

# Epidemiological Pattern and Trend Analysis of Animal Bite Cases of Anti-Rabies Clinic of Tertiary Care Hospital of Delhi

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## ABSTRACT

**Background:** Animal bites to humans are a public health problem. Rabies is caused by rhabdovirus which is present in the saliva of rabid animals like dogs, cats, monkeys, and wild animals like fox and jackals. **Objective:** To find the epidemiological pattern and trend analysis of animal bite cases registered in Anti-rabies clinic of tertiary care hospital of Delhi. **Materials and Methods:** A retrospective cross-sectional study was planned in Anti-rabies clinic of Hindu Rao Hospital, Delhi, and data from January 2010 to December 2018 was taken. Data were analyzed by SPSS software version 21.0. **Results:** After interpretation of data from 2010 to 2018, it was found that maximum number of animal bite cases belonged to category 3 (91.0%) and majority (93.6%) were due to dog bite. On analysis of year and season wise trend, it was found that the frequency of cases showed a rising trend from the year 2010, with highest number of cases in the year 2014, while animal bite cases were maximum with arrival of spring season (month of April). **Conclusion:** This study concludes that animal bite cases are rising over the years and dog bites are most common animal bite cases in Delhi. Most of the animal bite cases occurred during spring season followed by autumn season of the year. So, there is dire need of strengthening the preventive measures for controlling animal bites in the study area.

**Keywords:** Animal bites, Delhi, epidemiological pattern, rabies, trend analysis

## Introduction

Animal bites to humans is a public health problem, posing a potential threat of rabies to over 3.3 billion people worldwide.<sup>[1]</sup> These exposures occur in rural and urban areas and has been documented for more than 4000 years.<sup>[2]</sup> Most cases occur in Africa and Asia; where a close habitation of large human and dog population is seen.<sup>[3]</sup> The World Health Organization's (WHO) south-east Asia region has more exposures than in any other part of the world; nearly, 1.4 billion people are at risk.<sup>[4]</sup> In India,

an estimated 17.4 million animal bites occur annually, with an incidence of 1.7%.<sup>[5]</sup>

Rabies is one of the fatal diseases caused by bite of animals like dogs, cats, monkeys, and wild animals like fox and jackals. Rabies is caused by rhabdovirus which is present in the saliva of rabid animals and is transmitted through wounds and cuts in skin or mucous membrane after animal bite. Most common cause of rabies or animal bite in urban areas is dog bite.<sup>[6]</sup> In rabies endemic country like India, every rabid animal bite is potentially suspected as rabid exposure. Wound washing with soap/detergent and water, followed by early and complete post exposure prophylaxis, including compliance to complete the course of vaccination, will prevent rabies, even after high-risk exposure to potentially rabid

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animals.<sup>[7]</sup> However, in India, scientific data related to animal bite is mostly uncompiled, unstructured, and irregular till date.<sup>[8]</sup>

WHO in collaboration with global alliance for rabies control has target to eliminate dog mediated human rabies by 2030. Knowledge regarding epidemiology and trend of rabies cases will be helpful to achieve this target of elimination. Such studies will also increase the understanding of rabies for primary physicians who are dealing with such cases on regular basis. Better understanding of the disease will be helpful in planning effective preventive and curative measures, especially in rabies endemic areas.<sup>[9,10]</sup>

Although various studies have been conducted on animal bites in different parts of India, there is a paucity of literature regarding the epidemiological pattern and trend analysis of animal bite cases in North India. Hence, this study was concerned in finding the epidemiological pattern and trend analysis of animal bite cases registered in Anti-rabies clinic of tertiary care hospital of Delhi.

### Materials and Methods

**Study type:** A retrospective cross-sectional study was planned in the Anti-rabies clinic (ARC) of North DMC Medical College and Hindu Rao Hospital, Delhi, which is tertiary care hospital run by North Delhi Municipal Corporation. This ARC provides treatment and counseling services mainly to the residents living in North Delhi and surrounding area. A register is maintained in the clinic in which the data related to animal bite cases (categories and type of animal) and treatment history is entered on daily basis. The WHO protocol is followed for the treatment of animal bite cases coming to ARC clinic.

**Study population:** Animal bite cases reported to anti-rabies clinic from January 2010 to December 2018 were studied. All the available data maintained in the register of Anti-rabies clinic of Hindu Rao Hospital, Delhi, was included in the study. Data on sociodemographic characteristics of patients were not available, so it was excluded from the study.

**Study Procedure:** The data were taken from the register of Anti-rabies clinic of North DMC Medical College Hindu Rao Hospital, Delhi, after seeking necessary permission from the authorities. Secondary data from January 2010 to December 2018 was collected and analyzed. Variables like type of animal bite, category, year, and month wise distribution of all cases were taken into consideration from the records of ARC. The data were then entered in a master sheet in MS Excel and later transferred from MS Excel to Statistical Package for the Social Sciences (SPSS) Software version 21.0 for analysis. Data validation checks were performed at regular interval for the data entered in the worksheet in MS Excel. Simple tables and cross tables were made. Appropriate diagrams were made to illustrate the results, for example, bar diagrams and line graphs.

**Ethical issues:** Prior permission for the study was obtained from the institutional ethical committee of North Delhi Municipal

Corporation Medical College and Hindu Rao Hospital, Delhi. Administrative approval for accessing the data of Anti-Rabies clinic was obtained from Chief Medical Officer In-charge of Anti-Rabies clinic, Hindu Rao Hospital, Delhi. As it was secondary data analysis, informed consent was not applicable. Confidentiality of data was maintained.

### Results

The data for epidemiological pattern was available for 9 years from 2010 to 2018 from anti-rabies clinic of Hindu Rao hospital which mostly caters to the population of North Delhi. We studied the records of 1,58,413 animal bite cases in total.

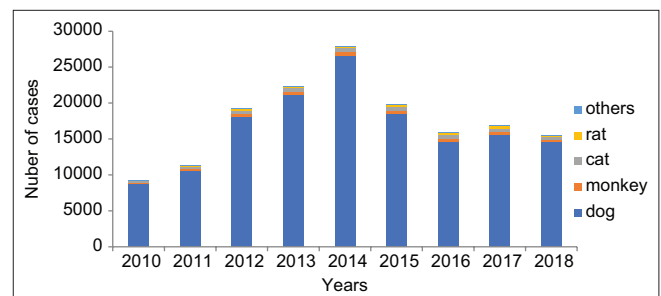
Table 1 shows that on analyzing category wise distribution of cases from the year 2010 to 2018, it was found that maximum number of animal bite cases belonged to category 3 (91.0%), while only a few (1.4%) of cases belonged to category 1. Highest number of category 1, category 2, and category 3 cases was found in the year 2016, 2015, and 2014, respectively.

In Figure 1, after interpretation of data from 2010 to 2018, it was found that maximum number of animal bite cases were due to dog bite (93.66%) followed by monkey bite (2.4%). Highest number of dog, monkey, cat, and rat bite cases was found in the year 2014, 2012, 2015, and 2016, respectively.

Figure 2 shows that on analysis of year wise trend of animal bite cases, it was found that the frequency of cases showed a rising trend from the year 2010, with highest number of cases was in

**Table 1: Distribution of animal bite cases according to year and categories of wound (n=1,58,413)**

Year	Category 1	Category 2	Category 3	Total
2010	94 (1.0)	915 (9.8)	8241 (89.0)	9250 (100)
2011	160 (1.4)	1249 (10.9)	9981 (87.6)	11390 (100)
2012	107 (0.5)	436 (2.2)	18708 (97.1)	19251 (100)
2013	291 (1.2)	1930 (8.6)	20164 (90.0)	22385 (100)
2014	296 (1.0)	1319 (4.7)	26346 (94.2)	27961 (100)
2015	312 (1.5)	2535 (12.7)	16980 (85.6)	19827 (100)
2016	466 (2.9)	1664 (10.4)	13791 (86.6)	15921 (100)
2017	461 (2.7)	1295 (7.6)	15146 (89.6)	16902 (100)
2018	35 (0.2)	582 (3.7)	14909 (96.0)	15526 (100)
Total	2222 (1.4)	11925 (7.5)	144266 (91.0)	158413 (100)



**Figure 1: Distribution of animal bite cases according to type animal involved in the bite. (N=158413)**

the year 2014. A decline in total number of animal bite cases was found after the year 2014 which reached to almost stagnant level in the year 2016, 2017, and 2018.

In Figure 3, after interpretation of data, it was found that number of animal bite cases was maximum with onset of spring season (month of April). There was reduction in frequency of animal bite cases in rainy season (month of June–July). After rainy season, the frequency of cases started increasing followed by a decline with the arrival of winter (month of October–November).

### Discussion

In this study, out of 1,58,413 animal bite cases, it was found that majority (91.0%) of these cases belonged to category 3 and similar pattern was seen in year wise cases also from year 2010 to 2018. As category 3 cases are severe and require urgent medical attention, it may result in early visit to tertiary hospital instead of home remedy or primary care. Similar findings were reported by Ichhpujani RL *et al.*<sup>[11]</sup> in their multicentric study conducted in India, in which they reported that about two-third (63%) of animal bite cases belonged to category 3. In another study by Bashir *et al.*,<sup>[12]</sup> the majority of animal bite cases coming to anti-rabies clinic in Kashmir belonged to category 3 exposure followed by category 2. Masthi *et al.*<sup>[13]</sup> in their study done in Karnataka also reported that majority (97.1%) of bite victims

had category 3 exposure. In this study, it was found that out of the total cases in last 9 years, about one-third (31%) of rabies cases were reported during 2013 and 2014 year. The reason behind this difference may be due to variable supply of anti-rabies vaccine in Delhi. Due to large number of animal bite cases and frequent shortage of supply of vaccine, patients usually prefer to go to hospitals having supply of vaccine irrespective of distance from home.

In this study, it was found that majority of animal bite cases were due to dog (93.6%) followed by cat (2.2%), during the period of 2010 to 2018. This was similar to findings reported by Sudarshan *et al.*<sup>[5]</sup> in a multicenter study, Masthi *et al.*<sup>[13]</sup> in Karnataka, Jyoti *et al.*<sup>[14]</sup> in Haryana, Bashir K *et al.*<sup>[12]</sup> in Kashmir, Ichhpujani RL *et al.*<sup>[11]</sup> in a multicenter study in India, and by Rana *et al.*<sup>[15]</sup> in Bangladesh. Out of 1,58,413 cases, 3519 (2.2%) cases were due to monkey bites. This may be due to the fact that residential area near Hindu Rao hospital is surrounded by forest and hilly area. Our finding was supported by multicentric study done by Ichhpujani RL *et al.*,<sup>[11]</sup> in which 3.2% animal bite cases were due to monkeys.

On analysis of year wise trend of animal bite cases in this study, it was found that the frequency of cases showed a rising trend from the year 2010, with highest number of cases was in the year 2014. A decline in total number of animal bite cases was found after the year 2014 which reached to a stagnant level in the years 2016 to 2018. The reason for this rising trend may be due to increase in overcrowding, encroachment of forest areas, and slum areas which led to increase in interaction of animals with human beings. Similar trend was reported during the same study period by Sheikh Saleem *et al.*<sup>[16]</sup> in Kashmir, Punguyire Damien *et al.*<sup>[17]</sup> in Ghana, Abubakar *et al.*<sup>[18]</sup> in Nigeria, Ishaya N *et al.*<sup>[19]</sup> in South Africa, and Abdulmoghni *et al.*<sup>[20]</sup> in Yemen.

On seasonal analysis of animal bite cases, it was found that animal bite cases started rising from the month of March, that is, arrival of spring season, and there is a slight dip in cases after May till September, that is, in monsoon season, and again there is rise in cases in the autumn season. This can be attributed to the fact

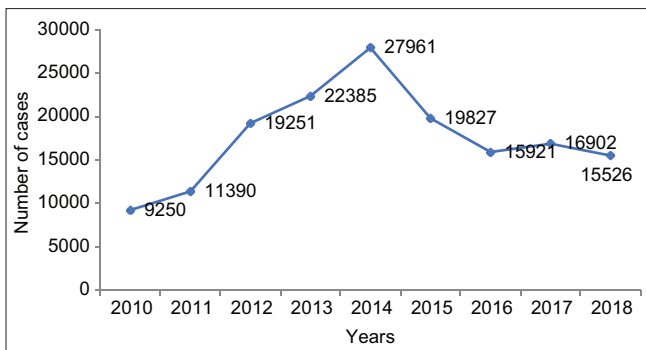


Figure 2: Yearly trend of animal bite cases (2010-2018)

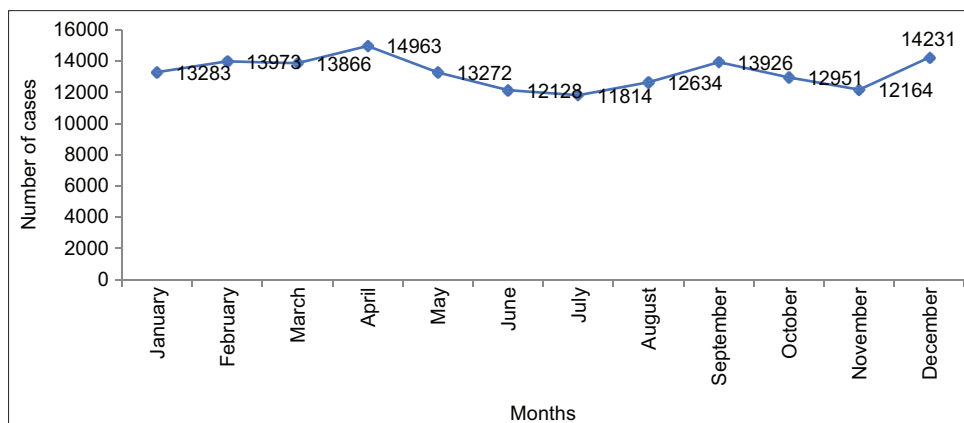


Figure 3: Seasonal Trend of animal bite cases (2010-2018)

that during spring season, there is increased outdoor activity of people specially children and adolescents playing in open areas and during monsoon season and winter, outdoor activities are decreased resulting in slight dip in cases. Similar trend was seen in studies done by Saleem SM *et al.*,<sup>[16]</sup> Masthi *et al.*,<sup>[13]</sup> Thahaby *et al.*,<sup>[21]</sup> and Bashir *et al.*<sup>[12]</sup> Studies done by Punguyire Damien *et al.*<sup>[17]</sup> in Ghana, Abubakar *et al.*<sup>[18]</sup> in Nigeria, and Ishaya *et al.*<sup>[19]</sup> in South Africa reported high number of cases in January to March and July to September. This difference may be due to different seasonal pattern and environmental condition in African countries. This study has certain strengths such as large sample size, depiction of decadal trend of rabies cases, as well as seasonal trend in each year. However, this study had certain limitations like missing of sociodemographic data and bias due to secondary data use from the records.

The information which is provided by our study is crucial to direct further long-term research to have a deeper insight of human rabies and factors associated with it. Such long-term studies will be a stepping stone in achieving global elimination of human rabies.

## Conclusion

This study concludes that animal bite cases are rising over the years and dog bites are most common animal bite cases in Delhi. Monkey bite cases are also significantly increased over the years in Delhi. Majority of cases were of category 3 level of exposure followed by category 2. During the period of 2010 to 2018, there was a peak of animal bite cases (was reported) in 2014 and lowest number of cases was reported in year 2010. Most of the animal bite cases occurred during spring season followed by autumn season of the year. There is dire need of strengthening preventive measures for controlling animal bites in the study area. Logistics and vaccine supply can be managed effectively by the hospitals looking at the seasonal trends of animal bite cases. Frequent Information Education & Communication (IEC) activities should be organized at different levels for creating awareness among people regarding prevention of animal bite cases. Animal components like population survey of dogs, dog vaccination, and population management of dogs under National Rabies Control Program should be strictly implemented in and around Delhi.

## Conflicts of interest

There are no conflicts of interest.

## Key points

1. Animal bite cases have an increasing trend over the years in the study area.
2. Dog bite is the most common cause of animal bite in the study area.
3. Most common category of animal bite was category 3.
4. Most of the animal bite cases occurred during spring season followed by autumn season of the year.
5. Reduction in frequency of animal bite cases in winter and rainy season was seen.

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