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Original Article

Investigation into dog bite in cattle, goats and dog at selected veterinary hospitals in Bangladesh and India

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ABSTRACT

Objective: The study was conducted to estimate the proportionate prevalence of dog bite in cattle, goats and dog at selected veterinary hospitals in Bangladesh and India, and to assess the farmers' knowledge level about dog bite and rabies in general.

Materials and methods: A 4-month prospective study was conducted to evaluate the prevalence of dog bite in different species at selected veterinary hospitals in Bangladesh and India during January to July 2015. A total of 119 dog bite cases were identified by anamnesis, manifesting signs and clinical and physical examinations. Information about site of bite, duration, bite management, vaccination history, rabid dog, breed, age, sex and knowledge about rabies were composed by extensive cross-questioning to the farmers using pre-structured questionnaire.

Results: The proportionate prevalence was found higher in goats (25.7%) irrespective of study placements. Hind leg (28-50%) and hind quarter (13-34%) of all species were found as the most vulnerable body part for dog bite. Younger (8-26%) and female (6-36%) animals were more prone to attack by dog. About 65% farmers had preliminary knowledge about rabies and they were aware about high fatality rate of this disease. Most of the respondents (about 45%) said that they did not know about how many days required to occur rabies after the animal being bitten by a rabid dog. Around 70% people had knowledge about source of rabies vaccine, and 74% people thought that the Government Veterinary Hospital was the main source of post exposure rabies vaccine. After dog biting, out of 119, 106 victims were recovered as a result of proper washing and dressing of biting site, and administration of post exposure rabies vaccine.

Conclusion: Dog bite was higher in younger and female animals as compared to males and adult animals with an exception in case of dog.

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INTRODUCTION

Wounds due to dog bite in different livestock species are one of the most common types of traumatic injuries. Most cases are commonly occurring in domestic animals like cattle, sheep and goats even in dogs and cats. Female and younger animals are the frequent victims of dog bite. Contrarily, adult and male dogs are reported to be bitten by other dogs.

Although dog bite in different animals commonly occurs, the measures of dog bite frequency in animal are rarely performed in Bangladesh. However, the occurrence of rabies caused by lyssavirus belonging to the family Rhabdoviridae in animal and human due to rabid dog bite is common in Bangladesh (Hossain et al., 2011). This country ranks the third in the number of rabies cases of livestock and humans (Hossain et al., 2013).

Rabies is a fatal neurologic illness transmitted to animal and human by direct contact with the saliva of a rabid animal, normally through a bite; however, transmission through saliva contact with mucous membranes or a fresh wound is possible (OIE, 2013). The virus will generally remain at the entry site for a period of time before travelling along the nerves to the brain. In the brain, the virus multiplies quickly, resulting in clinical signs (OIE, 2013). The incubation period of rabies is 6 months. The initial onset of rabies begins with fever, muscle weakness, tingling and burning at the bite site. As the virus continues to attack central nervous system, the following symptoms like insomnia, anxiety, confusion, partial paralysis, agitation, hallucinations, excess salivation, problems swallowing and fear of water occurs (Hossain et al., 2011). However, once symptoms appear, rabies is 100% fatal in animals.

Non rabid dog bite in domestic animals is managed by antiseptic washing and dressing of wounds followed by giving antihistaminic and antimicrobial drugs.

Rabid dog bite in domestic animals and dogs are managed by post-exposure rabies vaccine which should be initiated immediately with contacts of dog bites. The indication for post-exposure vaccination with or without rabies immune globulin depends on the type of contact with the rabid animal. For category I (licks on the skin by rabid dog) no treatment is required, whereas for category II (minor scratches or abrasions without bleeding, licks on broken skin) immediate vaccination is required and for category III (single or multiple bites or scratches) immediate vaccination and administration of rabies immune globulin are strongly recommended (Strategy Plan, 2010). In addition to immediate washing and flushing of all bite wounds and scratches are required.

Commercially post-exposure rabies vaccines available are Rabisin, Rabipur, Verorab TM, Imovax TM, Rabies vero TM, TRC Verorab TM. Post exposure vaccine should be followed as-three doses should be administered on days 0 (at the time of exposure), 7, and 21 in all animals. On day 0, 4 mL vaccine is required for large animal, 3 mL for calf and 2 mL for smaller animals (dog, cat, sheep and goats). On day 7 and day 21, 3 mL vaccine is required for large animal, 2 mL for calf and 1 mL for dog, cat, sheep and goats are recommended (Strategy Plan, 2010). The route of administration is intramuscular.

Community awareness about rabies is very crucial in rabies prevention and control (WHO, 2005). In countries where the disease is endemic, measures are implemented to address and reduce the risk of infection in susceptible populations (wildlife, stray and domestic animals). If any biting animal suspected of being rabid should be immediately killed humanly (WHO, 2005). For this firstly an urgent survey work has to be undertaken to locate the problem. People's awareness has to be increased through mass media, group discussion and seminar in urban and rural areas. Stray dogs should be either vaccinated or neutralized.

Knowledge about rabies and its management and prevention among livestock farmers are poor (Digafe et al., 2015). Therefore, the present investigation attempts to design the farmers' knowledge about dog bite as well as rabies.

Three Veterinary hospitals were included for the dog bite clinical study. Moheshkhali Upazila Veterinary Hospital (MUVH) and Shahedul Alam Quaderi Teaching Veterinary Hospital (SAQTVH) receive different clinical cases in livestock and poultry for treatment purposes. Madras Veterinary College (MVC) predominantly receives clinical cases of dog. The study was conducted to estimate the proportionate prevalence of dog bite in cattle, goats and dog at selected veterinary hospitals in Bangladesh and India; to describe wounds at different body parts of animals due to dog bite; to describe clinical symptoms of suspected rabid dogs; and to assess the farmers' knowledge level about dog bite and rabies in general.

MATERIALS AND METHODS

Clinical dog bite cases of different animal species were studied during 4 months internship period at Moheshkhali Upazila Veterinary Hospital (13 January to 15 March 2015), SAQTVH (17 March to 15 May 2015) and MVC (29 May to 7 July 2015). In addition to dog bite cases other clinical cases in goat, cattle and dog were also

recorded to be used as denominator to calculate the proportionate prevalence of dog bite case. Clinical and physical examination was carried out for each individual case. Species, site of bite, age, sex, breed and bite management with drugs and vaccination history was recorded using the structured questionnaire.

Information about rabid dog and knowledge 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. A face to face farmer's interview was performed to record the information using a separate questionnaire. The questionnaire included the following information were preliminary knowledge about rabies, required time to occurrence of rabies after being bitten by suspected rabid dog, knowledge about rabies vaccine and its source etc. Suspected rabid dog was diagnosed according to following clinical history and signs taken from farmer's interview. Aggression, down of tail, open mouth and salivation (Digafe et al., 2015) were found as the main key signs of rabid dog. Information to dog bite management for cattle, goats and dog details were also noted down.

The age of the species was determined by dentition and birth record sheet (only for dog) maintained by owners and breed of dog's was assessed according to phenotypic characteristics.

Statistical analysis: Data obtained were entered into Microsoft Excel 2007 and exported to STATA-11 (Stata Corp, 4905, Lakeway River, College Station, Texas 77845, USA) for statistical analysis. Descriptive analysis was performed. Fisher's exact test was applied to access the difference between the proportions of dog bite and non-dog bite cases in relation to different categories of variable. The results were expressed in frequency, number and percentage each category of variable and *P* value. The level of significance was set at $P \leq 0.05$.

RESULTS

The prevalence of dog bite in goat, cattle and dog by placements

The estimated proportionate prevalence of dog bite in cattle, goats and dog respectively 14%, 25.7% and 50% in UVH; 5.5, 6.6 and 12.5% in SAQTVH and 4, 3.5 and 16% in MVC (**Table 1**).

The proportionate prevalence of dog bite was significantly higher in goats (25.7%) than in cattle (14%) in UVH ($P<0.05$). The proportionate prevalence of dog bite was also slightly higher in goats (6.7%) than in cattle (5.5%) in SAQTVH placements but the difference was not statistically significant. In MVC the proportionate prevalence of dog bite was also significantly higher in goats (13.3%) than in cattle (4%) ($P<0.05$). Comparison among three species at MVC, the proportionate prevalence of dog bite was statistically higher in dog (16%) than either in cattle (4%) or goats (13.3%) ($P<0.0.5$) (**Table 1**).

Distribution of dog bite at different parts of animal by placements

Hind leg of all studied species was found most vulnerable body part for dog bite across the study sites. The dog bite at hind leg in cattle was 28.6, 40 and 33.3% in UVH, SAQTVH and MVC, respectively. The dog bite in hind leg in goats was 27.8, 40 and 37.5% in UVH, SAQTVH and MVC respectively. The dog bite in hind leg was 50, 30, and 45.5% in UVH, SAQTVH, and MVC respectively (**Table 2**). Dog bite at hind quarter and main body in the studied species was also high (**Table 2**).

Distribution of prevalence of dog bite by factors

In UVH, the proportionate prevalence of dog bite in female and male was respectively 14.3% and 13.3% in cattle; 28.9% and 20% in goat; 100% each in dog. In SAQTVH, the proportionate prevalence of dog bite in female and male was respectively 6.6 and 5% in cattle; 8 and 6% in goat; 10 and 14% in dog. In MVC, the proportionate prevalence of dog bite in female and male was 4 and 2% respectively in cattle; 14.2 and 12% respectively in goat; 30 and 18% respectively in dog (**Table 3**). Irrespective of species types, younger animals were frequently bitten by dog. However, in MVC adult dog was commonly bitten by other dog (**Table 3**).

Post-exposure rabies vaccine status

Only 3.3-10.5% animal were vaccinated by post exposure rabies vaccine across the study sites (**Table 4**). Frequency distribution of dog bite animals with or without post exposure rabies vaccine (**Table 5**). Frequency distribution of dog bite animals with or without post exposure rabies vaccine.

Clinical syndromes of suspected rabid dog

Most of the rabid dogs were aggressive (60.4%). Other manifestations of rabid dogs were tail-down (21.9%), open mouth (9.4%) and continuous salivation (8.3%) (**Table 5**).

Knowledge about dog bite and rabies in general

About 65% farmers responded that they had preliminary knowledge about rabies. Around 98% replied that rabies

Table 1. Proportionate prevalence of dog bite in cattle, goats and dog at selected veterinary hospitals in Bangladesh and India

Species	UVH			SAQTVH			MVC		
	N	Yes (%)	No	N	Yes (%)	No	N	Yes (%)	No
Cattle	50	7 (14%)	43	90	5 (5.5%)	85	150	6 (4%)	144
Goat	70	18 (25.7%)	52	225	15 (6.6%)	210	60	8 (13.3%)	52
Dog	4	2 (50%)	2	80	10 (12.5%)	70	300	48 (16%)	252

UVH: Upazila Veterinary Hospital, SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital, MVC: Madras Veterinary College, N=Total number of clinical cases

Table 2. Frequency distribution of sites of species bitten by dog at selected Veterinary Hospitals in Bangladesh and India

Site of bite	UVH			SAQTVH			MVC		
	Cattle (N=7)	Goat (N=18)	Dog (N=2)	Cattle (N=5)	Goat (N=15)	Dog (N=10)	Cattle (N=6)	Goat (N=8)	Dog (N=48)
Hind quarter	1 (14.7%)	3 (16.7%)	0	1 (20%)	4 (26.7%)	2 (20%)	2 (33.3%)	2 (25%)	6 (12.5%)
Hind leg	2 (28.6%)	5 (27.8%)	1 (50%)	2 (40%)	6 (40%)	3 (30%)	2 (33.3%)	3 (37.5%)	22 (45.9%)
Fore leg	1 (14.7%)	2 (11.1%)	0	0	1 (6.7%)	1 (10%)	0	0	3 (6.2%)
Body	2 (28.6%)	4 (22.2%)	1 (50%)	1 (20%)	3 (20%)	2 (20%)	1 (16.7%)	1 (12.5%)	5 (10.4%)
Face/Neck	1 (14.7%)	2 (11.1%)	0	1 (20%)	1 (6.7%)	2 (20%)	1 (16.7%)	2 (25%)	12 (25%)

Table 3. Frequency distribution of proportionate prevalence of dog bite in cattle, goats and dog at selected veterinary hospital in Bangladesh and India

Hospital	Factor	Variable	Cattle			Goat			Dog		
			N	+(%)	-	N	+(%)	-	N	+(%)	-
UVH	Sex	Male	15	2 (13.3)	13	25	5 (20)	20	3	3 (100)	0
		Female	35	5 (14.2)	30	45	13 (28.9)	32	1	1 (100)	0
	Age	<1 year	20	6 (30)	14	47	12 (25.5)	35	2	0 (0)	2
		>1 year	30	1 (3.3)	29	23	6 (26)	17	2	2 (100)	0
SAQVH	Sex	Male	30	2 (6.6)	28	75	6 (8)	69	50	7 (14)	43
		Female	60	3 (5)	57	150	9 (6)	141	30	3 (10)	27
	Age	<1 year	40	4 (10)	36	140	10 (7.14)	130	20	6 (30)	14
		>1 year	50	1 (2)	49	85	5 (5.9)	80	60	4 (6.7)	56
MVC	Sex	Male	40	2 (5)	38	25	3 (12)	22	190	30 (15.7)	160
		Female	110	4 (36)	10	35	5 (14.2)	30	110	18 (16.3)	92
	Age	<1 year	60	5 (8.3)	55	37	6 (16.2)	31	120	20 (16.6)	100
		>1 year	90	1 (1.1)	89	23	2 (8.6)	21	180	28 (15.5)	152

N= Total Number, UVH: Upazila Veterinary Hospital, SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital, MVC: Madras Veterinary College

Table 4. Frequency distribution of dog bite animals with or without post exposure rabies vaccine

Placements	Vaccinated		Non-vaccinated	
	Yes (%)	No	Yes (%)	No
UVH	2 (10.5%)	17	5 (62.5%)	3
SAQTVH	1 (3.7%)	26	2 (66.6%)	1
MVC	2 (3.3%)	58	1 (50%)	1

UVH: Upazila Veterinary Hospital; SAQTVH: Shahedul Alam Quaderi Teaching Veterinary Hospital; MVC: Madras Veterinary Hospital

Table 5. Distribution of clinical syndromes of suspected rabid dogs according to owner's response (N=96)

Category	No of dogs
Aggression	58 (60.4%)
Downward dropping of tail	21 (21.9%)
Open mouth	9 (9.4%)
Salvation	8 (8.3%)

occurred in domesticated animal due to rabid dog bites (**Table 6**). Most of the respondents (about 45%) said they did not know about how many days required occurring rabies after animals being bitten by rabid dog. Around 70% had knowledge about source of rabies vaccine and 74% thought government Veterinary Hospital was the main source of post exposure rabies vaccine. Eighty three percent responded that they could pay up to BDT 2,000 for rabies post exposure vaccine. Most of the farmers (78%) were aware about high fatality rate of animals due to rabies (**Table 6**).

DISCUSSION

Dog bite is the common and neglected phenomenon in Bangladesh while it is 100% preventable (Hossain et al., 2011). Large number of cases is commonly occurred in domestic animals like cattle, sheep and goats even in dogs and cats. If animals are bitten by rabid dog, the case fatality is notably higher than the normal dog (Marina et al., 2007).

Table 6. Knowledge of the respondents/owners regarding dog bite and rabies

Attributes	Variable	Number	%
Preliminary knowledge about rabies	Yes	77	64.7%
	No	42	35.3%
How does rabies occur?	Dog bite	117	98.3%
	Cat bite/ others	2	1.7%
Days required to occur rabies after animal being bitten by suspected rabid dog	Do not know	53	44.6%
	0 to 7 days	18	15.1%
	8-30 days	12	10.0%
	>30 days	36	30.3%
Knowledge about rabies vaccine	Yes	83	69.8%
	No	36	30.3%
Source of rabies vaccine	Government hospital	88	74%
	Medicine shop	17	14.2%
	Town/city	13	10.9%
	Others	1	0.8%
Amount willing to pay for vaccine (BDT) if available	Not willing	14	11.8%
	1,000-2,000 Taka	99	83.2%
	2,001-5,000 Taka	5	4.2%
	>5,000 Taka	1	0.9%
Whether rabies can cause death of cattle and goats or human	Yes	93	78.2%
	No	26	21.9%

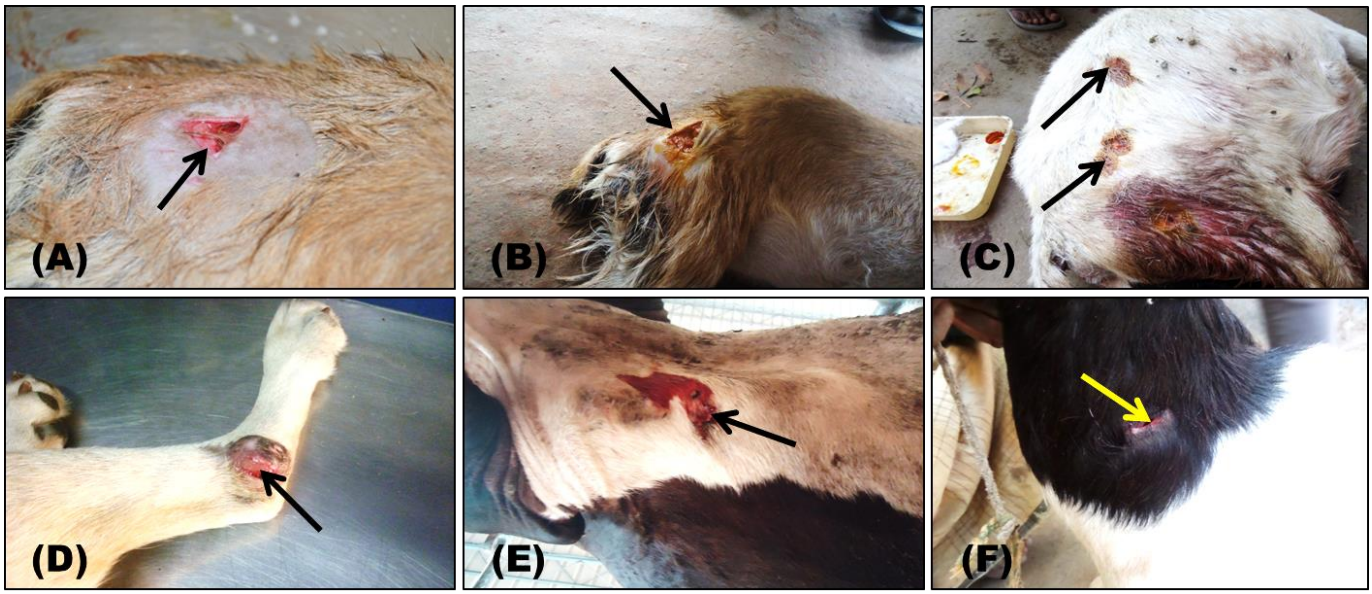

Figure 1: Dog bite in different places of different animals (arrows). **(A)** Dog bite wound in the body of goat, **(B)** Dog bite injury in hind quarter of goat, **(C)** Dog bite injury in hind quarter in goat, **(D)** Dog bite wound in leg of a dog, **(E)** Dog bite wound in hind quarter in calf, **(F)** Dog bite wound in neck of a goat.

Dog bite usually occurs in different animals due to many reasons as follows: they are being furious while threatened during feeding and feeling afraid at the time while their territory is being invaded. Sometimes they can be jealous in case of new entry to their territory (Hart and Hart, 1985; Appleby et al., 2002). They are aggressive, over excited and livid during their estrous period.

In this study, the proportionate prevalence of dog bite was 4-14% in cattle, 6.6-25.7% in goat, 12.5-50% in dog which is coincided with previous study of Santa-Maria et al. (2015). In Moheshkhali Upazila Hospital, the prevalence of dog bite was higher in goats than in cattle because of a large number of goats and dog population in this site. Besides, dog bite might have occurred in goats because of smaller body size. In case of dog in MVC, they are mostly attacked by another dog due to their dominant nature which is coincided with the number of earlier studies (Cole, 1991; Gershman et al., 1994; Shewell and Nancarrow, 1999) and in city dog population is remarkably high.

Hind quarter and hind leg of all species were found most vulnerable part for dog bite which is well supported by

(Rumana et al., 2013) as dog always target the hind quarter. Because it is easier to get access to the hind quarter, when the animal is running.

In ruminants, females and younger animals are more prone to effect of dog bite due to less energetic and ill thrift. The results are anticipated to a study (Ahmed, 2013). In MVC, male and adult dog are most susceptible to dog bite as being threatened during feeding and feeling afraid at the time while their territory is being invaded (Hart and Hart, 1985; Appleby et al., 2002). Sometimes, they can be jealous in case of new entry to their territory. Beside this aggressiveness and dominant behavior might be the cause of dog bite and it is supported by many researchers (Hart and Hart, 1985; Appleby et al., 2002).

Usually vaccinated dogs are not affected by rabies. But in this study, a little portion of vaccinated dogs were affected by rabies, may be due to vaccine failure or due to a wrong timing of vaccination or dog have vaccinated after appearing clinical signs. As the known, non-vaccinated dogs are exposed to rabies whose are bitten by rabid dog and is completely supported by this study (Mondal and Yamage, 2014). Some animal was non-vaccinated but was not affected by rabies; this is because the biting dog was might not be the carrier of rabies virus (Haque et al., 2011).

Aggression was treated out as major clinical syndromes in rabid animals by the majority of the respondents followed by tail down, open mouth and salivation which are confirmed by the previous study of (Digafe et al., 2015).

In line with the present study, a previous study regarded 73% of respondents stated the rabies vaccine was found in government hospitals, but the vaccine is not always available. Twelve point five percent of respondents believed the vaccine was free, while 83.2% believed its cost less than taka 2000 (Rumana et al., 2013) and may be for such people perceptions the prevalence of rabies increases frequently day by day.

Majority of the owners visited to traditional healer for dog bite case, and it was due to lack of proper education regarding effective prevention, as reported by Rumana et al. (2013). Unavailability of the rabies vaccine at public veterinary hospitals might also be a reason of rabies infections in animals (Rumana et al., 2013).

LIMITATIONS

The study was conducted in a small scale area and short time period which might not be the representative.

CONCLUSION

Dog bite was higher in younger and female animals than in males and adult animals with the exception in the case of dogs. Cattle, sheep, goats, cats even dogs were commonly affected by dog bite. The biting dog might be normal or rabid. The clinical symptoms of rabid dog according to owners' complains included aggression, down tail, open mouth and salivation. Non-rabid dog bite in domestic animals was managed by antiseptic washing and dressing of wounds followed by giving antihistaminic and antimicrobial drugs. In rabid dog bite post-exposure rabies vaccine is strongly recommended. Raising awareness among the owners about dog bite/rabies through health education is important to reduce dog bite fatality.

CONFLICT OF INTEREST

There is no conflict of interest.

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