JOURNAL OF PURE AND APPLIED MICROBIOLOGY, Sept. 2015. Vol. **9**(3), p. 2243-2249

Epizootic and Epidemiological Situation, Prevention and Measures of Fight Against Rabies of Animals in Kazakhstan and in Kostanay Region

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(Received: 09 February 2015; accepted: 16 April 2015)

The situation on rabies among animals and people in the Republic of Kazakhstan and Kostanay region is very disturbing. Special concern is caused by the steady growth of number of people, victims of stings, mutilations and injuries of wild, domestic and farm animals. The role of wild animals as a tank of formation of the natural centers is opened and defined, seasonality, frequency, intensity of epizootic process, its activation are established, the diagnostic value of various methods is determined, the main directions of prevention and measures of fight are planned. It is the strict account; preventive vaccination farm and domestic animals; constant over places of a congestion of wild animals and regulation of number of a livestock of wolves, foxes, corsac foxes, according to recommendations of the World Organization for Animal Health (OIE) and World Health Organization (WHO), and also stray dogs and cats in the cities and villages; sanitary and educational and explanatory work among inhabitants, school students and cattle breeders. In zones of stationary trouble it is necessary to increase quantity to 50 briquettes for oral immunization by each square kilometer of the territory. For search of places of a congestion of animals and an apportion of briquettes for oral vaccination small aircraft should be widely used. The comparative analysis about dependence of emergence of unsuccessful points on rabies of animals from quantity of the used vaccine for oral immunization is carried out. For prevention and fight against rabis the state program is necessary for the Republic, and for Kostanay region.

Key words: Rabies, Epizootology, Epidemiological situation, Diagnostics, Prevention, Vaccine, Oral immunization.

Rabies is a deadly zooantroponoze viral disease of warm-blooded animals and the human being, following by the polyencephalomyelitis phenomena, is included into the list from five the most dangerous diseases, general for the people and animals[1].

Now rabies is registered more than in 160 countries of the world, in the territory of all continents, except Antarctica, it isn't registered only in such countries as Japan, New Zealand, Cyprus, and Australia. Annually about 60 thousand people who had contact both with wild, and domestic animals[1,2,3]. Separate sensational cases of recovery of the people who got sick with rabies give up hope that progress in this direction will be made[4].

The epizootological and epidemiological situation is especially unsuccessful in developing countries where the fight against rabies at people and dogs became an urgent necessity. In the world at the present stage there is a global growth of a rabichesky infection. The same is noted and in the Russian Federation where social and economic value of a problem of rabies steadily grows in recent

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years, including owing to formation of the new centers of an infection. In the European part of Russia the most resistant natural centers of a disease remain in Volga-Vyatka, Central, Central Chernozem, North Caucasian, Volga, Uralsk, and West Siberian and in Far East regions of the country. In six last years in the territory of the Russian Federation about 12, 0 thousand cases of rage were registered. Then by quantity of cases of rabies among animals such countries as Ukraine, Belarus, Romania, Croatia, Turkey and others follow, it is presented in the table 1[5].

MATERIALS AND METHODS

During work collecting statistical data, pilot studies and the comparative epizootological analysis were carried out. Methods of research are the documentary, statistical, comparative and comparative analysis, pathoanatomical, morphological, bacteriological and serological data.

RESULTS AND DISCUSSIONS

The epizootological and epidemic situation on rabies both in the Republic of Kazakhstan, and in subjects of Kostanay region is very difficult and disturbing, it is defined by existence of the active natural centers inseparably linked with different types of animals of wild fauna – foxes, corsac foxes, wolves, etc. Rabies is registered annually and everywhere among wild, farm and domestic animals.Epizootological situation on rabies in the Republic of Kazakhstan for 2006-2014 is presented in table 2.

The number of cases of rabies in Kazakhstan in 2006 was 46, in 2007 – 177, in 2008 – 97, in 2009 86, in 2010 – 151, in 2011 – 216, in 2012 – 109, in 2013 – 174, and in 2014 – 163. The total number of the patients with rabies of animals equaled 1219. On average in 9 years of 55,2% from them 24,9% on domestic carnivorous (dogs), 13,8% - are the share of wild animals and 6,1% - of cats (Table 2, fig. 1) on farm animals.

In the Republic of Kazakhstan from a year to year the steady growth of number of people is noted, victims of the stings, mutilations, injuries caused by farm, domestic and wild animals and asked for the antirabies help. Annually in the country about 15 cases of rabies among people is registered. The number of the people receiving injuries from animals constantly progresses from 45,56 thousand in 2006, 53,93 thousand in 2007, 55,04 thousand in 2008, 58,5 thousand in 2009, 60,06 thousand in 2010, 67,68 thousand in 2011, 70,82 thousand in 2012, to more than 77,8 thousand in 2013 and 61,54 in 2014. The number of people, victims of stings carnivorous, injuries and mutilations is reflected in table 3. The average annual number of the people who asked for the help in fracture clinics made more than 61,22 thousand.

The epizootological situation on rabies remains difficult and in the cities of the republic. In Almaty, the number of the people who received the antirabies help is from 3,23 to 4,67 thousand people that exceeds by 1,2 times a similar indicator on the republic. In Astana annually the number of the people who addressed to fracture clinics fluctuated from 1,51 (2008) to 1,7 (2009) thousands that is 1,2-2,61 times less than a level on the republic. In Kostanay these figures flctuated from 0,82 (2006) to 1,2 thousand.

Annual growth of number of people, victims of stings in comparison with 2006 was in Kostanay, Rudnyi and Lisakovsk from 45,7 to 47%.

Rabies of animals both in the Republic of Kazakhstan, and in subjects of Kostanay region is registered annually and everywhere, and in a number of regions is shown permanently. Incidence of rabies of animals is shown during the whole year, and epizootic process becomes more active from January to July, and then in September and from November to February. The first rise of epizootic process is connected, obviously, with the reproductive period at wild and house carnivorous (wolves, foxes, corsac foxes), and from November to February with the period of moving of young growth. These periods coincide with a biological cycle wild and house carnivorous, including stray dogs. During the specified periods activity of transfer of a virus of rabies reaches a culmination point. It is well-known that stings of both wild animals, and the house carnivorous are always dangerous, but most they are dangerous in the spring in the period of animal and dog "weddings", at this particular time years there comes "blossoming" of rabies[6,7].

Incidence of animals of rabies is followed by a certain frequency (fig. 2) with an accurate interval of rises every three years.

The situation by rabies is determined by existence of the natural centers and the number of the wild carnivorous. So, according to Kostanay regional territorial inspection of forest and hunting economy, the number of foxes and corsac foxes for the beginning of 2014 was from 22,2 to 27,0 thousand individuals. As for quantity of wolves in the territory of our area, there are inconsistent data. According to the same department for the beginning of 2009 in the territory of area lived to five thousand gray predators[8]. Annually, according to the available information officially shoot till 10-15 wolves that in 5 years (2009-2013) was 50-75. If to treble these figures, they are only 150-225. Such figure of withdrawal of gray predators will practically not have essential impact on growth of their population. For 2002-2013 each family of wolves made on average on 3-4 wolf cubs (on average 3), and the posterity of 2009-2013 was created by the packs. So that the number of wolves in recent years at least was arranged and is within 12-15 thousand. It is huge figure if to consider that in soviet time at mass shooting, this number hardly reached four thousand. According to regional territorial inspection of forest and hunting economy, for the beginning of 2014 the number of wolves remains stable within 450 units. For regulation of number of wild animals in 2014godu it was planned to shoot foxes and corsac foxes within 10%, and wolves – 17% of total number.

In recent years villagers of our area steadily grow up a good harvest which by all means reproduction of mice and other rodents was promoted and, respectively, by many foxes', corsac foxes' and wolves' broods. We have no more exact data on a livestock of the wild carnivorous. That it is necessary to own them regularly to survey areas of their dwelling; however funds for it aren't enough. To engage in shooting of the wild carnivorous special crews of inspection of forest and hunting economy, hunters – fans, villagers, to whose farmsteads wolves threat, etc. animals, and also businessmen do that as entertainment. It follows from this that work on regulation of number of wild animals is severe need and it has to be planned.

The diagnosis on rabies establish in a complex taking into account the epizootologicalresults and discussion data, clinical signs of manifestation, including supervision for suspicious in a disease of dogs within 10 days, pathoanatomical changes (a trauma of a mucous mouth, a gullet and a stomach, existence of inedible

Table 1. Cases of manifestation of rabies of animals in the countries for 2009-2014.

Countries	2009	2010	2011	2012	2013	2014	for 6 years
Belarus	913	891	992	507	238	0	3541
Bosnia – Herzegovina	25	18	16	6	0	0	65
Bulgaria	58	6	1	0	0	2	67
Croatia	784	652	375	166	37	1	2015
France	14	6	7	9	2	3	41
Georgia	0	0	0	0	115	62	177
Germany	5	6	11	14	10	7	53
Greece	0	0	0	9	29	10	48
Italy	68	209	1	0	0	0	278
Latvia	69	16	1	2	0	0	88
Lithuania	63	33	14	5	1	0	116
Moldova	60	125	62	184	33	0	464
Poland	8	151	160	257	204	105	885
Romania	516	469	342	457	486	142	2412
Russian Federation	2480	2790	1997	1896	2143	581	11887
Serbia	181	104	46	19	5	1	356
Turkey	64	167	300	496	550	367	1944
Ukraine	1281	1863	1430	1995	1518	588	8675
Total	6589	7506	5765	6022	5371	1869	33112

alien subjects in a stomach, scratch and a self-gnawing in places of stings, etc.), the serological methods (the enzyme-*linked immunosorbent assay, ELISA*) , reaction of a diffusion pretsipitation, reaction latex agglutination), existence of specific inclusions –Taurus Babes-Negri's little bodies in dabs or the gistosrezakh of a brain. In tissues of a brain and places of stings of skin the virus of rabies is found reaction by immunofluorescent microscopy (direct and indirect methods). Statement of the diagnosis is accompanied, as a rule, with statement of a biological test on young rabbits, white mice and hamsters at intratserebralny infection, and also modifications with polimerazno-chain reaction[7,9,10].

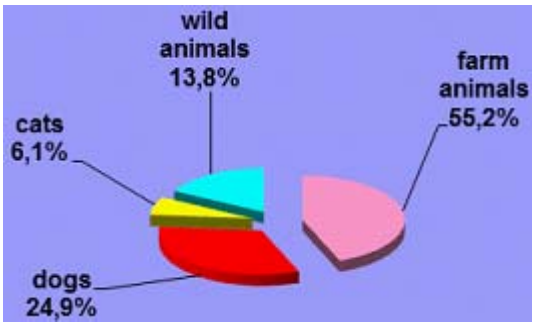

Fig. 1. Percent of the patients with rabies of animals for 2006-2014gg. across the Republic of Kazakhstan

The essence of modern methods of prevention of rabies among farm and domestic animals is reduced to carrying out strictly the account them; to implementation preventive the antirabichesc of inoculations as one of effective remedies of management of infectious process in general on area, and in each city, the settlement and especially in zones of stationary trouble on rabies; to identification and improvement of the unsuccessful natural centers in the territory of area by means of vaccines for oral application; to constant surveillance over places of a congestion wild carnivorous and regulation of their number according to recommendations of MEB I WHO

Table 2. The quantity of the animals which got sick with rabies across the Republic of Kazakhstan for 2006-2014.

Animal species	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total for9 years	On average in a year	%
Farm animals	16	82	45	36	83	151	67	93	100	673	74,77	55,2
Dogs	18	53	37	23	42	36	22	38	34	303	33,66	24,9
Cats	5	10	3	9	7	11	8	10	11	74	8.2	6.1
Wild animals	7	32	12	18	19	18	12	33	18	169	18.77	13.8
In total across RK	46	177	97	86	151	216	109	174	163	1219	135.4	100.0

Table 3. Dynamics of growth of number of people injured by wild animals and animals with clinical symptoms of rabies for 2006-2014 across the Republic of Kazakhstan.

Years	Number of the people who addressed to fracture clinic	Number of the people who had contact with sick animals
2006	46.56	55
2007	53.93	435
2008	55.04	262
2009	58.50	211
2010	60.06	349
2011	67.68	954
2012	77.82	526
2013	77.82	728
2014	61.54	400
On average in a year	61.22	429

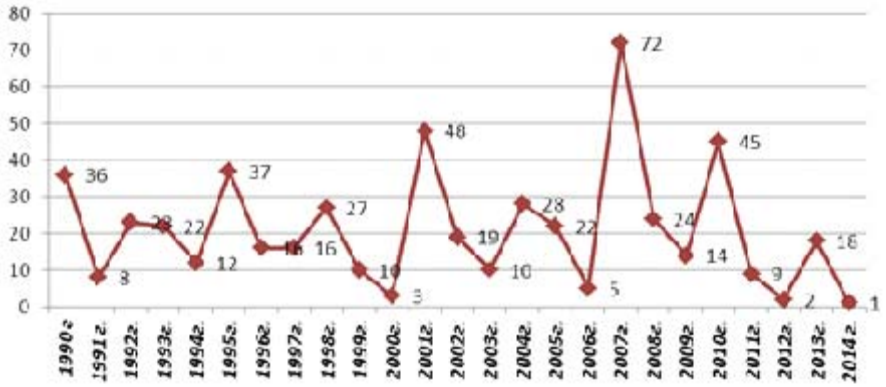

Fig. 2. Registration of Rabies among animals for 1990-2014 across Kostanay region

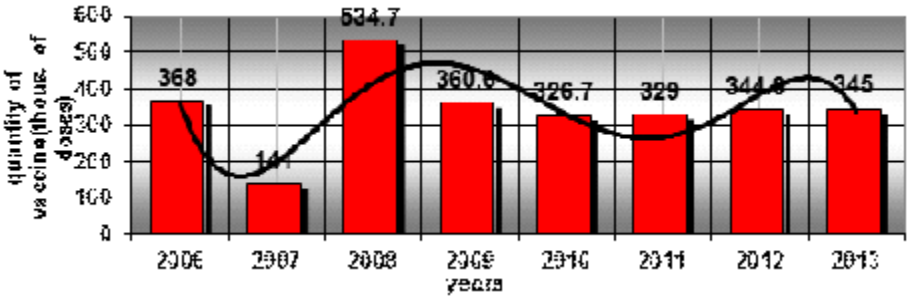

Fig. 3. Quantity of a Vaccine for oral application to wild carnivorous and stray dogs for 2006-2013.

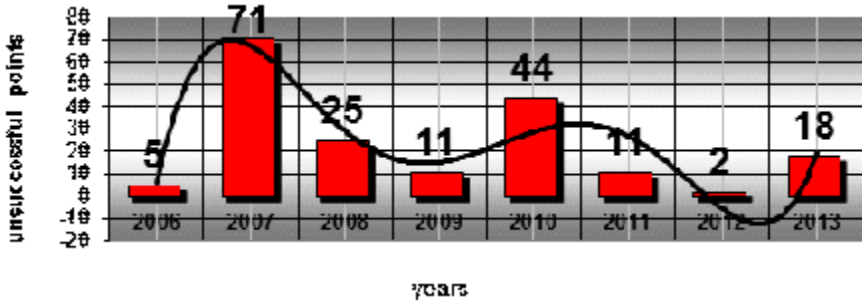

Fig. 4. Unsuccessful points on rabies across Kostanay region for 2006-2013

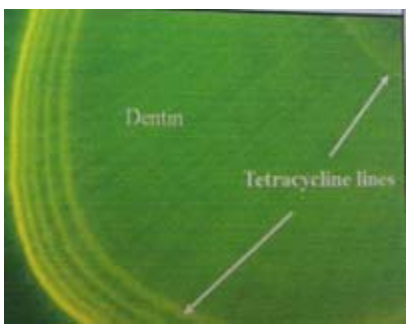

Fig. 5. A fluorescent method of detection of a marker of a vaccine – a tetratsiklin in tissues of teeth of animals for control of eatability of oral antirabichesc vaccines.

(no more than 2 individuals on 10 sq.km), and also stray dogs and cats in the cities and villages; sanitary educational and explanatory work among inhabitants, school students and cattle breeders on rabies problems. On regulation of number of wild carnivorous, stray dogs and cats annually (2010-2013gg.) from the local budget allocate from 10,0 to 25,0 million tenge[7].

Now in the countries of Europe non-drug ways of fight against rabies in wild fauna (shooting, catching, aeration, etc.) are forbidden as they render short-term efficiency in the long term and are inhumane. The most perspective and real in

prevention of rabies is oral immunization. A bright example of regular application of vaccines in prevention and fight against rage is the achieved success of countries of Western Europe, territories of many of them are free from rabies or are successfully controlled[1,11,12,13].

Vaccines for oral application (Sinrab, Rabisin, Oralrabivak, Fuksoral, Lysvulpen, etc.) consist from the blister of the briquettes filled with attraction weight with a specific smell for attraction carnivorous to which in a special ampoule the virus vaccine is added. Briquettes display on suburbs of the cities, settlements, in other places where there is a probability of access of wild carnivorous and stray dogs. In Kostanay region the oral method of immunization of wild carnivorous and stray dogs is applied since 2006. On average for every year from eight last (2006-2013gg.) the area received almost 344,0 thousand doses. The annual requirement of vaccines for single application at the rate of 25 briquettes (doses) on one square kilometer makes 4,9 million doses. The area received the greatest number of doses of a vaccine for oral application in 2008 – 534,75 thousand doses that is 9,2 times less than annual requirement. The annual requirement of a vaccine for oral immunization this year made about 11% (fluctuations on areas from 4 to 35,3%)[14].

The comparative analysis of results of single oral application of a vaccine and emergence of number of unsuccessful points on rabies showed that in this direction there is a certain interrelation (fig. 3, 4).

In 2013 the Committee of veterinary control and supervision of the Ministry of Agriculture of the Republic of Kazakhstan took into account an epizootic situation by rage in the republic in a section of areas on system of geoinformation technologies – (GIS) of the program reconnoitered and determined geographical coordinates of places of a congestion of wild carnivores, including in hard-to-reach and inaccessible spots. Territories of Kostanay, East Kazakhstan, Southern Kazakhstan and Zhambylsk regions are carried to zones of high degree of infection with rage[15]. Across Kostanay region scattering the blister of briquettes about a virus Lysvulpen rabies vaccine in number of 345,0 thousand doses was carried out by means of small aircraft with use of GPS navigation for fixation of places of emission. Seven grounds were created, the areas of the cities, the settlements which are in their territories are excluded from them the sizes of the areas on which wild animals live are determined. The vaccine was displayed through each 250 m at the rate of 25 briquettes (doses) on 1 sq.km with distance between parallel lines of flight of the plane in 250 m[7]. Earlier other researches[16] about use of the GIS base reported.

CONCLUSION

The epizootic and epidemiological situation, despite the held expensive events in the Republic of Kazakhstan and subjects of Kostanay region for rabies, remains very difficult and disturbing. The developed situation doesn't allow making the encouraging forecast without improvement of a complex the antirabichesc actions soon. Rabies is a natural and focal infection and consequently antiepizootic actions have to be directed on carriers of this disease. In the main way of prevention and fight against this artful infection, oral immunization by means of which it is really possible to eradicate a rabies virus from the natural centers of wild animals is. Results eight-year-old (2006-2013) production experiment on application of oral immunization wild and domestic carnivorous and emergence of unsuccessful points on rabies established a certain correlation. At the same time, in the epizootological analysis the antirabichesc actions and system of vaccination is revealed a number of the problems demanding the urgent decision. For objective control of eatability of briquettes the antirabichesc vaccines wild carnivorous, determination of efficiency of oral vaccination it is necessary to introduce everywhere laboratory methods of research (a fluorescent method of detection of a marker of a vaccine – a tetratsiklin who is postponed in teeth of animal (fig. 5), eaten a bait and ELISA for identification of antibodies of a virus of rabies in serums of blood and other liquids of a body wild and house carnivorous)[7,17].

In this direction the system of carrying out vaccination, sampling of material and their regular delivery for laboratory research, control of eatability of vaccines and efficiency of vaccination, unfortunately, aren't the debugged mechanism. The state program on control of rabies, including

efficiency of vaccination, intensity of post vaccine immunity at the vaccinated domestic and wild animals, including at the imported is necessary. All these problem directions have to be provided and be regulated the veterinary legislation which needs to be staticized and harmonized with the international standards. At permission of the specified problems, we will be able, not only to state an illness, and also to estimate efficiency and to struggle with rabies. A main goal of a state program is full eradication of rabies.

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