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Article

Epidemiology of Livestock and Poultry Diseases in Jhenaidah district of Bangladesh

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Abstract: A descriptive epidemiological study has been conducted using hospital database of Teaching Veterinary Hospital (TVH) at Jhenaidah Government Veterinary College (JGVC) from July 2018 to June 2019. The study aimed to estimate the proportionate prevalence of different livestock and poultry diseases along with their spatiotemporal distribution and drug prescribing pattern. A total of 960 clinical cases were recorded during the study period. Ectoparasitic cases were proportionately higher in cattle (25.2%), whereas Peste des Petits Ruminants (PPR) cases were more frequent in goat (53.4%). The proportionate prevalence of other cases in cattle was Fascioliasis (14.3%), Myiasis (11.2%) and Foot and Mouth Disease (FMD) (7.2%). The proportionate prevalence of other cases in goats were vitamin and mineral deficiency (12.3%), bloat (5.2%), abscess (4.7%), and dog bite (1.2%). Again, the proportionate prevalence of poultry diseases was Infectious Bursal Disease (41.2%), salmonellosis (33.4%), fowl cholera (13.7%) and pox (7.8%). Most of the cattle cases were highly prevalent during the summer season except fascioliasis. In goat, PPR was predominated in the rainy season whereas myiasis was in the winter. Around 92% of disease cases were spatially located within the 2.5 km radius of the TVH of JGVC where only 0.9% of disease cases came from >10km away from TVH of JGVC. Simple linear regression identified a significant relation (p=0.01) with the distance and number of diseased animals came to the hospital. Antimicrobials belonging to β-Lactam group were most frequently prescribed for both poultry (48.6%), cattle (32.5%) followed by goat (9.2%), however sulfar drugs (34.8%) were commonly prescribed for goat cases. This type of study is very novel in Jhenaidah region of Bangladesh that might contribute to the researchers for further investigation.

Keywords: Proportionate prevalence, spatial distribution, antibiotics, supportive therapy, Jhenaidah

1. Introduction

Bangladesh, a populous country where livestock sector is contributing a dominating role (16.23 %) in the national GDP [1]. A total of 23.8 million cattle, 26.2 million goat and

320.6 million poultry comprises the major livestock population of this country [2, 3] potentially contributing to combat the growing demand of milk, meat and egg. Unfortunately, seasonal pattern of this country has changed, which ultimately act as a threat on livestock sector due to the increased incidence of different pests and parasite [4]. In Bangladesh, the animal healthcare facility is mainly Government hospital based, which are located at almost every upazilla across the country for providing Veterinary health care facilities to the animals [2]. Most of the Veterinary hospital has a well-structured disease record system which can provide a comprehensive idea about the disease problems at local areas as well as country perspective. Again, retrospective evaluation of clinical case records helps to comprehend the predominant clinical problems along with demographic and seasonal distribution of specific clinical cases. Hospital data is a source to study a wide variety of disease at a cost-effective way with less manpower and time. There are hardly any studies in the literature explicit to Bangladesh where passive surveillance data was used to report the complete disease status on an area [1, 3, 5-7]. Hence, this study used a hospital generated dataset to investigate the complete disease scenario of Jhenaidah, Bangladesh.

Assessment of clinical and epidemiological aspects of disease is necessary to prevent any future outbreak situation through planning an effective disease control and management strategy. Nevertheless, in addition of treatment cost, diseases are causing huge economic losses by increasing mortality, hampering growth and production performance of both livestock and poultry [8]. Portraying the current disease pattern using a bigger and recent dataset would be a valuable expansion to the scientific literature. So, this study has estimated the proportionate prevalence of different infectious and economic diseases to illustrate overall picture of livestock and poultry diseases in Jhenaidah district of Bangladesh.

Moreover, the efficacy of drugs, in addition to their dose and prescribing pattern to treat animal diseases has not been ascertained yet in Bangladesh [9, 10]. Earlier some studies have published drug prescribing pattern mostly concise with species specific or disease specific [2, 11, 12]. So, this study aimed to estimate the proportion of use of different antibiotics and supporting drugs against a wide variety of animal diseases.

Besides, there's a believe that the circumstance may have changed because of the worldwide impact of environmental change which has impact on seasonal variation and prevalence of animal diseases established by earlier studies [13, 14]. Therefore, the study coincided to investigate different disease pattern according to season.

Veterinary hospital is a center where there would be a considerable number of specialized veterinarian to provide animal health care facility [15]. The quality of service provided to the farmers can be indirectly reviewed by the patient load and the distribution of the patients. In Bangladesh, ignoring the distance many of the farmers bring their animals to those hospital where they got best facility and service. So, in future, this might be a measurement key for the evaluation of services provided by the hospital through observing the patient distribution and frequency. Again, Teaching Veterinary Hospital (TVH) should have dominating role in Veterinary Health care services in contrast to other hospital for ensuring best learning opportunity to the students. Consequently, the study targeted to identify the spatial distribution of disease cases brought to the TVH of JGVC.

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Finally, the present study designed to estimate the proportionate prevalence of clinical disease of livestock and poultry population along with treatment pattern and temporal distribution. The study also aimed to identify the probable buffer zone and hotspot from where most of the cases came to the hospital.

2. Materials and Methods

2.1 Study site

Jhenaidah, a tropical climate area, is a district city of Bangladesh located in the South-western part at 23^{0}54' N and 89^{0}00'E. The annual temperature of this city ranged from 11.2-37.1^{0}C with an average rainfall of 1467mm per year [16].

Google map was used to collect the Global Positioning System coordinate data of the locations of the case origin. These data were formatted in decimal and stored into Microsoft excel spreadsheet before entering into a digitized map of Bangladesh. Geographic information system software (ArcGIS-ArcMap version 10.2; Environmental System Research Institute, Redlands, CA, USA) was used to prepare a map showing the spatial distribution of different cases recorded during July 2018-June 2019 at TVH, JGVC (Figure 1).

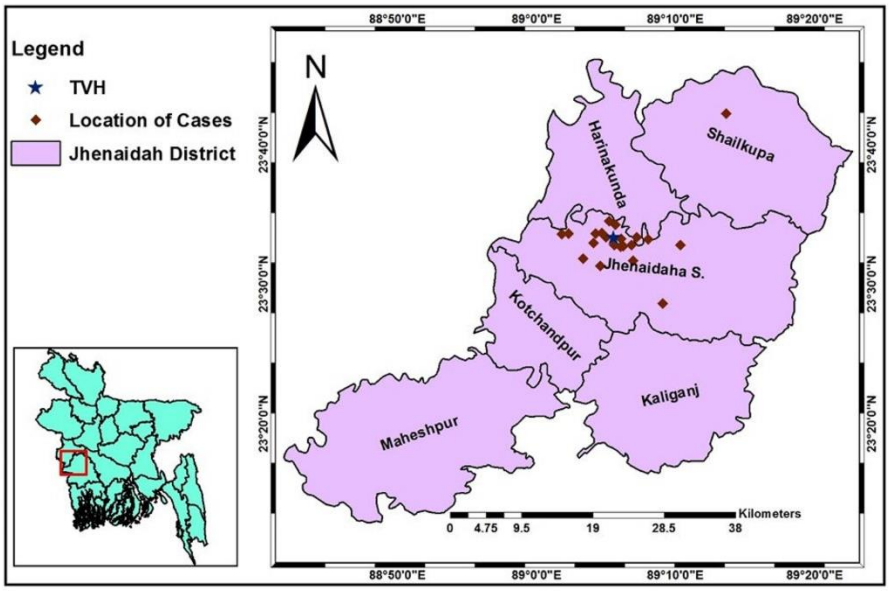

Figure 1 Spatial distribution of different disease cases at Jhenaidah, Bangladesh.

2.2 Study design

A descriptive epidemiological study was conducted on the clinical cases of different livestock and poultry diseases (N=960) registered during July 2018-June 2019 at TVH, JGVC. The hospital has a very good paper-based data recording system. Clinical cases were usually registered and then referred to the respective clinician according to the case category (medicine/reproduction/surgery) for assessment and treatment. The case record-keeping sheets were comprised with the information related to clinical data like clinical findings and

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tentative diagnosis, epidemiological data including patient's demography and management information and drug data that were usually prescribed by the clinician. After the examination and lab testing, prescriptions and advices were given to farmers on a case by case basis.

2.3 Data organization

Data from 960 cases were extracted from paper-based record sheets of the hospital and entered into the Microsoft Excel spreadsheet. Data were then cleaned, coded and recoded before forwarding to STATA 13.2 (StataCorp,4905, Lakeway Drive, College Station, Texas 77845, USA) for epidemiological analysis.

2.4 Statistical analysis

Descriptive analysis was performed by using STATA 13.2. The proportionate prevalence of different diseases was calculated through dividing the frequency of each disease type by the total disease frequency. The major drugs used to treatment of the cases were categorized based on their targeted action like antibiotics, anthelmintic and nutritional supplements. Other categories of drugs were normal saline, digestive and respiratory stimulant, urinary acidifier and alkalizers etc. Though, antibiotics were further categorized based on their generic composition. The results were expressed as frequency numbers, percentages and 95% confidence intervals. The seasonal difference of different economic and infectious disease frequency was evaluated statistically using chi-square test and the temporal distribution of proportionate prevalence was presented graphically according to three different seasons (Summer: March to June, Rainy: July to October and Winter: November to February) [17]. The total number of disease cases were divided into two categories based one percentile. Irrespective of species, a simple linear regression was performed between the frequency of cases, and distance of the location of the case of origin from TVH, JGVC. The results of linear regression were presented as a coefficient, 95% confidence interval and p-value to categories the spatial distribution of diseases.

2.5 Spatial analysis

The address of the owner was collected from the record sheet of each clinical case and the location was identified using Google map. The coordinate of the location was also stored into the Microsoft Excel spreadsheet before forwarding to the ARC GIS 10.2 edition for spatial analysis. The distance between the location of the case and TVH was calculated using the Google map distance system and the data were also recorded into the Microsoft Excel spreadsheet. Multiple ring buffer was used to identify 4 different buffer zone at 2.5 km, 5km, 7.5km and 10km radius area around the THV of JGVC. The frequency of cases was calculated which was spatially located within each buffer zone. Getis-Ord general G was performed for cluster detection where Moran's Index statistics was performed to identify the significance of clustering using spatial analysis tools of ARC GIS software 10.2 as described by Peeters, Zude [18].

3. Results

3.1 Proportionate Prevalence of poultry diseases

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Viral diseases were more frequent (49.0 %) than bacterial (47.1 %) and nutritional diseases (3.9 %). The overall proportionate prevalence of poultry diseases were 41.2% Infectious Bursal Disease (IBD), 33.4% Salmonellosis, 13.7% fowl cholera, 7.8% pox and 3.9% nutritional deficiency (Table 1).

Table 1: Frequency of different clinical diseases of poultry at Teaching Veterinary Hospital, JGVC (N=51)

Category	Diseases	N	%	95% CI
Viral	Infectious Bursal Disease (IBD)	21	41.2	27.6 - 55.8
	Pox	4	7.8	2.2 - 18.9
Bacterial	Salmonellosis	17	33.4	20.8 - 47.9
	Fowl cholera	7	13.7	5.7 - 26.2
Nutritional	Vitamin deficiency	2	3.9	0.5 - 13.5

3.2 Proportionate Prevalence of cattle diseases

The proportionate prevalence of ectoparasitic infestation was at highest percentage (25.2%) followed by fascioliasis (14.3%), myiasis (11.2%), bloat (9.5%), Foot and Mouth Disease (FMD) (7.2%), poisoning (3.4%), mastitis (2.0%) and dog bite (0.3%) (Table 2).

Table 2: Frequency of different clinical diseases of cattle at Teaching Veterinary Hospital, JGVC (N=294)

Diseases	N	%	95% CI
Ectoparasitic infestation	74	25.2	20.3 - 30.5
Fascioliasis	42	14.3	10.5 - 18.8
Myiasis	33	11.2	7.9 - 15.4
Bloat	28	9.5	6.4 - 13.5
FMD	21	7.2	4.5 - 10.7
Vitamin deficiency	18	6.1	3.7 - 9.5
Disease condition	17	5.8	3.4 - 9.1
Fungal dermatitis	17	5.8	3.4 - 9.1
Poisoning	10	3.4	1.6 - 6.2
Surgical cases	10	3.4	1.6 - 6.2
Ephemeral fever	7	2.4	0.9 - 4.8
Mastitis	6	2.0	0.8 - 4.3
Endometritis	6	2.0	0.8 - 4.4
Papillomatosis	4	1.4	0.4 - 3.4
Dog bite	1	0.3	0.01 - 1.9

3.3 Proportionate Prevalence of goat cases

PPR cases were ranked the highest percentage (53.4%) followed by nutritional deficiency (12.3%), ectoparasitic infestation (7.2%) and others (0.8-1.5%) (Table 3).

Table 3: Frequency of different clinical diseases of goat at Teaching Veterinary Hospital, JGVC (N=612)

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Diseases	N	%	95% CI
PPR	327	53.4	49.4 - 57.4
Vitamin deficiency	75	12.3	9.8 - 15.1
Ectoparasitic infestation	44	7.2	5.3 - 9.5
Bloat	32	5.2	3.6 - 7.3
Myiasis	29	4.7	3.2 - 6.7
Allergic reaction	28	4.6	3.1 - 6.5
Fracture	24	3.9	2.5 - 5.8
Fungal dermatitis	12	1.9	1.1 - 3.4
Babesiosis	9	1.5	0.7 - 2.8
Actinomycosis	7	1.2	0.5 - 2.3
Dog bite	7	1.2	0.5 - 2.3
Tetanus	5	0.8	0.3 - 1.9
Foot root	5	0.8	0.3 - 1.9
Mastitis	4	0.7	0.2 - 1.7
Fascioliasis	2	0.3	0.04 - 1.2
Endometritis	2	0.3	0.04 - 1.2

3.4 Drug prescription pattern

The highest percentage of antimicrobials were used in goat diseases (79.9%) followed by poultry disease (68.5%) and cattle disease (65.9%). Anthelmintic was prescribed at the highest percentage in cattle disease (45.6%) (Table 4).

Table 4: Frequency distributions of different category of pharmaceuticals prescribed for poultry, cattle and goat

Species	Antibiotics, n (%)	Anthelmintic, n (%)	Nutritional supplements, n (%)	Others*, n (%)
Poultry (54)	37 (68.5)	5 (9.3)	9 (16.7)	20 (37.0)
Cattle (294)	194 (65.9)	134 (45.6)	28 (9.5)	106 (36.1)
Goat (612)	489 (79.9)	63 (10.3)	61 (9.9)	400 (65.4)

*Others: Normal saline, digestive and respiratory stimulant, urinary acidifier and alkalizers etc.

3.5 Antibiotic prescription pattern

In order to treat the poultry and cattle diseases, β Lactam antibiotics prescribed most often in contrast to other generic group of antibiotics (Table 5). Nevertheless, Fluoroquinolone (40.5%) was also prescribed as a more preferred antibiotic against poultry disease. In cattle diseases, aminoglycosides (27.8%), oxytetracycline (22.7%) and sulfar drugs (15.9%) were used frequently. In goat diseases, sulfar drugs were prescribed at highest (34.8%) percentage (Table 5).

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Table 5: Frequency distribution of different prescribed antibiotics against different diseases at Teaching Veterinary Hospital, JGVC

Species	Total, N	Aminoglycosides, n (%)	β Lactam, n (%)	Sulfar drugs, n (%)	Oxytetracycline, n (%)	Fluoroquinolone, n (%)
Poultry (54)	37	1 (2.7)	18 (48.6)	2 (5.4)	1 (2.7)	15 (40.5)
Cattle (294)	194	54 (27.8)	63 (32.5)	31 (15.9)	44 (22.7)	2 (1.0)
Goat (612)	489	142 (29.0)	45 (9.2)	170 (34.8)	127 (25.9)	5 (1.0)

3.6 Temporal distribution of cattle diseases

The proportionate prevalence of ectoparasitic infestation varied significantly ($p<0.01$) in different season which was highest in summer (45.9%) and lowest in rainy season (14.2%). A significant difference ($p=0.05$) was estimated in the proportionate prevalence of fungal dermatitis in different season. Though, the proportionate prevalence of FMD was highest in summer (13.5%) followed by rainy (5.8%) and winter (4.0%) and this variation was differed significantly ($p=0.04$). The proportionate prevalence of fascioliasis was insignificantly ($p=0.11$) higher in winter (18.0%) followed by rainy (15.0%) and summer (8.1%) season (Figure 2).

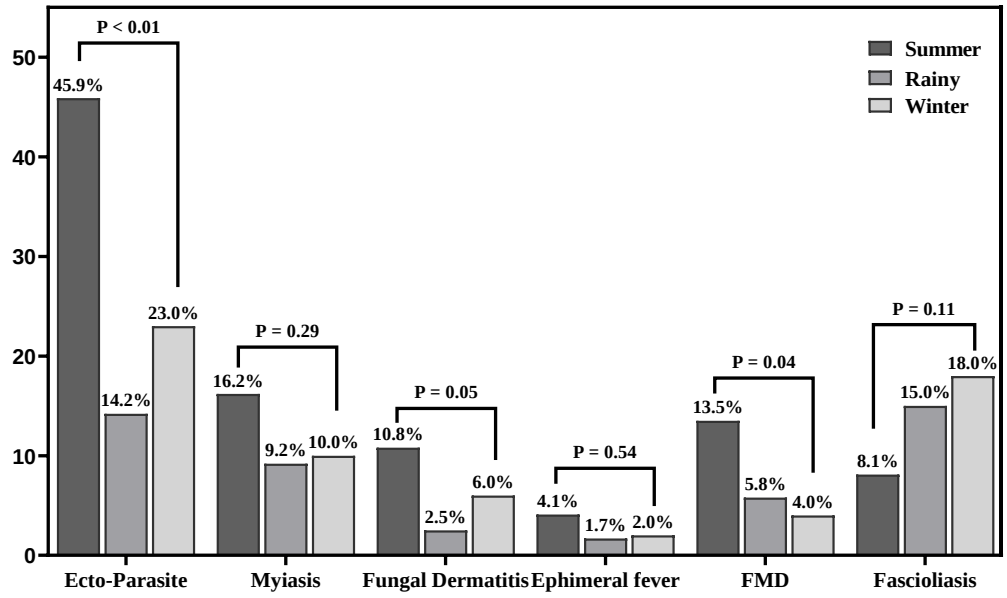

Figure 2 Temporal distribution of infectious and economic important diseases of cattle recorded at Teaching Veterinary Hospital (TVH), JGVC. Proportionate prevalence of each disease differs significantly ($P < 0.05$) among 3 seasons (Summer, Rainy and Winter).

3.7 Temporal distribution of goat diseases

The estimated proportionate prevalence of PPR was varied significantly ($p<0.01$) in different season which was 62.0% in rainy season followed by 51.9% in winter season and 46.5% in summer season. Again, ectoparasitic infestation was varied significantly ($p<0.01$)

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according to seasonal differences and the calculated proportionate prevalence was highest in summer (13.0%) and lowest in the rainy season (3.5%) (Figure 3).

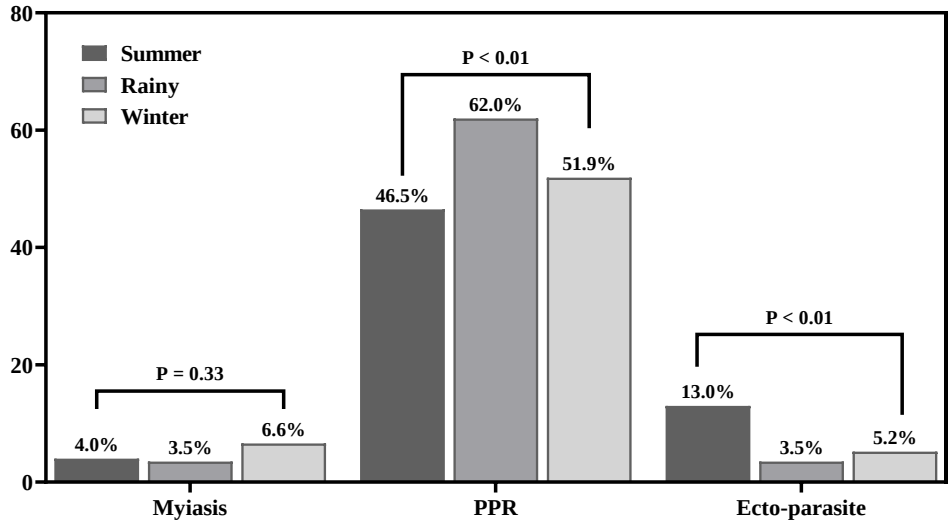

Figure 3 Temporal distribution of infectious and economic important diseases of goat recorded at TVH, JGVC. Proportionate prevalence of each disease differs significantly ($P < 0.05$) among 3 seasons (Summer, Rainy and Winter).

3.8 Spatial clustering detection and distribution of different clinical cases

Most of the animal patients were brought from the hospital's nearby area. A large proportion of animal patients about 92.0% were from areas spatially located within 2.5 km radius of the TVH of JGVC. Several patients were coming from a relatively distant location. Nearly 4.7% of patients were brought to TVH in between a range of 2.6 to 5 km radius area, 1.6% of patients were brought to TVH within 5.1-7.5 km radius area of TVH of JGVC. A few patients (0.9%) were from 7.6-10 km radius area of TVH and just 0.9 % of patients were brought from more than 10 km distantly located areas of TVH of JGVC (Figure 4).

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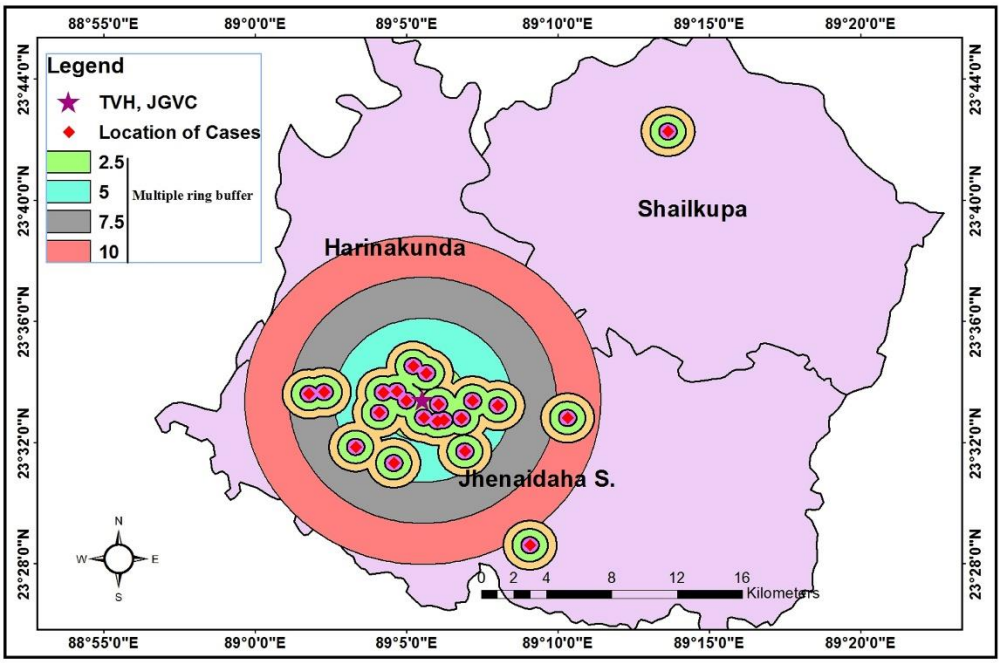

Figure 4 Buffer zone at different radius around TVH of JGVC.

Getis-Ord general G statistics has identified High-High level of clustering of cases represented as blue colored area in the map located at the closer proximity of the TVH. The identified cluster was statistically significant (Moran's I $p<0.001$) which indicated the spatial autocorrelation among cases of each area (Figure 5).

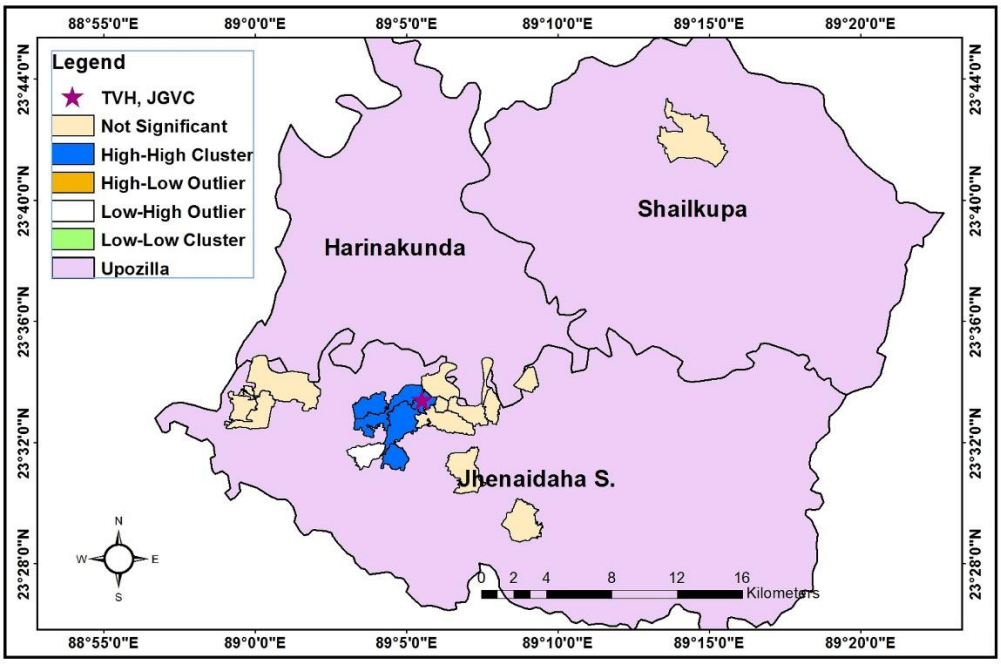

Figure 5 Spatial clustering of different disease cases of TVH, JGVC.

There was a significant relationship between the frequency of cases that came to TVH and the distance of the origin of the cases. Considering lower percentile (1 to 16 cases)

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as baseline, the frequency of cases (higher percentile of ≥17) has a significant relation with distance (β=4.5; p=0.01; 95% CI: 1.2-7.9) describing a large number of cases (≥17 frequency) came to the hospital from the nearby area.

4. Discussion

4.1 Proportionate prevalence of poultry diseases

The present study reported six dominating poultry diseases in the study area. For viral diseases, the estimated proportionate prevalence of IBD is much higher than the earlier studies conducted in Narsingdhi and Gazipur district of Bangladesh [19, 20]. Besides, the proportionate prevalence of IBD is also higher than the study conducted by Ahmad, Anjum [21] in Jammu and Kashmir of Pakistan. Improper biosecurity measures and vaccination failure due to not maintaining schedule or cool chain or even vaccination of stressed birds might confound the estimated outcome of IBD in the current study [3]. Contrarily, the calculated proportionate prevalence of Salmonellosis is higher than earlier study conducted by Sikder, Islam [22] in Patuakhali and Rahman, Rahman [3] in Kishoreganj district of Bangladesh. However, the value is also higher than the study conducted in neighboring countries like India and Pakistan [23, 24]. Poor hygienic condition of the farm with fecal contamination might be responsible for a higher percentage of bacterial disease like Salmonellosis in the study area which is supported by Marin, Hernandiz [25].

4.2 Proportionate prevalence of Cattle diseases

Among cattle population (N=294), the most threatening disease was ectoparasitic infestation which is much higher than the earlier reported prevalence in different district of Bangladesh [13, 26, 27]. Contrarily, as endoparasites disease, fascioliasis estimated as highest proportionate prevalence (14.3%) which is much higher than the earlier studies revealed prevalence in a different area of the country [14, 26, 28-31]. The higher values of parasitic infestation in contrast to other studies might be due to differences in the rearing system and nutritional condition of studied animals in association with poor utilization of veterinary services and inadequate knowledge of the farmers in the present study area [32-35]. In addition, rather than farm management, the parasitic management at this study area is fully therapeutic which might be a key factor for higher values. In case of economically important disease, the estimated proportionate prevalence of FMD is lower than the reported prevalence in Sirajganj, Comilla, Rajshahi and Kurigram district of Bangladesh [28, 30, 36, 37]. This disparity might be due to difference in age and breed of studied animals [36]. However, the vaccination against FMD was poorly practiced by the farmers in the present study area which might have a substantial effect for the higher values.

4.3 Proportionate prevalence of Goat diseases

In the goat population, the proportionate prevalence of PPR has a higher value in contrast to other studies conducted in different district of Bangladesh [6, 37-40] which might be due to different geographical locations, variations in study duration and sampling strategy of individual study. Besides, this calculated proportionate prevalence was also higher than the estimated prevalence (30.93%) in India [41]. However, abundance of unvaccinated animals in this study area might be mystified the variation of PPR prevalence. The calculated proportionate prevalence of ectoparasitic infestations is much lower than the

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reported prevalence in other districts of Bangladesh including Gopalgonj [13], Comilla [6], Dinajpur [42] and Chittagong [43]. However, the estimated output is lower than the prevalence reported in India (11.4%) by Mohan, Sagar [41]. This variation might be due to differences in environmental factors along with the availability of intermediate host and husbandry practices adopted by the farmers in different areas [14].

In case of digestive disturbances, the proportionate prevalence of bloat is much higher than the previously reported prevalence of 1.9%, 2.5%, 2.6% and 2.95% in Comilla, Gazipur, Magura and Sylhet district of Bangladesh, respectively [5, 27, 29]. The higher values might be due to disproportionate feeding of the animal stuffs for fattening within a short time that was practiced by the farmers in the current study area agreed by Badruzzaman, Siddiqui [14]. Regarding mastitis, the proportionate prevalence is lower than the earlier reported output of 1.43% and 6.59% calculated respectively from hospital database based study in Gazipur and Comilla district of Bangladesh [5, 6] which might be due to difference in husbandry practices. However, the overall proportionate prevalence of Fascioliasis is much lower than the reported prevalence in Sylhet [31], Magura [29] and Gazipur [5] district of Bangladesh which might be affected by the unavailability of intermediate host in the present study area [34].

4.4 Drug prescribing pattern against poultry diseases

A variegated percentage of antibiotics (68.5%) was picked out to combat numerous diseases of poultry. Other than ß-lactam, Fluroquinolone was recurrently used in poultry (40.5%) followed by sulfar drug (5.4%), these findings are not in agreement with the earlier study conducted by Rahman, Rahman [3], revealed that sulfar drugs (41.0%) were prescribed principally to treat poultry diseases. The identified deviation might be due to difference in drug choice of a Vet in a hospital where culture sensitivity testing is practically unavailable.

4.5 Drug prescribing pattern against cattle and goat diseases

In cattle, exclusive of ß-lactam (32.5%), aminoglycosides were successively used covering 27.8% pursued by oxytetracycline (22.7%), sulfar drug (15.9%) and fluoroquinolone (1.0%). Besides, in goat, the sequence of antibiotics use was sulfar drug (34.8%) followed by Aminoglycosides (29%), Oxytetracycline (25.9%), ß-lactam (9.2%) and Fluoroquinolone (1.0%). The use of sulfar drug was highest in goat supported by Sarker, Ahaduzzaman [44]. However, the use of aminoglycosides was in the second most commonly prescribed antibiotics which is also supported by Sarker, Ahaduzzaman [44]. This might be due to low price and availability of the drugs at the local markets. As antibiotics were prescribed merely on the skill of the veterinary surgeon instead of utilizing a built up treatment convention, the resistance possibly develops [3]. So, antibiotic sensitivity testing is of foremost significance going ahead in the treatment of the animal diseases presented in this investigation.

4.6 Temporal effect on different cattle disease

For cattle population, the proportionate prevalence of FMD was significantly ($p=0.01$) varied in a different season with the highest value at summer (13.5%) trailed by rainy (5.8%) and winter (4.0%) season agreed with Rufael, Catley [45] and Parvez, Faruque [17].

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However, Mohammed, Rahman [26] also reported the highest prevalence of FMD during summer, which is in favor with the current study. Seasonal variation of FMD might be due to differences in management practices in different seasons [6]. Fascioliasis was dominant in winter (18.0%) followed by rainy (15.0%) and summer (8.1%). This observation is partially matched with the study conducted by Mohammed, Rahman [26] where Fascioliasis was dominated in winter (13.88%) followed by the summer (11.04%) and rainy season (7.87%). Again, the calculated proportionate prevalence of ectoparasitic infestations was highest in the summer (45.9%) thereafter in the winter (23.0%) and the lowest was in the rainy season (14.2%) which is not in agreement with Mohammed, Rahman [26] who reported the highest prevalence at rainy season (25.63%) trailed by summer (22.48%) and winter season (21.19%).

4.7 Temporal effect on different goat disease

Among the goat population, there was a statistically significant ($p<0.01$) relation in-between season and ectoparasitic infestation supported by Sarkar, Rahman [46]. However, the present study identified a significant relation ($p<0.01$) with the proportionate prevalence of PPR in different seasons which is in line with the study conducted by Parvez, Khatun [47]. Besides, the proportionate prevalence of myiasis was varied insignificantly ($p=0.33$) in different seasons which was highest in winter (6.6%), followed by summer (4.0%) and rainy season (3.5%) supported by Imtiaz, Rahman [48]. All sorts of the seasonal difference of diseases might be due to both animal and farm level factors including age, breed, nutritional status of the studied animals along with farming practices.

4.8 Spatial effect on diseased patient available in TVH

This assessment was settled up with the explanation that a significant relationship lies between the patient's frequency and distance. This type of estimation seems new to the veterinary field. Therefore, it is almost impossible to metaphorize with other studies. Moreover, the statistically significant spatial clustering of patient's location was an indication of the spatial autocorrelation which might be due to the result of communication among the farmers regarding the services ensured by the hospital authority. Therefore, the outcome can be interpreted as the hospital is popular in its nearby area. This type of study can be conducted on several veterinary hospital to compare the popularity through indirect observation of patient load and spatial distribution.

4.9 Limitations

Some cramps had been identified during the study:

1. Some owners tended to hide information either intentionally or unintentionally due to illiteracy.

2. As symptomatic diagnosis was practiced in TVH of JGVC, there may be some tilts in the diagnosis process. Ultimately the study ended up with some negligible biased outcome.

5. Conclusions

Parasitic diseases were prevalent throughout the year both in cattle and goat population where viral diseases were prevalent in poultry. β Lactam, Fluoroquinolone and sulfar drugs were the most frequently prescribed drug. Significant variation was estimated between distance and frequency of diseases reported to the veterinary hospital. So, a community veterinary health care facility is needed to develop for the distantly located area to provide better service to the farmers.

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