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COMPARATIVE STUDY ON DOG BITE AND RABIES IN LIVESTOCK AND PET ANIMAL WITH THEIR MANAGEMENT IN FARIDPUR SADAR UPAZILLA VETERINARY HOSPITAL

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ABSTRACT

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A cross-sectional study was carried out from 13th January to 15th March 2015 in the Upazilla Veterinary Hospital of the Sadar Upazilla under Faridpur District to estimate the dog bites, rabies, and their management in different livestock and pet animals registered for treatment. A prototype questionnaire was used to obtain the necessary information from the owners of the animals observed. Out of the total 170 animals diagnosed and treated based on gross lesion and history, 24, 13, 133 were cattle, dogs, and goats, respectively. The proportion positive of dog bite cases was 17.4% in cattle, 20.5% in goats, and 8.3% in dogs. Among the dog bitten animals, 77.8% were Category-III (single or multiple transdermal bites or scratches, licks on broken skin) bite. The prevalence of rabies in dog bitten animals was 2.50% in dogs, 0.8% in goats and no rabies case was recorded in cattle. Post-rabies vaccine was used in 46.4%, 100% and 75.0% dog-bitten goats, cattle and dogs, respectively. The occupation and literacy of the owner, types of cattle, animal's age, and animal source etc. showed a considerable difference in prevalence. However, none of the association was statistically significant. This baseline study might be extended with a required number of samples to identify potential risk factors for the occurrence of rabies in different animals.

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INTRODUCTION

Rabies is an international public health threat having higher case-fatality rate among human and animal population. It is a highly fatal zoonotic viral disease (Feder et al., 2012). All warm-blooded mammals are believed to be susceptible to Rabies (Woldehiwet 2002). Rabies is an acute viral disease, which causes progressive encephalitis and death. It is caused by a single-stranded; negative-sense bullet shaped RNA virus of genus *Lyssa virus* from family *Rhabdoviridae* (Bourhyet al., 2008; Gould et al., 1998). Generally, virus remains in the saliva of clinically rabies infected mammals and is being transmitted through a bite to the healthy animal from the rabid animals or contamination of open wounds or mucous membranes with saliva or nervous tissue from a rabid animal (Rupprecht et al., 2002). Rabies is endemic in Bangladesh both in humans and in animals (Hossain et al., 2012; Jamil et al., 2012). Rabies can get from biting by an animal, which is infected with the rabies virus. Rabies occurs in two epidemiological forms, urban and sylvatic form. In Bangladesh dog, foxes and jackals are the main reservoirs of sylvatic form of rabies infection (Mohiuddin, 2001). Beside this, multiple rabies virus variants are maintained in wild mammalian reservoir populations such as raccoons, skunks, mongoose, bats etc. The urban form of rabies by which any warm-blooded animal can get rabies including cattle, goat, horse, domestic cats and humans is also often found in Bangladesh (Mohiuddin, 2001). Rabies can be totally prevented by taking appropriate health measures and post-exposure vaccines after biting by the rabid animal. Beside this, for both host animal and susceptible animal pre-exposure vaccination is also helpful to the prevention of rabies (Warrell 2012).

Globally, Bangladesh positions third in the number of human passing from rabies infection (Hossain et al., 2011). The most vital conditions for the effective spread of rabies infection in Bangladesh is an extensive populace of stray dogs, which conceivably collaborate human along with different types of creatures. Information about dog population is fundamental for successful national rabies control; canine control programs are rare in Bangladesh (Hossain et al., 2013). The mean density of the dog population was estimated to be 14 dog/km and the human: dog ratio to be 120: 01 in Narsingdi district, Bangladesh (Hossain et al., 2013). Stray dog control is one of the essential ways for controlling both rabies and dog bites problem in Bangladesh. Dhaka City Corporation alone kills up to 20,000 stray dogs a year and this stray dog culling program is only limited to the city corporation level in Bangladesh (Tenzin et al., 2015). Although rabies occurs throughout the year in all parts of Bangladesh, the number of deaths in animals is unknown and probably it is higher than the figure for human cases. Approximately, 50,000 humans and 8,000 domestic animals receive the post-exposure vaccine, treatment due to the dog bite in Bangladesh annually (Samad, 2011). However, many bites are not reported due to ignorance and lack of facilities in our Bangladesh.

Biting by dog is not only the main cause rabies but also for other serious problems like tetanus, fracture, paralysis, and vital organ damage and even can cause the death of animals (Morgan and Palmer, 2007). Therefore, like rabies, dog bite is another major problem in both humans and animals. Animal bites, if managed appropriately and timely the incidence can be reduced to a greater extent. In this regard, the post-exposure treatment of animal bite cases is of prime importance. In rabies endemic country like Bangladesh where every animal bite is potentially suspected as a rabid animal bite, treatment ought to be begun promptly as per their medical crisis (Parviz et al., 1998). Epidemiological studies of rabies in Bangladesh in livestock are very limited to formulate an effective control program (Ali et al., 1982; Biswas et al., 1996). On the above-mentioned background, this study was undertaken to determine the prevalence of rabies and dog bite cases in animals registered for treatment to an Upazilla Veterinary Hospital (UVH) at Faridpur, Bangladesh.

MATERIALS AND METHODS

Study period and population

The study was carried out at UVH, Faridpur Sadar, Faridpur (Figure 1). At this place, animals registered for treatments were observed for a period of 08 weeks: from 13 January to 15 March 2015. All of these animals were examined for the presence of dog bites with such histories from their owners. A prototype questionnaire was developed for this study to assess the intensity of dog bites in different animals, their management, vaccination histories and development of clinical cases of rabies.



Figure 1. Location of study area

Categorizing the severity of dog bites

The categorization of the severity of dog bites in the animals registered to the hospital was done according to World Health Organization (WHO, 2013). Accordingly, in this study, all dog bites were categorized into three types namely:

- Category I – touching or feeding animals, licks on intact skin (i.e. no exposure);
- Category II – nibbling of uncovered skin, minor scratches or abrasions without bleeding;
- Category III – single or multiple transdermal bites or scratches, licks on broken skin; contamination of mucous membrane with saliva from licks and exposures to bats etc.

Diagnosis of rabies

Diagnosis of rabies was made based on typical clinical presentations of rabies with the previous history of dog bites and the presence of such bite marks on the affected animals. There are two forms of rabies seen clinically: Furious and Dumb. The first form is characterized by restlessness, biting other animal or inanimate objects, aimless running, anorexia etc., and the second by paralysis, salivation, hydrophobia, off feed, recumbence followed by death (Susilawathi et al., 2012).

Statistical analysis

Data collected from this study was first stored in Microsoft Excel2010 (Microsoft Corporation, USA). These data were then sorted, cleaned and coded in Microsoft Excel. After that, data were exported to STATA 11.0 version (STATA Corporation, College Station, Texas, USA) for Windows 2010. Proportions and the Pearson's chi-square test (χ^2) were used to analyze the data and differences were considered significant when $P \leq 0.05$ (Rabe-Hesketh and Everitt, 2003).

RESULTS

In total, (N=170) animals were registered to the UVH, Faridpur Sadar, Faridpur during the study period for treatments and (n=36) of them were dog bite cases, that means 21.2% (95% CI: 15.7% - 28.0%) animals were bitten by dogs. A demographic description of the animals bitten, biting sites of the bodies, types of bites, post-rabies vaccination history and owner awareness on rabies are summarized in Table 1.

Table 1. Risk factors associated with dog bite cases in different species. ($P \leq 0.05 = \text{sig.}$)

Variable	Category	Cattle	Goat	Dog	P value		
		n (%)	n (%)	n (%)	Cattle	Goat	Dog
Age (months)	01 to 12	01(25.0%)	14(51.85%)	00 (0.00%)	0.976	0.303	0.081
	13 to 24	0(0.00%)	09(33.33%)	01(25.0%)			
	25 to 36	01(25.0%)	03(11.11%)	01(25.0%)			
	37 or above	02(50.0%)	01(3.70%)	02(50.0%)			
Sex	Male	01(25.0%)	10(37.04%)	01(25.0%)	0.035	0.041	0.029
	Female	03(75.0%)	17(62.96%)	03(75.0%)			
Biting by	Street dog	03(75.0%)	21(77.78%)	03(75.0%)	0.000	0.000	0.026
	Pet dog	01(25.0%)	06(22.22%)	01(25.0%)			
Biting site	Head	00(0.00%)	00(0.00%)	01(25.0%)	0.000	0.010	0.029
	Neck and shoulder	00(0.00%)	04(14.81%)	01(25.0%)			
	Fore quarter	02(50.0%)	02(07.41%)	00(0.00%)			
	Abdomen	00(0.00%)	04(14.81%)	00(0.00%)			
	Hind quarter	02(0.00%)	17(62.96%)	02(50.0%)			
Category of biting	I	0(0.00%)	00(0.00%)	01(25.0%)	0.000	0.000	0.002
	II	01(25.0%)	04(14.81%)	01(25.0%)			
	III	03(75.0%)	23(85.19%)	02(50.0%)			
Vaccination	Yes	04(100%)	12(44.44%)	04(100%)	0.001	0.000	0.001
	No	00(0.00%)	15(55.56%)	00(0.00%)			
Owner's type	Aware	02(50.0%)	06(22.22%)	03(75.0%)	0.058	0.014	0.185
	Not aware	02(50.0%)	21(77.78%)	01(25.0%)			

Table 2. Prevalence of rabies in livestock and pet animals

Goat n (%)	Cattle n (%)	Dog n (%)
01 (0.76)	0 (0.00)	03 (2.56)

Among the dog bitten animals, most were goats 77.1% (Figure 2) and 11.4% each for cattle and dogs. Among the dog-bitten animals Category-III predominated, proportionately, which was 77.8% (95% CI 61.7% - 88.5%). Category-III dog bite cases observed in goats in the study area are portrayed in Figure 3. The proportion of biting animal such as a dog, fox, cat, and others we had observed are shown in Figure 4. During this study period in UVH, Faridpur we found only 04 cases of rabies among 170 biting cases of livestock and pet animal patient within 02 month period. Proportionate prevalence of rabies is shown in Table-02.

In total, four clinical cases (3 dogs and 1 goat) of rabies seen in the study period and their distributions according to sex and the age of the species affected and awareness of the owners are displayed in Figures 05, 06 and 07, respectively. Animal owners have had variations in their awareness about rabies. The common clinical signs of rabies in the dogs and the goat were salivations (Figure 8) and furious form rabies was noticed in all the affected dogs, but the goat suffered from the dumb form of rabies.

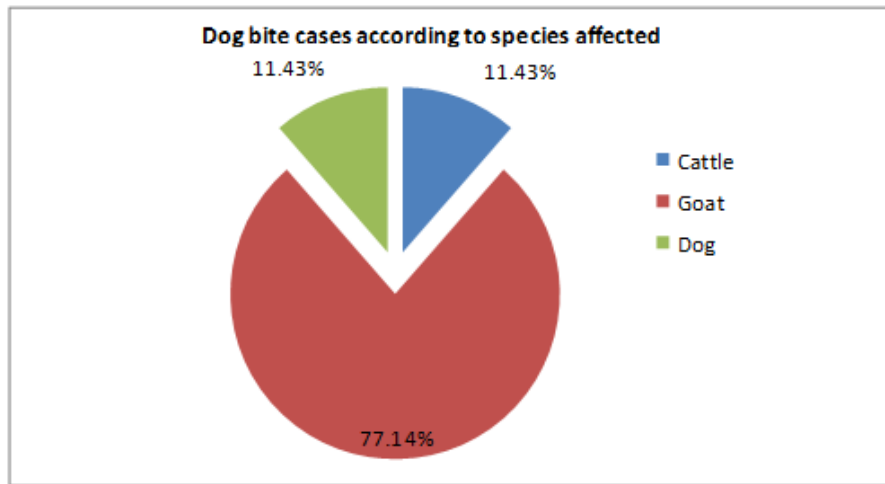


Figure 2. Proportions of dog bite cases observed in the study



Figure 3. Lesions and sites of a dog bite (Type-III) in goats

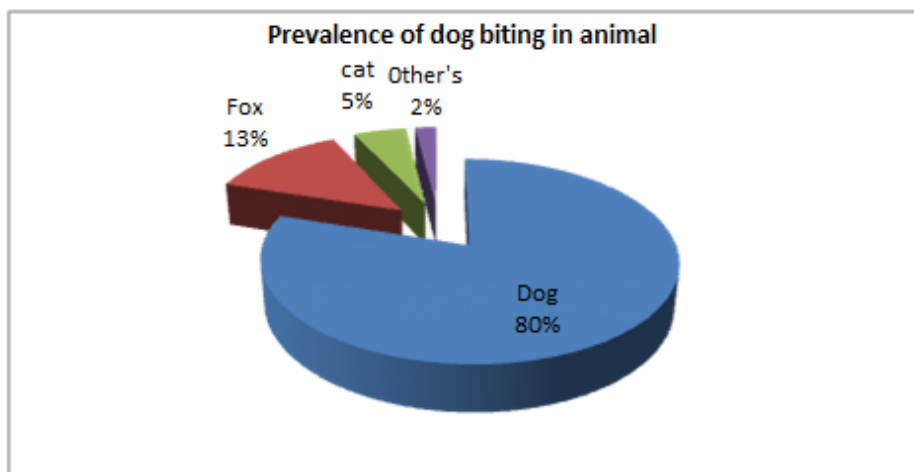


Figure 4. Proportion of biting animal according to species

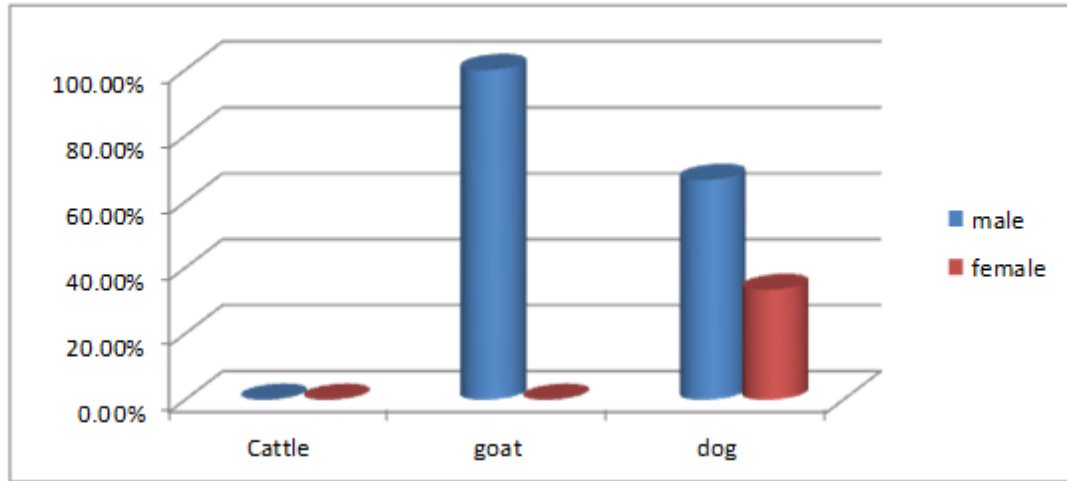


Figure 5. Sex-distribution of observed rabies cases seen in different species

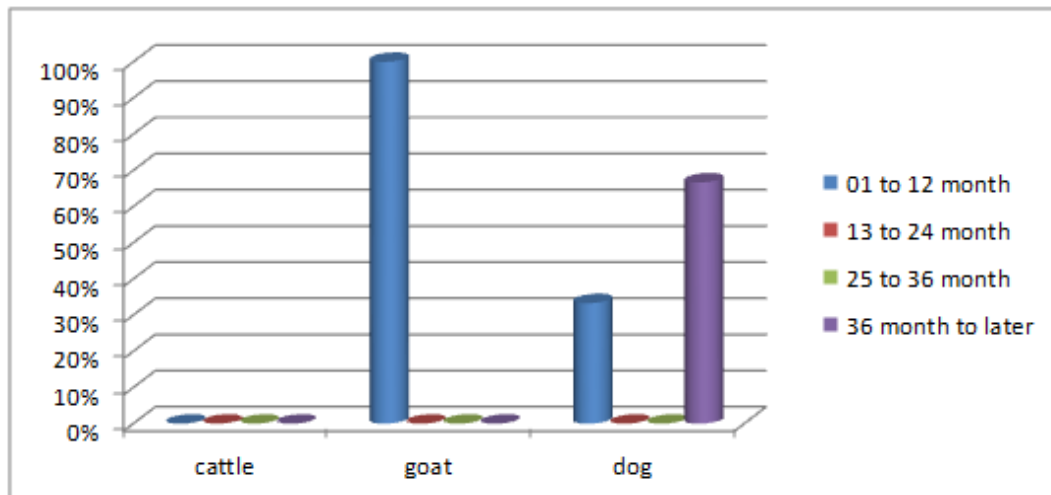


Figure 6. Age- distribution of observed rabies cases seen in different species

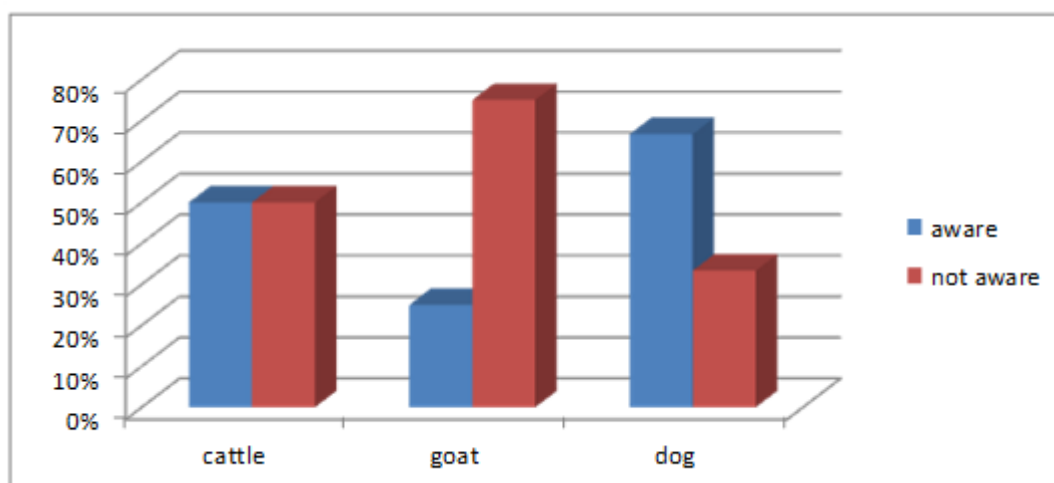


Figure 7. Distribution of rabies cases according to owner awareness about rabies



Figure 8. Clinical sign (salivation) in a rabid-goat (a) and a rabid-dog (b)

DISCUSSION

In Bangladesh, Dog bites in livestock and human are very much common due to a large number of stray dog populations and control measures for rabies have not been taken. This study revealed that the proportion of dog bite cases were (11.43%, 77.14%, and 11.43%) in cattle, goats, and dogs, respectively. Besides, the dog bite cases were higher in young goats (51.9%) than the older ones (03.70%), but in dogs and cattle, the age-scenarios were reverse. Female animals were more victims of dog bites than males. A previous study (Islam et al., 2016) in Bangladesh, find the similar result as the higher prevalence of dog bite found in goat (25.7%) than the other species of livestock such as in cattle (4-14%), dog (12.5-15%). etc. We have similar findings with another study (Islam et al., 2016) on dog bites in livestock of Bangladesh. They found that, Hind leg (28-50%) and the hind quarter (13-34%) of all species were found as the most vulnerable body part for the dog bite. Younger (8-26%) and female (6-36%) animals were more prone to attack by the dog. About 65% of farmers had preliminary knowledge about rabies and they were aware of the high fatality rate of this disease. Most of the respondents (about 45%) said they did not know about how many days required occurring rabies after the animal being bitten by a rabid dog. Around 70% had knowledge about the source of rabies vaccine and 74% thought government Veterinary Hospital was the main source of post-exposure rabies vaccine (Islam et al., 2016). One of the important findings of this observation was that most bite types were of category-III, suggesting that the attacks were from aggressive dogs (probably rabid dogs in the furious form of the disease) and on small ruminants, goats. Thus, goats in the studied area might suffer from rabies the most, although there is no published report on it.

Like other developing countries, most cases rabies in Bangladesh is diagnosed primarily based on clinical symptoms and signs, and a history of or evidence of a rabid animal bite, the death of an animal and incomplete or no vaccination following exposure (Leung, et al., 2007). The facilities for laboratory diagnosis and affirmation of rabies either in people or in animals are accessible in just a couple of organizations in our nation (Mondal et al., 2014).

Until now, Rabies has no effective treatment (Hankins and Rosekrans, 2004). In case of an animal with rabies, euthanasia is advised for the prevention of transmission of rabies and to reduce the sufferings of the affected animal. So, pre-exposure and post-exposure vaccination are the only way to prevent rabies in the animal population. A licensed veterinarian must administer vaccinations. Primary and booster vaccinations ought to be acquired as per proposals from authorized veterinarians and as per nearby animal control mandates (Rupprecht et al., 2004).

The present study of rabies in animal corresponds to the earlier studies in Bangladesh and India (Blanton et al., 2006; Ichhpujani et al., 2008; Hossain et al., 2012). However, a low level of prevalence of rabies was reported in goat (0.5%) in Bangladesh (Hossain et al., 2012) and in cattle (0.3%) (Mondal et al., 2014). The current study revealed that the prevalence of rabies cases in livestock and pet animal could be (0.7%) in goat and (2.5%) in dog among the corresponding animal populations registered to the Upazilla veterinary hospital for treatment. This assumption is slightly lower than the earlier studies. It may be due to the reduction of prevalence as the result of taking some steps for rabies control.

Surprisingly, most of the dog-bitten animals were vaccinated with the post-rabies vaccine, but the frequency and number of doses given could not be known. According to WHO (2013), a patient with category-III bite should immediately be vaccinated with post-rabies vaccine along with rabies immune-globulins. It is assumed that the animals could have been vaccinated with a single dose of the post-rabies vaccine without any rabies immunoglobulin, and thus, it would be interesting to know whether such single dose could protect the dog-bitten animals from the development of rabies or not.

CONCLUSION

Dog bite is common both in animal and human populations in Bangladesh. All of our joint effort may help us to control dog bite and rabies. For the prevention and control, we need more public awareness and knowledge about this problem. People are aware about the disease as reflected by the post exposure vaccination of all cases. Further education about proper vaccination and management of the disease may be needed. We should be cautious about dog bites which may causes rabies where as the rabies has no treatment with a 100% fatality.

CONFLICT OF INTERESTS

The authors declare that they have no competing interests

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