

Study on Fate of Rabies Patients following Canine Animal Bite or Scratch

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ABSTRACT

Background & objective: Rabies is major public health problem in Bangladesh, although little epidemiological information is available about the disease. The present study is, therefore, intended to assess the extent of animal bite and rabies, and the status of post-exposure prophylaxis in Bangladesh.

Materials & Methods: Data were retrospectively collected from clinical records and registers of patients with animal bites and rabies cases attended at IDH between January 2010 to December 2012. All the rabies cases were diagnosed clinically and were analysed using descriptive statistics.

Result: Of the 276 patients of rabies patients admitted in the Infectious Disease Hospital, Mohakhali, Dhaka during the period 2009 to 2013, about 39% were 10 or <10 years old and 26.4% more than 40 years old with mean age of the patients being 26 years (range: 2-90 years). Over three-quarters (76.1%) were male (3:1). Majority (80.1%) was rural resident. The injuries were primarily inflicted by bite (92%) and rarely by scratch (8%). About 96% had injury with bleeding. Dogs were the prime biting animal (88%) followed by cat (7.2%), jackal (2.9%), mongoose (1.4%) and others (0.4%). About three-quarters (74.6%) of the animals were stray animal, followed by rabid (mad) animal (18.1%), pet (4.3%) and others (2.9%). In most cases (82.6%) the biting animal could not be traced. Most of the patients received bite in lower limbs (76.4%), were multiple (70%) and were of category III (96%). Of the total cases, only 34(12.3%) received vaccine before admission at our hospital. Of them only 9(26.5%) completed the course schedule. Half of the patients received vaccine from the pharmacy and 38.3% from Institute of Public Health (IPH). However, over 60% of the patients were uncertain about their preservation status. More than 60% of patients took more than 40 days to develop rabies following bite, 27.5% 20 - 40 days and 10.9% < 20 days. The mean interval was 72.8 days (range 10 days to 3 years).

Conclusion: Rabies is usually a disease of children, male and rural resident primarily caused by bite of stray dogs. The post-exposure prophylaxis is at its worst with majority does not receive vaccine. Protection by rabies immunoglobulin is even rare. None of the patients survived of the disease.

Key words: Rabies, Canine animal, bite/scratch, fate of rabies.

INTRODUCTION

Rabies, a dreadful zoonotic disease caused by rabies virus with horrifying symptoms. It is characterized by acute viral encephalitis which leads to fatality once the symptoms stated. The disease is invariably fatal in which the sick person is tormented at the same time with thirst

and fear of water (hydrophobia).¹ Rabies is primarily a disease of terrestrial and airborne mammals and is widely distributed across the globe. Rabies virus belongs to the genus Lyssavirus of the Rhabdoviridae family. The virus is present principally in the nervous system of rabid animal and is excreted via the saliva.²

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Globally, more than 7.7 million people undergo post-exposure prophylaxis (PEP) for rabies and more than 55,000 people die of rabies each year, 99% of these occur in the developing countries³ largely due to inadequate rabies control measures. Control of stray dogs and vaccination of pet animals has led to reduced disease in several countries. However, recent increase in human deaths in several countries evidenced that rabies is reemerging as a serious public health crisis.⁴⁻⁷ Most deaths occurred in Asia and Africa. Rabies, takes away lives worldwide in every 10 minutes and most victims are children. According to World Health Organization (WHO), 1550 people die of rabies and about 100,000 people are getting post-exposure treatment (PET) each year. Recent survey by Disease control unit (2007) shows rabies death is more than 2000 per year in Bangladesh.

Animal bites, if managed appropriately and timely the disease is preventable to a large extent indicating that post-exposure treatment of animal bite cases is of prime importance.¹ Safe and effective vaccines are available to prevent rabies in animals and humans before and after exposure. To prevent rabies after exposure the WHO recommends cleaning and disinfecting a wound or point of contact and then administering anti rabies immunization as soon as possible.² Rabies vaccine is recommended for category II and III exposures, in addition rabies immunoglobulin (RIG) is recommended for category III contact.² Rabies is a major public health problem in Bangladesh ranking third (in terms of mortality) in the world after India and China.⁸

Rabies is not a notifiable disease in Bangladesh and there is no organized surveillance system for the disease. Therefore, reliable data are scarce and the mortality may be several fold higher than anticipated. Faced with this context, it is of utmost importance to evaluate the overall situation of animal bites and its treatment and preventive aspects in Bangladesh. As Infectious Disease Hospital (IDH) is the main referral center

for rabies patients, most of the animal bite cases from different corners of the country turn up here to receive free vaccine and treatment. This study was therefore carried out at IDH to assess the extent of animal bite and rabies, and the utilization of vaccines in Bangladesh.

MATERIALS & METHODS

Data were retrospectively collected from clinical records and registers of patients with animal bites and rabies cases attended at IDH between January 2010 to December 2012. All the rabies cases were diagnosed clinically. Demographic data, injury profile, profile of biting animal including species involved, inoculation of rabies vaccine, treatment with rabies immunoglobulin (RIG), type of vaccine administered, interval between development of rabies, symptoms manifested and fate of patients were collected using a structured data collection sheet. Targeted information of all cases was not retrievable from the documents as several of these were incompletely recorded. Perhaps, the concerned medical officer could not elicit a detailed history from the guardian at the time of reporting. Data were processed and analysed using SPSS (Statistical Package for Social Sciences), version 16. The test statistics used to analyse the data were descriptive statistics.

RESULT

Nearly 40% were 10 or < 10 years old and 26.4% more than 40 years old with mean age of the patients being 26 years. The youngest and the oldest patients were 2 and 90 years respectively. Majority of the patients was male (76.1%) (male to female ratio 3:1) and rural residents (80.1%) (Table I). Most (92%) of the injuries was caused by bite, only 8% were caused by scratch. Of the injured patients, about 96% had injury with bleeding and rest (4.3%) had injury without bleeding. Most of the patients received bite in lower limbs (76.4%). Face and body each injured in 10.5% and head and neck 9.4% and 4.3% cases respectively. More than 70% of the patients received multiple bites and

rest single bites (Table II). In terms of severity, 96% were of severe (category III), 2.2% moderate (category II) and 1.8% mild (category I) (Fig. 1). Most (88%) of the biting animals was dog, only 7.2% were cat. A few were jackal (2.9%), mongoose (1.4%) and others (0.4%). Around three-quarters (74.6%) of the animals were stray animal, followed by rabid (mad) animal (18.1%), pet (4.3%) and others (2.9%).

TABLE I. Distribution of patients by their demographic characteristics (n = 276)

Demographic characteristics	Frequency	Percentage
Age* (years)		
≤ 10	107	38.8
10 - 20	38	13.8
20 - 30	34	12.3
30 - 40	24	8.7
>40	73	26.4
Sex		
Male	210	76.1
Female	66	23.9
Residence		
Rural	221	80.1
Urban	50	18.1
Semi-urban	5	1.8

*Mean age = (26.0 ± 21.6) years; range = (2 - 90) years.

TABLE II. Distribution of patients by Injury related profile (n = 276)

Injury related profile	Frequency	Percentage
Nature of injury		
Scratch	22	8.0
Bite	254	92.0
Type of injury		
With bleeding	264	95.7
Without bleeding	12	4.3
Site of bite*		
Head	26	9.4
Face	29	10.5
Neck	12	4.3
Body	29	10.5
Upper limbs	131	47.5
Lower limbs	211	76.4
Number of bites		
Single	82	29.7
Multiple	194	70.3

*Total will not correspond to 100% for multiple response.

TABLE III. Distribution of patients by type of biting animal profile (n = 276)

Biting animal Profile	Frequency	Percentage
Biting animal		
Dog	243	88.0
Cat	20	7.2
Jackal	8	2.9
Mongoose	4	1.5
Others	1	0.4
Nature of animal		
Stray animal	206	74.7
Rabid (mad) animal	50	18.1
Pet	12	4.3
Others	8	2.9
Fate of the animal		
Alive & healthy	8	2.9
Sick	1	0.4
Dead	11	4.0
Killed	28	10.1
Not found	228	82.6

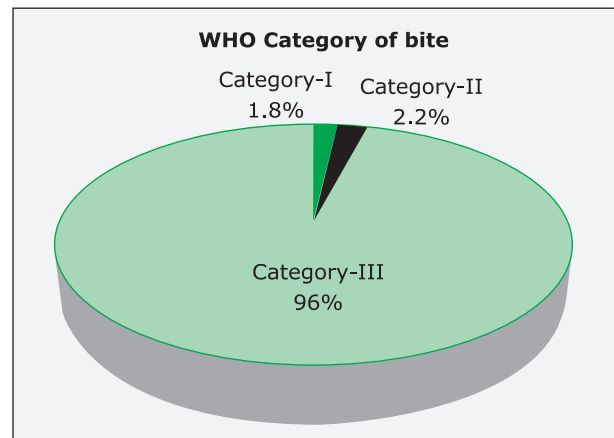


FIGURE 1. Distribution of patients by severity of bite

In most of the cases (82.6%) the biting animal could not be traced, while 10.1% were killed, 4% died, 2.9% alive & healthy and 0.4% sick (Table III). Out of 276 cases, only 34(12.3%) received vaccine before admission at our hospital. Of them only 9(26.5%) completed the course schedule (received vaccine in full dose). Half of the patients received vaccine from the pharmacy and 38.3% from Institute of Public Health (IPH), 8.8% from Poursava and 2.9% from health centres. However, over 60% of the patients were

uncertain about their preservation status (Table IV). More than 60% of patients took more than 40 days to develop rabies following bite, 27.5% 20 to 40 days and 10.9% < 20 days. The mean interval was 72.8 days (Table V). The full-blown rabies cases invariably complained of hydrophobia (98.9%) and aerophobia (93.8%). Patients rarely developed photophobia (0.7%) (Fig. 2).

TABLE IV. Distribution of patients by vaccine-related profile

Vaccine-related profile	Frequency	Percentage
History of vaccination	34	12.3
Dose of vaccine (n=34)		
Adequate	9	26.5
Inadequate	25	73.5
Course of vaccine (n=34)		
Complete	9	26.5
Incomplete	25	73.5
Source of vaccine (n=34)		
IPH	13	38.3
Health centres	1	2.9
Pourosova	3	8.8
Pharmacy	17	50.0
Preservation of vaccine (n=34)		
Proper	13	38.3
Not proper	21	61.7

Total will not correspond to 100% for multiple responses.

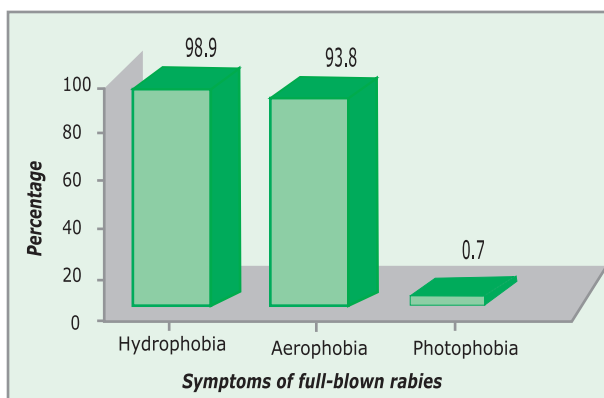


FIGURE 2. Distribution of patients by symptoms of full-blown rabies (n = 276)

TABLE V. Interval between bite & development of rabies (n = 276)

Interval between bite and development of rabies (days)	Frequency	Percentage
< 20	30	10.9
20 - 40	76	27.5
> 40	170	61.6

Mean interval = (72.8 ± 6.04) days; range = (10-1095) days.

DISCUSSION

The present study explores the current situation of human rabies, details of biting animal, profile of injury, fate of human rabies and post-exposure prophylaxis including utilization of vaccine. The study revealed that a sizable portion (about 39%) of the animal bite/scratch victims were children (≤10 years old), predominantly male (76.1%) (male-female ratio 3:1). A recent survey conducted in 30 Upazilas (Sub-district) by Hossain et al⁹ also demonstrated that children (≤10 years old) were the usual victims (34%) and male outnumbered the female by 3:2. As reported from other countries children and young people were the most vulnerable group for animal bite and were at highest risk of developing rabies.^{3,10,11} Together they constituted 73% of patients with rabies and animal bites. The reason for this vulnerability is unknown but possibly several factors exists. Children express natural affection for animals particularly for cats and dogs as a result they come in close contact with animals. Some children provoke/tease them as well. Again male were found more susceptible to animal bite possibly due to more chances of contact with animal as men spent more time outdoor. The present study showed that victims were mostly rural residents (80%). Consistent with this finding, recent studies in Bangladesh have also shown that rabies is largely prevalent in rural areas.⁹

The epidemiology of rabies is multifactorial and various factors are responsible to its high incidence in rural Bangladesh. Nevertheless, the only referral centre for rabies and animal bite

victims in the country, the IDH is situated in Dhaka, but economic or transportation constraints prevent many victims of animal bites and rabies in rural areas reaching it. As a result large number of people receives treatment locally or no treatment at all and is excluded from the mainstream statistics for animal bites and rabies. According to WHO, 1550 people die of rabies in Bangladesh each year¹² and 60000 seek post-exposure prophylaxis.¹³ However, these figures may be an underestimate of the true picture and death rate from rabies in developing countries may be 100 times higher than officially reported.⁹

Profile of biting animal as recorded showed that dog was the prime animal (88%) followed by cat, fox/jackal, mongoose and others. The stray animal comprised the main bulk (74.6%) followed by rabid animal (18.1%) and pet (4.3%). In majority of the cases the biting animal could not be traced (82%). Hossain et. al¹⁴ in a hospital-based study in Bangladesh demonstrated that dog bite was most frequent (90.7%) followed by cat (5.0%), fox/jackal (0.4%), mongoose (0.3%) and undetermined animals (3.6%). Hossain et al. in another population-based study also reported that dog-bite was the most frequent (75.3%), followed by cat (22.7%) and unknown animals (2%).⁹

They also showed that about 55% of the rabies cases were caused by free-roaming ownerless animal and 43% by free-roaming owned animal (2.8%). Stray dogs, followed by stray cats, were the principal animal responsible for bite and the transmitter of rabies in Bangladesh as has been reported from other countries.^{10,11,15-17} Government of Bangladesh has stray dog elimination programme in urban areas (though limited), but it is completely absent in the rural area where incidence of the disease is higher. Therefore, to improve the animal bite and rabies situation in Bangladesh, the Government has to put concerted effort in the rural area.

Most of the patients received bite in lower limbs (76.4%) and 47.4% in upper limbs. Face and body each injured in 10.5% and head and neck

in 9.4% and 4.3% cases respectively. Multiple bites were common (70%). Of the bites received, majority (96%) fell in category III (according to WHO criteria). Analysis of data of Hossain et al.⁹ showed that 46.8%, 47.8% and 5.4% had category III, II and I injury respectively. In 55% cases, the animal bites were below the knee, in 13.2% above the knee and in 15.3% cases in the finger. The frequency of bites in other parts of the body decreased in proportion to the distance from the lower limbs.⁹

Of the 276 rabies cases, only 34(12.3%) cases received post-exposure vaccine before admission at our hospital. Of them only 9(26.5%) completed the course schedule (received vaccine in full dose). Half of the patients received vaccine from the pharmacy and 38.3% from Institute of Public Health (IPH) and a few from Poursava and health centres, although over 60% of them were uncertain about their preservation status. In rabies patients about three-fourth of the patients did not receive any post-exposure vaccination. Of concern a good number of patients after receiving post-exposure vaccine developed rabies, which may be due to the absence of RIG from their treatment. Since RIG is expensive, only few patients were able to purchase it for treatment. These reveal the grievous situation of animal bite victims in Bangladesh.

The other reason for developing rabies may be the less effectiveness of Nerve Tissue Vaccine (NTV)^{18,19} which was mainly used for animal bite victims. Similar disappointing pictures are obtained from India and Pakistan. In a study in India it was found that about 80% of the victims did not receive any rabies vaccine and those received it, NTV was slightly higher than tissue culture vaccine (TCV). The use of RIG was negligible reflecting gross negligence on the part of both the bite-victim and healthcare system.¹⁵ From January 2005, India has discontinued the production of NTV. In Pakistan for post-exposure prophylaxis (PEP) all patients received NTV and only three of the 109 patients with category III bites received RIG.¹⁸ When rabies cases were

analyzed in Pakistan similar situation emerged, 67% of the victims received PEP by NTV without RIG and 40% only completed the full course of vaccination.¹⁹

Until recently the NTV was the mainstay for PEP. As per WHO recommendations, the production and use of this reactogenic vaccine should be gradually phased out from our country. Cell Culture Vaccines (CCV) are now being used for PEP in private and personal choice. Higher cost of intra-muscular application of CCV is a limiting factor for its wider use. To overcome this problem, WHO has recommended use of efficacious, safe and feasible intra-dermal (ID) route of inoculation of CCVs. India, Sri Lanka, Thailand and the Philippines have successfully adopted ID route of application of CCV against rabies as part of their policy. National authorities after expert consultation have approved the use of ID route for application of CCVs in Bangladesh in a phased manner. Hence, the guideline of prevention and control of rabies have been prepared with inclusion of correct technique of ID inoculation of CCVs.¹

Another study by Hossain et al. revealed that not only improper PEP but also a lack of knowledge about the appropriate first aid for animal bites results in significant death toll. Washing with soap, recommended by WHO for the management of animal bites, can significantly reduce the probability of acquiring rabies. However, about 60% of individuals who suffered rabies and animal bites did not wash the wound with soap.²⁰

Concluding the above discussion we find that rabies is usually a disease of children, male and rural residents, primarily caused by bite of stray dogs. The post-exposure prophylaxis is in deplorable situation with majority does not receive vaccine. Protection by rabies immunoglobulin is at its worst. Case fatality was observed to be hundred percent.

Finally from the above discussion, the following recommendations are put forward

1. The implementation of stricter laws for the vaccination of pet animals is urgently needed.

Public awareness regarding rabies should be created to successfully eliminate rabies from Bangladesh. Lack of public awareness may be partly blamed for the absence of motivation to eliminate rabies from Bangladesh.

2. Considering the current situation of rabies in the country, only one referral hospital for animal bite and rabies victims is not adequate. Therefore, it is better to establish several rabies centers across the country for better treatment and awareness of the people, and for the surveillance of rabies and animal bites in Bangladesh.
3. In rabies endemic country like Bangladesh, where animal rabies control programme is nonexistent, every animal bite is potentially suspected as a rabid animal bite and hence the management and care should be started immediately. Because of long incubation period, which is typical of most cases of human rabies, it is possible to institute PEP. However, it is desirable to initiate it at the earliest possible to ensure that the individual will be immunized before the rabies virus reaches the central nervous system. However, people who present for treatment even months after a possible rabies exposure or animal bite should be evaluated and given PEP as if the event had occurred recently.¹

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