

**Title:** FACTORS ASSOCIATED WITH DELAY IN POST-EXPOSURE PROPHYLAXIS AMONG ANIMAL BITE VICTIMS

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**Keywords** Animal exposures, rabies, prophylaxis, delay factors

**Abstract** Post exposure prophylaxis should be started immediately after any animal exposure to prevent rabies. However many a times there is a delay in receiving PEP. due to various factors like lack of awareness, negligence, non-affordability, lack of transportation/ access to health care facility, which may pose a potential risk to the exposed

## FACTORS ASSOCIATED WITH DELAY IN POST-EXPOSURE PROPHYLAXIS AMONG ANIMAL BITE VICTIMS

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### ABSTRACT:

**Background:** Post exposure prophylaxis should be started immediately after any animal exposure to prevent rabies. However many a times, there is a delay in receiving PEP; due to various factors like lack of awareness, negligence, non-affordability, lack of transportation/ access to health care facilities, non-availability of immune-biologicals and others, which may pose a potential risk to the exposed.

**Objectives:** 1. To describe the characteristics of animal exposures.

2. To determine the factors associated with delay in receiving post exposure prophylaxis.

**Methodology:** The study was conducted at the anti-rabies clinic, KIMS Hospital and Research Centre, Bangalore from January to December 2017. All the animal bite victims who had come for PEP were included in the study after taking their informed consent. The detailed information on exposure and the reasons for delay in receiving PEP was obtained.

**Results:** The study included 1214 animal bite victims. The biting animal was dog (92.1%) in most of the cases and were unprovoked bites (72.7%). The exposures were mainly on the limbs (91.9%) followed by head, neck and face (9.1%) and majority (94.8%) were category III exposures. Among the study subjects, 41.4 % had delay in PEP. The factors associated with delay in receiving PEP were lack of awareness (33.2%), lack of transportation/access to health care (20.3%), non-availability of immune-biologicals (18.1%), non-affordability (16.3%) and others.

**Conclusion:** Delay in PEP is an important issue and the factors for delay have to be addressed properly in order to prevent rabies and eventually eliminate by 2030.

**Key words:** animal exposures, rabies, prophylaxis, delay, factors.

### INTRODUCTION

Rabies can be prevented by timely and correct post exposure prophylaxis (PEP) after suspected or proven exposure to the virus.<sup>1</sup>The rabies virus (RABV) is transmitted to humans and other animals through close contact with saliva from infected animals i.e. bite, scratches, licks on broken skin and mucous membranes. Although a number of carnivorous animals serve as natural reservoirs, dogs are the main source of human infections and pose a potential threat to > 3.3 billion people Worldwide.<sup>2</sup>A combination of large human and dog populations in congested habitable areas combined with widespread poverty has led to more exposures in World Health Organization (WHO)'s South East Asia Region, than in any other part of the World, with more than 1.4 billion people in this region being at risk of rabies infection.<sup>3</sup>

The consequence of an exposure to RABV depends on several factors including the severity of the wound, the location of the bite on the body, the quantity and variant (genotype) of virus inoculated into the wound(s) and the timeliness of post-exposure prophylaxis (PEP). Therefore, when exposure is to an animal that is suspected, probably or confirmed to be rabid or when there is doubt about the factors that led to the exposure, PEP should be initiated and medical advice sought as early as possible.<sup>4</sup> PEP consists of: (1) thorough wound

washing with soap or detergent and water and/or virucidal agents to reduce the viral inoculum at the wound site (2) post-exposure vaccination to induce antibodies which lower the risk of RABV entering peripheral nerves after a bite from a rabid animal and (3) timely administration of RIG to neutralize the virus at the wound site.<sup>5</sup>

However many a times, there is a delay in receiving PEP; due to various factors like lack of awareness, negligence, non-affordability, lack of transportation/ access to health care facilities, non-availability of immune-biologicals, etc. which poses a potential risk to animal bite victims. The present study was done to know the characteristics of animal bites and factors associated with delay in receiving post exposure prophylaxis.

### MATERIALS AND METHODS

The present study was initiated after getting the Institutional Ethical Committee clearance and was conducted in anti-rabies clinic, Department of Community Medicine, Kempegowda Institute of Medical Sciences (KIMS) Hospital and Research Centre, Bangalore, India.

A prospective study was conducted from January to December 2017. All the animal bite victims who had come to the anti-rabies clinic to receive post exposure prophylaxis were included in the study after taking their informed consent. The detailed information regarding

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socio-demographic profile and characteristics of exposure was recorded using a pre-designed, semi-structured proforma. A detailed history regarding the time of exposure and reasons for delay in receiving post exposure prophylaxis, if any was also obtained.

All the study subjects were provided complete PEP as per WHO recommendation and the details regarding the PEP was also recorded.

The data obtained from the study was entered into a Microsoft excel sheet and analysed using mean & percentages; chi-square test was used to find out the association socio-demographic profile of animal bite victims and delay in receiving post exposure prophylaxis.

**RESULTS**

The present study included a total of 1214 animal bite victims who came for PEP at the anti-rabies clinic. The median age of the study subjects was 25 years with inter quartile range (IQR) 10-42 years and most of them were adults (51.9%) and children (38.5%). Majority of the study subjects were males (65.5%) and had studied high school and above (Table 1).

**Table 1:**  
**Socio - Demographic characteristics of the study subjects(n=1214)**

Socio - Demographic characteristics	Number	Percentage
Age	0-17	467 38.5
	18-59	630 51.9
	≥60	117 9.6
Sex	Male	795 65.5
	Female	419 34.5
Educational Status	Illiterate	101 8.3
	Primary school	142 11.7
	Middle school	81 6.7
	High school	241 19.9
	PUC	169 13.9
	Graduate	293 24.1
	Post graduate	18 1.5
	Not applicable	169 13.9
Occupation	Unemployed	40 3.3
	House wife	141 11.6
	Un skilled worker	55 4.5
	Semi- skilled worker	61 5.1
	Skilled worker	127 10.4
	Clerical/shop-owner/Farmer	104 8.6
	Semi-professional	86 7.1
	Professional	95 7.8
	Student	336 27.7
	Not applicable	169 13.9
Residence	Urban	981 80.8
	Rural	233 19.2

In the present study, the biting animal was dog in 92.01% of the study subjects followed by cat (5.11%), monkey (2.3%) and other biting animals were cow and horse. Among dog bites, 709 (57.9%) were stray dog bites and 413 (34.1%) were pet dog bites. Among them, only 12.7% of them were vaccinated against rabies (Table 2).

**Table 2:**  
**Characteristics of biting animal (n=1214)**

Characteristics	Number	Percentage
Biting animal	Dog	1117 92
	Pet (Owned)	413 34
	Stray(Unowned)	704 57.9
	Cat	62 5.1
	Monkey	29 2.3
	Cow	3 0.2
	Horse	3 0.2
Vaccination status of biting animal	Vaccinated	155 12.7
	Partially vaccinated	85 7.1
	Unvaccinated/Don't know	974 80.2

Majority of the exposures were abrasions (57.7%), followed by lacerations (32.1%) and punctured wounds (26.4%). The commonest site of bite was on lower limb (56.8%), followed by upper limb (35.1%), head neck and face (9.1%), trunk (5.2%) and genitals (0.7%). Most of these bites were unprovoked bites (72.7%) and happened outside the home (82.2%)(Table 3).

**Table 3:**  
**Characteristics of Exposure (n=1214)**

Characteristics	Number	Percentage
Type of Exposure	Abrasion	701 57.7
	laceration	389 32.1
	Puncture wound	321 26.4
	Lick on abraded skin	2 0.2
	Lick on intact skin	5 0.5
	Site of Exposure	Lower limb
Upper limb		426 35.1
Head, neck & face		110 9.1
Trunk		63 5.2
Genitals		8 0.7
Categorization of Exposure	Cat. II	63 5.2
	Cat. III	1151 94.8
Place of bite	Home	216 17.8
	Outside of home	998 82.2
Circumstance of bite	Provoked	331 27.3
	Unprovoked	883 72.7

In the present study, most of the animal bite victims had category III exposures (94.8%), followed by category II exposures (5.2%). 66.3% of animal bite victims had immediately washed wound(s) at home by water and soap and only 39.6% had applied antiseptics.

Among the study subjects, 41.4 % had delay in receiving PEP; among them 13.8% had delayed PEP by 24-48hrs, 9.7% by 48-72hrs and 17.9% had delayed by >72 hrs(Table 4).

**Table 4:**  
**Delay in PEP among animal bite victims(n=1214)**

PEP	Animal bite victims (n=1214)	
On Time (<24 hrs)	711(58.6)	
Delay	(24- 48hrs)	503(41.4) 168(13.8)
	(48-72hrs)	118(9.7)
	(>72 hrs)	217(17.9)

The factors associated with delay in receiving PEP were lack of awareness (33.2%), lack of transportation and access to health care (20.3%), non-availability of immune-biologicals (18.1%) non-affordability

(16.3%), negligence (9.7%) and non-disclosure of incident by children (2.4%)(Table 5).

**Table 5:**  
**Reasons for delay in PEP among animal bite victims (n=503)**

Reason for delay in PEP	Number
Lack of awareness about PEP	167(33.2)
Problem in transportation and access to health care facility	102(20.3)
Non availability of rabies biologicals	91(18.1)
Non-affordability	82(16.3)
Negligence	49(9.7)
Non-disclosure of incident by children	12 (2.4)

There was a significant association between socio-demographic factors like age and place of residence and animal bite characteristics like type of biting animal and type of exposure with the delay in receiving post-exposure prophylaxis (Table 6).

**Table 6:**  
**Factors associated with delay in PEP among animal bite victims**

Variables	Delay in PEP		X <sup>2</sup> value P value	
	Yes	No		
Age Group	0-17	199	268	11.9,
	18-59	273	357	0.002
	≥60	31	86	
Gender	Male	319	476	1.62,
	Female	184	235	0.2
Residency	Urban	393	588	3.9,
	Rural	110	123	0.04
Biting Animal	Dog	473	645	4.4,
	Other animal	30	66	0.03
Type of Bite	Abrasion/lick	218	490	13.9,
	Laceration	160	229	0.009
	Puncture wound	125	196	
Category of bite	III	469	682	4.3,
	II	34	29	0.03

## DISCUSSION

Rabies is a neglected zoonotic disease (a disease that is transmitted from animals to humans) caused by the rabies virus (RABV). The neglected disease indicates that, it is insufficiently addressed by Governments and the International community, and that, they are best defined by the people and communities they affect the most i.e., poor people living in remote rural areas and urban slums of the developing World.

Rabies is a preventable disease. Nearly 80% of human rabies deaths in India occurred because victims had not received anti rabies vaccines. Therefore, in rabies endemic country like India, where every animal bite is potentially suspected as a rabid animal bite, the treatment should be started immediately which includes wound management and simultaneous administration of rabies immunoglobulin in all category III exposures combined with anti-rabies vaccine, which is almost invariably effective in preventing rabies, even after high-risk exposure.<sup>4</sup> Individuals with WHO category II

(nibbling of uncovered skin, minor scratches or abrasions without bleeding) or category III exposures (single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, licks on broken skin, exposure to bat bites or scratches) should receive PEP without delay.

The present study showed that 41.4% had delayed in receiving PEP for > 24 hours. Among them 13.8% had delayed PEP by 24-48hours, 9.7% by 48-72hours and 17.9% by >72 hours which may pose a potential risk to animal bite victims. Similarly a hospital based cross sectional study conducted in a hospital in Narela sub-city, Delhi, among 200 patients attending the anti-rabies clinic showed that, the delay in initiation (vaccine initiation ≥48 hours) of PEP was found among 41% of the studied subjects.<sup>6</sup> Another retrospective study conducted at anti-rabies clinic, General Hospital, Dhule, Maharashtra showed that, 24.9% of the animal bite victims delayed in receiving proper PEP.<sup>7</sup> Other cross-sectional study conducted in Khalilabad, Iran, on delay in post exposure prophylaxis and associated factors among people bitten by animals in the Northeast of Iran, 2015, revealed that 6.6% of the subjects delayed PEP after exposure.<sup>8</sup> Another cross-sectional study on improper wound treatment and delay of rabies PEP of animal bite victims in China conducted in rabies prevention clinics of Wuhan city showed that 35.3% of animal bite victims delayed the initiation of PEP.<sup>9</sup> All the above studies showed that, there was a substantial number of animal bite victims who delayed seeking PEP, which may pose a potential threat to these bite victims.

In the present study, the reasons for delay in receiving PEP were lack of awareness (33.2%), lack of transportation and access to health care (20.3%), non-availability of immune-biologicals (18.1%) non-affordability (16.3%), negligence (9.7%) and non-disclosure of incident by children (2.4%). Similarly, a hospital based cross sectional study conducted in a hospital in Narela sub-city, Delhi, among 200 patients attending the anti-rabies clinic showed that, the potential reasons mentioned by the respondents for their inability to come for prompt anti-rabies vaccination included work related barriers (42.7%), anti-rabies clinic being closed on Sundays/National holidays (36.6%), unawareness about timely PEP (31.7%), not having anyone to accompany (20.7%), not having enough money to reach the health centre (14.6%), being referred to multiple clinics before reaching a government health centre for vaccination (12.2%) and having transport issues (6.1%). Therefore, the above said reasons can be tackled through:

1. Regular health education on prevention and control of rabies has to be given to the community including

children, by the health workers and mass media to improve the PEP seeking behaviours. Similarly, the health care personnel should be trained to follow WHO guidelines for categorization of exposures and providing appropriate PEP by means of CME programs, conferences, workshops, technical films, hands on training in IDRV & RIG use, etc.

2. Universal health care should be provided through accessible health care delivery system and the rabies immune-biologicals should be made available on a continual basis under the National Programme for Control of Rabies.
3. Complete PEP services including RIG/RMAb have to be provided free of cost by the Government and support from an international agency like GAVI may be obtained.

The present study also showed that, there was significant association between socio-demographic factors like age and place of residence; animal bite characteristics like type of biting animal and type of exposure with the delay in receiving PEP. Similarly, a retrospective study conducted at anti-rabies clinic, General Hospital, Dhule, Maharashtra showed that, the factors associated with delay in receiving post exposure prophylaxis were place of residence and category of animal bite. Another hospital based cross sectional study conducted in Narela sub-city, Delhi, among 200 patients attending the anti-rabies clinic showed that, the factors such as age of bite victim, distance of vaccination centre and family income were associated with delay in seeking PEP. Therefore, regular health education on prevention and control of rabies has to be

given to the community including children, by the health workers and mass media to improve the PEP seeking behaviours.

#### CONCLUSION

Delay in PEP and the factors associated for delay have to be addressed properly in order to prevent rabies. This relies heavily on the awareness of population about the disease and its prevention. Efforts to promote awareness should include education regarding animal bite prevention, prompt first aid after exposure and seeking early medical care.

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