

# Adherence to the post-exposure prophylaxis among animal bite patients attending rabies clinic at tertiary care hospital – A cross-sectional study



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## ABSTRACT

**Background:** Rabies is an acute and 100% fatal viral disease transmitted to humans through the bite or lick of an infected animal. It can be successfully prevented if a complete course of anti-rabies vaccine (ARV) is taken following an animal bite. The present study reveals the compliance of animal bite victims to post-exposure prophylaxis (PEP). **Aims and Objectives:** The objectives of the study are as follows:(1) To determine the adherence to PEP among animal bite victims and factors influencing it. **Materials and Methods:** A retrospective record-based cross-sectional study was conducted at the anti-rabies clinic of VIMS Hospital Ballari. Information regarding sociodemographic variables, animal bite history, category of bite, treatment received, and completion of ARV schedule of all the animal bite cases were collected from the animal bite register and treatment card during the period from July 2023 to December 2023. **Results:** Out of the total 350 animal bite victims, all of them received the first dose of vaccine, 86.28% completed two doses, 72% completed three doses, and only 51.14% completed the schedule by taking all four doses, 37% of them completed the schedule without any delay, 14% delayed one or more doses, and the rest 49% did not complete the schedule. **Conclusion:** Adherence to PEP is a dire necessity as rabies is a fatal disease. Counseling the animal bite victims about the importance of adhering to the complete PEP schedule at the time of administering the first dose of vaccine is crucial.

**Key words:** Animal bites; Anti-rabies vaccine; Compliance

## INTRODUCTION

Rabies is an acute fatal encephalomyelitis caused by a ribonucleic acid virus under the genus *Lyssavirus* belonging to the family *Rhabdoviridae*. It is one of the important viral zoonoses of warm-blooded animals. Once the symptoms set in, rabies is virtually 100% fatal. In up to 99% of cases, domestic dogs are responsible for rabies virus transmission to humans. Yet, rabies can affect both domestic and wild animals. It spreads to people and animals through saliva, usually through bites, scratches, or direct contact with mucosa (e.g., eyes, mouth, or open

wounds). Children between the ages of 5 and 14 years are frequent victims.<sup>1</sup>

Immediate treatment of bite victims after rabies exposure is post-exposure prophylaxis (PEP). Timely and complete treatment soon after exposure is necessary to prevent the onset of symptoms and death as those not completing the course of vaccination are still at risk of developing the disease.<sup>2</sup>

Lack of awareness to seek health care after animal bite claims the lives of thousands of people from rabies every

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year with 95% of human deaths occurring in Asia and Africa.<sup>3</sup>

As per the World Health Organization (WHO) reports, India is endemic for rabies and accounts for 36% of the world's rabies deaths. It causes 18,000–20,000 deaths every year.<sup>4</sup> India, being a signatory to the WHO's initiative toward zero deaths from dog-mediated rabies by 2030, suffers from a high mortality rate.<sup>5</sup>

The National Rabies Control Programme and National Action Plan for Dog-Mediated Rabies Elimination were launched in India following the Global Call for Rabies Elimination. This initiative aimed to achieve zero human deaths from dog-mediated rabies by 2030.<sup>6</sup>

The WHO has introduced the cost-effective, shortened intradermal regimen for rabies PEP to reduce visits, and increase availability and vaccine compliance.<sup>7</sup>

With this background, an attempt was made to know the adherence to PEP following an animal bite among the animal bite victims attending the anti-rabies clinic of VIMS Hospital Ballari in Karnataka.

### Aims and objectives

To determine the adherence to PEP among animal bite victims and factors influencing it.

## MATERIALS AND METHODS

A retrospective record-based cross-sectional study was conducted in the VIMS Hospital Bellary, rabies clinic after obtaining permission from the Institutional Ethics Committee. All the animal bite victims attending this clinic for PEP were registered and administered an intradermal schedule of anti-rabies vaccine (ARV). This clinic follows the Updated Thai Red Cross regimen involving two doses of 0.1 mL of reconstituted (Purified Vero Cell Rabies vaccine) administered intradermally on both the deltoids on days 0, 3, 7, and 28. Information about the animal bite cases was collected from the animal bite register and treatment card during the period from July 2023 to December 2023. The patients who were referred to other centers for their subsequent doses were excluded from the study.

The records had data about the age, sex, area (urban/rural), type of animal (cat/dog/rat/monkey) type of dog (pet/stray/wild) previous animal bite history of the victim, and category of animal bite.

Categorization of the animal bite wound was done according to the WHO guidelines.<sup>8</sup>

Category 1	Touching or feeding animals, licking on intact skin. No post-exposure prophylaxis was required
Category 2	Nibbling of uncovered skin, minor scratches, or abrasions without bleeding. Vaccines should be administered
Category 3	Single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks, and exposure to bats. Vaccines and immunoglobulin should be administered

The victims were categorized into three types as compliant, delayed compliant, and dropout/non-compliant based on their compliance with PEP.

Compliant – study subjects who completed the vaccination as per the schedule, delayed compliant – study subjects who completed the scheduled doses, but deviated from the scheduled regimen.

Dropout/non-compliant – those study subjects who had taken at least one dose of ARV after an animal bite, but did not complete all the scheduled doses.

Out of 350 participants, 46 of them had a history of previous animal bites. However, their vaccination status was unknown. Hence, they were administered all four doses of vaccine for the current animal bite.

### Statistical analysis

The data was entered in an MS Excel sheet and was analyzed using Open Epi version 3.01. The Chi-square test was used to compare categorical variables and a  $P < 0.05$  was considered to be statistically significant.

## RESULTS

The majority of the animal bite victims were males (69%) and 31% were females. Among the study participants, 46% were within the age group of 16–45 years, 34% of them were up to 15 years of age, and the rest 20% were above the age of 45 years. The majority of the animal bites were from rural areas (77%). Ninety-two percent of the animal bites were due to dogs and the rest were due to cats, monkeys, and other animals. As per the WHO classification, 74% of the bites were of category II and the other 26% were of category III. The majority (76.28%) of the victims received the first dose of vaccine within 24 h following the animal bite Table 1.

Out of the 350 participants, 37% completed the schedule without any delay, 14% of them delayed one or more doses, and the rest 49% were dropouts Table 2.

Out of 350 animal bite victims involved in the study, all the participants received the first dose of the intradermal

rabies vaccine as per the updated Thai Red Cross regimen. About 86.28% of the victims received a second dose of vaccine, 72% received the third dose of vaccine whereas only 51.14% completed the schedule by receiving all four doses Figure 1.

The compliance rate was better in those who were aged below 15 years of age (43.33%) when compared with other age groups 16–45 years and above 46 years where compliance was 31.48% and 38.23%, respectively, which was not statistically significant ( $\chi^2=5.32$ ,  $P=0.256$ ). Compliance was better in females (42.59%) than in males (34.29%) with no statistical significance ( $\chi^2=2.706$ ,  $P=0.25$ ) with a higher dropout rate in males (50%).

Compliance was better in rural residents (38.55%) than in urban residents (36.32%), without any statistical significance ( $\chi^2=1.005$ ,  $P=0.559$ ). Better adherence was observed in the dog bite victims (37.09%) than in those who were bitten by the other animals (34.48%) without any statistical significance ( $\chi^2=0.65$ ,  $P=0.724$ ). Compliance was better in category II bite victims (37.45%) than in category III bite victims (35.16%) which had no statistical significance ( $\chi^2=3.058$ ,  $P=0.216$ ).

Compliance was better in those who took the first dose of vaccine within 24 h following the animal bite (38.57%) than those who delayed the first dose beyond 24 h (31.32%). No statistical significance was found with this aspect ( $\chi^2=1.545$ ,  $P=0.46$ ). Compliance was better in those who had a history of previous animal bites (45.65%) than those who had an animal bite for the first time (35.52%) Table 3.

## DISCUSSION

In the present study, out of 350 participants, all of them received the first dose, 86.28% received the second dose, 72% received the third dose of the vaccine and 51.14% completed the schedule by receiving all four doses of ARV. In the study conducted by Shivasakthimani et al.,<sup>9</sup> in Chennai, 75.7%, 70.8%, and 55.1% received 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> doses, respectively, which is in concordance with our results. In the study conducted by Sahu et al.,<sup>10</sup> in Orissa, 52.3% completed all four doses of vaccine, where the compliance was in concordance with the present study.

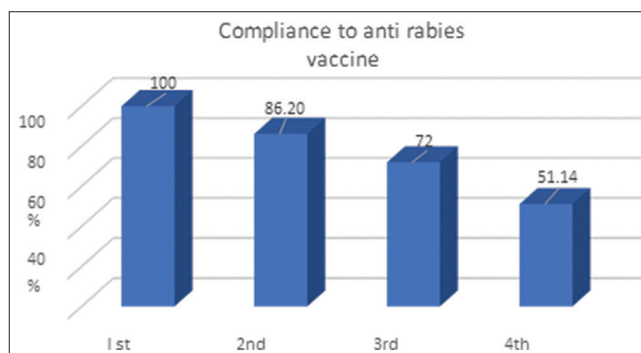
In the study conducted by Panda and Kapoor<sup>11</sup> in New Delhi, 18.7%, 33.9%, and 45.6% of the participants dropped out on the 3<sup>rd</sup>, 7<sup>th</sup>, and 28<sup>th</sup> day of ARV administration, respectively which is in concordance with our study where 13.8%, 28%, and 48.86% were dropped out on the 3<sup>rd</sup>, 7<sup>th</sup>, and 28<sup>th</sup> day of ARV administration. This shows that counseling the victims about the importance of

**Table 1: Study profile of the animal bite victims**

Variable	Frequency (n=350)	Percentage
Sex		
Males	242	69
Females	108	31
Age in years		
Below 15	120	34
16–45	162	46
46 and above	68	20
Area		
Urban	83	23
Rural	267	77
Type of animal		
Dog	321	92
Others	29	5
Category of bite		
Category II	259	73
Category III	91	27
The time gap between animal bite and the first dose of the vaccine		
<24 h	267	76.28
>24 h	83	23.72
Previous history of animal bite		
No	304	86
Yes	46	14

**Table 2: Adherence to post-exposure prophylaxis following animal bite**

Adherence to post-exposure prophylaxis	Frequency (n=350)	Percentage
Compliant	129	37
Delayed	50	14
Drop out	171	49



**Figure 1:** Compliance with four doses of intradermal rabies vaccine

PEP and the fatality of rabies is much essential when they visit the health-care facility for first dose administration.

In the present study, 37% of the participants completed the vaccination on schedule, 14% of them delayed one or more doses and 49% of them did not complete the schedule. In the study conducted by Chalotra et al.,<sup>12</sup> in Jammu, 71.7% completed the schedule without any delay, 24.6% of them delayed one or more doses and 3.7% of them did not complete the schedule. The study of Chalotra et al.,<sup>12</sup> had better compliance than this study. Lack of

**Table 3: Association between the various variables and adherence to a vaccination schedule**

Adherence	Compliant (%)	Delayed (%)	Dropout (%)	Total	Chi-square	P-value
Age (Years)						
Below 15	52 (43.33)	15 (12.50)	53 (44.16)	120	5.32	0.256
16–45	51 (31.48)	23 (14.19)	88 (54.32)	162		
46 and above	26 (38.23)	12 (17.64)	30 (44.11)	68		
Sex						
Male	83 (34.29)	38 (15.71)	121 (50)	242	2.706	0.2585
Female	46 (42.59)	12 (11.11)	50 (46.29)	108		
Area						
Urban	97 (36.32)	41 (15.35)	129 (48.31)	267	1.005	0.599
Rural	32 (38.55)	9 (10.80)	42 (50.60)	83		
Type of animal						
Dog	119 (37.09)	47 (14.64)	155 (48.28)	321	0.6502	0.7224
Other	10 (34.48)	3 (10.34)	16 (55.17)	29		
Category of bite						
Category II	97 (37.45)	32 (12.35)	130 (50.19)	259	3.058	0.2167
Category III	32 (35.16)	18 (19.78)	41 (45.05)	91		
Previous animal bite victim						
Yes	21 (45.65)	6 (13.04)	20 (43.47)	46	1.431	0.488
No	108 (35.52)	44 (14.47)	151 (49.67)	304		
The time gap between the animal bite and the first dose of the vaccine						
<24 h	103 (38.57)	38 (14.23)	126 (47.19)	267	1.545	0.4618
more than 24 h	26 (31.32)	12 (14.45)	45 (54.21)	83		

awareness about the rabies disease might be the cause for reduced compliance.

In the present study, more number of the victims were of the age group 16–45 years (46%), followed by those below 15 years (34%), and above 45 years (20%), in concordance with the findings of Singh and Rochwani<sup>13</sup> in Patiala Punjab where 50.7% victims were of age group 16–45 years, as the above age group spend much of their time outdoors in terms of occupation and education.

In our study, the majority of the animal bite victims were males (61%) and 39% of them were females in concordance with Panda et al.,<sup>14</sup> in Delhi who observed that 73% of the animal bite victims were males. This gender disparity may be attributed to increased mobility and outdoor activity of males, and hence more chance of exposure to animals.

In the present study, the majority of the animal bite victims belonged to category II dog bites (74%), and the rest 26% were category III bites which is similar to the findings of Sharma et al.,<sup>15</sup> in Delhi where 74.8% participants belonged to category II bite. The compliance to PEP was better in category II bite patients in our study in contrast to observations made by Sharma et al.,<sup>15</sup> where category III bite patients had better compliance.

In the current study, the majority of the animal bite victims (76.28%) took the first dose of vaccine within 24 h following the animal bite in contrast to the results of Kawale et al.,<sup>16</sup> in Maharashtra where 43% of the animal bite victims were administered the first dose within 24 h.

Better transport facility to our center might have a better access to our health-care facility.

#### Limitations of the study

As it is a record based study the patients are not contacted. They might have taken the subsequent doses in other centers after getting the first dose administered in our center.

## CONCLUSION

Compliance with the full course of ARV was 51.14%. The major cause for the poor compliance was lack of awareness about the rabies disease and its fatality. The majority of the victims were males and were of age group 16–45 years of age. Counseling the victims about the importance of adhering to a complete course of PEP and the deleterious consequences of rabies at the time of administering the first dose will improve compliance.

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#### Authors Contribution:

**SHN**- Definition of intellectual content, literature survey, prepared first draft of the manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article, concept, design, clinical protocol, and manuscript preparation; **CRC**- Editing and manuscript revision; design of the study, statistical analysis, and interpretation; **NPN**- Review manuscript; **SARB**- Literature survey and preparation of figures; coordination, and manuscript revision; **SCM**- Review manuscript; **RK**- Review manuscript; **AKR**- Review manuscript.

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