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## PLAGUE PECULIARITIES IN KAZAKHSTAN AT THE PRESENT TIME

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*Since 1990 to 2002, 19 human plague cases and 2 bacteria-carriers cases were registered in natural plague foci on the territory of the republic. For last 12 years plague in forms of bubonic and bubonic-septic was diagnosed in Kazakhstan. Out of 19 patients (14 men – 73,6% and 5 women – 26,3%), 13 persons recovered (68,4%), 6 persons died (31,6%). Employment of the treatment in the new scheme sharply lowered lethality from plague. Live attenuated *Y. pestis* EV vaccine available for human and camel use is applied as a basic preventive measure in plague natural foci. Epidemiological importance of ill camels remains high. At the analyzed period, in 5 cases infection was a result of forced camel slaughter. 11 people (57,8%) were infected through flea bites. Central Asian desert plague focus is still the most active and its potential to start epidemic increases in connection with rising of anthropogenic influence. All these changes occur on the background of epidemiological survey decreasing in natural plague foci.*

*Key words: natural plague focus, epidemiological plague surveillance, human plague, vaccine, carriers and vectors of plague*

### INTRODUCTION

Since 1959 till 2002 in the world more than 70 thousand of human plague cases were reported in 41 countries: in Asia 60,3%, in Africa 24,6%, in the USA and countries of South America 15,2%.

The considerable part of the territory of Kazakhstan is located on the range of one of the biggest plague foci in the world – Central Asian desert plague focus, occupying vast zone of a desert and semi-desert of the Central Asia and Kazakhstan. In Kazakhstan 39% of territory (1,4 million squares km) is the area of the plague natural foci. Epizootics with isolation of hundreds of virulent plague strains from the rodents and fleas are registered annually.

The primary carrier of plague in this focus is *Rhombomys opimus* (Great gerbil). In this focus *Yersinia pestis*, besides *Rhombomys opimus*, is detected at more than 20 species of rodents. 27 species of wild rodent's fleas are plague vectors. The majority of flea's species belong to Genera *Xenopsylla*, *Nosopsyllus* (1). The number of camels in Kazakhstan is about 100 000. Surveillance of these animals is very important prevention measure, because infection of camels may result in a very serious epidemics. In Kazakhstan, from 1907 to 2001, human plague was acquired from camels in 400 instances.

More than 400 outbreaks of this infection among the people, from 1904 to 1999, were related to spread of infection from the wild rodents and their fleas, from ill camels, or hunting of hares, foxes, and saiga.

Up to 1951 case fatality of human plague exceeded 90%. The formation of anti plague system in Kazakhstan, the use of antibiotics and vaccine prophylactics has resulted in a sharp plague reduction of case fatality.

## METHODS

The data on continuous monitoring of natural plague foci, carried out by M. Aikimbayev's Kazakh Scientific Center for Quarantine and Zoonotic Diseases (KSCQZD) and regional anti plague stations has been used for the analysis of the state of plague natural foci.

We have analyzed activity of natural plague foci in 1993–2001. We have also evaluated the anti-epidemic measures, the mechanisms and routes of transmission, and the human plague sources in Kazakhstan. The survey resulted in recommendations on epidemiological supervision of plague. An improvement has been made concerning epidemiological investigation and elimination of human plague focus. The measures taken to localize of especially dangerous infection foci are based on the normative rules, prepared by scientists of KSCQZD: (1, 2, 3) and other documents (4, 5).

## RESULTS AND DISCUSSION

In 1993–2001 plague epizootics in territory of Kazakhstan were found in most instances in *Rhombomys* type foci of plague. The activation of process since 2000 and expansion of the borders of epizootics is reported (tab. I).

More than 2,5 million persons of stable population and watch workers, builders, tourists and cattle-breeders of distant pastures live on the territory where outbreaks of acute epizootics occur. In settings of new geological, oil prospecting firms some of which are localized on the territory of natural plague foci, obligatory anti-plague vaccination was introduced (tab. II).

Table I. The size of epizootic territory and the prophylactic measures in plague natural foci (in thousands squares km)

Years	1993	1994	1995	1996	1997	1998	1999	2000	2001
Epizootic area	39,80	33,15	25,94	22,08	17,54	23,30	26,80	43,43	41,30
Area of deratization	8,41	7,83	5,75	7,42	7,73	9,55	12,67	14,70	13,70
Area of desinsection	2,85	0,61	2,37	3,41	2,03	1,62	4,01	6,34	6,65

Table II. Vaccinations against human plague in Kazakhstan

Years	1993	1994	1995	1996	1997	1998	1999	2000	2001
Vaccinated people (in thousands)	46,2	53,7	26,6	30,8	34,7	34,6	39,8	49,2	67,3

Live attenuated *Y. pestis* EV vaccine available for human and camel use, is employed as a basis of plague prevention in natural foci. Since 2001 the number of vaccine doses has been increasing because of growing numbers of inhabitants of small towns, living in outskirts, who often graze cattle in potentially dangerous territories and build illegal temporary houses there, not always complying with sanitary-hygienic requirements (tab. II). Moreover it is economically suitable for people to keep camels, which do not require any special care and feeding.

Coming back from pastures to the corral, the camels may be infected with plague by flea's bites. The camels may have infection without overt symptoms.

In Central Asia desert plague focus circulate highly virulent *Y. pestis* strains. Every year these microbes are isolated from rodents and fleas (tab. III).

Table III. Numbers of plague strains isolated from carriers and vectors in the territory of plague natural foci in Kazakhstan

Years	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of strains isolated from carriers and vectors	811	447	246	118	243	366	464	330	390

Since 1990 to 2002, 19 human plague cases and 2 asymptomatic carriers were reported in Kazakhstan in natural plague foci (tab. IV) (6).

Table IV. Plague cases in Kazakhstan (1990 – 2002)

Kazakhstan district			Total
Aktyube	Atyrau	Kyzylorda	
5+2 carriers	4	10	19+2 carriers
26,3%	21,0%	52,7%	100%

For last 12 years (1990–2002) the plague was registered on territory of Kazakhstan only in forms of bubonic and bubonic-septic. Out of 19 of plague patients 13 persons recovered (68,4%), 6 died (31,6%).

The high mortality was a result of delayed reporting to medical facilities, what occurred quite often due to remoteness of medical posts, lack of public transport and communication in many rural regions. As a rule, such patients had accompanying chronic diseases, low education, and poor sanitary knowledge.

Table V. Human plague foci in settlements of different types

Districts	Temporary sites		Stationary settlements		Railway and passing tracks		Towns	
	number	%	number	%	number	%	number	%
Aktyubinsk	–	–	3	15,7	–	–	–	–
Atyrau	–	–	3	15,7	1	5,2	–	–
Kyzylorda	2	11,05	4	21,05	1	5,2	1	5,2

In KSCOZD the scheme was developed to treat the plague. It consists specific treatment in the first day of illness by bacteriostatic drugs and intensive detoxification. Then bactericidal antibiotics are added and detoxification therapy with daily urine control is continued. If therapy with hormones is needed, it is necessary to control antibiotic sensitivity of the microbe constantly, and to have reserve of antibiotics for treatment, because during therapy with hormones formation of antibiotic-resistant plague strains frequently takes place.

A plague epidemiological peculiarity at the present stage is the appearance of patients out of rural settlements (residents of Aralsk town, str. Saksaulskaya). They constitute 6 persons out of 19 patients for last 12 years, 14 men (73,6%) fell ill; 5 women (26,3%) fell ill.

As before, epidemiological importance of sick camels is high. In 5 cases at the analyzed period, the infection was a result of forced camel slaughter. Two of the patients having plague were townspeople. Flea bites caused infection in 11 people (57,9%).

Table V shows that plague epidemic foci most frequently occurred in stationary settlements, then came temporary sites, and railway stations in the third place.

Overwhelming majority of epidemic foci in the above-mentioned districts were in the places of stable course of plague epizootics.

Age distribution of plague cases were as follows: adults 57,8%, children under 18 years old 42,2%. The analysis of plague cases among children indicated that program of sanitary education is not realized; children take part in cattle grazing on epizootic territory and often play without control in places inhabited by wild rodents.

Plague patients represented the following professional categories:

4 patients were workers of different organizations (21,1%);

2 patients were workers of a railway station (10,5%);

2-shepherds (10,5%);

2-housewives (10,5%);

1-pensioner (5,2%);

8-children of school and younger age (42,2%).

High percent of children among plague patients is also characteristic for a modern plague. Plague infection is related not so much to profession as to illegal cattle grazing, forced personal cattle slaughter and also closeness of inhabited premises to the holes of wild rodents.

In recent years the increase of epidemic potential of enzootic plague territories is observed. It is connected with intensive production of petroleum and hence, with anthropo-

genous transformation of landscapes. The new risk group are temporary workers of the petroleum companies. The production of petroleum is conducted directly on epizootic territories. The joint and foreign companies of China, Denmark, Great Britain, Russia, Turkey, Germany, USA, Japan, Canada, and Netherlands work here. People, who work in these territories, are registered in medical institutions and are vaccinated.

Thus, the analysis of long-term data shows that the Central Asian desert plague focus remains the most active focus of plague and its epidemic potential grows in connection with anthropogenous influence. These changes occur on a background of decrease of intensity of epidemiological supervision in the natural plague foci connected with insufficient financing.

#### CONCLUSION

In 1990–2002, in the territory of Kazakhstan 19 people fell ill with plague. Analysis of epidemiological data for the last 12 years showed that now Central Asian desert focus is still the most active plague focus and its epidemic potential is increasing in connection with rising of anthropogenic influence. All this changes occur in plague natural foci along with less effective epidemiological surveillance.

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#### SPECYFIKA DŻUMY W KAZACHSTANIE W DOBIE OBECNEJ

#### STRESZCZENIE

Pomiędzy 1990 i 2002 r., 19 przypadków dżumy oraz dwu nosicieli pałeczki dżumy zostało zarejestrowanych w ogniskach endemicznych na terenie republiki. W okresie ostatnich 12 lat była rozpoznawana w Kazachstanie dżuma w postaci dymienicznej oraz dymieniczno-septycznej. Wśród 19 zarejestrowanych pacjentów było 14 mężczyzn (73,6%), 5 kobiet (26,3%). 13 (68,4%) osób wyzdrowiało, a 6 (31,6%) osób zmarło. Zastosowanie nowych schematów leczenia znacznie zmniejszyło śmiertelność z powodu dżumy. Żywa atenuowana szczepionka (*Y. pestis* EV vaccine) dostępna do stosowania u ludzi i wielbłądów stanowi podstawowe narzędzie zapobiegania tej chorobie w naturalnych ogniskach endemicznych. Epidemiologiczne znaczenie zakażonych wielbłądów pozostaje wysokie. W analizowanym okresie 5 przypadków zakażenia ludzi wystąpiło przy uboju wielbłądów. 11 (57,8%) osób zostało zakażonych w wyniku ukąszeń pcheł. Środkowo-Azjatyckie ognisko dżumy jest ciągle najbardziej aktywne i znaczenie jego wzrasta w związku ze wzmocnionymi działaniami człowieka na tym terenie.

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