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Studies on the Degree of Infection of Gastrointestinal Parasites in Cattle at Sher-e-Bangla Nagar Area, Dhaka, Bangladesh

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Abstract

The study was conducted to investigate on gastrointestinal parasitic infections of Cattle in different areas of Sher-e-Bangla nagar, Dhaka, during the period from February, 2016 to January, 2017 using coproscopy examinations. A cross-sectional study was carried out to establish the prevalence and intensity of gastrointestinal parasites of cattle from Sher-e-banglanagar area, Dhaka. A total of 109 (different ages and sex) cattle faecal samples were examined using the differential sedimentation, Floatation and Stoll's ova counting techniques. Overall, cattle showed a prevalence (41.2%) of parasite infections. Out of this percentage, 19.2% had multiple parasites while 13.8% had a single parasite infection and mean egg per gram of feces (EPG) was 516.4±222.6. The parasites identified on fecal examinations, Amphistomes (22.9%) was highest followed by *Eimeria* spp. (11.9%), *Fasciolagigantica* (10.1%), *Oesophagostomum* spp. (8.2%), *Ostertagia* spp. (6.4%), *Monieziabenedini* (5.5%), *Cooperia* spp. (4.6%) and *Capillaria* spp. (3.7%). In general, most of the animals had low intensity (<500 EPG / <10EPC) of infection. There was a wide range of nematode, cestode and protozoa egg counts (0-850 EPG, 0-900 EPG and 0-2100 OPG, respectively). The range of trematode eggs count was 0-13EPC. A wide variety of gastrointestinal parasites were prevalent among cattle in the study area.

Keywords

Gastrointestinal Parasites, Intensity, Cattle, Faeces

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1. Introduction

Helminth infections are a major cause for reduced productivity in livestock, particularly in poor world [1]. Cattle are very much susceptible to parasitic infection. Parasites hamper their productive and reproductive performance in cattle. In Bangladesh prevalence of parasitic infestations are very common in cattle and that a variety of gastro-intestinal nematodes and liver flukes are widely prevalent in different areas of Bangladesh.

There is a lot of demand for the livestock products and by-products throughout the country. The contribution of livestock sector in GDP was 2.54% and growth rate was 2.41% in the year 2009-2010 [2]. Livestock sector plays a significant role in milk and meat production and source of hides and skin. The cattle population in Bangladesh is about 23 million [3]. The cattle are kept mostly by poor, landless, marginal and small-scale farmers. In addition, 80% of the poor and ultra-poor people rear livestock as a major means of livelihoods [4]. The geo-climatic conditions together with the

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water logged and low-lying areas in Bangladesh are conducive to parasitic diseases in domestic ruminants [5]. The climatic condition of Bangladesh with an average rainfall of 90 mm, humidity of 75%, temperature ranges between 11°C and 35°C are favorable for the optimal ecological survival of most of the parasites and the intermediate hosts [6].

In fact, cattle of Bangladesh are affected by various types of helminth parasites [7, 8]. The losses due to parasitism take in the form of mortality, poor general health condition, retarded growth, lower output of work, decrease in the production of milk and meat [9]. [10] clearly mentioned that the loss of productivity of animals in terms of mortality, milk, meat, generation loss and other productive traits due to parasitism (50%) in Bangladesh. Gastrointestinal parasite causes impaired digestion and also affect the absorption of minerals particularly the calcium and phosphorus [11]. Gastrointestinal nematodes are also serious problems for ruminants, especially young animals. [12] suggested that 50% calves up to 1 year of age died due to gastrointestinal parasites that cause digestive disturbances and malnutrition leading to calf mortality.

Therefore, in the present study an attempt has been taken to assess the degree of infection of gastrointestinal parasitesin Cattle at Sher-e-Bangla Nagar area, Dhaka.

2. Methodology

This research work was conducted in our Laboratory in the department of Microbiology and Parasitology, Faculty of Animal Science and Veterinary Medicine, Sher-e-Bangla Agricultural University, Dhaka for a period of 12 months to detect the prevalence and intensity of gastrointestinal parasitic infection of cattle in and around the Sher-e-Bangla nagar area.

2.1. Study Area and Animal

Samples were collected from the different areas of Sher-e-Bangla nagar, Dhaka for the convenience of the study and availability of the animals during the period of time. Coprological examinations were conducted in the department of Microbiology & Parasitology, Sher-e-Bangla Agricultural University, Dhaka. A total of 109 cattle were selected randomly in an area of Sher-e-banglanagar, Dhaka. The age of the cattle was young ≤ 24 months and adult >2 years. During collection of samples the age and sex of animals were recorded.

2.2. Fecal Samples Collection and Preservation

The cattle were selected randomly irrespective of their age and sex. The age of the cattle was determined on the basis of dentition and counting the rings of horn, sex detected by examining the external genitalia. After taking all the relevant information, the fecal samples were collected directly from the rectum of the animals or immediately after defecation. Before collection, the animals were restrained properly and all possible hygienic measures including wearing apron, hand gloves and gumboot were taken to avoid contamination. Fresh fecal samples were also collected from the ground when the animals were found in the act of defecation. About 10-15 grams of fresh faecal sample from each individual was drawn directly either from the rectum or collected fresh voided faeces with aseptic condition (using hand gloves). Each sample was kept in separate polythene bag, tied carefully and numbered properly and the samples were preserved in 10% formalin. Each Polybag is marked with the unique identification number and basic demographic information (age and sex). The correctly labeled and properly numbered samples containing the fecal samples with all required information were immediately transferred to the Microbiology & Parasitology Laboratory (SAU) and kept in refrigerator at 4°C temperature until further examination.

2.3. Examination of Fecal Samples and Identification of Parasites

The Sedimentation and Floatation methods described by [13] were performed to screen out the positive samples. The fecal samples were also examined by Modified Stoll's Ova dilution technique for counting the number of eggs per gram (EPG) of feces and identification of eggsof different gastrointestinal parasites had performed with the help of light compound microscope (x10) by their characteristic morphological features [14] and [15]. The species of the various eggs of the parasites were identified according to their characters and morphology.

2.4. Differential Floatation Technique

2-3gm of faecal sample was taken in a beaker to which 50ml waterwas added. With the help of a spatula, the sample was stirred and filtered with a tea strainer. The filtered sample (15ml) was then poured into plastic test tube and centrifuged at 1500 rpm for 5 min. The tube was taken out and the upper part of the water was removed with the help of a dropper. The tube was filled with sodium chloride solution and centrifuged at 1500 rpm for 5 min. More sodium chloride was added up to the tip of the tube. A cover slip was placed over the top of the tube so that the sodium chloride touches the cover slip for a few minutes and then the cover slip was placed on a slide and examined at 10× to 40× under microscope.

2.5. Sedimentation Technique

5-10gm of faecal sample was taken in a beaker to which

50ml water was added. The sample was mixed properly and then the sample was filtered using a tea strainer and the filtered sample was poured in a plastic test tube and centrifuged at 1500 rpm for 5 min. The tube was taken out and the upper part of water was removed with the help of a dropper. A drop of the deposited materials was taken out from the test tube with the dropper and placed on the slide, and finally examined the slide under microscope at 10x or 40x.

2.6. Modified Stoll'S Ova Counting Technique

The faecal sample was first well mixed and then 3 grams of faeces were weighed with the help of a balance and mixed with 42ml of NaOH solution in small glass container and put in 100 ml graduated beaker. Some small glass beads were added. The faeces were thoroughly mixed with water by a magnetic stirrer. The mixture was then strained with a coffee strainer. The strained mixture was again shaken and 0.15ml of mixture was taken with a 1 ml special pipette and and transferred to a glass slide and covered with a cover slip. Care was taken to avoid bubble formation. The slide was then placed under a microscope and identified and counted. The total number of eggs of parasites found in the slide was multiplied by 100 to get per grams of faeces (EPG).

Calculation for Stoll's Ova counting technique

3.0 grams feces +42.0 ml NaOH solution = 45.0 ml water suspension (Total volume)

45 ml of suspension contains =3 gram of feces

3 gm faeces in 45ml suspension

1 gm faeces in 15 ml suspension

0.15ml is equivalent to 15ml /100

If the total number of egg contained = N

1 gram of feces contained = N eggs/cysts

1 gram of feces contained = N× 100 eggs/cysts

i.e. EPG (Eggs/cysts/larvae/ per gram of feces) = N × 100

2.7. Statistical Analysis

All data was entered into a spreadsheet programme (Excel 2003, Microsoft Corporation), analyzed using Graph pad software and transferred to Stata 13.1 (Intercooled Stata 13.1, Stata Corp., College Station, Texas, USA) for analyses.

3. Result and Discussion

Different classes of parasites (Trematode, Nematode, Cestode and Protozoa) were observed in the faecal examination. Eight varieties of parasites were observed during faecal examination. Out of 41.2% animals positive, 19.2% of them had multiple parasites eggs species while 13.8% had a single parasite infection.

Table 1. Overall prevalence of gastrointestinal parasites in cattle.

Types of gastrointestinal parasites	No. of Cattle affected N= 109	% of Prevalence	EPG (Mean±SE)
Paramphistomum sp	25	22.9	3.6±0.3
Fasciola gigantica	11	10.1	4.8±0.5
Ostertagia sp	7	6.4	571.4±242.5
Cooperia sp	5	4.6	500±212
Oesophagostomum sp	9	8.2	700±312
Capillaria sp	4	3.7	475±192
Moniezia benedini	6	5.5	600±272
Eimeria bovis	13	11.9	1276.9±568.8
Total	45	41.2	516.4±222.6

N = Total animals examined. * = Total no. of animals affected is less than the summation of individual infection because same animal was infected by more than one parasite.

3.1. Overall Prevalence of Gastrointestinal Parasites in Cattle

During the study period, a total of 109 cattle were examined through fecal sample examination, of which 45 were found infected with one or more species of gastrointestinal parasites indicating an overall prevalence 41.2%. A total of 7 genera of helminths and 1 genera of protozoa were identified, of them snail borne trematodes were amphistomes (22.9%), *F. gigantic* (10.1%); nematodes namely, *Oesophagostomum* spp. (8.2%), *Ostertagia* spp. (6.4%), *Cooperia* spp. (4.6%), *Capillaria* spp. (3.7%); cestode namely, *Monieziabenedini* (5.5%); and protozoa namely, *Eimeriabovis* (11.9%). From this study, it was observed that the prevalence of *Paramphistomum* spp. (22.9%) was the highest whereas *Capillaria* spp. (3.7%) infection was the lowest (Table 1).

In this study, overall prevalence of gastrointestinal parasitic infections in cattle was recorded as 41.2% at Sher-e-banglanagar area, Dhaka, Bangladesh. This finding is not identical to the earlier finding of [16] who recorded much higher 86.19% cattle infected with various helminths.

However, the findings supported by [7] who recorded 37% of cattle infected with various helminths. In this study 10.1% case with *Fasciola*, 22.9% cases with amphistomesby fecal sample examination were recorded. In case of *Fasciola,* this finding is almost similar to the findings of [7], [17] and [18] who recorded 16.3%, 21.88%, 19.3% fascioliasis in cattle, respectively. The rate of infection found in this study is much lower than the earlier findings of [8], [19] and [20] who recorded 53%, 70%, 31.14% fascioliasis, respectively in Bangladesh and India. In amphistomes, the finding in this study is nearly similar to the findings of [21], [22] and [18] who recorded 29.5%, 36.19%, 35.8% cattle were infected with amphistomes. This result is similar to the report of [8] who recorded 21.6% amphistomes infection in cattle. On the other hand, the rate of infection found in this study is much lower than the earlier findings of [23], [24] and [7] who recorded 58.9%, 46.34% and 62.6% infection with paramphistomiasis in cattle in Bangladesh. The variations in the findings with the earlier reports might be due to the difference in the sample size, selection of samples, period and place of study, climatic conditions and managemental factors.

Figure 1. Egg of *Paramphistomum cervi.*

Figure 2. Egg of *Fasciola gigantica.*

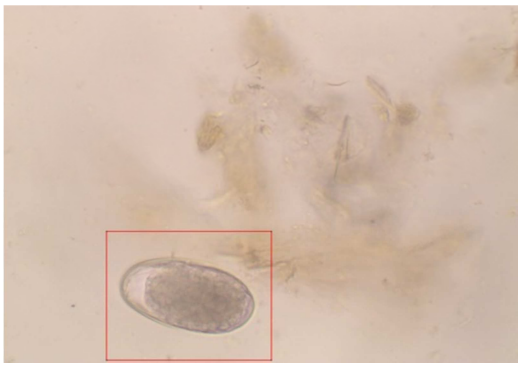

Figure 3. Egg of *Ostertagia sp.*

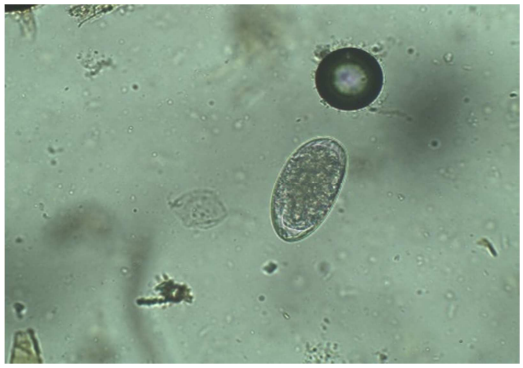

Figure 4. Egg of *Cooperia sp.*

Figure 5. Egg of *Oesophagostomum sp.*

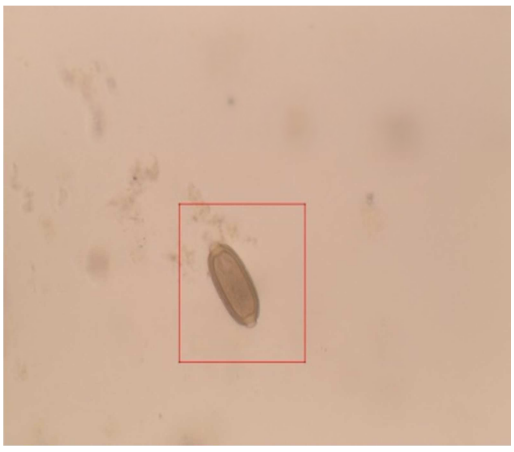

Figure 6. Egg of *Capillaria sp.*

Figure 7. Egg of *Moniezia benedini.*

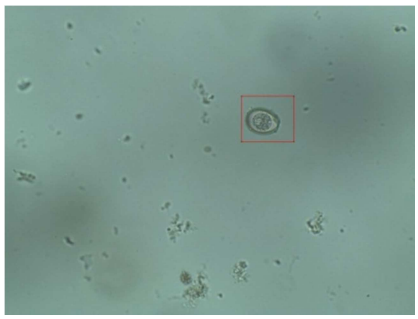

Figure 8. Oocyst of *Eimeria bovis.*

3.2. Prevalence and Intensity of Gastrointestinal Parasites in Cattle

The current study showed that cattle from the study area were infected with a wide variety of gastrointestinal parasites including nematodes, cestodes, trematodes and protozoa. Tables 2 and 3 showed the intensity of infection with the various parasites. Most of the animals had low infections (<500 EPG/OPG or <10 EPC). The percentage of animals with low infections ranged from 84.7% (*Eimeriabovis*) to 97.9% (*Capillariasp*). The few animals with severe (>2000 EPG/OPG or >20 EPC) infections ranged from 0.3 (*Capillariasp*) to 5.5% (*Eimeriabovis*). The mean Protozoa (*Eimeria*) OPG (1276.9±568.8) was high as compared to the other parasites. Among the nematodes, *Oesophagostomumsp* showed the highest mean EPG (700±312) while *Paramphistomumsp* showed the highest mean EPC (4.8±0.5) among the trematodes.

Table 2. Prevalence and intensity of trematode parasites in cattle (N= 109 samples).

Parasite	Prevalence, %	Percentage, % with infection			Egg count, EPC		
		Low	Moderate	High	Range	Mean	SE
Fasciolagigantica	10.1	95.6	3.8	0.6	0-11	3.6	0.3
Paramphistomumsp	22.9	92.9	6.2	0.9	0-16	4.8	0.5

EPC= Eggs per long cover slip; Low= <10EPC; Moderate= 10-20EPC; high= >20EPC

Table 3. Prevalence and intensity of nematode, cestode and protozoa parasites in cattle (N= 109 samples).

Parasite	Prevalence, %	Percentage, % with infection			Egg count, EPG/OPG		
		Low	Moderate	High	Range	Mean	SE
Ostertagiasp	6.4	96.5	2.9	0.6	0-800	571.4	242.5
Cooperiasp	4.6	97.3	2.3	0.4	0-700	500	212
Oesophagostomumsp	8.2	94.3	4.8	0.9	0-1200	700	312
Capillariasp	3.7	97.9	1.8	0.3	0-600	475	192
Monieziabenedini	5.5	95.7	3.5	0.8	0-900	600	272
Eimeriabovis	11.9	84.7	9.8	5.5	0-2100	1276.9	568.8

EPG = Eggs per gram of faeces; OPG = Oocyst per gram of faeces; Low= <500 EPG or OPG; Moderate= 500-2000 EPG or OPG; high= >2000 EPG or OPG

Intensity of trematodes: The highest Prevalence was of *Paramphistomum* spp. (22.9%) followedby *Fasciola* spp. (10.1%). Paramphistomum (22.9%) had the widest range of egg count (0-16) among the trematodes and a mean of (4.8±0.5 EPC). This result supports the earlier reports by [25] who observed 20.74% and 19.62% prevalences each of *Fasciola* spp. and *Paramphistomum* spp. infection in cattle. [26] also reported 12.28% and 3.81% prevalence each of *Paramphistomum* spp. and *Fasciola* spp. in cattle that is unlikely lower to this finding. The high prevalence among the cattle could therefore be due to a number of factors including anthelmintic resistance, the quality and dosage of the anthelmintic drug or reinfection.

Intensity of nematodes: The highest infection was of *Oesophagostomum* spp. (8.2%) followed by *Ostertagia* spp. (6.4%), *Cooperia* spp. (4.6%), *Capillaria* spp. (3.7%). *Oesophagostomum* (8.2%) had the widest range of egg count (0-1200) among the nematodes and a mean of (700±312 EPG). *Capillaria* (3.7%) had the lowest range of egg count (0-600) among the nematodes and a mean of (475±192 EPG). In nematodes, the finding in this study is nearly similar to the findings of [24] who recorded *Capillariasp.* 8.5%, *Oesophagostomum* spp. 6.6%, and *Eimeria* spp. 2.3% infection in cattle. However, [26] reported 1% prevalence of *Oesophagostomum* spp. in cattle. The influential factors on the prevalence of parasites is difficult to explain but it may be assumed that irregular deworming, feed supplement and

management practices may be associated with this variation.

Intensity of cestode: *Monieziabenedini* was recorded with (5.5%); Similar finding was reported by [26] who found 8.96% prevalence of *Monieziasp.* in cattle. It was found only in cattle with a mean egg count of 600±272, EPG (ranging from 0 to 900).

Intensity of protozoa*: Eimeria* was the only protozoan in this study and had a prevalence of 11.9%. *Eimeria* had the highest mean oocyst count (1276.9±568.8 OPG) as well as the widest range parasite load (0-2100 OPG). Similar results from faeces samples were reported earlier [27]. [28] also reported that 9.1% prevalence of coccidia in cattle. Eimeria causes coccidiosis in mainly calves and is usually accompanied by diarrhea with severity from watery faeces to one containing blood.

4. Conclusions & Recommendations

Parasitism is one of the major problems affecting health and productivity of livestock. By fecal sample examination, an overall 41.2% gastrointestinal parasitic infection was detected in cattle at Sher-e-Bangla nagar area, Dhaka, Bangladesh. Only the prevalence rate and intensity were investigated in this study. The effects of parasites in production performance of cattle are essential to be studied which would be more beneficial for the farmers. However, particular emphasis should be given to proper management, regular deworming and improved hygiene, to prevent the parasitic infections in cattle and other animals. For effective treatment and control, the variability of parasites would have to be considered.

So, further study should be carried out to determine the economic losses due to parasites of cattle and to find out effective control measures against it. Also, further studies on gastrointestinal parasites dynamics, distribution and impact are proposed.

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