GENETIC, PEDAGOGICAL AND PSYCHOLOGICAL CAUSES OF SPECIFIC DIFFICULTIES IN READING AND WRITING AMONG PRIMARY SCHOOL STUDENTS

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Summary. The paper presents the causes of specific difficulties in reading and writing among primary school students. Molecular - genetic studies confirm the relationship with several genes. The so-called weaker genes have been recognized to be responsible for dyslexia. The multi-causal concept has an important significance for the teachers to explain the causes of dyslexia which implies that the plexus of teaching, educational, cultural and social adverse effects determine the emergence of dyslexia. The following factors are indicated: educational methods, structure, atmosphere and the intellectual and cultural level of the family, parents' reactions to children's problems and the methods of their elimination, the teachers' attitude and relationship with the child, the methods and organization of reading and writing, the bad physical condition of the child, and frequent absences from school.

Key words: specific difficulties in reading, specific difficulties writing, primary school students

Specific difficulties in reading and writing that appear in childhood, from early learning to read and write, were described scientifically for the first time in 1896 and named ”developmental dyslexia”. Doctor W. Pringle Morgan was the first who discovered this phenomenon. He became interested in the student who seemed not to see the text. The doctor excluded the boy's visual defects but recognized the presence of congenital verbal blindness[9]. Dyslexia is often called ”hidden disability”.

Many people still confuse the specific difficulties in learning to read and write with the delay which may be a result of the environmental neglect or developmental delays. H.Spionek's research have shown that the majority of students with school problems were the students with the discordant, inharmonious development, but not globally delayed. It was also determined that the majority among children with severe learning difficulties were those whose intelligence indicated normal mental development. However, they had variety of selective mental and motor retardation [5].

M. Bogdanowicz indicates that dyslexia is treated as a learning disorder, not a disease entity. Specific learning disabilities are the consequence of the disorder in the development of certain cognitive functions. Primarily auditory-language functions. An important role is attributed to child's development disorders in the phonological aspects of the language (phonological processing disorder) - attention, memory, auditory perception, (impressions receiving and perceptions) and speech sounds. The characteristic symptom of these disorders is the difficulty in distinguishing articulatory and phonetically similar sounds called phonemic hearing disorders.

That's why children confuse voiced and unvoiced sounds, for example: ”puściej” instead of ”później”, mistakenly writing soften sounds, for example: ”Baza” instead of ”Basia” , mixing up ”i-j ”, for example: ”zjem ja” instead of ”ziemia”. The difficulty in making the sound analysis of words often leads to the lowering of letters, syllables and repositioning while reading, for example: ”do” instead of ”od ” and also the structure distortion of written words and often writing nonsense words for example: ”pijka” instead of ”bajka”. Reading

difficulties arise from the early stages of reading or decoding. ”Decoding ” means the matching letters and sounds that are represented by them. Therefore, dyslexic children read slowly making mistakes and without understanding. Poor concentration on aural stimuli and poor aural memory cause difficulties within the understanding of a reading text, leaving the words and endings of words (writing of the hearing) [2].

The research carried out under the direction of M. Bogdanowicz involved students from classes IV of the primary school revealed that dyslexia (difficulties in reading) was observed among 9-10% of children [5] .

Many models have been defined and many theories have been explained in the dyslexia-topic literature. However we still can't clearly define what is the essence of dyslexia. The oldest etiological approach indicates genetic theories. They appeared along with the first reports by J. Kerr, W. P. Morgan and J. Hinshelwood applied to the cases of ”congenital verbal blindness ”. They put up a hypothesis about the genetic conditioning. J. C. DeFries with the group of colleagues examined the acquisition of reading and writing skills in a group of 64 pairs of twins and 55 pairs of one-male twins. At least one of the twins showed some impairment in reading. They found that about 30% of the cognitive phenotype causing difficulty in reading is related to hereditary factors. The subject of empirical analysis was also the question of whether reading difficulties occur in the same family and the boys suffer from them more often. B. Hallgren found that the risk of dyslexia for the first degree of kinship is 41% and is higher than the risk of dyslexia in the whole population (5 -10%). By examining of the family risk of dyslexia G. P. Volger found that dyslexic fathers' sons were threatened by the 40% dyslexia risk and dyslexic mothers' sons were threatened by the 40% risk. For what daughters have inherited from their parents dyslexia, regardless of whether it was the father or the mother, the risk of dyslexia was 17-18%. E. L. Klasen, S. Naidoo and J. M. Finucci reported the similar estimates for the family risk of dyslexia (range 35-45%). Dyslexia usually is found more often among boys than girls, the estimate is 3.5-4.0 to 1. This estimate of the affected families is 1.5, - 1.8 to 1 [4].

Modern studies on the genetic background of dyslexia are conducted in two main areas: behavioral - genetic and molecular – genetic. The behavioral-genetic studies compare the relationship between the phenotype and the genotype in the group of twins and their families, and the molecular-genetic studies analyze the genetic structure of DNA in the search for the genes associated with dyslexia and reading. J. C. DeFires took the cognitive behavioural -genetic research conducting another great research project among the twins - within 622 monozygotic twins and 779 dizygotic twins. He also used a new method of analysis which allowed for a more accurate assessment. He applied the so-called DF rate based on the assumption that the monozygotic twins show greater similarity than the dizygotic ones. The analyses were performed to evaluate two types of the environmental factors that affect the membership of the group of people with dyslexia. The cognitive analysis included the reading and language skills associated with it such as reading words, verbal phonological decoding, orthographic coding and the removal of phonemes. Estimating the heritability of the deficits for all measurements proved to be statistically significant while the environment affected the process of reading. So we can summarize that the current behavioral genetic research shown that the variability in reading as well as the occurrence of dyslexia is partly hereditary. These studies also confirmed that dyslexia is the heterogeneous and complex phenomenon that isn't inherited in a simple manner compatible with the laws of Mendel [8].

Molecular - genetic studies confirm the relationship with several genes. The so-called weaker genes have been recognized to be responsible for dyslexia. Their localization in the chromosomes is called QTL (Quantitative Trait Loci) also known as ”the place of vulnerability”. They are the places on the chromosomes (genetic markers linked to the identified features which we are interested in) in which genes are associated with phenotypic differences in sensitivity, and the content of which depends on the object of study - in this case it depends on the sensitivity of the reading disorder. Despite the fact that single QTL has a little effect on the occurrence of events or other problems and disorders, all their group may be responsible for them genetically. So QTL does not affect dyslexia by itself, but may be associated with the transmission of both the normal reading conditions and its disorders. People suffering from dyslexia have more unfavorable alleles or more risk factors in the form of different places that are susceptible of the QTL to develop the skills of reading disorders. Instead of one gene we have several places of quantitative traits and each of them

can be relatively frequent in the population. There are at least a few areas of QTL affecting reading disorder, and they are located on chromosomes 1, 2, 3, 6, 15 and 18. Stein points out that the genes on chromosome 6 are ”responsible” for dyslexia and they are located next to the chromosome of the body immune system. Therefore, students - dyslexics suffer from a variety of somatic symptoms: allergies, migraine headaches and digestive disorders [8].

Oxford Genetic research aimed at independent genome scans has identified the qualitative - quantitative place in chromosome 18 that influences dyslexia. Fischer and Marow show two complete genome scans carried out on large family groups from the United Kingdom and the United States. Using a single-point analysis the relationship with marker D18S53 has been identified. The multipoint analysis pointed out the relationship between 18p.11.2 and reading single words. The measurements of the spelling and phonological processing also pointed out some links with that place in the gene. The replicating studies in another independent group of English families pointed out first of the relationships with phonological consciousness. The researchers point out that the combination of the analysis of the results of all British families have confirmed that the newly discovered 18p.11.2 is probably the main risk factor of dyslexia affecting the processes involved in reading [6].

Many scientists in the world including Bates TC, Luciano M, Lind PA, MJ Wright, GW Montgomery, NG Martin, G Poelmans, JK Buitelaar, DL Pauls, B Franke study candidate genes showing dyslexia [1, 10].

The multi-causal concept has an important significance for the teachers to explain the causes of dyslexia which implies that the plexus of teaching, educational, cultural and social adverse effects determine the emergence of dyslexia. The following factors are indicated: educational methods, structure, atmosphere and the intellectual and cultural level of the family, parents’ reactions to children’s problems and the methods of their elimination, the teachers’ attitude and relationship with the child, the methods and organization of reading and writing, the bad physical condition of the child, and frequent absences from school. The last years emphasize the importance of the multi-causal factor causing specific difficulties in reading and writing. All these causes lead in effect to the summary: language and perceptual-motor dysfunctions (perception of auditory, visual and motor skills), their mutual interaction, attention disorders, memory (visual, auditory, motor) disorders, lateralization (no hand and eye dominance) and orientation in space. These disorders are often deepened during the development of the child as a result of environmental and educational negligence. But the reading and writing problems resulting exclusively from such negligence shall be excluded from the area of dyslexia[3].

Psychologists point out the psychological concept of dyslexia whose supporters were P. Blanchard, S. M. Tuchin, M. E. Kripatrik and B. Hallgren. E.Gann sees the causes of dyslexia in emotional disorders. Psychological trauma and stress are the main pathogenic factors. This concept is not popular, because most scientists believe that trauma and leaving a child in the constant state of stress disorganizes all human activities, however, these difficulties are not specific exclusively for dyslexia. The secondary direct causes of the developmental dyslexia (pathogenesis) are the primary cause effects. This is the dysfunction of the central nervous system of the partial concerns of cognitive processes (perception, language), motor activity and the integration of these functions. The disturbances in the lateralization and orientation process in the pattern of the body and space are often accompanied by them [2].

H. Spionek believes that the speed and psychomotor disturbances of children’s development are the cause of the specific difficulties in reading and writing. These are not always noticeable at first sight, but they are significant enough to prevent the child’s further appropriate development.

H. Spionek’s studies pointed out that most children who manifested serious difficulties in learning to read and write have a variety of psycho-motor retardation despite their normal physical development. These delays are small, but they can significantly hinder or prevent the child’s proper execution of activities connected with the learning process [8].

Dyslexia can also be the result of disturbed cognitive function. Sometimes the attention involved in the process of decoding isn’t able to cover the higher memory processes, e. i. the understanding of a text. Merill, Sperber, Mc Cauley proved that dyslexics use all the meanings of a word – but don’t feel the context the word is used in. Memory also plays an important role - dyslexia appears from the inability of simultaneous

maintaining of several pieces of information in the short-term memory [7].

CONCLUSIONS

These causes do not cover the content of the topic, however they reveal the essence of the problem and the specific sources of dyslexia which are so important for parents, teachers and scientists. It is worth noting that such people as Hans Christian Andersen, Winston Churchill, Leonardo da Vinci and Albert Einstein had dyslexia. This shows that it is possible to overcome the difficulties connected with dyslexia disorders and to achieve success.

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