Original Research Article

Coproscopical approach to assess the current epidemiology of bovine paramphistomiasis at Babuganj, Barishal district, Bangladesh

Abstract

To conduct coprological studies to assess the current epidemiological state of bovine paramphistomiasis, 60 fecal samples were randomlycollected from different areas, of Babuganjupazila, Barishal, Bangladesh from 17th August to 5th January 2022. The sedimentation method was applied for the detection of parasitic eggs in the fecal contents. The overall prevalence rate of paramphistomiasis was 28.33%. Indigenous [28.6%, 95% CI: 1.067 (.247-4.614)] and older cattle had a slightly higher prevalence of paramphistomiasis than cross-bred(27.3%) and younger ones. Furthermore, the males [25%, 95% CI: 0.758 (.236-2.428)] were found to be less susceptible to *paramphitopmum*infestations than the females (30.6%). However, no significant effects of age, sex, and breed were established for the development of paramphistomiasis in the cattle population.

Comment [A1]: It is difficult to compare the males and females as the females were 60% and males 40%
The same for cross-bred and native breeds

Keywords: Fecal examination; paramphistomum spp. infestation; prevalence; sedimentation; gastrointestinal parasitism; paramphistomiasis; cattle; barishal.

1. Introduction

In Bangladesh, a significant portion of the rural population is engaged with the livestock sector for their livelihoods?? and approximately 37.6% of Bangladeshi rural households possessed at least one livestock in 2015 [1]. Approximately 20% of employment in the rural economy is estimated to be associated with the livestock sector [2]. Contrarily, in Bangladesh, 25.7 million cattle population is not only contributing to the mitigation of protein demands for humans but also developing the socioeconomic status [3]. Their production is hindered by a range of gastrointestinal parasites, which is marked by a drop in milk yield, and a reduction in quality products, including a reduction in milk's fat, protein, and lactose content, death, as well as other

subsequent ailments [4]. Afazuddin (1985) reported that multiple parasite infections in cattle at the military farm in Savar, Dhaka, caused a yearly financial loss of approximately $1400 [5]. Malnourishment and parasitism are the two principal factors restricting cattle productivity in Bangladesh, among several other limitations [6].

In Bangladesh, the geoclimatic parameters, in addition to the wet and low-lying terrain, favor parasitic infections and propagations in domestic animals. The tropical monsoon atmosphere in Bangladesh is conducive to parasite development and proliferation [7-8]. Amongst several Trematodes, Paramphistomiasis, which is caused by digenetic flukes of the superfamily Paramphistomoidea and found throughout the world with a high prevalence rate in subtropical, and tropical territories, is known to have a catastrophic impact on cattle productivity [9-10]. It has been noted that when sheep and goats co-graze, both species are introduced to one another and eventually act as a source of transmission to large animals [4]. Paramphistomiasis in ruminants is still an undertreated parasitic disease. In certain regions of India, South Africa, and Australia, cattle fatality has exceeded 80 to 90% [11-12]. In Bangladesh, livestock is most frequently reported to have Paramphistomum parasite infections. Adult flukes are often found in the rumen and reticulum, whereas young parasites are typically found in the duodenum. Immature flukes migrating to the duodenal mucosa lead to acute enteritis, perhaps necrosis and hemorrhage, and anemia [13] that results in anorexia, diarrhea, polydipsia, weight loss, reduced productivity, and ultimately fatality [14]. On the other hand, adult flukes cause ruminitis, reduced production efficiency, deterioration of body condition, decreased milk production, and reproductive capability [14,15]. Even though gastrointestinal parasitism causes enormous losses, the concerns are often neglected [16].

Although extensive research has been conducted on *Paramphistomum spp.* epidemics in several divisions of Bangladesh, the epidemiology of this parasite in the Barishal division is still poorly studied [16-20]. Therefore, the study was undertaken to overcome this gap by assessing the current epidemiological state of *Paramphistomum* species through a coproscopical approach in cattle.

2. Materials and methods

2.1 Study area

Fecal samples were obtained randomly from several areas of BabuganjUpazilla, including Khanpura, Khudrokathi, Rahamatpur, and others.

2.2 Study period

The study was carried out between 17th August to 5th January 2022.

2.3 Sample collection and examination

60 fecal samples from the animals including 17 males and 43 females, between the ages of 2 to 5 years, were examined. All the samples were preserved in the refrigerator at 4°C before the fecal examination. To detect and identify the parasite eggs in fecal contents, the centrifugation method was performed. The techniques followed for conducting centrifugation methods were described by (Atia, 2015) [26].

2.4 Identification of egg of parasites

The eggs were identified on basis of their morphological characteristics described by (Hazzaz et al., 2017) [27].

2.5 Statistical analysis

The collected data were imported and analyzed using IBM SPSS (Statistical Package for Social Sciences, Version 25) software. Chi-square statistics were used to determine the statistical relationship and evaluated at 0.05 level of significance.

3. Result and Discussion

Table 1. Infestation rate of *paramphistomum spp.* in cattle

Variables	Frequency	Percent (%)	Confidence Interval 95%	
			Lower	Upper
Positive cases	17	28.3	1.60	1.83
Negative cases	43	71.7		
Prevalence		28.33%		
Total cases	60	100		

Among 60 fecal specimens, 17 cases (28.33%) tested positive and the overall prevalence rate of the disease was 28.33% (Table 1). Numerous studies were carried out to investigate the

prevalence rate and risk factors for paramphistomiasis in cattle in different territories of Bangladesh. In contrast to other districts and sub-districts, the current study recorded a low prevalence rate, notably Chittagong (30%) [16], Sirajganj (53.10%) [20], Sylhet (32.41%), Sunamganj (52.31%), Moulovibazar (44.87%), and Habiganj (48.28%) [21], and Bogra (29.90%) [22].

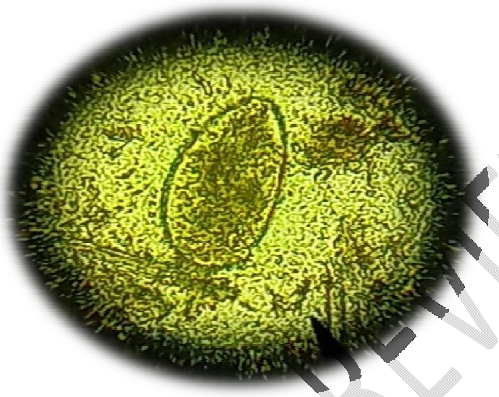

Fig. 1. Egg of *Paramphitomum spp.* in fecal smears observed in the light microscope (10X)

Table 2. Prevalence rate and risk factors assessment for *paramnphistomum* infection in cattle concerning their breed, age, and sex.

Variables	**Breed**				
Case (P/N)	**Indigenous**	**Cross Breed**	**Total**	**χ2 statistics**	
Positive	14	3	17	**χ 2 -Value**	.008
Negative	35	8	43	**df**	1
Prevalence rate (%)	28.6%	27.3%		**P-value**	.931

OR((95% CI)			1.067 (.247-4.614)						
Total	49	11	60						
Paramphistomiasis	**Age**								
Case (P/N)	**2-2.6 years**	**2.7-3 years**	**3.1-3.6 years**	**3.7-4 years**	**4.1-4.6 years**	**4.7-5 years**	**Total**	**χ2 statistics**	
Positive	3	5	3	5	0	1	17	**χ 2 Value**	4.808
Negative	5	12	13	8	4	1	43	**df**	5
Prevalence rate (%)	37.5%	29.4%	18.8%	38.5%	0%	50%		**P-value**	.440
Total	8	17	16	13	4	2	60		
Paramphistomiasis	**Sex**								
Case (P/N)	**Male**		**Female**		**Total**		**χ2 statistics**		
Positive	6		11		17		**χ 2 -Value**		.219
Negative	18		25		43		**df**		1
Prevalence rate (%)	25%		30.6%				**P- value**		.640
OR (95% CI)	0.758 (.236-2.428)								

Total	24	36	60

60% of the total population of our study was female, and the remaining 40% was male. The prevalence of paramphistomiasis in local cattle [28.6%, 95% CI: 1.067 (.247-4.614)] was slightly more than the cross-breed cattle (27.3%) (Table 2). Contrary to our present study, (Ghosh et al., 2014) reported that the occurrence of *paramphistomum* infestations is 40.54% in cross-breed and 24.28% in the native breed [22]. This variation may be due to the high population density of indigenous cattle in this area than the crossbreed cattle.

Older cattle were found to be more affected by *paramphistomum spp.* than the younger cattle. Likewise, (Paul et al., 2012) recorded 54.0% prevalence rate in younger and 60.3% in older animals which is in agreement with our current study findings [20]. According to Sarder et al. (2006), parasitic infestations are associated with multiple factors among which increased age is a key contributor to the greater prevalence rate of *paramphistomum* infestations in cattle [23]. However, (Ghosh et al., 2014) found younger cattle more susceptible to paramphistomiasis which does not satisfy our results [22].

In our study, we found that the males [25%, 95% CI: 0.758 (.236-2.428)] were more resistant than the females (30.6%) to paramphistomiasis. A study conducted by (Chowdhury et al., 2019) also recorded a higher prevalence rate in females (39.46%) than in males (27.13%), which is consistent with our findings [21].

No significant relation was established between the prevalence rate and the following factors throughout the study. Accordingly, (Ahmed et al., 2015) also demonstrated breed, age, and sex as non-significant factors that influence the infestation rate of *paramphistomum* spp. in cattle [16]. However, several studies identified age, sex, and breed as potential risk factors for bovine paramphistomiasis [20, 24]. These variations may be due to the difference in sample size, population density in a particular area, physiological conditions of individual animals such as disease resistance ability, grazing patterns, deworming, and others, and their management systems as well [22, 25].

4. Conclusions

The study reveals that the overall prevalence of paramphistomiasis in cattle was 28.33%, which is drastically lower than most of the areas of Bangladesh. However, this research will help in establishing the path for further investigation with a large sample size that will assist in the development of essential preventative and control strategies.

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Comment [A2]: I recommend a text or manual book