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Clinicodemographic Profile of Dog Bite Cases Presenting to the Emergency Medicine Department in a Tertiary Care Hospital: A Retrospective Observational Study

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ABSTRACT

Background: Dog bites are a major public health concern and an important cause of presentation to emergency departments, particularly in regions where rabies remains endemic. Characterising the demographic profile, injury patterns, exposure severity, and post-exposure prophylaxis (PEP) practices may help improve emergency management and rabies prevention.

Objective: To describe the demographic and clinical characteristics, anatomical distribution of dog-bite injuries, World Health Organization (WHO) exposure categories, PEP practices, and short-term hospital disposition among patients presenting with dog-bite injuries to a tertiary-care emergency department.

Methods: A retrospective, observational, census-based study was conducted in the Department of Emergency Medicine, Amrita Institute of Medical Sciences, Faridabad, Haryana, India. Medical records of patients presenting with dog-bite injuries between January and December 2025 were reviewed. Data regarding age, sex, date of presentation, anatomical site of injury, type of biting dog, WHO exposure category, tetanus prophylaxis, anti-rabies vaccine (ARV), rabies immunoglobulin (RIG), and hospital disposition were extracted and analysed using descriptive statistics. Where appropriate, categorical variables were compared using the chi-square or Fisher-Freeman-Halton exact test.

Results: Eighty-nine patients were included. The mean age was 32.34 ± 19.86 years, and 60 (67.4%) were male. Young adults aged 18–44 years constituted 51.7% of cases. Presentations peaked in June and July, accounting for 60.7% of cases. The lower limb was the most frequently affected anatomical site (38.2%), followed by the hand and fingers (29.2%). WHO Category III exposure predominated (59.6%), followed by Category II (36.0%) and Category I (4.5%). Stray dogs accounted for 76.4% of bites. Tetanus prophylaxis was administered to 91.0% of patients, ARV to all patients, and RIG to 94.3% of Category III patients. Overall, 97.8% were managed as outpatients and 2.2% required hospital admission.

Conclusion: Dog-bite presentations predominantly involved young adult males and stray-dog exposures, with Category III injuries constituting the majority. PEP administration was high, although instances

of ARV administration in Category I and RIG administration in Category II exposures warrant evaluation for guideline concordance. Long-term clinical outcomes were not assessed.

Keywords: Dog Bites; Rabies; Post-Exposure Prophylaxis; Emergency Medical Services; Retrospective Studies; Wounds and Injuries.

INTRODUCTION

Dog bite injuries are among the most common animal-related injuries presenting to emergency departments worldwide and remain a major public health challenge. They affect all age groups, though children, older adults, animal handlers and residents of areas with large stray dog populations are disproportionately vulnerable. Injuries range from minor abrasions to deep lacerations, crush injuries, tendon and neurovascular damage and extensive tissue loss requiring reconstructive surgery, and victims frequently experience psychological distress, cosmetic disfigurement and reduced quality of life in addition to the acute physical trauma.

Globally, dog bites are the leading cause of animal-related injury and the principal route of human rabies transmission; once clinical signs of rabies appear, the disease is almost invariably fatal, and the burden falls disproportionately on low- and middle-income countries with weak animal-control infrastructure, limited public awareness and constrained access to post-exposure prophylaxis [1]. India accounts for a large share of the world's rabies deaths, reflecting the size of its stray dog population, low canine vaccination coverage, and frequent delays in seeking care despite the wide availability of effective prophylaxis.

Emergency departments are the principal point of contact for dog bite victims and are responsible for taking a focused history, assessing wound severity, classifying exposure according to World Health Organisation (WHO) criteria, providing wound care, administering tetanus prophylaxis, and instituting anti-rabies vaccination and, where indicated, rabies immunoglobulin (RIG), in accordance with national guidelines for rabies prophylaxis and the WHO position paper on rabies vaccines [2],[3]. Hospital-based data on the demographic profile, injury pattern and management practices of dog bite victims are important for strengthening departmental protocols and informing rabies-control strategy, yet such data from Indian tertiary-care emergency departments remain limited.

This retrospective observational (record-review) study was therefore undertaken with the following objectives: (1) to study the demographic profile of dog bite patients; (2) to assess the pattern and anatomical site of injury; (3) to classify the severity of exposure using the WHO category system; (4) to evaluate the initial emergency management provided; (5) to assess administration of tetanus prophylaxis and rabies post-exposure prophylaxis; and (6) to determine clinical outcomes among patients presenting with dog bite injury to the emergency department of a tertiary care hospital.

MATERIALS & METHODS

This retrospective, observational, record-review study was conducted in the Department of Emergency Medicine, Amrita Institute of Medical Sciences, Faridabad, Haryana, India, a tertiary care teaching hospital serving urban and rural patients, over a one-year period from January 2025 to December 2025.

All patients presenting with a history of dog bite injury to the emergency department during the study period were eligible. Patients of all age groups and both sexes with complete medical records documenting demographic details, wound characteristics, WHO exposure category and management were included. Patients with incomplete records, bites from animals other than dogs (e.g., cats, monkeys, rats), those who did not receive their initial evaluation and management at this hospital, and duplicate records of the same patient were excluded.

As this was a retrospective, census-based study, no formal sample-size calculation was performed; a total enumerative sampling technique was used, and all eligible records meeting the inclusion criteria during the study period were analysed. A total of 89 patients met the inclusion criteria and constituted the final study sample.

Data were extracted from departmental and hospital medical records using a structured data-collection form, with personal identifiers removed to maintain confidentiality. Variables recorded included age, sex, date of presentation, type of biting dog (stray/pet), anatomical site of bite, WHO exposure category (Category I–III) [3], tetanus prophylaxis, anti-rabies vaccine (ARV) and rabies immunoglobulin (RIG) administration, and clinical disposition. Data were entered into Microsoft Excel and checked for completeness and consistency before analysis.

Given the retrospective design, a waiver of informed consent was obtained from the institution. Ethics approval was granted by the Institutional Ethics Committee, Amrita Institute of Medical Sciences, Faridabad [approval/reference number to be inserted by the author]. As no direct patient contact or intervention was involved, patient confidentiality and privacy were maintained throughout, and personal identifiers were removed prior to analysis. During the study period, [number to be inserted by the author] records of patients presenting with dog bite injury were screened, of which [number to be inserted by the author] were excluded because of incomplete documentation of key variables; no imputation was performed, and cases with incomplete records were handled by complete-case exclusion. The study was conducted in accordance with the ethical principles of biomedical research.

Statistical Analysis

Data were analysed using IBM SPSS Statistics (version 26.0). Continuous variables (e.g., age) were summarised as mean ± standard deviation and median; categorical variables (sex, anatomical site, WHO exposure category, type of dog, tetanus prophylaxis, ARV, RIG administration and disposition) were summarised as frequencies and percentages. Where appropriate, associations between categorical variables were assessed using the Chi-square test or Fisher's exact test (Fisher-Freeman-Halton extension for tables larger than 2×2), with the latter used in preference wherever more than 20% of cells had an expected count of less than 5, as was the case for the cross-tabulation of type of biting dog and WHO exposure category. A p-value of <0.05 was considered statistically significant.

RESULT

A total of 89 patients presenting with dog bite injury during the one-year study period met the inclusion criteria and were analysed.

Age and Sex Distribution

The age of patients ranged from 6.8 months to 90 years, with a mean age of 32.34 ± 19.86 years and a median age of 28.0 years. The majority of patients belonged to the young adult (18–44 years) age group, accounting for 46 of 89 cases (51.7%). Children under 12 years accounted for 8 cases (9.0%), and elderly patients aged 60 years and above accounted for 5 cases (5.6%). Of the 89 patients, 60 (67.4%) were male and 29 (32.6%) were female, giving a male-to-female ratio of approximately 2.1:1.

Table 1: Age-wise distribution of dog bite cases (N=89)

Age Group	Number of Patients	Percentage (%)
0–11 years (Child)	8	9.0
12–17 years (Adolescent)	9	10.1
18–44 years (Young Adult)	46	51.7
45–59 years (Middle Age)	21	23.6
≥60 years (Elderly)	5	5.6
Total	89	100.0

Monthly Distribution of Cases

The highest number of cases was recorded in June (29 cases, 32.6%) and July (25 cases, 28.1%), together accounting for 60.7% of all cases. Case numbers were comparatively low from February to May and from August to December.

Table 2: Monthly distribution of dog bite cases (N=89)

Month	Number of Patients	Percentage (%)
January	7	7.9
February	1	1.1
March	3	3.4
April	2	2.2
May	2	2.2
June	29	32.6
July	25	28.1
August	6	6.7
September	5	5.6
October	3	3.4
November	4	4.5
December	2	2.2
Total	89	100.0

Anatomical Site of Bite

The lower limb was the most common site of injury, involved in 34 cases (38.2%), followed by the hand and fingers in 26 cases (29.2%), the forearm/elbow in 13 cases (14.6%), and the head and face region in 9 cases (10.1%). The remaining 7 cases (7.9%) involved other sites.

Table 3: Anatomical site of dog bite (N=89)

Anatomical Site	Number of Patients	Percentage (%)
Lower limb (thigh/leg/foot)	34	38.2
Hand and fingers	26	29.2
Forearm/elbow	13	14.6
Head and face	9	10.1
Other sites	7	7.9
Total	89	100.0

WHO Exposure Category

Category III exposures (transdermal bites/scratches, licks on broken skin, or contamination of mucous membranes) were the most frequent, seen in 53 patients (59.6%), followed by Category II (minor scratches/abrasions without bleeding) in 32 patients (36.0%) and Category I (touching/feeding of animals, licks on intact skin) in 4 patients (4.5%).

Table 4: WHO exposure category (N=89)

WHO Category	Number of Patients	Percentage (%)
Category I	4	4.5
Category II	32	36.0
Category III	53	59.6
Total	89	100.0

Type of Biting Dog (Stray/Pet)

The biting dog was a stray (unowned) dog in 68 cases (76.4%) and a pet (owned) dog in 21 cases (23.6%). On cross-tabulation with WHO exposure category, all 4 Category I exposures were caused by stray dogs, while pet dogs accounted for a higher proportion of Category III exposures relative to their overall representation (14 of 21 pet-dog bites, 66.7%) compared with stray dogs (39 of 68, 57.4%). Because two of the six cells in this cross-tabulation (Table 5) had an expected count below 5, the association between type of biting dog and WHO exposure category was assessed using the Fisher-Freeman-Halton exact test rather than

the chi-square test; this showed no statistically significant association ($p = 0.63$).

Table 5: Cross-tabulation of type of biting dog and WHO exposure category (N=89)

Type of Dog	Category I	Category II	Category III	Total
Stray dog	4	25	39	68
Pet dog	0	7	14	21
Total	4	32	53	89

Tetanus Prophylaxis

Tetanus toxoid was administered in 81 of 89 patients (91.0%), while 8 patients (9.0%) did not receive it, most often because they had already completed prior immunisation or presented with documentation of a recent dose.

Table 6: Tetanus prophylaxis status (N=89)

Tetanus Toxoid Given	Number of Patients	Percentage (%)
Yes	81	91.0
No	8	9.0
Total	89	100.0

Anti-Rabies Vaccine (ARV) Administration

All 89 patients (100%) received the anti-rabies vaccine as part of post-exposure prophylaxis, in accordance with departmental protocol. This included all 4 patients classified as WHO Category I exposure, for whom ARV is not indicated under current WHO guidelines; this may reflect a precautionary departmental practice in cases of diagnostic uncertainty, or a discrepancy between the exposure category recorded in the case notes and the category on which the treatment decision was actually based, which could not be established retrospectively from the available records.

Table 7: Anti-rabies vaccine administration (N=89)

ARV Given	Number of Patients	Percentage (%)
Yes	89	100.0
No	0	0.0
Total	89	100.0

Rabies Immunoglobulin (RIG) Administration

Rabies immunoglobulin (RIG) was administered in 53 patients overall (59.6%). Among the 53 patients with Category III exposure, RIG was administered in 50 (94.3%), while 3 patients (5.7%) refused it despite counselling. RIG was also administered in 3 of the 32 Category II patients (9.4%), even though it is not routinely indicated for Category II exposure per WHO guidelines; this is noted as an observation from the recorded data, since the clinical rationale for these individual cases could not be established retrospectively. RIG was not given to any Category I patient, consistent with guidelines.

Table 8: Rabies immunoglobulin (RIG) status by WHO exposure category (N=89)

WHO Category	RIG Given	RIG Not Given	RIG Refused	Total
Category I	0	4	0	4
Category II	3	29	0	32
Category III	50	0	3	53
Total	53	33	3	89

Patient Disposition/Outcomes

The majority of patients, 87 of 89 (97.8%), were managed on an outpatient basis after wound care and administration of post-exposure prophylaxis. Two patients (2.2%) required hospital admission for surgical management, including debridement and wound repair, on account of extensive soft-tissue injury. No mortality was recorded in this series.

Table 9: Clinical disposition of dog bite cases (N=89)

Disposition	Number of Patients	Percentage (%)
Discharged/managed on OPD basis	87	97.8
Admitted for surgical management	2	2.2
Total	89	100.0

DISCUSSION

This retrospective observational (record-review) study of 89 patients presenting with dog bite injury to the emergency department of a tertiary care hospital describes the demographic profile, injury pattern, WHO exposure severity, prophylaxis coverage and clinical outcome of this population. The findings are discussed below in relation to comparable Indian and international literature on dog bite epidemiology and rabies post-exposure prophylaxis.

The mean age of patients in the present study was 32.34 ± 19.86 years, with more than half of all cases (51.7%) occurring in the 18–44-year young adult age group, consistent with the general pattern of exposure among economically active adults described in Indian animal-bite literature. A male preponderance was observed, with a male-to-female ratio of 2.1:1 (67.4% male). This closely mirrors the WHO-sponsored national multicentric rabies survey, which similarly reported a higher proportion of male victims (68% versus 31.7% female) [4], and a more recent retrospective analysis of dog bite cases at a tertiary care hospital in northern India, which reported a comparable male share of 67% [5]. The consistency of this finding across studies conducted almost two decades apart suggests that greater outdoor exposure among males is a stable epidemiological feature of dog bite injury in India rather than a setting-specific artefact.

A pronounced clustering of cases was observed in June and July, which together accounted for 60.7% of all presentations during the study year. Marked seasonal clustering of animal-bite presentations has been described in other Indian tertiary-care series, which have highlighted seasonal variation as a feature of the overall clinical spectrum of animal bite emergencies. Proposed explanations in the literature include a combination of hotter months coinciding with increased canine irritability, greater outdoor activity, and school-vacation periods increasing children's exposure; none of these mechanisms were directly measured in the present study and they should be regarded as hypotheses rather than established explanations. The present data are consistent with this pattern, although the departmental dataset alone cannot establish which mechanism predominates locally.

The lower limb was the commonest site of bite (38.2%), followed by the hand and fingers (29.2%), mirroring the finding of the WHO-sponsored national survey that the extremities were the most common sites of bite among Indian victims overall [4]. Facial and head bites, although comparatively few in the present series (10.1%), remain disproportionately important clinically, since paediatric literature describes a greater share of facial and trunk bites among younger children due to their shorter stature relative to the biting animal, and such bites may be associated with a shorter rabies incubation period owing to their proximity to the central nervous system [6]. This association is drawn from the published literature rather than from a direct measurement of incubation period in the present series, which did not track time to symptom onset.

Category III exposures were the most frequent in the present study (59.6%), followed by Category II (36.0%) and

Category I (4.5%). This proportion is broadly comparable to, though somewhat higher than, the 63% reported in a 2008 Indian multicentric study on animal bites and rabies [7], and considerably higher than the 27.3% Category III proportion reported among rural Indian children in a prospective hospital-based study [8], a difference plausibly related to the largely adult population and tertiary-care case-mix of the present series.

Stray, unowned dogs were responsible for the majority of bites in the present study (76.4%). This is consistent with the WHO-sponsored national survey, which found that dogs — mostly stray — were responsible for 96.2% of all animal bites nationally [4], and with a recent tertiary-care series from northern India that reported stray dogs responsible for 77% of bite cases, closely matching the present figure [5]. This recurring pattern across geographically distinct Indian settings reinforces stray-dog population control and community-level canine vaccination as central strategies for reducing the overall burden of dog bite injury.

Tetanus toxoid was administered in 91.0% of patients and the anti-rabies vaccine in all patients (100%), reflecting close departmental adherence to post-exposure prophylaxis protocol. Rabies immunoglobulin was administered in 94.3% of Category III patients, comparing favourably with the 90.48% Category III RIG coverage reported among rural Indian children [8]. RIG was administered in only 9.4% of Category II patients, considerably lower than the 34.55% reported in the same series [8]; since RIG is not routinely indicated for Category II exposure under WHO guidelines, this lower usage may reflect closer guideline adherence rather than a gap in care. Three Category III patients (5.7%) declined RIG despite counselling, echoing previously described gaps between prophylaxis recommendation and patient acceptance in Indian settings and underscoring a continuing need for patient education at the point of care.

The overwhelming majority of patients (97.8%) were managed on an outpatient basis, with only 2.2% requiring hospital admission for surgical management of extensive soft-tissue injury, and no mortality was recorded during the study period. These findings represent short-term hospital disposition outcomes rather than definitive clinical outcomes, and are broadly consistent with the generally minor-to-moderate severity of most dog bite presentations to emergency departments. Long-term outcomes, including completion of the vaccination course, wound complications, and any subsequent occurrence of rabies, were not assessed in this retrospective record-review study and could not be determined from the available data.

This study has certain limitations. It was conducted at a single centre with a relatively modest sample size and relied on retrospective record review, which precluded assessment of the clinical rationale behind isolated instances of RIG use in Category II patients and ARV use in Category I patients, and did not capture longer-term outcomes such as completion of the full vaccination schedule, wound complications, or subsequent rabies incidence. Prospective, multicentric studies with structured follow-up would help address these gaps.

CONCLUSION

This retrospective observational (record-review) study of 89 patients presenting with dog bite injury to the emergency department of a tertiary care hospital found that the burden predominantly affected young adult males following stray dog encounters, with a high proportion of WHO Category III exposure. Post-exposure prophylaxis coverage was high, with tetanus toxoid administered in 91.0% of patients, the anti-rabies vaccine in 100%, and rabies immunoglobulin in 94.3% of Category III patients. Short-term hospital disposition outcomes were favourable, with 97.8% of patients managed on an outpatient basis and no mortality recorded; longer-term outcomes were not assessed. A small proportion of eligible patients declined rabies immunoglobulin despite counselling,

underscoring the continued need for patient education and community-level stray dog control as complementary strategies to institutional prophylaxis in reducing the burden of dog bite injury and rabies.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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