

Evaluation physiotherapy group of children with autism spectrum disorders with visual perception

Natalia Habik¹, Jacek Wilczyński¹

¹The Faculty of Medicine and Health of Sciences, Institute of Physiotherapy, the Jan Kochanowski University in Kielce

Abstract

Introduction. Disorders of visual perception can be in the form of weakening: eye-hand coordination, perceptual constancy perception figures and background, perceive the position of objects in space, the perception of spatial relations. The subject of the study was to evaluate the physiotherapy in children of the autism spectrum with impaired visual perception.

Material and methods. The study involved 26 boys aged 3-6 years with autism attending therapy to the National Autism Society of Kielce. In research was based on observation on the perceptions disorders of the visual system. The study was based on observation relating to disorders of the visual system. Before treatment and after 6 months of its duration tests carried Clinical Observation and standardized Questionnaire Sensorimotor Disorders.

Results. In the group of children with autism have impaired regulation of sensory processing of visual and impaired eye movements in 3 dimensions. Examined children have a problem with normal convergence, the location of a visual stimulus and crossing the center line.

Conclusion. In children with autism spectrum disorders is a reduction in visual perception as a result of physiotherapy. Activities physiotherapy to improve the impact eye movement in the vertical, horizontal and oblique.

Key words: sensory processing, children, autism, visual perception, physiotherapy

Introduction

During the birth of the vision is the least developed sensory system. In the 8 months of age, intrauterine fetus begins to receive light stimuli. Pupils react newborn immediately after birth to light. In the brightly lit rooms newborns blink, turn his head, which affects the change in the heart rate and breathing. The optic nerve starts myelination only in the second month before the birth. In the first few months after the birth of a child he uses only the primary senses: touch and smell, and so it begins to explore the surrounding world. Shaping the process of view is conditioned by a properly

functioning visual system, optic nerve and specialized centers cortical [1]. The development process of seeing determine three basic aspects: the development of visual function, associated with the development of peripheral visual pathways and the development of the ability to focus attention. The final aspect is the development of integration capabilities, which combines information from the sensory organ systems. The first year of life is of great importance for the further development of the visual processes in the child. During the first month of life the child can focus on the subject's face and the other person. In the second

month the child begins to lead the arc to 90° . In the fourth month of life after the birth of a child can lead looked for the subject of the arc 180° . Binocular vision starts to develop after the third month of life. A breakthrough for the development of visual perception is a period of 3-6 months of age, when it comes to extinguish the original reflexes. In the seventh month of life in children who comes to the proper development of the eye can differentiate face the other person presenting emotions: fortunately, surprise, sadness. Visual acuity of the child at the age of 12 months is the same developed as an adult [2]. Visual perception is the ability to recognize and differentiate visual stimuli situated in a field of view and their correct interpretation in relation to the already acquired earlier experience. Disorders of visual perception can be in the form of weakening: eye-hand coordination, perceptual constancy perception figures and background, perceive the position of objects in space, the perception of spatial relations [3]. Visual-motor coordination disorders manifest themselves as difficulties in properly synchronized eye movements with the movements of the entire body. In contrast, abnormal perception of figures and background cause the occurrence of difficulties in concentrating on details, specific task. The child is not able to ignore irrelevant stimuli from the environment which in turn leads to distraction, and disorganization. Most often, in practice, this manifests itself in a child who may have problems discovery in the text for specific information or a specific word. Children with impaired perceptual constancy comes to a weakened perception of the properties of objects: the shape, size, belonging to the group. The difficulties associated with the permanence of perception may contribute to the occurrence of problems in the variety of nouns. For children with impaired perception of the scope of the perception of the position of objects in space may occur disorders perceive

spatial relationships between the observer and the subject [4]. A child who experiences difficulty in the proper distribution of spatial relationships do not understand the meaning of words relating to the position in space: at the top, bottom, outside, front, side, back, right, left. This condition can lead to the occurrence of problems with learning letters and numbers. In children with a weak perception of spatial relations comes to difficulties in determining the orientation of two or more objects relative to each other. This condition can lead to the occurrence of problems in children with redrawing figures by. A specific pattern, and threading beads. Children with disorders of perception do not look for toys that have in their hands, are not interested in small toys and images, not track smoothly items have delayed motor development (low muscle tone), they have difficulties with the functions of self-service and climbing and down stairs [5]. Older children with impaired visual perception have difficulty reading fine print, often tilt the head, set at an angle notebook, have a low level of visual attention, they make numerous errors in prescribing from the table, avoid games that require rapid convergence of image and have a problem with proper accommodation. Impaired visual perception affects motor development. Due to incorrect processing of the process of seeing a child may show no interest in small objects and images, which can lead to the occurrence of delays competence in education. Children with impaired sensory processing visual system does not look interlocutor straight in the eye, look as if “by” people and things – look at his face, without seeing her. This is due to the fact that the perception of the face requires a conscious recollection of sight: fixation consisting of skills consciously maintain sight for a long time at one point. In children with autism spectrum disorders may occur distortion of the visual image. Therefore, the children often stare at the images, which themselves produce,

curb expanding the visual [6]. Frequently observed deficit in the development of vision are incorrect eye movements, which usually occur in children with asymmetric alignment of the body or asymmetric posture. Uneven muscle tension also applies to the muscles of the eyeball. In children with autism spectrum stereotypical look at one point helps limit the scope of eye movement eye disrupting the process of convergence and accommodation. In the group of children with pervasive developmental disorders autism spectrum processing of visual perception can exist in two forms, hypersensitivity and hyposensitivity [7]. In children with hypersensitivity to the vision seen with frequent squinting eyes, aversion to strong light or to reside in heavily exposed space, incidence of anxiety at the sudden change of lighting and preference for playing in darkened rooms. However, in the case of children with sensory hyposensitivity the vision seen with wagging fingers or objects close to the eyes, an intense observation of particles of dust and pollen floating in the air, intense observation of cracks, fascination with a particular type of light [8]. The subject of the study was to evaluate the physiotherapy in children with autism spectrum disorders visual perception.

Material and methods

The study involved 26 boys aged 3-6 with diagnosed autism who attended physiotherapy to the National Autism Society (KTA). The research was conducted from June to November 2016 at the KTA facility. The research was conducted before the beginning of physiotherapeutic treatment and after 6 months of its duration to verify the results. In the study group, the inclusion criterion was the diagnosis of overall autism spectrum disorder. On the other hand, the exclusion criteria from the study were diagnosed with visual defects. The study was based on an observation aimed at gathering data on perceptual perceptions. The observation was

based on taking into account the presence of eye movements, convergence and the location of the visual stimulus. Diagnosis has also been reported with hypotensitivity and visual hypersensitivity. To this end the Questionnaire Sensorimotor Disorders and the Clinical Observation Test, standardized for therapists of the Sensory Integration Method, have been used to include questions about the sensory profile of the child's visual system in terms of the standardized test scale for the risk of sensory disorders. The subjects studied for the period of 6 months attended physiotherapy. Each child had an individualized approach to the visual modulation disorder therapeutic and rehabilitation program. Physiotherapeutic treatment aimed to develop the ability of visual perception through the use of appropriate visual stimulation training. In the case of children diagnosed with hypersensitivity, physiotherapy was aimed at minimizing the amount and variety of visual stimuli, limiting bright and colored colors, visualization of light objects, localization of light stimuli. To this end, the physiotherapist alerted the child in advance of any change in lighting, using pastel colors. Physiotherapy treatment was to provide the child with the right amount of visual stimulation by developing the perception of figures and background and positioning objects in space. Physiotherapeutic in children with hearing hypersensitivity were based on doing exercises in the light of the lamp (eyesight, visual fixation on the subject) and shaping visual and motor coordination. In the case of children diagnosed with visual sensitization, physiotherapeutic treatment was aimed at stimulating the child with light stimuli. For this purpose, sharp colors and contrasts were used in the immediate vicinity of the child and colored lights were used. There were also exercises in ultraviolet light in which the child was supposed to recognize objects and assess the distance. Physiotherapeutic treatment in both

hypersensitive and visual sensitivity children was also based on atrial stimulation, where the child undergoing atrial stimulation (swing and rotation) performed visual perception exercises to develop a stable image on the retina during motion.

Results

The study analyzed the eye movements in children diagnosed with autism spectrum disorder before classes begin physiotherapy. The results showed that most of these children had slight eye movement vertically. Symptoms complete eye movement in level occurred in the middle of the examined children. Slight eye movement in a diagonal occurred in the group of 11 (42%) children. The results are shown in table 1.

The study analyzed the visual perception of children with autism spectrum before proceeding physiotherapy. The results showed that half of the children were completely impaired visual stimulus location. Symptoms of total disorder convergence eye movement occurred in 11 (42%) children. Total eye movement crossing the center line occurred in the group of 12 (46%) children. The results are shown in table 2.

The study analyzes the profile of sensory processing visual system before the start of classes physiotherapy in children with autism spectrum disorders. The results showed that more than half of the children experienced symptoms of hypersensitivity visual system. Features hyposensitivity occurred in only 7 (27%) children. Test Chi2 conducted showed that there is a statistically significant association between the occurrence of hypersensitivity and hyposensitivity children sensory processing of the visual system in the group of children. The results are shown in table 3.

After six months of physiotherapy been rediagnosis research on the analysis of eye movement in children diagnosed with autism

spectrum disorders. The results showed that the majority of surveyed children had normal eye movement vertically after 6 months of physiotherapy activities. Eye movements in the level of normal occurred in more than half of the respondents. In contrast, eye movements in diagonal correctly performed the most studied group of children. The results are shown in table 4.

In this study after 6 months of physiotherapy been rediagnosis visual perception of children with autism spectrum disorders. The results showed that most of the children appeared correct location of the stimulus proper convergence eye movement in a group predominantly a group of children. The results of proper crossing the center line occurred in more than half of the children. The results are shown in table 5.

The study also made rediagnosis profile sensory processing visual system after 6 months of classes physiotherapy in children with autism spectrum disorders. The results showed that 3 (11%) of these children had hypersensitivity reactions of the visual system. Features hyposensitivity occurred in only 2 (8%) children. The results are shown in table 6.

Discussion

Analysis of the data evaluation of physiotherapy in children with autism spectrum disorders visual perception showed that in the group there has been improvement in eye movements, convergence, location stimulus and crossing the center line. Before starting treatment slight disorder of eye movements vertically occurred in 15 (58%) and total disorder in 4 (15%) patients. However, after 6 months of physiotherapy normal eye movements occurred in 18 (69%) children with autism spectrum disorders. Eye movement in a horizontal plane prior to therapy in 13 (50%) children was completely disrupted. After 6 months of therapy eye movements in the horizontal plane has

improved normal movement occurred in 14 (54%) children. In the plane oblique eye movements before physiotherapy was slightly perturbed in 11 (42%) patients, and completely disrupted in 9 (35%) of children with autism spectrum disorders. Convergence eye movement before physiotherapy was completely impaired in the group of 11 (42%) children, and slightly disturbed in 8 (31%) patients. However, after 6 months of therapy movement convergence eye it was normal in 18 (69%) of the surveyed children.

Also the location of a visual stimulus has improved, before classes physiotherapy in 13 (50%) were completely disrupted, and in 9 (35%) of children slightly disorder. After 6 months of therapy the correct location of a visual stimulus occurred in 16 (61%) children with autism spectrum disorders. The movement of crossing the center line before classes physiotherapy was totally disturbed a group of 12 (46%) of the children, and slightly disturbed in 9 (35%) children. After 6 months of therapy these figures have improved: eye movements crossing the midline normal occurred in 15 (57%) of children diagnosed with autism. Before the start of physiotherapy profile sensory processing of visual features of hypersensitivity occurred in 15 (58%) children and hyposensitivity in 7 (27%) patients. However, after 6 months of physiotherapy activities hypersensitivity reactions occurred in only 3 (11%) children, and hyposensitivity – 2 (8%).

Children with pervasive developmental disorders autism spectrum are sensitive to stimuli from the outside. A child diagnosed with autism show an increased loss of body control, no control over the movements, Research conducted by H. Asperger confirm that children with autism are sensory processing disorder of the eye of a sensitivity to different types of light: too bright, shiny, shimmering. The author described in his study also found that children with autism

spectrum disorders have poor tolerance to too strong sunshine [9]. G. Jagielska confirmed in their study that children with autism may occur behavior annoyance caused by flickering light, fluorescent light, or an excess of visual stimuli [10]. According to research conducted by L. Bobkowicz-Lewartowska sensory deprivation associated with decreased visual sensitivity, due to the fact that the number of visual stimuli received by children with autism as too small. According to the author's nervous system transmits to the brain insufficient information useful to seek stronger sensory experience. It manifests itself in the performance of many rhythmic body movements, for example. Rocking, at the proper angle in relation to the light source [11]. Research conducted by Mazefsky C. et al. suggest that in children with autism spectrum disorders are abnormalities in visual perception consisting in the fixation on a very small, specific visual objects [12]. According to E. Pisula children with autism spectrum avoid combining experience from two or more receptors. According to the author of children with autism do not recognize objects looking for an object by touching it and vice versa [13]. G. Jagielska in their study finds that children with autism spectrum eyesight is not accompanied when making contact with the partner interactions. Giving hand when greeting, usually look away, and when speaking or listening is often not accompanied by the look in his eyes, which according to the author is perceived as "devoid of content". Research H. Jaklewicz shows that children diagnosed with autism are not able to look analytically. Children look does not focus on potentially interesting objects is fast nature of peripheral vision. According to the author of children with autism spectrum mainly use peripheral vision children noting only moving objects and phenomena, but their perception is less precise and clear [14]. Research conducted by Y. Kawakubo et al. Have reported that children

with autism were found impaired ability to move eyes from one stimulus to another located in a field of view [15]. The results obtained by the authors of the article is confirmed by studies conducted by Ch. Johanson. The author conducted research on skills eyes follow the moving object consisting in the transmission of multiple looks and fiksowaniu vision and locating visual stimulus. Studies have demonstrated that children with autism spectrum disorders can not follow eyes the index finger of the parent [16]. According to a study conducted by M. Sekułowicz in the field of visual perception of space by children with autism they demonstrated that there are problems in determining the position of objects. In this study, we reported disruption to locate the position of objects in stoons to each other, as well as problems with the understanding of spatial concepts and the difficulty of isolating the figure from the background [17]. According to R. Watling et al. That properly conducted stimulation system senses impact on minimizing the occurrence of challenging behaviors in children with pervasive developmental disorders autism spectrum [18]. Research by D. Sinclair et al. Have shown that children with autism spectrum disorders too low or too reactive sensory stimulation, which may lead to the occurrence of different symptoms of behavioral disorders [19]. The research conducted by C. Stewert et al. Shows that children with autism are unusual sensory reactions that contribute to the weak reception of stimuli arising from the external environment [20].

Conclusion

1. In children with autism spectrum disorders is a reduction in visual perception as a result of physiotherapy.
2. The course of physiotherapy to improve the impact eye movement in the vertical, horizontal and oblique.
3. In the group of children with autism with

impaired sensory processing of visual comes to increased regulation of sensorimotor a result of participation in classes physiotherapy.

4. Procedure physiotherapy positive effect on improving the convergence location of a visual stimulus and crossing the center line of children with autism spectrum disorders.

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Corresponding authors:

dr hab. prof. UJK Jacek Wilczyński:

jwilczynski@onet.pl

mgr Natalia Habik: habiknatalia@gmail.com

**EVALUATION PHYSIOTHERAPY
GROUP OF CHILDREN
WITH AUTISM SPECTRUM
DISORDERS WITH VISUAL PERCEPTION**

Table 1. The structure of the eye movement in the group of children before starting physiotherapy

Eye movements	Correct		Slight disorder		Total disorder	
	n	%	n	%	n	%
Vertical	7	27	15	58	4	15
Horizontal	4	15	9	35	13	50
Oblique	6	23	11	42	9	35

Table 2. The structure of visual perception in the group of children before starting physiotherapy

	Correct		Slight disorder		Total disorder	
	n	%	n	%	n	%
Location visual stimulus	4	15	9	35	13	50
Convergence	7	27	8	31	11	42
Crossing the midline	5	19	9	35	12	46

Table 3. The structure of the profile of the visual sensory processing in the group of children before starting physiotherapy

	Correct		Disorder	
	n	%	n	%
Hypersensitivity	1	3	15	58
Hyposensitivity	3	12	7	27
Chi2=12,75> Chi20,001=10, 827; df=1; rc= 0,57 p=0,1024				

Table 4. The structure of the eye movement in the group of children after 6 months of physiotherapy

Eye movements	Correct		Slight disorder		Total disorder	
	n	%	n	%	n	%
Vertical	18	69	6	23	2	8
Horizontal	14	54	9	35	3	11
Oblique	16	61	8	31	2	8

Table 5. The structure of visual perception in the group of children after 6 months of physiotherapy

	Correct		Slight disorder		Total disorder	
	n	%	n	%	n	%
Location visual stimulus	16	61	7	28	3	11
Convergence	18	69	6	23	2	8
Crossing the midline	15	57	9	35	2	8

Table 6. The structure of the profile of the visual sensory processing in the group of children after 6 months of physiotherapy

	Correct		Disorder	
	n	%	n	%
Hypersensitivity	13	50	3	11
Hyposensitivity	8	31	2	8