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WEST NILE FEVER IN UKRAINE: THE RELEVANCE OF THE PROBLEM

ЛИХОРАДКА ЗАПАДНОГО НИЛА В УКРАИНЕ: АКТУАЛЬНОСТЬ ПРОБЛЕМЫ

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Abstract. *Numerous cases of West Nile fever (WNF) have been registered in Ukraine in 2024. WNF virus is transmitted through the bites of mosquitoes of the genera Culex, Aedes and Anopheles, of which there are more than 1000 species. The disease occurs with severe complications in the form of meningoencephalitis and polyneuritis. To date, there are no effective methods of etiotropic therapy and specific prevention, live attenuated and recombinant serums, as well as a vaccine, are undergoing clinical trials. Effective prevention of human infection includes surveillance and mosquito control in areas where WNF occurs.*

Keywords*: West Nile fever, epidemiology, clinical picture, treatment and prevention.*

Introduction.

Numerous cases of West Nile fever (WNF) have been recorded in Ukraine in the spring-autumn period of 2024.

Outbreaks of the disease were registered in several regions of the country, but the residents of Kyiv and the Kyiv region suffered the most - more than 50 cases since the beginning of the year and more than 40 laboratory-confirmed since the beginning of August [1]. The WNF virus (WNV), transmitted through mosquito bites, spread most actively in the summer, when favorable temperature conditions were observed for an increase in the number of insects. The most severe case was recorded in July, when a resident of Kyiv with suspected WNF was taken to intensive care. Despite the efforts of doctors and connecting the patient to a ventilator, his life could not be saved. Other cases of infection also led to hospitalization of victims for diagnosis and treatment in infectious disease departments of hospitals.

The outbreak of WNF in Kyiv and other regions was the first serious occurrence of WNV in Ukraine in the past few years. Experts note that the cause was a sharp change in climate: warming and increased humidity. The fever problem is comparable

to the Covid-19 epidemic, which indicates the serious danger of the disease and the difficulty of diagnosis, which poses a challenge for doctors.

For the first time in world history, the WNV virus was identified in 1937 in Uganda. WNV is endemic for many countries in Africa, Asia, and the Mediterranean. Outbreaks of the fever have been registered in different countries of the world – Europe, Central Asia, Transcaucasia, Australia, the USA, Canada, Central America and the Caribbean, Mexico, which has shown its danger for the entire world. Over the past twenty years, the number of outbreaks of this disease has increased.

Research objectives. Natural foci of WNF have been identified in the Odessa, Dnipropetrovsk and Kyiv regions, but the lack of widely available diagnostic tools in our country prevented the epidemic from being recorded in Ukraine.

By the end of the season, the recording of cases of the disease improved due to the receipt of diagnostics. Thus, according to the report of the Department of Health of the Kyiv City State Administration, from June 1, 2024 to August 30 of the same year, there were 17 patients in Kyiv with a confirmed conclusion of WNF, of which 3 died. In total, 150 cases were registered in the Kyiv region for the entire period of the year, of which 11 were fatal.

Main text.

West Nile fever (also encephalitis of West Nile, West Nile encephalitis, "duck fever") is an acute zoonotic arbovirus disease (transmitted in nature between vertebrates by blood-sucking insects by bites, rubbing of lymph of a crushed insect or their feces) with a transmissible mechanism of infection transmission, caused by the West Nile flavivirus of the same name (Encephalitis Nili occidentalis), which in severe cases is characterized by fever and inflammation of the meninges and brain tissue, damage to the mucous membranes and exanthema. The source of the disease is a virus with rapid antigenic variability and good stability in the external environment, well tolerates drying and freezing, inactivated at temperatures above 60 degrees. Investigations into WNV episodes in Europe and the United States have revealed differences in mosquito biology across continents, with dramatic complications in the United States.

Transmission routes. The main carrier of the infection is mosquitoes (females) of the genus Culex (Culex pipiens), Aedes and Anopheles, of which there are more than 1000 species. The mosquito becomes infected with WNV through the bites of infected birds or animals and transmits the virus to humans. Quite rarely (less than 5% of cases), the cause of infection with WNV can be the transmission of infection from person to person: during blood transfusion, organ transplantation, as well as from mother to child (during pregnancy, during childbirth or breastfeeding) [2].

The key factor in the spread of WNV is the high activity of mosquitoes in the warm season. For the climatic conditions of Ukraine, the most dangerous period begins in late May and ends in early October with a peak in August and September. Despite the fact that the transmission of the disease from person to person is extremely rare, in the conditions of Ukraine this factor is one of the significant causes of infection.

Risk groups. This group includes pregnant women, the elderly, as well as those suffering from various chronic, autoimmune and oncological diseases, infected with the human immunodeficiency virus (HIV), AIDS, and taking immunosuppressants; rural residents, hunters, farmers, builders, foresters, as well as workers who spend a lot of time outdoors, employees of diagnostic laboratories.

Children are a special risk group due to their incompletely formed immune system, which significantly increases the chances of the disease progressing with severe symptoms. The lack of vaccines for children and adults carries additional risks in a number of regions of the world with a warm, humid climate.

Research results. The main source and reservoir of the virus are birds of more than 250 species, the main ones are the crow family, pigeons, and exotic poultry, as well as migratory birds, in whose bodies the virus persists for up to 200 days, less often - rodents and bats. Birds transmit the virus vertically to their offspring through eggs, thus maintaining the development cycle. After an insect bites an infected bird, the virus circulates in their blood for several days, eventually entering the salivary glands. When a human is bitten, viremia occurs with further spread to organs, lymph nodes and neurons (dendritic cells and keratinocytes) and multiplies there, triggering apoptosis processes. The mucous membranes of the upper respiratory tract are affected with the

development of flu-like symptoms, vascular endothelium with the formation of perivascular lymphoid infiltrates, neurons, edema-swelling of the brain, thrombohemorrhagic syndrome. Humans and horses are the final hosts.

The disease may end in recovery, complications, prolonged persistence of the virus, and death.

The course of the disease. There are 4 periods of WNV: incubation (2-14 days), prodromal (5-7 days), peak (2-7 days), and end (10% mortality, 90% recovery). Recovery (very fast in children and slow in adults) occurs in all patients, but is often accompanied by prolonged muscle pain and fatigue [3].

Clinical picture. It is known that approximately 80% of infected people are asymptomatic or have mild, flu-like symptoms. The most common symptoms include fever (temperature up to 39, chills, sweating, general weakness), cold sore throat, myalgia, arthralgia, small-spotted or maculopapular rash on the skin that disappears after a few days, eye pain.

Complications. 1 in 150 people develops the neurotoxic form - encephalitis, meningitis, meningoencephalitis, as well as poliomyelitis symptoms. Neck stiffness, confusion, extreme fatigue, meningeal signs, extrapyramidal symptoms, coma, tremors of the hands, feet and head, convulsions, muscle hypotonia, paralysis, disruption of the spinal anterior nerve root (in adolescents) appear.

Diagnostics. Leukopenia and thrombocytopenia are observed in the general blood test, less often - lymphopenia. Also informative are methods for determining specific antibodies by PCR on the 4-9th day after the first symptoms appear. Less often, the serological diagnostic method of ELISA is used, which allows determining the presence of the virus in the blood serum on the 1-8th day and 14-21st day after infection with a simultaneous study for antibodies to other flaviviruses (to avoid cross-reactions). In those infected with WNV, the level of IgM and IgG in the blood and cerebrospinal fluid will be elevated from day 4-8.

When symptoms of encephalitis and meningitis appear, the cerebrospinal fluid is examined, in which polymorphonuclear or lymphocytic predominance, plasmacyte-like cells, neutrophils 41-45%, protein +1 g/l are found. Electroencephalogram (EEG)

reveals changes in wave activity, magnetic resonance imaging (MRI) - inflammation of the meninges.

Treatment. To date, there are no specific antiviral drugs that can effectively combat LNV. Therefore, syndromic, symptomatic and pathogenetic treatment is carried out, aimed at maintaining vital functions of the body, as well as preventing the development of severe complications.

Forecast. Timely treatment reduces the risk of complications and promotes full recovery within 10 days. The presence of neurological lesions prolongs the recovery period to 30-90 days.

Long-term (more than 1 year) depressive episodes have been described in 33% of patients who have had the disease, the persistence of asthenovegetative manifestations up to 36 weeks or more, neurological symptoms - more than 8 months. Mortality in the neuroinvasive form is due to paralysis of the respiratory muscles and is 10%.

Prevention. Specific prevention has not been developed and there is no vaccine against WNV for humans. However, there is an effective drug for vaccinating horses. One of the reasons for the lack of a human vaccine is the high variability of the virus; live attenuated and recombinant serums, as well as a vaccine, are currently undergoing clinical trials.

Methods of non-specific disease prevention include the control of WNV epizootics in horses, timely detection and isolation of patients, veterinary control over wild bird and domestic animal populations, and mosquito control (disinsection, mosquito nets, special clothing, repellents, and the use of air conditioners). In addition, it is recommended to follow the 4D rules:

1. Dusk - avoid being outdoors at dusk.

2. Dress - wear light-colored clothing that completely covers your arms and legs.

3. DEET. Before going outside, additionally treat exposed areas of the body with repellents containing DEET (diethyltoluamide).

4. Drainage. Getting rid of reservoirs with stagnant water in living quarters (water tanks, flower pots, aquariums, swimming pools) or using dense coverings. Regular maintenance of drinking bowls for birds and animals.

To reduce the risk of transmission through blood transfusion and organ transplantation during an outbreak, it is necessary to restrict blood and organ donation and conduct laboratory testing in affected areas.

Effective prevention of human infection with WNV includes epidemiological surveillance and mosquito control in areas where WNV is found [4].

Conclusions.

Global climate change in the form of warming and increased air humidity, increased tourism and urbanization have led to the spread of mosquito-borne viral infections beyond their usual habitats and their establishment in new conditions. Such a disease is West Nile Fever - a dangerous infection with a severe course and disabling complications and the threat of international spread.

The lack of specific prevention and treatment puts the lives and health of people around the globe at risk. Given the above, world science should make every effort to create a vaccine and a specific antiviral drug.

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В Украине в 2024 году были зарегистрированы многочисленные случаи заболевания лихорадкой Западного Нила (ЛНЗ). Вирус ЛЗН передается через укусы комаров рода Culex, Aedes и Anopheles, которых существует более 1000 видов. Заболевание протекает с тяжелыми осложнениями в виде менингоэнцефалита и полиневрита. На сегодняшний день отсутствуют эффективные метода этиотропной терапии и специфической профилактики, проходят клинические испытания живые аттенуированные и рекомбинантные сыворотки, а также вакцина. Эффективная профилактика заражения людей включает эпиднадзор и борьбу с комарами в районах, где встречается ЛЗН.

Keywords: *лихорадка Западного Нила, эпидемиология, клиника, лечение и профилактика.*