Central Asian Journal of Medicine

ANALYSIS OF THE EPIZOOTIC SITUATION ON THE TERRITORY OF THE CENTRAL SECTION OF THE KYZYLKUM NATURAL PLAGUE FOCUS AT THE PRESENT STAGE

A.N. Dmitriev [1], A.S. Nematov [2], J.A. Rakhmanova [3]

1 Anti-plague station of the Medical and Sanitary Unit No. 2 of the Regional Department "Uchkuduk" of the State Institution "NMMC Foundation", head of the station, Uzbekistan
E-mail: pestisr@mail.ru

2 Professor of the Department of Epidemiology, Center for the Development of Professional Qualifications of Medical Workers, Uzbekistan

3 Associate Professor of the Department of Epidemiology, Center for the Development of Professional Qualifications of Medical Workers, Uzbekistan
E-mail: jamila.rakhmanova@gmail.com

ABSTRACT

Epizootological examination was carried out on the areas of the Central section of the Kyzylkum plague outbreak around the NMMC facilities. The phenomenon of depression of the number of the main plague carrier was noted, against the background of a period of gradual warming, which explains the absence of spilled plague epizootics. The existing epidemiological prerequisites provide real grounds for increasing the risks of epidemiological complications and requires constant monitoring of the state of epizootic activity in the Central Kyzylkum territory.

Key words: Central Kyzylkums, Kyzylkum natural plague focus, epizootic activity, Great Gerbil, Navoi Mining and Metallurgical Combine.

INTRODUCTION

Kyzylkum is located on the Turan plate. The foundation of the slab is formed by Paleozoic crystalline rocks (crystalline slate, granite, limestones, etc. rocks), which are covered with rocks of later periods: sandstones, marls, clays, sands, conglomerates. Before the Paleogene period, Kyzylkum was under the water of the Tethys Sea, but the Paleozoic mountains formed islands. In the Neogene period, the sea retreated and the territory of Kyzylkum turned into land. In the Kyzylkum physico-geographical area, there are places of birth of gold (Muruntau, Kokpatas), uranium (Uchkuduk), natural gas (Gazli, Tashkent, Khojakazgan), sulfur, mercury,

graphite, phosphorus, asbestos, corundum, copper, building materials. Autumn in Kyzylkum is most often dry. Precipitation is low (up to 75-100 mm per year), and they are distributed unevenly throughout the seasons. The main part of the annual precipitation falls in spring (up to 48%) and winter (up to 30%), but the evaporation rate reaches up to 1000-1500 mm.

The purpose of the work - is to assess the current epizootological state of the Central section of the Kyzylkum natural plague outbreak in the territory associated with the NMMC facilities.

Materials and methods. The data of epizootological monitoring of rodent populations and ectoparasites of the Central site of the Kyzylkum natural plague outbreak of the Republic of Uzbekistan in 2015-2020 were used for the analysis. Epidemiological, epizootological, and statistical research methods are used in data processing.

Results and discussion.

There is not a single permanent watercourse in Kyzylkum. The Amu Darya transit River passes through the southwestern part of the district only. However, in spring, as a result of spring rains and snowmelt, temporary streams form on the slopes of low mountains, which dry out quickly. The area has a significant supply of groundwater. The dynamic amount of groundwater is 58-60 m/sec. The groundwater is salty. There are fresh Artesian waters in the strata of Mesozoic and Paleogene sediments. Mineral thermal waters have also been found in Paleozoic deposits.

In Kyzylkum, sandy and sandy loam soils are common in the flat part, gray—brown soils are common in the foothills and on the slopes of plateaus, and saline, salt marsh soils are common in the hollows.

The vegetation cover is dominated by perennial and sagebrush phytocenoses, psammophilic and halophilic communities are widespread, fragments of tugai vegetation are found. Ephemera and ephemeroids with a short spring growing season prevail among them: bulbous bluegrass, sedge, Dantonia bonfire, tulips, snowdrops, ixiolirion, and small-fruited cousinia. With the onset of heat, they dry up. Plants adapted to droughts and salt marshes continue growing in summer. Juzgun, white saxaul, celine, sandy acacia, kandym grow on the fixed sands. Wormwood and weeds are common on gray-brown soils. Black saxaul, tamarisk, fleshy solyanka, sarisazan grow on saline, saline-marsh soils, and sheep's cleavage grows on takyrs. Tugai plants grow in the Amu Darya Valley.

The sandy massifs of Kyzylkum are inhabited by ground squirrels, sand mice (gerbils), jerboa, lizards, monitor lizards, white snake, sand boa constrictors, efa,

muzzle. Mammals include steppe cat, gazelle, hangul (Bukhara deer), saiga, wolf, fox, tolai hare [2,5].

The Kyzylkum natural plague mesofocus, according to 2020, covers an area of 385,000 km2, is the most significant in epidemic terms, the territory with epidemic manifestations occupies 6700 km2. Most of the outbreak is located in the southern desert. For the first time, the plague in Kyzykums manifested itself in 1924 with an epidemic outbreak in Akkamysh. The study of the Kyzylkums began in 1949. The Kyzylkum focus is part of the Central Asian desert natural focus, on the territory of which the main carrier of the plague is a great gerbil - Rhombomys opimus. In addition to the great gerbil, the midday and red-tailed gerbils systematically participate in epizootics. The main carriers are species of fleas from the genus Xenopsilla (X. gerbilli, X. hirtipes, X. skrjabini), secondary – N.tersus, N. laeviceps, N. turkmenikus, C. lamellifer, E. Oschanini, etc. The variety of environmental conditions determines the asynchrony of epizootic activity of different parts of the focus[3].

In the Northern Kyzylkums bordering the plague-enzootic territory of the Republic of Kazakhstan, spilled plague epizootics are often recorded. In the Central and Southern Kyzylkums, plague epizootics are local in nature. The number of large gerbils varies from 1 to 20 animals/ha. Epizootic indices (I.E.) of districts range from 0.1 to 0.33.

The railway lines "Navoi-Uchkuduk-Bazaubai-Nukus", "Kogan-Khojidavlyat" and "Bukhara-Karshi-Termez" pass through the territory of the hearth. The territory of the Kyzylkums serves as a pasture for livestock farms in the southern and northern districts of Karakalpakstan and part of the Navoi region. Rural settlements located on this territory are large centers of livestock farms.

In the middle part of it there is a Landscape-ecological area "Central Kyzylkums" (index-27.11), with an area of 7.3 million hectares, the epizootic index is 0.24. The types of settlements of the main carrier are insular, diffuse, the number of the main carrier is resistant, varies sharply by years, the main vector is fleas of the genus Xenopsylla, the number of the carrier is characterized as low, up to 90-180 copies/ha.[4].

According to the scheme of epidemiological zoning of Kyzylkums (according to Rivkus Yu. Z., 1992), this territory is divided into the following epidemiological zones: 1-industrial-livestock; 2- agricultural-livestock; 3- livestock [6].

According to the available data, namely the indicators of weather reports, we are experiencing a period of gradual warming, so progressive in recent years that the existing adaptation mechanisms developed by hundreds of generations of rodents do not work. There are assumptions about the influence of solar activity

cycles, but at the moment the sun is going through a period of minimizing activity, and judging by the available data on the absence of sunspots and magnetic flares, we previously had reason to assume a mathematically related correlation, now we observe a discrepancy. So, most likely, in the coming years, when initiating a new cycle of solar activity, we will experience more detrimental effects than now.

Thus, a factor that has a strictly endogenous nature in the context of the earth, negatively affecting and having a global impact – progressive warming, which causes at the population level, for example in rodents, according to the data, a complex of negatively influencing factors that reflect the inability of the population to adapt in a short period of time to literally saltational climate changes, namely: violation of behavioral stereotypes, increased stress levels, possibly, as a consequence, displacement of low-ranking individuals and increased intrapopulation migration by individual individuals, violation of the intra-rank structure, lowering the overall immune status and resistance of the organism, which result in such consequences as an increase in the mortality of young animals, increased mortality from conditions that are normally perceived as tolerable, general suppression of generative function, the inability due to the incessant dominance of the temperature factor to restore the ability to reproduce at the population level, a decrease in the diversity of the genetic structure of the population, as the key to the leading mechanism of fertility regulation [3]. Taking into account the fact that late-summer and autumn generations of rodents and so, even in conditions of climatic optimum, are characterized as slow-growing, with less pronounced metabolic activity, and against the background of extreme aridity conditions observed in recent years, they are even less generative than populations of last year's rodents. It can also be assumed that the lack of adaptation mechanisms to such rapidly changing and even lethal hyperthermal indicators of the external environment leads to a decrease in the general population immune status and causes total mortality from the usual rodent infections and parasitoses carried under normal conditions at the population level with minimal losses. Moreover, the objectively justified observed absence of an index of flea infestation and migration sufficient for the plague epizootics, against the background of the formation and "maturation" of the plague block that do not correspond to the temperature optima of the formation and "maturation" of the plague block to environmental conditions, explains the absence, at least, of spilled plague epizootics.

Nevertheless, taking into account the presence of the minimum possible serological prognostics, the insufficiency of the survey of most of the sandy massifs, i.e. the insufficiency of the full range of data on the epizootic situation in

the Central Kyzylkums, including taking into account the presence of the nuclei of the preservation of the causative agent of the plague and natural, suggesting the development of epizootics among rodents, factors, in combination with non-unpredictable anthropofactors and the increasing anthropogenic load of invasion into "wild" areas, the appearance of local epizootics and sporadic epidemic consequences remains relevant. Accordingly, summarizing the above, the Central-Kyzylkum site in prognostic terms, we would refer to an area with an average prognostic potential for epizootic plague.

It has been established that over the past thirty years, the areas of desert autonomous plague foci of the Republic of Kazakhstan have increased by 79,710 km2, i.e. by 10%, compared to 1990. The most significant border changes took place in the Kyzylkum, Moyinkum, Taukum, North Aral, Balkhash and Betpakdalinsky desert autonomous foci (from 0.07 to 50.0%).

It was noted that the increase in the area of the North Aral and Kyzylkum natural plague foci to 46,500 km2 and 140,560 km2, respectively, took place against the background of the regression of the Aral Sea level and the expansion of the range of the great gerbil as a new coastline was formed[1].

In addition, such epidemiological prerequisites as the growth of industrial development of territories, the high intensity of migration processes in the Central Kyzylkum territory associated with the work of the NMMC industrial complex, trade, tourism, high direct or indirect contact of local and migrating populations with representatives of the parasitic system of the natural plague outbreak, They give real grounds for increasing the risks of epidemiological complications and require constant monitoring of the state of epizootic activity of the Central Kyzylkum territory through a thorough epizootological examination of the entire area of the focus using a full-fledged laboratory diagnostic complex, including ELISA and PCR methods.

REFERENCES

1. Abdel Z.Zh., Erubaev T.K., Tokmurzieva G.Zh., Aimakhanov B.K., Dalibaev Zh.S., Musagalieva R.S., Zhumadilova Z.B., Meka-Mechenko V.G., Meka-Mechenko T.V., Matzhanova A.M., Abdrasilova A.A., Umarova S.K., Rysbekova A.K., Esimseit D.T., Abdeliev A. Z., Konyratbaev K.K., Iskakov B.G., Bely D.G., Eskermesov M.K., Kulemin M.V., Askar Zh.S., Kaldybaev T.E., Mukhtarov R.K., Davletov S.B., Sutyagin V.V., Lezdin'sh I.A.[Demarcation of the Boundaries of the Central Asian Desert Natural Focus of Plague of Kazakhstan and Monitoring the Areal of the Main Carrier, Rhombomys opimus]. Problemy Osobo

Opasnikh Infektsii [Problems of Partikulary Dangerous Infektions]. 2021; 2:71-62.

2. Aykimbaev M.A.. [Central Asian Desert Natural Focus of Plauge]. Alma-Ata,1987.

3. Maksimov A.A.. [Long-term Fluctuations in the Number of Animals. Their Causes and Prognosis]. Novosibirsk, 1984.

4. [Methodological recommendations on the organization and conduct of an epizootological survey of natural-focal plague areas of the Republic of Uzbekistan]. Republican Plague Prevention Center of the Ministry of Health of the Republic of Uzbekistan. Tashkent,2021.

5. [Physical and geographical zoning of Uzbekistan]. Training manual.- T.: University, 2010.

6. Rivkus Y.Z.. [Epidemiology and Prevention of Plague]. Ashgabat,1992.

7. Tojibaev K.G., Beshko N.Y., Popov V.A.. [Botanical and geographical zoning of Uzbekistan]. Botanical journal. 2016;1.