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Animal rabies and post-exposure rabies treatment of humans in Slovenia

Mirjana Stantić-Pavlinić[1]*, and Peter Hostnik[2]

[1] *Institute of Public Health of Ljubljana, Slovenia*

[2] *Institute for Microbiology, Veterinary Faculty, University of Ljubljana, Ljubljana, Slovenia*

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ABSTRACT

Over the last decade cases of rabies in animals in Central Europe have decreased. The objective of this study was to analyse the influence of the changing number of laboratory confirmed rabies in animals on post-exposure rabies treatment (PET) of humans in the Republic of Slovenia. This article presents data on the number of PET patients during the period 1992-2001. In the first five years of observation, the ratio between treated patients and laboratory confirmed rabid animals was 1.0 to 3.6 respectively. Over subsequent years this ratio gradually changed to 116.2, falling to 6.3 in 2001. The main carrier of rabies in Slovenia was the red fox, but people were treated for rabies mostly because of being bitten by a dog whose owner was unknown. There was an association between PET patients and animal rabies (correlation coefficient $r = 0.77$; r^2 0.59; 95% confidence limits $-0.07 < r^2 < 0.89$). The average number of PET patients was 40.2 per 100,000 inhabitants/year (minimum 30.3, maximum 52.0, sd 6.3) and did not change as significantly as did the number of rabid animals in the same time period. Because of existence of a huge reservoir of rabies virus in animals almost all over the world, local focuses, migration of animals and travellers, bites from animals with unknown owners, and some possibility of importing rabies by pets and other animals, it is difficult to satisfy the need for post-exposure rabies treatment of humans in those regions where rabies in animals are in decline.

Key words: rabies, post-exposure treatment, oral vaccination

* Contact address:
Prim. mag. sc. Mirjana Stantić-Pavlinić dr. med. specialist in infectious diseases and epidemiology, Institute of Public Health of Ljubljana, Zaloška 29, 1000 Ljubljana, Slovenia, Phone: +386 1 5863 900; Fax: +386 1 5403 190; E-mail: mirjana.stantic@zzv-lj.si

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Introduction

Some infectious diseases occur very frequently in Europe (STRLE and STANTIC, 1996) whereas others are decreasing significantly. The question of when to stop PET of patients in some regions, after they have been declared rabies free has been the focus of recent discussions in Europe (STANTIĆ-PAVLINIĆ, 1999).

Since the beginning of oral vaccination of wild animals in the last 20 years in a large part of Europe we have observed decreasing numbers of rabies in animals (HOSTNIK et al., 1998; FRANKE, 1996; ANONYMOUS, 1995; ANONYMOUS, 1997; ANONYMOUS, 1998). This vaccination was initially administered manually. Success was achieved on a greater scale when we began dropping bait from light aircraft or helicopters. In Slovenia we began dropping such bait from aircraft in 1995.

As a result of joint action by many countries in Central Europe over the last few years, the regional survey on rabies is becoming more complete. Information available over the Internet has also contributed to more accurate and speedier exchange of information.

In a time of changing epidemiological features of rabies in Europe as a result of joint actions against rabies, we are attempting to achieve a reduction in PET of people through an evaluation of each individual case in order to determine the necessity of vaccination (KRAIGHER et al., 2001). We anticipate that vaccination of wild animals would generally reduce the number of PETs of humans.

Materials and methods

The study was carried out in the Republic of Slovenia, a country with a population of 2 million. The data on laboratory confirmed cases of rabies in animals were diagnosed in the Veterinary Faculty of Ljubljana by the direct immunofluorescence method (IF conjugate antinucleocapside, Bio-Rad, France) and/or by isolation of virus on culture of neuroblastoma cells lines where the result of IF was doubtful.

The data of the number of patients treated against rabies were collated at the Institute of Public Health of Slovenia from nine regional Institutes which had performed PET of patients. Patients who had been in contact

with rabid animals, or had been bitten by one suspected of having rabies, were interviewed using a standard questionnaire. We used the human diploid cell vaccine (Rabivac, Chiron-Behring, Marburg, Germany). If rabies in animals was confirmed, specific human rabies immunoglobulins were added.

Processing of statistical data was carried out using medical software applications of the World Health Organisation (Geneva, Switzerland) and Centers for Disease Control & Prevention (CDC, U.S.A.) Epi Info 6.

Results

Data on PET of patients, and the number of laboratory confirmed cases of rabies in animals during the years 1992 to 2001, are presented in Tables 1 and 2. The number of laboratory confirmed cases of rabies decreased rapidly following the introduction of vaccination of wildlife using aircraft in 1995. However, the number of persons who received post-exposure prophylactic treatment did not change so dramatically.

We have found an association between PET and animal rabies. Correlation coefficient between two data sets was $r = 0.77$; r^2 0.59; 95% confidence limits $-0.07 < r^2 < 0.89$. The data are presented in Graph 1. The

Table 1. Ratio between number of treated patients and number of laboratory confirmed rabies in animals, Slovenia 1992 - 2001

Years	Laboratory confirmed rabies in animals	Treated patients	Treated patients /Rabid animals	PET rate per 100.000 of inhabitants
1992	238	733	3,1	36,7
1993	531	813	1,5	40,7
1994	842	863	1,0	43,2
1995	1089	1039	1,0	52,0
1996	247	901	3,6	45,1
1997	29	684	23,6	34,2
1998	14	642	43,3	30,3
1999	6	697	116,2	34,9
2000	115	841	7,3	42,1
2001	135	849	6,3	42,5

annual number of PETs paralleled the annual number of animal cases, except in 1995 when in Slovenia the epizootic situation of rabies was extremely problematic.

In the observed period the average number of PET patients per 100,000 inhabitants per year was 40.2 (minimum 30.3, maximum 52.0, st. dev. 6.3, median 41.4).

Table 2. Number of tested and rabies-positive animals, Slovenia 1992-2001

Years	Total		Foxes		Dogs		Cats		Other	
	Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive
1992	1365	238	842	208	136	6	140	4	247	20
1993	2019	531	1285	476	148	8	230	13	356	34
1994	2632	842	1695	753	172	12	310	11	455	66
1995	3787	1089	2729	996	195	12	328	24	535	57
1996	2285	247	1530	208	174	11	200	17	381	11
1997	1267	29	781	18	109	1	131	6	246	4
1998	1382	14	1028	14	78	0	120	0	156	0
1999	1195	6	874	5	73	0	100	1	148	0
2000	1509	115	1148	104	87	2	100	2	174	7
2001	2153	135	1670	117	80	7	151	3	252	8
Average	1959.4	324.6	1358.2	289.9	125.2	5.9	181.0	8.1	295.0	20.7
St. dev.	809.2	376.1	588.0	342.7	45.7	4.9	83.6	7.9	131.8	23.9

The majority of treated people had been bitten by dog or cat whose owner was unknown (c. 70% and 15% respectively). PET was initiated after fox bites or after contact with open vaccine prepared for animals.

During the last few decades not one case of human rabies was registered in Slovenia. The main carrier of the disease was the red fox.

Table 1. Specification of myomorphus mammals examined by renoculture and microscopic agglutination acording to the trapping area with corresponding results

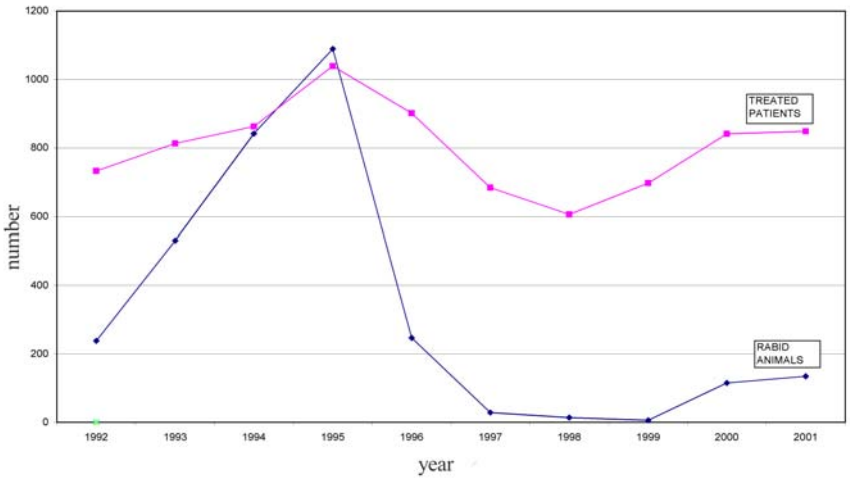

Fig. 1. Number of postexposure treated patients and rabid animals

Discussion

The number of laboratory-confirmed cases of rabies in animals in Slovenia and the wider Europe is on the decrease (LONTAI, 1997; ANONYMOUS, 1998). This fact has been presented in our study also. However, the possibility of the re-emergence of rabies is still possible because:

Rabies has not been eradicated in most Central European countries,

Traveller rabies is becoming increasingly common (ROTIVEL et al., 1997),

Possibilities of rabid animals moving across borders of neighbouring countries, which eventually worsens the epizootic situation vis-à-vis rabies,

Some possibilities of importing rabies with pets or other animals (BRUYERE-MASSON et al., 2001),

Existence of local focuses in those countries where rabies has been almost eradicated.

In these times of the changing epidemiological feature of rabies in Europe as whole, cases of laboratory-confirmed rabies in animals in our country still occur, but are decreasing. The risk of people contracting indigenous rabies is also decreasing.

The relationship between animal rabies and PET has also been investigated by a number of Canadian researchers (NUNAN et al., 2002). The results of that, and our, study indicate that the carefully applied oral vaccination programme for wildlife was useful. Both animal rabies and human PETs in the research of NUNAN et al. (2002) declined after the vaccination program was introduced. We need to continue our surveillance in this field. At this moment, the huge number of bites from dogs with unknown owners is the reason for the relatively high PET rate in Slovenia.

The existence of a huge reservoir of rabies in domestic and wild animals in certain European countries, and almost all around the world, (NOAH et al., 1998; STANTIC-PAVLINIC, 2002) is the main reason for the need to continue surveillance of the disease, and for health education.

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References

ANONYMOUS (1995): Oral immunisation of foxes in Europe in 1994. World Health Organisation. W. E. R. 70, 89-91.

ANONYMOUS (1997): Rabies Case dates Europe. Rabies Bulletin Europe. Rabies Surveillance Report 1, WHO Collaborating Centre for Rabies Surveillance and Research, 15-27.

ANONYMOUS (1998): World Survey of Rabies No. 33 for the year 1997. World Health Organisation. Geneva.

BRYERE-MASSON, V., J. BARRAT, F. CLIQUET, Y. ROTIVEL, P. H. BRIE, N. MELIK, C. GIBON, B. ALDO-BRETTE (2001): A puppy illegally imported from Marocco brings rabies to france. Rabies Bulletin Europe 25, 12-13.

FRANKE, V. (1996): Veterinary aspects of rabies prevention and transmission of disease. In: Current Situation of Rabies Prevention in Southeast and Central Europe. Proceedings of a symposium, Bad Waltersdorf, Austria, 13-19.

HOSTNIK, P., J. GROM, D. BARLIČ MAGANJA (1998): Immmunoprophylaxis of rabies in foxes in Slovenia. 2nd Congress of Slovenian Microbiologists with International Participation. Microbiological Society of Slovenia, pp. 176-180.

KRAIGHER, A., L. ŠMON, D. ARHAR, I. IMENŠEK, A. VRBANC, B. PLEVELJ (2001): Analysis of performing Programme of Immunisation in Republic of Slovenia for the year 2000. Zdrav. Var. Suppl. 6., 12-17.

LONTAI, I. (1997): The current state of rabies prevention in Europe. Vaccine Suppl. 15, S16-S19.

NOAH, D. L., L. D. DRENZEK, J. S. SMITH, J. W. KREBS, L. ORCIARI, J. SHADDOCK, D. SANDERLIN, S. WHITFIELD, M. FEKADU, J. G. OLSON, C. E. RUPRECHT, J. E. CHILDS (1998). Epidemiology of human rabies in the United States 1980 to 1996. Ann. Intern. Med. 128, 922-930.

NUNAN, C. P., R. R. TINLINE, J. M. HONIG, D. G. A. BALL, P. HAUSCHILDT, C. A. LA BER (2002): Postexposure treatment and animal rabies, Ontario 1958-2000. Emerg. Infect. Dis. 2, 214-217.

ROTIVEL, Y., H. BOURHY, S. WIRTH, M. GOUNDAL, H. TSIANG (1997): Imported human rabies cases in France. Rabies bulletin Europe. Information Surveillance Report, WHO Collaborating Centre for Rabies Surveillance and Research 4, 14.

STANTIĆ-PAVLINIĆ, M. (1999): Rabies in Central Europe – recent experiences. In: The 10th international rabies in the Americas meeting; 1999 Nov 14-19; San Diego. S. n., 1999, 33.

STANTIĆ-PAVLINIĆ, M. (2002): Rabies treatment of health care staff. Swiss Med Wkly 132, 129-131.

STRLE, F., M. STANTIĆ-PAVLINIĆ (1996): Lyme disease in Europe [letter, comment]. N. Engl. J. Med. 334, 803.

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SAŽETAK

U posljednjih 10 godina u Središnjoj Europi smanjuje se broj životinja oboljelih od bjesnoće. Istražen je utjecaj smanjenja broja bjesnoće u životinja na opseg postekspozicijske zaštite (PEZ) ljudi u Republici Sloveniji. Istraživanje je obavljeno za razdoblje od 1992. do 2001. godine. U prvoj polovici praćenog razdoblja omjer između vakciniranih osoba i laboratorijski potvrđene bjesnoće iznosio je 1,0 do 3,6. U narednim godinama taj se omjer postupno povećao na 116,2, a do 2001 godine se ponovno smanjio na 6,3. Utvrđena je povezanost izmedju PEZ ljudi i pojave bjesnoće u životinja ($r = 0,77$; r^2 0,59; 95% CI $-0,07 < r^2 < 0,89$). Prosječan broj PEZ na godinu bio je 40,2 na 100.000 stanovnika (najmanji 30,3 najveći 52,0) i nije se tako dinamično mijenjao kao broj oboljelih životinja od bjesnoće. Potreban je daljnji nadzor bjesnoće u životinja te PEZ, budući da je rezervoar virusa bjesnoće diljem svijeta izrazito velik, te da postoje lokalna žarišta bjesnoće i u državama koje su bjesnoću gotovo u cijelosti iskorjenile, a i zbog međunarodnog prometa putnika i životinja.

Ključne riječi: bjesnoća, postekspozicijska zaštita, oralno cijepljenje