

Methods of training and development of motor behaviors in children with autism and visual impairment – a case report **Metode ale formării și dezvoltării conduitelor motrice la copilul cu autism și deficiență de vedere - studiu de caz**

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Abstract

Background. In visually impaired children cases, the physical and psychomotor gaps arising from this deficit are frequently reported. Visual impairment, and even more, the lack of vision in childhood, is therefore a restricted sensory experience. Children with sight loss must make an extra effort of concentration. We consider it important to mention here autistic characteristics such as gaze avoidance, stereotypes, echolalia, motor agitation, bizarre behavior, obsessions, aggression and self-harm, sensory integration disorder, lack of intentional socialization, etc.

Aims. This case report discusses a 7-year-old pupil who is blind, who has autism and is institutionalized. The pupil entered our institution at the age of four, not knowing how to walk or to speak. This case needed a personalized intervention plan. Our goals were training and development of correct postural control, training and exercise of basic motor behaviors, formation of the body scheme and self-image, training and development of orientation and mobility skills.

Methods. To achieve recovery and rehabilitation of motor skills, exercises to stimulate head and neck control, exercises to stimulate rising in a bipedal position, exercises to stimulate walking with support and independently, exercises to identify the main parts of one's own and the partner's body, etc. were performed.

Results. The personalized intervention plan that was designed for a period of two years and was especially created for this case led to the acquisition of walking by the child, and to the development of his orientation and mobility in an efficient way.

Conclusions. This personalized rehabilitation plan for a child with autism, with specific needs also of visual impairment, can succeed in restoring the ability to walk and to orientate for children with associated and severe disabilities.

Key words: autism, visual impairment associated motor behavior, motor abilities, psychomotricity.

Rezumat

Premize. În cazul copiilor cu deficiență de vedere adesea se amintesc lipsurile în plan fizic și psihomotric ce derivă din acest deficit. Deficiența de vedere, și cu atât mai mult absența vederii la vârsta copilăriei, are ca urmare o experiență senzorială restrânsă, interacțiunea cu semenii este mult mai limitată, contacte interpersonale confuze. Considerăm important de amintit aici manifestări autistice precum evitarea privirii, stereotipii, ecolalia, agitație motorie, comportamente bizare, obsesii, agresivitate și autoagresivitate, tulburări de integrare senzorială, lipsa intenționalității socializării etc.

Obiective. Acest studiu de caz are în vedere un elev nevăzător de 7 ani cu autism, instituționalizat. Elevul a intrat în instituția noastră la vârsta de 4 ani, neștiind să meargă sau să vorbească. Acest caz presupune realizarea unui plan de intervenție personalizat al acțiunilor. Așadar finalitatea trebuie să vizeze următoarele obiective: formarea și dezvoltarea controlului postural corect, formarea și dezvoltarea conduitelor motrice de bază, formarea schemei corporale și a imaginii de sine, formarea și dezvoltarea unor deprinderi de orientare și mobilitate.

Metode. Pentru realizarea recuperării și reabilitării conduitelor motrice se vor viza exerciții precum stimularea controlului capului și gâtului, exerciții de stimulare a ridicării în poziție bipedă, a mersului cu sprijin și independent, de identificare a principalelor segmente ale corpului pe sine și pe partener, etc.

Rezultate. Planul de intervenție personalizat pe o perioadă de doi ani, realizat pe specificul elevului nevăzător cu sindrom autist, a dus la însușirea mersului de către acesta și la dezvoltarea orientării și mobilității în spațiul larg.

Concluzii. Aceste metode de lucru se pliază atât pe nevoile copilului ce suferă de autism, cât mai ales pe specificul autismului în cazul deficiențelor de vedere, reușind performanța însușirii mersului și a orientării copiilor cu deficiențe severe și asociate.

Cuvinte cheie: autism, deficiențe de vedere, deficiențe asociate, conduite motrice, psihomotricitate.

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Introduction

Psychologists and ophthalmologists mainly define amblyopia and blindness by reference to the functional indicators of vision (visual acuity, field of vision or peripheral vision, light sensitivity, color sensitivity, or stereoscopic binocular vision), involving the parameters that indicate the physiological characteristics of the visual apparatus.

In terms of educational definitions, visual impairments are interpreted according to the type of education that can be achieved by the visually impaired person. So, in educational terms, amblyopic children are those who due to vision deficiencies cannot attend regular school without prejudice to their eye sight or their educational development, but can be trained by special methods involving sight. A blind person is one that has no eye sight or whose eye sight is so diminished that it requires educational methods that do not involve sight (Miller cited by Stănică et al., 1997).

It is crucial for children to properly acquire and practice exploratory perceptive schemes consisting of specialized movements of the hands and eyes (Ștefan, 1981), such as:

- searching and training movements that contribute to the location of the object in a wide or narrow space;
- object tracking movements that achieve integrative comparison and synthesis;
- control movements that contribute to verifying the accuracy of the information collected about the object.

When we talk about sensory integration disorders, we wish to emphasize excessive sensitivity to certain stimuli or conversely, the lack of natural reactions to them. It is possible for children with autism to perceive the touch of the special education teacher as painful, but not to react to falls that can cause severe blows or even accidents.

It is essential to carefully assess motor disorders and tardive dyskinesia, and to distinguish those that are treatment-emergent from those that may be behavioral characteristics of some pediatric disorders (Pandina et al., 2007).

The level of motor ability plays an important role in the avoidance of an accident. There is no research on the relationship of the seriousness of an accident with the level of motor ability and the tendency of a child to have accidents (Ioannidou et al., 2008).

Many of these children are non-verbal, trying to transmit messages through the manifestation of aggression towards people or themselves. In order to develop successful strategies for motor behaviors, this minimum information should be taken into account.

Child motor and mental stimulation should start from birth by the influence of family stimuli (Albu et al., 2008).

In the case of institutionalized children, this stimulation does not occur in the normal stages, all the more so if the child is blind and autistic. Measures for motor stimulation are taken with the inclusion of the child in an educational institution, namely in a special kindergarten. Only now the child can benefit from personalized intervention plans regarding the education of motor, cognitive and emotional-affective skills.

Visual sensations are considered most important for human life and activity because they provide orientation in

the environment (Dumitrescu, 2008).

Psychomotor education is overlooked or ignored in the complex educational act at the very height of the educational plasticity period, specific to the age of 4-12 years (Neagu, 2012).

Psychomotricity is considered a very complex act that combines mental and motor skills in performing an action (Popovici & Matei, 2005). Such quantitative accumulation of sensory information may lead to qualitative leaps of motor and intellectual manifestations.

Therefore, many experts address physical, mental and motor development in all its complexity, as these processes can occur simultaneously (Albu et al., 2008).

This is a complex process dependent on a harmonious combination of physical, mental, social and emotional development (Cucerea & Simon, 2009). Psychomotricity as a science deals with the study of motor functions integrated and coordinated by mental functions (Albu et al., 2006).

This requires recovery and compensation. The manner of compensation is determined by the nature, extent, severity, etiology and age at which the primary visual impairment has developed, by possible associated deficiencies, by the extension of negative secondary consequences on physical, intellectual, psychomotor and affective-attitudinal development, requiring specific forms of compensation (Rozorea, 2011)

Attention is continuously focused on different directions or concentrated in one direction or another according to the intensity and significance of the perceived stimuli, which requires the continuous education of attention qualities (distribution, mobility and focus) depending on the degree of deficiency and the minimum amount of stimuli that maintain a state of optimal excitability, which is the basis of attention (Gherguț, 2007).

Parents, schools, and local authorities must now deal with school-aged children who spend increasingly less time in unsupervised free play with peers. These kids may lack the social skills they need to engage in rule-governed play and to sustain game play successfully (Lancy & Grove, 2011).

Preschoolers and primary school children are in constant search of interaction that they want increasingly more (Hetherington et al., 2006). This however is not true for blind children, who need encouragement and constant support in their efforts. Furthermore, children with autism do not want interaction with objects or people and if this happens, the whole situation becomes bizarre, they do not interact effectively, because they do not want to communicate, they just desire to cause stimuli that are pleasant to them.

Sensory education activities that require direct contact with objects (which make some noise, have certain smells, tastes, etc.) can be considered as tactile-kinesthetic stimulation activities (the child touches the object, identifies the shape, size, texture, etc.) (Marinache, 2009).

Such working programs for children with autism should be aimed at changing inappropriate behaviors through techniques that allow the emergence or development of behaviors such as: „modeling” (reinforcement of responses, which brings them closer to the final behavior), chaining of

behavioral sequences, verbal incitation, manual guidance, imitation, reinforcement and generalization (Preda, 2006).

Children with autism have a double deficiency, autism and mental retardation.

Counseling clients with Asperger's syndrome and high functional autism may seem a daunting prospect at the beginning; however, therapy with these individuals can be very rewarding (Woods et al., 2013).

The mental life of a congenitally blind person improves under the conditions of an active participation, in which movement, hearing and touch are dominant. In the direct relationships with the world, with the objects, touch gains a determinant role and subordinates the impressions from other analyzers (Popa, 2006). The entire space for educating children with autism should be well defined by its functional boundaries and by choosing specific stimuli depending on the space where we work with the child.

We consider that psychomotor counseling is important. Its main objectives are the study of individual motor capabilities compared to standard motor skills adequate for age, gender and social status; the study of transfer possibilities in order to improve the quality of life; establishing the most effective means of prevention and intervention (Dumitrescu et al., 2013).

Issues related to the development of perceptual-motor structures are essential for professionals working with children who display mental retardation. In these, the evolution of perceptual-motor structures is slow, late and incomplete. Sometimes they become adults and still have problems with body perception and spatial-temporal orientation (Albu et al., 2006).

Hypothesis

Motor behavior in preschoolers with autism and visual impairment can be acquired and developed through a personalized intervention program that takes into account the specificity of these deficiencies associated with positive outcomes on child development.

Material and methods

The research protocol

The reference objectives of this strategy are consistent with the curriculum for the 1st-6th grades, as part of the curriculum for severe, profound and/or associated mental impairments, approved by Ministerial Order no. 5235/01.09.2008. We mention that, in agreement with the Helsinki Declaration, the Amsterdam Protocol and Directive 86/609/EEC, the case study procedure was approved by the Ethics Commission of the Special School for the Visually Impaired, Buzău, Romania, and that we obtained the written consent of the legal guardian of the subject.

a) Period and place of the research

This case study was conducted at the Special School for the Visually Impaired in Buzău, over a period of 2 years, from September 2012 to September 2014.

b) Subjects and groups

Subject CH was 7 years old and had entered the above mentioned institution at the age of 4 years, the child being institutionalized, having no parents. He presented congenital visual impairment, blindness and autism,

serious intellectual deficiencies. The child did not walk on his own initiative and did not speak effectively, showing echolalia and preferring withdrawn areas.

c) Tests applied

We applied the Portage psychomotor development test (Gherguț, 2011); although the chronological age of the child CH was 7 years, due to intellectual deficiency, his mental age corresponded to the age of 6 years. This test compares the child's mental and chronological age; in addition, it identifies areas where the child has not progressed, helping professionals in their attempt to identify the deficiencies of the child. First, we conducted the initial testing (I.T.) of the child. Depending on the results, a personalized intervention plan was required to develop motor behavior in particular. After applying this plan that was materialized in a methodical strategy, we performed the final testing (F.T.) of the subject.

Presentation of the personalized intervention plan

The intervention plan was aimed at the training and development of correct postural control, the training and development of basic motor behaviors, the formation of the body scheme and self-image through specific exercises chosen and targeted to support the autistic child with visual impairments. This program was carried out once a week for approx. 30 minutes, as part of the morning school program. There were also special situations in which the subject was excused from the program, such as flu and cold episodes, quite common during the cold season, due to the low immunity of the child. We will detail the intervention plan by explaining the exercises used. This strategy aimed to achieve the following objectives:

1. Training and development of correct postural control

a. Exercises that stimulate head and neck control:

- The first step is choosing those toys or objects with noise (for the blind) or light features (for amblyopic subjects) that are pleasant to the child.

- Children should be encouraged to look at the toys, or at the objects, the adult moving them up and down, then left-right, verbalizing the action, so the baby will move his head in different directions, with effect on neck control. It is important not to manipulate the toys out of the sight of children; this may result in the child losing interest in them. Such items should be placed in the visual field of the child, encouraging the child to search with his eyes. The same is maintained for blind children, who will be stimulated by an audible sound source, moving in the four directions while the adult is maintaining the verbalization of the action „top-down”, „left-right”.

- Using the above exercise can be improved once the child is familiar with it and accepts it, by indicating the direction of the preferred object, which will be used as a stimulus only after the child turns his head towards the direction indicated by the adult, signifying that he has understood the motion directions of the object. So, the adult will verbalize the direction of the object, while moving it towards the indicated direction, waiting for the child to turn his head towards the right direction, after which the visual or auditory stimulus of the object will be triggered.

- Toys with light or sound features can be hanged within the playground of the child, at a distance allowing

the child only to touch them, to facilitate lifting the head towards the source, and reaching out for them.

b. Exercises to stimulate rising in a bipedal position:

- The same exercise can be used for hanging favorite toys, this time at the level of the child's head, helping the child in the attempt to rise, with the support of the adult's hand or with any object big enough for the child to grab while gaining the position. It is important to change after a while the place where the toys are hanged, as well as the place where the child will rise to touch the toys, which will ensure the diversification of the ways in which he manages to reach them.

c. Exercises to stimulate walking with support and independently:

- Gradually, once in bipedal position, the child can be encouraged to walk with the support of the adult, who will keep him with one or both hands. The same favorite toys can be used, which will be placed this time right in the child's visual or hearing field, but they will be located at some distance from the child, so that he will have to walk to reach them. It is recommended to repeat this exercise gradually, from easy to difficult, both in terms of number of repetitions and the distance between the object and the child. During each exercise, the child should be encouraged by the adult with few words, always the same. After each successful activity, the child should be praised, every time in the same way, with an enthusiastic tone. As a reward, the child will be given the desired toys, but not before he has performed the exercise at least three times, or sweet rewards, consisting of small pieces of favorite foods.

- Gradually, adult physical help in supporting the child while walking should be reduced, so the child will no longer be supported by the arm of the adult, but will only be touched on the forearm, then the adult's support will be moved down towards the child's hand, with the role of reassuring and guiding him.

2. Training and development of basic motor behaviors

a. Exercises to learn basic feet motor skills: independent walking, climbing, descending:

- If the proper acquisition of walking without support has been achieved, exercises can be performed in order to boost the rhythm of walking through verbal and visual stimulation, depending on the stimuli that the child accepts. Adults may clap, blow a whistle in a specific rhythm, use a flashlight, a tambourine or a toy that will light intermittently or tubes with liquid soap, so the child will be motivated to walk toward the source of the bubbles in order to touch them.

- Also, in this section of exercising and encouraging walking, we can include walking with the hand resting on the railing. For an accurate learning of this method, a sound bracelet will be put on the right hand of the child in order to guide him about the hand he will be using for support, while repeating the name of the hand which the child is using for support. This technique is welcomed in schools for the blind that have railings on both sides of the hallways. If the child with autism does not accept the bracelet, this work will be done by placing the child's hand on the railing and by covering it with the hand of the adult, who will be positioned in front of the child. The support given by the adult must decrease up to its complete suppression, using

only verbal support, which will also diminish in time. If the child does not accept to touch the railing due to the unpleasant sensation that this may cause to him, a piece of fabric that the child accepts can be used, which will have his hand size. The fabric will be put between the railing and the child's hand. In time, the size of the fabric will be reduced by cutting, allowing the child's hand to gradually come into contact with the railing.

- As a first step, climbing and subsequently, descending the stairs will be learned. The adult must choose for this activity less circulated stairs, without metal protection edges and no level differences between them. The child will be positioned facing the stairs, with the right hand on the railing and the left hand supported by the adult. If the child does not want to carry out this action, the adult must verbalize the action while guiding the child, with a firm voice and few words. After each step climbed, the child will be praised with an enthusiastic tone; moreover, the adult may allow the child to use specific stereotypes, but no more than 3-5 seconds, as a reward.

b. Exercises to learn the basic hand movements: arms, forearms, wrists, fingers:

- Stringing beads with decreasing sizes, from large to small, on pipes of different sizes.

- Using Montessori games that are designed to develop fine motor skills, involving the handling of various parts that are made of laces, tubes, pipes, ditches, mazes, on which various geometric figures, objects of different sizes and textures are placed.

3. Body scheme and self-image formation:

a. Exercises to identify the main parts of one's own and the partner's body

- The teacher will touch each segment of the subject and will verbalize its name. In time, the child will be asked to verbalize with the teacher.

- During dressing-undressing, the teacher will name the body part to be undressed or dressed, will touch the previously named segment and will guide the child in action. It is important that the sequences are always the same; the teacher starts every time by undressing the right hand, the left hand, slipping the blouse over the head, and continues with the lower body. Children with autism need routine, which gives them security and a better understanding of reality.

- Physical guidance of the child in identifying the partner's, especially the teacher's body parts. The dominant hand of the child will be guided to touch the teacher's body segments, with the teacher positioned in front of the child, asking the child to name each segment. At this stage, prompting or help from another adult can be used; this will be positioned behind the child, guiding him in performing the task. After completing each task, the child will be praised with an enthusiastic tone, to support his efforts.

d) Statistical processing

For data processing, we used Microsoft Office Excel 2007.

Results

Following initial testing (IT), we found that the development of the subject was not equal at all levels, having the following scores: socialization-1.2 years;

language-1 year; self-service-1.5 years; cognitive-1 year; motor-1.3 years. With these scores, we calculated the mental age of the subject.

The arithmetic mean of the scores divided by 5 $(1.2+1.5+1+1.3):5=1.2$ years. Thus, mental age (MA)=1.2 years. The development coefficient $DQ=(MA:CA) \times 100$; $(1.2:7) \times 100=17.14$ pts. According to the test interpretation, all scores below 30 points show profound retardation.

Final testing (FT) revealed the following scores: socialization=2.5 years; language=2.5 years; self-service=3.2 years; cognitive =3.5 years; motor=4 years.

Thus, $(2.5 + 2.5 + 3.2 + 3.5 + 4): 5 = 3.14$. So, mental age (M.A.) = 3.14 years.

Motor development had the highest score, increasing by a difference of 3 years. The development coefficient DQ following (F.T.) is $DQ = (3.14: 10) \times 100 = 31.4$ pts. According to the interpretation of the test, the category ranging between 30-39 points shows severe retardation (Table I).

Table I
Evolution of developmental stages.

| Development stages | IT | FT |
|--------------------|-----|-----|
| Socialization | 1.2 | 2.5 |
| Language | 1 | 2.5 |
| Self-service | 1.5 | 3.2 |
| Cognitive | 1 | 3.5 |
| Motor | 1.3 | 4 |

Discussions

After the application of the intervention plan, the scores increased significantly for each parameter indicated in the test. So, following the application of the personalized intervention plan aimed at the training and development of motor behaviors, high scores were obtained in the final testing for all development areas.

We consider important to remind that the subject is trained in the Special Class of the Special High School for the Visually Impaired in Buzău, based on the curriculum for severe, profound and/or associated mental deficiencies, approved by Ministerial Order (OM nr. 5235/ 01.09.2008) (1).

National Education Law no. 1/2011 gives children with deaf-blindness/multiple sensory deficiencies the right to appropriate educational services in classes with an average number of 5 students, who benefit from educational support from special education teachers (2).

The activities to be performed during school hours must not exceed 30 minutes, given that fatigue in children with associated disabilities occurs rapidly, and the avoidance of effort specific for intellectual deficiency is another factor that should be taken into account.

Over the past decades, the main attention in the area of education has been focused on the improvement of the school system: raising educational standards, improving the students' achievements, improving the quality of work of teachers and schools (Miovska-Spaseva, 2013).

This requires knowledge by teachers of the particularities of each child, their understanding of the

characteristics of deficiencies, and finding of the best working methods and techniques. Thus, the quality of the teaching-learning system will increase significantly with the students' achievements.

It seems obvious that the severity of a student's disability influences their engagement in a curriculum that involves the development of self-determined behavior in relation to health (Carrington et al, 2013).

This is why teachers who work with children with deficiencies must estimate their current and future needs, guiding them towards activities that can support the development process, and the efforts of specialists should be focused on meeting the needs of children with associated deficiencies.

Conclusions

1. The implementation of this personalized intervention plan that includes specially designed exercises to assist children with associated severe disabilities (blindness and autism) is very effective, resulting in the development of the child's autonomy and independence.

2. The effectiveness of this intervention plan was demonstrated by the evolution of the subject, highlighted by the final test results.

3. Research on the motor skills of visually impaired students should be extended because of the psychomotor flaws characteristic of this type of subjects.

Conflicts of interests

There is no conflict of interests.

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