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PREVENTING THE SPREAD OF INFECTIOUS DISEASES IN HOT CLIMATES

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Annotation: This article analyzes environmental, sanitary-hygienic, and social factors that affect the spread of infectious diseases in hot climates, as well as measures to prevent them. High temperatures, precipitation and humidity fluctuations, water supply and sanitation conditions, food safety, and the biological activity of disease vectors can affect the epidemiological characteristics of some infectious diseases. Prevention of waterborne and foodborne infections and vector-borne diseases is particularly important in hot climates. The article highlights the importance of personal hygiene, access to safe drinking water, proper storage and preparation of food, improved sanitation infrastructure, vector control, epidemiological monitoring, and climate-based early warning systems. The need for an integrated approach to the prevention of infectious diseases, based on the collaboration of medicine, sanitation, ecology, and the public, is justified.

Keywords: hot climate, infectious diseases, epidemiology, prevention, sanitation, hygiene, water safety, food safety, vectors, epidemiological monitoring, climate change.

Infectious diseases are one of the most serious medical and social problems that pose a serious threat to public health. Their spread is determined by the interaction of the infectious agent, the mechanism of transmission, the host organism, the environment, and social conditions. Climatic factors, particularly temperature, precipitation, and humidity, can influence the ecology of the spread of certain infectious diseases [1,2].

According to the World Health Organization, climate and environmental conditions are among the important factors that affect the risk of transmission of waterborne, foodborne, and vector-borne diseases [1,2]. The effect of hot climates is not the same for all infections. While the development cycle of some microorganisms, vectors, and diseases is sensitive to temperature and humidity, in other diseases the impact of climatic factors is manifested in conjunction with sanitation, water supply, urbanization, and living conditions.

Failure to comply with food storage conditions during the warm season, contamination of drinking water, violation of sanitary and hygienic requirements, and the activation of certain insects can increase the epidemiological risk. Therefore, prevention of infectious diseases in hot climates should not be limited to treating the disease, but should include preventive measures aimed at identifying and reducing risk factors in advance.

The aim of the article is to analyze the main factors influencing the spread of infectious diseases in hot climates and to highlight effective preventive measures aimed at their prevention.

Research material and methods

The theoretical basis of the study was the analysis of scientific and official sources on the epidemiology of infectious diseases, climate and health, water and sanitation, food safety, and vector-borne diseases. The study used relevant materials from the World Health Organization and the U.S. Center for Disease Control and Prevention. Comparison, generalization and systematization methods were used in data analysis.

Main part

1. The impact of hot climate conditions on the spread of infectious diseases

Climatic conditions are one of the important environmental factors that affect the epidemiological process of infectious diseases. Temperature, humidity, precipitation, and seasonal changes can affect the biological characteristics of pathogens, their carriers, and reservoirs [1,3].

The effect of high temperatures has a complex character. For certain vectors, a certain temperature range can create favorable conditions for reproduction and development, but excessively high temperatures can also reduce the viability and activity of certain species. Therefore, hot climates should not be considered the sole cause of infectious disease transmission, but rather in conjunction with other environmental and social factors [3].

Precipitation and water-related processes are also of epidemiological importance. Heavy rainfall and flooding can lead to the release of sewage into the environment and the contamination of drinking water sources. Drought can also limit access to safe water and negatively affect hygiene conditions [2,8].

Therefore, when assessing the risk of infectious diseases in hot climates, it is necessary to consider not only air temperature, but also humidity, precipitation, water supply, sanitation, and the activity of disease vectors.

2. Epidemiological importance of water supply and sanitation

Safe drinking water is one of the key factors in preventing infectious diseases. Diarrheal diseases, cholera, shigellosis, typhoid fever, and other infections can be transmitted through contaminated drinking water [4].

According to the WHO, in 2022, at least 1.7 billion people worldwide used drinking water sources that were at risk of fecal contamination. Microbiologically contaminated water remains an important source of intestinal infections [4]. The increased demand for water in hot climates also increases the demand for safe water supplies. Water scarcity can reduce the ability to maintain personal hygiene, increase the sanitary burden on water sources, and increase the risk of contamination [5].

Therefore, it is important to regularly monitor the microbiological quality of drinking water, protect water sources from pollution, properly manage wastewater, and educate the public on the safe use of water. The WHO also highlights the adaptation of water, sanitation and hygiene services to climate change as an important preventive measure [5].

3. Food safety and the hot season

Hot weather increases the demands on food storage and transportation processes. Improper storage temperatures, leaving prepared foods at room temperature for long periods of time, contact between raw and prepared foods, and poor hand hygiene can increase the risk of foodborne infections [6,7].

According to the WHO, contaminated food can cause more than 200 diseases. Data published in 2026 noted that hundreds of millions of people worldwide become ill each year as a result of consuming contaminated food [6]. To ensure food safety, it is important to store products at the appropriate temperature, store raw and cooked foods separately, wash fruits and vegetables thoroughly, provide adequate heat treatment of food products, and cool cooked foods promptly. The CDC recommends following the principles of cleaning, separation, cooking, and cooling in food safety [7].

4. Vector-borne diseases and hot climates

Vector-borne diseases are of particular epidemiological importance in warm climates. Vectors are living organisms that transmit disease-causing agents from one organism to another, including mosquitoes, ticks, and other carriers.

According to the WHO, vector-borne diseases include malaria, dengue, chikungunya, yellow fever, Zika virus, leishmaniasis, and others. Their distribution depends on the interaction of temperature, precipitation, humidity, urbanization, population migration, and other factors [3]. healthcare

Changes in climatic conditions can expand the geographic distribution area of certain vectors or extend their active season. However, such an effect is not the same for every vector and disease. Therefore, it is important to assess the risk based on local epidemiological surveillance data [3].

To prevent vector-borne diseases, it is important to reduce areas where water accumulates, improve sanitation around dwellings, install protective barriers on windows and doors, and, if necessary, implement vector control measures by specialists [3,9].

5. Importance of urban environment and sanitation

The urbanization process is also one of the factors that affect the risk of infectious disease transmission. High population density, increased load on water and sewage systems, inadequate waste management, and inadequate drainage systems can create favorable conditions for the spread of certain infections [2,9].

Water accumulation near residential areas creates an environment for the proliferation of certain mosquitoes. According to WHO, deficiencies in water supply, drainage, and wastewater management can increase the risk of certain vector-borne diseases [9].

Therefore, assessing the sanitary condition of residential areas before the hot season, timely removal of waste, eliminating water accumulation areas, and monitoring the operation of drainage systems are important areas of prevention.

6. Personal hygiene and sanitary education

The sanitary and hygienic culture of the population is of great importance in the prevention of infectious diseases. Regular handwashing with soap, using safe drinking water, storing and preparing food properly, and maintaining a clean living environment can help reduce the risk of infection [4,7].

Hand hygiene, in particular, is a simple and effective measure in preventing water- and food-borne diseases. WHO and CDC materials emphasize the importance of hand hygiene in food safety and infection prevention [4,7]. Collaboration between healthcare workers, educational institutions, the media, and the local community is essential in delivering preventive information to the public.

Strengthening sanitary and educational activities before the start of the hot season will help raise public awareness of risk factors.

7. Epidemiological monitoring and early warning systems

Epidemiological monitoring plays an important role in the prevention of infectious diseases. By regularly monitoring cases of the disease, it is possible to detect changes in the epidemiological situation early and take necessary preventive measures in a timely manner.

Analyzing epidemiological data for climate-related diseases in conjunction with weather and climate indicators can improve the effectiveness of early warning systems. WHO notes that such systems can enhance the ability to implement preventive measures at the early stages of disease outbreaks [10].

In such monitoring, it is important to jointly analyze epidemiological data on air temperature, precipitation, humidity, water supply, vector distribution and Infectious Diseases. The result is the possibility of strengthening the appropriate preventive measures before the epidemiological risk increases.

8. Comprehensive preventive approach

Prevention of infectious diseases in hot climates should not be limited to a single medical intervention. Water supply, sanitation, food safety, environment, vector control, and public sanitation culture should be considered in an interconnected manner.

In this approach, the concept of "single Health" (One Health), which takes into account the link between human health, animals and the environment, is important. WHO presents this approach as a model of collaboration aimed at addressing zoonoses, vector-borne diseases, food safety, and health issues related to the environment together [11]. Comprehensive prevention should cover the following key areas:

- Providing safe drinking water;
- Improving sanitation and sewage systems;
- safe storage and preparation of food products;
- adherence to personal hygiene rules;
- identification and control of vector breeding sites;
- strengthening epidemiological monitoring;
- Develop early warning systems using climate data;
- Increase the sanitary and hygienic literacy of the population;
- Strengthen cooperation between medical, sanitary and other relevant services.

Discussion

The spread of infectious diseases in hot climates is a multi-factor process. High temperatures alone are not always and directly responsible for the increase in diseases; their effects are manifested in conjunction with factors such as the disease agent, vector, water and sanitation conditions, urbanization, and population behavior [1,3].

Water and food safety are particularly important during the hot season. The availability of safe water supply and sanitation services not only prevents intestinal infections, but also improves the ability of the population to practice personal hygiene [4,5]. Proper storage and preparation of food is important in reducing the risk of foodborne infections [6,7].

In vector-borne diseases, prevention should not be limited to identifying patients. It is necessary to control the living and breeding conditions of vectors, conduct epidemiological surveillance, and, if necessary, organize special control measures [3,9].

Also, integrating epidemiological monitoring with climate data can expand the possibilities of predicting the risk of disease outbreaks in the future [10]. This makes it possible to carry out preventive measures not after the prevalence of diseases, but before the risk arises.

Thus, in hot climates, a systematic approach based on the principles of "primary prevention — epidemiological monitoring — early warning — rapid response" is desirable in preventing infectious diseases.

In hot climates, the spread of infectious diseases is determined by the interaction of environmental, biological, sanitary-hygienic, and social factors. High temperatures, precipitation, and changes in humidity can affect the biological activity of some disease pathogens and vectors. However, because these effects vary by region and disease type, a comprehensive assessment of epidemiological risk is necessary.

Safe drinking water, effective sanitation and sewage systems, proper food storage and preparation, personal hygiene, and improved environmental sanitation are important in preventing infectious diseases. In vector-borne diseases, it is necessary to control the breeding sites of carriers and strengthen epidemiological monitoring.

Combining epidemiological surveillance with weather and climate data can help in early detection of infectious disease risks and timely implementation of preventive measures. At the same time, increasing the sanitary and hygienic literacy of the population is an integral part of prevention.

In conclusion, the prevention of infectious diseases in hot climates is not limited to the medical field. An integrated approach that combines water and sanitation, food safety, environmental protection, vector control, epidemiological monitoring, and active participation of the population is an important condition for reducing epidemiological risks.

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