# **Research Article**

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20161603

# An epidemiological study of animal bites among rural population in Tamil Nadu, India

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Received: 18 March 2016 Accepted: 07 May 2016

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#### **ABSTRACT**

**Background:** There are many zoonotic diseases which are deadly to human like Rabies, Plague, and Monkey pox etc. But Human rabies continues to be endemic in India and according to recent estimate 20,000 person's die of this disease every year. Hence this study was conducted to know the prevalence and pattern of animal bites during last one year. The aim was to estimate the prevalence and pattern of animal bites in a rural population and to determine health care seeking behaviour for animal bites.

**Methods:** This study was conducted at rural health training centre and field practice area of AMCH Erumapatti & Kandantheri, Salem, India between March 1<sup>st</sup>-March 31<sup>st</sup> 2014. It is a cross sectional study, where convenient sampling method was used. The sample size was 688 subjects above 1 year age group. Using pre-tested structured questionnaire, the sample adult population were interviewed for any animal bites in the past one year in the family. The socio demographic characteristics, epidemiological and associated factors for animal bites were studied.

**Results:** It was found that during last one year 69 (10.03%) of study population had animal bites and majority of them were bitten by dogs 44 (63.77%), others bites like millipede, centipede, scorpion, snake 17 (24.64%), cat 5 (7.25%), rat 2 (2.90%) and monkey 1 (1.45%). It was found that majority had animal bites on leg 42 (60.87%). It was found that majority of them were bitten by pet animals 41 (59.42%). It was found that 42 (60.87%) took first aid after bite, while 27(39.13%) had not taken first aid. It was found that 51 (81%) took treatment for animal bites, while 18 (19%) did not take any treatment.

**Conclusions:** The prevalence of animal bites in our study population is 10.03%. Among that, dog bites were majority about 44 (63.77%). Only 51 (81%) people had taken treatment for their bites. Knowledge about animal bite is essential because it causes many fatal diseases to human beings. People living in the rural areas should be aware of animal bites like dog bite, cat bite, rat bite, monkey bite and other bites like snake bite, scorpion bite, bites caused by centipedes which may cause morbidity & mortality among rural population.

Keywords: Animal bites, Prevalence, Pattern, Rural area

#### INTRODUCTION

Zoonoses is an infection or infectious disease transmissible under natural conditions from vertebrate

animals to man. There are many zoonotic diseases which are deadly to human like Rabies, Plague, and Monkey Pox etc. According to WHO survey conducted in 2002, the annual incidence of animal bite is 1.7% and the bites

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were more in children (2.5%) and males (68%). In India, about 98% of animal bites are caused by bite of dogs and cats. Bites of animals like monkeys, horses, donkeys and rats are about 1% prevalent. The rest of the animal bites are caused by bites of squirrels, bats and mongooses. Likewise, majority of deaths (about 97%) due to animal bites are attributed to dog bites. Animal bites are neither notifiable nor reported in the routine surveillance system. 3

Rabies is acute fatal viral encephalitis caused by a single stranded RNA virus belonging to the genus *Lyssa Virus* of the family Rhabdoviridae. 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. Human rabies continues to be endemic in India and according to recent estimate 20,000 persons die of this disease every year. About 2.1 million people are known to receive post-exposure treatment annually. Rabies is a major public health problem which is 100% fatal 100% preventable. 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.

The aim of the study was to estimate the prevalence and pattern of animal bites in a rural population and to determine health care seeking behaviour for animal bites.

## **METHODS**

This study was conducted at rural health training centre & field practice area of AMCH Erumapatti & Kandantheri, Salem, India between March 1- March 31<sup>st</sup> 2014. It is a cross sectional study, where convenient sampling method was used. The sample size was 688 subjects above 1 year age group calculated using formula 4PQ/d\*d.

Using pre-tested structured questionnaire, the sample adult population in the study area were interviewed for any animal bites in the past one year in the family. They were asked about the animal that had bitten them, the type of animal, site of bite, reasons for bite, whether animal vaccinated or not, time taken to seek treatment, first aid given and regarding post exposure prophylaxis.

The socio demographic characteristics, epidemiological and associated factors for animal bites were also studied. Those who were unwilling to participate were excluded.

#### **RESULTS**

It was found that during last one year 69 (10.03%) of study population had animal bites.

Table 1 shows socio-demographic characteristics of the study population. Considering age group, it was found that majority of study population 262 (38.10%) belonged

to 26-45 years age group and 5-25 years age group, 32 (46.38%) had maximum number of animal bites in the last one year, followed by 46-65 years, 17 (24.65%).

Table 1: Socio demographic characteristics of study population.

Socio- demographic character	Study population Number (%) n=688	Subjects with animal bites in the last one year Number (%) n=69
Age (Years)		
<5	41 (5.96%)	1 (1.45%)
5-25	233 (33.87%)	32 (46.38%)
26-45	262 (38.10%)	16 (23.19%)
46-65	124 (18.02%)	17 (24.65%)
>65	28 (4.07%)	3 (4.33%)
Sex		
Male	371 (53.92%)	28 (40.58%)
Female	317 (46.08%)	41 (59.42%)
Education		
Illiterate	175 (25.44%)	15 (21.74%)
Primary	108 (15.7%)	15 (21.74%)
Secondary	256 (37.2%)	21 (30.43%)
Graduation	105 (15.26%)	9 (13.04%)
Post-graduation	18 (2.62%)	3 (4.35%)
Others	26 (3.78%)	6 (8.7%)
Occupation		
Unskilled	230 (33.43%)	22 (31.89%)
Semi-skilled	261(39.93%)	12 (17.40%)
Skilled	146 (21.22%)	7 (10.14%)
Professional	11 (1.6%)	4 (5.8%)
Others(students)	40 (5.8%)	24 (34.78%)
Socio-economic class		
Upper	38(5.5%)	2(2.90%)
Middle upper	75(10.9%)	1(1.45%)
Middle lower	220(31.9%)	31(44.93%)
Lower upper	286(41.6%)	19(27.54%)
Lower lower	69(10.0%)	16(23.19%)

It was found that epidemiological distribution of study subjects with animal bites (n=69) were found maximum in females 41 (59.4%), those who had completed secondary education 21 (30.43%), students 24 (34.78%), unskilled workers 22 (31.89%) and those belonging to middle lower socio-economic class, 31 (44.93%).

Table 2: Pattern of animal bites.

Type of animal	Number	Percentage (%)
Dog	44	63.77
Cat	05	7.25
Rat	02	2.90
Monkey	01	1.45
Others	17	24.64
Total	69	100

It was found that majority of them were bitten by dogs 44 (63.77%), cat 5 (7.25%), rat 2 (2.90%), monkey 1 (1.45%) and others like millipede, centipede, scorpion, snake 17 (24.64%) (Table 2).

Table 3: Type of animal bites.

Type of bite	Number	Percentage (%)
Stray	11	15.94
Pet	41	59.42
Wild	17	24.64
Total	69	100

It was found that majority of them were bitten by pet animals 41 (59.42%) and found that survival of animal after bite was 44 (63.77%), while 25 (26.23%) animals died later. About 13 (25.50%) of animals were vaccinated and 38 (74.50%) were not vaccinated (Table 3).

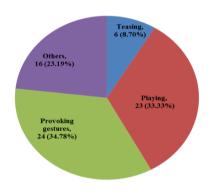


Figure 1: Reasons for animal bites.

Majority were bitten after provoking gestures towards animals 24 (34.78%), playing with animals 23 (33.33%), teasing animals 6 (8.70%) and others such as feeding the animal etc. 16 (23.19%) (Figure 1).

Table 4: Nature of animal bite.

Nature of animal bite	Number	Percentage (%)
Superficial	53	76.81
Deep	16	23.19
Total	69	100

It was found that majority had superficial bites 53(76.81%) and 16(23.19%) had deep bites (Table 4).

Table 5: Site of animal bites.

Site of animal bites	Number	Percentage (%)
Leg	42	60.87
Hand	18	26.08
Face/neck	2	2.9
Body	5	7.25
Trunk	2	2.9
Total	69	100

It was found that majority had animal bites on leg 42 (60.87%), hand 18 (26.08%), face/neck 2 (2.9%), body 5 (7.25%) and trunk 2 (2.9%) (Table 5).

It was found that 42 (60.87%) took first aid after bite, while 27 (39.13%) had not taken first aid. Majority washed with soap and water 16 (40%), 14 (34%) used antiseptics and 12 (26%) used others like chilli powder, coffee powder, Kerosene, lime stone etc.

Table 6: Subjects have taken treatment for animal bites.

Taken treatment	Number	Percentage
Yes	51	81
No	18	19
Total	69	100

It was found that 51 (81%) took treatment for animal bites, while 18 (19%) did not take any treatment. Majority who had not taken any treatment 9 (50%) complained that they were not aware of vaccine or treatment, 8 (44.44%) were ignorant and 1 (5.56%) gave other reasons (n=18) (Table 6).

Table 7: Time taken for treatment after animal bite.

Time for treatment	Number	Percentage (%)
<1/2 hour	31	60.78
½-6 hour	8	15.69
6-12 hour	5	9.8
>12 hour	7	13.73
Total	51	100

It was found that majority 31 (60.78%) sought treatment within <1/2 hour, 8 (15.69%) sought treatment in  $\frac{1}{2}$ -6 hours, 7 (13.73%) in >12 hours and 5 (9.8%) in 6-12 hours (Table 7).

It was found that majority 40 (78.43%) preferred allopathy treatment, homeopathy 10 (19.61%) and indigenous medicine 1 (1.96%).

Table 8: Preferred place of treatment for animal bites.

Preferred place	Number	Percentage (%)
Government Hospital	39	76.47
Private hospital	12	23.53
Total	51	100

It was found majority 39 (76.47%) went to Government hospital for treatment and 12 (23.53%) went to private hospital for treatment (Table 8).

About 35 (60.61%) took anti rabies vaccine for animal bites while 16 (39.39%) did not take it (n=51).

#### **DISCUSSION**

In our study, 688 individuals of age more than one year were recruited and the incidence of animal bites was 10.03% in last one year. It was observed that 16 (23.19%) of animal bites belong to the age group 5-25 years and 41(59.42%) were females. A WHO survey showed the annual incidence of animal bite as 1.7% and the bites were more in children (2.5%) and males (68%).<sup>6</sup> Lai et al in Delhi observed the prevalence rate of dog-bite as 4.1 per 1000 population in a year. Bharadva et al study found that out of total 119 cases of animal bites majority (49.6%) belonged to 15-45 years of age-group but 70% were males.<sup>8</sup> Behera et al observed that 46.4% of the animal bite victims were from economically productive age group of 15 to 45 years. 9 Venu shah et al found that 48.4% of animal cases were below 25 years of age and 76% of them were males. 10

Among those who were exposed to animal bites, 21 (30.43%) had completed secondary education, students 24 (34.78%), unskilled workers 22 (31.89%) and those belonging to middle lower socio-economic class, 31 (44.93%). Seenivasan et al found High school was completed by 29.3 % of the victims and majority of them were household workers (29.2%) and labours (31.3%). Varsharani et al found that most of the cases were educated up to primary school (23.32%). 12

Our study found that 44 (63.77%) of the bites were from dogs and majority of them were bitten by pet animals 41(59.42%) of whom only 13 were vaccinated. Roseline et al found that majority of the animal bites were by dogs (94.3%) of them 28% bites were by stray dogs, 82% were by pet dogs. 13 The WHO survey observed that 91.5 % of all animal bites were due to dogs and 63% were bitten by stray dogs.<sup>6</sup> Venu shah et al observed in Ahmedabad that Stray dogs were responsible in 96.2% of cases. 10 Seenivasan et al from Chennai noted that 51.9% of the victims were bitten by stray dogs, the rest were bitten by pet animals of which only 21.4% animals were protected by canine vaccination. 11 Several multi-centric studies in India have shown that unprovoked bites by stray dogs were most common cause of dog bites (Ichhpujani RL, Sudharshan).14

The most common reason for animal bite was provoking gestures towards animals 24 (34.78%) followed by playing with animals 23 (33.33%). Provoked bites were more among children than adolescents and adults as observed by Rambhau et al. 15

While assessing the nature of bites, it was found that 53 (76.81%) had category II bites like scratches, abrasions and the remaining 16 (23.19%) had category III bites according to WHO classification. Seenivasan et al found about 50.3% of bites belong to category II and 31.7% were category III. Varsharani et al found class II animal bites were 67.26% and class III was 30.94%. <sup>12</sup> Studies conducted in various parts of India also confirmed that

category II exposure is more common followed by category III (Umarigar).  $^{16}$ 

Site of the animal bites were on legs 42 (60.87%) and hands 18 (26.08%) in our study. Similar finding was reported by Seenivasan et al that 58.6% of the bites were on the legs, 32% were bitten on the hands.<sup>11</sup>

Our study found that two third of victims (60.87%) took first aid after bite, while 27 (39.13%) had not taken first aid. Majority washed with soap and water 16 (40%), 14 (34%) used antiseptics and 12 (26%) applied chilli powder, coffee powder, Kerosene, lime stone etc. on the bites. Teena et al reported that more than 90% of patients washed the wound soon after exposure.<sup>17</sup> Umarigar et al also noted that 67% of animal bite cases had taken pretreatment before reaching health facility where 67% washed with either water alone or with soap & water; around 40% applied stuff like Chili powder, Lime and salt, Turmeric, Snuff etc. <sup>16</sup> Shelke et al found that 33.76% of subjects washed wound immediately after bite, 14.22% applied antiseptic and 37% applied Indigenous products. Rambhau et al observed that 11.5% washed with water or soap and water, 4.3% used antiseptic, 20.3% applied turmeric power, 63% applied lime and 8.7% used bitter gourd leaf. 15 Jain et al found that 56.2% applied indigenous products (lime, chili powder etc.) over wounds before attending the ARV Clinic.<sup>1</sup>

In our study, 51 (73.9%) took treatment for animal bites and all of them reached hospital before 24 hours of bite. Umarigar et al found that about 71.5% of victims had treatment before 24 hours the remaining had after 24 hours. Roseline et al found that 88.7% of the bite victims took anti- rabies treatment. Shelka et al found that only 26% of the victims took anti- rabies treatment on the same day.

Among the 19% who did not take any treatment, common reasons were found to be not aware of vaccine or treatment 9 (50%), 8 (44.44%) were ignorant about treatment which is corresponding to results of Umarigar et al and Sudarshan et al. 1,16

About 35 (60.61%) took Anti rabies vaccine for animal bites while 16 (39.39%) did not take it. Lai et al found that 32.5% of victims had ARV and 58.5% took ARV in the study conducted by Roseline et al.<sup>7,13</sup>

#### **CONCLUSION**

The prevalence of animal bites in our study population is 10.03 %.

Among that, dog bites were majority about 44 (63.77%), then other bites accounts for about 17 (24.64%) following that cat bites 5 (7.25%), rat bites 2 (2.90%) & monkey bites 1 (1.44%).

Out of 69 people who had animal bites, 51 (81%) people were taken treatment & 18 (19%) were not taken treatment.

Among 51 those who have taken treatment for animal bite, 40 people were undergone allopathy treatment, 10 people were undergone Homeopathy treatment and 1 were taken indigenous treatment.

Out of 18 people those who have not taken treatment, 8 people were ignorant, 9 people were not aware and 1 were due to belief pet dog will not spread the disease.

Among 51 people those who had taken treatment for animal bite, 35 had taken anti-rabies vaccine and 16 had not taken anti-rabies vaccine.

Recommendations of the study were as following.

- Knowledge about animal bite is essential because it causes many fatal diseases to human beings.
- People living in the rural areas should be aware of animal bites like dog bite,cat bite,rat bite, monkey bite & other bites like snake bite, scorpion bite, bites caused by centipedes which may cause morbidity & mortality among rural population.
- After being aware, people should also have a knowledge of vaccines which should be taken after animal bites since vaccines were available for both human beings & animals.
- Treatment should be taken for not only for dog bites, rat bites & snake bites but also for other bites like monkey bites, scorpion bites, centipedes bites, cat bite etc.
- This should be known to everyone those where dwelling in rural areas.

### **ACKNOWLEDGEMENT**

The authors thank all those who supported and participated in this study.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Sangeetha S, Sujatha K, William RF. An epidemiological study of animal bites among rural population in Tamil Nadu, India. Int J Community Med Public Health 2016;3:1413-8.