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RABIES IN THE STATE OF SÃO PAULO: THE RODENTS QUESTION

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SUMMARY

The authors looked over the epidemiological data on the aggression by rodents in the period 1976-1985 in the records of the Instituto Pasteur in the State of São Paulo (Brazil). They observed that out of 367 379 people attacked, 22 250 were victims of rodents. Mainly responsible for these accidents were urban rodents, whose capture, however, was a limiting factor for the sending of samples to the laboratory. Laboratory diagnosis carried out in 1 083 samples of rodents did not show any positive case in the period, in spite of the presence of rabies in other animals species. It is conclude that, as rabies is rare among rodents, tests are necessary for the identification of the virus whenever suspicion of a positive case occurs; in addition, in the absence of reported cases of human death caused by rabies related to rodents, possibility exists for a reduction of antirabies treatments following exposure to these animals.

KEY WORDS: Rabies, prevention and control — Rabies rodents

INTRODUCTION

Rabies is a zoonosis transmitted mainly by the bite of infected animals. Actually, all warm-blooded animals are potential transmitters; domestic animals, due to their closer contact with humans, are found to be the major source of infection.

In urban areas, dogs and cats are by far the principal vector animals in transmission to man. Different species of rodents, which are responsible for a part of bite accidents, have been object of controversial discussions as to their possible role in this context. Although some cases have been reported, rodents, in the vast majority of the studies, have not confirmed their condition as possible source of infection for man.

Positive rodents have been reported by several researchers [3,7,8,10,14,17,18,21,22]. In the United States, where about 25% of laboratory diagnosed animals are rodents, rabies incidence in these species is extremelly low. Out of 25 000 rodents examined annually, the rabies virus was isolated in only 4 or 5 animals, leading to the conclusion that rodents in that country are not important in the transmision of the disease [15,19,25,26]. Among these rare diagnosed cases is that of a domestic rabbit which showed clinical symptoms of rabies (later confirmed in laboratory tests) 30 days following a figth with a wildlife animal [22].

Due to the low rabies incidence among the various species of rodents, some authors recommend a reduction in the amount of post-exposure prophylaxis, pointing to the necessity of observing local transmitters [2,5,11,16].

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In Europe, the most interesting reports found in the literature are those by REMLINGER in 1952, who questions the rat infection, assuming that it might even derive from domestic animals such as dogs and cats [18]. In Spain, during an epizootic outbreak in Malaga, 107 positive cases in domestic animals were found, including 3 hamsters which belonged to the same owner [3].

The only reference to a possible rodent rabies transmission to humans is given by JONNESCO in 1945, in Bucarest, in which a patient showed characteristic symptoms of the disease 30 days after being attacked by a rat which, however, was not captured [8].

In Latin American countries, occurrence of rabies in rodents is reported annually, especially in Mexico, Colombia and Guatemala. Neverthless, data contained in the epidemiological surveillance reports do not allow identification as to whether the animals are urban or wild [13,27,28,29].

The national literature does not confirm cases of rabies in rodents or human rabies associated with these species.

However, as rodents are highly susceptible to this infection, they are usually chosen for the diagnosis of rabies, and routinely used as test animals in the laboratory in experimental studies with the rabies virus.

The purpose of the present study was to investigate the transmission of rabies to man when attacked by rodents. Epidemiological data from the Instituto Pasteur were used as well as clinical and laboratory studies, carried out in the period 1976-1985.

For classification purposes, the rodents were grouped into three categories: urban rodents (rat and mouse); pet rodents (hamster, rabbit * and guinea-pig); and wild rodents (capivara and caxinguelê — Braz. rodent of the squirrel family).

Live animals were observed for 10 days and considered clinically healthy when no neurological symptoms could be detected. Ill or dead animals were sent to the laboratory for rabies virus identification through the Sellers's rapid staining, fluorescent antibody and mouse inoculation techniques [23,4,9]. The research was conducted in fragments of the central nervous system and of the salivary glands.

The data regarding aggression caused by rodents were taken from medical records of the Instituto Pasteur in the studied period.

SOCIAL AND EPIDEMIOLOGICAL ASPECTS

Due to a reduction in housing physical space caused by the increase of population in urban areas, rodents such as hamsters, rabbits and guinea-pigs, traditionally used as test animals, have acquired the status of pet animals.

Therefore, a great number of people attacked by these rodents does not need antirabies treatment, since the animals are domestic, what permits easy observation; and the attack occurs mainly when the animal is cornered. In these cases only the other prophylactic procedures should be followed [20]. Although they are susceptible to the rabies virus, their importance in the transmission of rabies is remote.

Rodents which might be considered as a possible source of infection are the urban rodents, such as rats and mice. In the State of São Paulo (Brazil), out of a total of 367 379 people attacked who seeked antirabies treatment, 22 250 were victims of rodents, 12 042 of which were urban rodents (Tables I and II).

TABLE I

Number of people attacked by animal species in the period 1976 — 1985. Instituto Pasteur — S.P.

Year	Dog	Cat	Rodents	Other	Total
1976	23 324	2 447	1 571	2 102	29 444
1977	24 798	2 966	1 458	2 430	31 652
1978	24 694	3 489	2 054	2 889	33 126
1979	28 125	3 578	1 879	2 993	36 575
1980	28 690	3 341	1 940	3 702	37 673
1981	34 414	4 176	2 090	3 701	44 381
1982	33 341	5 014	2 265	4 340	44 960
1983	27 836	4 275	2 947	4 895	39 953
1984	26 324	3 913	3 033	4 627	37 897
1985	20 675	3 217	3 013	4 813	31 717
Total	272 221	36 416	22 250	36 492	367 379

Very little is known about rabies epidemiology under natural conditions in such species.

* lagomorph

TABLE II

People attacked by rodents in the period 1976 — 1985. Instituto Pasteur — S.P.

Year	Urban *	PET **	Wild ***	Total
1976	1 449	120	2	1 571
1977	1 342	111	5	1 458
1978	1 939	102	13	2 054
1979	1 826	51	2	1 879
1980	1 879	52	9	1 940
1981	2 003	82	5	2 090
1982	2 149	114	2	2 265
1983	2 810	131	6	2 947
1984	2 853	167	13	3 033
1985	2 792	220	1	3 013
Total	21 042	1 150	58	22 250

* Rat and mouse
** Hamster, rabbit and guinea-pig
*** Capivara and caxinguelê

It is believed that, similarly to what is observed under experimental conditions, urban rodents when contamined and infected would keep themselves confined to their dens, not attacking others of the same species. Albino mice, following intracerebral inoculation with street virus, stop eating, try to hide in a corner of their cages, undergo a paralysis period and finally die, rarely attacking other mice in the same cage. This occurs both with weanling mice and 2 to 3-day-old suckling ones which, once inoculated, remain close to their healthy mother.

Still on a hypothetical basis, another limiting factor to the presence of rabid urban rodents would be their own survival when attacked by infected carnivores.

Healthy animals, however, are known to look for food and this is when urban rodents leave their hiding places; if taken by surprise and threatened by man they are sure to attack. It is also known that ill rats are promptly eliminated from the community by healthy ones.

Anyway, under natural conditions, rodents rabies epidemiology needs to be better studied. Rodents are found practically in any place where food is available for their survival, but their contact with man is closer where low socio-economical conditions prevent the observation of the minimum principles of hygiene. Therefore, they play an important role in the transmission of diseases such as salmonellosis, leptospirosis and rat bite fever [30]. In the United States, for example, it is estimated that about 6 000 people annually suffer from diseases caused by rat bites; rabies, however, is not included among them [1].

In the period studied, no case of human rabies diagnosed by the Instituto Pasteur could be attributed to rodents. It is true that any urban rat or mouse bite, when the capure for furher exam does not occur, always leads to antirabies treatment; but, it is worth noting that many times people do not seek prophylactic services. In a study carried out in New York City, for example, where the Health Department has an excelent system of data collecting, 10 out of 100 000 people p.a. were found to be victims of urban rodents. However, these are reported cases and it is estimated that they represent only one third of the total cases, since victims of minor bites seldom seek health services [1].

On the other hand, in a study conducted at Hospital Emílio Ribas, in the city of São Paulo, on zoonosis transmitted by rodents, two neuro-paralitic accidents were reported due to postexposure antirabies treatment following rat bites [24].

In fact, the importance of rodents in the rabies complex seems to be less associated with the effective risk of infection than to factors deriving from measures used to eliminate it, such as people's anxiety in face of an unpleasant and possibly unnecessary treatment [6].

LABORATORIAL ASPECTS

In the case of rodents, the clinical diagnosis of rabies is not enough; aggressiveness is typical of the behaviour of these animals when defending themselves, and clinical signs of paralysis can be attributed to other viruses commonly found in the species, such as the Theiler' disease or the lymphocytic choriomeningitis.

Laboratory exams are essential for the confirmation of positive cases.

In the studied period, most of the samples taken to the laboratory were represented by pet animals (Table III).

TABLE III
Number of rodents examined in the period 1976 — 1985. Instituto Pasteur — S.P.

Year	Urban	PET	Wild	Total
1976	22	164	1	187
1977	33	160	1	194
1978	24	53	1	78
1979	27	17	0	44
1980	46	24	3	73
1981	39	25	2	66
1982	45	30	0	75
1983	51	64	1	116
1984	37	69	0	106
1985	60	84	0	144
Total	384	690	9	1 083

Capture is a limiting factor in the sending of samples to the laboratory when the attack is caused by urban rodents. Thus, out of 21 042 people attacked, only 384 samples were sent in for diagnosis, a rate of just 1.82%.

No case of rabies virus in rodents was detected in the 1 083 samples examined in the period of study, despite the high incidence of rabies observed in dogs, cats and other species (Table IV).

It is important to point out that the laboratory diagnosis should include hystopatholo-

TABLE IV
Number of animals examined and number of positive cases in the period 1976 — 1985. Instituto Pasteur — S.P.

	Dog			CAT			Rodents			Other		
Year	n.º exam.	n.º posit.	%	n.º exam.	n.º posit.	%	n.º exam.	n.º posit.	%	n.º exam.	n.º posit.	%
1976	1 287	435	27.70	406	38	1.98	187	0	—	36	4	0.20
1977	1 260	464	23.90	433	56	2.88	194	0	—	54	10	0.51
1978	1 234	309	16.82	473	38	2.06	78	0	—	52	1	0.05
1979	1 306	341	18.20	458	28	1.49	44	0	—	65	9	0.48
1980	1 467	354	16.99	384	16	0.76	73	0	—	159	23	1.10
1981	1 328	240	11.39	491	18	0.89	66	0	—	132	8	0.39
1982	1 179	164	8.88	448	5	0.27	75	0	—	143	16	0.86
1983	1 140	38	2.13	397	1	0.05	116	0	—	123	6	0.33
1984	984	22	1.46	318	1	0.06	106	0	—	89	6	0.40
1985	734	14	1.15	258	1	0.08	144	0	—	74	3	0.24
Total	11 919	2 381	19.98	4 066	202	4.97	1 083	0	—	927	86	9.28

gical tests, immunochemical tests (direct immunofluorescence or immunoperoxidase) and virus isolation (mice inoculation), as recommended by the World Health Organization; and also that, although the tissue studied is the central nervous system, it is necessary to examine the salivary glands as well.

Usually, the three tests mentioned suffice for a conclusive diagnosis. However, as the disease is rarely observed in this species, upon suspicion of a positive case the virus must be identified through tests such as the serum neutralization one; this will exclude the possibility of a false positive or the presence of another rhabdovirus as already confirmed in foreign studies, although never reported in the national literature [12].

CONCLUSIONS

The results of this study and the data obtained in the pertaining literature, in addition to the experience acquired by the Instituto Pasteur, show that pet rodents are not dangerous as rabies transmitters. Therefore, human preventive treatments are not recommended, but other prophylactic procedures required in cases of animal aggression should be followed. In favor of this recommendation it might be added that, as pet rodents are kept in cages, their contact with probable transmitters is unlikely to occur. In addition, these animals can be kept under clinical observation for 10 days, and when sick or dead they can be sent to the laboratory.

Regarding urban rodents, in the studied period none of the samples proved to be positive. In spite of the small number of samples analysed, this observation gives support to a reconsideration of the need for postexposure antirabies treatment. In the evaluation of the aggression in these case, not only the recommendations by the World Health Organization should be taken into consideration, but also the

circumstances which caused it and especially the incidence of rabies in other animal species in the same region.

As to the diagnosis, when the classical laboratory tests prove the animal to be positive, it is absolutely necessary that further tests be carried out in order to identify the virus, since the disease in rodents is extremely rare in our conditions.

In other parts of the world, due to diversified social and environmental conditions, these animals, and in special wild rodents, might play an important role in the rabies epidemiology. This topic, however, was not object of the present study.

RESUMO

Raiva no Estado de São Paulo: A questão dos roedores

Os autores compulsaram dados epidemiológicos a respeito de agressão por roedores no período de 1976 a 1985, nos registros do Instituto Pasteur de São Paulo (Brasil). Observaram que de 367 379 pessoas agredidas, 22 250 foram vítimas de roedores. Os roedores mais implicados nesses acidentes foram os urbanos, sendo que a captura foi um fator limitante para o envio de amostras ao laboratório.

O diagnóstico laboratorial realizado em 1 083 amostras de roedores não revelou nenhum caso positivo no período, embora a raiva estivesse presente em outras espécies animais. Concluem que, sendo a raiva rara entre os roedores, é necessário que se realizem provas de identificação do vírus quando houver suspeita de caso positivo; e que, não existindo casos relatados de óbitos humanos por raiva relacionados a roedores, existe a possibilidade de redução dos tratamentos anti-rábico pós-exposição a estes animais.

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