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Article

Surveillance and prevalence of gastrointestinal parasite of domestic animals in different abattoirs in Bangladesh

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Abstract: The study was conducted to examine the gastro-intestinal parasite infestation of animal at Gopalganj district in Bangladesh during July 2020 to June 2021. Total collected sample were 151, among them 32 cattle and goat 119. Parasites were collected directly from viscera then preserve for further analysis. Age, sex and species of the examined animals were recorded as far as practicable. Overall prevalence of nematodes, cestodes and trematodes were 62.25%, 9.27% and 50.33% respectively. The prevalence of parasites was variable with *Paramphistomum* spp. (58.29%), *Fasciola* spp 62.91%, *Moniezia* spp. (5.3%), *Haemonchus* spp. (41.06%), *Trichuris* spp. (3.31%), *Oesophagostomum* spp. (10.59%), *Strongyloides* spp. (2.64%), *Trichostrongylus* spp. (5.29%), *Bunostomum* spp. (5.96%), Toxocara spp. (25.17%). Parasitic in male and female exhibited no significant variations ($p>0.05$) between them. The infection was significantly higher in young than in adult. No significant ($p>0.05$) variation was observed in infection rates between cattle and goats.

Keywords: gastrointestinal parasite; prevalence; cattle; goats; abattoirs; BAPARD

1. Introduction

Bangladesh is an agricultural country where 21% GDP comes from the agricultural sector like crops, livestock, fisheries and forestry (Begum *et al*., 2007; Hasan *et al*., 2021; Mustafa *et al*., 2020 and 2021). There are about 24.54 million cattle, 1.5 million buffalo, 3.68 million sheep and 26.6 million goat and also share in agricultural GDP 13.1%. (Livestock Economy, 2020-21). Livestock demand due to low nutritional status and disease prevalence (Hasan *et al*., 2022; Barman *et al*., 2017; Sarkar *et al*., 2008; Mazed *et al*., 2004; Rahman *et al*., 2002, 1999, 1998 and 1997). Parasitism claims to be one of the main obstacles in livestock production in Bangladesh (Islam *et al*., 2022; Mustafa *et al*., 2022; Jabbar *et al*., 1983; Khokan *et al*., 2017). Gastrointestinal parasitism is a world-wide problem and in Bangladesh it may be considered as one of the major constraints in cattle production. The infection causes productivity losses through reduced feed intake and decreased efficiency in feed utilization due to subclinical or chronic infections that are responsible for economic losses (Renaldi *et al*., 2011; Sarker *et al.,* 2015; Bary *et al*., 2018).

Gastrointestinal parasites like helminths and protozoan are very common in cattle and goats. When heavy infections occur those parasites contribute to reduced milk and meat production (Murthy and Rao, 2014). The losses caused by parasitic infections are in the form of lowered general health condition, retarded growth rate, diminishing the working efficiency, decrease milk and meat production, abortion; cost associated with preventive measures and reduces the disease resistance capability, which may ultimately lead to higher mortality (Silvestre *et al*., 2000). Small ruminants under intensive and extensive production systems are extremely susceptible to the effects of wide range of helminths (Abede and Esayas, 2001). Helminth infestation lowers the immunity of the animals and render them susceptible to other pathogenic infections (Garedaghi *et al*., 2011; Sarker *et al.,* 2020). Rahman *et al.* (1975) reported the death of as high as 25.0% kids and lambs and 43.5% adult goats due to GI parasites in both rural and farm condition. In another report, Mazid *et al.* (2006) reported that about 81.1% and 94.7% helminthiasis occurred in cattle and goats, respectively. Various risk factors related to host and environment play an important role in the onset of GI parasitic infections. Environmental factors include agro-ecological conditions, animal husbandry practices such as housing system, deworming intervals and pasture management; these largely determine the type, incidence and severity of various parasitic diseases (Badran *et al*., 2012; Mustafa, 2022). Parasitic problems are often neglected and overlooked as majority of the infected animals show a number of little obvious clinical signs during their productive life and their effects are gradual and chronic (Islam *et al*., 1985; Tariq *et al*., 2010).

Gopalganj district is very prospective for cattle and goat rearing due to its agro-ecological condition. Despite routine vaccination against major infectious diseases, large and small ruminants are still suffering from poor body condition state due to parasitism. However, there is limited information about the infection prevalence of GI parasites in large and small ruminants in the study area. Therefore, the present study was conducted to investigate the GI parasites prevalent in Gopalganj district and identify associated risk factors such as age, sex and species.

2. Materials and Methods

2.1. Study site and study period

The study areas were the surroundings of Gopalganj district, Bangladesh. Samples were collected during the period from July 2020 to June 2021. A total of 151 carcasses of cattle and goats were examined for GI parasites in different abattoirs in Gopalganj region of Bangladesh.

2.2. Sample collection and preservation

A total of 151 fecal samples were collected from different abattoirs of Gopalganj region irrespective of age, sex, breed, BCS (body condition scored) and seasons like rainy, summer and winter. In this study, age of cattle are categorized into three groups, viz calf aged 3 less than, aged > 3years, goat ≤ 2 years and adult aged > 2 and above. During sample collection, the biometric data of each animal like, age, sex breed, and general body condition were recorded. Approximately 10 gm of fecal samples were collected directly from the rectum of the cattle and kept into a small plastic container and stored in ice containing cool box and labeled properly. After collection, the fecal samples were preserved with 10% formalin and transferred immediately to the Laboratory of the BAPARD and stored at 4°C temperature until further examination.

The sample for *Fasciola* spp., *Paramphistomum* spp. were collected in normal saline and washed in distilled water through several changes and kept in glycerinealcohol (70% ethyl-alcohol 95 parts with pure glycerine 5 parts). Helminth parasites (*Fasciola* spp.) in the liver were collected and examined in fresh state. They were shaken vigorously in 1 percent salt solution and then fixed in 10 percent formalin. This was done to prevent contraction of other parasites. Sometimes a fixative consisting of 85 parts of 85% ethyl-alcohol, 10 parts of 40 % formalin and 5 parts of glacial acetic (AFA) was used to fix the parasites.

Parasites were also collected from different parts of the body of the individual cattle by hand picking and precautions were taken to preserve the mouthparts and appendages of the GI parasites during collection. Parasites were preserved in 70% alcohol in a clean and well stopper glass vials which were labeled properly.

2.3. Laboratory examination of fecal samples and parasites

Fecal samples were examined using the direct smear method followed by the McMaster technique and eggs were identified under microscope at low power objective (10X) followed by higher magnification (40X objectives) according to the technique by Urquhart *et al*., 1996.

The positive samples in the direct smear method were subjected to EPG counting to determine the number of eggs per gram of feces. Eggs were identified according to the previously described morphological characteristic by Soulsby (Soulsby, 1982). The EPG (egg per gram of feces) were calculated by multiplying the total numbers

of identified eggs in two chambers with the dilution factor 50. The parasitic load was considered as light (egg counts from 1 to 500), moderate (egg counts above 500 to 1000) and heavy or severe infection respectively when eggs counts were found >1000 per gram of feces and parasites were identified under light microscopy based on their morphological characters (Sweeny *et al*., 2011).

2.4. Statistical analyses

Statistical analyses were carried out by Statistical Package for Social Science (SPSS version 22.0, SPSS Inc., Illinois, USA) using F test. To identify the risk factors univariate analysis was performed.

3. Results and Discussion

3.1. Overall prevalence of gastrointestinal parasitism

In this study a total of 151 carcasses of cattle and goat (32 cattle and 119 Goat sample) were examined at different abattoirs of Gopalganj region. Overall prevalence of nematodes, cestodes and trematodes was 62.25%, 9.27% and 50.33% respectively (Table 1). The prevalence of parasites were varied with *Fasciola* spp. (62.91%), *Paramphistomum* spp. (58.29%), *Moniezia* spp. (5.3%), *Haemonchus* spp. (41.06%), *Trichuris* spp. (3.31%), *Oesophagostomum* spp. (10.59%), *Strongyloides* spp. (2.64%), *Trichostrongylus* spp. (5.29%), *Bunostomum* spp. (5.96%), Toxocara spp. (25.17%) (Table 2).

Table 1. Prevalence of parasites in slaughtered animals.

Parasite	Cattle (N=32)	Goat (N=119)	Total (N=151)
Nematodes	62.5% (20)	62.18% (74)	62.25% (94)
Cestodes	9.37% (3)	9.24% (11)	9.27% (14)
Trematodes	46.87% (15)	51.26% (61)	50.33% (76)

Table 2. Prevalence of different parasites in slaughtered animals.

Parasite	Cattle (N=32)	Goat (N=119)	Total (N=151)
Fasciola spp.	68.75% (22)	61.34% (73)	62.91% (95)
Paramphistomum spp.	53.12% (17)	59.66% (71)	58.29% (88)
Moniezia spp.	3.12% (1)	5.88% (7)	5.3% (8)
Haemonchus spp.	37.5% (12)	42.02% (50)	41.06% (62)
Trichuris spp.	3.12% (1)	03.36% (4)	03.31% (5)
Oesophagostomum spp.	6.25% (2)	10.08% (12)	10.59% (16)
Strongyloides spp.	6.25% (2)	01.68% (2)	2.64% (4)
Trichostrongylus spp.	09.37% (3)	04.20% (5)	05.29% (8)
Toxocara spp.	34.37% (11)	22.69% (27)	25.17% (38)
Bunostomum spp.	0%	05.96% (9)	05.96% (9)

The same findings was partially consistence with the reports of Khan *et al*. (2010) and Saravanana *et al*. (2009) who documented slightly lower prevalence in Pakistan and India, respectively. The reports of Hirani *et al*. (2006) supported the prevalence of Trematode (46.25%) of the present study. The earlier findings of indigenous cattle was also partially similar with the findings of Raza *et al*. (2007) and Regassa *et al*. (2006) who documented somewhat higher prevalence in Pakistan and Ethiopia, respectively. However, similar types of parasites as reported in this study were detected by different scientists in different areas with variable rate of infections (Ahmed *et al*., 2015; Islam *et al.,* 2014; Xiao, 2010; Mustafa *et al*., 2022). Variation in the occurrence of gastrointestinal parasitic infections might be due to geo-climatic conditions, breed, age, sex, plane of nutrition, stress, availability of intermediate host (Hansen and Perry, 1993).

3.2. Sex-specific prevalence of gastrointestinal parasitism

The prevalence of livestock parasite in cattle and goat is variable in relation to sex. In this study, Livestock parasite present higher in Bulls (66.67%) than cows (50%) but in case of goat, doe bears higher infection than buck and castrated goat (Table 3).

Table 3. Prevalence of parasitic diseases in several species in relation to sex.

Parasite	Cattle (N=32)		Goat (N=119)	
	Male N=24	Female N=08	Male N=41	Female N=78
Nematodes	66.67% (16)	50% (4)	56.09% (23)	65.38% (51)
Cestodes	12.5% (3)	0%	07.32% (3)	10.26% (8)
Trematodes	41.67% (10)	62.5% (5)	41.46% (17)	56.41% (44)

Sex-specific prevalence of gastrointestinal parasitic infections showed that infection caused by Nematode, Cestode and Trematode were found predominant in female than male cattle. Findings of this study was found in accordance with the reports of Raza *et al.* (2007, 2010) who also reported higher worm burden in female cattle compared to male cattle. On other hand, Nematode infection in indigenous male cattle was found in harmony with the reports of Rekwot and Ogunsusi (1985) and Soulsby (1982). In crossbred cattle, Nematode infections were also in line with the observation of Avcioglu and Balkaya, (2011) and Raza *et al*. (2010). Variation in occurrence of such helminth infections in male and female animals might be due to the variation in sample size (Bachal *et al.*, 2002), lowered resistance of female animals or temporary loss of acquired immunity near parturition (Garcia *et al.*, 2007), stress, genetic resistance of host and insufficient feed supply against their higher needs (Raza *et al.*, 2010; Hansen and Perry, 1993).

3.3. Age specific prevalence of gastrointestinal parasitism

The prevalence of gastrointestinal parasitic infections varied between two age groups of cattle. The highest infection of Nematode, Cestode and Trematode was recorded in cattle of >3 years (54.55%, 0%, 54.55% respectively).

Table 4. Prevalence of parasitic diseases in relation to age of cattle.

Types of Parasites	Age			
	< 3 year N=21	Prevalence	>3Year N=11	Prevalence
Nematodes	14	66.67%	06	54.55%
Cestodes	03	14.29%	00	0%
Trematodes	09	42.86%	06	54.55%

Age specific prevalence (Table 4) of gastrointestinal parasitic infections especially, Nematode, Cestode and Trematode were found more in adult cattle which supported the observation of Sardar *et al*. (2006) who reported that Nematode, Cestode and Trematode were highest in the age group greater than 36 months and lowest in age group less than 12 months. Findings of Fritsche *et al*. (1993) also supported the findings of this study. The earlier findings of this investigation showed disagreement with Raza *et al.* (2007) and Regassa *et al*. (2006) who recorded significantly higher worm burden in younger animals than adult. Higher prevalence of parasitic infection in adult cattle might be due to keeping them for a longer period of time in breeding and milk production purposes or supply inadequate feed against their high demand (Sardar *et al.*, 2006). Moreover, stress like lactation, pregnancy, nutritional deficiency which might be accounted for higher prevalence in adult cattle (Radostits, 1994). On the other hand, the highest prevalence of Nematode infection in calf was supported by the reports of Sarder *et al.* (2006) and Bachal *et al*. (2002) who recorded such infection in early months of life.

4. Conclusions

This surveillance work gives an outline about GI parasitic infection cattle and goat in Gopalganj area in Bangladesh that will be helpful to design a layout for controlling parasitic infestation, training manual preparation of BAPARD and further action research about parasitic infection in this area.

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Data availability
The data used to support the findings of this study are included within the article.

Conflict of interest
None to declare.

Authors' contribution
Md. Murshed Hasan Mustafa wrote the manuscript, Md. Rafiul Islam collected samples from abattoirs and examined them, Md. Abul Hashem assisted data processing and analyzing, Md. Abdul Alim ckecked the parasitic experimental protocal and Md. Mukhlesur Rahman assisted the manuscript writing and correction of the paper. All authors have read and approved the final manuscript.

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