Epidemiology of reported human rabies cases in Nepal, 1992-1996

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Abstract

Human rabies is the most dreadful of all communicable diseases. Human rabid cases are reported from time to time in Nepal. An estimated 100 or more persons die of hydrophobia in Nepal annually. With an objective to study the epidemiology of human rabies in Nepal, all the human rabid cases were collected in a standard format from different hospitals during the period from 1992 to 1996. The analysis of reported human rabid cases indicates that rabid cases are reported from both rural and urban areas of Nepal due to negligence after animal bite. A total of 181 cases were reported in the kingdom of Nepal during the period from 1992 to 1996. All the hydrophobia cases except one were diagnosed on clinical background. Only 6 patients developed rabies despite complete or partial anti-rabies vaccination during the last 5 years. Sixty-one percent human rabid cases were reported from Central Development Region alone. Forty to eighty-one per cent hydrophobia patients were children. The male to female ratio was 3:1.

Dog bite was the primary source of infection, 96 per cent hydrophobia patients were exposed to a rabid dog. Adult patients were bitten mostly in lower extremities whereas child patients were bitten in upper extremities and highly sensitive areas like head, neck and finger tips.

Keywords: Human rabies; hydrophobia; dog; source of exposure; site of bite; incubation period.

Introduction

Human rabies is the most dreadful of all communicable diseases. Rabies is usually of the 'furious' type in man. The most characteristic symptom of human rabies is spasm of the muscles of deglutition often precipitated by an attempt to swallow from which the disease gets its name 'hydrophobia'. The infection usually results from the bite of a rabid animal. Worldwide, dogs transmit more rabies to humans than any other animal. Cat, wolf, jackal and mongoose are known to play an important role in transmitting rabies to humans in many Asian countries including Nepal. Man to man transmission, although rare, has occured via corneal grafts from donors who have died from undiagnosed neurological disease i.e. rabies encephalitis.

The incubation period in human rabies is more variable than any other disease, ranging from four days to many years (Hattwick and Gregg, 1975). In general, incubation period tends to be shorter in severe exposures and bites on face, head and upper extremities and longer in respect of bites on lower extremities. Bites by wild animals are more dangerous than bites by domestic animals.

The true incidence of human rabies throughout the world is unknown. Rabies is under-reported, partly for political reasons, partly because its untreatable nature is well known and patients prefer to die at home, and partly because it maybe unsuspected as a cause of death. Though the exact figures are not available, the worldwide number of human rabid deaths is estimated to be between 35,000 and 50,000 annually (WHO, 1997). It is estimated that South-East Asian region accounts for approximately 80% of tragic human deaths due to rabies in the world. An estimated 100 or more persons die of hydrophobia in Nepal annually (Zoonoses Bulletin, 2049).

In Nepal, only human patients seen or treated at government hospitals are reported. When reported, the diagnosis of rabies is reasonably trustworthy, as in rabies endemic areas the rather characteristic clinical symptoms are well recognized. Moreover, most patients complain that they were bitten by a dog some time ago which was killed or disappeared spontaneously. It must be noted that most hospitals do not admit hydrophobic patients to avoid possible consequences due to exposure of medical staffs to a rabid patient. Nevertheless, most hospitals are now reporting hydrophobic cases if the case is diagnosed in the emergency ward by a physician.

Although epidemiological information related to human rabies is valuable to improve post-exposure prophylactic treatment of patients, it is rarely available. It is high time to analyse reported human rabid cases in Nepal in such a way that the mortality due to rabies could be reduced by improving current practices of post-exposure prophylaxis (PEP) of patients exposed to a rabid animal.

Materials and Methods

The surveillance data were submitted monthly by central, regional, sub-regional, zonal and district hospitals to the Epidemiology and Disease Control Division (EDCD). Information recorded on this data form included name and address of hydrophobic patients, age, sex, source of exposure, the species of animal involved, site of bite, date of bite, date of death. The hospital also provided information about vaccination failure if it happened to a hydrophobic patient.

All the reported cases during the period 1992 - 1996 were studied to examine the following:

- the distribution of reported hydrophobic cases in Nepal;
- the age and sex distribution of hydrophobic patients;
- the source of exposure to rabies;
- the correlation between site of bite and development of rabies in patients;
- the cases of Pot-exposure Prophylaxis failure.

All patients aged over 15 were considered as adult.

Results

A total of 181 human rabid cases were reported in the kingdom of Nepal during the period of 1992 - 1996. Out of 181 patients, only 165 (91%) patients were Nepalese residing in 37 different districts. All the hydrophobic cases except one were diagnosed on clinical background. A child-patient with suspected rabies encephalitis admitted to the Kanti Children Hospital was diagnosed using Mouse Inoculation Test (MIT). Ninety-seven percent of hydrophobic patients did not seek anti-rabies vaccination. Only 6 patients developed rabies despite complete or partial anti-rabies vaccination during the period of 1992-1996. District-wise, distribution of human rabid cases from 1992 to 1996 is presented in Table I.

Table I: District-wise human rabid case distribution in Nepal by year, 1992-1996.

Year	*1992*		*1993*		*1994*		*1995*		*1996*		
Districts	*Adult*	*Children*	*Adult*	*Children*	*Adult*	*Children*	*Adult*	*Children*	*Adult*	*Children*	*Total*
Taplejung	0	0	0	0	0	0	0	0	0	1	1
Pachthar	0	0	0	0	0	1	0	0	0	0	1
Jhapa	2	2	1	0	1	0	1	0	0	1	8
Terhathum	0	0	0	0	0	0	0	0	1	0	1
Sunsari	0	1	0	1	0	1	0	1	0	2	6
Morang	0	1	2	0	1	1	1	7	2	3	18
Saptari	0	0	0	0	0	0	0	1	0	0	1
Udaypur	0	0	1	0	0	0	0	0	0	0	1
Khotang	0	0	0	0	0	0	0	1	0	0	1
Siraha	1	0	0	0	0	1	0	0	0	0	2
Dhanusha	2	0	1	0	0	2	0	0	0	0	5
Mahottari	0	0	0	0	0	0	0	0	0	1	1
Sindhuli	0	1	1	0	0	1	0	0	0	0	3
Ramechhap	0	0	0	0	0	0	0	0	0	1	1
Dolakha	0	0	1	0	0	0	0	0	0	0	1
Sarlahi	0	0	1	2	0	0	0	0	0	0	3
Bara	0	0	1	2	1	8	0	3	0	0	15
Parsa	1	0	1	0	2	4	1	1	0	1	11

Chitwan	2	2	2	0	0	0	0	0	0	0	6
Kathmandu	0	0	4	6	5	2	0	0	3	2	22
Bhaktapur	0	0	1	2	0	2	0	0	0	0	5
Lalitpur	1	0	1	2	0	0	1	0	0	0	5
Sindhupalchowk	0	0	0	2	0	0	0	0	2	0	4
Nuwakot	5	3	3	0	1	0	0	0	0	1	13
Dhading	0	0	1	0	0	3	0	0	2	0	6
Gorkha	0	1	1	1	0	0	0	0	0	0	3
Tanahu	0	0	0	0	0	0	0	0	0	1	1
Lamjung	1	0	0	0	0	0	0	0	0	0	1
Syangja	1	0	0	0	0	0	0	0	0	0	1
Nawalparasi	1	0	0	0	0	0	0	0	1	0	2
Rupandehi	0	1	1	0	0	0	0	1	1	0	4
Kapilbastu	0	0	0	0	0	0	0	0	1	0	1
Pyuthan	1	0	0	0	0	0	0	0	0	0	1
Dang	0	0	0	0	3	0	0	0	0	0	3
Banke	0	0	2	0	0	1	0	0	0	0	3
Bardiya	0	0	1	1		0	0	0	0	0	2
Kanchanpur	0	0	1	0	1	0	0	0	0	0	2
Total	18	12	28	19	15	27	4	15	13	14	165

During the last 5 years, 79 (48%) human rabid cases were reported mainly from Kathmandu, Morang, Parsa, Bara and Nuwakot. Sixty-one percent of human rabid cases were reported from the Central Development Region (16 districts) alone.

The age and sex distribution of human rabid cases reported from 1992 to 1996 is presented in Figure 1.

Hydrophobic patients (%)

Epidemiology and Disease Control Division

Fig. 1: Patient's age, gender distribution by year in Nepal, 1992-1996

Figure 1 shows that the majority of reported human rabid cases were observed in children. It is important to note that 40 to 81 per cent of hydrophobic patients were children during the period of 1992-1996. The male to female ratio was 3:1.

The distribution of human rabid cases according to the source of exposure is presented in Figure 2.

* Mongoose, Cat, Calf

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Fig. 2: Source of Exposure, Human Rabies in Nepal, 1992-1996.

As can be seen from the Fig. 2, dog bite was the primary source of infection. Ninety-six per cent of hydrophobic patients were exposed to a rabid dog. Other patients were exposed to rabid jackal, cat, mongoose and calf.

The distribution of site of bite in adult and child patients is presented in Figure 3.

Fig. 3: Distribution of site of bite among hydrophobic patients, Nepal 1992-1996

Fig. 3 indicates that adult patients were bitten mostly in lower extremities. In contrast, only forty-seven per cent of child patients were bitten in lower extremities whereas other patients were bitten in upper extremities and highly sensitive areas like head, neck and finger tips.

The relationship between site of bite and development of rabies in adult and children patients is presented in Table II.

Table II: Site of bite and development of rabies in adult and children patients.

	Site of Bite (Wks.)						
	Face/ Head	*Finger*	*Arm*	*Hand*	*Buttock*	*Thigh*	*Leg*
Average	4.7	8.7	9.5	7.8	9.0	8.8	9.3
Min	2	3	4	4	6	7	3
Max	10	12	22	20	12	13	20
Median	4	9	8.5	6	9	8	8

Children

	Site of Bite (Wks.)					
	Face/ Head	*Finger*	*Arm*	*Hand*	*Thigh*	*Leg*
Average	2.3	5.4	7	8.4	7.0	11
Min	2	3	7	4	5	4
Max	3	13	7	20	9	34
Median	2.0	4	7	6	7	10

Adult The results indicate that a patient may develop rabies within two weeks after severe exposure to a rabid animal. It may take 34 weeks to develop rabies in patients bitten in leg by a rabid animal.

Six well-documented human rabid cases despite anti-rabies vaccination were recorded during the last five years in Nepal. The detailed information of those cases is presented in Table III.

Table III: Human rabid cases despite post-exposure prophylaxis.

Case No.	*Year*	*Address*	*Age*	*Sex*	*Biting animal*	*Site of bite*	*Type of vaccine used*	*Remarks*
1	1992	Nuwakot	40	M	Jackal	Thigh	Semple type	Incomplete

2	1993	Chitwan	65	M	Dog	Leg	Semple type	Complete/Alcoholic
3	1993	Kathmandu	53	M	Dog	Face/Head	Semple type	Complete
4	1994	Pachthar	8	F	Dog	Trunk	Semple type	Complete
5	1994	Kathmandu	22	M	Dog	Finger	Semple type	Partial
6	1996	Kathmandu	15	F	Dog	Face	Semple+Serum	

As can be seen from the Table III, all patients except one were bitten by rabid dogs. The reason of post-exposure prophylaxis failure was not the same in each case. Some patients developed rabies due to incomplete or partial vaccination. One patient took a single dose of Semple-type vaccine in Trisuli Hospital and went back to his village. In another case, a daily-wage worker from Nepal Electricity Authority refused to take a full course of Semple-type vaccine due to pain. A middle-class patient had a severe bite in his face and hand. He was advised to take Human rabies immunoglobulin (HRIG) but he decided to take a full course of Semple-type vaccine. It was unfortunate that a female patient developed rabies despite the application of Anti-rabies serum (ARS) and vaccine in time.

Discussion

A total of 92 human rabid cases were recorded in Nepal during the period of 1982/83 - 1988/1989 (Joshi *et al*, 1991) whereas the present study indicates that 181 hydrophobic cases were recorded in Nepal during the last 5 years. It is a clear indication of improving hydrophobic case-reporting-system in this country. Moreover, epidemiologically important information of a hydrophobic patient is now available for further investigation which was lacking in the past. It is expected to minimise under-reporting of hydrophobic cases by improving the supply of ARV and providing training to medical staff working in emergency and vaccination units of different hospitals. More rabid cases were reported from central and eastern development regions of Nepal because health staff are more conscious about case reporting. In addition, the consumption of ARV is very high in these regions. The EDCD is urging hospitals of both regions to provide basic information on post-exposure rabies treatment and human rabid cases so that ARV supply could be ensured.

Many studies show that children account for the largest percentage of human rabid cases. The 1-14 age group is the most affected. In our study, 40 to 81 per cent hydrophobic patients were children.

According to the previous study, ninety-four per cent of total patients were bitten by rabid dogs (Joshi and Regmi, 1983). Ninety-five percent of total hydrophobic patients were bitten by a rabid or rabies suspected dog during the period of 1982/83 - 1988/1989 (Joshi *et al*, 1991). We found that dog bite is still the primary source of human rabies infection. In our study, ninety-six per cent of hydrophobic patients were exposed to rabid dogs. More than 95% of human rabid cases were reported in India and Sri Lanka due to dog bite (Bhatia, 1998; WHO, 1997a). Wild animals like jackal, mongoose, monkey, fox (Joshi *et al*, 1991) and cat were also responsible for rabies transmission in Nepal which should be taken into consideration for post-exposure prophylaxis. The author observed that many hydrophobic patients did not bother to take anti rabies vaccine simply because the biting dog was unknown or disappeared or killed by community members.

The location of rabid animal bites in 18 human rabid cases was distributed as head 17.7%, fingers 33.3%, hands 33.3% and lower extremities 16.7% (Joshi and Regmi, 1983). In our study, we analyzed the site of bite in adult and children patients separately and found that children were bitten in most dangerous areas like head, face, neck and finger tips (24% of the total cases). Adult patients were mostly bitten in lower extremities (69%). A detailed epidemiologic study in urban areas in Latin America showed that 25.6% of bites are inflicted on the head and neck in children as compared to 11.7% in adults (Szyfres *et al*, 1982). A person bitten on the head, neck or finger tips by a rabid animal is at a greater risk of developing rabies than one bitten on the trunk. The reason for this greater risk of transmission in these sites is that these areas are relatively richer in peripheral nerve supply, not the distance from the central nervous system (Sikes, 1975). The incubation period of rabies in these cases maybe as short as 2 weeks and therefore it is recommended to use vaccine plus serum if it is available in the market.

The study results indicate that ninety-seven percent hydrophobic patients did not seek anti-rabies vaccination when they were exposed to a suspected rabid animal. Most probably, the majority of them did not know that rabies can easily be prevented by vaccination. On the other hand, anti-rabies vaccine may not be available in district hospitals when it is badly needed for patients. Regular supply of vaccine to different hospitals and mass awareness programmes become necessary to reduce the incidence of human rabid cases.

A number of hydrophobic cases have been recorded in Nepal despite anti-rabies vaccination. We found that patients developed rabies despite anti-rabies vaccination due to negligence, late application of vaccine or no use of serum in case of severe bite.

Conclusion

Since canine rabies is the major epidemiological pattern of the disease and dog bite is the primary source of human

infection, it will be necessary to put major emphasis on stray dog control and compulsory vaccination of pet and community dogs in endemic areas.

It is highly recommended to organize teacher's training on rabies prevention by rabies experts especially in the Kathmandu valley and Terai districts from where the majority of rabid cases are reported. Major emphasis should be given on washing the wound with soap and water immediately after dog bite, and consulting doctor or health worker for anti-rabies vaccination in case of severe bite.

Since children are frequently exposed to rabies infection and it is 100% fatal, every effort should be made to educate parents to consult physician or health worker for post-exposure prophylaxis in case of dog bite.

It is important that we should take every possible means to provide maximum safety to the patient. Every effort should be made to encourage patients to take full course of anti rabies vaccine in time. It is strongly recommended to use highly potent tissue-culture vaccines in double doses on the first day if serum is not available or patient is not in a position to buy it.

Many patients refuse to take the painful course of Semple-type rabies vaccine for 10 days. Tissue-culture rabies vaccines are highly immunogenic, less painful and have negligible side effects in comparison to Semple-type vaccine. The government should introduce intradermal (I/D) schedule of tissue-culture rabies vaccine in big hospitals so that the general public could afford the cost of vaccine.

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