Clinical and epidemiological characteristics of the cutaneous anthrax in the south of Kyrgyzstan

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Abstract: The article presents the results of a clinical analysis of the registered incidence of anthrax in the South of Kyrgyzstan. A pronounced tendency towards an increase in the incidence of anthrax with a wide distribution in disadvantaged stationary points of anthrax foci is shown. Despite the ongoing anti-epidemic and preventive measures, cases of the disease are registered annually among the population, mainly in the endemic territories of the republic. Anthrax in Kyrgyzstan among animals has been officially registered since ancient times, people are often involved in the epizootic cycle, among which the epidemic process is manifested by sporadic morbidity or a group outbreak of infection. The Kyrgyz Republic belongs to a permanently unfavorable region in terms of anthrax. At the same time, in the conditions of the south of Kyrgyzstan, as a result of natural disasters, many anthrax foci were washed away by mudflows, destroyed, lost, some of them remained on the territory of private property. Despite significant achievements in the study of the etiology, epidemiology, clinic, immunology, and prevention of anthrax, many theoretical and practical aspects of this set of tasks remain insufficiently studied, especially at the regional level. Significant changes in the living conditions of people, forms of management, uncontrolled slaughter of animals, imperfection in the diagnosis, treatment and prevention of this disease determine the relevance of studying anthrax in humans in modern conditions.

Key words: Anthrax, soil foci, clinical course, especially dangerous infections, epidemiology.

1. Introduction

Despite the progress made in studying the problem of anthrax, the infection continues to be registered in many countries of the world and remains relevant for public health and veterinary medicine. Anthrax is a zoonotic anthropurgic infection. Due to sporulation, the anthrax pathogen is able to

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persist for a long time, multiply and thereby take root in the soil and leads to the formation of persistent soil foci of infection. The problem of anthrax is exacerbated by the emergence and spread of drug-resistant strains of B. anthracis [7,13], which undoubtedly creates certain difficulties in the therapeutic tactics of managing patients. Accumulated evidence indicates that the discovery of antibiotic-resistant forms of anthrax in nature is not a rare event, and the use of widely used disinfectants is not always effective [15,4].

Features of the epizootology and epidemiology of anthrax in Kyrgyzstan in the 1990s were determined by the socio-economic conditions of the population during this period. Anthrax remains one of the most urgent problems of modern health care. The relevance is due to the high incidence of anthrax in people, the wide distribution of anthrax foci. Violation of the current veterinary and sanitary rules in animal husbandry has led to epidemiological problems. Long-forgotten issues of anthrax diagnosis and treatment have suddenly become a real problem for public health in many countries. Therefore, a detailed analysis of the epidemiological situation of the principles of diagnosis and recommendations for the treatment of anthrax, regularly published in leading medical journals, may be of interest to the medical community.

A feature of the current epidemiological situation both throughout the world and in Kyrgyzstan and the CIS (commonwealth of independent states) is the widespread activation of almost all known infectious diseases, including those that were considered studied and traditionally were and are under the close control of sanitary and epidemiological services. [6,11,14].

The greatest danger in the epidemiological plan is primarily especially dangerous and dangerous infections related mainly to quarantine and natural focal diseases, such as anthrax. The modern evolution of zoonoses, expressed in a significant change in their main epidemiological features, was the result of the following processes: the formation of anthropurgic foci of B. anthracis; change in the boundaries of the structure of their nosoareals; changes in the composition of epidemiologically significant sources of infectious agents; the introduction of B. anthracis into areas previously free from them; changes in the structure of circulating strains of pathogens; enhancing their variability and adaptive abilities under the influence of natural and anthropogenic factors, etc. Proven, widespread variability of pathogens of especially dangerous zoonoses; isolation of anthrax microbes in natural foci, migration to atypical hosts, and other phenomena make it difficult to timely identify pathogens and diagnose diseases caused by B. anthracis. Currently, in the CIS and abroad, there have been reports of the presence of penicillin-resistant strains of the anthrax microbe. [2,10,5]. The issues of developing an effective complex therapy for patients with anthrax remain topical [12,1,5].

Since penicillin is one of the main antibiotics used in the treatment of human anthrax, the interaction of this antibiotic with penicillin-resistant anthrax is becoming an important study.

The purpose of this study was to study the incidence of anthrax in the south of Kyrgyzstan, the features of the course of the cutaneous form of anthrax.

2. Materials and methods

Materials of registration of cases of anthrax in the south of Kyrgyzstan were used in the work. Morbidity rates are expressed per 100,000 population. The material for studying the prevalence of anthrax was the data on the recorded incidence of the Republican Center for Quarantine and Especially Dangerous Infections, the materials of the study were also retrospective data, epidemiological maps of the examination of foci (form. 357 / y), registers of registration of infectious diseases (f. 60 / y). The work used a comprehensive epidemiological research method, including the study of long-term

dynamics and structure of the incidence of anthrax. An epidemiological assessment of the monthly incidence in general, as well as in various age groups of the population, was carried out. The age structure and seasonality have been studied. The incidence analysis was carried out from 2015-2020. An analysis of the clinical manifestations of the cutaneous form of anthrax was carried out on the basis of observation of 109 patients with this nosology, aged 7 to 70 years, who were hospitalized in the south of Kyrgyzstan from 2015-2020.

During clinical examination and assessment of the severity of the condition of patients, generally accepted criteria were used and special attention was paid to the nature of the severity of the main symptom complexes of the cutaneous anthrax: the duration of fever, the presence of edema, the size of the ulcer, serous discharge, the duration of the scab, the duration of lymphadenitis. All patients underwent decoding of the leukocyte count of peripheral blood. The diagnosis of the skin form of anthrax was confirmed bacteriologically (by isolating the culture of the pathogen from the patient) and epidemiologically and using an anthraxin skin allergy test [2,7].

To confirm the diagnosis in the dynamics of the disease, an anthraxin skin-allergic test was used strictly intradermally using a syringe with a thin needle at a dose of 0.1 ml in compliance with the rules of asepsis. A sterile isotonic sodium chloride solution is injected into the skin of the other forearm in the same dose, with another syringe with a thin needle.

At the injection site of anthraxin and sodium chloride, hyperemia and skin infiltration are noted after 24 and 48 hours. The final count was made after 48 hours. All patients underwent antibiotic therapy in accordance with Order No. 1 of the Ministry of Health of the Kyrgyz Republic dated January 2, 2001 "On measures to reduce the incidence of anthrax in the Republic." Results of the discussion. Our analysis of 109 patients with cutaneous anthrax showed that, regardless of the epidemiological situation, people of active age from 15 to 50 years old, children of the older age group from 8 to 15 years old, and persons of mature age from 51 to 60 years old are most often ill. predominance of males. This is explained by the fact that people of these age groups, due to a more active lifestyle, are more at risk of infection. The source of infection in 62.3% of patients was cattle, in 22.95 small cattle, in 9.2% horseheads, in 7.8% the source was not established. Infection occurred, as a rule, from animals of individual farms. Among the sick, the predominant number of patients were provided by laborers, farmers, livestock breeders 68.2%, veterinarians accounted for 4.4%, housewives and pensioners 22.4%.

Due to the presence in the territory of the South of Kyrgyzstan a significant number of soil foci of anthrax 772 (47.1%). Locations of 52.9% of the recorded soil foci have not been found, and they remain potentially dangerous. In the formation of natural foci, the main role was played by cattle (61.8%), a somewhat smaller role was played by small cattle (30.8%). Natural foci (8.1%) are taken into account. This was facilitated by a sharp change in natural and climatic conditions: hot, dry summers, frequent landslides, mudflows, and floods. Infection occurred in the process of forced slaughter of sick animals, skinning, butchering carcasses, etc. The slaughter was carried out on their own backyards, without the knowledge of veterinary workers and veterinary examination. In general, in the South of Kyrgyzstan, there was a low coverage of animal vaccination, before the outbreak, only up to 36% were covered, after the epidemiological incidence - 89%. Patients were admitted to hospitals in August, September, November 80.8%. According to the literature data, 79.8% of cases occur in July and October, which coincides with our data.

3. Results and discussion

Analysis of the incidence of anthrax in the south of Kyrgyzstan over 5 years showed that there was a steady upward trend in registered incidence, there were periodic rises in 2015, 2018, 2020. The southern region remains unfavorable in terms of the spread of anthrax in recent years, where cases of this disease of the skin (outer) form among people are recorded annually.

Table 1. Dynamics of the incidence of anthrax among people in 2015-2020.

Years	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
n=109	**20.1%** ±8.5	**16.5%** ±8.7	**12.8%** ±8.9	**27.5%** ±8.1	**4.8%** ±9.5	**18.3%** ±8.6

Of the analyzed periods, the largest share falls on 2018, which is 27.5%. In 2015, a total of 22 cases were registered in the region (intensive indicator 20.1) against 5 cases (intensive indicator 4.8), for 2020 an increase of 18.3 times.

Table 2. Distribution of patients with cutaneous anthrax by age.

Age, years	7-14	15-19	20-29	30-39	40-49	50 and above
Total 109	20	15	29	32	10	3

As can be seen from Table 1,2,3,4, in the age structure, 29.3% of the incidence falls on the adult working population. This concept is explained by the fact that persons of mature age, and with a predominance of males, due to a more active lifestyle, are more at risk of infection.

Table 3. Distribution of patients with cutaneous anthrax according to social status.

Total	Pupils	employees	private sector livestock breeders	workers	unemployed	students
109	4	--	38	21	40	6
	3.6% ±9.3	0%	34.8% ±7.7	19.2% ±8.5	36.7% ±7.6	5.7% ±9.4

Infection occurred, as a rule, from animals of individual farms. Among the sick, the predominant number of patients by social status is 36.6% of the unemployed, 34.8% of private sector livestock breeders, 3.6% of schoolchildren, 19.2% of workers and 5.5% of students.

Table 4. Distribution of patients with cutaneous anthrax by source of infection.

Total	Participation in the slaughter of cattle		During the cutting carcasses		Contact with raw meat	
n=109	abs N.	%	abs.n	%	abs.n	%
	54	49.5±6.7	37	33.9±7.7	18	16.5±8.7

According to the sources of infection: 49.5% were infected by the forced slaughter of animals, 16.5% by contact with raw infected meat and 33.9% by butchering the carcass. The largest number of soil foci of anthrax was recorded in the Jalalabad region. In 2015, 351 soil foci were registered, of which 155 (44.1%) were found, 155 (100%) were concreted, 139 foci (89.6%) have identification marks, a decrease due to Nooken district 1, Suzak district by 9, and in 6 outbreaks in Jalalabad city, 89 (57.4%) have fences. Reduction due to Nooken and Suzak districts in 29 outbreaks, in Jalalabad in 6 outbreaks and in the city of Tashkumyr there are none. Since fences and identification marks are in most cases installed from wooden bars and taken away by the population. In total, 3 active foci over the past 5 years have been registered in the Suzak region: Of the new foci of anthrax, 98 soil samples were examined in the laboratory, of which anthrax bacillus was isolated in 4 samples. [3,8,9].

Table 5. Terms of admission of patients with cutaneous anthrax for inpatient treatment.

1st day abs.number %	2nd - 3rd day abs.n %	4-5th day and above %	Total abs.number
----	25	84	109
%	23% ±8.4	77.0%±4.5	100%

Table 6. Distribution of patients with cutaneous anthrax by sex.

Female abs.number%	Male abs.number%	Total abs.number.%
24	85	109
22.0%±8.4	78%±4.4	100%

Table 7. Distribution of patients with cutaneous anthrax according to severity.

Mild abs.n %	Moderate abs.n%	Severe abs.n%	Total abs.n
70	31	8	109
64.2%±5.7	28.4%±8.0	7.4%±9.2	100%

Sources of anthrax infection in Kyrgyzstan.
Cattle-80%, Small cattle-14%, horse-12%, 0.50% soil, 0.50% hide, 5.30% not established.

The number of cases of anthrax in the regions of the republic.
Osh region - 66 cases, Jalalabad region - 108, Batken region - 13, Osh city - 9, Chui region - 16, Talas region - 13, Issyk-Kul region - 1, Naryn region - 1, Bishkek city - 3.

Examination and treatment were carried out in accordance with the current order of the Ministry of Health of the Kyrgyz Republic dated January 2, 2001 on measures to reduce the incidence of anthrax in the Republic [7]. All patients were prescribed intramuscular penicillin, 1 million - 2 million 4-6 times a day, tetracycline 2 g per day for 10 days, doxycycline 2 g per day for 10 days, amoxacillin 2 g per day for 10 days, ciprofloxacin 1 g per day for 10 days and pathogenetic therapy.
The patients were discharged after clinical recovery from the moment of carbuncle prolapse. Due to the absence of specific anti-anthrax globulin (serum), the latter was not used in the treatment of patients.

4. Conclusions

Thus, according to our study, patients were admitted to the hospital in the summer from 4 days of illness or more. Males predominated by sex, mild by severity. It should be noted that at present the epidemiology and epizootology of anthrax have changed significantly compared to the period of collective animal husbandry. Prerequisites for the growth of soil foci of anthrax, and uncontrolled rearrangement of livestock are the reason for the existence of many foci of anthrax in the Republic and the increase in the incidence of people.

1. The main features of the epidemic process of anthrax remained unchanged. The following features have survived:

- uncontrolled household forced slaughter of animals affected by anthrax without a preliminary veterinary examination and laboratory research
- the sale of meat and offal from dead and forcedly killed animals that did not pass the veterinary examination in market conditions, through the distribution network.

2. However, it should be noted some new features of the epizootic process that has manifested itself in the southern regions of Kyrgyzstan over the past decade. These include: - the predominance of the environment of diseased animals that are in the personal possession of the population - the increase in outbreaks in settlements previously unknown as stationary unfavorable for anthrax - a trend towards a shift in the territorial confinement of the incidence in the south of Kyrgyzstan.

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