

## ORIGINAL RESEARCH ARTICLE

# Delay in Post Exposure Prophylaxis and Associated Factors Among Animal Bite Victims Attending a Tertiary Care Hospital

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### ABSTRACT

**Introduction:** Animal bites are significant causes of morbidity and mortality worldwide, which can be prevented by timely and appropriate post-exposure prophylaxis (PEP). Delays in receiving PEP can affect the effectiveness of the treatment and outcome. **Aims and Objectives:** To study factors associated with delay in initiating post-exposure prophylaxis for rabies prevention among animal bite cases. **Methods:** The present cross-sectional study was conducted in May 2018, and included 362 cases of animal bites recorded at the anti rabies vaccine (ARV) OPD, B J Government Medical College, Pune. A semi-structured questionnaire was used for collecting information regarding the interval between exposure and the initiation of anti-rabies PEP, the socioeconomic status of the family, the bite site on the body, and other risk factors associated with the delay in the initiation of the vaccine. For the purpose of this study, a delay in the initiation of anti-rabies PEP was defined as the initiation of PEP  $\geq$  48 hours after the animal bite. **Results** It was seen that majority of the patients were children and young male. 80.11% patients were of Cat III bite. The prevalence of delay in initiating the treatment was 25.14%. Factors significantly associated with the delay in receiving post exposure prophylaxis were gender, place of residence, animal bite characteristics like type of biting animal and status of animal. The most common reason for delay in initiating treatment was Lack of knowledge (46.15%) followed by was distance from ARC (26.37%) and unavailability of vaccine in peripheral hospitals (23.08%). Work related barriers were observed in 20.88% patients while closed on Sundays/national holidays and Social cause was reported by 15.38% each. **Conclusion:** The prevalence of delay in initiating the PEP was 25.14%. The most common determinants responsible for delay in initiating treatment were Lack of knowledge followed by was long distance from ARC and Unavailability of vaccine in peripheral hospitals. Patient's occupation related barriers and vaccination centre closed on Sundays/national holidays were also observed.

**Key words:** Post-exposure prophylaxis, Vaccination, Rabies, Delay

### INTRODUCTION:

Rabies is a fatal infectious disease, which causes severe neurological symptoms that unavoidably result in death. Although human rabies is currently untreatable,<sup>1</sup> appropriate postexposure prophylaxis (PEP) can entirely prevent rabies.<sup>2,3</sup> Such PEP, which consists of local treatment of the wound, followed by vaccine (with or without rabies immune globulin [RIG] depending upon the type of exposure) should be initiated immediately after a suspected rabid bite. Recommended first-aid procedures include immediate and thorough flushing and washing of the wound for a minimum of 15 minutes with soap and water, as well as disinfecting the wound with detergent or other substances of proven lethal effect on the rabies virus. Appropriate wound cleansing and disinfection can prevent one-third of rabies infections.<sup>4-6</sup>

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Despite being a vaccine-preventable disease, rabies is still a significant public health problem in many developing countries within Asia and Africa.<sup>7</sup> According to a World Health Organization (WHO) report, to prevent this disease, more than 15 million people receive post-exposure vaccination every year worldwide. In reality, PEP is the most critical life-saving intervention essential for the prevention of rabies in humans after exposure.<sup>8</sup>

Rabies has been reported in many parts of India and thus, the management of this disease is considered to be one of the most important priorities of the health authorities. Post-exposure vaccination against rabies is essential for prevention of this fatal disease. Obviously, several essential factors, in the proper implementation of PEP, are at play. Multiple myths are associated with the disease which determines the post exposure treatment seeking behaviours of animal bite victims. Many other factors influence timely access to PEP and its administration.<sup>9</sup> Thus the present study was conducted to study the various determinants of delay in initiating post-exposure prophylaxis for rabies prevention among animal bite cases.

### AIMS AND OBJECTIVES:

To study the proportion of delay and its determinants in initiating post-exposure prophylaxis for rabies prevention among animal bite cases.

### MATERIALS AND METHOD:

The present study was a hospital-based cross-sectional study conducted in the anti-rabies clinic of B J Government Medical College and Sassoon General Hospital Pune. A consecutive sampling of 362 patients with a history of animal bite was recruited in the anti-rabies clinic. This study was conducted during May 2018.

A semi-structured questionnaire was used for collecting information regarding the interval between exposure and the initiation of anti-rabies PEP, the socioeconomic status of the family, the bite site on the body, and other risk factors associated with the delay in the initiation of the vaccine. For the purpose of this study, a delay in the initiation of anti-rabies PEP was defined as the initiation of PEP  $\geq$  48 hours after the animal bite.<sup>10</sup>

Institutional Ethics Committee approval was taken. From all the patients written Informed consent was taken including illiterate persons who were first explained about the study and in the case of patient less than 18 years of age, it was obtained from their parents/guardians. In case of children between 7-12 years verbal assent was obtained, and for children between 12-18 years written assent was obtained. The accompanying guardians/parents as well as the victim were interviewed in case of children less than 18 years. The data was entered in a Microsoft Excel spread sheet and analysed by SPSS and presented with appropriate graphs and tables.

### Results:

**Table 1: Distribution according to characteristics of patients**

Parameter		No. of patients	Percentage
Age group	$\leq$ 10	65	17.96
	11-20	71	19.61
	21-30	76	20.99
	31-40	57	15.75
	41-50	34	9.39
	51-60	30	8.29
	61-70	18	4.97
	>70	11	3.04
Gender	Female	90	24.86
	Male	272	75.14
Type of animal	Dog	321	88.67
	Cat	28	7.73
	Any Other	13	3.59
Category of Animal Bite	I	1	0.28
	II	71	19.61
	III	290	80.11
Total		362	100

In the present study (Table 1), out of total 362 animal bite cases, it was seen that majority of the patients were in the age group of 21-30 years followed by 11-20 years (19.61%) and less than 10 years of age (17.96%) were observed. It was seen that 75.14% cases were male while 24.86% were female. It was observed that majority of the cases were exposed to dog (88.67%) followed by 7.73% to cat, while exposure to other animals was 3.59%. It was seen that 80.11% cases in the present study were having Category III bite.

Diagram 1 : Distribution of cases according to delay initiating PEP



It was observed that the prevalence of delay in initiating the PEP was 25.14% while 74.86% victims received PEP without delay (Diagram 1).

There was a significant association between factors like gender, place of residence, animal bite characteristics like type of biting animal and status of animal with the delay in receiving postexposure prophylaxis (Table 2).

The most common reason for delay in initiating treatment was Lack of knowledge (46.15%) followed by long distance from ARC (26.37%) and Unavailability of vaccine in peripheral hospitals (23.08%). Work related barrier was observed in 20.88% patients while Closed on Sundays/national holidays and Social cause was reported by 15.38% each (Diagram 2).

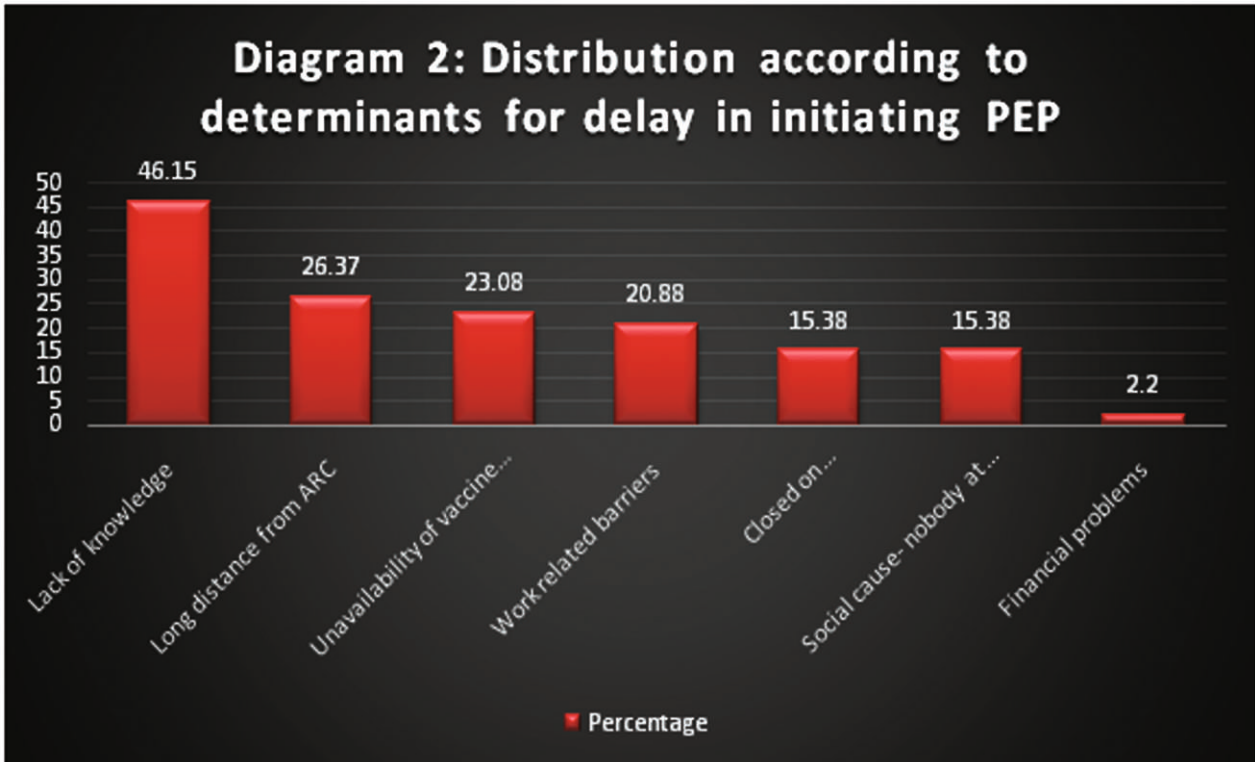
Table 2: Factors associated with delay in initiating PEP among animal bite victims

Factors		Delay in initiating PEP n=91(%)	On time PEP received n=271(%)	Grand Total n=362	
Age group	≤ 10	12(18.5)	53(81.5)	65	$X^2=4.668$ , df=7, p=0.700
	11-20	17(23.9)	54(76.1)	71	
	21-30	17(22.3)	59(77.7)	76	
	31-40	18(31.6)	39(68.4)	57	
	41-50	10(29.4)	24(70.6)	34	
	51-60	10(33.3)	20(66.7)	30	
	61-70	4(22.2)	14(77.8)	18	
	>70	3(27.3)	8(72.7)	11	
Gender	Female	32(35.5)	58(65.5)	90	$X^2=6.907$ , df=1, p=0.008
	Male	59(21.7)	213(78.3)	272	
Place of residence	Rural	11(45.8)	13(54.2)	24	$X^2=5.85$ , df=1, p=0.01
	Urban	80(23.7)	258(76.3)	338	
Type of animal	Dog	75(23.3)	246(76.7)	321	$X^2=4.74$ , df=1, p=0.02
	Cat*	8(28.6)	20(71.4)	28	
	Any Other*	8(61.5)	5(38.5)	13	
Status of animal	Pet	43(28.7)	107(71.3)	150	$X^2=8.713$ , df=2, p=0.01
	Stray	43(21.1)	161(78.9)	204	
	Wild	5(62.5)	3(37.5)	8	

Factors		Delay in initiating PEP n=91(%)	On time PEP received n=271(%)	Grand Total n=362	
Type of Bite	Provoked	20(23.8)	64(76.2)	84	$X^2=0.103, df=1, p=0.748$
	Unprovoked	71(25.5)	207(74.5)	278	
Category of Animal Bite	I**	1(100.0)	0(0)	1	$X^2=0.33, df=1, p=0.564$
	II**	19(26.8)	52(23.2)	71	
	III	71(24.5)	219(75.5)	290	

\*Cat and any other animal are pooled together for applying  $X^2$  test

\*\*Category I and II are pooled for applying  $X^2$  test



**DISCUSSION:**

One of the most zoonotic diseases, a disease transmitted to humans from animals, is rabies which is caused by a virus in the Rhabdovirus family that affects wild and domestic mammals. Because rabies is a vaccine-preventable disease, the estimated 55,000 annual human deaths caused by this disease worldwide is unacceptable and inexcusable.<sup>10</sup>

In the present study total 362 cases of animal bite were studied and it was seen that majority of the patients were in the age group of 21-30 years followed by 11-20 years (19.61%) and less than 10 years of age (17.96%) were observed. Thus, young and children were affected more. In the Wani et al.<sup>11</sup> study children less than 18 years were 26.13%, and 6.53% were above 60 years in the samples taken. Similarly, in the Joyce A. Addai et al<sup>12</sup> study majority of suspected rabies exposed receiving rabies post-exposure prophylaxis were between the age group 1–10 years (29.2%) followed by individuals were between the age group 10 to 19 years (18.7%) were reported. According to the study conducted by Firooz Esmailzadeh, et al<sup>13</sup> majority (58.9%) of the bite victims were younger than 30 years of age. The mean age of the subjects in the S. Khazaei et al<sup>14</sup> study was 32.4 years and the highest proportion of them (34.1%) fell in the 0-to-20-year age range.

It was seen that 75.14% cases were male while 24.86% were female. Similarly, Wani et al.<sup>11</sup> also reported 76.38% of male patients if animal bite in their study. In the S. Khazaei et al<sup>14</sup> study 71.8% victims of animal bite were male. In the study conducted by Firooz Esmailzadeh, et al.<sup>13</sup> 75.9% of the victims were males. Joyce A. Addai<sup>12</sup> also observed male predominance in their study. The higher incidence of disease and bites in males and also in children is considered a behavioral risk because of their extreme curiosity, lack of inhibition, limited knowledge and experience about dog behavior and inability to protect themselves from an attack.<sup>15,16</sup>

It was observed that majority of the cases were exposed to dog (88.67%) followed by 7.73% while exposure to other animals

was 3.59%. In the Waniet et al.<sup>11</sup> study majority of the patients had a history of dog bite (73.34%), followed by cat bite (20.60%) and others 12 (6.03%). S. Khazaei et al<sup>14</sup> in their study observed that domestic dogs were involved in 59.1% of the exposures while cat and Stray Dogs were involved in 20.9% and 10.3% exposure respectively. In the study conducted by Firooz Esmailzadeh, et al<sup>13</sup> most of the animal bites were from dogs (67.1%). Dog being the predominant pet animal; majority of animal bites observed were due to dog bite.

It was seen that 80.11% cases in the present study were having Category III bite while 19.61% were having Category II bite. Only 0.28% cases were having Category I bite. In the Waniet al<sup>11</sup> study almost half of the patients had category III bite 95 (47.74%) and 104 (52.26%) had category II bite. In the Joyce A. Addai et al<sup>12</sup> study Dog bites accounted for 96.5% of all cases of animal bites.

It was seen that the prevalence of delay in initiating the PEP in present study was 25.14%. In the Joyce A. Addai et al<sup>12</sup> study 18.7% initiated PEP within 24 hours of bite while 37.8% and 31.7% initiated PEP within 1-2 days and 3-7 days, respectively and 11.7% initiated treatment after one week. In the S. Khazaei et al<sup>14</sup> study 37.18% victims started treatment on time while 49.41% victims had started treatment with delay of 7-48 hrs whereas 13.41% victims had started treatment with delay of more than 48hrs. Whereas in the study by Waniet al<sup>11</sup> the prevalence of delay in initiation of treatment by 48 hr was 9.04%. In the study conducted by Firooz Esmailzadeh, et al<sup>13</sup> majority (85.9%) of those who presented at the Rabies Treatment Centre came within 24 hours of the animal bite while a delay (of  $\geq 48$  hours) in the initiation of PEP was observed in 6.8% of the animal bite patients. 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>17</sup> while Ravish et al found that it was 41.4% in Bangalore.<sup>18</sup>

Rabies Post Exposure Prophylaxis is essential for the prevention of this fatal disease but many factors influence the timely access to PEP and its administration. Factors significantly associated with the delay in receiving post exposure prophylaxis were gender, place of residence, animal bite characteristics like type of biting animal and status of animal. Social and economic access to health care services barriers for the females to visit the hospital.<sup>18</sup> In our country, it's a usual belief that rabies is caused due to dog bite; many of the victims didn't know that bites by all warm blooded animal may cause rabies. They took the PEP for all stray dog bite immediately as compared to the wild animal or pet bite. The most common reason for delay in initiating treatment was Lack of knowledge (46.15%) followed by was long distance from ARC (26.37%) and Unavailability of vaccine in peripheral hospitals (23.08%). Work related barrier was observed in 20.88% patients while Closed on Sundays/national holidays and Social cause was reported by 15.38% each. Wani et al<sup>11</sup> studied reasons for delay in initiation of treatment and observed that 31.0% patients reported lack of money as the reason for delay followed by unaware about the PEP dose (20.1%) and Lack of Immunoglobulin at periphery (16.3%). Hampson et al.<sup>19</sup> in their study to assess risk factors associated with rabies exposure reported that 20% of rabies-exposed individuals did not seek medical treatment and were not documented in official records, and only 65% of the identified rabies exposures received PEP. The authors also showed that those who live furthest from the health facilities and are in lower socioeconomic classes undergo longer delays before receiving PEP which increases the risk of developing rabies. Most often, rabies PEP is not available in rural areas where it is most needed<sup>20</sup>. Some patients often report late due to long travel distance from site of bite to centre for rabies PEP, which constitute significant delays in initiating rabies PEP. Studies have found significant delays in the initialization of rabies PEP<sup>21</sup> which affect the efficacy of rabies PEP. Delays in rabies PEP initiation affect the overall quality of the efficacy of the PEP. However, some rabies exposed individuals initiate rabies PEP late and others do not complete the schedules for rabies PEP. For the purpose of better counselling for clients reporting for rabies PEP, it is essential to undertake this review and find out-patient characteristics that predispose to noncompliance to rabies PEP schedule so as to intensify adherence counselling for such individuals.

#### LIMITATION:

As the present study was hospital based and was limited to individuals who sought treatment at the Anti-Rabies clinic, it is possible that our study excluded some individuals who were bitten but did not seek treatment.

#### CONCLUSION:

The prevalence of delay in initiating the PEP was 25.14%. Factors significantly associated with the delay in receiving post exposure prophylaxis were gender, place of residence, type of biting animal and status of animal. The most common determinants responsible for delay in initiating treatment were Lack of knowledge followed by was long distance from ARC and Unavailability of vaccine in peripheral hospitals. Patient's occupation related barriers and vaccination centre closed on Sundays/national holidays were also observed.

#### REFERENCES:

1. Wilde H., Hemachudha T., Tantawichien T., Khawplod P., (2004) Rabies and other lyssavirus diseases. Lancet 363: 1906; author reply 1907.

2. Hemachudha T, Laothamatas J, Rupprecht CE (2002) Human rabies: a disease of complex neuropathogenetic mechanisms and diagnostic challenges. *Lancet Neurology* 1: 101-109. PMID: 12849514
3. World Health O (2013) WHO Expert Consultation on Rabies. Second report. World Health Organ Tech Rep Ser: 1±139, back cover.
4. Kaplan MM, Cohen D, Koprowski H, Dean D, Ferrigan LW. Studies on the local treatment of wounds for the prevention of rabies. *Bulletin of The World Health Organization* 26: 765-775. PMID: 14453773
5. Dean D.J., Baer GM, ThompsonWR. Studies on the local treatment of rabies-infected wounds. *Bulletin of The World Health Organization* 28: 477. PMID: 14026136
6. Wilde H (2007) Failures of post-exposure rabies prophylaxis. *Vaccine* 25: 7605-7609. <https://doi.org/10.1016/j.vaccine.2007.08.054> PMID: 17905484
7. Esmailzadeh F, Hatam N, Esmailzadeh Z, Rajabi A, Anami M, Vahedi S, et al. Effectiveness of post-exposure rabies prophylaxis. *Tehran Univ Med J* 2014;72(9):630-637 (Persian).
8. Quiambao BP, Dy-Tioco HZ, Dizon RM, Crisostomo ME, Teuwen DE. Rabies post-exposure prophylaxis with purified equine rabies immunoglobulin: one-year follow-up of patients with laboratory-confirmed category III rabies exposure in the Philippines. *Vaccine* 2009;27(51):7162-7166.
9. Narawane Ganesh, Parande MA, GayathriVeenu. Epidemiological determinants of animal bite cases attending the Anti-Rabies Vaccination (ARV) clinic at B.J. G. Medical College & Sassoon General Hospital, Pune, Maharashtra. *APCRI Journal* 2016;xviii(1):6-10.
10. World Health Organization. Rabies. Geneva: WHO; 2013; Available from: <http://www.who.int/mediacentre/factsheets/fs099/en/>.
11. Wani RT, Chowdri IN, Dar H. Factors influencing delay in initiating post-exposure prophylaxis for rabies prevention among animal bite victims: A cross sectional study. *J Family Med Prim Care* 2020;9:4751-5.
12. Addai JA, Nuertey BD. Pattern of Animal Bites and Delays in Initiating Rabies Postexposure Prophylaxis among Clients Receiving Care in Korle-Bu Teaching Hospital. *J Trop Med.* 2020 May 26;2020:6419104. doi: 10.1155/2020/6419104. PMID: 32547622; PMCID: PMC7271065.
13. Esmailzadeh F, Rajabi A, Vahedi S, Shamsadiny M, GhelichiGhojogh M, Hatam N. Epidemiology of Animal Bites and Factors Associated With Delays in Initiating Post-exposure Prophylaxis for Rabies Prevention Among Animal Bite Cases: A Population-based Study. *J Prev Med Public Health.* 2017;50(3):210-216. doi: 10.3961/jpmph.17.027. PMID: 28605885; PMCID: PMC5495689.
14. Khazaei S, Rezaeian S, Soheylizad M, Gholamaliee B. Factors associated with delay in post-exposure prophylaxis in bitten people. *Med J Islam Repub Iran.* 2014;28:158. Published 2014 Dec 29.
15. Si H, Guo ZM, Hao YT, Liu YG, Zhang DM, Rao SQ, et al. Rabies trend in China (1990–2007) and post-exposure prophylaxis in the Guangdong province. *BMC Infect Dis.* 2008;8:113. doi: 10.1186/471-2334-8-113.
16. Rezaeinasab M, Rad I, Bahonar AR, Rashidi H, Fayaz A, Simani S, et al. The prevalence of rabies and animal bites during 1994 to 2003 in Kerman province, southeast of Iran. *Iran J Vet res.* 2007; 8(4):343-50.
17. Patil AR, Bawa MS, ShirpurkarMB, Tambe MP. A retrospective epidemiological study of delay for updated Thai red cross intradermal anti-rabies vaccination schedule amongst animal bite cases attending ARV clinic at a tertiary care centre. *Int J Community Med Public Health* 2015;2:19-24
18. Ravish HS1, Ramya MP2, Nitu Kumari2, Rachana AR3Factors associated with delay in post-exposure prophylaxis among animal bite victims. *APCRI Journal* 2018;XX(1):15-18.
19. Hampson K, Dobson A, Kaare M, Dushoff J, Magoto M, Sindoya E, et al. Rabies Exposures, Post-Exposure Prophylaxis and Deaths in a Region of Endemic Canine Rabies. *PLoS Negl Trop Dis.* 2008;2(11):e339.doi:10.1371/journal.pntd.0000339.
20. H. Wilde, B. Lumlerdacha, F. X. Meslin, S. Ghai, and T. Hemachudha, "Worldwide rabies deaths prevention-a focus on the current inadequacies in postexposure prophylaxis of animal bite victims," *Vaccine*, 2016; 34(2): 187–189.
21. J. B. Ramanand, S. C. Jaykare, S. J. Ramanand, A. M. Zende, R. R. Bhosale, and J. R. Patil, "Assessment of initiation of postexposure prophylaxis with anti-rabies vaccine in cases of dog bites: an observational study," *International Journal of Basic & Clinical Pharmacology.* 2017; 4:1109–1112.