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Epidemiological Study of Cardinal Signs and Reasonable Antibiotic Usage in FMD at Bagherpara Upazila in Jashore District

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ABSTRACT

Foot and mouth disease (FMD) is a viral disease that is epitheliotropic and transboundary, affecting cattle, buffalo, sheep, goats, and wild animals all over the world. Due to lower productivity and higher mortality in calves, this highly contagious disease causes significant economic loss. The study was conducted to identify clinical signs, management, complications, and prevalence of Foot and Mouth disease (FMD) in cattle for five months at Bagherpara Upazila, Jashore. A total of 66 cattle of both sexes were investigated clinically. The impact of season, breed, age, sex, and purpose of keeping cattle on disease incidence was investigated. In December, the prevalence of FMD was higher (27.27%). Crossbreds (71.21%) were discovered to be more vulnerable than local breeds (28.79%). Male and adult cattle were found to have a significantly higher prevalence of the disease than females and young cattle. Clinical observations of cattle affected by foot-and-mouth disease showed fever, salivation, erosive lesions in the oral mucosa and the interdigital region of the foot, and lameness. In complicated FMD cases, the antibacterial drug might be advised for clinical use to control secondary bacterial infection. Sulphadimidine, Ampicillin, and Oxytetracycline, as well as other supportive drugs, were used to treat the patient whereas the recovery rate was 90.91%, 77.27%, and 68.18%, respectively.

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Introduction

Foot-and-mouth disease is a serious, highly contagious and economically devastating viral disease affecting domestic cloven-hoofed cattle, swine, sheep, goats and more than 70 species of mammals (Giasuddin et al., 2016). FMDV, a small, non-enveloped, single-stranded RNA virus is the causative agent. It belongs to the genus Aphthovirus, which is part of the Picornaviridae family. There are seven immunologically distinct serotypes identified: A, O, C, Asia-1 and South African Territories (SAT-1, SAT-2 and SAT-3). In Bangladesh, virus types A, O, C, Asia-1 and subtypes A-5 and A-22 are common (Loth et al., 2011). FMD is most stable between pH 7.4 and 7.6 and is quickly destroyed by pH changes outside of this range (Fraser, 1991). It can be stored at freezing temperatures for many years and stays alive below 4°C. The temperature of 56°C for 30 minutes inactivated most FMD field strains (Loeffler and Frosch, 1997). This virus enters the body by inhaling or ingesting it. The virus enters the bloodstream and targets its sites of predilection. Under favorable conditions, the virus multiplies in various tissues. After replication, the virus forms primary vesicles within 1 to 4 days and viremia with fever is observed 2 days later. Secondary vesicles appear in the stratified squamous epithelium such as the gingiva, the dental pad and the interdental fissure (Fraser, 1991). FMD occurs in cattle in Bangladesh, either universally endemic or occasionally epidemic. Among animal diseases, foot-and-mouth disease is considered the worst because of its dangerous pathogenic and the complexity of controlling it. Once the outbreak begins, it continues throughout the year, affecting large numbers of cattle herds. The peak incidence of the disease was recorded in 1990. Out of the 64 counties, the FMD epidemic broke out in 55. During this period, the economic loss was catastrophic due to the total loss of livestock production due to the foot and mouth disease.

In Bangladesh, this disease was found in 61.20% of cattle and caused 19.50% of calf mortality (Howlader et al., 2004). Animals that have been crossbred are more likely to be affected than native breeds (Chowdhury et al., 1996). Environmental factors including temperature (20-34°C) and humidity (50-60%), as well as farm management factors like keeping a closed herd and maintaining good biosecurity, have been linked to an increased prevalence of FMD (Radostits and Hinchclif, 2007). The implementation of a vaccination program can help to control FMD. The monovalent vaccine (strain A) is injected at 3ml intramuscularly for a four-month animal, the bivalent vaccine (strains A and O) is injected at 6ml intramuscularly for the animal and the trivalent vaccine (strains A, O and Asia-1) is injected at 9 ml intramuscularly for the animal, according to the Livestock Research Institute (BLRI), Mohakhali, Dhaka, Bangladesh (BLRI, 2015). Strong biosecurity measures, such as preventing the entry of foreign materials, isolating infected animals and quarantining new animals, will aid in disease control (Chowdhury et al., 1996). FMD affected animals do not have a specific treatment. Antimicrobial therapy and antiseptics like potassium permanganate and glycerin have been suggested to improve lesion healing (Hussain and Sarker, 1978). FMD control is required not only to reduce economic losses caused by the disease but also to increase livestock production. Consequently, this study was aimed to narrate FMD infection concerning age, sex and breed. In addition, the comparative efficacy of various antibacterial therapy for the restoration of FMD lesions and the implications of FMD infections.

MATERIALS AND METHODS

The current study was conducted in the Bagherpara Upazila in Jashore, Bangladesh. The study was observed from 20th December 2020 to 20th February 2021, 22nd August to 21st October 2021 and 1st December to 31st December 2021; a total of 5 months.

Data collection

The clinical FMD cases in cattle were observed which was registered at UVH and treated on various domestic and commercial farms. Each registered animal's description was recorded, as well as the owner's opinions. During the five months, a total of 66 cases were accessible for general clinical examinations based on disease history and the owners' concerns. For this investigation, a questionnaire was created. The following information was collected for each animal: animal demography (age, gender and breed), body condition score, lactation status, pregnancy status, rectal temperature, date of case occurrence, clinical signs and treatment. The questions were asked directly, with any necessary explanations offered. Data were obtained through face-to-face conversations with owners of the patient and personal visits to randomly chosen farms.

Statistical analysis of data

The survey data were analyzed using spreadsheets (Excel 2013; Microsoft office professionals) on the computer system. All data were statistically analyzed using the frequency procedure. The stored data were tabulated and organized as a percentage value.

RESULTS

Owner's information

Age, gender, level of education and occupation are the significant variables that represent the owner's characteristics shown in Table 1.

Table 1. Demography of owners

Parameter	Variable	Categories	Frequency (n=66)	Percentages (%)
Owner	Age	21- 30 Years	8	12.12
		31-45 Years	35	53.03
		>46 Years	23	34.85
	Gender	Male	45	68.18
		Female	21	31.82
	Educational Status	Illiterate	15	22.73
		Primary	32	48.48
		Secondary	10	15.15
		Higher Secondary	5	7.58
		Graduate	4	6.06
Occupation	Farmer	37	56.06	
	Business	11	16.67	
	Housewife	15	22.73	
	Govt. Employee	0	0.00	
	Private Job	3	4.54	

Based on the age structure, 53.03% of farmers were between the ages of 31 and 45, while 34.85% and 12.12% were old and young, respectively. Concerning gender, the majority of owners of the patient (68.18%) were males, while 31.82% of respondents were females engaged in cattle farming. At the education level, the majority of owners (48.48%) have completed primary level. The majority of the owners (56.06%) were farmers and the lowest private job holder.

Monthly variation of FMD infection

Figure 2 shows that the infection rate is higher in December (27.27%) and lower in February (3.03%).

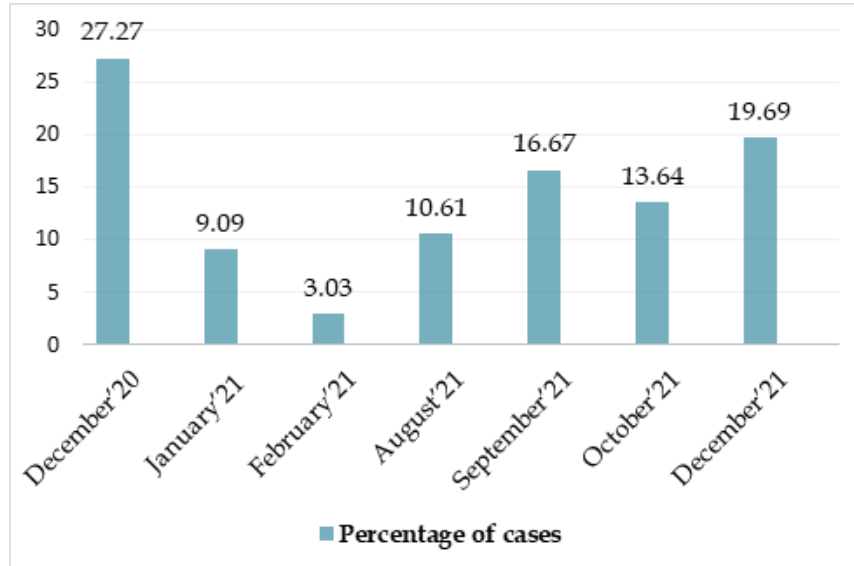


Figure 2. Monthly variation of FMD infection

FMD Incidence in Cattle Depending on Several Factors

Cattle with poor body condition scores (BCS of 3) were more likely to be infected when compared to cattle with better body condition scores (BCS of 4-5). Lactating (59.00%) cattle had more cases than non-lactating cattle (41.00%). Pregnant cattle (68.18%) were frequently affected by FMD as compared to non-pregnant cattle (31.82%).

Table 2. Transmission of FMD cases in cattle based on a variety of criteria

Parameter	Categories	Frequency number	% of cases
Unions	Basuari	5	7.58
	Jamdia	2	3.03
	Dohakula	10	15.15
	Darajhat	12	18.18
	Roypur	15	22.73
	Narikebaria	9	13.64
	Bandabilla	6	9.09
	Jaharpur	3	4.54
	Dhalgram	4	6.06
Body Condition Score	3	36	54.55
	4	19	28.78
	5	11	16.67
Lactation	Yes	39	59.00
	No	27	41.00
Pregnancy	Yes	45	68.18
	No	21	31.82

FMD in cattle of different sex, age and breeds

The susceptibility of various breeds of cattle to FMD is shown in Table 3. The crossbreds (71.21%) are more susceptible than the local breed (28.79%). Male and adults are more susceptible than young.

Table 3. FMD at different sex, age and breeds

Breed of cattle	Animal infected (%)	Sex variation		Age variation	
		Male (%)	Female (%)	Young (%)	Adult (%)
Local	19(28.79)	11(57.90)	8(42.10)	5(26.32)	14(73.68)
Crossbred	47(71.21)	32(68.09)	15(31.91)	21(44.68)	26(55.32)

Cardinal signs of FMD cases

Affected animals showed cardinal signs of Fever (104° - 106° F) (66), Frothy salivation (47), Sored foot (44), Tongue erosion (51), and Lameness (24). 100% of FMD cases presented with a high fever (104° - 106° F). Other common clinical signs and lesions encountered in FMD cases were frothy salivation (71.21%), sored foot (66.67%), tongue erosion (77.27%) and Lameness (36.36%) (Fig., 3).

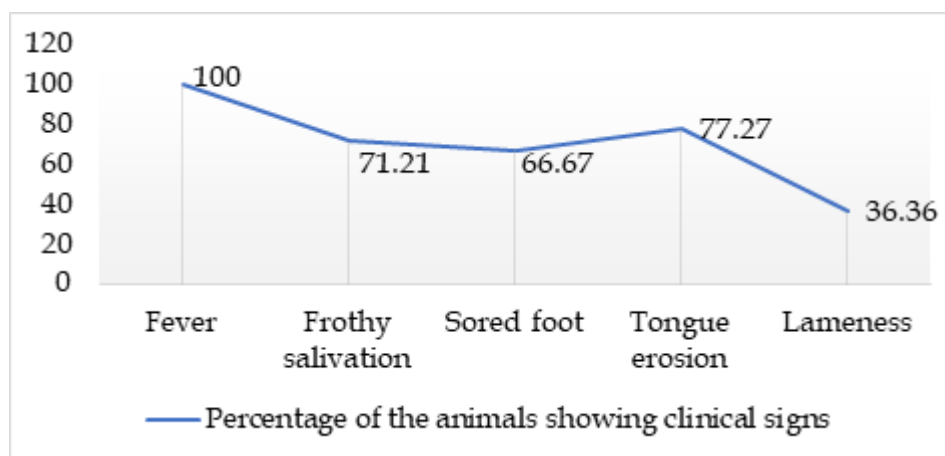


Figure 3. Cardinal signs of FMD cases

Drugs used for Clinical Cases of FMD in Cattle

Different drugs were prescribed for the treatment of clinical FMD cases. The most common drugs were Sulphadimidine, Ampicillin, Oxytetracycline. The recovery rate was 68.18-90.91% (Table 4).

Table 4. Antibacterial drug evaluation in FMD for secondary bacterial infection

Drug used	Doses and duration	Frequency numbers	Recovered Within days	Recovered Animal	Recovery %
Sulphadimidine	30ml/50 kg body weight followed by half of the initial dose IM daily for 5 days	22	7-8	20	90.91
Ampicillin	12ml/100 kg body weight IM daily for 5 days	22	9-10	17	77.27
Oxytetracycline	12ml/100 kg body weight IM daily for 5 days	22	11-12	15	68.18
Total		66		52	



Figure 3. Showing clinical signs of FMD with tentative diagnosis and Treatment

DISCUSSION

The present study was conducted to determine the prevalence of Foot and Mouth Disease at higher in December (27.27%). Melo et al., (2003) found that FMD prevalence was highest in December (37.14%) in Rajshahi. Cattle with poor body condition scores (BCS of 3) were more likely to be infected than cattle with better body condition scores (BCS of 4-5). Non-lactating cattle (41.00%) had fewer cases than lactating cattle (59.00%). When compared to non-pregnant cattle (31.82%), pregnant cattle (68.18%) were more frequently affected by FMD. Islam et al.,(2017) was found out that lactating cattle had 18 cases compared to 4 cases in non-lactating cattle. In comparison to non-pregnant cattle, pregnant animals were more frequently affected by FMD (14 versus 8 cases). Crossbreds were more vulnerable (71.21%) than local breeds (28.79%). Males and adults seem to be more risky than young. It is supported by Rahman et al., (2012). The study is presented that cardinal signs of FMD are 100% high fever (104-106°F), frothy salivation (71.21%), sore foot (66.67%), tongue erosion (77.27%) and lameness (36.36%). This study's clinical symptoms (high fever, frothy salivation, etc.) and

lesions (sore mouth, sore foot, lameness, etc.) are consistent with the findings of another study. 100% of cases present high fever was supported by Islam et al., (2017). Different anti-bacterial medications were used to treat FMD-affected clinical cases that were complicated by a secondary bacterial infection to compare their efficacy on the disease's progress and the healing of FMD lesions. When Sulphadimidine was used for secondary infection in FMD cases, the recovery rate was 90.91% within 7-8 days. On the other hand, Ampicillin and Oxytetracycline were used whereas the recovery rate was 72.27% and 68.18% within 9-10 days and 11-12 days, respectively. Especially given the fact that sulphadimidine injection was proven to be more efficient in controlling secondary bacterial infections and curing FMD lesions. However, in comparison to infected cattle, such complete medicine was found to have a considerable influence on the healing of FMD lesions. It is supported by Sorwar et al., (2016).

CONCLUSION

The study is concluded that crossbred males are more vulnerable than local breed males. Adults were found to have higher disease prevalence than young. During the winter (December), most animals were infected with FMD. There is no specific treatment for it. Sulphadimidine was the most commonly used drug for attempting to control secondary bacterial infection. Vaccination is the sole way of protecting against FMD. Foot and mouth disease is a curable and preventable disease if we take appropriate action promptly.

COMPETING INTEREST

The authors declare that they have no competing interests.

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