

Table Of Content

Journal Cover 2

Author[s] Statement 3

Editorial Team 4

Article information 5

 Check this article update (crossmark) 5

 Check this article impact 5

 Cite this article 5

Title page 6

 Article Title 6

 Author information 6

 Abstract 6

Article content 7

Academia Open



By Universitas Muhammadiyah Sidoarjo

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Epidemiological Features of Leptospirosis

Ciri-ciri Epidemiologi Leptospirosis

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Abstract

Leptospirosis, according to the zoonosis control program adopted by WHO in 1985, is one of the most significant diseases. This infection, both epidemiologically and epizootologically, is not yet fully controlled and causes significant economic and social damage in many countries of the world. Leptospirosis belongs to the group of zoonotic infectious diseases. It is characterized by an acute onset, symptoms of intoxication, fever, various manifestations of hemorrhagic syndrome, damage to the liver, kidneys and nervous system. The disease was first described by A. Weil in 1886 and N. P. Vasiliev in 1888, after whom it was long called Weil-Vasiliev's disease. The etiology of leptospirosis was established by Japanese researchers R. Inada et al. in 1915. On the territory of our country, the disease was first described in 1927 by V. A. Bashenin under the name "water fever".

Highlights:

- Leptospirosis is a significant zoonotic infectious disease causing economic and social damage worldwide.
- The disease is characterized by acute onset, fever, hemorrhagic syndrome, and damage to the liver, kidneys, and nervous system.
- Leptospirosis was first described in 1886 and its etiology was established in 1915, playing a role in the development of a control program.

Keywords: Leptospirosis, Zoonotic infectious disease, Weil-Vasiliev's disease, Epidemiology, Control program

Published date: 2022-12-31 00:00:00

Introduction

Relevance. Leptospirosis is a group of non-transmissible natural focal infections that ranks first among zoonoses in terms of the breadth of distribution of natural and anthropurgic foci. Leptospirosis is one of the most common zoonotic diseases and occurs on all continents. More than 500,000 human cases are registered annually in the world. Most often, high incidence is noted in countries with a tropical and subtropical climate. In countries with a temperate climate, the real epidemic process is more intense than the official incidence, since not all cases are recorded in official statistics. The sources of specialized literature emphasize the importance of leptospirosis as a re-emerging (returning) infectious disease (manifested by large outbreaks in countries where it was previously recorded - Nicaragua, Brazil, India, Malaysia, the USA, the states of Southeast Asia, etc.), and how emerging (new disease) - for tourists from tropical countries and countries with a temperate climate. It is noted that leptospirosis causes severe social and economic damage, even if the disease proceeded in mild forms or was registered under a different diagnosis, as well as due to the emergence of new clinical forms and the possibility of re-infection with various leptospira serological groups.[1.2]

It is known that some serogroups of *Leptospira* are found in certain types of hosts and vectors. However, recent studies have shown that it is possible to overcome host specificity. Changes in epizootology and epidemiology of leptospirosis infection require an in-depth study of the internal structure of natural foci and factors that contribute to human infection. [3.4]

Despite advances in understanding many aspects of leptospirosis, they remain widespread and cause significant damage in many parts of the world. Along with the traditionally significant incidence of this infection in the population of endemic territories, the relevance of leptospirosis is steadily growing due to the growing popularity of extreme tourism, the growth of emigration of residents from developing countries, military operations, as well as emergency situations, including natural ones.[5.6]

In recent years, against the backdrop of changes in socio-economic management, there has been an increase in sporadic cases of diseases all over the world, the spread of infection in recreational areas, the predominant role of domestic animals as the main sources of infection, which requires improvement in the organization of monitoring, which should be based on regional features of epizootology. and epidemiology of this infection.[7,8].1. Вспышки лептоспироза у человека, ассоциированные с

Purpose of the study. Assessment of modern epidemiological features of leptospirosis in cities as a basis for the development of effective preventive measures against this infection in large cities.

Research Objectives

1. To study the main epidemiological patterns of leptospirosis infection in the cities of 2010-2022. and identify their features in the modern period.
2. Carry out mapping, epidemiological and epizootological zoning of the city for leptospirosis, identify risk areas.
3. To study proposals for improving the system of epidemiological surveillance of leptospirosis and planning measures to prevent this infection

Materials and methods

In the foci of leptospirosis of various types, an epizootological-epidemiological examination is organized in order to determine the boundaries of the focus, the main reservoirs of infection and possible mechanisms for the transmission of the pathogen. The groups of the population living or carrying out various types of activities in conditions of risk of infection, and the volume of preventive measures, including laboratory monitoring and specific prophylaxis, are determined. The main method for diagnosing leptospirosis is serological to determine the level of antibodies in the animal's blood in the microagglutination reaction (PMA). Blood serum is used for research.

For preliminary diagnosis and detection of antibodies in the serum (plasma) of the blood, the ELISA method is used. The time for preliminary diagnosis by ELISA is 2.5 hours, by PMA - 3-4 hours per sample. To detect the antigen in the pathological material (blood plasma or urine), the PCR method is used (the time for the study is 3 hours). Urine microscopy is also performed to detect leptospira (urine must be delivered within 2-3 hours after sampling)

Together with the institutions of the regional veterinary service in 2018-2021, an epidemiological and epizootological survey of the territories of Uzbekistan was carried out. According to epidemiological indications, 305 blood sera of livestock breeders were examined (by a serological method for the presence of antibodies to leptospira and by a molecular genetic method for the detection of DNA sections) Laboratory studies were carried out on the basis of [1,4] bacteriological (dark field microscopy and inoculation on liquid nutrient media), biological

(bioassays on guinea pigs and golden hamsters), serological (microagglutination reaction - PMA), molecular genetic (polymerase chain reaction - PCR) methods and one of the newest methods - mass spectrometry MALDI-ToG. The data on the incidence of leptospirosis infection in humans and animals from the archival materials of the region were analyzed. We studied two case histories of persons diagnosed with [3,4] leptospirosis, who were treated in the regional infectious diseases clinical hospital in 2018 and 2020, and 16 case histories of persons with diseases, the clinical manifestations of which do not exclude leptospirosis (pyelonephritis, cystitis, hepatitis and etc.). An epidemiological examination of the focus of leptospirosis was carried out.[5,9]

The causative agents of leptospirosis are spirochetes belonging to the species *Leptospira interrogans* of the genus *Leptospira*, which is part of the *Leptospiraceae* family of the order *Spirochaetales*. Pathogenic *Leptospira* identified to date are assigned to 25 serological groups, 250 serovars and 20 taxonomic species. A person is included in the infectious process by direct contact with the urine of infected animals - *Leptospira* carriers or through contaminated environmental objects, mainly through water, soil and plants, sometimes foodstuffs. The following infection mechanisms have been established: contact and fecal-oral. It should be noted that the disease is not transmitted from person to person and a sick person is a "dead end" of the infection.[9].

The groups of high occupational risk of infection with leptospirosis in economic foci include livestock breeders, workers of meat processing enterprises and slaughterhouses.

It is not excluded inside the laboratory infection when working with animals used in research activities, with careless manipulations with cultures of virulent strains of *Leptospira*.

Result

The greatest epidemic manifestation of leptospirosis is observed in countries with a tropical and subtropical climate, where outbreaks are recorded annually (Table 1), covering hundreds and thousands of people

| Region, year | Number of cases | Source | Putative serogroup |
|--------------------------------|-----------------|--|--|
| North Dakota, 1950 | 9 | domestic dogs | Canicola - |
| Georgia, 1952 | 26 | Swimming in a pond, presumably dogs | Canicola - |
| Japan, 1953 | 114 | Swimming in a pond, presumably dogs | Canicola canicola |
| Texas, 1971 | 7 | dog puppies | Canicola canicola |
| Portland, Oregon, 1972 | 9 | domestic dogs | Autumnalis fort bragg |
| Louisiana, Missouri, 1972 | 5 | dog puppies | Icterohaemorrhagiae icterohaemorrhagiae |
| Moron, Cuba, 1986 | 6 | Swimming in a pond, presumably dogs | Canicola - |
| Barbados, 1988 | 1 | Dog kennel | Autumnalis bim |
| Nicaragua, 1995 | 100 | Flooding, walking on water, presumably dogs | Canicola portlandvere |
| Southwest India August 1, 2018 | 300 | Bathing in open water and drinking water infected with leptospira. | Canicola - |
| Krasnodar Territory, 1998 | 64 | Dogs and possibly pigs | Canicola canicola |

Table 1. The greatest epidemic manifestation of leptospirosis is observed in countries with a tropical and subtropical climate, where outbreaks are recorded annually

It is necessary to train doctors of all profiles on the clinical manifestations of leptospirosis, treatment, laboratory tests, differential diagnosis with other infectious diseases and prevention, as well as informing people traveling to endemic areas about the risk of leptospirosis infection, the first symptoms of the disease and prevention of its occurrence.

Findings

Active natural and anthropogenic foci of leptospirosis have been identified and documented in seven municipal districts of the region.

It is necessary to continue planned monitoring studies with the most complete coverage of territories favorable for the formation of foci of leptospirosis. One of the main areas of further work is the active identification of patients in risk groups. Insufficient attention is paid to the possible risk of infection of people during holidays in "exotic"

countries, which have recently become very popular. It is necessary to include leptospirosis in the leaflets for people traveling to endemic countries. Doctors of the medical and polyclinic network should be informed about the clinical manifestations and effective treatment of a disease that is not typical for our region - leptospirosis.

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