

# Rabies-related risk factors and animal ownership in a community in Sri Lanka

G Matibag, R Ditangco, T Kamigaki, T Wijewardana, P Kumarasiri, D Niranjala De Silva, G Panduka De S. Gunawardena, Y Obayashi, K Kanda, H Tamashiro

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## Abstract

To determine the animal bite recipients' compliance to wound washing and immediate medical consultation in the prevention of human rabies, we studied the relationship of the profiles of animals and bite with the status of their ownership and the subjects' decision whether or not to complete post-exposure prophylaxis (PEP). Face-to-face interviews were conducted on May 2006 to 357 household heads with family members who had animal bites. Results show that there was no correlation between the recipients' decision to complete PEP with the animals' availability for observation, health outcome and bite circumstances. Most recipients who did not complete the PEP were bitten by unvaccinated animals. The subjects should be taught that the decision to receive the complete course of PEP should be based on the animal's vaccination history, bite circumstance, and health outcome after the observation period. Strict adherence to vigorous wound washing and immediate medical evaluation after animal bites will prevent the development of human rabies.

## INTRODUCTION

Of the estimated 55,000 human rabies deaths that occur annually, 56% occur in Asia and 44% in Africa. Majority of US\$583.5 million that is spent for treatment every year is borne by Asian countries where large amounts of post-exposure prophylaxis (PEP) are administered (Asia: US\$563 million, Africa: US\$20.5 million) <sup>1,2</sup>.

In Sri Lanka, the incidence of human cases has continuously declined since the adoption of the national rabies control program in the mid-1970s. However, canine rabies remains endemic in the island. The numbers of reported human rabies cases in the country from 2003 to 2005 were 76, 98 and 55, respectively <sup>3,4</sup>. The annual government expenditure for rabies control is approximately US\$4.6 million, which comprise 10% of the country's annual expenditure on drugs and vaccines <sup>5</sup>. About 84% of this amount is spent for PEP whereas the remaining 16% is spent for animal rabies control <sup>6</sup>. The high cost of expenditure for PEP is due to the endemic status of rabies in the country, poor management of bitten victims, and the availability of free medical services from government hospitals. Out-of-pocket spending for PEP costs between US\$280-370 which is prohibitive for an

annual personal income of US\$1416 <sup>3,4,7</sup>.

A survey on knowledge, attitude and practices with regard rabies in Kandy District, Central Province showed that about 58% of the respondents were pet owners, and that they were highly aware of the disease and receptive to rabies control measures. However, only around 48% of pets were vaccinated, and the subjects' practices and attitudes (e. g., notifying authorities if bitten by dogs or submitting the head of a suspected animal for laboratory confirmation of rabies) with regard animal bites were not consistent with the knowledge of the disease <sup>8</sup>.

In this study, we evaluated the relationship of the animal and bite profiles (circumstances of the bite, canine vaccination history, and health outcome) with status of animal ownership and the subjects' decision to receive complete or incomplete course of PEP. The results would give an insight on the role of pets in the spread of human rabies whether animal bite victims followed the recommended procedures for rabies prevention.

## MATERIALS AND METHODS

This cross-sectional study was conducted in selected communities of Kandy District, Sri Lanka in May 2006, as described in an earlier paper<sup>8</sup>. Animal and bite profiles that were gathered regarding the responsible animals were: species, ownership status, location of bite, vaccination status, availability for observation, circumstance of the bite, and health outcome after 14 days observation period.

A complete course of PEP was defined as a patient who received two or more doses of tissue culture vaccine intradermally during the observation period of the responsible animal. An incomplete course of PEP was defined as receiving less than two doses of the rabies vaccine.

The association between the animal and bite profiles with the animal ownership status and the decision to receive PEP were evaluated using the Chi-square test or the Fisher's exact test (2-tailed). A p value <0.05 was considered statistically significant. Data analysis was done using SPSS version 14.0.

## RESULTS

Majority (275/357, 77.0%) of the biting animals have owners. Almost half of the bite incidents occurred at home (178/357, 49.8%). Majority of the biting animals were unvaccinated (240/357, 67.2%). Furthermore, most pets were unvaccinated (169/275, 61.4%). Among animals that have owners, there were still more than 7.6% that were not observed after the bite incident (21/275). Majority of the bites were unprovoked (236/357, 66.1%). Also, most bites by animals that have owners were unprovoked (170/275, 61.8%). Among animals that were owned 16.0% developed signs and symptoms or rabies or with uncertain outcome (44/275) (Table 1).

**Figure 1**

Table 1: Relationship of rabies risk factors with animal ownership status

	Pet		Stray <sup>a</sup>		p
	n	%	n	%	
Responsible animals					
Dogs	261	94.9	69	84.1	0.003
Cats and others <sup>b</sup>	14	5.1	13	15.9	
Locations of bites					
Home	154	56.0	24	29.3	0.000
Others <sup>c</sup>	121	44.0	58	70.7	
Animal vaccination					
With history	106	38.5	11	13.4	0.000
Without history	169	61.5	71	86.6	
Animal observation					
Available	254	92.4	58	70.7	0.000
Not available	21	7.6	24	29.3	
Animal behavior					
Provoked	105	38.2	16	19.5	0.001
Unprovoked	170	61.8	66	80.5	
Fate of animals					
Remained healthy	231	84.0	45	54.9	0.000
Had signs and symptoms of rabies/ Uncertain	44	16.0	37	45.1	

<sup>a</sup>Includes community, wild and stray animals.

<sup>b</sup>Other animals include a monkey, cattle, a rat and a mongoose.

<sup>c</sup>Other locations include street, neighbor's house, school, market and temple.

The subjects' decision to receive complete or incomplete course of PEP did not correlate with the animals' availability for observation after the bite, health outcome after the observation period, and the circumstances of the bite. Most of the people who received incomplete course of PEP were bitten by animals without vaccination history (Table 2).

**Figure 2**

Table 2: Relationship of rabies risk factors with completion of PEP

Variable	Post-exposure prophylaxis				p
	Complete		Incomplete		
	n	%	n	%	
Animal observation					
Available	174	88.3	138	86.3	0.631
Not available	23	11.7	22	13.8	
Fate of animal					
Remained healthy	147	74.6	129	80.6	0.204
Had signs and symptoms of rabies/ Uncertain	50	25.4	31	19.4	
Animal vaccination history					
With history	51	25.9	66	41.3	0.002
Without history	146	74.1	94	58.8	
Animal circumstances					
Provoked	66	33.5	55	34.4	0.911
Unprovoked	131	66.5	105	65.6	

## DISCUSSION

In Sri Lanka, dogs are the main rabies-transmitting animals and are classified as pets (family/domestic) and strays (community/neighborhood, wild and strays) in this study. The family or domestic dogs comprise 50% of total dog population, while the community or neighborhood dogs share 45% and the remaining 5% comprise strays<sup>9</sup>.

The relative roles of stray and pet dogs in the epidemiology of rabies in Sri Lanka most probably follow the classical pattern in which the stray dog seems to be the disseminator among dogs, while the pet dog is the more important source

of human exposure<sup>10</sup>. Thus, the stray dog seems to play a role in bringing the virus from one community to the other, while the pet dog is still the most likely source of human infection.

Our results show that the most common sources and locations of bites were pet animals and home, respectively. Majority of the animals that were responsible for the bite were not vaccinated and a small percentage of them were not observed after the bite incident. These factors have very important implications on responsible pet ownership.

Responsible dog ownership means to be the best owner or caregiver to a dog. Other than food, water and shelter, it is the obligation of dog owners to incorporate their dogs into the community, to be a good neighbor, and to provide the various needs of their dogs such as proper veterinary care and routine rabies vaccination (Table 3)<sup>11</sup>.

### **Figure 3**

Table 3: Responsible dog ownership\*

Responsible dog ownership means that owners should:	
1.	Realize that a pet is for life and must dedicate themselves to the life of their dogs.
2.	Place effort in the proper care of their puppy (proper veterinary care, vaccinations, deworming, and proper feeding).
3.	Learn proper feeding and making healthy choices for their pets.
4.	Invest in the proper health care throughout their dog's life.
5.	Train their dog through gentle means to be a good canine citizen.
6.	Train their dog not to be a nuisance and help them achieve that goal.
7.	Teach children to respect animals and not abuse them through play (this is also Responsible Parenting).
8.	Obey animal laws, rules and regulations set for the protection of all. By not obeying the laws, the owner will ruin it for everyone else.
9.	Not breed their dog because he is "so cute".
10.	Do their part to help pet overpopulation problem and keep their animal intact at home and away from other intact animals, or neutering the animal to prevent future health issues.
11.	Teach other humans how to interact with their dog.
12.	Provide the dog with a family and a home, not just food and shelter. Dogs are very social, and isolation from the family will result in an unhappy and ultimately, unhealthy dog.
13.	Be liable for whatever damage the dog does and to take steps to rectify it.

\*Modified from Mifflin K.

In Sri Lanka, dog ownership is strictly maintained, however, some owners have to be taught how to be responsible. Dog registration, prevention of abandonment of dogs, keeping dogs indoors or within a restricted environment, caring for their health, mandatory vaccination, control of breeding through sterilization, and awareness programs for dog owners are some strategies for pet dogs. For abandoned dogs, adoptive homes and creation of a network for willing pet owners should be considered.

Furthermore, responsible pet ownership should be taught especially to children since it is widely accepted that they are fond of animals. Lectures, posters and videos on the danger, prevention, treatment and management of rabies would be helpful for this purpose. Together with a high literacy rate and knowledge of the people of the disease, the support from the community would be far from difficult.

The results further show that there were people who received

incomplete course of PEP even though the health outcome of the animal was suspicious (the animal was not available for observation, died of unknown reasons, or escaped). It is possible that some of these animals were not observed considering that a good number of animals were not observed in general. Furthermore, most of the bites were unprovoked which are associated with potentially rabid animals. It is possible that those who had unprovoked bites may have been exposed to the virus and yet discontinued PEP.

In a bite accident, pet owners and parents should immediately report to proper authorities (police, veterinarians and hospital). The wound should be thoroughly washed in order to immediately decrease the viral inoculum present in the saliva of the responsible animal. Immediate medical attention should be sought so that the anti-rabies immunoglobulin could be administered to neutralize the virus at the site of the inoculum. This is followed by active immunization to establish longer immunity. PEP is administered when the biting animal is suspected to be rabid. Poor vaccination history, unprovoked bite, and the presence of signs and symptoms of rabies are suggestive of being rabid<sup>12</sup>. PEP is also indicated when the biting animal is not available for observation. PEP is discontinued if the dog remains healthy throughout the 10-14 days after the bite or if the animal were euthanized and showed negative result by fluorescent antibody testing<sup>5</sup>. It is important that the animal be monitored for 14 days to determine the necessity of continuing the PEP.

Recognizing the first World Rabies Day in 8 September 2007, the WHO stressed the need for responsible dog ownership to protect communities from rabies. The WHO Regional-Director for South-East Asia appealed to dog owners to take the lead and ensure that their dogs are vaccinated against rabies. Furthermore, he urged all governments to develop and strengthen their policies and legislative measures for executing National Rabies Elimination Programs<sup>13</sup>.

The decision to administer and receive either complete or incomplete course of PEP should be based on the animal vaccination history, circumstances of the bite, and health outcome of the animal after the observation period. Strict compliance to the recommended procedure, such as vigorous wound washing and immediate medical care following animal bites, will prevent the development of rabies and curtail the unnecessary use of PEP.

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## **CORRESPONDENCE TO**

Dr. Hiko Tamashiro Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University Kita-15 Nishi-7, Kita-ku, Sapporo 060-8638 Hokkaido, Japan Tel: +81-11-7065051 Fax: +81-11-7067374 Email: tamashiro@med.hokudai.ac.jp

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**Author Information**

**Gino C. Matibag, Ph.D.**

Post-Doctoral Fellow, Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University

**Rossana A. Ditangco, MD**

Post-Doctoral Fellow, Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University

**Taro Kamigaki, MD**

Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University

**Thula G. Wijewardana, Ph.D.**

Professor, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya

**Pallegoda V. R. Kumarasiri, Ph.D**

Senior Lecturer, Faculty of Medicine, University of Peradeniya

**D.D. Niranjala De Silva, Ph.D.**

Senior Lecturer, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya

**G.S. Panduka De S. Gunawardena, Ph.D.**

Senior Lecturer, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya

**Yoshihide Obayashi, Ph.D.**

Assistant Professor, Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University

**Koji Kanda**

Graduate Student, Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University

**Hiko Tamashiro, Ph.D.**

Professor and Chair, Department of Global Health and Epidemiology, Graduate School of Medicine, Hokkaido University