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Tatyana Meka-Mechenko, Alim Aikimbayev[2], Tatyana Kunitza[1], Kenes Ospanov[3], Gulnara Temiralieva[1], Valentina Dernovaya[1], Larissa Luchnova[1], Aigul Abdirassilova[1]

CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTIC OF TULAREMIA IN KAZAKHSTAN

[1] Department of Zoonotic Diseases, Kazakh Scientific Center for Quarantine and Zoonotic Diseases, Almaty, Kazakhstan
[2] Deputy Director in Science and Epidemiology, Kazakh Scientific Center for Quarantine and Zoonotic Diseases, Almaty, Kazakhstan
[3] Republic Sanitary Epidemiological Station, Almaty, Kazakhstan

From 1950 to 1977, 5049 human tularemia cases were registered that had been associated with a large number of non-immunized people coming to Kazakh tularemia endemic areas from different places of Soviet Union to harvest the grain. Since 1978, the number of tularemia patients has considerably decreased and during 1992 – 2001 thirty-one human cases were reported.

Epidemiological analysis showed that infection was transmitted by a variety of routes, including bites of infected arthropod, ingestion of infected food and water, transfer to mouth by contaminated hands and direct contact from skinning musk-rats and hares. The disease presented mainly as glandular-bubonic (62.5%), bubonic (25.0%) or pulmonary (12.5%) forms.

Key words: Human tularemia, immunization, endemic areas, natural foci, tularemia microbe, outbreak, clinical forms

INTRODUCTION

The authors take part in surveillance of natural and human tularemia foci in Kazakhstan. The description of clinical forms of human tularemia, sources and factors influencing the spread of the disease came from reports of regional antiplague stations and sanitary epidemiological stations.

RESULTS

An analysis of the collected data shows a decrease of sickness rate for some time of the analyzed period resulting in implementation of complex sanitary-hygienic and prophylactic measures. The planned vaccination of people in tularemia endemic regions was initiated in 1950. The long-term practice of the vaccine use for human tularemia prophylaxis immunization induces immunity on the average in 95–98% of the vaccinated decreasing the sickness rate.

NATURAL FOCI OF TULAREMIA IN KAZAKHSTAN

Tularemia is a natural foci zoonotic disease, the wide distribution of which in Kazakhstan may be explained by geographic conditions favorable for the causative agent. The natural foci of tularemia occur in such different landscape complexes as: steppe, flood-lands-marsh, foothills-stream and tougai. Tularemia is reported in almost all the regions of Kazakhstan except South-Kazakhstan and Mangistayu district (1). The foci of flood-lands-marsh type occupy the water meadows of Irtish, Tabol, Ishim, Nura, Ubagan, Turgai, Ural, Bolshoi and Maly Uzen rivers, the delta of the Volga and also the hollows of a number of lakes – Alacul, Sassykkol and others. Others types are located in the forest-steppe, steppe, and semidesert zone. The main host of the microbe is a water vole *(Arvicola terrestris)* but more than twenty species of wild mammals may be found infected in nature. A wide range of invertebrates (ixodid and gamasid ticks, mosquitoes, tabanids and other blood-sucking arthropods) are involved in epizootic cycle in those natural foci. The *holarctic* subspecies of the tularemia microbe circulates in the foci. The epizooties are the most intensive in the middle of summer and autumn.

The foci of the tougai type were described in river valleys of the desert zone in Kyzyorda, Taraz, Almaty districts (2). Tougai, a specific landscape, is characteristic for valleys of the deserted rivers of Kazakhstan. The rivers mentioned above are Syr-Daria, Ili, Chu. The main carriers of tularemia microbe are hare-tolai *(Lepus tolai Pall) and Meriones tamariscinus*, while main vectors include ixodid ticks *D. daghestanicus* and *Rhipicephalus pumilio*. *F. tularensis mediaasiaitca* circulates in the foci. Epizootics are reported as a rule in Spring and in Summer.

The foci of steppe type have been revealed only in the North-West and in the North of the Ural district. Their biocenotic structure appears rather complex. The carriers of the tularemia microbe are hamsters, forest and house mice, field-voles, hare-russack and gophers. The vectors are recruited from ticks of *Dermacentor* and *Ixodes* genera. The Spring--Summer epizootic outbreaks are typical of these foci.

HUMAN TULAREMIA

For the first time human tularemia cases were registered in Kazakhstan in 1928, in Uralsk province during an outbreak on the Ural river connected with the supply water--vole skins. From 1st May to 9th June, 105 cases of mainly bubonic and ulcerous-bubonic forms were reported (3).

In summer 1930 an outbreak of the disease transmitted by vector-bite was reported from Taldi-Kurgan district (Ush-Tobe), and in 1942, 16 settlements in the delta of the Volga river were enveloped with tularemia. An unusually heavy outbreak was recognized in Gvardeiski region of the Taldi-Kurgan district in 1947 where 658 people fell ill. The infection took place as a result of using water from the reservoir contaminated by excreta and carcasses of water voles. Another extensive outbreak occurred in Karatalsk region in July-October 1949 involving 152 human cases and in the same year there were reported 200 cases from the North-Kazakhstan district.

The greatest outbreak took place in Pavlodar district of Kazakhstan in 1954 in the Irtish flood-lands affected 1791 persons. The epidemic was of a mixed type in its nature starting in result of handing skins of infected animals (trade type), then it was transmit-

ted by infected blood-sucking insects (transmissive type) and finally it was spread by contaminated water (water type). In the years 1954 and 1958–1959, an increase of the sickness rate was noted in Tselinograd (present Astana), in Karaganda and Semipalatinsk districts as a consequence of a vast territories of the districts being lain follows an extensive migration of non-immunized persons to these favorable places. Mass cases reported in 1968 and 1972 originated from stings of infected blood-sucking Diptera (mosquitoes) (1). The data on tularemia morbidity in Kazakhstan in 1950–2002 are presented in figure 1.

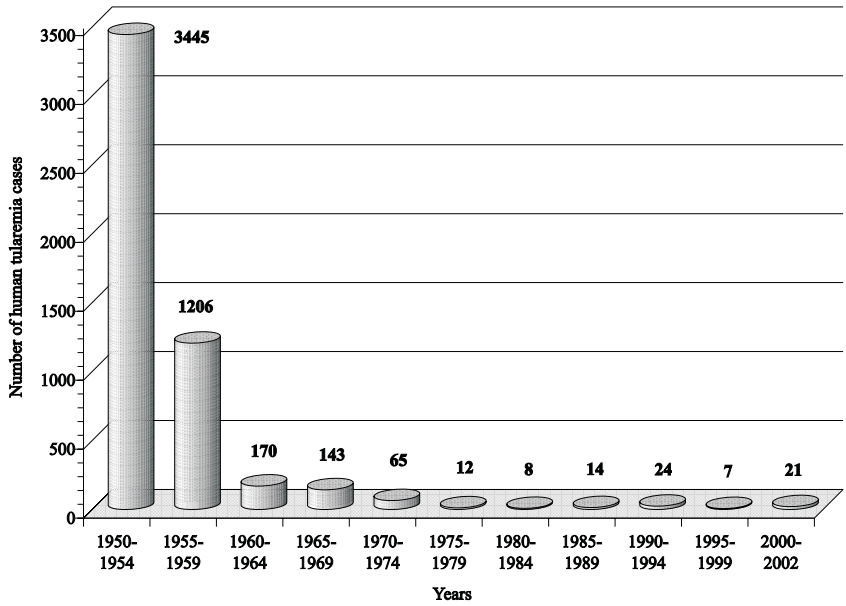

Fig. 1. Tularemia morbidity in Kazakhstan (1950–2002)

CLINICAL FORMS RELATED TO THE ROUTE OF INFECTION

Tularemia in Kazakhstan occurs in outbreaks, usually associated with blood-sucking arthropods (87.0%), direct contact with infected animals (7.0%) and ingestion of contaminated water (5.7%). Ulceroglandular form is the most frequent.

Important methods of acquisition the infection in Kazakhstan include:

- Trade type, from the skins of infected musk-rats and water voles
- Water type, from use of the contaminated water for drinking and other needs
- Transmissive type, by the stings of blood-sucking diptera (mosquitoes, gadflies etc) and ticks
- Agricultural type, from processing of agricultural products and working in haystacks and straw contaminated with excreta of sick with tularemia rodents
- Domestic type, from pollution of household articles and food products by mice-like rodents infected with *P. tularensis.*
- Hunting type, caused by hunting and consumption of underdone hare meat
- Air-borne, from inhalation of infected aerosols and dust

According to incomplete data, since the beginning of the last century there were reported over 10 000 tularemia cases in Kazakhstan. An analysis of the collected data showed a decrease in incidence rate for some time of the analyzed period, resulting from implementation of complex sanitary-hygienic and prophylactic measures. The planed vaccination of people in tularemia endemic regions was initiated in 1950. The live dry vaccine of holarctic strain # 15 is used (Russia, Omsk). Periodicity of vaccination was 1 time per 5 years. The long-term practice of the vaccine use for human tularemia prophylaxis demonstrated that immunization induces immunity on the average in 95–98% resulting in decrease of incidence.

CONCULUSION

The number of human cases has considerably decreased after 1978. Only 40 cases were reported for the last decade, although it is possible that number of cases running pulmonary form remained undiagnosed. The cases reported in the last decade were isolated or occurred in small outbreaks, most frequently in Almaty, North-Kazakhstan and Akmola districts in result of work being undertaken by victims of tularemia natural foci. Careful analysis of available case histories revealed that infections were acquired most frequently by the alimentary way from infected water or transfer of the pathogen to the mouth on contaminated hands. Twenty five percent of human cases were of the transmissive and trade types, caused by skinning and cutting of musk-rats and hares. 12.5% of all the cases were air-borne.

The glandular-bubonic and bubonic forms were recognized most frequently (in 62.5% and 25% respectively). The pulmonary form was diagnosed in 12.5%. In 81.25% of the cases the illness ran a mild or moderate course, in 28.75% it was severe; however, there were no deaths.

Presently occurring isolated cases are associated with musk-rat trapping, drinking of infectious water from open reservoirs, and bites of blood-sucking insects.

In the treatment of tularemia amino glycosides (streptomycin and gentamicin) given for 10–14 days have been found effective. Ciprofloxacin and doxycycline have also been used. It is recommended to check isolated tularemia strains for antibiotic resistance.

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T Meka-Mechenko, A Aikimbayev, T Kunitza, K Ospanov, G Temiralieva, V Dernovaya, L Luchnova, A Abdirassilova

KLINICZNA I EPIDEMIOLOGICZNA CHARAKTERYSTYKA TULAREMII W KAZACHSTANIE

STRESZCZENIE

Od 1950 r. do 1977 r., 5049 przypadków zachorowań ludzi na tularemię zostało zarejestrowanych w Kazachstanie. Stanowiło to efekt dużej liczby podatnych osób podróżujących w okresie żniw do obszarów o endemicznym występowaniu tularemii. Od 1978 r. liczba nowych przypadków tularemii znacznie zmalała i w okresie 1992–2001 zarejestrowano tylko 31 przypadków tej choroby u ludzi.