

Speech development delay in a child with foetal alcohol syndrome

Opóźnienie rozwoju mowy u dziecka z alkoholowym zespołem płodowym

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Medical Studies/Studia Medyczne 2016; 32 (3): 199–203

DOI: 10.5114/ms.2016.62312

Key words: foetal alcohol syndrome, alcohol in pregnancy, delay in speech development.

Słowa kluczowe: alkoholowy zespół płodowy, alkohol w ciąży, opóźnienie rozwoju mowy.

Abstract

A female foetus in her mother's womb was exposed to high concentrations of alcohol at each stage of pregnancy on a long-term basis, which resulted in a permanent disability. In addition to a number of deficiencies in the overall functioning of the body of the child, there are serious problems pertaining to verbal communication. This thesis aims to describe foetal alcohol syndrome (FAS) disease and present the basic problems with communication functions in a child, caused by damage of brain structures responsible for speech development. The thesis includes a speech diagnosis and therapy program adapted to the presented case. In the Discussion Section we have presented characteristics of communication disorders in case of children with FAS and the description of developmental malformations, neurobehavioral disorders, and environmental factors affecting the development of the child's speech.

Streszczenie

Dziewczynka, będąc w łonie matki, była narażona na długotrwałe działanie alkoholu w wysokim stężeniu na każdym etapie ciąży, co spowodowało trwałe kalectwo. Poza szeregiem deficytów w całościowym funkcjonowaniu organizmu u dziecka występują duże problemy w zakresie komunikacji werbalnej. Celem pracy jest opis alkoholowego zespołu płodowego oraz przedstawienie podstawowych problemów w funkcjonowaniu dziecka w zakresie komunikacji, spowodowanych uszkodzeniami struktur mózgowych odpowiedzialnych za rozwój mowy. Praca zawiera diagnozę logopedyczną oraz program terapii logopedycznej dostosowany do omawianego przypadku. W dyskusji przedstawiono ogólną charakterystykę zaburzeń komunikacji u dzieci z alkoholowym zespołem płodowym oraz opis wad rozwojowych, zaburzeń neurobehavioralnych i czynników środowiskowych mających wpływ na rozwój mowy dziecka.

Introduction

Foetal alcohol syndrome (FAS) is a disorder occurring in the case of children whose mothers consume alcohol during their pregnancy. Microdamage of the brain caused by teratogenic effects of alcohol on an embryo, causes mental and physical disorders of a child. Foetal alcohol syndrome is an encephalopathy; changes that have taken place in the brain are irreversible, comparable to the stroke, in a micro-scale [1]. The extent and degree of changes in the brain depend largely on the alcohol dose, duration of exposure, and the gestation period in which it was consumed. A toxic effect of alcohol on a developing embryo causes abnormal processes of multiplication and differentiation of cells and their dying, which leads to the situation that a child is born with a small-

er number of neurons and a smaller, deformed brain. In case of children with foetal alcohol syndrome the following triad of symptoms are observed: characteristic facial features, delays in physical development: low birth weight, delayed growth, dysfunction of the central nervous system [2].

Case report

Girl, 6 years old. The girl attends the Public Nursery in Jastrzebie-Zdroj. In this case a lot of general developmental disorders were observed. Research performed at the Psychological and Pedagogical Dispensary revealed a delayed physical and psychological development, taking into consideration the possibility of FAS syndrome. The child was observed, and the following anomalies and dysfunctions appeared: facial dysmor-

phia, slight intellectual disability, destruction of eye-motion coordination, emotional lability, attention deficit disorder, delayed speech development.

The performed interview revealed that the girl's parents are addicted to alcohol and that her mother drank alcohol during her pregnancy. The speech therapy research it is conducted showed the following deficits in the development of the girl's speech: 1) In terms of expression of speech: distortion of sounds, substitutions, metathesis, elision, kinaesthesia articulation disorders, very small lexical resource. Speech is characterised by brief statements in the form of simple sentences with numerous agrammatisms. 2) In terms of perceptual speech: difficulty in understanding simple and complex commands, phoneme hearing disorders, poor auditory memory.

Moreover, the girl was diagnosed with emotional instability, impaired planning, poor memory, impaired motor skills, noticeable increased tension in small limbs, and attention deficit disorder. The girl was sent for additional audio-logical testing. The speech therapy study it is conducted was based on the following diagnostic tools: a picture questionnaire to examine articulation [3], test boards to examine phoneme hearing and kinaesthesia articulation [4], and a test to examine aphasia AFA scale [5].

On the basis of the research, the social report, and the opinion of Psychological and Pedagogical Dispensary, it is stated that Spontaneous Speech Development Delay appeared in the speech of this girl, caused by damage to the nervous system as a result of foetal after alcohol syndrome. Despite a lack of further research on the girl or studies performed by neuroimaging technique, one may assume that as a result of teratogenic effects of alcohol, damage occurred to important centres in the brain particularly sensitive to the effects of poison, such as:

- the frontal lobes (occurring afatic disorders, emotional instability, impaired concentration),
- the hippocampus, which is responsible for storing new experiences, transfer of memories from short-term memory to long-term [2],
- the cerebellum, which is responsible for the coordination of movements (damage to the front of the vermis) [6],
- corpus callosum (in the case of children with FAS, the corpus callosum is small and poorly formed, and approximately 7% of them do not have it at all), which is responsible for the exchange of information between the two hemispheres [7],
- temporal lobe responsible for verbal memory and remembering [6].

Therapeutic procedure

The girl should be involved in a comprehensive integral treatment, which would include permanent psychological and pedagogical care and speech ther-

apy. The recommended program of speech therapy is as follows:

- articulation exercises, exercises of kinaesthesia of articulation organs,
- exercises to develop phoneme hearing and auditory analysis and synthesis,
- exercise of perception and auditory memory,
- exercises in the orientation of one's body schema, naming body parts, pointing to a further order on the picture,
- simultaneous exercise of memory, sequential memory, and categorisation,
- exercises to develop visual – motor coordination,
- exercises to develop auditory sensitivity,
- exercises enriching passive and active vocabulary, repetition and naming of nouns, verbs, adjectives,
- exercise of personal pronouns,
- exercises prepositions and numerals,
- exercises to develop emotionally: expressing and identifying their own emotions, naming various emotions experienced by the child,
- learning about herself as a human being: consolidating personal data (my name, my age..., remembering her address),
- implementing exercises to release tension in joints and muscle motility of small hands and fingers (improve precise movements of the wrist, hand, and fingers: swings of hand, circulatory, wagging fingers drawing, letters, figures, figures on trays with sand, rice flour, torn pieces) [8],
- graphomotor exercise.

Children with FAS are characterised by so-called short memory. They forget information that they have previously learned, but have not used for a long time. So regular repetitions of required skills should be performed [9].

Discussion

Normal development of speech is conditioned by many factors, such as proper functioning of brain centres responsible for transmission and perception of speech, normal development phonetic-articulatory apparatus, proper functioning of physical ability to listen. Ethanol is a substance which negatively impacts the foetus and interferes with processes of development, causing a number of drawbacks and related language deficits. An example of this is described in my case, which proves damage in a developing organism caused by teratogenic effects of alcohol, and showcases subsequent consequences.

In this chapter, it will be discussed malformations and dysfunctions affecting communication in the case of children with FAS. A holistic approach to a child is crucial to provide proper diagnosis and to identify appropriate therapy. Children with FAS exhibit behavioural and cognitive deficits. The spectrum of deficits is quite large. These include language disorder, atten-

tion deficit disorder, learning difficulties, impaired motor skills, and impaired visual-spatial secondary psychiatric disorders. Exposure of the foetus to alcohol negatively affects many developmental processes such as behaviour, learning, and memory. Children with FAS also suffer from significant impairment of speech. They show deficits in both language production and comprehension. The problem with perception of speech seems to be slightly larger [10]. Foetal alcohol syndrome is characterised by congenital malformations associated with impaired hearing. There are four types of auditory disorders found in FAS, namely: delay in the development of auditory maturation, sensory hearing loss – teratogenic effect of alcohol on the auditory system causes damage to the inner ear cells in the embryo [11], hearing loss caused by recurrent serious otitis of the middle ear, and central hearing loss [12].

Studies of people with FAS showed significant weakening of the central auditory [13] in all patients (100%). As it is apparent from the above tests that delayed speech development in case of children with FAS is a result of central auditory processing disorder [14], as well as damage to conductive hearing, receiving, or a mixed one. Early detection of hearing defects and hearing loss treatment has a significant impact on the results of speech therapy, which is why it is very important that a child with foetal alcohol syndrome be examined audiologically. It should be kept in mind that better language communication of a child with FAS brings better functioning in society. In the presented case study, a serious problem with learning and acquiring skills is indicative of verbal memory deficit.

Therefore, in order to be effective, the therapy must be conducted with a particular focus on systematic repetition and reinforcement of acquired skills. Memory disorders are the most common problem in the case of children with FAS. Exposure of a foetus to alcohol in the first trimester of pregnancy causes deficits in learning disabilities, impaired short-term memory, and long-term especially in the area of verbal and auditory and spatial memory. Foetal exposure to alcohol is therefore connected with generalised deficits of learning and memory, verbal memory loss, and impaired hearing processes of encoding/storing and extracting information. Structural changes in the basal brain ganglia caused by the teratogenic alcohol effect cause attention deficits, persuasive responses, and disturbance in verbal learning and recalling [15].

The causes of articulation disorders in the case of children with FAS are hearing impairment, intellectual disability, as well as tooth and facial defects. Already in the case of newborns who are exposed to prenatal alcohol exposure motor delays and problems with sucking can be seen, and in the case of children malocclusions are observed such as: crowding of the

incisors, undershot, and open bite [16]. One should remember that the cerebellum and frontal lobes are particularly sensitive to the teratogenic effect of alcohol, and in connection with the front and front cerebellar damages they affect verbal fluency disorder, since it is dependent on the cerebellar-frontal loop [17]. In the case described by me, a girl exhibited poor performance in terms of small motility. Recommended graph-motor exercises are intended to improve this dysfunction and to prepare the child to perform more precise motor movements associated with writing skills. Written communication is a key element in school activities and education. Writing is often the primary method of demonstrating knowledge and performance of educational tasks. Children who in their foetal life were exposed to alcohol, in school-age have pronounced difficulty with writing. Research has shown abnormalities in writing of individual letters, words, sentences, and writing under dictation. Writing speed is slower and it is less accurate.

The reason is reduced visual-and-motor ability and sensory-and-motor disorders [18]. Cerebellar dysfunction in the case of children with FAS contributes significantly to the lack of oculomotor control [19]. This results in difficulties in learning to read, errors while writing, and reduced level of graphics. Children with FAS have difficulties in learning new material, and there are big problems in the implementation of tasks requiring visual-spatial processing (e.g. copying the figure), and in the course of scientific processes, e.g. mathematics. The teratogenic effect of ethanol on the nerve cells can also cause significant damage to the eyes.

Therefore, a child with FAS should be examined by an ophthalmologist in order to diagnose disorders of sight, which can cause problems, and as a consequence, difficulties in science education, writing, or reading. In the case of children with FAS there are commonly observed ocular aberrations, underdevelopment of the optic nerve, retinal vascular tortuosity, and microphthalmia [20]. In the United States, the opinion of the ophthalmologist and the optometrist is crucial in the diagnosis of alcohol syndrome. Examination of oculomotor dysfunction, visual problems, reduced field of vision, poor vision field, and poor isolation of a valid object may assess the extent of brain damage [21].

Numerous dysfunctions and birth defects should be diagnosed early by a physician and teachers/educators who have contact with a child. Based on my own observation, preschool educators and paediatricians do not have sufficient knowledge about FAS and related neurobehavioral, cognitive, and somatic disorder syndrome. Such knowledge and awareness are needed to allow an appropriate approach and early care provided by specialised medical centres and psycho-pedagogic centres, where a child will have access

to comprehensive therapy. Lack of proper knowledge and awareness of a child's brain injury, which caregivers and educators should possess, prevents a child from reaching his/her potential. There is therefore a need to understand that a child with FAS is a person whose primary concern is the pathology of the brain [21].

The problem of drinking alcohol is still a common phenomenon among pregnant women, so one should assume that such children are born not rarely, but not every child is properly diagnosed. Facial dysmorphism is not always present, which is a major diagnostic problem (non full-symptomatic FAS), and therefore such children do not receive adequate assistance in the proper time. They have to deal with consequences of lack of support for the rest of their life. Delayed speech development in the case of children with FAS is primarily due to damage to brain structures and due to the teratogenic effects of ethanol on nerve cells. It should also be taken into account that language deficits may be deeper as a result of unfavourable actions of the child's speech environmental factors, which influence speech development. Lack of correct language patterns, lack of proper relationship of a child with parents, poor contact with family, domestic violence, and alcohol abuse are additional reasons for a negative impact on the development of speech and the child's behaviour.

Children with alcohol syndrome often have symptoms of oppositional defiant disorder behaviours that may be a mask for depression. These symptoms are caused by lack of safe development experience ties, neglect, or violence [22].

A child's lack of willingness to work, not executing commands, and aggressive behaviour, can often take place during the course of speech therapy. Therefore, in order for a speech therapy to be effective, collaboration between a speech therapist with a psychologist, and an educator with a supervisor is needed.

Children with FAS, along with speech disorders comorbid with emotional disorders, behavioural disorders, and perception-and-motor function, along with delay and mental retardation, so there is a need for speech therapy parallel to the treatment of emotional disorders, behavioural disorders, and educational therapy. When planning speech therapy there should be a need of being guided by the principle of comprehensive therapeutic effects [23].

Behavioural disorders and difficulty in obeying standards, rules, and regulations also stem from the fact that a child with FAS does not recognise the feelings experienced by him/herself, does not see the feelings of others, poorly understands other people's intentions, and has limited skill of memorising commands [21, 24].

The case the girl shows how extensive brain damage is caused by drinking of alcohol in pregnancy. The broad spectrum of defects and their diverse con-

figuration are dependent on alcohol dose and duration of teratogenic effects on the brain in the development phase. Despite the fact that children with FAS are different, on the basis of this case and comparison of numerous studies, it can be concluded that damage in each case primarily comprises, to a greater or lesser extent, brain structures particularly sensitive to the toxic effects of alcohol and responsible for memory, hearing, communication, motor skills, and behaviour.

Conclusions

It is cruel to destroy another person's life and take away his/her right to normal functioning in society. A mother who drinks alcohol during pregnancy dooms her child to disabilities both physical and mental, and takes away from her offspring the right to a normal life. Today, we hear more about FAS and the effects of drinking alcohol during pregnancy, but it is still not enough. We think that the awareness of women has increased, but is still dominated by the belief that a small glass of wine will not hurt, but this is far from the truth. Risk of damage to foetal brain structures may occur with even small and occasional consumption of alcohol. Hence there is no safe dose of alcohol consumption in pregnancy. This fact should be publicised, and education among young people in this area should be implemented.

Conflict of interest

The authors declare no conflict of interest.

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