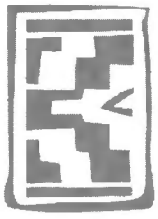

Characterization and observation of animals responsible for rabies post-exposure treatment in Phnom Penh, Cambodia

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ABSTRACT

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In order to provide relevant therapeutic answers to human patients exposed to risk of rabies infection who visit the Institut Pasteur du Cambodge for post-exposure treatment and to improve control of rabies in Cambodia, a pilot study was carried out in Phnom Penh Province in November and December 1997 with three objectives: characterization of the population of animals responsible for the exposure to rabies, observation of the animals concerned, and confirmation of the presence of rabies virus in the province. Between 18 November 1997 and 19 December 1997, 409 of the 741 patients treated at the Institut Pasteur du Cambodge because of an exposure to a known rabies vector were included in the study. The animals concerned were: 401 dogs (98 %), six monkeys (1,5 %) and two cats (0,5 %). Three-hundred-and-seventy of the animals (90,5 %) were owned, 4 (1 %) were unowned but were available for characterization and observation, and 35 (8,6 %) had an unknown ownership status and were not available for further study. The exposures occurred on private property in 84 % of the cases, and 80 of the 370 owned animals (22 %) lived in the same home as had the patient. The 374 animals with known ownership status were examined. Five were already dead and two of these five dogs had presented clinical signs typical of those of rabies. The male:female sex ratio of the dogs was 2,1:1. The 369 live animals were placed under observation for 10 d immediately after exposure of the humans had taken place. At the end of the period none of the animals had developed clinical signs of rabies, three had died of diseases other than rabies, and one was lost. Tests for the rabies nucleocapsid antigen were positive in two cases (the two suspected rabid dogs), confirming the presence of rabies in Phnom Penh Province. Consequently, we recommend measures to improve the control of rabies in Cambodia.

Keywords: Cambodia, post-exposure treatment, rabies control

INTRODUCTION

A centre for rabies post-exposure treatment of humans was opened in 1995 at the Institut Pasteur du Cambodge, in Phnom Penh city. This centre is the only place in Cambodia providing this kind of treatment.

The care is free of charge and includes:

- a medical interview and examination by a physician, during which a form detailing the circumstances of the exposure and the main medical observations is filled in
- disinfection of the wounds
- the possible administration of suckling mouse brain rabies vaccine and/or tetanus vaccine
- according to the circumstances, the injection of equine rabies immune globulin and/or anti-tetanus serum

Eight-thousand-six-hundred-and-seven patients visited the centre for treatment in 1996 and 8 984 in

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1997 of whom 76 % and 70 % respectively were inhabitants of Phnom Penh Province. All the patients with an exposure to a known rabies vector species received rabies post-exposure treatment because no information was available concerning the sanitary status of the animals involved. The large number of patients given systematic and complete vaccine treatment led us to carry out a pilot study in Phnom Penh Province in November and December 1997. The aim was to characterize the animal population responsible for the exposure to rabies, to confirm the presence of rabid animals in the province, and to assess the recommended 10-days' observation period for animals responsible for exposure in order to provide adequate treatment, and to improve the control of rabies in Cambodia.

MATERIALS AND METHODS

Selection of the animals

Animals responsible for the visit of a human patient to the rabies post-exposure treatment centre (RPET centre) were included in the study if:

- the patient came to the centre between 18 November 1997 and 19 December 1997 and were treated as category II and III, according to the WHO guide (WHO 1997)
- the patient visited the centre less than 10 d after contact
- the animal lived in Phnom Penh Province in an area restricted to 11°36'30"N, 11°31'S, 104°50'W and 104°57'30"E which is 130 km^2 in extent and is centred on Phnom Penh city

Characterization of the animals

For each selected animal, the first part of a specific questionnaire was filled in at the RPET centre by one of the five investigators during an interview with the patient, after he or she had been seen by the physician. The information recorded included the address of the patient, the date of contact with the animal, the species of animal involved, the place of contact (private or public), whether or not there had been a spontaneous attack by the animal without provocation, and the vaccinal status of the animal. If the animal was unknown to the patients, investigations were stopped, but if it was known, a meeting was organized between the patient and the owner of the animal (if the animal was owned), at the place where the animal lived.

The second part of the questionnaire was completed at the place where the animal lived on the same day or the day following the patient's visit to the rabies centre. Various items of information about the animal were recorded, including sex, identification signs, rabies vaccination status and behaviour (e.g. aggressiveness). If the animal had died within the previous 24 h, its head was collected and sent to the virology laboratory of the Institut Pasteur du Cambodge for rabies diagnosis. If the animal was still alive and showed any clinical signs which could be construed as those of rabies, it was killed and its head sent to the laboratory. If the animal was healthy or had no signs of rabies, it was placed under observation.

Observation of the animals

The animal was placed under observation for 10 d immediately following the contact of the patient, according to WHO recommendations (WHO 1992). The approval of the owner was required if the animal was owned and a document explaining the purpose of the study was provided. Five investigators visited the animal every 3 d to check its health. If, at one of the visits, the animal presented clinical signs of rabies, it was killed and its head collected for laboratory investigation. If it died between two visits, its head was brought to the laboratory by the owner. At the conclusion of each visit, and at that of the observation period, the animal was declared healthy, sick, dead (of illness or killed) or lost. The person in charge of the animal was advised to keep it tied up during the period of observation.

Rabies laboratory diagnosis

Rabies was diagnosed by detection of rabies nucleocapsid antigen in fresh brain specimens by direct immunofluorescence, as described by Bourhy & Sureau (1990). The test was carried out at the Virology Laboratory of the Institut Pasteur du Cambodge.

Data analysis

Data were entered into a computer database and analyzed using EPIINFO version 6.04b (CDC/WHO 1997).

RESULTS

Characterization of the animals

Four-hundred-and-nine (55 %) of the 741 patients who came to the RPET centre between 18 November 1997 and 19 December 1997 were included in the study. The animals involved consisted of 401 dogs (98 %), two cats (0,5 %) and six monkeys (1,5 %). Twenty-five of the dogs were known to have bitten someone other than the person visiting the centre, and one dog had bitten two other people. Five dogs had also bitten other dogs. Three-hundred-and-seventy animals (90,5 %) were owned, four dogs (1 %) were known not to have owners and the ownership status of 35 (8,6 %) animals (33 dogs and two monkeys) was unknown. Patients came into contact with the animals concerned on private property in 84 %

of cases, and the contact was spontaneous and without provocation by the patient in 68 % of cases. Eighty of the 370 patients (22 %) who had had contact with an owned animal lived in the same home as the animal.

A visit was made to the animal's home for the 374 animals known by the patients. Table 1 shows the species and sex of the animals. The male:female sex ratio was 2,1:1. The sex of the animal was not recorded for six of them. Of the animals, 7,6 % were declared to have been vaccinated against rabies (all dogs) and 27 % of the animals (two of the monkeys, and 99 of the dogs) were known to be aggressive.

Of the 374 animals, five (all dogs) had already died before the first visit by an investigator. Three of them had died of illness, one of which had shown clinical signs commensurate with those of rabies: their three heads were sent to the laboratory. The other two of the five had been killed. One of them had not shown signs of ill-health and had been eaten by its owner and its head could not be collected, while the other had manifested signs of rabies and its head was collected for examination.

It was suggested to the persons in charge of the other animals (n = 369) that they be subjected to an observation period of 10 d after the contact. This suggestion was accepted by all of them.

TABLE 1 Species and sex of the 374 owned or known to be unowned animals

	Male	Female	Undetermined
Dogs (n = 368)	245	117	6
Cats (n = 2)	2	0	0
Monkeys (n = 4)	3	1	0

TABLE 2 Delay between exposure and visit to the centre for the 369 cases under observation

Period (days)	0	1	2	3	4	5	6	7	8	9
Number of cases	81	179	55	26	9	6	7	5	1	0

TABLE 3 Status of the 369 cases under observation at the first and last visits

	Lost	Healthy	Sick	Dead from illness	Killed
1st visit	8	355	6	0	0
Last visit	8	358	0	3	0

Observation of the animals

The delay between contact and visit to the centre for the 369 cases under observation is shown in Table 2. This distribution resulted in a programme of visits carried out every 3 d. There were 369 second visits, 354 third visits, 301 fourth visits and four fifth visits, giving a total of 1 402 visits. There was a mean of 40 visits per day (minimum eight, maximum 76, with a standard deviation of 20). Effective cooperation with the owners made it possible to continue observations until the end of the 10-d period.

Table 3 shows the health status of the animals under observation at the start and end of the observation period. During the first visit, none of the six sick animals showed clinical signs resembling those of rabies. During the observation period, four of these six animals recovered and two died. One of the 355 healthy animals became sick during the observation period and died after showing signs not consistent with those of rabies: this animal was eaten by the owner. One lost dog was found alive and was healthy at the end of the observation period, and another healthy dog was lost.

Rabies laboratory diagnosis

In total, eight dogs died: five before the first visit and three during the observation period. Of these eight animals, seven were sick (two with clinical signs consistent with those of rabies) and one was healthy. Six heads were sent to the laboratory for rabies diagnosis.

Brain specimens from the two cases which had shown signs of rabies tested positive for the rabies nucleocapsid by immunofluorescence assay.

One of these two dogs was owned by a patient living at Kauk Chambak village, just east of Pochentong International Airport. The dog, a male, was not vaccinated. It had bitten its owner at home 7 d after the initial manifestations of a disease with clinical signs consistent with those of rabies. It died on the following day, which was the day of the first visit. The owner was the only person bitten by the animal.

The second case was a male dog of unknown ownership status which bit the patient without provocation in a street north of Phnom Penh city in Russey Keo district. Nothing is known about the possible exposure of other people or animals. The animal was killed because it was aggressive.

DISCUSSION

Three animal species were responsible for the exposure of the patients to possible rabies, i.e. dogs, cats and monkeys. The distribution of species in this study was similar to that reported by the RPET centre for 1996 and 1997 (data not shown). Dogs and cats were involved in 98,5 % of the cases reported in other Asian countries (WHO 1996). In the study reported

here more of the dogs involved were male than were female (sex ratio 2,1:1). No data could be found concerning the sex ratio of animals responsible for the contact in South East Asia. The male:female dog population sex ratio has been estimated to be 1,5:1 in Thailand (Mitmoonpitak, Tepsumethanon & Wilde 1998). The dog population sex ratio could explain that of the dogs responsible for human contacts in this study but the sex ratio of the dog population of Cambodia has never been characterized. A maximum of only 10% of the animals were unowned (four were undoubtedly unowned animals and 35 were considered to be unowned because they were unknown to the patients). This proportion is much lower than that reported in Bangkok before the national rabies eradication programme was commenced (Swaddiwudhipong, Tiyacharoensri, Singhachai & Chutiwongse 1988) and in that in other Asian countries (WHO 1996). This low frequency of unowned animals may be explained by the fact that such animals are caught and killed because dog meat as food is appreciated by some Cambodians and is sold in some Phnom Penh city markets. The low proportion of unowned dogs suggests that an animal pound is not a priority for the control of rabies in Phnom Penh city.

In addition:

- most of the animals were owned
- they mostly bit or scratched a relative of the owner (84% of the contacts were on a private property)
- 98% of the contacts were caused by dogs
- only 7,6% were vaccinated against rabies

Therefore, information about rabies control could be given to owners of this species to encourage them to have their animals vaccinated as there is no national rabies control programme. It is widely recognized that this kind of measure reduces the number of transmissions of rabies to humans in countries where the disease occurs in dogs (WHO 1992).

Currently, almost all patients attending the RPET centre are given post-exposure treatment because little is known about the animals with which they have had contact, but the post-exposure treatment strategy could be improved by applying the WHO recommendations (WHO 1997). Thus, if the owner of the animal is a relative of the patient, particularly if they both reside at the same address or if the animal is a dog or a cat and is healthy, the owner could be requested to observe his or her animal during the 10-d period following the contact. If no clinical signs of rabies are observed during the observation period, the RPET centre would stop the treatment. Similarly, if the contact (bite) by the animal does seem justified on the animal's part (e.g. it was disturbed by a child during its meal), it nevertheless does not seem realistic to postpone the treatment during the observation period for as long as it has not been established that Phnom Penh city is a low risk area of exposure to rabies. Observation of the animals does not seem to be a difficult task for the owners to carry out, because they voluntarily restrained their animals by tying them up to enable us to carry out our observations during the study period. If this system had been applied during our study, between 80 (if the animal is owned and lives with the patient) and 365 (if the animal is owned) of the 409 treatments (number of patients included in the study) could have been stopped.

These are the first two laboratory-confirmed cases of rabies in dogs in Cambodia since the 1970s due to a lack of diagnostic facilities for rabies in the country. They show that the rabies virus is, indeed, present in the Phnom Penh city and its suburbs. However, the prevalence of infected animals detected during the study period was low. This can be partly explained by the fact that Cambodians live in a country in which rabies is endemic and are rather well aware of the clinical signs of the disease and of its lethal outcome. This knowledge is responsible for bitten or scratched people visiting the RPET centre after the slightest risk of exposure, even if the contacts are not hazardous from the viewpoint of contracting rabies. More information about rabies transmission, according to WHO recommendations (WHO 1997), should be given at the rabies centre to explain that treatment can be stopped (categories II and III) or postponed (category I) if the particular circumstances warrant it. This requires a very well trained medical staff who is able to change the attitudes of patients by providing clear and convincing explanations. The aim of this would obviously not be to prevent the first visit but to convince patients that observation of the animal and maintaining contact with the RPET centre is an effective alternative to immediate specific treatment.

Our study shows that the voluntary participation of owners in Phnom Penh city and suburbs can be used not only to ensure the observation of an animal which has in some way injured a human, but also to transmit to the authorities any useful information concerning the health of the animal. It is considered, however, that in the near future, observation procedures of such animals must be organized by the veterinary services of the municipality or by private veterinarians commissioned by them. Public administrative bodies should formulate regulations which make it obligatory that, when deemed necessary, all owners should allow their animals to be kept under official supervision.

Since May 1997, laboratory-diagnosed rabies in dogs has been reported in Kandal, Kompong Cham, Kompong Chnam, Kompong Speu and Ratanakiri Provinces (data not shown). The lack of specimens submitted for rabies diagnosis prevents firm conclusions being drawn about the presence of the disease in the other provinces. It is very difficult to evaluate

the prevalence of the human disease in Phnom Penh Province and the rest of the country because the notification of cases is not effective (although eight, two and no human cases were observed at the RPET centre in 1995, 1996 and 1997, respectively). One reason is that rabid patients are not sent to the hospital as, in the majority of cases, the family cannot afford to pay the cost of hospitalization, or is not willing to pay particularly if the prognosis is known to be death. Rabies is probably more widespread in some other provinces than in those where the disease has been confirmed by laboratory diagnosis. More specialist centres are therefore required to provide post-exposure treatment for all Cambodians, especially those far from Phnom Penh Province.

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