Bangladesh Journal of Veterinary and Animal Sciences
Journal homepage: www.bjvas.com
pISSN 2227-6416
eISSN 2709-2542

Research article

Prevalence of dog bite in animals, and humans' perception of rabies in southeastern part of Bangladesh: a veterinary public concern

Tridip Das[1]*, Eaftekhar Ahmed Rana[2], Mizanur Rahman[3], Mohammad Bayazid Bostami[3], Tofazzal Md. Rakib[4], Mohammad Inkeyas Uddin[1], Shubhagata Das[5] and Mohammad Rashedul Alam[6]

[1]Poultry Research and Training Centre, Chattogram Veterinary and Animal Sciences University (CVASU), Chattogram, Bangladesh; [2]Department of Microbiology and Veterinary Public Health, CVASU, Chattogram, Bangladesh; [3]Teaching and Training Pet Hospital and Research Centre, CVASU, Dhaka, Bangladesh; [4]Department of Pathology and Parasitology, CVASU, Chattogram, Bangladesh; [5]School of Animal and Veterinary Sciences, Charles Sturt University, Bathurst, Australia; [6]Department of Physiology Biochemistry and Pharmacology, CVASU, Chattogram, Bangladesh

A R T I C L E I N F O

Article history:

Received: 10/09/2020
Accepted: 30/12/2020

Keywords:

Dog Bite, Prevalence, Ruminants, Rabies, Humans' Perception

**Corresponding author:*

Cell: +8801675657403
Email: das.vet671@gmail.com

A B S T R A C T

Dog bite is one of the most common and significant predisposing factors for transmission of rabies from reservoir to other hosts including human. Human perception about infectious diseases like rabies is arguably the most deciding factor in controlling epidemics. A cross sectional study was conducted on dog bite cases in domestic and pet animals of 17veterinary hospital entrants in southeastern part of Bangladesh from January to December 2018 and the respondent perception regarding rabies, dog bite management and post exposure vaccination (PEV) information was also collected by using a pre-structured questionnaire. All the dog bite cases were confirmed based on patient history, clinical signs and physical examination. Finally, all data were summarized using Stata 13 programme. A total of 895 dog bite cases (11.9%; 95% CI 11.1-12.6) were confirmed from 7538 outpatients. Of them, highest prevalence was found in dog (33.3%; 95% CI23.3-45.1) followed by goat (12.6%; 95% CI 12.1-13.8) and cattle (6.9%, 95% CI 5.7-8.2). Among the body sites, thigh region was found to be the most vulnerable region for dog bite (50 to 73.9%) in all species. However, female (13.3%) and younger (11.6%) animals were frequently affected by dog bite in all cases. Out of 327 respondents, about 59% animal owners had preliminary knowledge about rabies and they were concerned about fatality and consequences of this disease. Perception regarding post exposure vaccination (PEV) was quite variable among dog owners (65.8%) and farmers (34.2%), where most farmers (82.9%) perceived that government veterinary hospitals are the only center for PEVs. This study reveals a high proportion of dog bite patients in veterinary hospitals in Bangladesh and the majority of animal owners do not have appropriate perception on post exposure prophylaxis (PEP) in dog bite cases.

To cite this paper: *T. Das, E. A. Rana, M. Rahman, M. B. Bostami, T. M. Rakib, M. I. Uddin, S. Das and M. R. Alam, 2020. Prevalence of dog bite in animals and humans' perception of rabies in southeastern part of Bangladesh: a veterinary public concern. Bangladesh Journal of Veterinary and Animal Sciences, 8(2):151-156.*

1. INTRODUCTION

Dog bite is a frequent cause of traumatic injury in domestic as well as pet animals and typically results in wound, permanent scars, severe disability or even death due to rabies (Overall et al., 2001). It is a common but under-recognized public health predicament. Despite domestication, dogs like their ancestor wolves, remain astute, fleet, strong, nimble, territorial and voracious. The reasons behind dog bite are being threatened while feeding and getting frightened at the invasion of their territory by other individuals (Blackwell, et al., 2008; Takeuchi, et al., 2006).

However, the occurrence of rabies in animal and human caused by Lyssavirus, belonged to the family Rhabdoviridae, due to bite of rabid dog is common in developing countries (Hossain, et al., 2013). There are about 40,000 to 70,000 estimated deaths worldwide due to rabies yearly and an estimated 10 million people receive post exposure rabies prophylaxis (Wilde, et al., 2003). After India and China, Bangladesh ranks the third position in the number of rabies cases of livestock and humans (Hossain, et al., 2013). Although dog bite commonly occurs in different animals, the measures of prevalence of dog bite in animals are rarely performed in Bangladesh.

Knowledge about rabies as well as its preventive management are poor among livestock farmers (Digafe, et al., 2015). In rural areas, only 14% of victims, either human or animal, receive post-exposure prophylaxis (Hoque, et al., 2018). Likewise, community awareness about rabies is very crucial in rabies prevention and control (WHO, 2013). In countries, where the disease is endemic, measures are implemented to address and reduce the risk of infection in susceptible population including wildlife, stray and domestic animals. Therefore, the present investigation was intended to estimate the prevalence of dog bite in domestic and pet animals as well as associated risk factors and to assess the farmers' knowledge about rabies and dog bite management at veterinary hospitals of southeastern part of Bangladesh.

2. MATERIALS AND METHODS

Sources of data

A retrospective survey was conducted on entrants at 17 veterinary hospitals (Anwara, Bashkhali, Boalkhali, Chandanaish, Double-moring, Fatikchhari, Hathazari, Kotwali, Lohagara, Mirshari, Panchlaish, Patiya, Rangunia, Raozan, Sandwip, Satkania, Sitakundu) in southeastern part of Bangladesh (latitude: 22.3569° N, longitude: 91.7832° E) for one-year period (January to December 2018). Three species of domestic and pet animals (cattle, goat and dog) related with clinical dog bite case were studied during this period. Furthermore, the locals' perceptions regarding rabies were also collected from animal respondent.

Data collection process and ethical approval

The data were recorded based on history, clinical signs and physical examination from selected veterinary hospitals in a pre-structured questionnaire. A face to face interview was performed with the farmers to record the information using the questionnaire. Suspected rabid dogs were diagnosed according to clinical history and signs taken from the farmers' interviews. Perception about rabies and its management were also obtained from the farmers who brought their animals bitten by dogs to the Veterinary Hospitals during the study period. The survey protocol was reviewed and approved by the Ethics Committee (Approval no: EC/2017/931-3C) of Chattogram Veterinary and Animal Sciences University, Bangladesh.

Statistical analysis

All data were entered into a spreadsheet of Microsoft Excel 2016 and transferred to Stata13 for data summary and descriptive statistical analysis. The 95% confidence interval (CI) of the prevalence estimate values were calculated by the modified Wald method using the GraphPad software QuickCalcs.

3. RESULTS

A total of 895 dog bite cases from 7538 hospital outpatients were recorded during this year long survey. The overall prevalence of dog bite cases was 11.9% (95% CI 11.1-12.6) among all outpatient entries (Table 1) where highest incidence was found in dog 33.3% (95% CI 23.1-45.1) followed by goat 12.6 % (95% CI 12.1-13.8) and cattle 6.9% (95% CI 5.7-8.2). The prevalence of dog bite according to sex of animals brought to selected veterinary hospitals is shown in Table 2. The prevalence estimates in male and female were 4.4% versus 8.7% in cattle; 10.3% versus 14.3% in goat; and 41.9% versus 19.3% in dog. All the animals were divided into three categories depending on their age (Figure1). The age group "between 1 to 2 year of age", considered as the young group, was found to be at a higher risk to dog bite among all the mentioned species. Dog bite in animals varied based on different anatomical locations (Table 3). Thigh area was the most vulnerable site for dog bite in cattle (50%), goat (58%) and dog (73%). Clinical syndromes of suspected rabid dogs were collected from the farmers (Figure 2). Most frequent answer regarding the sign was the aggressive behavior (38%).

Table 1. Prevalence of dog bite in different species of animals

Species	N	Dog bite case	%	95% CI
Cattle	1571	108	6.9	5.7-8.2
Goat	5898	764	12.9	12.1-13.8
Dog	69	23	33.3	23.3-45.1
Total	7538	895	11.9	11.1-12.6

[N=Total case number, %= Percentage, CI= Confidence interval]

Table 2. Prevalence of dog bite according to sex among different species

Species	Sex	N	No. of dog bite case	%	95% CI	*p*-value
Cattle	Male	663	29	4.4	3.1-6.2	0.001
	Female	908	79	8.7	7.1-10.7	
Goat	Male	1957	202	10.3	9.1-11.8	0.001
	Female	3941	562	14.3	13.2-15.4	
Dog	Male	43	18	41.9	28.4-56.7	0.05
	Female	26	5	19.3	8.1-38.3	

[N= Total case number, %= Percentage, CI= Confidence interval]

Table 3. Distribution of dog bite in different body sites of animals

Biting area	Cattle (N=108)		Goat (N=764)		Dog (N=23)	
	F	% (95% CI)	F	% (95% CI)	F	% (95% CI)
Ear	6	5.6 (2.3-11.8)	26	3.4 (2.3-4.9)	1	4.3 (0.01-22.7)
Neck	21	19.4 (13-27.9)	150	19.6 (16.9-22.6)	4	17.4 (6.4-37.7)
Abdomen	4	3.7 (1.1-9.4)	68	8.9 (7.1-11.1)	1	4.3 (0.01-22.7)
Thigh	54	50 (40.7-59.2)	443	58 (54.5-61.4)	17	73.9 (53.2-87.7)
Tail	4	3.7 (1.1-9.4)	38	5 (3.6-6.8)	0	0
> one site	19	17.6 (11.5-25.9)	39	5.1 (3.7-6.9)	0	0
p-value		0.04		0.003		0.07

[N=Total case number, F= Frequency, %= Percentage, CI= Confidence interval]

Table 4. Knowledge of the respondents regarding dog bite and rabies

Attributes	Outcomes	F	%	95% CI	*p*-value
Cause of rabies	Dog bite	312	95.4	92.5-97.3	0.001
	Cat bite/ others	15	4.6	2.7-7.5	
Knowledge about incubation period of rabies	Do not know	177	54.1	48.7-59.5	0.04
	0-7 days	61	18.7	14.8-23.3	
	8-30 days	36	11	8-14.9	
	>30 days	53	16.2	12.6-20.6	
Familiar with post exposure rabies vaccine	Yes	112	34.2	29.3-39.6	0.23
	No	215	65.8	60.5-70.7	
Knowledge about source of rabies vaccine	Government hospital	271	82.9	78.4-86.6	0.01
	Pharmacy	47	14.4	11-18.6	
	Others	9	2.8	1.4-5.2	
Whether rabies can cause death of cattle, goat, dog	Yes	207	63.3	58-68.3	0.31
	No	120	36.7	31.7-42.1	
Knowledge about zoonotic importance of rabies	Yes	173	52.9	47.5-58.2	0.27
	No	154	47.1	41.8-54.2	

[F= Frequency, %= Percentage, CI= Confidence interval]

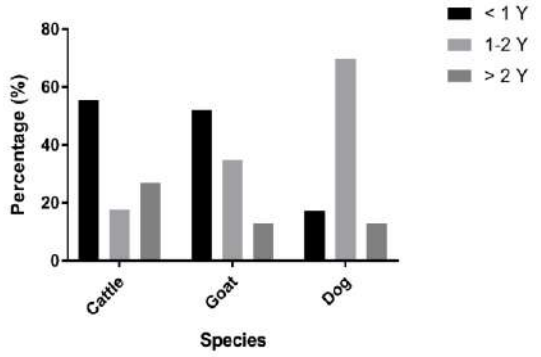

Figure 1. Prevalence of dog bite in three different age groups of cattle, goat and dog. The frequency is expressed in vertical axis as percentage. Horizontal axis indicates the age (in year) of different species

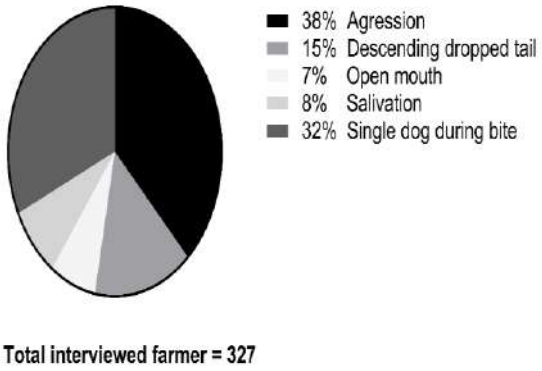

Figure 2. Prevalence of clinical syndromes in rabid suspected dogs

A total of 327 respondents were interviewed with some fixed questions through a questionnaire. Table 4 reflects the results of locals' perception on rabies and dog bite management. About 95% interviewed farmers put their judgment on dog bite for the cause of rabies but almost half of them had no idea about the incubation period of rabies. Around 34% of the farmers familiar with post exposure rabies vaccine, whereas majority of them assumed that govermnet hospitals were the only source of rabies vaccine. Even, almost half of the farmers were not aware of the zoonotic significance of rabies.

4. DISCUSSION

Dog bite is one of the under-recognized but completely preventable phenomenon (Takeuchi, et al., 2006) and the main victims of dog bite are domestic and pet animals like cattle, goats, even dogs. In this study, the overall prevalence of dog bite was found to be 11.9%. The case fatality was conspicuously higher if animals are bitten by rabid dog (Paschos, et al., 2014).

Smaller body size of goat and sheep might be an attributable factor for dog bite in goats than in cattle. In addition, dogs might be mostly attacked by another dogs due to their dominant nature which is corresponded with the number of earlier studies (Schalamon, et al., 2006). Male ruminants are physiologically stronger than the females so that they can protect themselves from the attack of another beast (Alam, et al., 2013). The prevalence of dog bite in female ruminants (8.7 to 14.3%) was higher than the male ruminants (4.4 to 10.3%). Similar findings were reported by the study of Gilchrist et al., 2008. On the other hand, male dogs (41.9%) were found more susceptible to dog bite than female (19.3%) which was analogous with the number of earlier studies (Alam, et al., 2013; Sudarshan, et al., 2006).

The majority of dog bites found in cattle and goats in the age group "less than 1 year" (53.9% and 57.1%, respectively) and "between 1 to 2 years" (18.3% and 32.6% respectively) of age which is similar with other studies from Bangladesh and India (Hossain, et al., 2013; Sudarshan, et al., 2006; Gilchrist et al., 2008). Adult male dogs were most susceptible to dog bite as being threatened during feeding and feeling afraid at the time while their territory is being invaded by other male dogs (Blackwell, et al., 2008; Takeuchi, et al., 2006). Aggressiveness and dominant behavior might make them jealous in case of new entry to their territory (Blackwell, et al., 2008; Takeuchi, et al., 2006).

The majority of victims were inflicted on extremities especially in the hind quarter which were found to be most defenseless part for dog bite in cattle, goats and dogs, well supported by Rumana et al., 2013 and Umrigar et al., 2013. Dogs always target the hind quarter for biting as it might be easier to get access when the prey animal was running as well as the predator always attack the prey from behind (Loneet al., 2014). Aggression was found to be major clinical syndromes (38%) in rabid animals followed by descending dropped tail (15%), open mouth (7%), and salivation (8%), according to the

perception of the respondents which are supported by a previous study finding (Digafe et al., 2015). History information revealed that, instead of being grouped, a rabid dog singly (32.2%) bites other animals.

In line with the present study, about 59% respondents knew preliminary knowledge of rabies. But majority of them had no actual knowledge about the incubation period of rabies (54.1%). About 82% of respondents stated that the rabies vaccine might be found in government hospitals. However, it is usually available in some government hospitals for free of cost e.g., Chattogram General Hospital, Bangladesh Institute of Tropical & Infectious Diseases (BITID), etc. Simultaneously, some pharmacies keep the commercial vaccine produced by few pharmaceuticals. About 60% of respondents believed that the vaccine was free while 24% believed that it would cost less than BDT 1000 (Rumana et al., 2013). In addition, 52.9% of the respondents did not know about the zoonotic significance of rabies. This misunderstanding might lead them to take PPE after dog bite both in animal and human (Rumana et al., 2013). Raising awareness among the owners about dog bite and rabies through health education is important to reduce dog bite fatality.

5. CONCLUSIONS

This study revealed that overall 11.9% of dog bite cases were recorded in different cattle, goats and dogs entrant in selected Veterinary Hospitals of Chattogram. Among them young domestic animals suffer from dog bite more frequently than adults. Although dog bites were recorded in several body sites of the animals, among them thigh region was found to be the most vulnerable region in three species. A number of 59% respondents had preliminary knowledge about rabies and they were concerned about fatality and consequences of this disease. As post exposure vaccination percentage among the dogs was very low and small part of the victims received hospital care public awareness should be created to tackle the fatality of rabies.

ACKNOWLEDGEMENTS

The authors would like to acknowledge all the veterinary surgeons and livestock extension officers of mentioned seventeen veterinary hospitals for their cooperation during data collection from veterinary hospitals.

REFERENCES

Alam, A.N., Munir, M. and Hossain, E., 2013. Rabies control in Bangladesh: human behaviours following dog bites. Bhutan, 2-6 December 2013. South Asia Regional One Health Symposium, pp: 38-39.

Blackwell, E.J., Twells, C., Seawright, A. and Casey, R.A., 2008. The relationship between training methods and the occurrence of behavior problems, as reported by owners, in a population of domestic dogs. Journal of Veterinary Behavior: 3(5):207-217.

Digafe, R.T., Kifelew, L.G. and Mechesso, A.F., 2015. Knowledge, attitudes and practices towards rabies: questionnaire survey in rural household heads of Gondar Zuria District, Ethiopia. BMC Research Note, 8(1):400.

Gilchrist, J., Sacks, J.J., White, D. and Kresnow, M.J., 2008. Dog bites: still a problem? Injury Prevention, 14(5):296-301.

Hoque, M.M., Akter, F., Ahmed, B.W., Alam, S.M.N.E., Amin, R. and Faiz, M.A., 2018. Clinical study on rabies prone animal bite. Bangladesh Journal of Medicine, 29(1):26-30.

Hossain, M., Ahmed, K., Marma, A.S.P., Hossain, S., Ali, M.A., Shamsuzzaman, A.K.M. and Nishizono, A., 2013. A survey of the dog population in rural Bangladesh. PreventiveVeteterinary Medicine, 111(1-2):134-138.

Lone, K.S., Bilquees, S., Salimkhan, M. and Haq, I.U., 2014. Analysis of dog bites in Kashmir. An unprovoked threat to population. Natl. J. Comm. Med., 5:66-9. Available from: http://njcmindia.org/uploads/5-1_66-68.pdf [Accessed 27 October 2019]

Overall, K.L. and Love, M., 2001. Dog bites to humans-demography, epidemiology, injury, and risk. Journal of American Veterinary Medical Association, 218(12):1923-1934.

Paschos, N.K., Makris, E.A., Gantsos, A. and Georgoulis, A.D., 2014. Primary closure versus non-closure of dog bite wounds. A randomised controlled trial Injury, 45(1):237-240.

Rumana, R., Sayeed, A.A., Basher, A., Islam, Z., Rahman, M.R. and Faiz, M.A., 2013. Perceptions and treatment seeking behavior for dog bites in rural Bangladesh. Southeast Asian J Trop Med Public Health, 44(2):244. Available from: https://www.ncbi.nlm.nih.gov/pubmed/23691634 [Accessed 26 October 2019]

Schalamon, J., Ainoedhofer, H., Singer, G., Petnehazy, T., Mayr, J., Kiss, K. and Höllwarth, M.E., 2006. Analysis of dog bites in children who are younger than 17 years. Pediatrics, 117(3):374-379.

Sudarshan, M.K., Mahendra, B.J., Madhusudana, S.N., Narayana, D.A., Rahman, A., Rao, N.S.N.,

X-Meslin, F., Lobo, D. and Ravikumar, K., 2006. An epidemiological study of animal bites in India: results of a WHO sponsored national multi-centric rabies survey. Journal of Communicable Diseases, 38(1):32. Available from: https://www.ncbi.nlm.nih.gov/pubmed/17370688 [Accessed 16 October 2019]

Takeuchi, Y. and Mori, Y., 2006. A comparison of the behavioral profiles of purebred dogs in Japan to profiles of those in the United States and the United Kingdom. Journal of Veterinary Medical Science, 68(8):789-796.

Umrigar, P., Parmar, G.B., Patel, P.B. and Bansal, R.K., 2013. Epidemiology of animal bite cases attending municipal tertiary care centres in Surat city: A cross - sectional study. Journal of Community Medicine 4(1):153-7. Available from: http://www.njcmindia.org/home/abstrct/396/Jan_-_March [Accessed 13 October 2019]

Wilde, H., Briggs, D.J., Meslin, F.X., Hemachudha, T. and Sitprija, V., 2003. Rabies update for travel medicine advisors. Clinical Infectious Diseases, 37(1):96-100.

World Health Organization, 2013. WHO expert consultation on rabies: second report (Vol. 982). World Health Organization.