

Rabies in mongooses and domestic rats in the Southern Province of Sri Lanka

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Abstract

Objectives To determine the prevalence of rabies in free roaming mongooses and domestic rats in the Southern Province of Sri Lanka, and determine the different species of mongooses and domestic rats that could be reservoirs of rabies infection.

Design A descriptive cross-sectional study during the period July – September 1999.

Setting The Southern Province of Sri Lanka.

Study population Fifty mongooses roaming in gardens (excluding the wildlife protected zones), and 100 domestic rats found inside houses from the Divisional Secretariats in Galle, Matara and Hambantota districts.

Sample collection and testing The animals were trapped and speciated. After decapitation, the head was cooled immediately and brought to the Medical Research Institute (MRI) with minimum delay. The fluorescent antibody test (FAT) was done on the dissected brains at the Department of Rabies, MRI.

Results Of the mongooses caught, 32 were brown mongooses and 18 ruddy mongooses. Eleven mongooses were found to be positive for rabies antigen. All domestic rats examined (common Sri Lankan house rats 76, Indian house mice 17, brown rats 7) were found to be negative for rabies antigen.

Conclusions Rabies exists in mongooses in the Southern Province. Both brown and ruddy mongooses were found to be reservoirs. The domestic rats were unlikely to be reservoirs of rabies infection in this province.

Introduction

During the past few years the number of patients seeking advice from the MRI on rabies post-exposure therapy following mongoose and domestic rat bites have increased from both urban and rural areas of Sri Lanka (Wimalaratne O. Unpublished observations). During the period of January 1997 to December 1998, out of 13 mongoose specimens tested by fluorescent antibody test (FAT) for rabies diagnosis, 12 were positive, necessitating high risk post-exposure anti-rabies treatment. According to statistics from the Central Epidemiology Unit, Colombo, there were 4 reported human deaths due to mongoose bites from four different districts in Sri Lanka during 1996. So studies were necessary to find out the role of mongooses in the spread of rabies to humans in Sri Lanka.

Specimens of domestic rats received and tested by FAT for rabies diagnosis during the same period were negative for rabies, and further studies were necessary to decide whether rabies post-exposure therapy should be recommended routinely for people following domestic rat bites. No studies have been done so far to determine the prevalence of rabies in domestic rats in Sri Lanka.

Methods

A descriptive cross-sectional study was carried out during the period of July to September 1999 in the Southern Province of Sri Lanka. Mongooses roaming in gardens (excluding the wildlife protected zones), and domestic rats found inside houses, in the Southern Province of Sri Lanka were studied from the different Divisional Secretariats in Galle, Matara and Hambantota districts. Samples were collected by using the method of proportionate stratified sampling. The number of households in each divisional secretariat was taken into consideration in sample selection.

This project proposal was approved by the ethical committee of the MRI. Permission to kill mongooses was obtained from the Director, Wildlife Conservation Department as all species of mongooses are protected animals. All persons involved in handling of the animals were given rabies pre-exposure therapy one month before the commencement of the study.

Mongooses were caught using wooden traps, domestic rats with the help of tar traps, and anaesthetised with diethyl ether. Species identification of mongooses and domestic rats was done as there are several species of mongooses and domestic rats in Sri Lanka. After decapitation the heads were cooled immediately to prevent decomposition and brought to the MRI with minimum delay.

FAT was carried out on the dissected brains (Ammon's horn and brain stem). The specimens were stored at -20°C until the FAT was done (1). The method described in *Laboratory Techniques in Rabies*, WHO 1996 was employed (2).

Results

In this study out of four species of mongooses found in Sri Lanka, namely common Sri Lankan grey mongoose (*Herpestes edwardsii lanka*), brown mongoose (*Herpestes*

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fuscus), Sri Lankan ruddy mongoose (*Herpestes smithii zeylanicus*) and striped necked mongoose (*Herpestes vitticollis vitticollis*), only two species (brown mongooses and ruddy mongooses) were found in the Southern Province (3,4). Out of these 32 were brown mongooses and 18 were ruddy mongooses. 11 out of 50 mongooses were found to be positive for rabies antigen. Positive mongooses were found in all 3 districts namely, Galle, Matara, and Hambantota (table 1 and table 2).

Though there are five species of domestic rats in Sri Lanka, namely common Sri Lankan house rat (*Rattus rattus kandiyanus*), Indian house mouse (*Mus musculus castaneus*), brown rat (*Rattus norvegicus*), Indian grey musk shrew (*Suncus murinus caeruleus*) and common Indian musk shrew (*Suncus murinus murinus*), only three species were caught during the study (5,6). Out of them 76 were common Sri Lankan house rats, 17 were Indian house mice and 7 were brown rats.

All domestic rats examined were found to be negative for rabies antigen (table 1).

Table 1. FAT results of all specimens in three districts

District	Mongooses (50)		Domestic rats (100)	
	Positive	Negative	Positive	Negative
Galle	2	20	Nil	45
Matara	6	11	Nil	34
Hambantota	3	8	Nil	21
Total	11	39	Nil	100

Table 2. FAT results in two species of mongooses from three districts

District	Brown mongoose (<i>Herpestes fuscus</i>) (32)		Ruddy mongooses (<i>Herpestes smithii zeylanicus</i>) (18)	
	Positive	Negative	Positive	Negative
Galle	1	12	1	8
Matara	5	5	1	6
Hambantota	2	7	1	1
Total	8	24	3	15

Discussion

From the results obtained in this study, we conclude that there is widespread rabies in free roaming brown mongooses (*Herpestes fuscus*) and ruddy mongooses (*Herpestes smithii zeylanicus*) in the Southern Province. Domestic rats, namely, common Sri Lankan house rats (*Rattus rattus kandiyanus*), Indian house mice (*Mus musculus castaneus*), and brown rats (*Rattus norvegicus*) were unlikely to be reservoirs of rabies infection in this province. This needs to be confirmed by more extensive studies.

The results of a preliminary study in 1971 showed that a specimen of a grey mongoose in a sample of 135 had positive serology for rabies (7). Whether the other species of mongooses found in Sri Lanka were included in this study is not known.

Though extensive studies on wildlife rabies in *Viverridae* and *Mustelidae* have been done in South Africa, some parts of India and northern Nigeria, prevalence data are not available to compare with our study (8). Yellow bushy-tailed mongooses (*Cynictis penicillata*) have been found to be the reservoir of rabies infection. *Herpestes javanicus* and *Herpestes auropunctatus* (Burmese mongoose) were found to be the reservoir of rabies infection in Cuba, Puerto Rico, Granada and the Dominican Republic during the mid-19th century (8).

Sample size should have been more for both mongooses and domestic rats. Due to financial and time constraints, only 100 domestic rats were studied. Fifty mongooses were studied as permission was obtained to catch only 50 animals as all species of mongooses are protected. The population of mongooses and domestic rats in the districts in Sri Lanka is not known. Hence a proportionate stratified sampling method was employed, including all Divisional Secretariats as sample collecting areas.

For testing of samples, only the direct FAT was employed, as it is the gold standard available at present for the diagnosis of rabies (9). FAT is a highly sensitive and specific rapid test to detect rabies antigen (9). It is the confirmatory test used at the MRI for rabies diagnosis (10).

Though we may conclude that mongooses (brown and ruddy) are reservoirs of rabies infection, the source of the virus has to be identified by further studies. This can be done by the rabies virus strain identification (11). Further studies are also necessary to find out whether there is a carrier state in mongooses and in other wild animal species in this country.

The results obtained from this study showed that common Sri Lankan house rats, Indian house mice and brown rats were negative for rabies antigen. However, the present practice of rabies post-exposure therapy following domestic rat bites is justified until such time as more extensive studies are done to cover all provinces in Sri Lanka. Even though rabies post-exposure therapy is not recommended routinely following domestic rat bites, each bite has to be assessed individually, and under special circumstances PET is advised (eg. facial bites, multiple bites, etc) (12). The results of most studies to determine the importance of domestic rats as a reservoir of rabies are similar to our results, except for a few studies in Germany and Thailand (8).

The use of oral rabies vaccination has shown promise as a tool to curb the spread of wildlife rabies (13). Vaccination of wildlife through oral baits has been effective in controlling or eliminating rabies in foxes from some areas of Europe and Canada (13). More recently, the introduction

of oral rabies vaccination of foxes in Switzerland has resulted in virtual elimination of rabies from that country, as wildlife reservoirs can transmit the disease to dogs, other pets and livestock animals (14,15). Since there is clear evidence for a wildlife reservoir of rabies among mongooses in Sri Lanka, introduction of oral rabies vaccination would be an effective method for the control of this disease in wild animals.

Epidemiological surveillance must be strengthened to detect and predict the emergence of new rabies reservoirs, as successful urban and sylvatic control programs must guard against a reintroduction of the disease through the importation, transport or natural movements of infected wild animals (9,16).

Acknowledgements

We thank Mr. Sunil Fernando in the Department of Rabies, MRI for technical support, and the National Health Research Council for funding the project.

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Correction

The sentence on page 16 under "Results" in the *CMJ* 2003; **48**: 14-16 that reads as "...75% of the gram negative bacilli were sensitive to metronidazole" should read "... 75% of the gram negative bacilli were sensitive to cefotaxime".

Editors *CMJ*