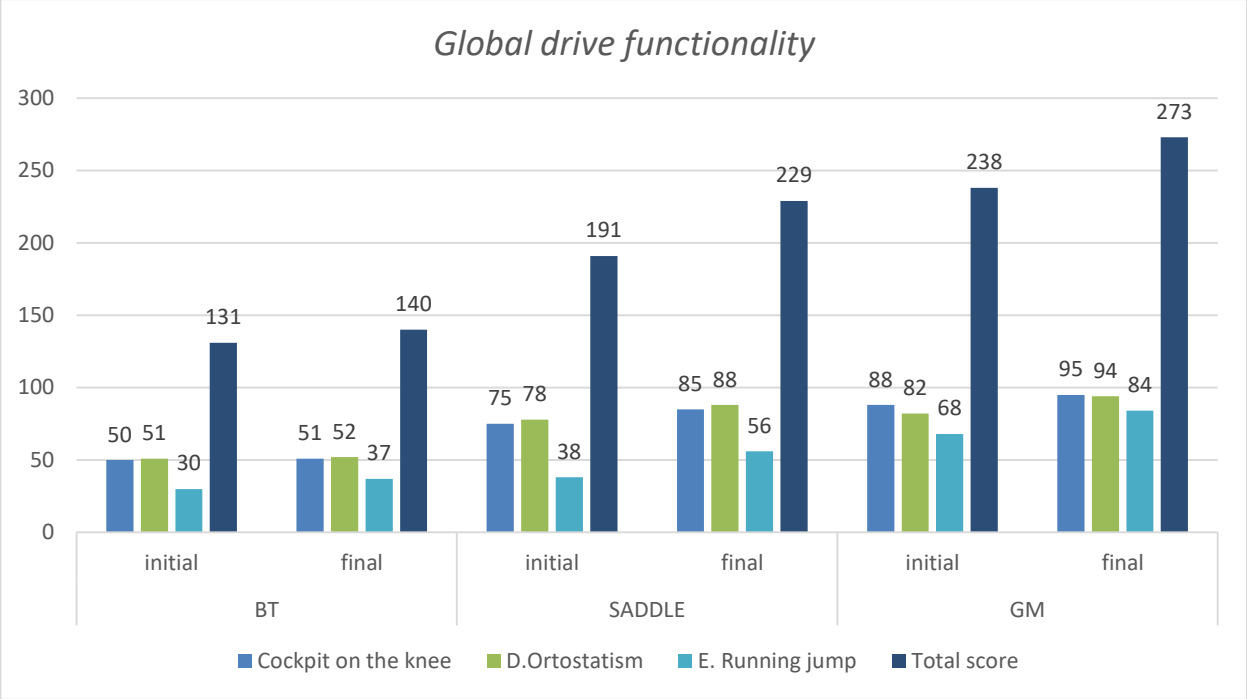

Fig. 2. Graphic representation of the global motor functional assessment according to the EMFG or GMFM Scale

The distribution according to the GMFCS Scout Functional Level is as follows:

Table no. 4 GMFCS Scale Assessment

The moment of evaluation	GMFCS functional level	M.T.	S.A.	G.M.
Initial time		II	II	II
Final Time		II	II	II

At the ambulance classification, the three children presented level II, functionally with limitations walking, both at the initial and the final assessment.

Static spinal disorders in children in the study **were: B.T.** dorsal kyphosis with compensatory lumbar lordosis, there is an improvement in postural control in sitting, orthostatisc and walking. **S.A.** exhibits hemiplegic compensatory with slight posture changes and **G.M.** does not exhibit vertebral static disorder, improved static balance, maintains its orthostatic position with equal support on both legs with very slight imbalances. The arms are slightly inclined forward to maintain the orthostatic position. There is a significant improvement in walking balance, as well as an improvement in the position of the pelvis and torso both in the orthostatic position and during the ride.

Conclusions

Complementary therapies prove to be beneficial, either intercalated or in parallel with classical treatment methods in recovering children with CP.

In this study we used two complementary therapies, namely hypotherapy and aquatic therapy. It is worth mentioning that we have limited ourselves to the possibilities existing in our centers. Of course, there are private facilities with multiple facilities both in the country and abroad with other financial possibilities, but we have done our best to create the necessary similar conditions. Thus the water pool for children with CP, has facilities for entering and exit the water, height-adjustable ladders and height-

adjustable backrests, the depth of the water is progressive, with grip on the runways, to avoid slipping and injuries, water temperature is pleasant to create an immediate relaxation feeling. There are adjustable lifting and lowering platforms in pools to facilitate water accommodation, exercises and accessory games in deep water.

It is also worth mentioning that in the field of hypo therapy, we have used the pony according to the existing possibilities, but there are also specialized centers that use horses with wide backs, which are used as "treatment surfaces" children with CP, facing or in the opposite direction riding, which greatly facilitate balance and self-confidence. Rhythmic movement of the horse is very important. There is also general relaxation due to the joy and pleasure of the child who responds positively to the application of this exciting auxiliary treatment, in which another factor is involved: example - hot water and accessories in aquatic therapy, and pony, proximity to the gentle and loved animal, desired by all children. We have insisted on re-education and recovery of balance, stability, change of positions, varied walking, and other low skills. On all levels, positive, beneficial results have been noticed that have increased enthusiasm and hope that there are innumerable methods to be addressed, introduced into the therapy of these children dependent on the majority of families. Obtaining independence in daily activities of these children with handicap is the priority goal but with these, many "sleepy" abilities are awakened, which must be stimulated to be re-educated.

References:

1. CĂCIULAN, E., STANCA, D. (2007). *Paralizie cerebrală infantilă, Evaluare şi Kinetoterapi*e. Bucureşti: Editura Moroşan.
2. LEVITT, S. (2018). *Treatment of Cerebral Palsy and Motor Delay*. Publishing Blackwell.
3. MILLER, F. (2007). *Pysical Therapy of Cerebral Palsy*. Editura Springer.
4. MANOLE, V., MANOLE, L. (2009). *Evaluare motrică şi funcţională în kinetoterapie*. Iaşi: Editura Pim.
5. MOŢET, D. (2001). *Psihologia recuperării handicapurilor neuromotorii.* Bucureşti: Editura Fundaţiei Humanitas.
6. PASTAI, Z. (2004). *Kinetoterapia în neuropediatrie*. Galați: Editura Arionda.
7. ROBĂNESCU, N. (1968). *Reeducare neuromotorie*. Bucureşti: Editura Medicală.