



Pattern of Injuries among Dog Bite Victims in an Urban Area of Kancheepuram District, Tamilnadu

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ABSTRACT

Introduction: Rabies is a fatal zoonotic disease caused by bite of an infected animal, dogs being the most common reservoir of the virus. India accounts about 59.9 % of rabies death in Asia. The site of bite, depth of the wound and health seeking behavior among the victims play a major role in the prevention and effective management of rabies

Objectives: To study the pattern of injuries among dog bite victims in an urban area of Kancheepuram district, Tamilnadu.

Methodology: A community based cross-sectional study was conducted among 120 victims who visited a tertiary care veterinary hospital followed by a dog bite. They were selected by convenient sampling method. Data collected was analyzed statistically using SPSS 25.0 version.

Result: In this study, the most common site of bite was lower limbs (62.0%). Prevalence of bite by stray dogs was high (56.2 %). Immediate post - exposure prophylaxis with soap and water was practiced by 78.5 %. Around 82.6% knew that it is preventable

Conclusion: Health education about rabies vaccination and appropriate management measures with intersectoral coordination and community participation needed to achieve the target of zero human death from dog mediated rabies by 2030.

Key words: Rabies, Vaccine, Post-Exposure Prophylaxis

INTRODUCTION

Rabies is acute fatal viral encephalitis caused by a bullet shaped single stranded RNA virus belonging to the genus *Lyssa* Virus of the family *Rhabdoviridae* order *Mononegavirales*. The disease is transmitted through saliva from infected animals to human beings by means of bites, scratches, licks on broken skin and/or mucous membrane among which dogs are the most common reservoir of the virus¹. Rabies is estimated to cause 59,000 human deaths annually in over 150 countries, with 95% of cases occurring in Africa and Asia². It is a major burden in Asia with an estimated 35,172 human deaths per year. India ac-

counts for about 59.9% of rabies deaths in Asia and 35% of deaths globally³. Rabies being a major public health problem is 100% fatal, but 100% preventable.

Despite evidence that control of dog rabies through animal vaccination programs and elimination of stray dogs can reduce the incidence of human rabies, dog mediated rabies remains common in many countries and is still the cause of over 99% of human rabies deaths worldwide⁴. It has been often considered that there are important differences between the incidence of animal bites in developed countries and underdeveloped or developing countries. The latter have inadequate conditions for keeping animals, spe-

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cifically associated with low levels of restriction, allowing the animals to roam freely and in public spaces temporarily or permanently. Hence results in a higher incidence of bites in underdeveloped countries than in developed countries⁵. Over the recent years, urbanization and deforestation has an impact on habitants, there are more chances of man being exposed to mammals and in turn leading to increase in animal bite cases. They may also influence the epidemiology of rabies⁶. Thus it is important to know about the epidemiology and pattern of animal bites among human to formulate effective rabies control strategies and thereby to reduce the morbidity and mortality due to rabies.¹

The deadly rabies virus spread to people from the saliva of infected animals, usually through an animal bite. The incubation period may vary based on the location of the exposure site, the type of rabies virus and any existing immunity. The first symptoms of rabies may be very similar to those of the flu including general weakness or discomfort, fever, or headache. These symptoms may last for days. There may be also discomfort or a prickling or itching sensation at the site of the bite, progressing within days to acute symptoms of cerebral dysfunction, anxiety, confusion, and agitation. As the disease progresses, the person may develop abnormal behavior, hydrophobia (fear of water), fear for draught of air (aerophobia), fear for light (photophobia), hallucinations progressing to delirium, coma and eventually death. Once clinical signs of rabies appear, the disease is nearly always fatal and treatment is typically supportive. Tests used to confirm a diagnosis of rabies in its more advanced stages includes skin biopsy, saliva test, lumbar puncture to remove a small sample of cerebrospinal fluid (CSF), which can be checked for the rabies antibodies and blood tests to check for the rabies antibodies

Based on the above background, the study was done with objectives to describe the pattern of injuries among dog bite victims; and to assess the level of awareness about rabies among dog bite victims

METHODOLOGY

Study type and study area: A community based descriptive cross-sectional study was conducted among victims of dog bite who visited a tertiary care veterinary hospital in an urban area of Kancheepuram district, Tamil Nadu

Sampling method and Study tool: All the patients who reported with history of dog bite to a tertiary care veterinary hospital from January 2021 to February 2021 and gave consent were included in the study. The study participants were selected by purposive sampling method and questioned on OP basis. A pre - tested semi-structured questionnaire was used to elicit relevant information among the victims. Questionnaire was pilot tested in the neighboring primary care center among 15 dog bite victims

who reported to the outpatient department. Based on the responses and feedback received, the questionnaire was modified and was used in this study population. Questionnaire was designed to cover various issues regarding exposure to dog bite and the details included briefly demographics, category of dog which had bitten (stray dog/pet dog), location of bite wound in body, kind of bite (provoked/ unprovoked), type of exposure (bite/scratch/lick), kind of first aid measure taken after the dog bite and level of awareness.

Data entry and analysis: Data entry was made in Microsoft Excel. The entered data was cleaned and validated for consistency. Analysis was done using SPSS 25.0 software. Frequency was expressed in percentage and association with factors was tested for significance using Chi square test. p - Value < 0.05 was considered significant. Charts, tables and graphs are added wherever necessary

Ethical approval and informed consent: The study was approved by the Institutional ethical committee and consent was obtained from participants before the study.

RESULTS

In the present study, animal bites occurred in all age groups but people aged < 35 years of age were more vulnerable (52.9%) and males constituted (51.2%) more than females (48.8%) among the total victims. Almost 87.5% of study participants belonged to either upper / upper middle class and 12.5% belonged to middle / lower middle / lower class (Table 1).

A total of 56.27% cases of dog bites were attributed to stray animals whereas 43.8% cases were bitten by pet animals. From time distribution analysis of injury caused, it was seen that highest number of injury (69.4%) occurred at morning and evening (from 6.00 am to 6.00 pm) and rest (30.6%) at night (6.00 pm to 6.00 am). Lower extremity (62%) was most commonly affected site followed by face and neck (22.3%). Upper limb (15.7%) was least commonly involved site. On analysis of exact cause of injury, it was found that non-provocative injury was the highest number of cases (73.3%) that came with history of spontaneous bite while walking or standing on the street.

Table 1: Frequency distribution of socio demographic variables of dog bite victims

Variable	Frequency (%)
Age	
<35 years	64 (52.9)
>35 years	56 (47.1)
Gender	
Male	62 (51.2)
Female	58 (48.8)
Socio-economic status (BG Prasad classification)	
Upper / upper middle class	105 (0.875)
Middle / lower middle / lower class	15 (0.125)

Table 2: Frequency distribution of pattern of injury among dog bite victims (n = 120)

Variable	Frequency (%)
Type of dog	
Stray	68 (56.2)
Pet	52 (43.8)
Time of bite	
Morning / evening	84 (69.4)
Night	36 (30.6)
Site of bite	
Lower limb	75 (62)
Face / neck / others	26 (22.3)
Upper limb	19 (15.7)
Reason for injury	
Provoked / defense mechanism	23 (19.2)
Sick / furious	9 (7.5)
No specific reason	88 (73.3)
Type of injury	
Lick / scratch (CAT I)	41 (34.2)
Abrasions without bleeding (CAT II)	66 (55)
Bite with bleeding (CAT III)	13 (10.8)

Table 3: Post - exposure measures followed

Variable	Frequency (%)
Immediate post-exposure measure	
Washed with soap and water	95 (79.1)
Others	25 (20.9)
Received rabies vaccine after bite	
Yes	105 (86.8)
No	15 (13.2)
Hospital preferred for vaccination	
Private	66 (62.9)
Government	39 (37.1)
Time duration between bite and treatment	
<6 hours	80 (76.2)
>6 hours	25 (23.8)

Table 4: Association between socio demographic variables and vaccination status of the victim

Sociodemographic variable	Post-exposure rabies vaccine received		p value
	Yes(n=105)	No(n=15)	
Age			
<35 years	57 (89.0)	7 (10.9)	0.029*
>35 years	48 (85.7)	8 (14.2)	
Gender			
Male	48 (77.4)	14 (22.5)	0.001*
Female	57 (98.2)	1 (1.72)	
Socio-economic status (BG Prasad classification)			
Upper / upper middle	96 (91.4)	9 (8.5)	0.003*
Middle/ lower middle / lower	9 (60)	6 (40)	

*P value < 0.05 statistically significant at 95% Confidence Interval

Table 5: Awareness about rabies (n = 120)

Variable	Frequency (%)
Awareness about symptoms of rabies	
Yes	89 (74.4)
No	31 (25.6)
Awareness that rabies is preventable	
Yes	99 (82.6)
No	21 (17.4)
Awareness about rabies immunoglobulin	
Yes	69 (57.1)
No	51 (42.9)

This is followed by (19.2%) provocative incidence (19.2%) that is caused in a case of beating / injuring the animal followed by other reasons such as dog being sick or furious (7.5%). About 55.0% victims were under category II that included scratches or abrasions of skin without bleeding, followed by 34.2% under category I which includes licking or touching or scratching on intact skin and rest under category III that results in bleeding (10.8%) (Table 2).

It was found that about 79.1% took first aid after dog's bite by washing the wound site with soap and water, while 20.9% had other measures to clean the site that includes use of antiseptics and others like chili powder, coffee powder, kerosene, lime stone etc. It was observed that 86.8% took vaccination for animal bites, while 13.2% did not take any treatment as post exposure measure. Most of the victims got vaccination from public sector (62.9%) and 37.1% preferred government hospitals for further treatment. Most of them (60.78%) sought treatment within 12 hours and 5 participants (9.8%) in 6-12 hours (Table 3).

A significant association was found ($p = 0.029$) between the age of the study participants and the number of participants who had PEP vaccination. Victims aged < 35 years of age mostly preferred vaccination than victims aged > 35 years. The reason for this significant finding may be due to high concern about health and more knowledge about post exposure dog bite treatment and vaccination among younger generation. Higher proportion of females was vaccinated than males which was statistically significant ($p = 0.001$), though males were affected in higher proportion. There was a statistically significant association ($p = 0.003$) found between the socioeconomic status of the participant and their vaccination status. People belonging to upper/upper middle class had more vaccination than people in middle / lower middle and lower classes (Table 4).

Around 74.4% of the study population was aware about signs and symptoms of rabies, which might have been a major cause for encouraging them towards treatment and vaccination followed by dog bite immediately. Approximately 82.6% knew that it is preventable, but awareness about rabies immunoglobulin was estimated to be 57.1%, which has to be taken into concern (Table 5).

DISCUSSION

In this study, it was found that gender distribution among victims was almost equal and people aged < 35 years were more commonly affected among the victims of dog bite. Almost 87.5% of the victims in this study belong to upper bites by pet and street dogs observed in the study by Agarwal N et al⁸. But in the study conducted by Bharathy et al in Chennai reported 47% and Shivasakthimani R. et al (2018) reported 46.5% study participants were bitten by stray dog^{6,9}. In this study, time distribution of most

of the incidents happened in morning and evening (70%) rather than night which were similar to the result obtained in the study conducted by Sreenivas NS et al in 2017 and Niraj Bharadva et al in 2015 that reported 67.86% and 85% cases in day time respectively^{10, 11}. This finding about the time of incidence may be due to increased public activity in daytime.

Overall, lower limbs (62%) were the main site of bite in the present study as these are most easily approachable part of the body for an animal. Almost same result obtained from the study conducted by Ghosh et al (2014) and Shivasakthimani R. et al (2018) where lower limbs were more commonly bitten by dog 62.69% and 63.80% respectively^{7,9}. The present study found majority of bites were unprovoked (73.3%) which was in contrary to a study done by Sukumar B et al in 2017 with only 39.45% being unprovoked⁶. Yale et al (2013) however observed that only 44.44% bites were provoked and 55.55% were unprovoked¹². Intentional provocation should be discouraged as unprovoked bites are suspicious for rabies. The study showed that the degree of bite varied significantly with provocation and hence emphasizes the need to educate public in this matter¹². Most of the animal bites were of category II (55%) in this study. The result obtained in the study by Modi et al also stated that most of the cases reported belonged to category II (85.94%)¹³. In contrary, study conducted by Khokhar et al observed maximum category III animal bite exposure (82.75%)¹⁴

In the present study, almost 3/4th study population (79.1%) washed wound immediately with water and soap whereas one third (33.33%) of the cases received first aid treatment as per Ghosh A et al (2014) study⁷. Lower awareness (31%) regarding wound treatment with water and soap was reported in the study conducted by Kulkarni P et al (2017). There were higher levels of wrong perceptions like application of turmeric powder, mud and lime to the wound¹⁵. Almost 63 % of this study participants preferred attending private hospital to receive anti-rabies treatment, which was in contrary to study done by Ghosh A et al (2014) where 95.08% received treatment from public sector⁷. Almost 78 victims (92.9%) had post-exposure prophylaxis (PEP) with anti-rabies vaccine in a study done by Ogundare EO et al in 2017 which is higher than when compared to the present study (86.8%)¹⁶. Majority (76.2%) of victims in this study had history of post exposure vaccination within 6 hours in this study, slightly lesser (81%) than the study done by Bharadva N et al in 2015¹¹. Almost 83 % were aware that rabies is preventable. Similar findings (83%) observed in study conducted by Kapoor P et al (2019)¹⁷.

A significant association that was found ($p = 0.029$) between the age of the study participants and the number of participants who had PEP vaccination attributes to high concern towards the health and the level of knowledge about post exposure dog bite treatment and vaccination among younger generation. Females preferred more vaccination than males

that was statistically proven ($p = 0.001$), though males were affected in higher proportion. There was a statistical significant association ($p = 0.003$) found between the socioeconomic status of the participant and their vaccination status. This association attributes to the education level and affordability for vaccination in participants belonging to upper / upper middle class when compared with those belonging to middle / lower middle / lower class.

This study concluded that majority of dog bite victims were among people aged < 35 years and males were more vulnerable to such dog bite incidents (51.2%). Stray dogs (56.2%) were more commonly involved in attacks rather than pet dogs. Lower limb is the most common site of exposure (62%) and almost 78.5% had immediate post exposure measures. 62.9% preferred private sector for their vaccination. Though 74% were aware about clinical manifestations of rabies, only 57% were aware about the schedule and significance of rabies immunoglobulin. To develop effective preventive strategies for dog bites, it is more important to have a better understanding about the various demographic and socio-cultural risk factors in these incidences. The results of this study could give insights on the different scenarios and risk factors that should be taken into account for the development of more efficient and cost-effective educational and regulatory interventions for the prevention of dog bites¹⁸.

CONCLUSION

Creating awareness is generally considered as the first step to control rabies. To enhance rabies awareness, it is necessary to use information and education campaigns (IEC) throughout the country and school-based rabies control programs should be implemented through proper health education using electronic media in local language. Physicians and veterinarians play a crucial role in controlling rabies through a one-health approach by linking animal and human health focused mainly on the promotion of habits and customs to enhance the human-dog bond and the positive daily interactions between these animals and the people around them¹⁷. Based on the observations in this study, it is recommended that multipronged strategies including behavior change communication for the community members should be made on home-based care for optimum management of animal bites. The serum and vaccines for rabies should be made available along with capacity building of health care providers at all levels. Municipal Cooperation should also play a sincere role in removing food wastes from roads and control stray dog population⁷. Another new concept of adapting street dog's is gaining popularity in cities of India. Adoption of street dogs will result in reduction of the number of roaming street dogs; provide better homes for them and higher opportunity to get vaccinated by the owners. Moreover, adoptions will re-

duce their interactions with the general population at large and hence prevalence of rabies decreases¹⁹.

LIMITATIONS OF THE STUDY

Firstly, the present study limited to a smaller sample size; a larger sample size could have provided more precise information.

Secondly, there was a chance of recall bias that may have influenced the outcome analysis of the study. To minimize the recall bias, the questionnaire was modified with questions pertaining only to recent events which occurred.

RECOMMENDATIONS

To get more insight information, generalized epidemiological studies need to be conducted all over the India as well as at community level to know more about actual demographics of dog bite victims.

Future directions of research have to provide regional and demographic mapping of human deaths to formulate a national rabies control programmes and can be used in the futuristic models will be used for evaluation regional elimination though abolition of the canine reservoir.

Focus to be more prioritized towards complete coverage of anti-rabies protocol. Public education campaigns need to be conducted to make people more aware of rabies, especially in remote and rural areas, and of the vital importance of seeking medical care immediately after an animal bite.

Proper information and education regarding rabies through mass media requires for false beliefs about the disease and deeply seated misconceptions about treatment of disease

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