

Clinico-epidemiological study on animal bite presenting to a tertiary care hospital in western part of Nepal

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ABSTRACT

Introduction: Animal bite is a common public health problem and dog bites are most common among them in Nepal. Rabies infection is of most significant concern following animal-bites' injuries. This study aimed to assess the epidemiological variation in terms of demographic variables, type of animal, circumstances of bite, type and site of wound and outcome of the animal bite. **Methods:** It was a descriptive cross-sectional study conducted at emergency department of Gandaki Medical College Teaching Hospital and Research Centre among animal-bite cases from October 1, 2020 to September 30, 2021 using a pre-designed questionnaire. **Results:** Out of total 217 cases of animal-bite included in the study, 65 (29.95%) were of 21 to 30 years and 129 (59.46%) were males, 120 (55.23%) cases hailed from rural area and 63 (29.03%) were farmers. Most cases 168 (77.42%) were bitten by dog among which 93 (55.35%) were owned dogs and only 22 dogs were vaccinated. A total of 127 (58.53%) were unprovoked and lower limb 130 (59.91%) was the commonest site. World Health Organization (WHO) Category II wound were the most commonly encountered 122 (56.22%). Majority 99 (45.62%) came to hospital within 25 to 48 hours of bite and after cleaning the wound site 115 (52.99%). Only 81 (37.78%) animals were observed for 10 days after the bite out of which 5 (6.09%) developed signs of rabies. **Conclusions:** Animal bite was common in males and source was owned dogs. Majority of the owned dogs were not vaccinated and most of the cases visited hospital without following first-aid measures.

Keywords: Animal bite, epidemiological variation, rabies, vaccination.

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Submitted: May 10, 2022

Accepted: June 19, 2022

To cite: Pokhrel S, Yadav R, Sharma K, Shrestha A, Poudel R, Pun CB. Clinico-epidemiological study on animal bite presenting to a tertiary care hospital in western part of Nepal. JGMC Nepal. 2022;15(1):48-52.
DOI: 10.3126/jgmcn.v15i1.44791

INTRODUCTION

Animal bites, has been an emerging, yet neglected public health problem.¹ Annually, tens of millions of animal-bite injuries are reported worldwide; most importantly dogs, cats, rodents and monkeys.² Among 28514 animal bite cases reported in Nepal in the year 2017/18, 26312(92%) were dog bite cases.³

Rabies infection is the most significant concern following animal-bites' injuries, others being risk of sepsis due to bite wounds, psychological trauma and high cost of post-exposure prophylaxis (PEP) for the victims.⁴ The health impacts of animal bites are dependent on the type and health of the animal species, the wound type, and health of the bitten person, and accessibility to proper health care.¹

Rabies is a Neglected Zoonotic Disease (NZD) and is 100% fatal once symptoms appear.⁵ It can affect both domestic and wild animals. In up to 99% of cases, domestic dogs are responsible for the transmission to humans. It is spread to people and animals through bites or scratches, usually via saliva.

According to the World Health Organization (WHO), the virus kills approximately 59,000 people worldwide each year, out of which Asia bears the highest burden i.e. about 56% of total global rabies.^{6,7} The main source (95%) of animal and human rabies in Asian continent is bites from infected dogs.^{1,8} Case fatality is more due to poor access to anti-rabies post-exposure treatment (PET) and lack of sophisticated patient care and management system.²

Rabies has been endemic in Nepal with an underestimated annual death of 100 per year.^{9,10} In Nepal, the transmission of rabies is from jackals to humans through stray dogs as the mediator.¹⁰ The fenceless forests allowing contiguity of wild and pet animals and the free trade and movement of humans and animals across unbarred border with India has facilitated the transmission of infectious diseases. Also, the increasing population of stray dogs has primarily escalated the transmission risk of rabies from wild animals to stray dogs, which subsequently imparts the virus to humans.^{9,10} The majority of the human and animal rabies cases have been reported from terai region.⁸

The objective of this study was to study the clinico-epidemiological aspects of animal-bite in cases reporting to our hospital. It will help us develop strategies to prevent primary animal-bites and get prepared for managing the same.

METHODS

This descriptive cross sectional study was conducted at Gandaki Medical College Teaching Hospital and Research Center (GMCTHRC) in the department of emergency medicine after taking ethical approval from the Institutional Review Committee of the same. Sample size was calculated based on the study done by Venkatesan et al.¹¹ by using the formula, $n = Z^2 * p(1-p) / d^2$, where $Z = 1.96$ at 95% confidence interval, $p = 0.08$ and $d = 0.04$. This makes sample size of 177. During this study period from October 1, 2020 to September 30, 2021 around 228 cases of animal bite visited our study site. They were explained about the purpose of the study and those who gave informed consent i.e, 217 cases were included in the study. They were then interviewed, and relevant clinical examination was done. Animal bite wound was categorized as per the WHO guideline and wound was managed according to our hospital protocol. A predesigned questionnaire containing questions about the sociodemography (age/ sex/ education/ occupation), circumstances of bite (provoked or unprovoked), site and severity of wounds (WHO category), animal type, and vaccination status of animal, was presented to the patients in a face-to-face interview and data was collected. Follow-

up was done via phone call after 10 days of the first visit to know the outcome of the animal. Data was entered in Microsoft excel 2010. Analysis was done using statistical package for the social sciences version 20.0.

RESULTS

A total of 217 cases were included in our study. Among them, 65 (29.95%) were from the age group of 21 to 30 years and pediatric age group (upto 10 years) accounted for 30 (13.83%) cases. Majority of cases 129 (59.46 %) were males and 88 (40.55%) were females. The demographic parameters of the cases are represented in table 1.

Table 1: Demographic parameters of victims (N=217)

Demographic parameters	Categories	Number (%)
Age (years)	0-10	30 (13.83)
	11-20	23 (10.60)
	21-30	65 (29.95)
	31-40	39 (17.97)
	41-50	29 (13.37)
	51-59	18 (8.29)
Sex	60 and above	13 (5.99)
	Male	129 (59.46)
Literacy	Female	88 (40.54)
	Literate	189 (87.10)
	Illiterate	28 (12.9)
Occupation	Farmer	63 (29.03)
	Student	58 (26.73)
	Housewife	41 (18.89)
	Employee	29 (13.37)
	Dependent	15 (6.91)
Residence	Businessman	11 (5.07)
	Urban	120 (55.23)
	Rural	97 (44.77)

Out of total cases, 168 (77.42%) were bitten by dogs among which 93 (55.35%) were pets and 75 (44.65%) were stray. A total of 17 (7.83%) were bitten by cattle (buffalo, cow, goat). Others animals involved were cats 7 (3.23%), rats 5 (2.3%), rabbits 4 (1.84%), horses 2 (0.92%) and wild animals 14 (6.45%). Wild animals included monkey, bat, and unknown animals. (Table 2)

Table 2: Circumstances of animal bite (N=217)

Characteristics	Categories	Number (%)
Offending animal	Dog	168 (77.4)
	Cattle	17 (7.8)
	Cat	7 (3.2)
	Rat	5 (2.3)
	Rabbit	4 (1.3)
	Horse	2 (0.9)
	Wild	14 (6.5)
Circumstances of bite	Provoked	90 (41.47)
	Unprovoked	127 (58.53)
Vaccination status of animal	Vaccinated	22 (10.13)
	Non-vaccinated	195 (89.87)

Table 2 shows the circumstances of animal bite. A total of 127 (58.53%) bites were unprovoked and 90 (47%) were provoked. Among the sources, only 22 (10.13%) animals were vaccinated. Among the bite wound, majority 122 (56.22%) were WHO Category II. (Figure 1)

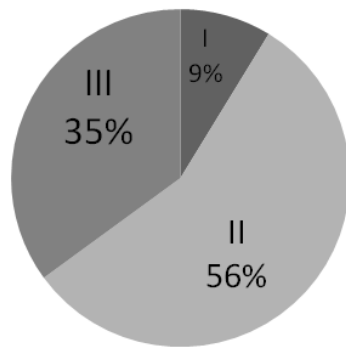


Figure 1: WHO wound category of animal bite (N=217)

Most common sites of bite were lower extremities in 130(59.91%) cases, multiple sites in 35(16.12%), upper extremities in 23(10.6%), trunk in 17(7.84%), and head & neck in 12 (5.53%) cases. (Table 3). Among the victims, majority 99(45.62%) presented to the hospital within 25 to 48 hours of incident while 10(4.61%) presented after 48 hours of the incident.

Table 3: Wound characteristics and outcome (N=217)

Characteristics	Categories	Number (%)
Site of bite	Head and neck	12 (5.53)
	Trunk	17 (7.84)
	Upper extremities	23 (10.60)
	Lower extremities	130 (59.91)
	Multiple sites	35 (16.12)
Time taken to reach health facility (hours)	<12	42 (19.36)
	13-24	66 (30.41)
	25-48	99 (45.62)
	>48	10 (4.61)
Cleaning before reaching hospital	Yes	115 (52.99)
	No	102 (47.01)
Observation for 10 days	Yes	82 (37.78)
	No	135 (62.22)
Signs of rabies (n=82)	Yes	5 (6.09)
	No	77 (93.91)

Majority of cases 115 (52.99%) cases presented to the hospital after cleaning the wound site while 102 (47.01%) directly came to the hospital without any cleaning. Among the sources, only 82 (37.78%) were observed for 10 days after the bite for signs of rabies. Among the observed ones, 5 (6.09%) developed signs of rabies. (Table 3)

DISCUSSION

Animal bite is a major public health problem in our country. Though dog is main cause, Nepal being an agricultural country, animals like goat, buffalo, cow are grazed in open fields. And freely roaming stray dogs are in contact with them, which is the main mode of transmission of human rabies.⁸

In our study, majority 65 (29.95%) was from 21 to 30 years age-group and pediatric age group accounted for 30 (13.83%) of cases. In a meta-analysis done by Abedi et al.⁶ age with maximum burden was 26.23 years which

is similar to ours. Majority were from same age group in different studies which is consistent with our study.^{4,12,13} Young adults are adventurous, would like to travel and play with dogs, thus increasing their risk for animal bite. Pediatric age-group also pose risk as they don't know how to deal with animals and fend off an attack.¹⁴

Majority of our cases were males. As high as 83% of cases were males in a study presented by Umbrigar et al.¹⁵ Males were predominantly affected in other several studies as well.^{2,4,16,13} The reasons could possibly be due to the reason that males are generally engaged more in outdoor activities and get exposed to the outer environment and women being more confined to household. Most cases hailed from rural area. In studies done by Bay et al.⁷ as high as 67% cases and in study by Munibullah et al.², 77.7% were from rural area. Our center being a tertiary center, mostly the cases get referred from surrounding rural areas. Similarly, 89 (87.10%) cases were literate which shows that awareness program will be successful if properly conducted.

Among our victims, most 63 (29.03%) were farmers as Nepal is an agricultural country. People who had occupation with extensive travel¹⁵ and freelancers⁷ pose maximum risk of animal bite due to their increased risk of exposure. Dog bites account for over 50% of animal-related injuries in people who are travelling.¹ In this study, people were most frequently bitten by dog followed by cattle. In study done by Munibullah et al.², 86.9% of biting animals reported were dogs, followed by rats (4.7%), cats (4.0%), donkeys/horses (2.1%), cattle/buffalos (1.3%), rabbits (0.7%), and wild animals (0.3%). Owned dogs carried major 93(55.35%) burden. In other studies too, dog was the predominant source^{7,12,14,16} and owned dogs were more frequent to stray dogs.^{4,6} In our country, owners allow their dogs to roam freely, thus increasing chances of harming people.¹⁷ In a retrospective study done in Nepal, 102 people got bitten by the dogs on a monthly basis.² However, most of these bites were reported from urban areas, where the stray dog population is higher than the rural areas.⁹

Regarding circumstances of animal bite, most were unprovoked. Unprovoked cases were as high as 81 to 87%.^{2,15} Among the sources, only 22 (10.13%) animals were vaccinated. Most people being from rural areas didn't know about the provision and need of vaccination. Lower extremities were most commonly bitten site while head & neck sustained the least. Lower limb was the most common site of bite in most of the studies so far^{13,14,16} as legs are easily accessible to the biting animals. Head and

neck region was least common as the stature of the animal doesn't reach that area.

Among the bite wound, majority were WHO Category II followed by Category III. It was similar as in studies done by Umbriger et al.¹⁵ (Category II, 53.4%) and by Gupta et al.¹⁴ (Cat II, 53%). Most 99 (45.62%) of our victims came to hospital within 25-48 hours of the incident. Median days (57%) of presentation to health facility were two days in study by Ngugiet al.⁴ Late presentation was due to lack of awareness. More than half of the cases of cases came to hospital after cleaning the wound site with whatever means. Study by Kumar et al.¹³ showed that 48% came to hospital after cleaning with soap and water. People should be made aware of the first-aid measures which includes immediate and thorough flushing and washing of the wound for a minimum of 15 minutes with soap and water, detergent, povidone iodine or other substances that remove and kill the rabies virus.¹⁸ In our study, only 82 (37.78%) biting animals were observed for ten days after the animal-bite for signs of rabies as some animals ran away, some were killed in fear and some were unnoticed. Among the observed ones, 5 (6.09%) developed signs of rabies. In study done in Pakistan, 10.1% of the observed animals developed signs of rabies.²

CONCLUSIONS

Owned dogs have been the major source of animal bite in our part of country. Hence, Nepal government should focus on preventing number of primary animal-bite and on sustained mass vaccination of owned dogs. Other strategies include dog population management, pre and post-exposure prophylaxis in humans, ample provision of human-rabies immunoglobulin and public education regarding responsible dog ownership and animal behavior which will help us eliminate dog-mediated human rabies.²

ACKNOWLEDGEMENT:

The authors would like to express gratitude of thanks to the Department of Emergency Medicine of GMCTHRC for support to conduct the research.

CONFLICT OF INTEREST: None declared

SOURCE OF FUNDING: None

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