Advanced Medical Journal, Vol.10, No.2, P.85-91,2025 https://doi.org/10.56056/amj.2025.346

Outcomes of Dog Bite Injuries Presenting to the Emergency Department in Erbil, Iraq

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Abstract

Background and objectives: Incidences of dog bites persist as a significant public health and clinical challenge, creating a burden on healthcare resources. The purpose of this study was to investigate the patterns and effects of dog bites.

Methodology: This study was a descriptive cross-sectional analysis conducted using data obtained from emergency departments within government hospitals in Erbil city, namely Rojhalat Emergency Department, Rozhawa Emergency department. The data collection utilized a consecutive sampling method and was carried out from April 1, 2023, to September 1, 2023. Data regarding time of occurrence of bite, type of dog, severity of the wound and vaccination were collected. Patient follow up was done to assess the outcome of each patient.

Results: The majority of dog bitten cases were adults 55 (55%). Male patients accounted for 80% of the cases, with most incidents occurring in urban areas 51 (51%). Most cases were classified as category 2 bites (62%), with timing often between noon and evening (41%). Only 35% received the accurate Anti-rabies dose, and merely 45% completed the full vaccination course. Among those not vaccinated, 12% cited vaccine unavailability at the hospital. Upon follow-up, 95% of cases showed no complications, while approximately 3% presented severe injuries($p>0.05$).

Conclusions: The majority of cases were males in urban areas. Treatment mainly comprised anti-rabies medication and antibiotics, yet the accurate anti-rabies dose was received by only a third of patients, and less than half completed the full vaccination course, partly due to vaccine unavailability.

Keywords: Dog bite, Rabies, Vaccination, Wound categories

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Introduction

Incidences of dog bites persist as a significant public health and clinical challenge, creating a burden on healthcare resources and causing anxiety and concern among patients, their families, and healthcare professionals.[1] They are deemed harmful due of the deadly zoonotic illness rabies, which is the most dangerous incurable outcome.[1-3] Rabies poses a significant global issue for public health. It is a severe viral disease of the central nervous system that is currently essentially incurable. Rabies is a result of the rabies virus, a member of the Rhabdoviridae family within the Lyssavirus genus.[4,5] It results in acute encephalomyelitis and generally spreads by rabid animal saliva through a bite, scrape, or mucous membrane exposure.[5] However, rabies can be avoided by using post-exposure prophylaxis on time. Most impoverished countries have insufficient rabies preventive awareness.[6] The sole method to avoid rabies involves providing pre-exposure immunization to individuals at risk, delivering post-exposure prophylaxis (PEP) either with or without human rabies immune globulin (HRIG), and controlling rabies within animal populations.[7] Administering these measures promptly to individuals exposed to rabies, following appropriate wound care, is crucial. A human diploid cell vaccination combined with rabies immune globulin is nearly 100% effective in avoiding human death.[8] Since the initial WHO Expert Consultation on Rabies held in 2004, WHO, along with its collaborating rabies centers, members of the WHO Expert Advisory Panel on Rabies, specialized national institutions and the Global Alliance for Rabies Control, partners including the Gates Foundation, and the Partnership for Rabies Prevention, have been promoting the possibility of regional and global elimination of rabies while encouraging research into sustainable and cost-effective strategies.[9] The World Health Organization (WHO) and World Organization for Animal Health (OIE) suggest that countries where canine rabies is prevalent should conduct recurrent mass vaccination initiatives targeting 70% of the dog population within a span of three to seven years to manage and potentially eradicate the disease.[9] In order to determine the elements causing it and to devise healthcare strategies to treat it. The purpose of this study was to investigate the patterns and effects of dog bites.

Patients and methods

This study was a descriptive cross-sectional study conducted using data obtained from emergency departments within government hospitals, namely Rojhalat Emergency Department, Rozhawa Emergency department in Erbil city, located in the Kurdistan region of Iraq. The data collection utilized a consecutive sampling method and was carried out from April 1, 2023, to September 1, 2023.Consecutive convenient sampling method was used to recruit data. Verbal consent was obtained from each patient prior to data collection and study objectives were clearly explained for each participant. Ethical approval was obtained from the Kurdistan Board for Medical Specialties scientific committee. Data regarding gender, age, time of bite, anatomical site of bite, and category of bite wound was collected by the principal investigator. This information was recorded using a questionnaire which was composed of five parts. The first part of the questionnaire comprised questions regarding the demographic data of the patients. The second part is composed of questions regarding the dog. In the third part, information regarding the presenting symptom and the category of the wound were recorded. In the fourth part, data regarding management of the case was recorded. Lastly, in the fifth part, the outcome of the patient at follow up was recorded.The victims were classified into four age groups:

https://doi.org/10.56056/amj.2025.346

children (aged 1 to 10), adolescents (aged 11 to 19), adults (aged 20 to 60), and the elderly (aged 61 years or above).Wound categories were divided according to WHO classification of wounds into category 1 (intact skin animal licks), category 2 (scratches and breeching of skin), category 3 (multiple transdermal bites).[10] In addition, the time of the bites were categorized into four periods: early morning to noon (from 06:00 AM to 12:00 PM), noon to evening (from 12:00 PM to 06:00 PM), evening to night (from 06:00 PM to 12:00 AM), and night to early morning (from 12:00 AM to 06:00 AM).Data analysis was conducted using SPSS (Statistical Package for the Social Sciences) version 25. Mean and standard deviation were employed to illustrate numerical data, while chi-square was utilized to note associations among categorical data, with significance considered at p-values of 0.05 or lower. Information encompassing bite type, victim age, timing and month of the bite, bite location, rabies development, and vaccination completion from the same center was presented in percentage form.

Results

The number of dog bite incidents reported during the study period was 100. The mean age of patients was 25.14 ± 16.1 years and the majority of cases were adults (55%), followed by adolescents (25%), children (19%), and lastly elderly (1%). There were more male patients (80%) than female patients (20%). The majority of the cases were from urban areas 51 (51%). The most common presenting symptom was laceration/wound (83%), followed by pain and swelling (14%) and bleeding (3%). The vast majority of the dogs were stray dogs (85%), Table (1).

Table (1): Sociodemographic characteristics of the cases.

Variables	Categories	Prevalence
Age groups (years), %	Children (1 to 10 years)	19%
	Adolescents (11 to 19 years	25%
	Adults (20 to 60 years)	55%
	Elderly (>60 years)	1%
Gender, %	Male	80%
	Female	20%
Residency, %	Urban	51%
	Rural	49%
Presenting symptoms, %	Laceration/Wound	83%
	Pain and swelling	14%
	Bleeding	3%
Type of dog, %	Stray dog	85%
	Pet dog	15%

The most common sites of injury were upper limb (39%) and lower limb (39%). Some patients presented with multiple injuries (11%) and only a minority presented with injuries to the face/head (5%) and the trunk (6%), Table (2). Out of 100 cases the most common bite category found was category 2 (62%), followed by category 1 (24%) and Category 3 (14%), Table (3).

Table (2): Site of dog bite injuries

Site of injury	%
Upper limb	39%
Lower limb	39%
Face/head	5%
Trunk	6%
Multiple wounds	11%

Table (3): Dog bite categories

Wound categories	%
Category 1: Intact skin licked	24%
Category 2: Scratch and breech of skin	62%
Category 3: Multiple Transdermal Bites	14%

The most common time of the day in which the dog bite occurred was between noon to evening (41%), followed by morning to noon (29%), evening to midnight (19%), and midnight to morning (11), Table (4). Dog bites were most prevalent in June (44%),

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followed by April (24%), May (15%), July (11%), and lastly August (6%), Figure (1).

Table (4): Prevalence of the time of the day of the dog bites

Time	%
Morning to noon (6 AM to 12 AM)	29%
Noon to evening (12 PM to 6 PM)	41%
Evening to midnight (6 PM to 12 AM)	19%
Midnight to Morning (12 AM to 6 AM)	11%

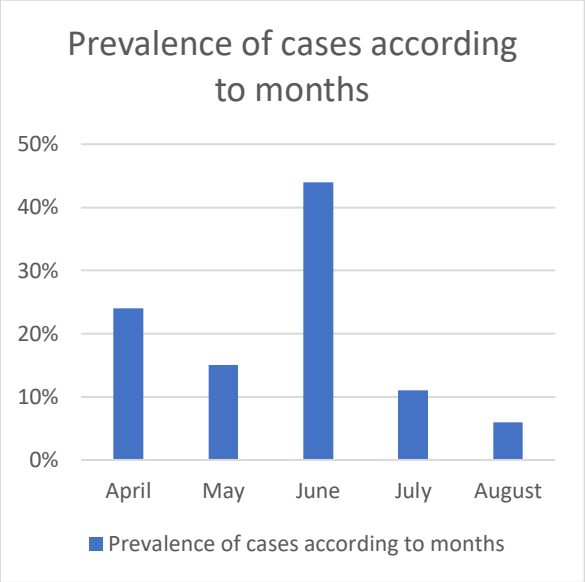

Figure (1): Prevalence of cases according to the months of the year

Most of our cases received anti-rabies (90%), Antibiotic treatment (92%), and ATS vaccination (89%), Table (5). However, only 35% of cases received the correct dose of anti-rabies. Only 45% completed vaccination. As for the patients who did not receive vaccines, 12% were due to the unavailability of vaccines at the hospital, Table (6).

Table (5): Treatments received by dog bite patients

Treatment	%
Anti-rabies	90%
Antibiotics	92%
ATS	89%

Table (6): Vaccination status of the study population

Vaccination status	%
Patient started but did not complete vaccination	34%
Patient completed vaccination at the same center	45%
Vaccine was not available at the hospital	12%
Unknown	9%

At follow up, we found that 95% of cases had no complication of which 33.7% started did not complete vaccination, 45.3% completed vaccination, 11.6% didn't receive vaccination because it wasn't available at the hospital and the vaccination status of 9.5% were unknown. About 3% of cases had severe and difficult to treat injuries involving the head, face, neck, chest, abdomen. Among them 66.7% started but did not complete vaccination, 33.3% completed vaccination. Only two cases developed rabies, one of them completed vaccination whereas the other one did not get vaccinated because vaccine was not available at the hospital. There was no statistically significant association between vaccination status and outcome of patients (p= 0.636), Table (7).

https://doi.org/10.56056/amj.2025.346

Table (7): Association between vaccination status and patient outcome

Outcome	Uncompleted vaccination	Not vaccinated	Completed vaccination	p-value
No complication	32 (33.7)	11 (11.6%)	43 (45.3%)	0.636
Severe and difficult to treat injuries	2 (66.7%)	1 (33.3%)	0 (0.0%)	
Rabies	0 (0.0%)	1 (50%)	1 (50%)	

Discussion

Studies conducted in developed countries show that, females, children, and adolescents are more likely to be bitten by dogs compared to males and other age groups.[11,12] However, in this study we found that males (80%) were most likely victims of dog bite rather than females. As for age group, the highest number of cases were reported among adults (55%), whereas children, and adolescents comprised 19% and 25% of cases respectively. The findings in the current study are in accordance with a study conducted in Pakistan by Ali et al.[13] in which they reported that males (85.7%) and adults (59%) were more likely to be victims of dog bite. An explanation for this finding is that females, children, and adolescents tend to stay at home more compared to males and adults. Stray dogs impose a bigger threat than pet dogs because they're not immunized and have a higher potential to cause infection.[14,15] In this study, most of the cases were from bites of stray dogs rather than pet dogs. This is in contrast to studies conducted in developed countries in which more pet dogs have been reported to be responsible for dog bite injuries rather than stray dogs.[16] In the current study, the most common sites for dog bite injuries were upper limbs (39%) and lower limbs (39%). This finding is similar to Ogundare et al.'s study in which they reported that the most common site was the lower limbs (57.2%) followed by the upper limbs (28.6%).[17] Most of the bites, categorized based on WHO criteria, were shown to be category 2 (62%) bites. This is in accordance with Ali et al.'s study,[13] in which they reported that 51.4% of the dog bites were category 2. However, following category 2 Ali et al. reported that category 3 came next (47.6%) meaning the least type of bite was category 1 (0.8%). [13] This is in contrast to our study as we found that category 1 (24%) bites were more common than category 3 bites (14%). Another study conducted in China also reported that category 2 and 3 bites were more common than category 1 bites.[18] In this study, most of the cases were bitten between noon to evening (from 12 PM to 6 PM). This is in contrast to Ali et al.'s finding in which they reported that the majority of dog bites were between morning to noon.[13] According to the findings in the current study, dog bite incidences were most prevalent in June (44%). This finding is in accordance to a study conducted in Pakistan by Ilyas et al., in which dog bites were reported most prevalent in the months May, June and July. In another study conducted in Korea by Park et al., the highest frequency of dog bites was reported in May.[19] Human diploid cell vaccination combined with human rabies immune globulin that is administered promptly after being bitten by a suspected rabid dog or other canines has been found to be particularly efficient in preventing human rabies.[20] In this study, only 45% of patients completed the post-exposure prophylaxis regimen, which is lower than the percentages reported by Ogundare et al. (50%) and Abubakar et al. (60.5%).[17,21] This difference could be due to the unavailability of vaccines at government hospitals, which was reported in 12% of our cases, and the high cost of the vaccines. At follow up, the majority of the cases had no

https://doi.org/10.56056/amj.2025.346

complications, 3% of cases had major injuries and 2% developed rabies. Ali et al. reported that 3.9% of their cases had major injuries that were difficult to treat and only 0.03% of their cases developed rabies.[13] This difference in the frequency of rabies could be because more than half of their patients completed their vaccination. Hence, greater emphasis on public health education is required, as well as the provision of vaccine funding, including human rabies immune globulin, and medical care for victims who have been bitten by a dog. This would make health care accessible in Erbil hospitals and assist to reduce preventable deaths.

Conclusions

Based on the findings, males and adults were the most vulnerable, most attacks occurred in the afternoon, and stray dogs were the most prevalent animal responsible. Numerous victims did not complete their vaccinations from the same location. At the peak of the heat of summer during July and August, a drop in the number of incidents was noticed. The implication that can be drawn from this study is that vaccine unavailability and lack of a proper system for follow up of victims of dog bite injuries, at government hospitals creates a challenge for both healthcare professionals and patients to keep up with the international guidelines for dog bite injury management.

Disclosure:

The authors assert that they have no conflicts of interest.

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