



## Neuropsychological and Clinical Nature of Disorders in Children with Dyslexia

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**Abstract:** One of the first descriptions of dyslexia in children belongs to Morgan, where a teenager with preserved intelligence found it difficult to read (1, 3). Reading itself is written speech, and is formed later than oral speech, consisting of the interaction of cognitive systems and a series of functions. The reading process goes through the stage of decoding and reading comprehension. Dyslexia is caused by a large number of factors, but the main ones are genetically determined periods of development of ontogenesis or as a result of insufficiency of certain brain structures, brain immaturity (2, 6). Numerous literary sources confirm the interest of scientists in the problem of dyslexia. A special section of diagnostics, starting from the last century, is the results of autopsy and neuroimaging data, a wide range of studies of the bioelectrical activity of the brain, a separate section of the psychological analysis of children with dyslexia (4, 8). In recent years, with the advent of a large selection of pharmacological drugs, modern medicine points to general recommendations and the feasibility of therapeutic treatment of patients with dyslexia, to improve the quality of patients with dyslexia, a normal lifestyle with the achievement of the level of development of reading skills, addressing the issue of social well-being of the future generation (5, 7).

**Keywords:** dyslexia, neurological nature, neuropsychological character

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**Target.** To study the factors leading to dyslexia in children, the clinical and neurological nature of the manifestation and evaluate the effectiveness of the proposed therapy.

**Material and research methods.** The survey included children aged 7-10 years (that is, schoolchildren of grades 1-3), in the amount of 36 main group, children with dyslexia, 20 children of the control group without signs of dyslexia. The diagnosis is based on the ICD-10 classification criterion (WHO, 1994). The selection of children was carried out with the permission of parents and teachers in the outpatient clinic as they applied for the period 2019-2021. General examination of children consisted of 100 children. A team of several doctors selected children, they are a neurologist, psychologist, psychiatrist, pediatrician. The exclusion criterion was children with a low level of intellectual development, with mental disorders, children with somatic dysfunction, with reduced hearing or vision. All children were examined with the presence of their parents, moreover, the parents underwent a questionnaire - a questionnaire that included anamnesis of hereditary predisposition, obstetric history, assessment of the child's development before the examination. Neurological examination according to the standard scheme. The psychological

examination included a method for determining the level of reading, writing, speech, and memory. An additional research method included electroencephalography according to the classification of Djirmunskaya E.A. (1991). Several children, if necessary, underwent neuroimaging, and since the number of MRI examinations was insignificant, this work is informative in nature. After 3 months, the children underwent a second examination, at the end of the treatment proposed by us. In this regard, the main group of children was divided into 2 subgroups, A - 18 children received the drug Alcheba in the form of a syrup, the second subgroup B - Cortixin in the form of an injection. The effectiveness of the given therapy was assessed in terms of the qualitative and quantitative use of the drugs used.

**Research result.** As suggested above, the main point of inclusion of children in the study is low school performance associated with the development of reading and writing; repeated mistakes in the form of impaired concentration of letters and sounds, lack of reading tempo (not increasing), writing under dictation in all cases was characterized by persistent grammatical disorders. Naturally, the complaint about anxiety, aggressiveness, unwillingness to learn and fatigue follow from the consequences of learning difficulties. At the first stage of selection of patients for examination, some children showed absent-mindedness or increased distraction, the nature of the reduced academic performance was associated with attention deficit and hyperresponsiveness, and therefore children of this category were not included in the study. About 12% of children complained of headaches. The headache had the character of tension, intensified in the second half of the day, against the background of emotional stress. According to many authors of scientific works, dyslexia is formed by biological factors, perinatal damage to the central nervous system, hereditary predisposition. Taking this into account, the work carried out a thorough collection of anamnesis of obstetric and life of mothers whose children were included in the study group. Collecting the analysis of pedigrees in the main group turned out to be very difficult, since many of the parents did not have an idea about the data of relatives in previous generations. But from what happened, a certain picture emerged. Thus, in several children, the parents' cousins and sisters tended to make learning (directly reading) difficult in 7 cases. 5 children have a direct hereditary predisposition on the part of the father or mother (on the part of the mother, 1 child). As for the issues of the period of pregnancy and childbirth, all children of the main group had any pathological deviations from the obstetric history of the mother. The most frequent was toxicosis of pregnant women in the first half - 21%, in the second half - 10%. Infected mothers during this pregnancy are TORCH infections (herpes, cytomegalovirus) in 29%. Mother's age, over 35 years in 3 cases, previous COVID infection in 6 women. According to the anamnesis, childbirth with premature outpouring of near-water waters was in 9%, rapid labor in 25% of cases, large fetus in 2 cases, caesarean section (the reason is a functional narrow pelvis, short maternal stature, placenta previa, preeclampsia) in 13% of cases. On the part of the neurological status during the examination period, minor, diffuse symptoms were revealed, mainly from the side of vision. Weak convergence in 20%, failure of the eyeballs to the outside in 1 patient, horizontal nystagmus 15%. Changes in other cranial nerves were uncharacteristic. In the motor sphere, hypotonia was present in several cases.

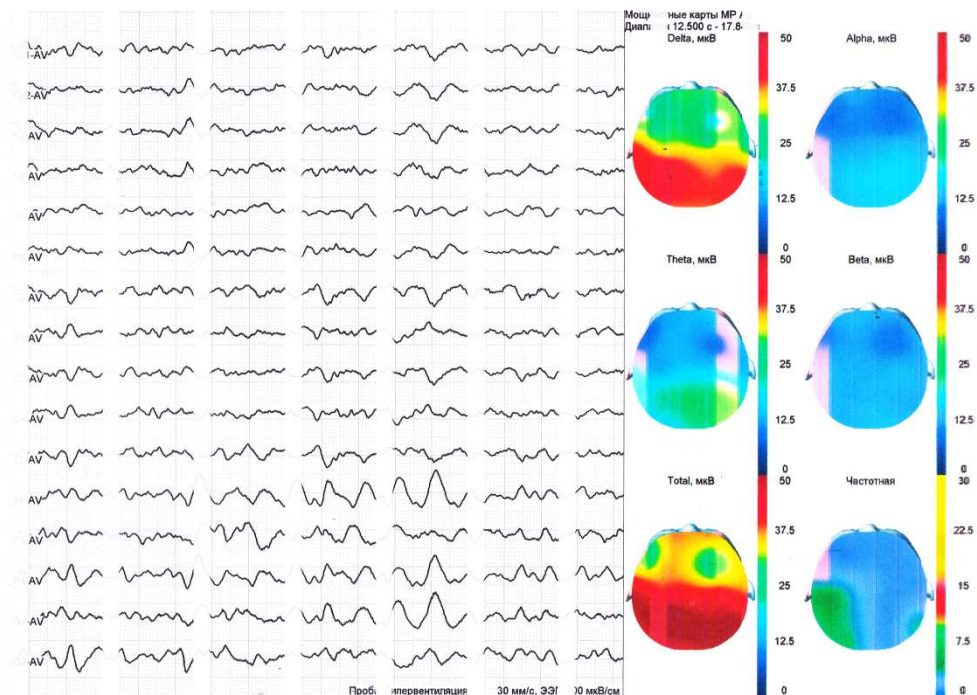
The severity of the signs of dyslexia was determined according to the results of psychological testing RAN. RAS (Repetition Test). The surveyed children were asked to name the colors, numbers, objects, while the time for completing the task was recorded. Then the skill of hearing analysis (word composition) was assessed and the execution time was also recorded. The test methodology was modified into Russian according to Grigorenko (2001). In Table 1, the result of a study of children with dyslexia can be traced.

**Table 1 Findings from a study of children with dyslexia**

Investigated indicators	Children with dyslexia n = 36	Control group n = 20
Colour - time / points	64 ± 3 *** / 2.0 ± 0.3 **	51 ± 2 / 0.8 ± 0.2
Numbers: - time / points	42 ± 2 *** / 1.0 ± 0.3 *	29 ± 0.5 / 0.2 ± 0.1
Item - time / points	90 ± 4.5 *** / 2.3 ± 0.3 **	60 ± 2 / 1.3 ± 0.2
Letters: - time / points	40 ± 2 *** / 1.0 ± 0.2 **	27 ± 0.5 / 0.2 ± 0.1
- score	20.0 ± 1.6 *	13 ± 1.0
<i>Single word reading test</i>		
- time / point	190 ± 12 *** / 12 ± 1.0 ***	110 ± 4 / 4 ± 0.5
- words that do not exist	4 ± 0.5 ***	1 ± 0.1
- simple words	8 ± 0.57 ***	3.5 ± 0.5

Significance of changes: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

As can be seen from the table, the skill of automation is much lower in children with dyslexia, which is the basis for successful mastering of the reading skill. An important component in the assessment is the time it takes to complete the task and the number of mistakes made. The analysis showed a large difference between peers of a healthy group of children, which has reliability.

**Rice. 1. EEG, girl with dyslexia, 9 years old**

Additional studies in children with dyslexia on electroencephalography, recorded a fairly pronounced hypersynchronous rhythm, which corresponded to type 1 in 60% of cases. disorganized slow delta waves were found in 38% of cases. No difference was found between the alpha rhythms of both hemispheres, which is confirmed by the literature data.

The dynamics of the effect of the proposed therapy was monitored after three months. For this, the main group is divided into subgroups. A subgroup of children, with a gradual increase in dosage, received the drug Alcheba (memantine), which has a neuroprotective effect, improves the cognitive process and the ability to learn. B-subgroup injected, received Cortexin 10 ml (3 times, every month for 10 days) - a nootropic drug that has a neuroprotective effect. On the background of treatment, positive dynamics were noted in both subgroups, school performance in almost all subjects increased, and the reading indicator significantly improved. With a small margin in the A-subgroup.

But in the second B-subgroup, parents noted, in addition to the performance indicator, the level of psychoemotional state, the behavior of children changed completely, a desire to study appeared, isolation, aggression disappeared, children became more obedient, unreasonable "crying" and the problem of socialization were erased, attention and interest improved to study, to the environment. Auditory-verbal memory increased by 41% in subgroup A and 44% in subgroup B, almost identical improvement. Positive dynamics in both subgroups was found in terms of the level of time for completing the task; the total number of errors in performing the task decreased and significantly decreased. So, in the A-subgroup, the speed in time increased by 70%, and in the B-subgroup by 68%, as you can see, the figures are also close in significance. On the EEG in children treated per os, there is a slight decrease in the alpha-rhythm indices relative to the background values. In the subgroup where Cortexin was used, the accent of disorganized slow waves and signs of acute Alpha waves in the cerebral cortex rhythm decreased by 25%. Obviously, neurophysiological indicators indicate a better effect with the use of Cortexin.

Thus, a combined change as a peri- and postnatal factor of damage to the central nervous system of a child, hereditary predisposition, are the main factors in the development of dyslexia in children. In addition to a significant lag in school performance, due to insufficiently developed reading and writing skills, children develop a certain neuropsychiatric nature of behavior, tearfulness, aggressiveness, isolation, and poor sleep. And if, neuropsychiatric signs occur in children with dyslexia, then it is necessary to use Cortexin in treatment to have a positive effect on the reading, attention and memory indicators, and on the emotional state of children. In addition, significant improvements are presented by electroencephalographic indicators under the influence of the Cortexin indicator. Accordingly, long-term treatment courses are a justified and effective approach to the treatment of dyslexia in children.

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