ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Prediction of The Epizootic Situation in The Natural Foci of Tularemia Area for Biological Risk Assessment of Food Production.

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ABSTRACT

The aim of this study was a multi-year study of the epizootic situation in the natural foci of tularemia zone in the Stavropol Territory (Southern Russia). Studied mechanism of transmission of zoonotic diseases of wildlife in the intensity of the epidemic process, identify effective measures to combat this disease. Long-term comprehensive study of tularemia allows us to differentiate the administrative territory of the Stavropol Territory on the degree of danger of epizootic and epidemiological into three zones: 1) conditionally safe area (eastern part of the province); 2) endangered area (northern and central part of the province); 3) The real danger zone (the western part of the province). Obtain reliable data needed for the prediction of the epizootic situation in the natural foci of tularemia zone to ensure the biological safety of animal products.
Keywords: tularemia, epizootic, safety of food production.

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ISSN: 0975-8585

INTRODUCTION

At the present stage of development of the food industry one of the most pressing issues in favor biosafety (Mironov A.Y., 2012; Trukhachev V.I., 2014; Emelyanov S.A., 2016). Tularemia refers to diseases transmitted to man in the care of animals, processing and use of meat and dairy products, meeting not only in wild mammals, but also among large and small cattle, paramount importance, issues of prevention of the infection and the organization of anti-epidemic measures (Kozak V.L., 2005). A special role is played by the study of the mechanism of transfer of pathogens zoonosis of wild animals in the epidemic process intensity in order to ensure timely assessment of epidemiological risks and the fight against the disease in the present conditions of agriculture (Zdolnik T.D., 2014).

The scientific and practical interest is the study of the epizootic situation in the natural focal zone of tularemia in the Stavropol Territory (Southern Russia) based on the analysis of long-term observation results. A special role is played by the study of the mechanism of transfer of pathogens zoonosis of wild animals in the epidemic process intensity. An equally important aspect is the timely assessment of epidemiological risks, and effective measures to combat this disease to ensure the biological safety of production of animal products.

MATERIALS AND METHODS

The data derived from the epidemiological survey in the Stavropol Territory, which registers changes in the number of rodents and bloodsucking arthropods, as well as the results of laboratory tests to confirm the presence of the pathogen (or antigen) in a variety of objects on the basis of the Stavropol Research Institute for Plague Control Rospotrebnadzor Stavropol in the 1972-2013 years. On the basis of the results given by a reasoned opinion about the presence in the territory is now an epizootic of tularemia.

RESULTS AND DISCUSSION

A characteristic feature of the epidemiology of tularemia is a multiplicity of mechanisms of infection and pathogen transmission paths, high susceptibility to her people, without distinction of sex or age, lack of transmission from person to person.

The fauna of the Stavropol Territory has 33 species of rodents, 5 species of insectivores. The epizootic of tularemia is mainly involved Highly responsive to tularemia wild mammals I -II groups: common vole, hamster, gray, mouse subgenus Sylvaemus, field mouse, white-toothed shrew Small shrew common, muskrat, gray rat, hare-rusak. Distribution of rodents landscaped zones and individual habitats differ in species composition and population abundance. The main carriers of the causative agent of tularemia in the Stavropol Territory recognized: common vole, mouse houses and mouse p.r Sylvemus, gray hamster, and some species of insectivores.

Long-term comprehensive study of tularemia allows us to differentiate the administrative territory of Stavropol Territory (Southern Russia) on the degree of danger of epizootic and epidemiological into 3 zones:

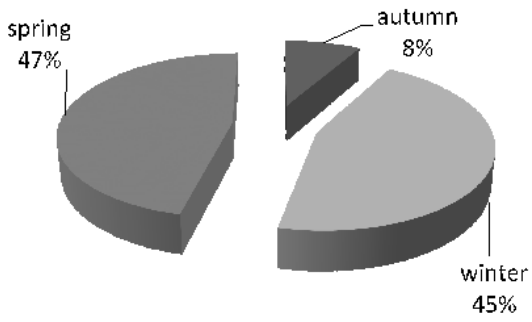
1. Conditionally safe area (eastern part of the territory) - the area in which the disease are not registered among the people. However epizootiynye manifestations of tularemia infection in natural foci are set on the basis of serological and molecular-biological methods. During the observation period in three districts of this group showed an epizootic among small mammals. On a share of 11 districts of this group had 7.3% of all isolates.
2. Threatens area (northern and central part of the territory) - an area where there are less active epizootiynye manifestations of tularemia infection and recorded single sporadic cases of the disease tularemia in humans. On a share of this territory accounts for 8.5% of all ill people and 6.35% of the isolated strains of tularemia microbe.
3. The real danger zone (the western part of the territory) - a zone where there are active natural foci of tularemia, recorded the maximum incidence in the population. In this group accounted for 91.5% of all patients with tularemia. During the sharp increase in the number of carriers of tularemia infection occurs microbe removal of microcenters on adjacent territories, leading to the development of the epizootic of tularemia on the large-area territories. In this regard, it is increasing the likelihood of

ISSN: 0975-8585

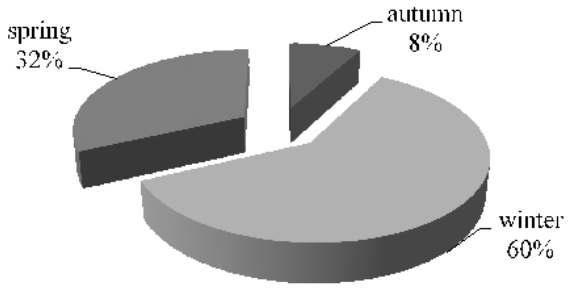
human contact with infected rodents, as well as other objects contaminated external environment, which may lead to diseases of humans.

Epizootic process with tularemia usually depends on the number of rodents, ticks, and due to the influence of climatic conditions (Figure 1).

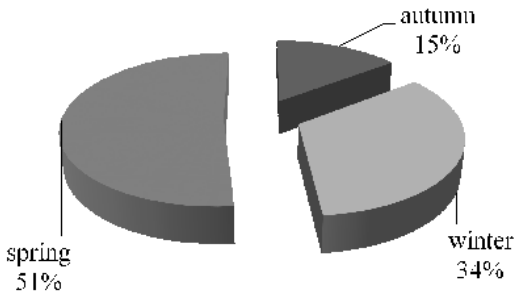
Seasonal landscape and the geographical distribution the causative agent of tularemia



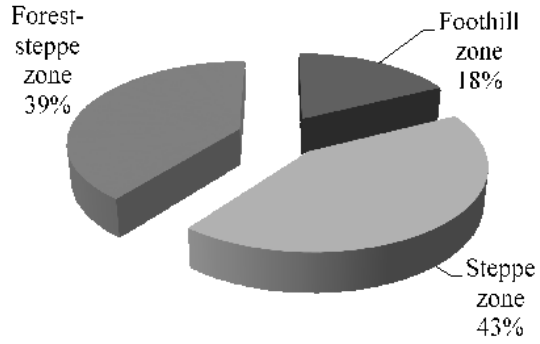
Seasonal ratio allocated tularemia pathogen strains in the foothill zone



Seasonal ratio allocated tularemia pathogen strains in the forest steppe zone



Seasonal ratio allocated tularemia pathogen strains in the steppe zone



Ratio allocated tularemia pathogen cultures in different landscape-geographical zones

Despite the significant transformation of the steppe landscape in the Stavropol region in the zone of intensive agriculture is not self-destruct was a natural focus of tularemia. Therefore, currently stored biocenotic basic communication between rodents, ticks, and pathogen infection. Periodically activates in the outbreak of epizootic process, against which the epidemic complications can occur. The factors that determine the dynamics of epizootic process are: the abundance of food, as a result of a good harvest of all species of plants; peak number of rodents in October; a high percentage of rodents reproduction in September; significant predominance of males among the main species of rodents; high numbers of raptors; abundant rainfall in October and November.

On the territory of the hearth marked inhabit 11 species ixodid ticks. Collect on flag in spring were revealed dominant (83.3%) is *D. marginatus*, the number of which in recent years has fallen under the influence of anthropogenic factors. The second kind of dominance in the training camp is *Haem. punctata*, the number of which over the years has remained stable. Pasture of ticks attached to the forest belts and virgin areas, which contribute to more favorable conditions compared to other habitats (High humidity, thick herbage, grazing in woodland belt, habitation to many species of small mammals that are breadwinner immature phase). The degree of participation of various rodent species in the larvae and nymphs sustenance depends on their size.

ISSN: 0975-8585

CONCLUSION

1. When you change the agricultures on farmland may territorial redistribution of habitat of various species of small mammals, and their concentration in the local areas.
2. Anthropogenic influence led to the formation not typical for steppe centre of tularemia landscape and ecological areas - shallow-water fish breeding ponds with reeds in the coastal area where vector control can act as blood-sucking mosquitoes. This determines the possibility of manifestation of tularemia as a group outbreaks of people diseases.
3. Analysis of the results of years of research of dynamics of common species of small mammals abundance in the natural focus of tularemia revealed a periods of fluctuations in the number. Each of the periods has a three-year cycle.
4. The determining factors are the number of rodents: climatic conditions and the state of forage; deep plowing, leading to the destruction of nests; introduction of new techniques and technologies of harvesting of grain, reduce grain losses during threshing; lack of machinery for mow formation on cultivated fields as key habitats feelings of rodents in the winter. Stalled keeping, the use of pesticides and fertilizers lead to a decrease in the number of ixodid ticks.
5. Monitoring of the functioning of the natural focus of tularemia epidemic to determine the potential of the territory and to allow early prediction of the epizootic situation promptly organize prevention activities and to ensure the biological safety of food production.

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