

Statistical Analysis of the Prevalence of Persons with Autism in Modern Society

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Abstract—This article is devoted to the study of the problem of prevalence of persons with autism spectrum disorders in the world, in some regions of our country (including the Kurgan region). The data on structural changes in the cerebral cortex obtained as a result of neurophysiological studies of children with this disorder are presented. Scientists who are actively involved in studying the autism spectrum disorder are noted, the characteristic features of the mental development of children with autism are determined. Methods of statistical analysis of the prevalence of children with autism are determined. The data on the prevalence of the autism spectrum disorders in Russia over different periods of time are analyzed. The prevalence of autism spectrum disorders in foreign countries is considered. The trends of the further spread of autism spectrum disorders in Russia and in the Kurgan region are revealed.

Keywords—*statistics, disability, autism, autism spectrum disorder.*

I. INTRODUCTION

At the present stage of society development, a lot of attention in the world, as well as in Russia, is paid to education and socialization of people with an autism spectrum disorders. In this connection, in 2001, the World Health Organization (WHO) declared the problem of autism disorders to be one of the leading in psychiatry. And in 2008, the UN General Assembly proclaimed April 2 as "World Autism Awareness Day." Over the past twenty years, the scientific interest in autism spectrum disorders (ASD) has evolved from a narrow problem to one of the leading areas of pedagogical, psychological, and neurobiological research.

The very concept of autism is defined as a complex disorder of mental development, through which the skill of communication, building social contacts is disrupted. The behavior of autistic children is characterized by increased stereotyping (from repeated perseverations of primitive motor acts, such as shaking hands, bouncing, to complex ritualization) and often destructive (manifestation of aggression, self-harm, screaming, negativity, etc.) [1].

Autism spectrum disorders are complex mental development disorders that are characterized by a social adaptation disorder and a lack of social interaction and communication ability, as well as a stereotyped behavior [2].

The data of Russian researchers over the past five years have indicated various forms of childhood autism, which occur in 4-25 cases out of 10,000, which is 0.04-0.26% of the total child population. Moreover, there is a tendency to an increase in frequency of this developmental disorder. Today,

ASD is considered to be a rather complex disintegrative mental disorder, which is manifested in a many-sided deficit of social interaction, as well as socialization. The prevalence of ASD in Russia has tripled since 2000.

There are paradoxical results of studies of newborn children who were later given this diagnosis, where at birth the head circumference in infants with early childhood autism (ASD) is significantly less than in neurotypic children (Courchesne et al., 2003), though in infants aged from six to fourteen months, it increases markedly (Courchesne et al., 2003).

According to Sack et al. (1998), Carper & Courchesne (2005) when studying magnetic resonance imaging of the brain and post-mortem neuropathological studies, it was found that ASD is characterized by dynamic structural and functional defects caused not only by age but also by development heterochrony. The studies by foreign neurologists show that such children have an increase in the volume of the occipital-temporal lobe and cerebellar hemisphere (Brambilla et al., 2003). In accordance with the results of MRI, the amount of gray substance is reduced in some areas, and the main volume of cerebrospinal fluid in patients with autism, on the contrary, is significantly increased. Some studies indicate an increase in gray substance growth in different areas with autism (Rojas et al., 2006).

Aylward et al. (1999), Herbert et al. (2003), Loveland et al. (2008), note a decrease in the volumes of the amygdala, as well as the hippocampus, along with this, the speed of performing neuropsychological tasks is significantly reduced. At the same time, significant changes were recorded in the structure of the limbic system, which is known to be responsible for motivation, memory and emotions of a person.

The behavioral features inherent in this disorder are due to functional abnormalities in the development of the brain (Cohen, 2007).

The etiological factors of this disorder act as various causes, and so far there is no single concept for the occurrence of ASD.

II. LITERATURE REVIEW

The review of literature indicates that there are several classifications of childhood autism. The term "children autism" integrates such categories as autism disorder, infantile autism, infantile psychosis, Kanner syndrome, Asperger syndrome.

Over the past ten years, there has been an increase in the degree of incidence of ASD syndrome and related disorders, and currently the number of such children totals to from 15 to 20 per 10,000 children (D. Wolf, E. Mash). Etiology study of autism continues to become more specified, and the psychological structure of the syndrome is also being studied in detail.

Scientists such as H. Williams, L. Kanner, R. Schramm, A. V. Haustov, E. B. Zhestkova, Yu. A., Ertz and others are actively involved in the study of ASD. A distinctive feature of the formation of the psyche with ASD is inconsistency and ambiguity of its manifestations. Children have impaired feelings of self-preservation (this can be noted both in over-caution and in the complete absence of a sense of danger); of an affective contact with others; of a visual and tactile contact (for example, looking “past” or “through” the face of an adult, avoiding a tactile contact or an inadequate reaction to it), they have communicative disorders (difficulties in expressing their own affective state, in expressing a request); deviations of speech development (difficulties in construction of a speech utterance of their own).

These children often have a peculiar development of thinking (for example, children may show an ability to symbolize; they obsessively carry out complex mental operations); they may have difficulties in the voluntary organization of their behavior; specific features of motility (largely determined by the desire for stereotypical movements and actions). You can also note some of the characteristic features found in children, such as sensory vulnerability; desire for additional sensory stimulation; sleep-awakening disruption; deviations in self-preservation behavior; deviation of eating behavior. In addition, it can be noted that the behavioral features inherent in this disorder are due to functional abnormalities in the development of the brain (Cohen, 2007).

Factors for occurrence of this disorder manifest themselves as different causes, and at the moment there is no single concept for the occurrence of ASD. One of the leading aggravating factors is genetic disposition. Speaking about defectology in Russia, there is a single theoretical and practical approach to the correction of childhood autism (K.S. Lebedinskaya, O.S. Nikolskaya, 1991; O.S. Nikolskaya, E.R. Baenskaya, M.M. Libling, 1997).

The constellation of the psychological approach to correcting an autistic child and his family is based on the doctrine of the primary defect in the formation of the emotional sphere in the general structure of the syndrome (O.S. Nikolskaya, 1985, 1999). Psychological correctional assistance, effectively forming the possibilities of autistic children in contact, eliminating their affective defects, nevertheless, does not guarantee the subsequent adaptation of children in society.

III. METHODS

In order to identify the trends in prevalence of people with autism spectrum disorders in Russia and in the Kurgan region, the faculty members of the Chair of Defectology of Kurgan State University conducted a study based on the data of the Russian official statistics received from the following sources: from the Ministry of Education of the Russian Federation, the Federal State Information System, and the Federal Resource Center of Moscow State Pedagogical University, Federal State Statistics Service, from the analysis of scientific literature for

different periods of time. To study, analyze and group information, we applied the method of generalizing indicators, the selective method and the method of statistical groupings.

IV. RESULTS

The fundamental scientific researches of ASD show that this disorder has been more and more active in recent years.

In 1966, Victor Lotter conducted epidemiological studies. V. Lotter studied the children who were characterized by the same structure of behavior as described by Kanner. As a result of this experiment, Lotter revealed a statistical universe of the prevalence rate of individuals with Kanner's “syndrome”, it amounted to 4.5 cases per 10,000 children. In 1979, Laura Wing and Judith Gould continued studying the prevalence of autism, they conducted a study among children with specific needs (in individuals with an IQ of less than 70), the findings from these scientists were 5 out of 10,000. They also studied children with a “triad” of disorders, they only partially corresponded to the picture of early childhood autism (or typical autism), previously described by Kanner. There were about 15 cases out of 10,000 of such children in terms of prevalence rate.

Further on, we are going to consider the level of prevalence of ASD in foreign countries.

The current data estimate the prevalence of autism to 1-2 cases in 1,000 children and, as for ASD, it amounts to about 6 children per 1,000 [2]. In this connection, in 2006 in Great Britain, about 57,000 children were examined, 9 and 10 year olds. As a result of this study, the scientists found that generalization of ASD was 11.61 per 1,000 and 3.89 per 1,000 for children with autism. Such high indicators of the level of prevalence of these disorders according to relevant data may be explained by the fact that by this time the diagnostic criteria and tools for such deviations had sufficiently expanded. It should also be noted that the researchers made direct detailed observation of individuals with similar pathologies, and it turns out in some cases to be a more effective and complete method of study than, for example, the analysis of medical documentation, or conversations with parents of children suffering from ASD. This research indicates a higher prevalence of ASD, although in no case does it exclude other methods for detecting this deviation among children. In addition, this fact also indicates that official information may underestimate the real degree of generalization of ASD in Russia and foreign countries [3].

In the observations of the UK Office of National Statistics, the frequency of ASD generalization is 90 per 10,000 (Green et al., 2005). Differentiation between autism, Asperger's syndrome or other types of autism spectrum disorders was not performed in this case.

Gillian Bird's study showed a prevalence rate of 38.9 per 10,000 for childhood autism and 77.2 per 10,000 for other disorders of this spectrum, which amounted to 116 per 10,000 for all autism spectrum disorders (Baird et al., 2006).

In a 2009 study (England) where different methods for assessing the intensity of ASD were applied, it was noted that in 40% of cases, ASD cannot be diagnosed, and according to these researchers, true generalization is about 11.3 for autism and 15.7 for the autism spectrum per 1,000 population [4].

The situation was approximately the same according to a study conducted in 2009 in the USA, where the prevalence

rate of ASD among eight-year-old children was 9.0 per 1,000 [5].

According to the results of the 2009 report, which was compiled on the basis of a study of the incidence rate in accordance with the materials of the National Health Service, among the adults with psychiatric diagnoses, the prevalence rate of ASD was approximately 1% of the population, with the highest incidence rate among males without distinction between age groups [6]. These results demonstrate that generalization of ASD among the adults was similar to that in children (in 2009) [6].

If we analyze the prevalence rate of ASD in the USA over 11 years (from 1996 to 2007), it will be very obvious that the number of cases of autism per 1,000 children has increased dramatically during this period (Figure 1). Up to the present, no specific reason has been found for such a significant increase in the number of people with ASD in the USA over 11 years. [7].

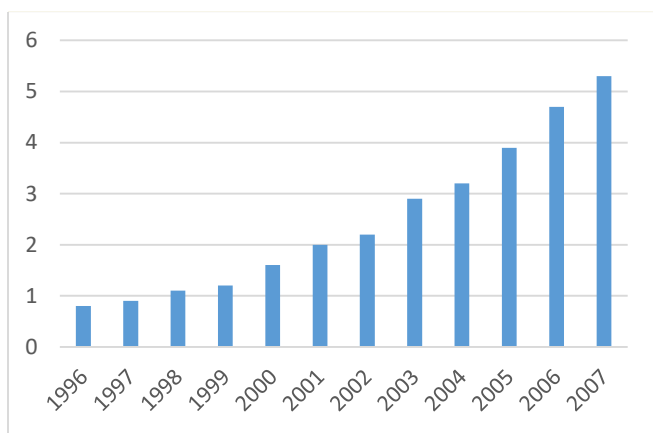


Fig. 1. Autism prevalence rate in the USA per 1,000 children over the period 1996–2007.

The 2007 study simulating the incidence of autism showed that diagnostic criteria extension and modification, diagnosis at a younger age, and, in addition, increase in efficiency of detecting cases of the disease, can lead to an increase in the incidence of autism in the range up to 29-fold (depending on the frequency of its measurement) [8].

In a pilot study conducted in California in 2009, the scientists found that the generally accepted (official) prevalence of autism increased from the early 1990s to 2007 by a 7-8-fold factor, this increase in the incidence of this disease is explained by a connection with diagnostic criteria transformation, namely, due to inclusion of milder cases and the diagnosis at an earlier age [9].

If we look at the statistics on generalization of ASD in different countries, we can see that one of the countries with the largest number of people suffering from this pathology is the United States. So, as of 2012 in the United States, every fiftieth citizen was diagnosed as a person suffering from ASD. Below is a graph that shows an increase in the number of children with autism in this country (Figure 2).

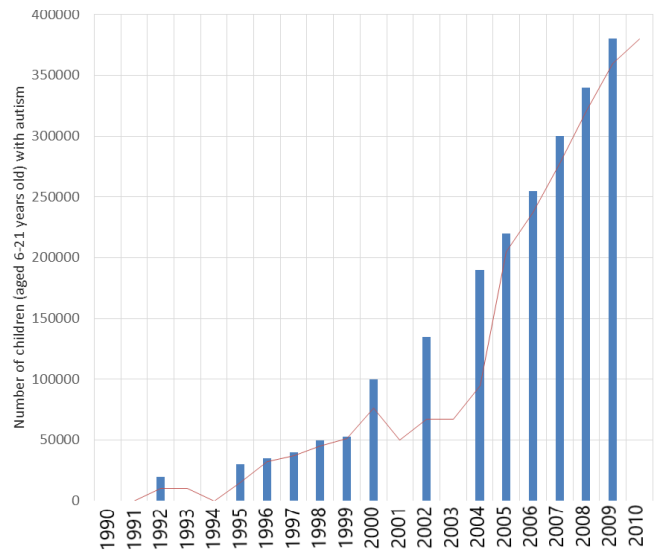


Fig. 2. Increase in the number of children with ASD in the USA from 1990 to 2010.

Specialists do not establish the relationship between the autism development and belonging to any race, social conditions of life, material well-being. However, scientists believe that the influence of the external environment and genetic factors cannot be ruled out. Perhaps, the greatest increase in the number of people suffering from ASD is observed in the countries such as the United States, due to the fact that this disorder in other countries has been studied to a lesser extent, and people with a similar deviation are given completely different diagnoses. In America and Europe, this problem appeared relatively long ago. That is why appropriate conditions are created for such people that will allow them to be and feel full-fledged members of society. Russia and neighboring countries have encountered the problem of autism relatively recently, and therefore, the relevance of this problem still exist at the present time.

According to the statistics, more than 10 million people suffer from autism in the world. A few decades ago, there was one person with ASD per 10,000 inhabitants. Each year their number increases by 11-17%. For example, in China, this quantity is even higher and totals to 20%. In modern society, almost one per 100 inhabitants of the planet suffers from autism. The table below shows statistics on the prevalence rate of ASD in the world from 1995 to 2017. [10].

TABLE I. PREVALENCE OF PEOPLE WITH ASD IN THE WORLD IN DIFFERENT YEARS FROM 1995 TO 2017

| Year | Number of persons with ASD globally |
|------|-------------------------------------|
| 1995 | 1 out of 5,000 |
| 2000 | 1 out of 2,000 |
| 2005 | 1 out of 3,00 |
| 2008 | 1 out of 150 |
| 2010 | 1 out of 110 |
| 2012 | 1 out of 88 |
| 2014 | 1 out of 68 |
| 2017 | 1 out of 50 |

According to the global scientific forecasts in 2020, every 30-eth inhabitant of the planet will suffer from this disorder. And after 5 years, every second will.

Let us consider the state of this problem in Russia. The following statistics can be observed in Russia: in 2005 there was on average one case of autism per 250-300 newborns; in

2008, the incidence of autism spectrum disorders was 1 case per 150-161 newborns (data from the Center for Disease Control in Russia) [11].

In Russia, the incidence of autism disorders has increased from 4-5 per 10,000 children over the past 30-40 years to 50-100 cases per 10,000 children. According to statistics, the number of children with autism in our country has tripled over the past 5 years. A growing trend in the number of people (especially children) with ASD is also observed in some regions of Russia.

According to the statistics, in our country, 0.1% of the child population suffer from autism. According to the latest data for the year 2018, the number of children diagnosed with autism was 31685. This information was published at a press conference on the system of continuous inter-agency support for people with autism spectrum disorders in Russia [4].

According to the monitoring data of the Ministry of Education and the Ministry of Enlightenment of the Russian Federation, the number of children with ASD increased from 15,989 in 2017 to 22,953 in 2018 (Figure 3) [12]. In other words, in some regions of the Russian Federation, the number of children with ASD has also increased significantly, which once again demonstrates the relevance of implementing the measures to prevent the disease dissemination, it will contribute to successful socialization of children.

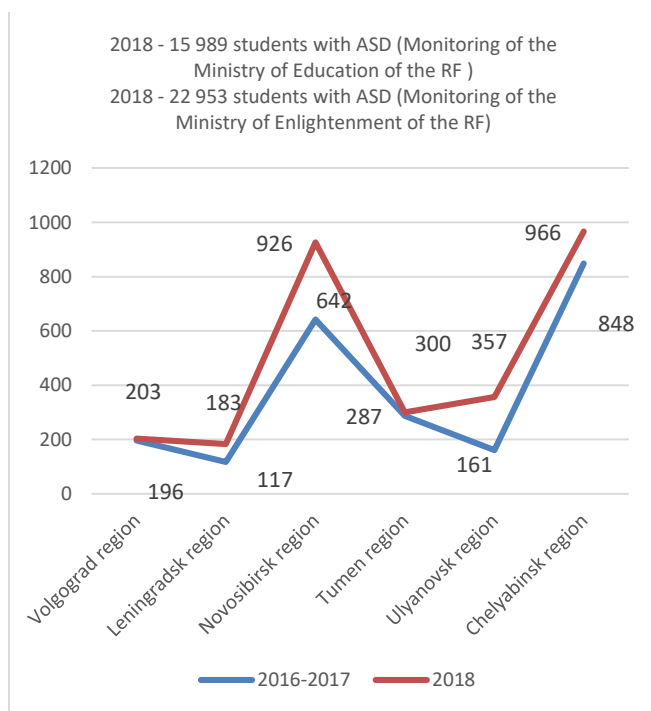


Fig. 3. Number of students for the period from 2016 to 2018 with ASD.

The number of children with different degrees of disability and deviations in psychophysical development in the Kurgan region is also growing. The main place among them is occupied by children with autism.

In the Kurgan region, the number of children with disabilities is monitored every year, the regional database of children with disabilities is updated, but there are no special records for children with ASD. This is a serious problem for timely provision of psychological, medical and educational assistance to children in this category.

The regional register of all the children with ASD, containing the data on the social, medical and educational services that the child and the family receive during their life cycle, should be one of the most important tools, creating the prerequisites for systematic assistance.

The analysis of the situation for providing comprehensive medical care for the children with ASD and their families in the Kurgan region proves that it is necessary to solve the problems of identifying, registering and rehabilitating the children with autism, to establish cooperation among specialized institutions, to provide the professional community with organizational and methodological support in offering rehabilitation services and training, and also in providing care of children with autism and their families.

V. CONCLUSION

1) In the world, as well as in Russia (including the Kurgan region), there has been an increase in the number of people suffering from autism disorders (this is especially noticeable in the recent years - 2017-2019).

2) Over the past 10 years, the number of people with ASD around the world has increased from 1 person with ASD per 5,000 healthy people to 1 person with ASD per 50.

3) Scientists predict that in 2020, every 30-eth inhabitant of the planet will suffer from such a disorder, and after 5 years, every second will.

4) In some regions of the Russian Federation, the number of students with ASD in the period from 2016 to 2018 increased by 6,964 people.

5) In the Kurgan region, the problem of monitoring and maintaining the register of persons (including children) suffering from ASD remains urgent.

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