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Prevalence of Hereditary Diseases of the Nervous System in Uzbekistan on the Example of the City of Tashkent

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Abstract: As you know, hereditary diseases of the nervous system are one of the important medical and social problems. They make up a significant share in the burden of monogenic diseases and in the structure of neurological pathology, especially in childhood and adolescence. Hereditary diseases of the nervous system manifest more often in adolescence and are steadily progressive without treatment, leading patients to severe disability.

Keywords: Hereditary diseases, clinical polymorphism, epidemiology, Tashkent city, Human genome.

Relevance. Hereditary diseases of the nervous system (NDNS) are the most common and studied group of hereditary diseases, which are characterized by an extraordinary variety of nosological forms, pronounced genetic heterogeneity and clinical polymorphism, as well as a severe disabling course [1].

In the structure of monogenic NDs, a significant part is made up of hereditary diseases of the nervous system (NDNS). They account for a significant part, more than 5%, of all neurological pathology in modern society. NBNS occupy a special place both among all forms of human hereditary diseases and pathologies of the nervous system, which is associated with their overall high prevalence, a wide variety of nosological units, significant phenotypic polymorphism, and pronounced genetic heterogeneity. Most NBNS are of a severe progressive nature, often leading to early disability and sometimes death of the patient, while to date, effective pathogenetic treatment has not been developed [4, 7, 8] .

Epidemiological studies on NBNS have been conducted in various countries. So, according to Chung B., Wong V., in China the prevalence of NBNS is 21.4 per 100,000 population, in Sweden - 53.1, in Estonia - a relatively low rate - 12.1, in the Russian Federation - 28 ,8 [2-4, 5-7].

In Uzbekistan, similar epidemiological studies were carried out, however, only individual nosologies of NBNS were studied in certain regions of the country, in particular, in the Tashkent region and in the city of Tashkent. It was revealed that the prevalence of progressive muscular dystrophy (PMD) in the Tashkent region is 5.7 per 100,000 population, limb-girdle form of muscular dystrophy (CMD) - 2.7 per 100,000 population; a form of autosomal dominant essential tremor linked to chromosome 3q13 locus ETM 1 - in the territory of Yunusobotsky district of the republic [8].

As you know, hereditary diseases of the nervous system are one of the important medical and social problems. They make up a significant share in the burden of monogenic diseases and in the structure of neurological pathology, especially in childhood and adolescence [1]. Hereditary diseases of the nervous system manifest more often in adolescence and, without treatment, are steadily progressive in nature, leading patients to severe disability.

Excessive variety of nosological forms, genetic heterogeneity and pronounced clinical polymorphism of hereditary diseases of the nervous system not only complicates their diagnosis, but also complicates the conduct of medical genetic counseling in families burdened by these ailments [3].

The first place among all hereditary monogenic neurological diseases is occupied by hereditary neuromuscular diseases (HNMD), which include progressive muscular dystrophy, which is a clinically and genetically heterogeneous group with a primary lesion of the skeletal muscles of a non-inflammatory nature, which is also characterized by a wide nosological spectrum and pronounced clinical polymorphism [2].

In 2022, a detailed examination of disabled people was carried out in Uzbekistan by a commission organized by the Ministry of Health of the Republic, which concluded that in the city of Tashkent, unlike other regions of republican subordination, a significant number of patients with NBNS were identified.

Purpose of the study. To identify all available nosological forms of NBNS in the city of Tashkent, as well as to assess their prevalence and type of inheritance.

Material and methods. For the period from January 2021 to December 2021, 198 patients with various forms of NBNS from Tashkent, districts of republican subordination and more remote regions of the country were treated in the neurology department of the central hospital at the Tashkent Medical Academy. There were 25 patients from the Yunusabad district, which is more in comparison with other districts of republican subordination. For example, there were 18 people from the Shaykhantakhur region, and 15 from the Almazar region.

The study was conducted during expedition trips in the Yunusabad district in the period July-August 2021. Information about existing patients was obtained from the data of the District Health Center and rural outpatient clinics. A total of 74 patients from 42 families were identified, aged from 4 to 61 years. The average age was 27.7±0.6 years, among them there were 51 men and 23 women.

During the examination, special cards of patients were used, including information about the proband, siblings, parents and close relatives. Pedigrees of burdened families were also compiled.

To clarify the form of the disease, a clinical and neurological examination was used, which included determining the time of appearance of the first signs of the disease, anthropometry, identification of various skeletal deformities, malnutrition, the presence of muscle retractions and contractures.

Results and its discussion. The conducted studies revealed 9 nosological forms of NBNS in the territory of Yunusabad district. Patients with limb-girdle form of muscular dystrophy predominate (n=22). The prevalence of this form of the disease was 8.4 per 100,000. The second most common is Strümpel's disease (n=14). The smallest number of patients (1 patient each) - with atypical form of PMD and Becker's PMD (Table 1).

Among the surveyed, males predominated - 51 patients, and 23 - women. Diseases such as PMD Becker, Duchenne, atypical form of PMD and myotonia were observed only in men. Spinal Werdnig-Hoffmann amyotrophy was present only in females.

Drawing up pedigree maps made it possible to distribute patients depending on the type of inheritance of the disease. The results showed that, in general, diseases with an autosomal recessive type of inheritance prevail in the load of heredity (35.1%). The smallest number of patients - with X-linked type of inheritance (2.7%). The autosomal dominant type of inheritance was most often observed in patients with Charcot-Marie-Tooths neural amyotrophy, and the autosomal recessive type was observed in patients with CPMD (10 and 11 people, respectively) (Table 2).

When assessing consanguineous marriages, it was found that out of 42 examined families, in 15 (35.7%) cases, the parents of the patients were in consanguineous marriages, in which 25 patients were born, which is 33.8% of all examined.

In the course of the study, for the first time in the Republic of Uzbekistan, the prevalence of diseases such as Strümpel's disease, hereditary cerebellar ataxia and myotonia was estimated, which amounted to 5.3, 2.7 and 1.5 per 100,000 population, respectively.

Table 1. Nosological forms of NBNS on the territory of Yunusabad district

Diagnosis	Number of patients	Number of families	Prevalence per 100,000 population
Strumpel's disease	14	8	5,3
Cerebellar ataxias	7	6	2,7
Progressive Duchenne muscular dystrophy	6	6	2,3
Becker progressive muscular dystrophy	1	1	0,4
Spinal Werdnig-Hoffmann amyotrophy	3	3	1,1
Neural amyotrophy Charcot-Marie-Tooths	16	6	6,1
CMDD (limb girdle muscular dystrophy)	22	12	8,4
Atypical form of PMD	1	1	0,4
Myotonia	4	3	1,5
Total	74	42	28,1

Table 2. Type of inheritance NBNS

Diagnosis	autosomal dominant	autosomal recessive	X-linked	sporadic cases
Strumpel's disease	5	5		4
Cerebellar ataxias	2	2		3
PMD Duchenne			2	4
PMD Becker				1
Spinal Werdnig-Hoffmann amyotrophy		2		1
Neural amyotrophy Charcot-Marie-Tooths	10	4		2
CMDD (limb girdle muscular dystrophy)	5	11		6
Atypical form of PMD				1
Myotonia		2		2
Total	22 (29,7%)	26 (35,1%)	2 (2,7%)	24 (32,3%)

Thus, the prevalence of NBNS in the Yunusabad district of Tashkent is 28.1 per 100,000 population. The prevalence rate of CMDD in Yunusabad district exceeds the data obtained for the districts of the Tashkent region (8.4 and 2.7 per 100,000 population, respectively), while Duchenne's PMDD, on the contrary, is lower (2.3 and 5.7, respectively). Given the prevalence of consanguineous marriages, it is required to conduct educational work among the population of Uzbekistan about their adverse effect on the birth of healthy offspring. It is expedient to develop medical genetic counseling in the Republic of Uzbekistan.

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