DEVELOMENT OF MOTOR SKILLS IN CHILD WITH CEREBRAL PALSY

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Abstract

When talking about cerebral palsy already at the first sight, usually because of mobility impairments, deficits in the sphere (area) of motor skills look like the most visible and most striking. Motor disorders are the result of brain function disorders so the clinical picture is visible already in early childhood and concerning the fact that it is a state it remains that way in the course of life whereby deteriorating. This is why the subject of our work is motor abilities of children with cerebral palsy at school age. The aim of this work is to examine the motor development of children with cerebral palsy at school age throughout the ability of performing movements of upper extremities. The instruments applied in the research are: The test for evaluation of upper extremities movement, The test for evaluation of upper extremities coordination, "Colorado trial" for evaluation of manipulative skills and The test for evaluation of visual motor control (Ćordić & Bojanin, 1981). The research has been performed on the sample of examinees with palsy, both sexes, from the first to the eighth grade, from the age of seven to fourteen years. Results of our research show that our examinees have difficulties connected with motor functioning of upper extremities and that those difficulties are manifested in performing elementary movements, then coordination and manipulative skills with somewhat lower deficit in the area of visual motor control. Being familiar with development of motor skills of upper extremities is of utmost important since it affects these children's participation in educational activities as well as all other activities in life which require motor action.

***Key words**: palsy, upper extremities, motor skills*

Introduction

Psycho motor development implies synchronized trias of maturing i.e. motor intellectual and emotional maturing while all these dimensions are mutually conditioned in both function and development, and in overall maturing they are inseparable unity (Ilanković & Ilanković, 2009). The notion motor implies the performing part of the psycho motor unity. Motor skills consist of neuro-muscle entity as structure and muscle activity as specific function of that structure. Motor behaviour is the result of biological characteristics and effects of surroundings and can be observed in the domain of learning and performing movements or motor skills (Rapajić and co., 1996). Movement is the essential part of psycho motor activity and it always integrates the motive for execution, goal and the manner of action.

Movement is the way of reacting of one's organism to outer surroundings whether it belongs to local motion or it is in the function of defensive or social behaviour (Radovanović, 1996; according to Nedović, 2000). Motor skill space can be divided into so called fine motor ones (fingers, hand, forearm, motor skills, which are followed by oculo-motor coordination) and rough motor skills (motor skills of big muscle groups of shoulder area, body and legs). When speaking about functional ability of upper extremities one refers to the ability of performing elementary movements, visual motor coordination, the ability of catching, manipulative skills, differentiation of fingers motor skills and movement coordination (Eminović, 2009).

It is by elementary movements that we discover the ability of differentiation in the field of muscle function but "organization of psycho motor skills of upper extremities is in direct relationship with development of psycho-social life of a person as a whole which awakens the basic schemes of reflective process and participates in manifesting creative needs, both of a child and a grownup person" (Bojanin; according to Hrnjica e al., 1991).

Fine motor skills show how children use their eyes and arms to manipulate objects, things and toys while playing and in self-help activities, such as feeding oneself with a spoon, buttoning, turning pages of a book and combing their dolls hair. Fine visual motor skills are also a factor in manual communication through gesticulation, sign language, drawing and painting (Stošljević et al., 2006). Arm development is characterized by hand development the one being the organ for fine coordinated movements, the most intensified development of which occurs at the age when the child becomes independent and walks (Kljajić, 2010). The development of hand function does not depend solely on motor control of shoulder area, arm and hand, but on visual, observing, observing motor and cognitive development. The main motor aspects of hand function include the model of squeezing, the model of catching, the model of catching and squeezing and the model of loosening. These aspects can be developed independently from rough motor activities, in the development of pronation, supination, sitting, standing and walking.

Such development of upper extremities function depends on well supported lying, sitting and standing position. Manipulative hand skills start developing in the following way: around the third month the reflex of catching fades and then willing catching comes instead. At birth fingers and thumb are firmly squeezed into a fist and no active movements are performed or whatsoever. In the second month the infant starts freeing closed hands. Development of catching starts by the end of the fourth month as "palmar ulnar" catching so that by the end of the sixth month it would shape as "palmar medial". The next level covers "palm radial" catch in the seventh month, then "three-pinching" (thumb, index finger and middle finger) in the ninth month. "Pinching catch" which is characterized by outstretched thumb and index finger with adduction of the thumb appears in the tenth month, whereas in the eleventh the grasp according to the type "semi pliers", which means that when catching tiny objects the thumb is outstretched and the index finger is bent. The highest level of the development of catching function is the "pliers" type in the twelfth month, using the index finger by flection in inter-phalangeal knuckles and for the first time the thumb is in flection is in flection and opposition (Ilanković & Ilanković, 2009). During the first year offering and catching objects occur. A child up to one year of age catches objects more easily in lying than in sitting position, for when seated it has to keep the balance of its body. The child catches stagnant objects more easily than the moving ones. After its first year of life it feeds itself on its own despite the fact that it spills food, but it cannot use a knife and a fork. Huge improvement is obvious from one year to another, especially armed motor skills. "At the ages two to three years a child builds a tower made of blocks, rolls the ball, doodles and then draws on paper and dresses. With time movements become more and more precise, so that after the age of five a child may master the skill of writing" (Kaljača, 2003). Visual-motor coordination is the ability of motor output ratio with visual input. So to speak, it is non-visual or kinetic feedback which is of at most importance for the skill of writing, but visual feedback cannot be underestimated. Visual feedback gives rough monitoring of writing in better way than refined adjusted monitoring gained from non-visual feedback. It is that rough monitoring which prevents us from writing on the table, crossing the line and remaining within the margins (Thorne, 2006). Children with visual motor non coordination function in a much different way from those with damaged kinaesthetic feedback, because of different demands of certain motor tasks. Poor visual motor integration can lead to problems with tasks demanding fine motor skills which mostly rely on visual feedback. They include stinging with a needle, drawing, painting, craftwork, building objects with blocks, mending things, playing games such as Nintendo and using a mouse of a computer. When it comes to palsy at the very first sight, usually because of impeded movement, the deficit in the motor sphere.

And it looks like the most obvious and conspicuous. Gavrankapetanović et al., 2001; according to: Švraka, 2007), define "Palsy as pathological state the first and foremost characteristic of which is damaged motor function to whom other disorders might be joined such as hearing and seeing handicap, intellectual deficit, emotional problems, behaviuor disorders, speech disorder, epileptic attacks etc." (p47). Motor disorders are result of brain function disorder so the clinical picture is noticeable in early childhood and having in mind the fact that this is a state it has to be emphasized that it remains during a person's lifetime and it most often deteriorates. That is the reason why the subject of this paper is motor skills of schoolchildren who suffer from palsy.

Methods

The aim of this paper is examining motor development of schoolchildren with palsy by performing movements of upper extremities. The instruments applied in the research are: The test for evaluation of upper extremities movement, The test for evaluation of upper extremities coordination, "Coloredo trial" for evaluation of manipulative skills and the test for evaluation of visual motor control (Ćordić & Bojanin, 1997). The research has been performed on the sample of examinees with palsy, both sexes, from the first to the eighth grade, from the age of seven to fourteen years (Table 1).

Table 1. Structure of examinees

		N(46)	%
	male gender	29	63
SEX	female gender	17	37
	I	6	14.8
	II	/	/
	III	8	18.5
GRADE	IV	2	3.7
	V	5	11.2
	VI	12	25.8
	VII	6	11.3
	VIII	7	14.7
	7-8	2	3.7
AGE	9-10	5	11.3
(years)	11-12	10	22
	13-14	17	37

Results

The first task of this research has been focused on the evaluation of ability of performing upper extremities movements. The highest percentage of our examinees 71.7% (33 examinees) perform partialy well elemntary movements of upper extremities, elementary movements are well performed by 21.7% (10 examinees) while there are only 6.5% impeded ones (3 examinees) (Table 2). Such results are by all means of importance because when there is upper extremities damage the immature catch appears, unprecisness when performing precise movements dropping tiny objects from hand, great gap of time between the intruction and its execution. The ability of movement coordination in children with palsy is usually jeopardized.

So we can notice that 30.4% (14 examinees) do not have coordinated movements, even half of the children, 50% (23 examinees) have impeded ability of upper extremities movements (usually because of constantly present involuntary movements) whereas only 19.6% (9 examinees) have good coordination (Table 3).

Table 2. Upper extremities performing ability evaluation

Level of performing	N	%
Impeded performance	3	6,5
Partially good performance	33	71,7
Good performance	10	21,7
Total	46	100,0

Table 3. Development of upper extremities coordination

Coordination	N	%
Without coordination	14	30,4
Impeded coordination	23	50,0
Good coordination	9	19,6
Total	46	100,0

Table 4. Development of manipulative dexterity

Manipulative dexterity	N	%
Impossible	14	30,4
Partially good	24	52,2
Good	8	17,4
Total	46	100,0

Since upper extremities movements demand "more refined" performance they become more and more difficult to perform when it comes to children with palsy. Hence manipulative dexterity of the majority of children is partially good (24 or 52.2%) followed by impossible in 30.4% or 14 examinees, while only eight children have good manipulative dexterity which makes 17.4% of our sample (Table 4). With children who suffer from palsy development of manipulative dexterity depends on the primary damage. In certain number of these children involuntary movements occur which disturb the development of manipulative dexterity.

Table 5. Development of visualmotor control

Visualmotor control	N	%
Below expected	4	8,7
Adequately developed	34	73,9
Above expected	8	17,4
Total	46	100,0

When dealing with visual motor control one has to bear in mind that this is an activity which refers to ability at what extent the eye follows hand movements our children achieve good results so that the highest percentage 73.9% have adequately developed visual motor control while 17.4% have even reached above expected for their age while only 7.8% have the result below expected (Table 5). With particular desire to discover the mutual connections of examined abilities the Pearson coefficient of correlation has been applied which lead to the conclusion that all of them are highly correlated with each other (Table 6).

Table 6. Mutual connection of examined abilities (N = 46) - Pearson Correlation Sig. (2-tailed)

	Elementary movements	Movements coordination	Manipulative dexterity	Visual mot. control
Elementary Movement	1,00	,78**	,75**	,88**
Movement coordination	,78**	1	,98**	,77**
Manipulative dexterity	,75**	,98**	1	,80**
Visual mot. control	,88**	,77**	,80**	1

Conclusion

Motor impediments in palsy are the result of neurologic deficit and comprise neuromuscular and musculoskeletal disorders: abnormality of tonus (spasticity, dyskinesia, dystonia, athetosis) contraction of muscles, bone abnormality (foot deformities, subluxation and dislocations of hips, deformities of torso of other bones), balance obstructions, loss of selective motor control (Flett, 2003). Because of everything mentioned above the ability of standing, sitting and walking is also to more or less extent jeopardized in children with palsy (Ilić, 2001). Certain number of children with palsy is not able to sit, and subsequently, in further stage of motor skills development, will not be able to crawl, stand and walk. In ability of a child or an adult who suffers from palsy to sit on their own will make it harder for them to follow and participate in the process of education demanding a special kind of bed, special didactic devices, as well as developing special methods when teaching (Eminović et al., 2009) and in everyday activities. Children with palsy in order to move most often use perambulators or some other orthopaedic aid (Pacić and co.,2009) which can affect availability of various services and therefore the quality of their life. Speaking of disorders which characterize palsy and are connected to the upper extremities motor skills we have in mind the ability of performing elementary movements, visual motor coordination, the ability of catching, manipulative dexterity, differentiation of fingers motor skills and movement coordination, as well as the ability of coordination practical organization. Apart from the above mentioned the damage might include cognitive abilities, perception of body unity, perception of handedness, orientation in space and time. And lastly the damage of attention, memorization and thinking, whereas some authors emphasize that mastering everyday activities is tightly connected to the ability of memorizing (Rapajić & Nedović, 2011). Results of this research show that our examinees have difficulties when it comes to motor functioning of upper extremities and that these difficulties are present in performing elementary movements, as well as coordination and manipulative dexterity with somewhat lower deficit in the field of visual motor control. The nature of motor deficits could be such to create problems in other spheres of functioning (Golubović and co., 2005), which is a frequent case with children who suffer from palsy. "Palsy is one of the states wh8ich disturb the individual in all aspects of functioning.

The physical handicap and health problems usually resolved in limited performing of fine movements" (Eminović F and co., 2010 p72). Limitation and deficits in motor behavior in the course of time lead to: 1. irregularity and backwardness in physical development, 2. decreases of overall motor skills, 3. certain body deformities (functional and /or structural). Such a state limits and restrains examinees' functioning at school and their participation in school activities and all other out-of-school activities which require motor action by nature (Nedović, 2003).

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RAZVOJ MOTORIČKIH VJEŠTINA KOD DJETETA
S CEREBRALNOM PARALIZOM

Sažetak
Kada govorimo o cerebralnoj paralizi već na prvi pogled, najčešće zbog oštećenja mobilnosti, deficiti u sferi (području) motorike izgledaju najvidljiviji i najmarkantniji. Motorički poremećaji su rezultat poremećaja funkcije mozga pa je klinička slika vidljiva već u ranom djetinjstvu i odnosi se na činjenicu da je stanje i dalje isto u tijeku života, pri čemu se moće i pogoršati. To je razlog zašto je tema našeg rada motorička sposobnosti djece s cerebralnom paralizom u školskoj dobi. Cilj ovog rada je ispitivanje motoričkog razvoja djece s cerebralnom paralizom u školskoj dobi tijekom formiranja sposobnosti pokreta gornjih ekstremiteta. Instrumenti koji se primjenjuju u istraživanju su: Test za procjenu gornjih ekstremiteta pokreta, Test za procjenu gornjih ekstremiteta koordinacije "Colorado test" za procjenu manipulativne sposobnosti i Test za procjenu vizualnog motoričkih kontrole (Ćordić i Bojanin, 1997). Istraživanje je provedeno na uzorku ispitanika s paralizom, oba spola, od prvog do osmog razreda, u dobi od sedam do četrnaest godina. Rezultati našeg istraživanja pokazuju da ispitanici imaju poteškoće povezane s motoričkim funkcioniranjem gornjih ekstremiteta, te da su ti problemi očituju u obavljanju osnovnih pokreta, zatim koordinacije i manipulativne vještine s nešto manjim deficitom u području vizualne motoričke kontrole. Biti upoznat s razvojem motoričkih vještina gornjih ekstremiteta je od iznimne važnosti jer utječe na sudjelovanje ove djece u obrazovnim aktivnostima, kao i sve ostale aktivnosti u životu koje zahtijevaju motoričke radnje.

Ključne riječi*: paraliza, gornji ekstremiteti, motoričke vještine*