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COMPREHENSIVE APPROACH TO THE TREATMENT OF MOTOR ALALIA IN PRESCHOOL CHILDREN

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In this article, we considered and analyzed the problem of treatment of motor alalia in children by integrating medical and psychological components into the complex treatment course. The purpose of the study was access test the effectiveness of a comprehensive approach to the problem of differential diagnosis and treatment of motor alalia in preschool children. This study lasted within 2017-2020, during which a retrospective analysis of outpatient cards of 150 children with motor alalia was performed. As a result of the study, it was found that organic brain syndrome affects not only the clinical picture of non-speech symptoms, but also mental and speech development in particular. This was proved by a comparative analysis of the results of the brain's bioelectrical activity on the EEG, which reflects the process of its morphological maturation in ontogeny. Based on the obtained data analysis, it was found that in children with motor alalia there were changes in the main electroencephalographic patterns in the form of slowing of the main rhythm in frontal (48.6 %), temporal (21.3 %), frontotemporal and parietal (30.0 %) lobes with interhemispheric asymmetry and rhythm disorganization, which indicates the presence of organic brain syndrome.

Key words: children with motor alalia, preschool children, correctional treatment, etiology of speech disorders, nervous system disorders, electroencephalography, neuropeptides, hopantenic acid.

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КОМПЛЕКСНИЙ ПІДХІД ДО ПОДОЛАННЯ МОТОРНОЇ АЛАЛІЇ У ДІТЕЙ СТАРШОГО ДОШКІЛЬНОГО ВІКУ

У статті розглянуто та проаналізовано проблему подолання моторної алалії у дітей шляхом інтеграції медико-психологічних складових в організацію комплексної корекційної роботи. Метою дослідження була перевірка ефективності застосування комплексного підходу до проблеми диференційної діагностики та подолання моторної алалії у дітей старшого дошкільного віку. Дане дослідження тривало протягом 2017-2020 рр., в ході якого був проведений ретроспективний аналіз амбулаторних карт 150 дітей із моторною алалією. В результаті дослідження було встановлено, що органічне ураження головного мозку впливає не лише на клінічну картину немовленнєвої симптоматики, а й на психомовленнєвий розвиток зокрема. Це доведено порівняльним аналізом результатів біоелектричної активності головного мозку на ЕЕГ, що відображає процес його морфологічного дозрівання в онтогенезі. На підставі аналізу отриманих даних встановлено, що у дітей із моторною алалією відмічені зміни основних патернів електроенцефалограми у вигляді уповільнення основного ритму у лобних (48,6 %), скроневих (21,3 %), лобно-скронево-тім'яних (30,0 %) відділах з міжпівкульною асиметрією та дезорганізацією ритму, що свідчить про наявність органічних уражень головного мозку.

Ключові слова: діти із моторною алалією, дошкільники, корекція, етіологія порушень мовлення, захворювання нервової системи, електроенцефалографія, нейропептиди, гопантенова кислота.

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Comprehensive assessment of speech development disorders in preschool children, which is the unity of medical and psychological components, is an important condition for ensuring the high efficiency of correctional and developmental work. Therefore, in the process of comprehensive treatment of children with speech disorders, including motor alalia, an integrative approach to the organization of correctional therapy with the organic use of psychological and medical techniques in the diagnosis and treatment of motor alalia is becoming increasingly important.

Numerous studies [3–11], performed in the field of disorders of structural and functional organization of the child's brain, which cause various speech disorders, show the importance of a comprehensive approach to identifying and treating the motor alalia in preschool children. These views were the impetus for scientific research into new ways to overcome severe speech disorders.

Thus, the content and features of modern neurophysiological research methods are the theoretical basis for studying and assessing the level of functional brain maturity, understanding the structure of the defect and predicting the prospects of studying children with various developmental disorders.

Such methods include: neurosonography, used to diagnose central nervous system disorders; magnetic resonance imaging – for the diagnosis of perinatal cerebrovascular lesions; doppler sonography – a marker of perinatal lesions of the CNS; electroencephalography (EEG) – a method of studying the bioelectrical activity of the brain, which reflects the process of its morphological maturation in ontogeny [4].

Numerous studies have presented methods for the treatment of functional and organic disorders of the nervous system of various etiologies in children [2]. Scientists emphasize the pharmacological effect of the neuropeptide drugs. It is based on remyelination, glial proliferation and generation of new neurons in the brain, which optimizes the neurometabolic and hemodynamic support of the brain during active development and contributes to the regression of neurological symptoms, significant improvement of cognitive, subtle manipulative skills and speech functions. On the other hand, a representative of classical nootropic drugs – hopantenic acid is a natural metabolite of gamma-aminobutyric acid (GABA) in nervous tissue. The action of hopantenic acid is based on two main components: neurometabolic and neurotransmitter ones, which are realized through the activation of acetylcholine and GABA synthesis, as the leading links of cognitive and mnestic functions.

The purpose of the study was to establish the theoretical, practical and methodological foundations of an integrative approach to the organization of corrective work in treatment of motor alalia in preschool children.

Materials and methods. During 2017–2020, we carried out a retrospective analysis of outpatient cards of children with speech disorders of various etiologies.

A total of 250 children participated in the study. Two groups were identified. The experimental group consisted of 150 preschool children with motor alalia aged 5.5–7 years, the mean age was 5.99±0.75 years, including 57 girls and 93 boys.

The control group of children without speech disorders consisted of 100 people (48 girls and 52 boys), aged 5.5-7 years, the mean age was 6.18±0.63 years.

The study consisted of two stages. The first stage included the detection of signs of speech disorders and the study of bioelectrical activity of the brain on the EEG.

For this purpose, all children on an outpatient basis underwent neurological (including instrumental using a 21-channel electroencephalograph "Neuron-Spectrum-4/P" (Ukraine) and speech therapy examination using the author's diagnostic methods. It is based on adapted diagnostic tasks of existing methods [1, 4, 6, 8–12], which contribute to the study of mental and speech development of children with motor alalia, however, we supplemented it with a comprehensive application of instrumental examination.

The second stage of the study was drug therapy of motor alalia. 23 children out of 150 (15.3 %) were selected to participate in this stage. Patients in this group had an EEG-confirmed diagnosis of motor alalia, which contributed to the differential diagnosis from other speech disorders.

Combination of neuropeptides and hopantenic acid in the recommended age dosages was used in complex drug therapy. First, 2 courses of neuropeptides (Cerebrocurin, NIR LLC, Ukraine) intramuscularly 2 ml once a day, regardless of food intake, lasting 10 days with an interval of 3 months. Then, hopantenic acid with continuous administration for 3 months in the age-specific dosage of 250 mg twice a day after 30 minutes after a meal (Cognum, JSC "Kyiv Vitamin Plant", Ukraine).

To compare the results of the study, we used the rank correlation coefficient according to the bilateral Student's t-test (for independent, unrelated samples). The results were considered reliable at $p<0.05$.

Results of the study and their discussion. A retrospective analysis of outpatient records of children with motor alalia (150 persons) revealed that the anamnestic data of these patients indicate a burdened perinatal history. According to etiological factors, the group of mothers examined children was distributed as follows: preeclampsia of the first half of pregnancy had 118 women (78.6 %), signs of placental dysfunction – 98 (65.4 %) rapid or prolonged labor – 67 (44. 5%), signs of mild – 50 (33.3 %) and moderate – 81 (54.1 %) asphyxia at birth, the threat of miscarriage was recorded in 41 women, which is 27.3 %.

Since one of the indications for the EEG is a delay in speech and psychomotor development of children, this type of study was chosen as the safest method for additional diagnosis, which is important to consider when re-used to assess the efficacy of medical and pedagogical impact.

The EEG examination of children with motor alalia and children without speech disorders clearly emphasizes the features of the manifestations of brain's bioelectrical activity.

The analysis of the EEG examination results revealed that diffuse changes in the bioelectrical activity of the brain were found in all studied children with motor alalia. The study of EEG patterns of the examined children identified clearly localized changes in biopotentials in the frontal, temporal and frontotemporal and parietal lobes of the dominant hemisphere in the form of regional rhythm slowing with interhemispheric asymmetry and rhythm disorganization, which indicates the presence of organic brain syndrome.

To access the number of fluctuations of one or another rhythm, the analysis of the study results was used, which allowed to record the slowing down of the alpha rhythm, while children without speech

disorders had age-related features of the alpha rhythm. It should be emphasized that children without speech disorders on the EEG have synchronous rhythms in both hemispheres, no acute peaks of electrical activity, stable brain activity, even in the presence of short-term reactions to light or other stimuli. At the same time, the following trend is observed on the EEG in children with motor alalia: the presence of a motor component in the structure of the studied speech disorder is indicated by EEG-signs of pronounced disorders of brain electrogenesis in the form of dysrhythmias and neurophysiological signs of immaturity of cortical structures, changes in zonal differences, interhemispheric asymmetry. In the study, these phenomena and their combinations were registered in more than half of the surveyed preschoolers (102 children), which accounted for 68 % of the total number of children covered by the study.

The combination of regional rhythm slowing with interhemispheric asymmetry and rhythm disorganization turned out to be prognostically unfavorable in the context of the rate of speech function formation.

The analysis of clinical data allowed to allocate groups of children on characteristic EEG signs. The data obtained indicate that among preschool children with motor alalia, the most common are slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the frontal lobes, which was manifested in 73 people (48.6 %). In children without speech disorders this manifestation is observed only in 12 persons (12.0 %). Slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the temporal lobes were manifested in 32 children with motor alalia (21.3 %), in children without speech disorders – in 12 persons (12.0 %). Slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the frontotemporal and parietal lobes was manifested in 45 children with motor alalia (30.0 %), while in children without speech disorders this category included only 8 people (8.0 %). Consequently, the data of clinical analysis strongly indicate pronounced differences between EEG indicators in preschool children with motor alalia and their peers without speech disorders.

The sample indices became different by all criteria (the null hypothesis was rejected and accepted as an alternative with a significance level of α=0.05 and α=0.01), which statistically confirms a significant difference in brain activity in preschool children with motor alalia and without speech disorders.

According to each criterion of bioelectrical activity of the brain: slowing of the main rhythm in the frontal, temporal, frontotemporal and parietal lobes with interhemispheric asymmetry and rhythm disorganization, the levels of EEG manifestations were determined – mild, moderate, severe (fig. 1).

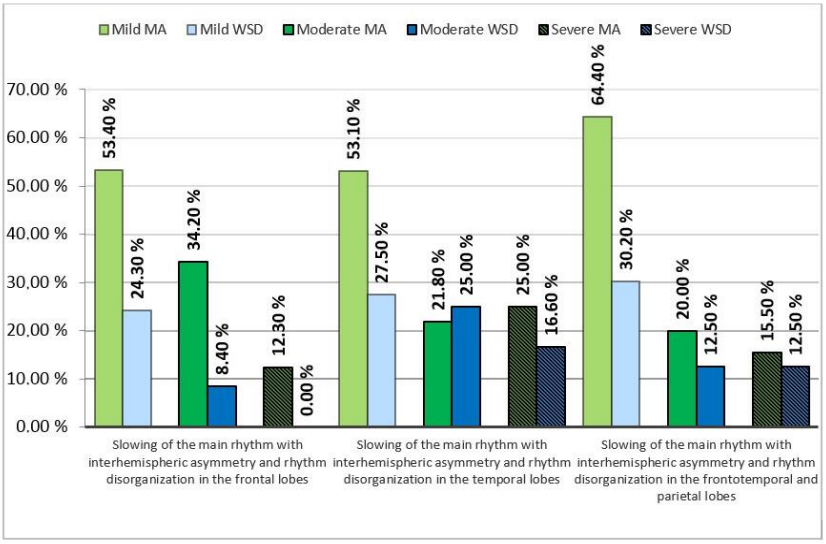

Fig. 1 Levels of EEG manifestations in children with motor alalia (MA) and children without speech disorders (WSD).

Analyzing the level indices for each criterion, it was found that changes in biopotentials in the frontal, temporal and frontotemporal and parietal lobes of the dominant hemisphere in the form of regional slowing of rhythm with interhemispheric asymmetry and rhythm disorganization were distributed unevenly. Higher indices of moderate and severe levels also were noted, while in children with normative speech development there is a predominantly mild level of EEG manifestations.

Manifestations of slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the frontal lobes in children with motor alalia (mild – 53.4 %, moderate – 34.2 %, severe – 12.3 %) exceeded those of children with normal speech development (mild – 24.3 %, moderate – 8.4 %, severe level – not detected). Higher level indices were determined in children with motor alalia by manifestation of the main rhythm slowing with interhemispheric asymmetry and rhythm disorganization in the temporal lobes, namely: mild level in children with motor alalia is 53.1 % (in WSD – 27.5 %), moderate – 21.8 % (in WSD – 25.0 %), severe – 25.0 % (in WSD – 16.6 %). Slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the frontotemporal and parietal lobes of mild degree were found in 64.4 % of children with motor alalia, while in WSD group this index reaches

only 30.2 %; moderate level in children with motor alalia is 20.0 %, in WSD children– 12.5 %; severe level was determined in 15.5 % of children with motor alalia, in WSD children – 12.5 %.

In addition, the control level of EEG manifestations was determined based on the results of children without speech disorders, which is 17.4 %.

Therefore, the results of quantitative EEG examination, taking into account the conclusion of a pediatric neurologist, were used to compare the results of speech therapy examination. A comprehensive study allowed to confirm the speech therapy conclusion and helped to outline clearer areas of medical and pedagogical influence.

At the end of complex drug therapy, repeated assessments of speech function and studies of bioelectrical activity of the brain in children with motor alalia were performed. As a result, there was a clinical effect, which manifested itself in the form of increased concentration and speech activity, the appearance of new words, phrasal speech, extended vocabulary size, improved speech comprehension. At the same time, the prevalence of pathological EEG manifestations remained the same.

Therefore, the proposed method of drug influence on overcoming the problem of motor alalia in preschool children for widespread implementation in the comprehensive medical, psychological and pedagogical rehabilitation of this category of children requires further long term studies.

Thus, our results mainly confirmed and expanded the conclusions of O. Luria [6] on the creation of a scientifically sound doctrine of abnormal child development, evaluation of its defects, finding rational ways to overcome them using a system of clinical, experimental psychological and pathophysiological studies. In addition, the results correlated with studies of S. Yevtushenko [2], L. Zenkov [4], N. Pavlova [7], on the complex diagnosis and overcoming of clinical manifestations of motor alalia in children.

V. Tyshchenko's conclusions [10] on scientific research of new ways to overcome severe speech disorders, which are based on a comprehensive approach, were supplemented by ideas about the medical and psychological impact on the formation of mental and speech development of children with motor alalia.

As the study included a comprehensive approach to overcoming the problem of motor alalia, its results expanded in the direction of scientific understanding of the impact of organic brain syndrome not only on the clinical picture of nonverbal symptoms, but also on mental and speech development in particular. The described influence is proved by a comparative analysis of the results of the brain's bioelectrical activity on the EEG, which reflects the process of its morphological maturation in ontogeny.

Conclusions

1. Modern instrumental methods of diagnosis of speech development disorders allow to identify the objective signs of motor alalia, namely: slowing of the main rhythm with interhemispheric asymmetry and rhythm disorganization in the frontal lobes in 73 people (48.6 %), slowing of the main rhythm with interhemispheric asymmetry and disorganization of the rhythm in the temporal lobes in 32 people (21.3 %), slowing of the main rhythm with interhemispheric asymmetry and disorganization of the rhythm in the frontotemporal and parietal lobes in 45 people (30.0 %), which indicated the presence of organic brain syndrome.

2. Complex drug therapy contributed to a positive clinical effect in the form of increased concentration and speech activity, the emergence of new words, phrasal speech, extended vocabulary size, improved speech comprehension. At the same time, the prevalence of pathological EEG manifestations remained the same.

The prospect of further research are as follows: in the next study, we are going to improve the method of differential diagnosis of motor alalia from other speech disorders and to increase the study duration on the impact of drug therapy in overcoming motor alalia in preschool children.

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ANALYSIS OF THE DYNAMICS OF REFRACTION DISORDERS IN SCHOOLCHILDREN TROUGHOUT THE YEAR

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The article used a retrospective analysis to investigate the state of the visual system of students of different ages and genders. For this purpose, refractive errors (myopia, hyperopia, astigmatism and myopia or hyperopia with astigmatism) and contrast sensitivity in the dynamics of the year were determined. There was an incredible increase in refractive errors (from 60.12 % to 65.32 %): myopia (from 33.53 % to 36.88 %) and hyperopia (from 20.23 % to 21.97 %). The study of contrast sensitivity revealed its reduction from 2.5 (limit value) to 2.0 in 10.15 % of cases. The use of corrective means prevented the progression of refractive errors. At the same time, their non-use is accompanied by the progression of refractive errors in 97.67 %. It was found that the limit value of the contrast sensitivity index =2.5 is important for further prediction of changes in the visual system of schoolchildren and can be used for preclinical rapid diagnosis of visual impairment. Students with contrast sensitivity 2.5 are at risk and need careful monitoring of their refractive apparatus for a long time, which allow us to detect refractive errors of the visual analyzer in the early stages and to apply corrective means in a timely manner.

Key words: myopia, hyperopia, astigmatism, visual analyzer, refractive errors.

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АНАЛІЗ ДИНАМІКИ ПОРУШЕНЬ РЕФРАКЦІЇ У ШКОЛЯРІВ ПРОТЯГОМ РОКУ

У статті за допомогою ретроспективного аналізу дослідили стан зорової системи учнів різного віку і різної статі. Для цього визначали порушення рефракції (міопія, гіперметропія, астигматизм і міопія або гіперметропія з астигматизмом) та контрастну чутливість в динаміці року. Було встановлено невірогідне зростанні порушенньрефракції (з 60.12 % до 65.32 %): міопії (з 33.53 % до 36.88 %) і гіперметропії (з 20,23 % до 21.97 %). Дослідження контрастної чутливості виявило його зменшення з 2.5 (межове значення) до 2.0 в 10.15 % випадків. Застосування корекційних засобів попереджувало прогресування порушень рефракції. В той же час їх невикористання супроводжувалось їх прогресуванням в 97,67 %. Було встановлено, що межове значення індексу контрастної чутливості=2,5 має значення для подальшого прогнозу змін в зоровому апараті школярів та може бути використано для доклінічної експрес-діагностики порушень зору. Школярі з контрастною чутливістю 2,5 складають групу ризику і потребують ретельного спостереження за їх рефракційним апаратом, протягом тривалого часу, що дає змогу виявити порушення рефракції зорового аналізатора на ранніх стадіях і своєчасно застосувати корекційні засоби.

Ключові слова: міопія, гіперметропія, астигматизм, зоровий аналізатор, порушення рефракції.

The work is fragment of the research project "Hygienic assessment of the impact of PCs on the body of children and adolescents with disabilities", state registration No. 0117U002749.

The problem of visual impairment and loss is extremely relevant around the world. According to statistics from the World Health Organization (WHO), there are currently 45 million blind people in the world, including 1.5 million children, and 135 million have severe visual impairments [9]. Almost every minute in the world, for various reasons, one child loses his sight. The scale of the problem led to the adoption of the WHO international program "VISION-2020: The Right to Sight", which was joined by Ukraine. The aim of this program is to eliminate preventable blindness and low vision [4]. In recent years, the number of children with pathology of the visual organ has increased significantly in our country as well. According to the Ministry of Health of Ukraine, 840,000 cases of ophthalmic diseases