

Temporal analysis of animal bite incidents in a tertiary care hospital in Western Maharashtra

Sudesh Gandham and Atul A. Jagtap*

Department of Community Medicine, Rajarshi Chhatrapati Shahu Maharaj Government Medical College and CPR Hospital, Bhausinghaji Road, Dasara Chowk, Kolhapur-41002, Maharashtra, India

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Abstract: *Background:* Rabies is a fatal disease with no cure but 100% preventable and effective vaccines are available. Time trends in epidemiological factors related to exposure to biting animal, management & adherence to vaccination have poorly studied. Hence, we have undertaken this study to analyze the time trends in epidemiological factors associated with animal bite cases over the period of eight years. *Methods:* Present study was cross sectional in nature conducted in patients presenting to ARV clinic. *Results:* Of the various age group classes, majority (47.46%) of the cases were from 15-44 years followed by 19.06% from 6-14 years age group. Majority (61.29%) of the cases were males. maximum (81.43%) cases were from category 2 of WHO classification of animal bite exposure. 89.42% cases type of animal bite exposure was dog. Male gender, age group of 15-44 years, category 3 exposures & cases presenting within 24 hours had shown significantly increasing trend with time ($p < 0.001$). *Conclusion:* There was increasing trend of category 3 exposures but fortunately simultaneously increasing trend in cases presenting within 24 hours. Mortality due to rabies was low (0.07%) & has shown declining trend.

Keywords: Rabies, Time Trends, Epidemiology, Mortality, Animal Bite, Dog Bite, Tertiary Institution.

Introduction

Rabies is disease with no cure but 100% preventable and effective vaccines are long been available. Nevertheless, rabies still kills about 60 000 people a year, of whom over 40% are children under 15, mainly in rural areas of economically disadvantaged countries in Africa and Asia. More than 99% of these deaths occur in developing world. Of all human cases, 99% are acquired from the bite of an infected dog & it has high positivity (48.4%) [1].

According to WHO, each year, 23,000-25,000 people die in the south-east Asia Region due to rabies. These accounts for approximately 45% human deaths due to rabies worldwide [1]. Of the estimated 25,000 deaths due to rabies in SEAR, a majority are in India and Bangladesh. The annual reported number of dog bites in India is 17.4 million according to recent statistics, leading to estimated 18,000-20,000 deaths due to human rabies per year [2]. Maharashtra reported highest number of dog bite cases in India in 2023 with over 4.35 lakh incidents as per Times of India

report. More than 2.5 million people undergo post-exposure prophylaxis after being bitten by rabid or suspected rabid animals causing considerable morbidity and economic loss [3]. Association of rabies prevention & control in India (APCRI) had envisioned the rabies free India by 2020 under rabies elimination program [4]. However, due to multiples myths associated with rabies, various economic and political factors, multiple cultural, religious and social practices, even in the midst of effective control measures the disease has not been brought under control [5].

Dog bites are reported proportionately more frequently than human cases of rabies and may provide an accessible data source from which human deaths from rabies can be inferred. With an existing effective rabies prevention program, it is still very important to understand the trends in various epidemiological factors of animal bite cases to improve the management of the same. Time trends in epidemiological factors related to

exposure to biting animal, management & adherence to vaccination have poorly studied. With this perspective, the present study was undertaken to assess time trends in some epidemiological factors related to animal bite cases in a tertiary care institution in Western Maharashtra.

Objectives: To analyze the time trends in epidemiological factors associated with animal bite cases over the period of eight years from 2015 to 2022 in a tertiary care hospital in Western Maharashtra.

Material and Methods

The protocol of this record-based cross-sectional study was approved by the institutional ethical committee of the medical college. All patients fulfilling inclusion criteria and exclusion criteria attending ARV OPD of our tertiary care hospital were taken up for the study. Study was carried out over a period of three months from January to march 2023. We have analyzed the data of last eight years, from 2015 to 2022.

All the animal bite victims with potential rabies exposure like dog bite, cat bite and wild animal bite irrespective of their age & gender were analysed from the record. Cases of Rat bite, rabbit bite, rodent bite, snake bite and human bite without any potential of rabies exposure & cases that had come for pre-exposure prophylaxis and re-exposure prophylaxis were excluded from the study.

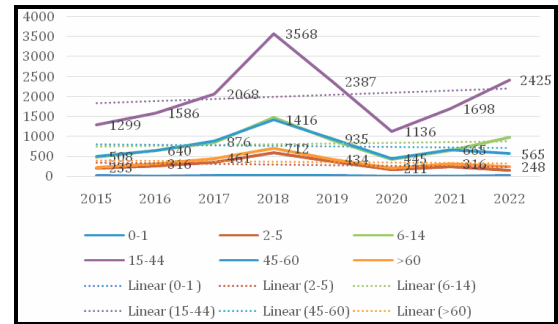
The dedicated anti-rabies vaccination clinic (ARC) running under the administrative control of the Department of Community Medicine of our tertiary care institute. Management of animal bites except snake bites is exclusively provided in our clinic. On an average 20-25 new animal bite cases and 35-40 old patients for subsequent doses are being reported daily. The animal bite victims fulfilling the inclusion and exclusion criteria who attended the anti-rabies clinic during the study period of eight years from 2015 to 2022 were found to be 34065. There were data regarding gender, category of animal bite, type of animal, residence (urban/rural) and duration since bite which was analyzed. Also, we gathered information of deaths due to rabies in these eight years in our institute. All animal bites were managed according to WHO guidelines.

Data was entered in Microsoft Excel and analyzed using SPSS Software. Frequency and percentages were calculated for various variables. Mantel-Haenszel chi square for trend was used as test of significance and p value less than 0.05 was considered for significance.

Results

In the present record-based study, in total we have analyzed 34065 cases of animal bite exposure presented to anti rabies vaccination OPD of our tertiary care institution to present trends in certain epidemiological factors concern with effective prevention and control of the disease. Of the various age group classes, majority (47.46%) of the cases were from 15-44 years followed by 19.06% from 6-14 years age group. 15-44 years age group had shown significant increasing trend over the period of eight years as compared to other age groups (p<0.01) (Chart 1).

Chart-1: Trend of dog bite exposure cases according to age groups.

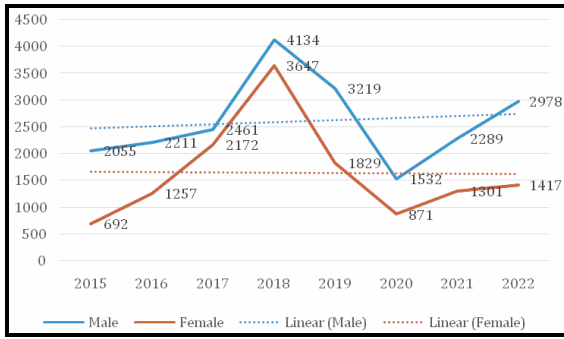


Mantel-Haenszel chi square for trend= 68.81; df=1; p<0.001. (for age group of 15-44 years as compared to other groups).

Majority (61.29%) of the cases were males. Further, we have observed that males had significantly increasing trend over the years as compared to females which were more or less constant in absolute numbers (p=0.00009) (Chart 2).

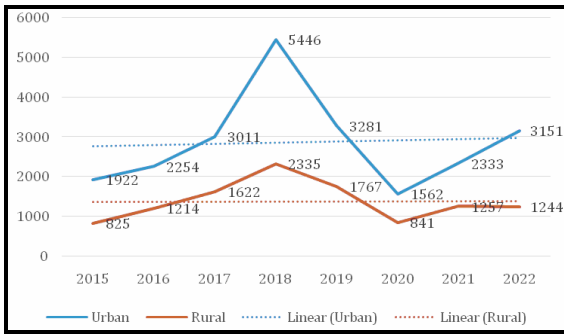
In the current study, though a greater number (67.40%) of animal bite cases presented from urban area, it's increasing trend, did not differ significantly from rural area (p=0.07) (Chart 3).

Chart-2: Trend of dog bite exposure cases according to gender.



Mantel-Haenszel chi square for trend= 15.31; df=1; p=0.0009.

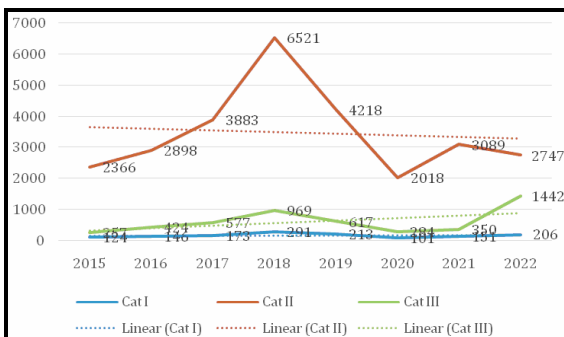
Chart-3: Trend of dog bite exposure cases according to residence.



Mantel-Haenszel chi square for trend= 3.19; df=1; p=0.07.

In our study, maximum (81.43%) cases were from category 2 of WHO classification of animal bite exposure. But from the 2015 baseline, there was consistently declining trend of category 2 patients while significantly increasing trend of category 3 patients as compared to category 1 (p<0.001) (Chart 4).

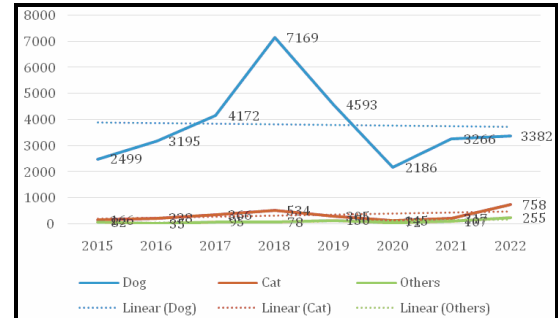
Chart-4: Trend of dog bite exposure cases according to category of animal bite.



Mantel-Haenszel chi square for trend= 533.18; df=1; p<0.001.

Among majority i.e. 89.42% cases type of animal bite exposure was dog, but we have seen significant declining trend in dog bite cases as compared cat & others (p<0.001) (Chart 5).

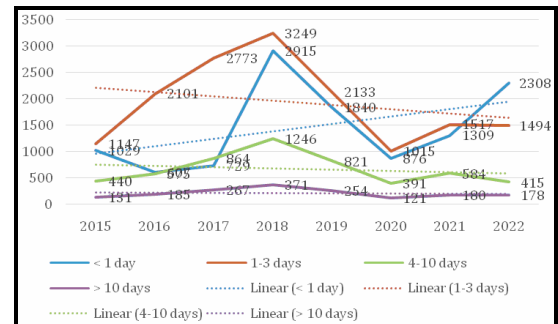
Chart-5: Trend of dog bite exposure cases according to type of animal exposure.



Mantel-Haenszel chi square for trend= 345.09; df=1; p<0.001.

In the present study, trend analysis according to time since bite of animal has shown that significant increase in the cases presenting early i.e. in <1 day of exposure while declining trend of cases presenting late after animal bite exposure (p<0.001) (Chart 6).

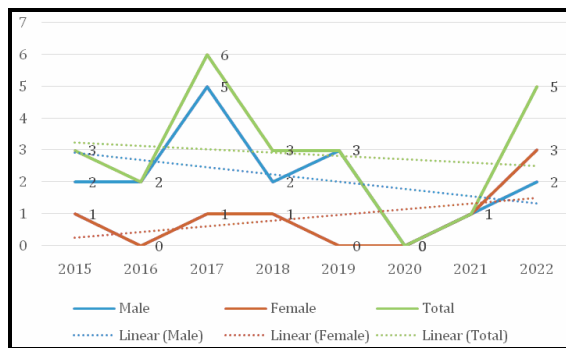
Chart-6: Trend of dog bite exposure cases according to time since bite of animal.



Mantel-Haenszel chi square for trend= 877.79; df=1; p<0.001.

When we analyzed rabies related deaths in our institution over the period of 8 years, we found that overall mortality was showing declining trend, mortality among males was also showing declining trend while mortality in females was showing increasing trend but statistically it was not significant (p=0.1). Overall mortality rate was 0.07% (Chart 7).

Chart-7: Year and gender wise rabies deaths in our institution.



Mantel-Haenszel chi square for trend= 2.48; df=1; p=0.1.

Discussion

In the present record-based study, in total we have analyzed 34065 cases of animal bite exposure presented to anti rabies vaccination OPD from 2015 to 2022 i.e. over period of eight years, to present trends in certain epidemiological factors concern with effective prevention and control of the disease. Of the various age group classes, 15-44 years age group had shown significant increasing trend as compared to other age groups (p<0.01) which indicates that people of working class more at a risk of animal bite exposure. This might be due to outdoor life they had, to win bread & butter for the family. This is consistent with Kishor M. Dhaduk et al [6] who found 15-30 years age group at higher risk of having dog bite, Navya Sri Sreenivas reported people from 20-29 years age group & SS Rajderkar et al [7] reported people from 30-45 years age group most at risk.

With regards to gender, males had significantly increased trend over the years as compared to females (p=0.00009). So, males are more at a risk of animal bite exposure. Though a greater number of animal bite cases reported from urban area, it's increasing trend, did not differ significantly from rural area (p=0.07). Kishor M. Dhaduk et al [6], Mahendra Singh et al [8], SS Rajderkar et al [7] & G.R. Vishwanath et al [9] also found male majority among animal bite victims in their studies. Pattanayak S et al [3] similar to our study noted that greater number of cases were from urban area.

In our study, from the 2015 baseline, though greater number of patients were from category 2,

there was consistently declining trend of category 2 patients while significantly increasing trend of category 3 patients (p<0.001). So, sever cases significantly increased over the period of 8 years. Similarly, Ramesh Masthi NR et al [10] in their community-based study of animal bite exposures observed majority of category 2 exposures & Kirti V Kinge et al [11] also noted majority of category 2 bite (61%) but Mahendra Singh et al [8], Seema Patel et al [12] & SS Rajderkar et al [7] found majority of category 3 patients in their study. We are also experiencing increase in category 3 patients over the years. We have seen significant declining trend in dog bite exposure cases as compared cat & others (p<0.001) though the dog was major biting animal. This could be due to effective control of stray dog population. Many of the studies reiterated this finding that dog was the commonest biting animal [6-9, 12].

One of the favorable factors in our study was significant increase in the cases presenting early i.e. in <1 day of exposure while declining trend of cases presenting late after animal bite exposure (p<0.001) which would be an important thrust to rabies control programme in India. This is in accordance with SS Rajderkar et al [7] who in their study in 2015 found that only 18% cases presented within 12 hours. So, as compared to 2015 baseline early reporting is improving & this might be due to increased awareness about the rabies in general population.

Considering rabies related mortality in our institution over the period of 8 years, we found that overall mortality and mortality among males was showing declining trend while mortality in females was showing increasing trend but statistically it was not significant (p=0.1). Sudarshan and Narayana et al [13] who had done appraisal of Surveillance of Human Rabies and Animal Bites in Seven States of India also found that though animal bites had increased, there was a gradual decline in the reported cases of human rabies from the states during the 5-year period of 2012-2016, which would be attributable to improvement in the overall rabies postexposure prophylaxis.

Conclusion

From the present study we can conclude that male gender, young productive age group of 15-44 years was showing increasing trend of animal bite exposure. There was increasing trend of category 3 exposures but fortunately simultaneously increasing trend in cases presenting within 24 hours, so that effective post exposure prophylaxis

can be started early in severe cases. Mortality due to rabies was low (0.07%) & has shown declining trend. To further reduce mortality due to rabies pre-exposure prophylaxis can be considered in working age group of 15-44 years for which awareness needs to be increased.

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Conflicts of interest: There are no conflicts of interest.

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*All correspondences to: Dr. Atul A. Jagtap, Assistant Professor, Department of Community Medicine, Rajarshi Chhatrapati Shahu Maharaj Government Medical College and CPR Hospital, Bhausinghaji Road, Dasara Chowk, Kolhapur-41002, Maharashtra, India. E-mail: jagtapatul32@gmail.com