

Original Research Article

A cross-sectional epidemiological study of animal bite victims in district hospital Alwar, Rajasthan, India

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ABSTRACT

Background: Rabies, an invariably fatal viral disease, transmitted to humans through animal bites, mostly dogs. According to WHO, each year, 23000-25000 people die in the SEA region due to rabies. These accounts for approximately 45% human deaths due to rabies worldwide. Objective was to study epidemiological trend of animal bite in Alwar district hospital.

Methods: A retrospective, record-based study was conducted in 200 animal bite victims presenting to district hospital Alwar, Rajasthan wherein information on monthly number of animal bite cases was collected from records section of the hospital. Information on annual number of animal bite cases was available from the annual report of the hospital from 2018 onwards, this data was used for studying the monthly variation in animal bite cases. Data were compiled and analyzed using Microsoft Excel.

Results: Among 200 victims 76.3% were males, 56.7% belongs to 15-45 years, 61.6% were living in urban area, 31.3% and 21.7% of the victims were agriculture worker and laborers respectively. Among 95.8% victims bitten by dog, 89% of them were stray. 89.4% had category III bite, lower extremity affected in 60.8%, fate of animal was unknown in 78.6% and 46% of the victims were bitten during evening hours.

Conclusions: Majority of bites were by stray dogs, unprovoked and category III bites. This indicates the need of large amount of anti-rabies serum or HRIG thereby increasing the cost of management of animal bite cases. There is a need to control stray dog population and immunize pet dogs.

Keywords: Animal bite, District hospital Alwar, Epidemiology, Rabies

INTRODUCTION

Rabies, a virulent viral disease, poses a significant threat to human health, primarily transmitted through animal bites, with dogs being the most common vectors. In regions where rabies is endemic, such as southeast Asia, dog bites account for a staggering 96% of human rabies cases, according to the World Health Organization (WHO). Tragically, the SEA region witnesses a substantial toll of 23,000 to 25,000 lives lost annually due to rabies, representing nearly half of the global human deaths attributed to this disease.¹

Among the countries in this region, India bears the heaviest burden, with an estimated 19,000 deaths annually, followed by Bangladesh with around 2,000 fatalities. The aftermath of rabies doesn't just end with the loss of lives; over 2.5 million individuals undergo post-exposure prophylaxis each year after being bitten by rabid or suspected rabid animals. This not only leads to significant morbidity but also results in substantial economic losses.²

Despite the grave consequences, obtaining accurate information on the incidence of animal bites and rabies

remains challenging in India due to the absence of systematic reporting. Compounded by the fact that rabies is not a notifiable disease in the country, the reported figures are believed to underestimate the true magnitude of the problem. While sporadic studies have been conducted in various parts of India, the profiles of animal bites vary widely not only between countries but also within regions.³

Given that rabies is preventable with effective preventive and control measures, the lack of comprehensive epidemiological data poses a significant obstacle to its elimination. The success of any elimination program hinges on an accurate assessment of disease burden, morbidity, mortality, and understanding of epidemiological trends, necessitating a robust epidemiological surveillance mechanism.^{4,5}

Regrettably, both dog and human rabies are not notifiable diseases in most endemic countries, exacerbating the challenge. Thus, researchers have embarked on studies like the one conducted in Rewa city to examine epidemiological trends and characteristics of animal bite victims.⁶ Such endeavours are crucial for informed decision-making, enabling the formulation of targeted prevention and management strategies to combat this deadly disease effectively.

METHODS

A retrospective study was conducted among animal bite victims presenting to district hospital Alwar, Rajasthan. The research adopted a cross-sectional observational study and was conducted at district hospital Alwar, situated in Rajasthan, India. Record based data collection took place over a period spanning from November 29, 2018, to December 2, 2023, with an additional two days allocated for thorough analysis. Inclusion criteria necessitate that patient data considered for analysis be both current and readily accessible within the hospital's record book, while incomplete entries are excluded from the study. The primary tool employed for data collection was the annual report sourced from the hospital's extensive database. Seasonal changes were classified as: winter: December, January, February. pre-monsoon: March, April, May. Monsoon: June, July, August. Post-monsoon: September, October, November.

Time series analysis

We arranged statistical data in a chronological order, i.e., in accordance with its time of occurrence. It reflects the dynamic pace of movements of a phenomenon over a period of time.

If we fit the linear trend $y = a + bx$, where 'x' was obtained from 't' by change of origin such that $\sum x = 0$, then for the yearly data, the annual rate of growth is b or 2b according as the number of years is odd or even respectively.

Wherein information on monthly number of animal bite cases was collected from records section of the hospital. Information on annual number of animal bite cases was available from the annual report of the hospital from 2018 onwards this data was used for studying the monthly variation in animal bite cases. Data was compiled and analysed using Microsoft Excel and statistical significance was found by using IBM SPSS version 25.

RESULTS

In our study, it was determined that the majority of individuals affected by animal bites were males, accounting for 76.3% of the cases. Additionally, 56.7% of the victims fell within the age range of 15-45 years. Furthermore, our findings indicated that 61.6% of the animal bite incidents occurred in urban areas. Regarding occupation, 31.3% of victims were agriculture workers, while 21.7% were laborers.

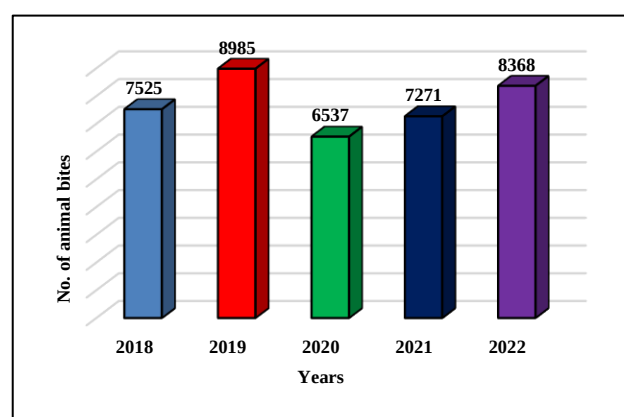


Figure 1: Distribution of total animal bites per year.

While assessing the distribution of animal bites per year, in 2022, there were a total of 8,368 reported animal bites, accounting for 22% of the total cases. On the other hand, in the year 2020, the lowest number of animal bites were reported, with a total of 6,537 cases, representing 17% of the total cases. This indicates a higher number of animal bites in 2022 compared to the previous years captured in the data (Figure 1).

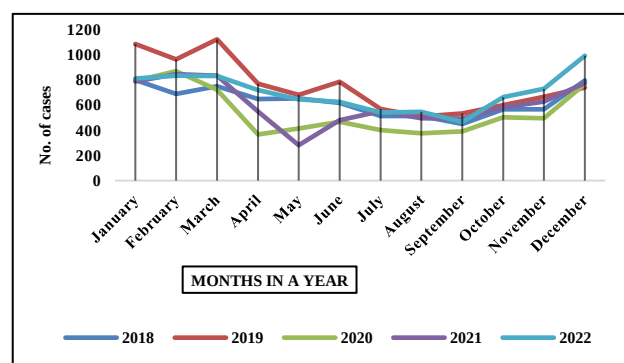


Figure 2: Monthly variation in animal bites cases in months per year.

While assessing the monthly variation in animal bite cases major peaks of cases have been observed in the initial months and towards the last months of every year. This could be attributed to factors such as changes in animal behaviour, mating seasons, or increased human interactions with animals during these months.

Additionally, it is note that lower numbers of animal bite cases were found during the COVID-19 pandemic in 2020-2021 a dip in the graph at August and September. This could be due to various reasons, such as reduced outdoor activities and decreased human-animal interactions during lockdowns and social distancing measures. The pandemic has indirectly affected the occurrence of animal bite cases by influencing human behaviour and limiting opportunities for animals to come into contact with humans (Figure 2).

While assessing the yearly variation of animal bites cases in months per year, we found that dog bites were the most common, accounting for 95.8% of all animal bite cases. Among the dog bite victims, a significant proportion (89%) were bitten by stray dogs. When we assess the categories of animal bites. Category III bites, were reported in 89.4% of the cases. Lower extremities, such as legs and feet, were affected in 60.8% of the cases. The fate of the animals involved in the bites was not known in 78.6% of the cases. A major proportion (46%) of the victims were affected during evening hours (Figure 3).

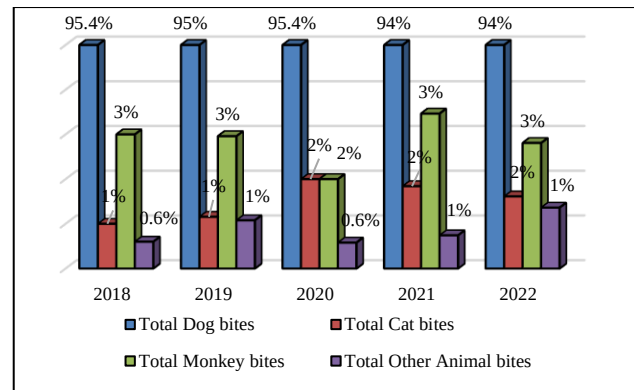


Figure 3: Yearly variation of animal bites cases in months per year.

In assessing the threat of animal bites, a decreasing trend is observed in the overall incidence of animal bite cases. This declining trend is similarly noted in the specific category of dog bite cases. However, when examining the data for other categories, there is an increasing trend in the incidence of bites from cats, monkeys, and other animals (Table 1).

While assessing the monthly index of total animal bite cases, an increase was observed during the winter season, followed by a decline during the pre-monsoon, monsoon, and post-monsoon seasons (Figure 4). The calculations are presented in Table 2.

Table 1: Assessing the trend per year ($y=a+bx$).

Assessing the Trend per year ($y=a+bx$)					
Year	Total animal bite	Dog	Cat	Monkey	Other animals
2018	37503	7159.4	79.6	218.4	48
2019	37500	7131.3	93.6	219.6	57.9
2020	37497	7103.2	107.6	220.8	67.8
2021	37494	7075.1	121.6	222	77.7
2022	37491	7047	135.6	223.2	87.6
2023	37488	7018.9	149.6	224.4	97.5
2024	37485	6990.8	163.6	225.6	107.4

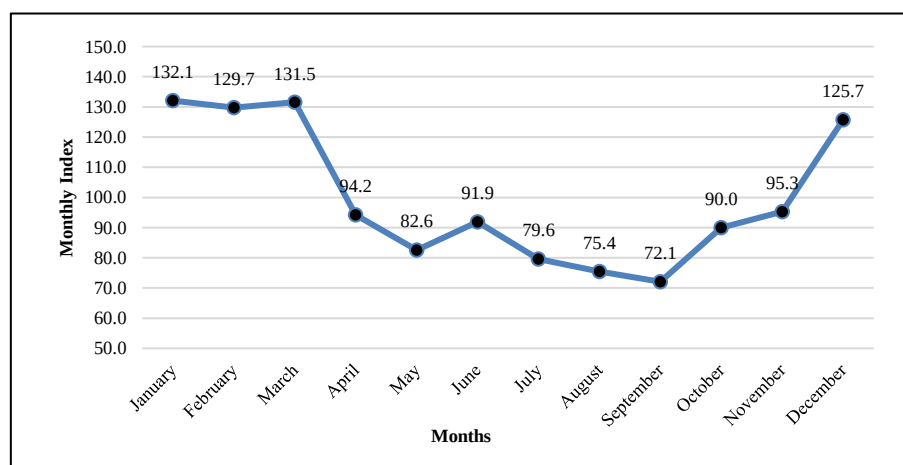


Figure 4: Variation of monthly index per month.

Table 2: Monthly index calculation.

	January	February	March	April	May	June	July	August	September	October	November	December	Grand total
2018	796	686	746	644	650	614	512	511	448	563	565	791	16511
2019	1082	959	1118	766	678	782	567	507	530	597	662	737	15522
2020	789	866	718	365	411	466	399	375	390	500	494	764	13808
2021	784	842	831	546	280	477	550	493	491	580	625	772	15639
2022	807	829	828	715	643	623	539	545	464	661	726	988	47055
total monthly	4258	4182	4241	3036	2662	2962	2567	2431	2323	2901	3072	4052	108535
monthly average	851.6	836.4	848.2	607.2	532.4	592.4	513.4	486.2	464.6	580.2	614.4	810.4	
grand average = total Monthly average/4	644.7833												
Monthly index = monthly average *100/grand average	132.1	129.7	131.5	94.2	82.6	91.9	79.6	75.4	72.1	90.0	95.3	125.7	

DISCUSSION

The study by Sudarshan et al revealed that a high proportion of bite victims did not wash their wounds with soap and water (39.5%), and the use of rabies immunoglobulin was notably low (2.1%).⁷ These findings underscore the critical gaps in post-exposure prophylaxis and wound management practices, necessitating improved public health education and accessibility to appropriate medical care. Additionally, the reliance on indigenous treatments and local applications to wounds, as reported by Sudarshan et al, further emphasizes the need for community education on proper wound care and the risks associated with untreated animal bites.⁷

The study by Ichhpujani et al highlighted that nearly 40% of rabies cases involved children below 15 years of age, and males constituted 78.6% of the cases, reflecting the exposure-related nature of the disease.⁸ This demographic pattern is consistent with our findings and reinforces the importance of targeted interventions for vulnerable populations, including children and males in high-risk age groups.

CONCLUSION

Our study revealed that males and individuals aged 15-45 years were predominantly affected by animal bites, with most incidents occurring in urban areas. Agricultural workers and labourers were notably among majority. Dog bites were the most common, primarily involving stray dogs, with severe bites frequently affecting the lower extremities. Peaks in cases were observed in winter and during the initial and final months of each year. A decline in bites was noted during the COVID-19 pandemic due to reduced human-animal interactions. Despite an overall decrease in animal bite incidents, bites from cats, monkeys, and other animals showed an increasing trend.

Recommendations

These findings highlight the need for targeted prevention and public health strategies, particularly in urban areas and among specific occupational groups, to mitigate animal bite risks.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Sawai Man Singh Medical College, Jaipur

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