Research article

Prevalence of Diseases and Disorders of Large Ruminant in Moulvibazar Sadar Upazila, Bangladesh

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A R T I C L E I N F O	A B S T R A C T
	A retrospective epidemiological study was conducted at Sadar Upazila of Moulvibazar district from January 2018 through December 2018 to explore the prevalence of different cattle diseases and disorders based on Upazila Veterinary Hospital register data. The information regarding the animal's age, sex, breed, and date of treatment was collected passively from the registered patient. A total of 10434 cases record were evaluated. Diseases were categorized into seven different classes, where parasitic and protozoal diseases showed the highest magnitude (47.78%). Fascioliasis has been estimated most frequent complaint parasitic cases with a prevalence of 20.87% (95% CI: 20.10-21.67). Prevalence of FMD (6.12%; 95% CI: 5.67-6.60) was highest among all infectious diseases. The overall disease prevalence was higher in the rainy season (43.80%), followed by winter and summer seasons. Infectious disease prevalence was significantly higher in males (12.79%) than females (8.86%); Red Chittagong Cattle (24.69%) than crossbred (9.45%) and local cattle (10.73%); and in the rainy season (12.12%) than summer (9.50%) and winter season (10.14%). Prevalence of parasitic and protozoal disease was higher in females (51.42%) than in males (43.64%); local cattle (52.32%) than Red Chittagong Cattle (7.00%) and Crossbred (46.45%); and the rainy season (64.76%) than summer (31.11%) and winter (37.00%). Findings of the present study will provide information about disease burden and help make informed decisions and necessary steps to control the diseases and disorders in the study area. Further, outcomes will act as baseline information and pave the road to further epidemiological study in the selected region.

1. INTRODUCTION

With the burgeoning global population expecting to exceed 9 billion by 2050, food demand will heighten to 50-60% by this period (Inbaraj et al., 2019). Therefore, increased production of animal protein would be required for the larger population. Globally, livestock graziers frequently confront the endemic diseases that appall animal health and welfare (Ritter et al., 2017). In the context of South-Asia, the region is an important harbor of a variety of endemic and emerging infectious zoonotic diseases circulated possibly from marginal agrarian level (Mackey et al., 2014). Although the agriculture sector comprises about 60% of the total labor force here, the agricultural

policies and programs are still inadequate (Pandey et al., 2016). Lack of education, improper farm location, weak biosecurity, poor feeding and watering source, improper vaccination, and treatment needed to be addressed. The onset of clinical and sub-clinical diseases is the primary concern in cattle farming, resulting in severe production loss and subsequently substantial monetary losses worldwide (Rashid et al., 2019). Particularly, parasitic diseases remain the most common complaint of farmers in Bangladesh as in many tropical and sub-tropical countries (Ghosh et al., 2016; Haque et al., 2012). Although the parasitism in livestock is significantly reported, the frequency of other infectious diseases and disorders cannot be overlooked. In Bangladesh, cattle are regarded as the most preferred domestic animal for marginal farmers for milk, meat, draught, transport, biogas, fertilizer, and fattening purposes, where the rate of rearing indigenous animals is 80% (Ullah et al., 2015). The country is exclusively populous with about 24 million cattle, and the number of animal heads ranges from 50-200 per square kilometer (Hegde, 2019; Uddin et al., 2017). Admittedly, around 3% of the national Gross Domestic Product (GDP) is contributed by the livestock sector, which affords 15% of overall employment (Haider et al., 2014).

The geographic location and climatic condition of Moulvibazar provides favorable ecology for disease agents because of the large water basins and sharing a border with India facilitating trans-boundary transmission disease. To date, there are limited studies on the cattle diseases and disorders conducted in the Moulvibazar district, most of which have limitations, for instance, the power issue due to data availability. This study aimed to explore the current status of clinical diseases and disorders of cattle enrolled in the Upazila Veterinary Hospital of Moulvibazar Sadar in Bangladesh. The study also explored the effect of season, animal age, and breed to identify the intensity of diseases in different host and environmental strata.

2. MATERIALS AND METHODS

This retrospective study was conducted on the information collected passively from the patient registers of Upazila Veterinary Hospital of Moulvibazar Sadar, Moulvibazar. A total of 10434

clinical case records of cattle were retrieved from the patient register from January 2018 through December 2018. The cases were enumerated with specific information like age, sex, breed, date of treatment, owner's complaints, diagnosis, and treatment.

The data were obtained from the hospital record book enrolled through physical examination, clinical signs, gross pathology, and patients' laboratory finding. Bacterial, viral, protozoal and parasitic diseases were explicitly diagnosed based on specific clinical signs and gross lesions (Jones, 1997; Radostits et al., 2007). Parasitic infestations were diagnosed by feces examination under the microscope (Soulsby, 1968). The diseases were reported as their etiological characterization, and 'others' include those diseases with a non-specific clinical sign.

After the collection of all these data, descriptive analyses were performed. The date of diagnosis of animal cases was categorized into three different seasons for convenience – namely, summer (March-June), rainy (July-October) and winter (November-February). Clinical diseases and manifestations were categorized as infectious disease (bacterial, viral and fungal), parasitic and protozoal infection, digestive disorder, respiratory disorder, metabolic disorder, reproductive disorder and others. The prevalence of diseases and disorders were calculated by using the following equation:

$$\text{Prevalence (\%)} = \frac{\text{Number of affected cattle with specific diseases at a given time}}{\text{Total number of cattle cases attended}} \times 100$$

Chi-square tests assessed variations of the prevalence of different diseases among different breeds, sex, and seasons. The statistical significance of these variations was evaluated by a p-value <0.05 as the chi-square test's cut-off value. Statistical Analysis System (SAS) version 9.4 was used to perform all statistical analysis (SAS Release 9.4 for Windows, SAS Institute Inc. Cary, NC, USA).

3. RESULTS

Total records of 10434 cattle that visited the Upazila Veterinary Hospital of Moulvibazar Sadar during the study period were included in the

current study. Results of the estimated prevalence are presented in Table 1. Among the infectious diseases, the estimated prevalence of Foot and Mouth Disease (FMD) was highest (6.12%). Among parasitic and protozoal diseases, the prevalence of Fascioliasis was highest, and the prevalence was 20.87%, followed by different ectoparasitic infestations 11.28%. Besides, higher prevalence were calculated for malnutrition (9.04%), non-specific fever (4.61%), pneumonia (1.96%), milk fever (0.81%), and retention of placenta (0.70%) (Table 1).

Table 1. Prevalence of different clinical diseases in cattle at Moulvibazar Sadar during Jan' 2018 to Dec' 2018

Disease Categories	Disease/Disorder	Affected cattle (n=10434)	Prevalence (%)	95% CI
Parasitic and Protozoal Disease	Babesiosis	27	0.26	0.17-0.38
	Anaplasmosis	41	0.39	0.28-0.58
	Coccidiosis	119	1.14	0.95-1.36
	Fascioliasis	2178	20.87	20.10-21.67
	Hump sore	187	1.79	1.55-2.07
	Balantidiasis	105	1.01	0.88-1.22
	Strongyloidiasis	265	2.54	2.25-2.86
	Paramphistomiasis	886	8.49	7.95-9.04
	Ectoparasite (Lice, tick, mange)	1177	11.28	10.68-11.90
Digestive disorder	Non-specific Diarrhea	799	7.65	7.15-8.18
	Anorexia	395	3.79	3.43-4.17
	Simple indigestion	402	3.85	3.49-4.24
	Malnutrition	943	9.04	8.49-9.60
	Colic	55	0.53	0.40-0.69
	Ruminal acidosis	105	1.01	0.82-1.22
Infectious Disease	FMD	639	6.12	5.67-6.60
	BQ	96	0.92	0.75-1.12
	Mastitis	219	2.10	1.83-2.39
	HS	5	0.05	0.02-0.11
	Wart	9	0.09	0.04-0.16
	Bovine Ephemeral Fever	125	1.20	1.00-1.43
	Tetanus	4	0.04	0.01-0.10
	Calf scour	29	0.28	0.19-0.40
Respiratory disorder	Pneumonia	205	1.96	1.71-2.25
	Nasal granuloma	14	0.13	0.07-0.23
Reproductive disorder	Placental retention	73	0.7	0.55-0.88
	Uterine prolapse	18	0.17	0.10-0.27
	Dystocia	37	0.35	0.25-0.49
	Anestrus	58	0.56	0.42-0.72
Metabolic disorder	Milk fever	85	0.81	0.65-1.01
	Weak calf syndrome	17	0.16	0.10-0.26
Others	Dog Bite	46	0.44	0.32-0.59
	Arthritis	100	0.96	0.87-1.27
	Fracture	59	0.57	0.43-0.73
	Lacrimation	14	0.13	0.07-0.23
	Non-specific fever	481	4.61	4.22-5.03
	Wound	394	3.78	3.42-4.16
	Surgical affection	20	0.19	0.12-0.30

Among all diseases/disorders categories, parasitic and protozoal diseases were more frequent, and the proportion was 47.78%, followed by digestive disorder (25.87%). The metabolic disorder was observed less often among the cattle, and the proportion was estimated at 0.98% (Figure 1). The prevalence of infectious disease was significantly higher in the rainy season (12.12%), followed by winter (10.14%) and summer seasons (9.50%). Similarly, in parasitic and protozoal illnesses, the prevalence was calculated higher for the rainy season (64.76%) than the summer (31.11%) and winter seasons (37%). In the case of digestive disorder and metabolic disorder, disease prevalence was relatively higher in the summer season than winter and rainy seasons. Higher disease frequency was observed in the winter season for respiratory disorders, reproductive disorders, and other categories (Table 2). The overall disease prevalence was found higher in the rainy season (43.80%) compared to winter (28.75%) and summer (27.45%) seasons. A breed wise comparison of the prevalence of clinical cattle diseases and disorders recorded during the study period was performed, and the results are presented in Table 3. The highest prevalence of parasitic and protozoal infection was estimated in the indigenous breed (52.32%) followed by the
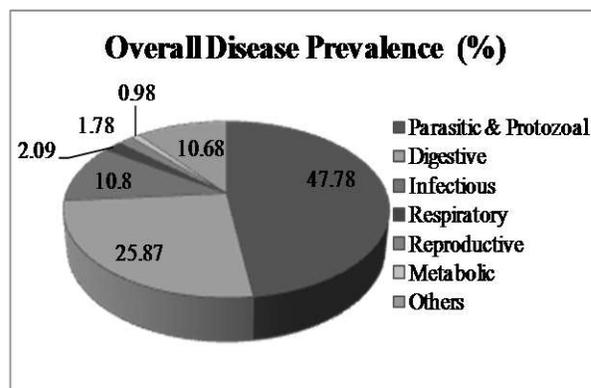
Figure 1: Overall prevalence of clinical diseases of cattle at Upazila Veterinary Hospital of Moulvibazar Sadar

crossbred (46.45%) and Red Chittagong Cattle (7.00%). The difference in prevalence between breeds was statistically significant (P-value <0.01).The digestive disorders were the second-highest prevalent condition, with 24.18% in local, 28.22% in crossbred, and 21.60% in Red Chittagong Cattle. Besides, there were breed wise significant differences in the prevalence of infectious diseases, respiratory and reproductive disorders (Table 3). However, no breed-specific differences were observed for the metabolic disorder (p-value = 0.25). Moreover, all breeds experienced the lowest sufferings with metabolic disease (milk fever).

Table 2. Prevalence of seasonal variation of bovine clinical diseases and disorders in Moulvibazar Sadar.

Diseases	Summer (n=2864)	Prevalence (%) 95% CI	Rainy (n=4570)	Prevalence (%) 95% CI	Winter (n=2959)	Prevalence (%) 95% CI	p-value
Parasitic and Protozoal Disease	891	31.11 (29.31-32.73)	2984	64.76 (63.06-65.85)	1110	37.0 (35.27-38.76)	<0.01
Digestive disorder	1251	43.68 (41.71-45.36)	542	11.86 (10.94-12.83)	906	30.2 (28.56-31.88)	<0.01
Infectious Disease	272	9.50 (8.42-10.59)	554	12.12 (11.19-13.10)	300	10.14 (10.25-12.56)	<0.01
Respiratory disorder	52	1.82 (1.35-2.37)	58	1.27 (0.97-1.64)	109	3.63 (2.99-4.37)	<0.01
Reproductive disorder	52	1.82 (1.35-2.37)	53	1.16 (0.87-1.51)	81	2.7 (2.15-3.34)	<0.01
Metabolic disorder	52	1.82 (1.35-2.37)	29	0.63 (0.43-0.91)	21	0.7 (0.43-1.07)	<0.01
Others	294	10.27 (9.15-11.40)	388	8.49 (7.70-9.34)	432	14.4 (13.16-15.71)	<0.01
Overall Prevalence (%)	27.45		43.80		28.75		

Table 3. Prevalence of bovine clinical diseases in Moulvibazar Sadar during Jan'2018 to Dec'2018 in different breeds

Disease	Local (n=5285)	Prevalence (%) 95% CI	Cross (n=4663)	Prevalence (%) 95% CI	RCC (n=486)	Prevalence (%) 95%CI	p-value
Parasitic and Protozoal Disease	2747	52.32 (50.62-53.33)	2207	47.33 (45.89-48.78)	34	7.00 (4.89-9.64)	<0.01
Digestive disorder	1278	24.18 (23.03-25.36)	1316	28.22 (26.93-29.54)	105	21.60 (18.03-25.53)	<0.01
Infectious Disease	569	10.73 (9.91-11.59)	437	9.45 (9.09-11.16)	120	24.69 (20.92-28.78)	<0.01
Respiratory disorder	136	2.57 (2.16-3.04)	53	1.14 (0.85-1.48)	30	6.17 (4.20-8.70)	<0.01
Reproductive disorder	73	1.38 (1.08-1.73)	67	1.44 (1.12-1.82)	46	9.47 (7.01-12.42)	<0.01
Metabolic disorder	50	0.95 (0.70-1.25)	43	0.92 (0.67-1.24)	9	1.85 (0.85-3.49)	0.25
Others	432	8.17 (7.45-8.95)	540	11.58 (10.68-12.53)	142	29.22 (25.21-33.48)	<0.01
Overall Prevalence (%)	56.65		44.69		4.66		

Gender specific prevalence of the disease is presented in Table 4. There was a statistically significant difference (p <0.01) in prevalence between males (43.64%) and females (51.42%) for parasitic and protozoal diseases. The gender-specific difference in prevalence was observed for digestive disorders, infectious diseases, respiratory and reproductive disorders (Table 4).

Table 4. Prevalence of bovine clinical diseases in Moulvibazar Sadar from January 2018 through December 2018 based on gender

Disease	Male (n=5138)	Prevalence (%) 95%CI	Female (n=5293)	Prevalence (%) 95%CI	P-value
Parasitic and Protozoal Disease	2242	43.64 (42.27-45.00)	2743	51.42 (49.72-52.43)	<0.01
Digestive disorder	1457	28.36 (27.13-29.61)	1242	23.45 (22.32-24.62)	<0.01
Infectious Disease	657	12.79 (11.89-13.73)	469	8.86 (8.05-10.46)	<0.01
Respiratory disorder	124	2.41 (2.01-2.87)	95	1.79 (1.45-2.19)	0.05
Reproductive disorder	0	-	186	3.51 (3.03-4.04)	-
Metabolic disorder	12	0.23 (0.12-0.41)	90	1.70 (1.37-2.08)	0.51
Others	646	12.57 (11.68-13.51)	468	8.84 (8.09-9.63)	<0.01
Overall Prevalence (%)	49.24		50.73		

4. DISCUSSION

The present study explored many infectious and non-infectious diseases and disorders prevailing in Moulvibazar Sadar that affect cattle's production performance. A total of 10434 cases were categorized into parasitic and protozoal diseases, digestive disorders, infectious diseases, respiratory disorders, reproductive disorders, metabolic

disorders, and others. Overall, parasitic and protozoal diseases were the most frequent among all diseases and disorders, and the proportion was 47.78% (Figure 1). The findings were congruent with previous studies from Bangladesh (Alam et al., 2018; Hossain et al., 2016; Sen et al., 2018). A Higher parasitic and protozoal disease in the study area might be due to lack of proper management of cattle farm, ignorance of farmer about the parasitic infestation, lack of anthelmintics administration, endemic nature of parasites in the study area, free grazing in the field, and mixing with animals of other animals. The second highest percentage was calculated for the digestive disorder, 25.87%. This finding was slightly higher than the record of Karim et al. (2014) but lower than the report of Badruzzaman et al. (2015); Hossain et al. (2016); Pallab et al. (2012).

Fascioliasis was estimated most prevalent (20.87%) among parasitic and protozoal disease diseases. This finding was consistent with Chowdhury et al. (2018), who also reported a higher Fascioliasis prevalence (20.88%). Current findings are corroborated with findings of Kabir et al. (2019), who has been reported 16.66% prevalence for Fascioliasis from the Sirajganj District. These findings could be due to the limited use of anthelmintics, intermediate host availability, and the animals' free grazing. Coccidiosis (1.14%) was observed as the most commonly occurred protozoal disease in this study. Further, different ectoparasitic diseases were found prevalent, and the estimated prevalence was 11.28%. The result agreed with the findings of Chowdhury et al. (2018). However, disagree with the findings of Sen et al. (2018) who documented a 6.88% prevalence for ectoparasitism. There might be a possibility that the tick and mite were endemic to the study area and improper management of animals leads to a high infestation.

In the current study, the prevalence of FMD was calculated as 6.12%, which is the highest prevalent infectious disease, followed by mastitis (2.10%), bovine ephemeral fever (1.20%), black quarter (0.92%), calf scours (0.28), wart (0.09%), HS (0.05%), and tetanus (0.04%). These results were supported by the previous studies of different parts of Bangladesh (Badruzzaman et al., 2015; Chowdhury et al., 2018; Hossain et al., 2016).

FMD prevalence recorded in this study was slightly higher from the findings of Karim et al. (2014) and Sen et al. (2018) but lower from the record of Hossain et al. (2016) and Islam et al. (2019). This discrepancy might be due to the immunization status of cattle against FMD in the study area. Overall, the rate of infectious disease was significantly high. It might be due to poor hygiene, nutrition, health conditions, pastoral backyard farming, and lack of awareness about routine and booster vaccination (Islam et al., 2020).

This study found some digestive disorders, respiratory disorders, metabolic disorders, reproductive disorders, and non-specific diseases. Higher prevalences were observed for malnutrition (9.04%), non-specific fever (4.61%), pneumonia (1.96%), milk fever (0.81%), and retention of placental (0.7%) (Table 1), and, which were supported by the previous study (Chowdhury et al., 2018; Hossain et al., 2016; Sen et al., 2018). The present study depicted a significantly higher prevalence of infectious diseases in the rainy season (12.12%) followed by winter and summer seasons. These findings were agreed with the results of Badruzzaman et al. (2015), who also reported the highest prevalence in the rainy season. However, it was dissimilar with the findings of Rahman et al. (2017), who has been reported a higher prevalence of infectious diseases in the winter. These discrepancies might be due to geo-climatic variation and endemicity of the infectious agent in study areas and cattle's immune status. Similarly, in the case of parasitic and protozoal diseases, the highest prevalence was observed in the rainy season (64.76%) compared to the summer and winter seasons. It was similar to the findings of Lucky et al. (2016). The possible reason behind this might be the wet weather conditions, which facilitated parasitic and protozoal agents for infestation and distribution. In the case of digestive disorder and metabolic disorder, disease prevalence was relatively higher in the summer season than winter and rainy seasons, and the prevalence was 43.68%, 30.2%, and 11.86%, respectively. These results were consistent with the findings of Hossain et al. (2016) and Lucky et al. (2016). The prevalence of respiratory disorder (3.63%), reproductive disorder (2.7%), and other categories (14.4%) was higheri n the winter (Table

2), which is in line with the reports of previous studies (Badruzzaman et al., 2015; Hossain et al., 2016). The overall disease prevalence was found higher (43.80%) in the rainy season than in winter (28.75%) and summer (27.45%) seasons. This observation substantiates the results of Hossain et al. (2016).

While comparing the breeds, the overall prevalence of clinical diseases observed maximum at indigenous breeds (50.65%) following the crossbred (44.69%) and Red Chittagong (4.66%). Our finding is in line with the previous study conducted by Hossain et al. (2016) in the same geographical location. However, other earlier studies (Badruzzaman et al., 2015; Mannan et al., 2009) reported that crossbreds are highly susceptible to disease occurrence. The endo and ectoparasitic infestations were higher in non-descriptive indigenous cattle (52.32%) than crossbred (46.45%) and Red Chittagong Cattle (7.00%), which supports the observation of Alim et al. (2012). The possible reason behind the phenomenon can be the irregular deworming followed by marginal farmers in Bangladesh (Chowdhury et al., 2017; Islam et al., 2016). The digestive disorder is one of the common problems faced by the livestock owners of the study area. Diseases like diarrhea, anorexia, indigestion, colic were recurrently found in Moulvibazar, which positioned the second highest disease occurrence in indigenous and crossbred animals. High yielding dairy cows, which are commonly adapted to a forage diet, shifting suddenly to high grain feed might cause various gastrointestinal problems (Abdela, 2016). In the case of Red Chittagong Cattle, the prevalence of infectious diseases was high 24.69%. There was earlier evidence of sub-clinical mastitis prevalence (Rabbani and Samad, 2010) and bovine tuberculosis (Chakraborty and Prodhan, 2015) in Red Chittagong Cattle. Further, 29.22% of animals were registered into the hospital with a history of dog bite, arthritis, fracture, lacrimation, non-specific fever, and wound. A limited number of animals with a history of metabolic disorder recorded the least amount among all three breeds; indigenous (0.95%), crossbred (0.92%) and Red Chittagong Cattle (1.85%).

The magnitude of disease burden was almost equally distributed to male (5138/10434) and female (5296/10434) cattle registered into Veterinary Hospital (Table 4). The prevalence of parasitic infections appeared higher in females (51.42%) than in male cattle (43.64%), which supports the findings of Hossain et al. (2016). In developing countries, digestive disorders are common in animals due to low farm management strategies and improper diet charts (Hegde, 2019). The digestive disorders varied significantly between males (28.36%) and females (23.45%). The study found that the prevalence of infectious diseases comparatively higher in males (12.79%) than in females (8.86%). A higher prevalence of black quarter (Ambhore et al., 2018), FMD (Mostary et al., 2018), wart (Prakash et al., 2019) has been reported earlier. The reproductive disorders in female such as retention of placenta, uterine prolapse, dystocia, and anestrus were reported with a prevalence of 3.51%, representing slightly lower than the report of Alam et al. (2018) (4.87%) and Rahman et al., 2012 (4.7%) in Cumilla and Patuakhali respectively. The varied prevalence might be observed due to geographical location, farm management, and breed variety.

5. CONCLUSIONS

The present study represents the prevalence of common endemic diseases and disorders of cattle in the study area. Diseases and disorders are significantly impacting overall animal production and health and subsequently to the economy. Following the current investigation, significant diseases of cattle in Moulvibazar include different ectoparasitic and endoparasitic infestations, Foot and Mouth Disease, mastitis, non-specific fever, and diarrhea. Parasitic infestations are predominantly prevalent in this region. More importantly, fasciolosis and ectoparasite infestations are notably high in cattle. Indigenous female cattle are highly susceptible to most of the diseases and disorders. Although few diseases still show low magnitude, they cannot be ignored. Our findings will provide valuable insight into designing and implementing priority-based research on specific diseases and instituting control strategies against diseases and disorders. Further epidemiological investigations should be performed to understand the complete ecology of diseases and disorders.

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