A prospective study of patients presenting at General Hospital, Kandy for post exposure prophylaxis of rabies

K. V. H. K. K. Perera[2], M. Zarook[1] and V. Thevanesam[2]

The Ceylon Journal of Medical Science 1998; 41: 47-51

Abstract

There is limited information on the characteristics of the large number of patients seeking rabies post exposure prophylaxis at state hospitals in Sri Lanka. 876 patients seeking rabies post exposure prophylaxis at General Hospital, Kandy during July-August 1997 were individually interviewed using a structured questionnaire. The majority of patients (94.2%) were from the central province with 2.7%,1.2% and 1.3% from Uva, North East and North Western province respectively. 35% lived within 10km and 21%>25km from the hospital and 29% had travelling times of over 1 hour. 45.2% of patients were referred by health care workers, the rest being self referrals. 18.2% of the former and 45.4% of the latter group did not need prophylaxis. 90.4%, 6.7%, and 1.8% of risk exposures were to dogs, cats and other animals respectively. 72% of dogs and cats were domestic animals of which only 13.6% had received rabies immunization in the past year. State costs included the cost of vaccine (Rs1,091,000/=), cost of consumables and medical and nursing staff time. Rabies post exposure prophylaxis is costly in money and personnel. The cost to the state for vaccine alone for a 2 month period was over 1 million rupees. Animal rabies eradication and awareness promotion programmes are urgently needed.

Key words - Rabies, post-exposure prophylaxis

Introduction

Animal rabies is endemic in Sri Lanka. Sri Lanka has a high population of dogs, with a dog: human ratio of 1:8 (1). Inoculation or mucosal exposure to the saliva of dogs or other animals with rabies may result in human rabies, which is universally fatal. Reported deaths due to human rabies in Sri Lanka ranged from 98 to 156 per annum in the period 1990 to 1995 (1).

Exposure to animals leading to a request for rabies post exposure prophylaxis is a common occurrence in Sri Lanka. Earlier post exposure vaccination programmes using Semple type vaccines required 17-21 injections of 2 ml each, usually into the anterior abdominal wall. These vaccines, besides being poorly immunogenic, were also associated with neuroparalytic reactions (2). The combination of serious side effects and the need for several injections acted as a deterrent to post exposure vaccination unless the risk of rabies was believed to be high. It was observed by the authors that the advent of safe tissue culture vaccines requiring only 5 intramuscular injections lowered the threshold for requesting and prescribing rabies post exposure prophylaxis. The cost of the vaccination programme using tissue culture vaccines however is known to be high (3).

Many efforts have been directed towards the eradication of animal rabies in Sri Lanka. In spite of this, animal, and in particular, dog rabies, remains a hazard to the human population. Patient characteristics and the pattern of animal exposures resulting in a perceived need for prophylaxis have not been looked at previously. In view of the difficulties experienced in the rabies eradication programmes in many developing countries, including Sri Lanka (4), such information may be useful to determine areas to focus eradication programmes, in order to reduce the risk and incidence of human rabies.

1. General Hospital, Kandy
2. Department of Microbiology, Faculty of Medicine, Peradeniya.

Methods

The General Hospital, Kandy (GHK) has a daily clinic for rabies prophylaxis with a separate medical officer (one of the authors -MZ) assigned to it. 876 patients presenting for prophylaxis during July and August 1997 were interviewed by 2 of the authors (MZ and KP). A questionnaire designed for this purpose was used. Patients in whom prophylaxis was begun were followed up for the course of the vaccination.

Adherence to the protocol for rabies post exposure prophylaxis was assessed in 700 questionnaires by the third author (VT).

The cost of rabies prophylaxis was assessed by costing vaccine and anti rabies serum at current market prices.

Results

The majority of patients (93.6%) presenting for post exposure prophylaxis were from the central province as shown in Table 1. However, only 35% lived within a 10 kilometre distance of the hospital (Table 2) and 29% of all patients had travelling times in one direction of over 1 hour (Table 3). Time taken for assessment and rabies prophylaxis if required varied from less than 30 minutes for 34.4% of patients to over 6 hours for 31.9% as shown in Table 4. The latter group were those given anti-rabies serum who had to remain 6 hours in the ward for observation. The length of stay of the rest depended on the time of arrival of the patient in relation to time of vaccination, the latter being batched for efficient use of the vaccine.

Table 1
Geographical distribution of patients seeking post-exposure prophylaxis

Province	No.	%
Central	819	93.6
Uva	24	2.7
North-East	10	1.1
North West	11	1.2
Others	12	1.4

Table 2
Distance traveled by patients for post-exposure prophylaxis

Kilometres	%
0 - 10	35
10 - 25	44
25 - 49	13
50 - 99	08
>100	0.2

Table 3
Travel time of patients seeking post-exposure prophylaxis[a]

Time taken	%
1 - 30 mins	34
30 - 60 mins	37
1 - 2 hours	20
2 - 4 hours	06
> 4 hours	03

(a. Number of patients 398)

Table 4
Duration of hospital stay[a]

Time in hospital	No	%
0 - 30 mins	137	34.4
30 - 60 mins	61	15.3
1 - 3 hours	65	16.3
3 - 6 hours	08	2.0
> 6 hours	127	31.9

(a. Number of patients 398)

Self referrals and Health care referrals were equally distributed in the study group. However, there was a significant difference (Chi square test $p<0.001$) in the need for prophylaxis in the 2 groups as shown in Table 5.

Table 5
Referral patterns of patients seeking post-exposure prophylaxis

	Total	Need prophylaxis	No prophylaxis
Self referrals	480	54.6%	45.4%
Health care referrals	396	81.8%	18.2%

$p < 0.001$

Table 6
Animal risk exposures

Animal	Number	Domestic	Vaccination in past year	Stray
Dogs	792	562	13.6%	230
Cats	53	47	00.0%	06
Cattle	05			
Rats	04			
Monkey	01			
Mongoose	01			
Squirrel	01			
Wild Boar	01			
Human	09			

The majority of risk exposures were to domestic dogs, only 13.6% of which had been vaccinated (Table 6). Staff who had taken part in the care of a patient with rabies and relatives of another patient with rabies made up the group presenting for prophylaxis after human exposure. None had sustained bites or salivary exposure of mucosa or broken skin.

Non compliance to a standard rabies post-exposure protocol was found in 193 instances (27.5%). Prophylaxis was not given as indicated in 51.3% and inappropriately given in 48.7% of patients in this group. Withholding of anti-rabies serum(ARS) when indicated was the major non compliance in the first category. In addition, patients did not return for vaccine on the indicated dates. This may have implications for the 2 dose intradermal regimen where strict adherence to the schedule is crucial for the development of protective immunity.

2615 vials of anti-rabies vaccine was used in the study period. 357 patients were given ARS, for which 463 vials of ARS were used. The total entimated cost of vaccine was Rs 1,091,000/=.

Discussion

Human rabies is a disease with 100% mortality. Transmission of the rabies virus is by contact with saliva of animals excreting virus. As the virus cannot penetrate intact skin, some break in the skin or inoculation via a bite is necessary for infection. However, virus can penetrate intact mucosa. Factors such as whether virus excretion is occuring at time of contact, titre of virus in saliva, and immediacy of washing following contact, influence the final outcome of infection or non-infection.

Efforts to eliminate human rabies by vaccination were begun in the late 19th century by Louis Pasteur, who prepared a live viral vaccine by passaging the brain of a rabid cow through rabbits until a non virulent strain was obtained. The "Semple" phenol inactivated adult animal nerve tissue vaccines were used for post-exposure prophylaxis from 1902 until the 1970's when the first cell culture vaccine became available. Semple type vaccines were relatively non-immunogenic, requiring large volumes and several doses (17-21) of vaccine for effective immunity. As they contained brain tissue, allergic encephalomyelitis was a recognized post vaccine complication. Cell culture vaccines are more immunogenic, requiring only 5 one ml injections. They are also safe (2). However, they are more expensive. Their effectiveness and safety has lowered the threshold for requesting and prescribing post exposure prophylaxis, thereby substantially increasing the cost of this programme.

Although efforts have been made in Sri Lanka to reduce the burden of animal rabies, there has been limited success for a variety of reasons. Animal rabies remains endemic and risk exposures occur daily throughout the country, creating a demand

for post exposure prophylaxis. Information of patient characteristics and risk encounters may help target specific groups and / or behaviours for cost-effective rabies prevention strategies.

876 patients were seen at the rabies clinic at the General Hospital, Kandy (GHK) in a 2 month period in 1997. Although the majority of patients were from the central province (94%), and 79% lived within a 25 km radius of the hospital, 66% of the group took more than half an hour to reach the hospital. The 501 (57.2%) patients who required prophylaxis would have to travel on 4 more occasions, increasing their travel from distant places such as Mahiyangana, Ampara, Dambulla and Anuradhpura took more than 3 hours for a single trip. Their total travel time for the whole course would exceed 30 hours. The time taken for administering post exposure prophylaxis for the individual patient needs to be reduced. As patients living more than 25 km away had lengthy travellung times, an effort needs to be made for all General and Base Hospitals to stock both ARV and ARS. A continuing supply also needs to be ensured so that patients need not travel vast distances on 5 occasions to receive this vaccine.

Approximately half the patients were seen at another health care facility and referred to GHK for assessment or because vaccine or anti-rabies serum were not available at the initial centre. Only 18.2% of this group did not need vaccine. In contrast, 45.6% of the self referrals assessed at clinic did not require post exposure prophylaxis.

The majority of risk exposures were to dogs as is documented world wide. 72% of the dogs and cats encountered by the study group were claimed to be 'domestic' animals, which meant that observation of the animals for a 10 day period was possible. Of 253 patients asked to observe the animal and report immediately if the animal died or disappeared, or at 14 days if the animal remained healthy, 215 did as requested. None of this group was offered prophylactic vaccination (5, 6, 7). A high proportion of the 253 patients asked to observe a domestic dog/cat returned as requested. Patients can be trusted to observe domestic animals. The assessment of the animal in the risk assessment protocol should be retained.

The observation that only 13.6% of dogs and none of the cats had received vaccine in the previous year is disquieting. The reasons for non-vaccination were not obtained. However, a strategy which includes the creative use of the media to increase immunization of domestic dogs and cats would be useful, considering that almost 75% of risk encounters were to this group of animals.

GHK uses a standard protocl for the management of patients (5,6) presenting for rabies post-exposure prophylaxis. This limited study shows the difficulty in maintaining compliance with a protocol, even when staff dedicated to the task are used. The level of compliance to protocol is likely to be less when staff assessing need for prophylaxis are changed often. With safe vaccine, the tendency would be towards over use of vaccine with attendant increase in cost, although this is not demonstrated in the study. Widespread dissemination of protocols and regular audit of compliance would reduce this tendency and also ensure use of anti-rabies serum when indicated.

The cost of vaccine alone in a 2 month period in a single hospital in Sri Lanka is estimated at Rs 1,091,000/=. This could be reduced by the use of the intradermal vaccination regime as recommended by WHO (7) which has been introduced recently in selected hospitals in Sri Lanka. However, additional costs which would include consumables such as needles and syringes, cotton wool and antiseptics and the cost of labour including those of medical and nursing staff would be similar or higher although vaccine costs would be reduced substantially. Individual patient costs were not assessed in this study. However, travel costs and wages lost would contribute to the financial burden of many patients requiring prophylaxis.

Apart from the tragedy of human rabies and the anxiety generated by risk exposures, the cost of over a million rupees in a 2 month period in a single hospital and the time lost by both patients and staff for post exposure prophylaxis is a cause

for concern. Increasing dog / cat immunization by targeting owners of domestic animals, retaining assessment of the risk status of the animal to which exposure has occurred in the post-exposure protocol with regular audit of compliance to protocol and maintaining a supply of ARV and ARS in General and Base Hospitals are 3 ways by which cost savings could be made without compromising post-exposure prophylaxis in patients genuinely at risk of rabies.

Acknowledgements

We wish to thank the Director, General Hospital, Kandy for granting permission to carry out this study, Dr Jayantha Weerasinghe of the Faculty of Dental Sciences, University of Peradeniya for computer and statistical help and staff of the Emergency Unit of General Hospital, Kandy for their corporation during the patient interviews.

References

1. Annual Health Bulletin Sri Lanka 1995; 102.
2. Fishbein D B, Bernard K W. Principles and Practice of Infectious Diseases. Mandell, Douglas and Bennett 4th Edition NewYork Churchill Livingstone 1995; 1536.
3. Bogel K, Meslin F X. Economics of human and canine rabies elimination: guidelines for programme orientation. Bulletin of the World Health Organization 1990; 68: 281-291.
4. Bogel K, Motschwiller E. Incidence of rabies and post-exposure treatment in developing countries. Bulletin of the World Health Organization 1986; 64: 883-887.
5. Immunization against Infectious Disease DHSS Edited by David M Salisbury & Norman T Begg London HMSO 1996 pp 186-187.
6. WHO Technical Report Series 824: WHO Expert Committee on Rabies 8th Report WHO Geneva 1992 pp 23.
7. WHO recommendations on Rabies Post Exposure treatment and the correct technique of intradermal immunization against rabies WHO 1997 pp 1-3.