

Comparative Study of Mental Activity of Primary School Students with Different Clinical Forms of Cerebral Palsy

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Abstract: Changes in the system of education in Russia as well as orientation towards inclusive education made important the issue of creation of conditions for psychological and pedagogical support of challenged children. Successive inclusion of the primary school students with musculoskeletal disorders is possible given that the specific features of their mental activity are taken into account. The study offers a theoretical review devoted to the problem of cognitive disorders in children with cerebral palsy and a comparative study of peculiarities of mental activity of children with little's disease, hemiparetic and hyperkinetic forms of Infantile Cerebral Palsy (ICP). The study describes characteristics of the components of mental activity (motivational, operational, regulatory) of the primary school children with musculoskeletal disorders depending on sidedness and severity of a disorder, the degree of intellectual and speech development. It was stated that children with ICP (right-sided hemiparesis, Little's disease) combined with mental retardation are distinguished by difficulties with the operational and regulatory mental activity components. Children with ICP (hyperkinetic form, left-sided hemiparesis, little's disease) and normal rate of mental development demonstrate decrease of the motivational and operational component indices. The revealed qualitative characteristics place emphasis on disproportionality of the principal mental activity components and necessity of their consideration in the system of psychocorrective work under the conditions of inclusive education.

Key words: Primary school age, infantile cerebral palsy, mental activity, psychocorr active, ICP

INTRODUCTION

Infantile cerebral palsy is a generalized term which includes a group of nonprogressive nervous system diseases developed as a result of cerebral maldevelopment or damage at the early stages of ontogenesis (Ito *et al.*, 1997).

Clinical presentation of ICP identifies musculoskeletal disorders in many cases accompanied by mental, speech, vision and hearing disorders as a guiding symptom of the disease. The top researchers Badalian, Ippolitova and Semenova in their researchers describe etiology and reasons of ICP development, identify a structure of musculoskeletal and speech disorders and a classification of forms of the mentioned disease.

After the 60th years of the XX century there appeared a lot of works devoted to study of cognitive and speech development. The results of investigations of cognitive activity in children with ICP evidence that definite immature (according to age) cortical functions which are manifested first of all through impairment of special skill are an important element of disorder. In the course of the performed neuropsychological investigations (Levchenko, 2001) it was mentioned that the primary school students with cerebral palsy experienced disorders

of visuospatial organization of motor acts, visual gnosis, aural memory, constructional praxis, function of vigilance.

Osipenko in her investigation mentioned diminution of cerebral competence in children with ICP, namely impairment of gnostico-praxical, intellectual and speech functions as well as of mnestic functions. Kinesthetic (64%) and visuospatial (32%) dyspraxia is the most common disorder for different forms of ICP.

An investigation of intellectual disorders in children with cerebral palsy carried out by Mastiukova *et al.* (1988) allowed to state that various in their nature deviations in cerebral competence development in case of the mentioned disease depend on localization and a degree of the CNS affliction at different stages of preand postnatal development. Thus, it was found out that deep cerebral structures damage results in more severe disorders of cognitive activity which are characterized by low-efficient solution of cognitive tasks, weak information memorizing and reproducing functions. In case of diffuse damages (mainly of cortical motor zone) no significant cognitive disorders were observed and in 50% of cases intellect remained intact.

A neuropsychological investigation of Mamaychuk which determined characteristic features of structure and

level of intelligence in the children of primary school age with ICP (with use of Wechsler intelligence scale for children and neuropsychological methods of A.R. Luriya) with spastic, hemiparetic and hyperkinetic forms and identified both quantitative and qualitative differences as compared to developmental norms of the children of the same age is of interest. Thus in case of little's disease children experience difficulties when solving tasks aimed at identification of specific feature of visual thinking which serves as a confirmation of maldevelopment of visuospatial functions in patients with the mentioned form of ICP. Children with the hemiparetic form depending on the damage localization (right or left hemisphere) have lower, intellectual measures as compared to healthy children. But, the main component in the structure of defect in case with children with left-sided hemiparesis is maldevelopment of visuospatial analysis and synthesis of perceptual generalizations. Children with right-sided hemiparesis demonstrate higher results when they deal with non-verbal tasks, however no severe disorders of visuospatial analysis and synthesis as in case of children with left hemiparesis were observed. These results evidence high significance of the right hemisphere for cortical functions development. Children with the hyperkinetic form of disease do not demonstrate visuospatial function disorders. Reduction of aural and verbal memory span is attributed to expressive speech maldevelopment. Therefore as I.I. Mamaychuk states that "different forms of children ICP vary not only in the frequency of intellectual disorders but in qualitative peculiarities of psychical functions structure formation depending on degree and severity of cerebral affection" (Mamajchuk, 1992).

Thus, severe musculoskeletal disorders may be combined with insignificant mental retardation while minor musculoskeletal disorders may be complicated by severe intellectual maldevelopment. A lot of investigations state that lack of practical activity, passive mode of life of children with cerebral palsy facilitate development of a single-sided orientation of interests, predominance of verbal thinking over practical one. But, the prevailing verbal functions according to Levchenko (2004) do not have material effect on general intellectual development. With advancing age sufficiently developed verbal functions in children with cerebral palsy remain isolated from other psychical functions and do not influence on development of the latter like it happens with their healthy age-mates (Levchenko, 2001).

In the beginning of the XXI century number of both clinical and psycho-pedagogical investigations which specify a complicated mechanism of disorders of mental development of children with ICP grows (Levchenko,

2001; Nemkova, 2013; Akhmetzyanova, 2014a, b). The mentioned researchers describe specific peculiarities of development of children with ICP which combine both musculoskeletal and intellectual disorders. A number of investigators Kalizhniuk, Mamaychuk, Bakhmatova, Mastiukova speak of inactivity, insufficient successiveness and purposefulness of mental activity operations; inadequacy of visual active thinking and retarded formation of conception thinking. Mastiukova drew attention to disorder of mental processes dynamics manifested in their slowness, insufficient successiveness and tendency to supplementary associations.

An investigation carried out by Levitskaya and Dmitrieva aimed at study of intellectual flexibility as a condition for enhancement of efficiency of self-actualization and social adaptation of children and teenagers with ICP diagnosis showed that the results of these groups of children differ considerably from the norms in terms of fluency and the level of development. The researchers mention that on the one part such results are a consequence of physical limitations of the subjects, namely musculoskeletal disorders significantly limit objects-handling practical activity of a child. On the other hand the results could be a consequence of insufficient working efficiency of children with cerebral palsy and their inability to experience long-term intellectual tension. In relation to flexibility and originality the investigated children also have lower results as compared to norms which is conditioned by insufficiency of practical activity and social experience, communicative links with others and absence of a full-scale play activity. The scholars also emphasize that in a group of teenagers with ICP all studied indices of creative thinking just slightly exceed the results of children of primary school age. From the point of view of purposefulness mental activity of children with ICP is characterized by "sliding away", tendency to supplementary associations, insufficient successiveness. The thinking process of this category of children is marked by specificity, difficulties with concepts formation, inability to transfer and generalize knowledge (Ostensjo *et al.*, 2003).

Lapshina in her investigation devoted to detection of characteristic features of non-verbal creative thinking of children with musculoskeletal disorders also states that the degree of visual perception is an important regulator of mental development. The researcher detected directly-proportional connection between the indices of mental creativity (fluency, flexibility, originality), the developed function of visual perception and a child's work efficiency (fatigue) in children with musculoskeletal disorders.

The analysis of the process of mental activity of school students with ICP (with little's disease, hemiparetic

and hyperkinetic forms) will allow to mark the specific features characteristic only for these forms of cerebral palsy, these specific features are mentioned in a clinical investigation of Kalizhiuk. Thus in case of Little's disease on the one hand there can be observed satisfactory development of verbal thinking, ability to abstraction and generalization (children can determine a central plotline in a story, explain the meaning of a thematic picture and establish cause-and-effect relations) and on the other hand insufficient development of visual active thinking. Fulfillment of tasks requiring verbal formulation comes rather easy for them. Simultaneously, these children experience difficulties with accomplishment of tasks involving spatial orientation. The hyperkinetic form is accompanied with satisfactory development of visual thinking and deficiencies of verbal thinking. Children with such form of ICP can successfully deal with the exercises aimed at classification of pictures and objects but experience difficulties while forming a verbal answer, sometimes they are able only to name an action or an object. In case with the hemiparetic form sidedness of affection is of great importance. Thus right-sided hemiparesis (affection of the left hemisphere) is characterized by low level of verbal thinking, difficulties in composition of stories based on a thematic picture. A more complicated tendency can be observed in the case of left-sided hemiparesis (a defect of the right hemisphere), it is manifested through permanent disorders of neurodynamic and regulatory processes of higher mental activity which results in both verbal and non-verbal dysfunctions. That's why, the issue of differentiation of children with cerebral palsy by the level of maturity of mental activity depending on the form, the sidedness and the severity of musculoskeletal disorder is of primary importance for organization of the effective psychological and pedagogical support in the process of education and social adaptation (Semenova, 1991).

The results of review of the literature allow to state the necessity of further investigation of the specific features of mental activity of children belonging to the mentioned category, however, the comprehensive studies which could describe specificity of mental activity development of the primary school children with ICP with provision not only for a clinical form of the disease but for the levels of intellectual and speech development as well as for the affection sidedness from the point of view of a subject-activity approach are not available by now (Sigurdardottir *et al.*, 2008).

MATERIALS AND METHODS

In the course of elaboration of a strategy of the present investigation, we have taken as a basis the

fundamental statements of the value of activity in mentality development and of a subjective factor which have considerable influence on both development of an actor himself/herself and on mastering a certain activity by him/her. In this aspect, development of mental activity of a child of the primary school age is an important condition for his/her formation as an actor.

The analysis of the clinical, psychological and pedagogical investigations and of mental activity of children with ICP showed that this problem was not subject to comprehensive study by psychology for special needs. Considering the fact that the contemporary special education system adopted development of sufficiently active and independent students' mental activity individual characteristics of which have a great influence on personal enhancement dynamics of a child with ICP and his/her adaptive abilities in the process of socialization as one of its principal purposes, we decided it necessary to determine the above problem as one of the most urgent.

Purpose of the investigation: to perform a comparative psychological study of the special features of mental activity of the primary school students having different clinical forms of cerebral palsy.

Total sample population comprised 69 respondents of the primary school age, among them 37 children (53.6%) with little's disease, 9 children (13%) with right-sided hemiparesis, 13 children (18.8%) with left-sided hemiparesis, 10 children (14.6%) with the hyperkinetic form of cerebral palsy. The severity of musculoskeletal pathology was distributed in the group of children as follows: mild degree of affection 32 persons (46.2%), medium degree of affection 26 persons (38%), severe degree of affection 11 persons (15.8%).

RESULTS AND DISCUSSION

In the course of the comparative analysis of the maturity levels we've found out characteristic features of mental activity of children with cerebral palsy accompanied by different degrees of musculoskeletal disorders and by absence or presence of mental retardation. Thus, general immaturity of mental activity is in most cases typical for the children with right-sided hemiparesis and little's disease accompanied by mental retardation (during examination the children demonstrated the III and IV levels of mental activity maturity) (Tvardovskaya, 2014). These children are not able to purposefully analyze the statement of an intellectual task to distinguish significant elements within the task to correlate them. There can be observed immaturity of motivation and orientational activity which is especially,

can be seen while offering more complicated tasks. Non-continuous cognitive acts in the process of tasks solution due to deficient and non-systematized knowledge and ideas of the environment. Some children are not able to start acting by themselves despite of understanding the statement of a task. In this case, a stimulating and organizing assistance is helpful in making an offered task executable for a child. But, separate cognitive acts appear to be relatively intact, namely only analysis or only classification. Inability to plan activity as a sequence of certain cognitive acts (i.e., mental activity self-regulation is absent) is the main obstacle for integral mental activity realization by children with right-sided hemiparesis and little's disease complicated by mental retardation.

Other characteristic features of mental activity can be observed in case of the hyperkinetic form, left-sided hemiparesis and little's disease not complicated by mental retardation. These children during examination demonstrated the II, III levels of mental activity maturity (Tvardovskaya, 2014). Their mental activity is characterized by such principal disorder as immaturity of individual operations (analysis, synthesis, abstraction, generalization, comparison) while a child is able to manage with overall plan of activity, i.e., a disorder of mental activity operational component is prevalent. The children attentively listen to the statement of a task, start to act purposefully and actively but are not able to accomplish the task due to marked hyperkineses, immature operations of generalization, poor speech development and disorders in the sensorial and perceptive sphere. When the children are given a task to form a picture from separate cut parts they appear to be interested in the task fulfillment, start to work with material and even indicate correctly a whole resulting image but their actions connected with putting individual parts together are chaotic, often erroneous and finally result in failure to fulfill the task.

The results of distribution of children with ICP depending on the musculoskeletal disorder severity, the form and sidedness of the affection, the level of mental development reflect the following typical individual characteristics: there is no apparent dependency between the form of ICP and the maturity level of mental activity. Thus, 13% (9 children) with little's disease, 5.8% (4 children) with the hyperkinetic form, 2.9% (2 children) with right-sided hemiparesis, 8.7% (6 children) with left-sided hemiparesis accompanied by various degrees of musculoskeletal disorders demonstrated the II level of mental activity maturity. It is possible to identify the following most characteristic features of the components of mental activity of children with ICP: apparent interest at the beginning of the task fulfillment which

afterwards is fading due to extreme distractibility, immature self-control actions at all stages of mental activity; the cognitive acts are performed more or less properly, a child has sufficient knowledge to fulfill the task but sometimes is not able to justify verbally his/her proper actions.

The group of children who demonstrated the III level of mental activity maturity had non-uniform values of the analyzed indices. It included 33.3% (23 children) with little's disease, 4.35% (3 children) with the hyperkinetic form of ICP, 7.25% (5 children) with right-sided hemiparesis and 5.8% (4 children) with left-handed hemiparesis. The following features appeared to be characteristic for children with the III level of mental activity maturity: intermittent interest to the tasks, to the process of fulfillment and to their own results; these children do not dispose of sufficient general ideas, concepts, methods and techniques for dealing with verbal reasoning tasks; they are not always able to explain and realize own proper actions.

The children who demonstrated the IV level of mental activity maturity according to the evaluation criteria are represented as follows: 7.25% (5 children) with Little's disease, 2.9% (2 children) with the hyperkinetic form of ICP, with right-sided hemiparesis and 4.35% (3 children) with left-sided hemiparesis. These children demonstrated even more immature active attitude to mental activity manifested through impulsivity, disinhibition and hurriedness at time of the offered tasks fulfillment. The children often demonstrated indifferent attitude to the situation of interaction with a psychologist and to the results of their own activity. The tasks were often fulfilled in a reactive and chaotic manner. Even assistance of the psychologist in a form of suggestive and prompting questions didn't give a positive result.

CONCLUSION

The carried out comparative analysis allowed identifying typical characteristics of mental activity with a breakdown to its main components. Thus the children with ICP complicated by mental retardation typically have difficulties with operational and regulatory components. The children with ICP and normal rate of mental development demonstrated decrease of the motivational and operational component indices. The revealed qualitative characteristics emphasize disproportional nature of the main mental activity components and the necessity of their consideration in the system of psychocorrective work.

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REFERENCES

- Akhmetzyanova, A.I., 2014a. The development of self-care skills of children with severe mental retardation in the context of Lekoteka. *World Applied Sci. J.*, 29: 724-727.
- Akhmetzyanova, A.I., 2014b. Correction of sensorimotor functions of pre-lingual children with cerebral palsy in the context of Lekoteka. *World Applied Sci. J.*, 29: 743-746.
- Ito, J.I., A. Araki, H. Tanaka, T. Tasaki and K. Cho, 1997. Intellectual status of children with cerebral palsy after elementary education. *Dev. Neurorehabilitation*, 1: 199-206.
- Levchenko, I.Y., 2001. System of psychological studying of persons with infantile cerebral palsy at different stages of social adaptation. Ph.D. Thesis, University of Surrey, Guildford.
- Nemkova, S.A., 2013. Cognitive Defects in case of Infantile Cerebral Paralysis. Publishing House-Triada, Moscow, Pages: 440.
- Ostensjo, S., E.B. Carlberg and N.K. Vollestad, 2003. Everyday functioning in young children with cerebral palsy: Functional skills, caregiver assistance and modifications of the environment. *Dev. Med. Child Neurol.*, 45: 603-612.
- Semenova, K.A., 1991. Infantile Cerebral Palsy (Pathogenesis, Clinic, Treatment). In: *Medico-Social Rehabilitation of Patients and Disabled People*, Semenova, K.A. (Ed.). The Institutional Care Program, Moscow, pp: 5-17.
- Sigurdardottir, S., A. Eiriksdottir, E. Gunnarsdottir, M. Meintema, U. Arnadottir and T. Vik, 2008. Cognitive profile in young Icelandic children with cerebral palsy. *Dev. Med. Child Neurol.*, 50: 357-362.
- Tvardovskaya, A.A., 2014. Thinking patterns of primary school children suffering from the cerebral palsy. *Middle-East J. Scient. Res.*, 20: 2070-2074.