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Epidemiological study on dog bite presenting at district hospital in Karnali province of Nepal

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Abstract

Introduction: Worldwide, dog bite is a serious health concern which can lead to severe injury and endemic diseases like rabies. Particularly because of dog bites, Nepal is a rabies-endemic country. Dailekh District has been noted for the high incidence of dog bites. However, studies in this area remain scarce. Hence, this study aimed to find the epidemiological patterns of dog bite cases registered in the Dailekh District Hospital, Nepal.

Method: A descriptive cross-sectional study was conducted using secondary data from the Dailekh District Hospital. A total of 659 dog bite cases were registered during October 2023 to September 2024. Data were entered and analyzed in SPSS 26.0. Descriptive analysis was done.

Result: Out of 659 dog bite cases, no death was reported. The highest number of cases 234(35.5%) was recorded in winter, primarily in January 102 (15.5%) cases indicating the peak season for dog bites. Most cases 653(99.1%) originated from Dailekh District, primarily from Narayan Municipality 340 (52.1%) cases, with the highest incidence observed in Wards 08, 09, and 11. Out of total cases, 385(58.4%) were males and 325(49.3%) were below 20 years of age. However, the highest incidence was seen in the 80+ Years age group.

Conclusion: Dog bite is highly prevalent in Dailekh District, particularly during winter season. It is more common among males, children, adolescents and elder population. Targeted interventions such as public awareness programs and rabies prevention strategies are recommended particularly in areas with high incidence and high-risk groups of Dailekh District.

Keywords: Dog bite, Epidemiology, Incidence, Prevention, Rabies

INTRODUCTION

Globally, dog bite is a significant public health issue,¹ mainly affecting Asia and Africa,^{2,3} principally due to its association with rabies which is almost fatal (100%) disease once clinical symptoms appear.⁴ Over 99% of human rabies are caused by infected dogs where children under 15 years of age are affected most (40%).^{1,4,5}

Rabies has been progressively impactful endemic disease, distributed globally in nearly all land masses except Antarctica and Australia where dog-mediated rabies cases have not been reported yet.^{3,4} According to WHO fact sheet-2024, it is assumed that 50,000 - 60,000 human deaths occur annually with rabies worldwide, with 95% of deaths in Asia and Africa.^{2,4} Rabies is highly prevalent in India and Bangladesh, and moderately prevalent in Indonesia, Myanmar, Bhutan, Thailand, and Nepal.³

Immediate post-exposure prophylaxis (PEP) after a dog bite prevents rabies deaths, which includes wound washing with soap and water, administering tetanus vaccine, and human rabies vaccine with rabies immunoglobulins.^{1,2} To end human deaths from dog-mediated rabies, a comprehensive One Health approach is promoting mass vaccination of dogs, assuring access to PEP, orienting health workers, reformed surveillance and bite prevention through public awareness.^{3,4} Governmental and non-governmental organizations in Nepal are involved in rabies control and prevention programs through a collaborative and multi-sectoral strategy, such as the One Health approach.³

In Nepal, approximately 30 to 110 thousand dog bite cases were reported annually between the fiscal year 2018/19 and 2022/23 A.D, showing an increasing trend over the year with a large proportion being children.^{6,7} It has been estimated that almost half of the population of Nepal are at high risk and a quarter at moderate risk of rabies.⁷ Over 96% of animal bite cases in Nepal are due to Dog bites.³

The transmission cycle is broken after vaccinating 70% of the dogs in the risk area.⁶ Despite rabies and dog bites being preventable, the evidence regarding the epidemiology in Nepal suggests a plausible and persistent public health concern.⁸ Dog bites consist a major health concern in Dailekh where cases appear to be increasing. Despite the rising incidence, evidence is scarce regarding the epidemiological distribution of dog bites in this area. Hence, this study aims to describe the epidemiology of dog bites (their distribution over time, place and person) in Dailekh district of Karnali Province which may assist in future planning of preventing and controlling the spread of rabies.

METHOD

This study is a descriptive cross-sectional study that employed a quantitative approach to investigate registered dog bite cases at the District Hospital in Dailekh. The hospital provides treatment services and rabies vaccines for dog bite cases. The study population included all dog bite cases registered in the Electronic Health Records (EHR) of the District Hospital. The study population included all dog bite cases recorded from October 2023 to September 2024, i.e., 659 cases. Each dog bite case was the unit of analysis. Data entry and analysis were carried out using SPSS software version 26.0. Descriptive analysis of secondary data were computed in terms of frequency, percentage, and incidence, to identify patterns and variations among the cases. For calculating incidence rate, population at risk was taken from the population size indicated by the Census 2021.⁹ The distribution of dog bites have been presented in terms of time (month and season), place (different districts, municipalities of Dailekh and ward number within Narayan municipality), and person (sex and age). Coded secondary data of dog bites were used for research. Approval letter with reference no. 2081-082-1807 was taken from the

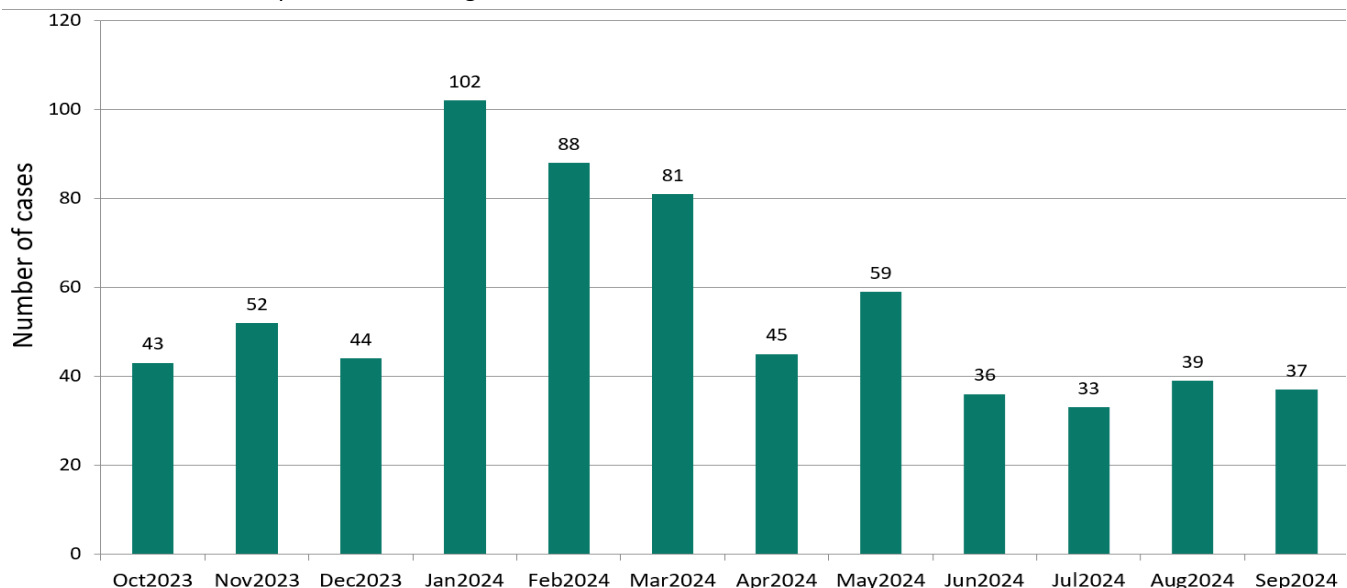


Figure 1. Monthly and seasonal variations of dog bite cases (n=659)

Health Service Office located at ward no.08, Narayan Municipality, Dailekh.

RESULT

A total of 659 cases of dog bites were reported at the District Hospital in Dailekh, with no fatalities reported. Almost all of the dog bite cases, i.e., 653 (99.1%), were from Dailekh District and 6 (0.9%) cases were migrant workers at Dailekh who were permanent residents of other districts (4 cases from Jajarkot, 1 case from Banke, and 1 case from Surkhet).

Among the total cases, 102 (15.5%) cases were reported in January 2024, indicating the peak month for dog bites. Most dog bites occurred during January to March, with no variation in distribution throughout the rest of the year. The peak season for bites was during winter (December to February) with a clustering of 234 (35.5%) of cases. There were 185(28.1%) bite cases in spring (March to May), 108(16.4%) bite cases in summer (June to August) and 132(20.0%) bite cases in autumn (September to November). (Figure 1).

Out of 653 cases from Dailekh District, majority of the cases i.e., 340 (52.1%) cases were reported from Narayan Municipality. This was followed by Bhagwatimai Rural Municipality (76 cases, 11.6%) and Dungeshwor Rural Municipality (63 cases, 9.6%). (Figure 2).

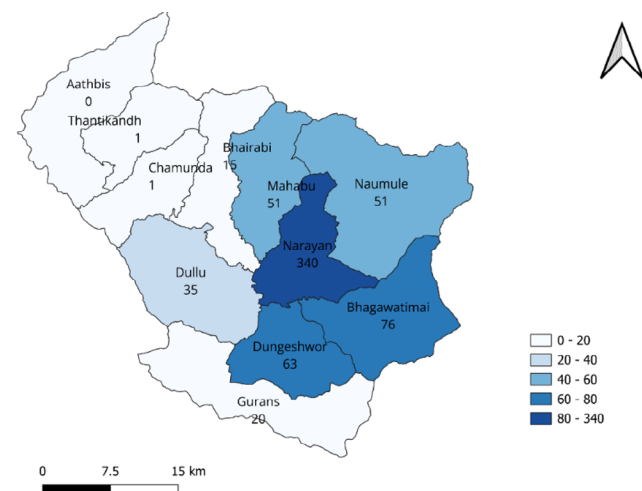


Figure 2. Dog bite cases from various municipalities of Dailekh district

Out of 340 cases from Narayan Municipality, the majority of cases, i.e., 57 cases, were reported from ward no. 01, followed closely by 50 cases from ward no. 11 and 46 cases from ward no. 06. (Figure 3).

But according to incidence rate per 1000, the majority of cases were from ward no. 08 followed by ward no. 09 and 11. For calculating incidence rate, denominator was the population of each ward of Narayan Municipality as per census 2021 AD.⁹ (Figure 4).

The highest number of cases were seen in age group 10-19 years, followed by 0-9 years and 20-29 years and again a

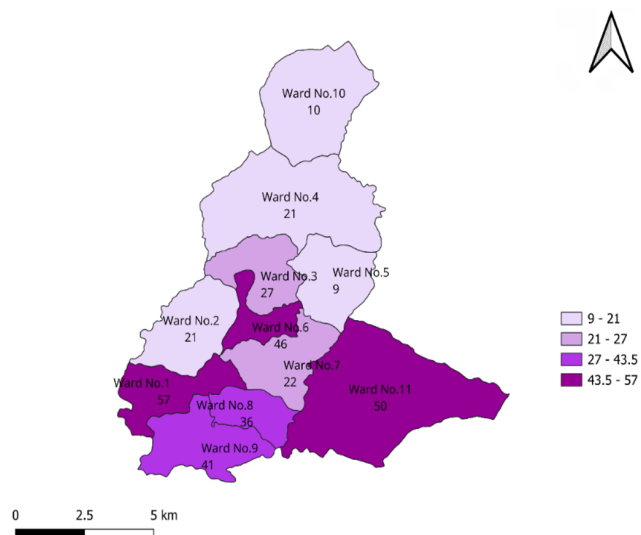


Figure 3. Dog bite cases from various wards of Narayan Municipality of Dailekh district



Figure 4. Incidence rate by ward

peak in 50-59 years age group. Overall, the highest cases, 325(49.3%) were recorded under 20 years of age. But the highest incidence was seen in age group 80+ years followed by 50-59 years and 10-19 years that might be because of low elder population size in the district according to census 2021.⁹ Dog bite cases were higher among male (58.4%) than in female (41.6%) and also similar results observed according to incidence rate per 1000 population.⁹ (Table 1).

Table 1. Variables on dog bite cases by age and sex (n=659)

Variables	Categories	f (%)	Incidence Rate (per 1000)	Risk Population
Age groups (years)	0-9	140 (21.2%)	28.3	4952
	10-19	185 (28.1%)	32.6	5675
	20-29	83 (12.6%)	17.4	4773
	30-39	64 (9.7%)	19.7	3251
	40-49	52 (7.9%)	19.2	2704
	50-59	79 (12.0%)	34.3	2303
	60-69	28 (4.3%)	19.4	1444
	70-79	20 (3.0%)	23.8	842
	80 and 80+	8 (1.2%)	47.9	167
Sex	Male	385 (58.4%)	31.5	12205
	Female	274 (41.6%)	19.7	13906

DISCUSSION

In Nepal, among 1,19,392 cases of animal bites reported in fiscal year 2022/23, the dog bite cases were 1,08,555, with 10 deaths reported,⁷ which shows animal bite, especially dog bite, is a more serious public health issue. This study identified 659 cases of dog bites in the Dailekh District, with no reported deaths due to dog bites or rabies. However, the annual report of Nepal has reported deaths every year due to rabies.^{6,7}

Studies have shown that during mating and breeding seasons, dogs exhibit protective behaviors towards their puppies and can display aggressive behavior towards others, including humans.^{1,10} Other studies have found several reasons behind dogs' aggressive behavior, such as cold weather, hunger, teasing or the beating behavior of humans.¹⁰⁻¹² These could be reasons for the highest cases of dog bites during the winter season in our study district. Studies done in some parts of India are also consistent with this result.^{1,10} However, contradictory results have been reported in studies conducted in other parts of India, such as Delhi and Mumbai.^{13,14} These studies showed that bite cases were higher in summer due to increased outdoor activities and movements of human, but lower in winter and the rainy season due to reduced mobility and outdoor activities.^{13,14}

In this study, the majority of cases were reported from Narayan municipality and its wards where the district hospital is located, whereas fewer cases were reported from other areas. It seems that distance, as well as the dispatch of rabies vaccine, played a vital role in visiting health centers and utilizing health services from periphery. These evidences are supported by other study done in India by Gadapani et al.¹⁵ However, our findings differed when analyzing the incidence rate. This could be attributed to the distribution and density of the human population in relation to the number of dog bite cases.

The highest number of cases was observed in children and adolescents under 20 years of age in our study. These findings are consistent with studies in Nepal and Austria, where cases were due to the children's behaviors like teasing a dog while eating, pulling its tail while sleeping or resting, beating a dog with stick, throwing stones at the dog, lack of risk awareness, and not knowing how to deal with or defend themselves against animals.^{8,16} The same study from Nepal showed that the highest number of cases were seen in adolescents, as they are active and aggressive population, more likely to travel to new places and interact with pets.⁸ Another peak in cases were seen in 50-59 age group in the present study which could have been attributed to increased exposure due to involvement in higher outdoor activities, domestic work and domesticating pets.

In the present study, the highest incidence was observed in elder individuals aged 80 and above where their population size was small in the district. This also might be because elder

people are often unable to defend themselves or flee due to decreased physical strength and diminished defensive abilities.^{17,18} The current study found a higher number of dog bites among males than females. These results are supported by studies done in Nepal and Turkey, where male behaviors, such as high-risk-taking behaviors and spending more time in outdoor activities and the outer environment, were significantly associated with dog bites.^{5,8}

The study was conducted among the dog bite cases registered only in the EHR of the Dailekh District Hospital. Due to an individual's choice and access to health facilities, the distribution of dog bites may not accurately represent the actual incidence, as shown by the study. This data also does not reveal the population density of stray dogs; we can't ascertain whether bites are due to the presence of multiple stray dogs or to a dog that bites numerous times. Variables such as the body parts bitten and the time of the bite were not recorded in the EHR of the Dailekh District Hospital. The main recommendations of the study includes conducting awareness programs on dog bites and rabies for school going children and adolescents, adults aged 50-59 year and elder population of high incidence areas of Dailekh district focusing on topic of avoiding aggressive dogs and behaviors like teasing or disturbing dogs or playing with unfamiliar or newly adopted dogs. Further studies in coordination with municipalities, veterinary hospital and veterinary service office should be carried in places with higher incidence of dog bite considering the density of stray dogs, sex of dogs, context of bite, relationship to dog and behavior done by individuals at the time of bite.

CONCLUSION

Dog bites are highly prevalent in Dailekh during the winter season. The number of recorded cases were higher in Narayan Municipality, as the hospital is located within this municipality, that has increased access for the people residing there. The high-risk groups for dog bites were males, children, adolescents, and the elder population. Policy actions and interventions such as preventive measures and awareness programs considering factors indicated by study would help to reduce dog bites cases in high-incidence areas of Karnali Province.

DECLARATIONS

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Conflicts of Interest

None

Funding

None

Ethical Clearance

Approval letter with reference no. 2081-082-1807 was obtained from the Health Service Office, Dailekh, to use the data and conduct the research.

Consent of the Study

Consent with participants were not taken because secondary data analysis was done.

Consent for Publication

All authors have approved the final version of the manuscript.

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