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NATURAL TULAREMIA FOCI ON THE TERRITORY OF THE UKRAINIAN SSR

[Following is the translation of an article by V. M. Stupnitskaya, M. P. Marinov, Ye. F. Litvinenko, V. V. Slesarenko, A. S. Slesarenko, O. P. Khizhinskaya, I. A. Stepanova and S. G. Buyalo, Basseynovaya Medico-Epidemiological Station, Ministry of Public Health, Ukrainian SSR (Kiev), published in the Russian-language periodical Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Journal of Microbiology, Epidemiology and Immunobiology), #10, 1964, pages 94-98. The article was submitted on 4 Dec 1962. Translation performed by Sp/4 Richard M. Koplen]

Tularemia foci exist in separate territories of the Ukrainian Republic. Tularemia morbidity among humans was diagnosed for the first time nearly 30 years ago (Ruchkovskiy et al., 1935; Shmuter, 1947).

In separate years human morbidity with tularemia took on wide dimensions. Thus, in 1948-1949 against a background of a diffuse epizootic among mouse-like rodents, mass human morbidity with tularemia emerged, which appeared in almost all the oblasts of the republic.

Then tularemia morbidity dropped sharply and, for an example, in 1960 on the territory of the UkSSR no cases of tularemia were recorded. The stated success was the result of extensive and meticulous work by Public Health agencies and, in particular, the departments for especially dangerous infections. With the organization of these institutions in the republic, the systematic work began on exposing the natural foci of tularemia by all existing methods, mainly by the method of the mass examination of pasture ticks.

Beginning the work, we turned our attention to the quite intolerable situation that tularemia foci were exposed mainly on the basis of morbidity among people. Therefore the main aim of our work was the timely exposure of tularemia foci in nature and the introduction in them of a complex of antitularemia measures to avert possible morbidity among humans.

In the process of carrying out the work we established, for the first time, natural foci of tularemia in 25 rayons of 9 oblasts (Rovenskaya, Zhitomirskaya, Volynskaya, Kievskaya, Sumskaya, Chernigovskaya, Ternopolskaya, Chernovitskaya and Stanislavskaya) of the UkSSR. In 20 rayons of 6 oblasts (Vclinskaya, Rovenskaya, Khmel'nitskaya, Kievskaya, Sumskaya and Kharkovskaya), where human morbidity with tularemia was registered earlier, the existence of natural foci of tularemia was confirmed by the isolation of the specific causative agent

from ticks.

From 1956 through 1962 inclusively, the republic department of especially dangerous infections investigated more than 325,000 ticks and out of these isolated 265 cultures of the tularemia causative agent. In one of the forest area rayons (Kostopolskiy), observations have been conducted since 1956 on the duration of existence of a natural focus of tularemia.

Cultures of the tularemia causative agent were isolated from ticks with the help of biological probes. Based on morphological, cultural and virulent properties, all the isolated cultures were typical cultures of the tularemia causative agent.

The isolation of cultures of the tularemia microbe from ticks testified to the presence of a natural focus of this infection and gave rise to the introduction of a complex of antitularemia measures among the population in the given territory. We reported the exposure of the tularemia causative agent in nature to the oblast and at the same time the rayon public health workers, who upon receiving the report organized the inoculation of the population and other antitularemia measures. The republic department checked the carrying out of antitularemia measures and in case of necessity rendered assistance in carrying out these measures.

Thus, we did not wait for the appearance of the disease among humans, but carried preventive measures against the emergence of the disease.

Oblasts in which the natural foci of tularemia were situated were located in the forest area and forest steppe zones and also in the vicinity of the Carpathian Mountains. In the forest area zones the natural foci of tularemia exposed were foci of the river terrace-lake-swamp type in which the infection was supported primarily by the water rat. Also settled in this same zone are common and chestnut voles, hares and other species of rodents (multiple host foci). The Ixodes ticks Dermacentor pictus and Ixodes ricinus were the carriers and prolonged preservers of the infection. In the summer time in this zone there were many mosquitoes, horseflies and other blood-sucking arthropods (multiple vector foci) which spread the infection among rodents and infected people. Tularemia morbidity in the forest area zone emerged most frequently in the summer-autumn period and had a transmissive nature. Individual cases of a professional origin and cases connected with the water factor were observed.

In the forest steppe zone the natural foci of tularemia exposed were related to the meadow-field type; here the infection was supported mainly by the population of common voles, then water rats, shrews, hares, etc. The Ixodes ticks Ixodes ricinus and Dermacentor pictus were the carriers and prolonged preservers of the infection. Autumn

and winter outbreaks were characteristic for this zone; these were connected with the late threshing of grain, harvesting of corn, etc. Also individual cases of tularemia of a professional origin were observed.

In the western Ukraine, both in the forest-steppe part of it (Ternopolskaya, Stanislavskaya and Chernovitskaya Oblasts) and in the mountains (Stanislavskaya and Chernovitskaya Oblasts), forest species of mouse-like rodents and the Ixodes tick Ixodes ricinus were predominant in the natural foci of tularemia exposed. In the steppe zone the departments of especially dangerous infections, in carrying out the huge work in the struggle with the zoonotic diseases disposed on their territory, did not divert sufficient attention to the exposing of natural foci of tularemia. This, to a known degree, furthered the opinion that in the steppe zone of the Ukraine there supposedly were no conditions for natural foci of tularemia to take root. As a result, on Biryuchiy Island in Khersonskaya Oblast, a natural focus of tularemia in a hunting preserve was not exposed in time. This was the reason for cases of tularemia in humans in December 1961. The mass multiplication of gray voles and house mice on the island created conditions for the emergence of an intensive epizootic among them which led to almost their complete dying off. Implicated in the epizootic were hares which propagated on the game reserve in large quantities. The main carriers and preservers of the infection in nature were the ticks Hyalomma plumbeum, Rhipicephalus rossicus, Dermacentor marginatus, and Haemaphysalis punctata, which lived on the island in huge quantities and in a large percentage were infected with the tularemia causative agent (table 2).

Tularemia took root on the island and formed a natural focus, which based on the time of exposure (1961) was fresh, but based on the time of formation apparently had considerable age. This is testified to by the exceptionally high infection ability of the focus (the causative agent of tularemia was isolated from Ixodes ticks out of every second bioprobe) and the repeated sharp lowering of the number of rodents during the last ten years. Finally, during the tularemia inoculations which were conducted on the people of the island, in two of the persons inoculated the reaction proceeded in an allergic manner. Since both these persons were permanent residents of the island, but had not been inoculated against tularemia earlier, it can be supposed that they had had tularemia. Unfortunately, in the inoculation log book which is kept at the island's medical station, the results of the inoculations are routinely recorded after two weeks and there are no remarks about checking the results after 5--7 days. This prevented us from exposing other personnel who had had tularemia in the past.

The natural focus of tularemia on Biryuchiy Island in the steppe zone is not unique. In 1962 the Zaporozhskiy Department of Particularly Dangerous Infections exposed a focus of tularemia in the Akimovskiy Rayon of Zaporozhskaya Oblast. Akimovskiy Rayon is connected directly with Biryuchiy Island by Fedotova sand bar.

The presence of foci of tularemia on Biryuchiy Island and in Akimovskiy Rayon of Zaporozhskaya Oblast testifies that in the steppe zone there are conditions for the formation and existence of natural foci of tularemia.

The exposure of natural foci of tularemia by the method of mass investigation of Ixodes ticks makes it possible to timely organize and carry out the complex of prophylactic measures.

The Public Health Agencies of the Ukraine are giving much attention to the problem of vaccine prophylaxis of the population of unsafe territories, and also the vaccination of individual groups of safe territories who by the nature of their activity are subjected to the possibility of infection with tularemia. On the basis of data of the epizootic and epidemic situation, lists are compiled of the rayons for all the oblasts where there is the necessity for carrying out general vaccination starting at 7 years of age. With the aim of a precise calculation the registration was introduced of those who had been inoculated only according to family lists. This makes it possible to fully consider all those who had been inoculated, to control the inoculation of vaccine, to revaccinate personnel who had a negative result following the first inoculation, and to conduct the revaccination of the population in the established periods.

Along with the building up of immunity in the population of unsafe territories, the struggle with tularemia in the republic is carried out by means of destroying rodents and Ixodes ticks and by strengthening agrotechnical measures.

As a result of carrying out the stated antitularemia measures in the republic, significant successes have been achieved in the struggle with tularemia. In spite of the presence of vast natural foci, cases of tularemia in the republic have been reduced to a minimum.

However, for the solution of the problem, set up by the party and the government-- the liquidation of tularemia morbidity, it is necessary to develop methods for improving the sanitary conditions of natural foci. With the methods which are known up to now we are in a position to influence the lowering of the infecting ability of a focus, but we are not disposed with the experience for the sanitary improvement of a natural focus.

In connection with this, it is necessary to gain experience in improving the sanitary conditions of a natural focus of tularemia in a limited territory, so that on the basis of this experience it is possible to develop the methods for improving the sanitary conditions of vast territories. This will open wide perspectives for really creative scientific-practical work by the departments for especially dangerous infections.

Conclusions

1. The mass bacteriological investigation of Ixodes ticks has great importance, since it makes it possible to expose foci of tularemia on the territory being investigated.
2. The exposure of natural foci and the detailed study of them make it possible to correctly and timely plan the carrying out of the complex of antitularemia measures, and also to exert an influence on the foci with the aim of reducing their infecting ability.
3. The necessity for developing methods for improving the sanitary conditions of natural foci of tularemia has become ripe.

Literature

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Table 1

Oblasts and rayons of the UkSSR, on the territory of which natural foci of tularemia have been established by means of investigating Ixodes ticks.

Year of investigation	Oblast	Rayon	Results of investigating the various species of ticks							
			D. pictus		I. ricinus		Other species		All told	
			Number of ticks	Cultures isolated	Number of ticks	Cultures isolated	Number of ticks	Cultures isolated	Number of ticks	Cultures isolated
1956	Rovenskaya	Kostopolskiy	7 433	7	751	1			8 184	8
		Dubrovitskiy	925	1	640	--			1 565	1
	Zhitomirskaya	Korostenskiy	406	1	123	--	--	--	529	1
		Olevskiy	2 036	1	1 313	2	--	--	3 349	3
	Rovenskaya	Vladimiretskiy	2 407	1	17	--	--	--	2 424	1
1957	Zhitomirskaya	Slovehanskiy	183	--	1 594	1	--	--	1 777	1
	Zhitomirskaya	Olevskiy	642	--	1 824	1	--	--	2 466	1
	Rovenskaya	Vladimiretskiy	1 240	5	65	--	--	--	1 305	5
		Kostopolskiy	13 491	12	1 448	--	--	--	14 939	12
		Zarechnyanskiy	594	--	315	1	--	--	909	1
1958	Rovenskaya	Dubrovitskiy	4	--	3 850	1	--	--	3 854	1
		Kostopolskiy	3 920	12	533	2	--	--	4 453	14
	Chernigovskaya	Lyubechskiy	1 693	2	--	--	--	1 693	2	
	Sumskaya	Krolevetskiy	365	1	9	--	--	374	1	
	Zhitomirskaya	Yemelchanskiy	6 523	5	3 657	2	--	--	10 180	7
Olevskiy		670	--	1 275	1	--	--	1 945	1	
Volynskaya		Manevichskiy	226	1	--	--	--	226	1	
1959	Kievskaya	Kolkovskiy	628	3	--	--	--	628	3	
		Chernobilskiy	1 231	4	966	3	--	--	2 197	7
		Borodnyanskiy	69	1	327	--	--	--	396	1
	Zhitomirskaya	Rozvazhevskiy	515	--	30	1	--	--	545	1
		N-Volynskiy	1 305	2	2 510	1	--	--	3 815	3
		Olevskiy	72	--	648	13	--	--	720	13
		Chernyakhovskiy	664	1	10	--	--	--	674	1
Sumskaya	Putivlskiy	187	--	1 766	1	--	--	1 953	1	
Rovenskaya	Kostopolskiy	3 609	6	265	--	--	--	3 874	6	
	Zarechnyanskiy	418	--	1 060	2	--	--	1 478	2	

(Continued on next page)

Table 1 (continued)

Year of investigation *	Oblast	Rayon	Results of investigating the various species of ticks							
			D. pictus		I. ricinus		Other species		All told	
			Number of ticks	Cultures isolated	Number of ticks	Cultures isolated	Number of ticks	Cultures isolated	Number of ticks	Cultures isolated
1960	Stanislavskaya	Zhabyevskiy	--	--	65	1	--	--	65	1
		Tlumachskiy	--	--	50	1	--	--	50	1
		Lanchinskiy	--	--	25	1	--	--	25	1
		Tismenetskiy	--	--	335	1	--	--	335	1
	Ternopolskaya	Tovstenskiy	--	--	354	2	--	--	354	2
		Rovenskaya	6 665	11	247	--	--	--	6 912	11
		Kievskaya	216	--	372	1	--	--	588	1
		Sumskaya	21	--	100	1	--	--	121	1
1961	Rovenskaya	Kostopolskiy	8 045	3	599	2	--	--	8 644	5
		Volynskaya	949	1	--	--	--	--	949	1
		Kolkovskiy	340	1	1 561	3	--	--	1 901	4
1962	Khersonskaya	Vyzhevskiy	400	1	145	--	--	--	545	1
		Rovenskaya	--	--	--	--	5 279 ²	9	5 279	90
	Rovenskaya	Kostopolskiy	5 700	6	245	3	--	--	5 945	9
		Rokitnyanskiy	847	6	35	2	--	--	882	8
	Chernigovskaya	Osterskiy	2 653	2	91	--	1 513	--	4 257	2
		Kievskaya	221	1	503	8	--	--	726	9
	Chernovitskaya	Vyzhnitskiy	350	--	3 858	2	--	--	4 213	2
		Putivl'skiy	--	--	85	2	--	--	85	2
	Sumskaya	Alkhtyrskiy	--	--	201	2	--	--	201	2
		Glukhovskiy	7	1	83	2	--	--	90	3
Romenskiy		440	3	--	--	--	--	440	3	
Putivl'skiy		46	2	--	--	--	--	46	2	
Sr. Budskiy		238	4	--	--	--	--	238	4	
		Total.....	78 594	108	33 950	67	6 799	90	119 343	265

* Only those years are included during which cultures of the tularemia causative agent were isolated.

2 For the species, see table 2.

Table 2

Species composition and results of investigating Ixodes ticks, collected on Biryuchiy Island during April -- July 1962.

Species	Number of		
	ticks in- vestigated	biotests conducted	cultures isolated
<i>Hyalomma plumbeum</i>	2 973	82	37
<i>Rhipicephalus rossicus</i>	1 271	52	23
<i>Dermacentor marginatus</i>	1 020	42	25
<i>Haemaphysalis punctata</i>	5	1	1
<i>Ixodes laguri</i>	10	2	1
Total	5 279	179	90