

Epidemiological and clinical characteristics of patients attending a community health centre for rabies post-exposure prophylaxis in Aligarh, Uttar Pradesh, India

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ABSTRACT

Background

Rabies remains a major public health concern in India, accounting for a substantial proportion of global human rabies mortality. Evidence from primary care settings, where the majority of post-exposure prophylaxis (PEP) is delivered, is essential to guide prevention strategies. This study assessed the epidemiological and clinical characteristics of patients seeking rabies PEP at a community health centre in northern India.

Methods

A retrospective record-review was conducted at Community Health Centre, Jawan, district Aligarh, Uttar Pradesh. Records of new cases reporting for rabies PEP from April 2022 to March 2023 were analysed. Socio-demographic characteristics, type of biting animal, wound category, site of bite and delay to presentation were extracted. Descriptive statistics were computed. As the study involved secondary analysis of routine facility-based records without personal identifiers, it constituted less than minimal risk research as per the ICMR ethical guidelines; therefore, formal ethical committee approval was not required.

Results

A total of 2270 animal bite cases were recorded during the study period. Mean age of patients was 23.69±17.83 years. Males constituted 71.7% of cases. Lower limb bites were most common (63.3%). Dog bites accounted for 94.0% cases. Category II wounds constituted 96.0%. None of the Category III patients received immunoglobulin due to non-availability at the facility. Mean time to reporting was 1.91±2.24 days.

Conclusions

Young males and lower limb bites were the most common among PEP seekers. Lack of immunoglobulin for Category III wounds persists as a major system gap. Strengthening availability of biologicals and community-level prevention remain key priorities.

Key-words: Rabies, animal bite, post-exposure prophylaxis, epidemiology, Uttar Pradesh, community health centre

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INTRODUCTION

Rabies is a highly fatal zoonotic viral disease caused by RNA viruses of the genus *Lyssavirus*, transmitted to humans predominantly through bites of infected mammals, especially dogs.¹ It is one of the neglected tropical diseases which causes tens of thousands of deaths annually, with a substantial proportion (around 40%) occurring among children below 15 years of age.² Once the virus affects the central nervous system and clinical manifestations develop, the disease is almost universally fatal. Nevertheless, deaths due to rabies are entirely preventable through timely and appropriate post-exposure prophylaxis (PEP). PEP primarily involves immediate and thorough washing of the bite wound, followed by administration of the complete course of human anti-rabies vaccine, along with rabies immunoglobulins when indicated. Every suspected exposure to a potentially rabid animal should be treated as a medical emergency and requires prompt initiation of PEP. The World Health Organization and global stakeholders advocate for a One Health based multi-sectoral strategy to eliminate human rabies transmitted by dogs.² Despite being vaccine preventable, rabies remains a high-impact global public health challenge, especially in many low- and middle-income countries, with India accounting for an estimated 20,000 human rabies deaths annually², making it the single highest contributor globally. The disease is almost always fatal after onset of clinical symptoms, therefore prevention relies exclusively on prompt and appropriate post-exposure prophylaxis (PEP).³ In India, animal bite injuries are common, and dog bites form the overwhelming majority of human rabies exposures.⁴ Primary health care delivery points, particularly Community Health Centres (CHCs), represent the first line of care for the majority of animal bite victims in rural and peri-urban India. They are responsible for wound care, timely initiation of WHO-recommended vaccine schedules, administration of immunoglobulin in indicated cases, and counselling on subsequent doses. Therefore, epidemiological profiling of PEP seekers at CHCs provides evidence critical for forecasting biologicals requirement, improving supply chain responsiveness, and guiding targeted community education. Aligarh district in western

Uttar Pradesh has extensive human–animal interface and a high burden of free-roaming dogs, yet published literature on PEP-seeking epidemiology from primary care settings in this region is scarce. Most available Indian studies are either tertiary care based or are limited to specific urban centres.^{5–9} Evidence from routine primary care service points is essential to understand real-world PEP demand, reporting delays and clinical patterns, because these represent the actual operational workload faced by rabies control services. This study was conducted to address this evidence gap. Our objective was to describe the epidemiological and clinical characteristics of persons attending a Community Health Centre in Aligarh district for rabies post-exposure prophylaxis over a one-year period, focusing on demographic distribution, biting animal species, anatomical site of bite, WHO wound categorisation, and delay in presentation.

METHODS

A retrospective record-based cross-sectional study was conducted at Community Health Centre (CHC), Jawan, district Aligarh, Uttar Pradesh. Records of all new animal bite cases reporting for rabies post-exposure prophylaxis (PEP) at CHC Jawan over a period of one calendar year, from April 2022 to March 2023, were studied. Repeat visits of already registered patients for subsequent vaccine doses were not included. Only first-contact registrations were considered as study cases.

Data were extracted from the CHC PEP register maintained at the facility as per routine documentation practices. Variables included age, sex, type of biting animal, anatomical site of bite, WHO wound category, and number of days taken to report after the bite. No personal identifiers were recorded. Data were entered into Microsoft Excel and analysed using IBM SPSS version 20.0. Descriptive statistics were used. Continuous variables were summarised using mean and standard deviation. Categorical variables were summarised using frequencies and percentages. The study utilised secondary data extracted from routine facility-based registers without direct patient contact or



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intervention. No personal identifiers were collected. As per the ICMR ethical guidelines, this constituted less than minimal risk research; therefore, formal ethical committee approval was not required.

Original Articles

A total of 2270 animal bite cases reported to CHC Jawan during the study period April 2022 to March 2023. The mean age of patients was 23.69±17.83 years (range 1-91 years) with nearly half of the respondents (44.2%) being below 15 years of age. The majority of cases were males (71.7%), with a male-to-female ratio of 2.53:1 (Table 1).

RESULTS

Table 1: Socio-demographic characteristics of study participants (n=2270)

Variable	Frequency (n)	Percentage (%)
Age group (years)		
<15	1004	44.2
15-30	604	26.6
31-45	331	14.6
46-60	236	10.4
>60	95	4.2
Sex		
Male	1627	71.7
Female	643	28.3
Socioeconomic status		
Class I	216	9.5
Class II	375	16.5
Class III	499	22
Class IV	851	37.5
Class V	329	14.5

Lower limb bites constituted the most common anatomical site (63.3%), followed by upper limb (26.4%). Bites over trunk/back/buttocks accounted for 8.6% cases, while head and neck region

constituted 1.5%. A very small proportion (0.3%) had extensive bites involving multiple body regions (Figure 1).

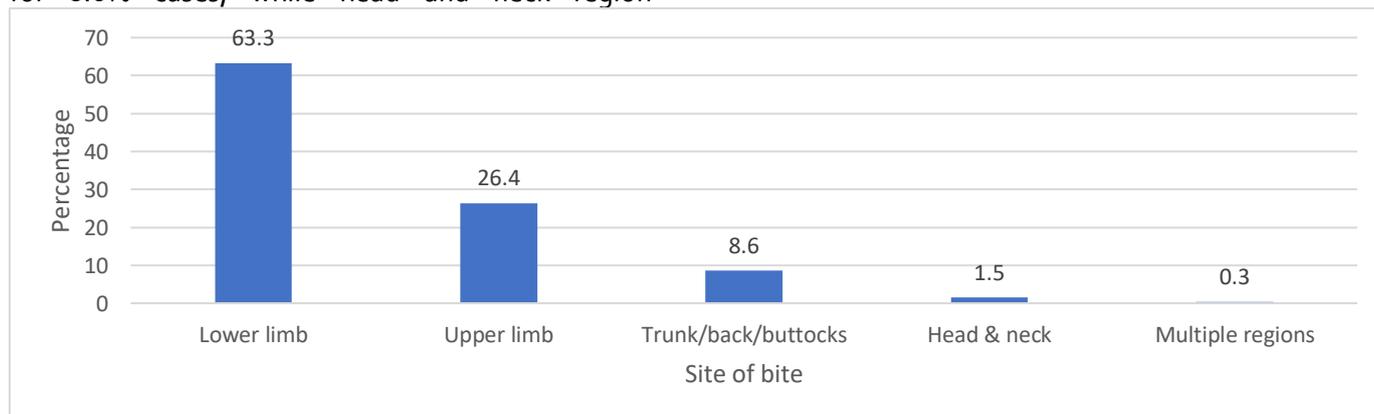


Figure 1: Anatomical site of bite among study participants (n=2270)

Dogs were the most common biting animal (94.0%), followed by monkeys (4.4%). Cat, jackal and pig

together contributed less than 2% of all bites (Figure 2).

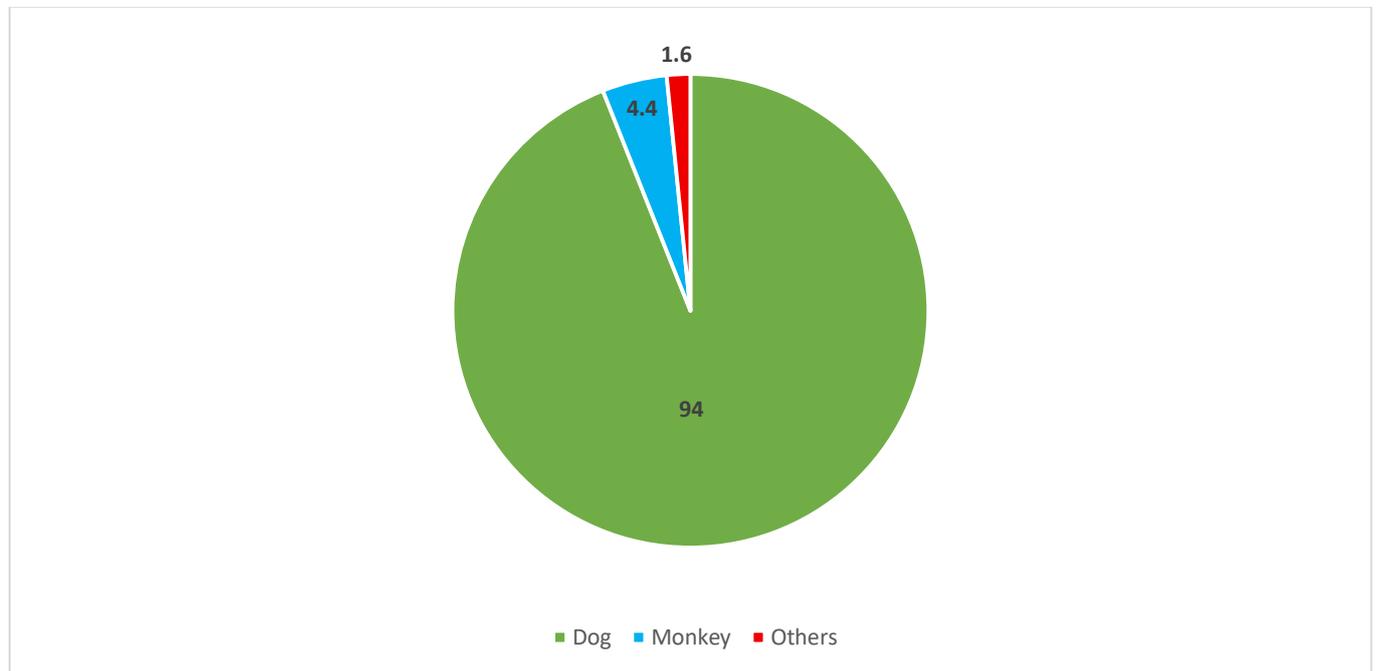


Figure 2: Distribution of biting animals (n=2270)

Based on WHO classification of wound category, a majority of cases were Category II (96.0%). Category III constituted only 3.3% of cases, while Category I

accounted for 0.7%. None of the Category III patients received rabies immunoglobulin due to non-availability at the facility (Table 2).

Table 2: WHO wound category distribution (n=2270)

WHO Wound Category	Frequency (n)	Percentage (%)
Category II	2180	96.0
Category III	75	3.3
Category I	15	0.7

The mean number of days taken to report to the CHC after bite was 1.91 ± 2.24 days. Overall, 1671 patients (73.6%) reported within 24 hours of exposure, of which 956 (42.1%) presented within 6 hours. Table 3

summarizes the 10-day observation outcome of the biting animals. Majority of the animals were found alive after the observation period, with only a very small proportion either dead or not traceable.

Table 3: Biting animal status after 10 days

Status	Frequency	Percentage
Alive	2222	97.9
Dead	12	0.5
Not traceable	36	1.6
Total	2270	100

Although the present study included first-contact patients, all the participants were followed up to assess completion of the prescribed five-dose anti-rabies vaccine (ARV) regimen. Nearly 95% of the

patients received at least the first three doses, while only about 65% completed all five doses of the schedule. The distribution of vaccine completion is shown in Table 4.

Table 4: Completion of Prescribed 5-Dose Anti-Rabies Vaccine (ARV) Schedule

ARV Doses Received	Number of Patients (n)	Percentage (%)
Completed 3 doses	2157	≈95%
Completed all 5 doses	1476	≈65%

DISCUSSION

This retrospective record-based study over one year among 2270 bite victims reporting for rabies PEP at a community health centre in northern India demonstrates that the burden of animal bites requiring PEP remains substantial at primary care level. In the present study, males constituted nearly three-fourths of the victims and a considerable proportion were in younger age groups. Male predominance among animal bite victims has been consistently documented in studies from northern India, including Lucknow, Delhi, Gorakhpur and Srinagar.⁵ Comparable gender distributions have also been reported from southern India, including Mysore and Hyderabad, as well as in a multicentric Indian study.⁹⁻¹¹ Socio-economic patterns were also comparable, as a substantial share of victims in our setting belonged to lower socio-economic categories,

consistent with findings from West Bengal by Karmakar et al, indicating that animal bites continue to disproportionately affect socially vulnerable populations in India.¹² With regard to exposure characteristics, dog bites accounted for the overwhelming majority of cases and lower limb involvement was the most frequent site in the present study. Similar patterns have been reported from Lucknow, Delhi, Mysore, Hyderabad, Gorakhpur and Srinagar.⁵⁻¹⁰ The multicentric analysis by Sudarshan et al also highlighted extremities as the most common sites and dogs as the predominant biting animals.¹¹ These convergent observations across different states clearly indicate that domestic dogs remain the primary reservoir of exposures in India and lower extremity bites are the typical clinical presentation at primary care level. In the present



study, most cases were categorised as WHO Category II wounds. Comparable predominance of Category II injuries has been reported in Lucknow by Sahu et al and Hyderabad by Asma et al.^{5,10} However, regional variation is evident within the country. In contrast to our findings, Panda et al from Delhi, Ain SN et al from Srinagar and Sadasivan et al from Uttarakhand reported predominance of Category III bites.^{6,8,13} Such variations across primary care settings highlight the heterogeneity in rabies-risk profiles likely influenced by local animal populations, exposure patterns and other determinants. A major concern observed in the present study was the lack of administration of rabies immunoglobulin (RIG) to Category III cases due to non-availability. Similar gaps in RIG usage have also been reported from Mysore by Kulkarni et al.⁹ Even in settings where RIG was available, utilisation remained lower than expected. For example, Sahu et al from Lucknow reported low utilisation (11.1%).⁵ Contrary to these findings, Asma et al from Hyderabad reported cent percent utilisation. This reflects heterogeneity in the availability and utilisation of RIG across Indian settings and underscores persisting system-level gaps, particularly at peripheral health facilities. In the present study, nearly three-fourths of patients reported within 24 hours of exposure, reflecting favourable care-seeking behaviour. Similar prompt initiation of PEP was also documented by Datta in Kolkata, where a majority of animal-bite victims initiated prophylaxis within 72 hours.¹⁴ However, regional variability still exists. In Eastern Uttar Pradesh, Khan et al reported that almost one-third of victims initiated PEP after 48 hours of exposure, with delay significantly influenced by residence, age and type of biting animal.¹⁵ This indicates that although early reporting is improving overall, sub-regional determinants continue to influence timely care-seeking.

Data on pre-hospital wound care could not be assessed in the present study. However, Indian evidence shows substantial variability in adherence to recommended wound hygiene. Sahu et al from Lucknow reported moderate levels of wound washing, while Kulkarni et al from Mysore documented very low practice.^{5,9} Asma et al from Hyderabad observed relatively better wound washing, whereas Karmakar et al from West Bengal reported poor adherence.^{10,12} Ain SN et al from

Srinagar also reported suboptimal wound care practices, with nearly half the patients not washing wounds adequately.⁸ Additionally, Singh P et al from Gorakhpur found inadequate wound washing among a majority of victims.⁷ These variations suggest that despite clear guidelines, pre-hospital wound care practices remain inconsistent and poorly standardised. Although our analysis was based on first-contact registrations, we prospectively followed all patients to document completion of the prescribed five-dose anti-rabies vaccine regimen. While almost all participants (about 95%) received the first three doses, only around two-thirds (65%) completed the entire five-dose schedule. This pattern is consistent with the attrition documented in several Indian settings. For instance, Sadasivan et al. in Uttarakhand reported that while 76.2% of patients completed the full ARV course, 22.2% left the vaccination midway, highlighting similar challenges in ensuring full adherence.¹³ These findings collectively highlight that although initial reporting is satisfactory, completion of the entire vaccination regimen remains influenced by factors such as distance to the health facility, indirect costs, perceived reduction in risk after initial improvement, and suboptimal awareness of the necessity of completing all recommended doses. Overall, the patterns observed in the present study align with the broader Indian evidence base—male predominance, dog-related exposures, predominance of lower limb involvement and Category II wounds remain consistent across many regions. Persisting gaps in RIG availability at peripheral levels and context-specific delays in PEP initiation continue to be major operational challenges. Strengthening supply chain systems for rabies biologicals, improving wound care literacy and reinforcing community awareness on the urgency of early post-exposure prophylaxis remain critical for enhancing rabies prevention outcomes in India.

CONCLUSION

Rabies PEP caseload at primary care level remains substantial, with young males constituting the predominant risk group. Dogs accounted for nearly all exposures, and lower limbs were the most frequently affected site. While most cases presented within 24 hours, reporting within the first few hours after exposure was suboptimal. Critically, non-availability of rabies immunoglobulin for Category III bites



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represents a major systemic gap in service delivery. Strengthening the availability of rabies biologicals, promoting early reporting through community awareness, and reinforcing preventive measures remain essential components of rabies control in India.

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