



# Coproscopical Approach to Assess the Current Epidemiology of Bovine Paramphistomiasis at Babuganj, Barishal District, Bangladesh

Abu Sayed <sup>a\*</sup>, Md. Hasibul Hossain <sup>a</sup>,  
Sabiha Akter <sup>a</sup> and Efaaj Islam <sup>a</sup>

<sup>a</sup> Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Bangladesh.

## Authors' contributions

This work was carried out in collaboration among all authors. Author AS designed and supervised the study, reviewed the literature, analyzed the samples and data and wrote the final manuscript. Author MHH assisted in writing the manuscript. Authors SA and EI collected the samples and assisted for coproscopical examination. All authors read and approved the final manuscript.

## Article Information

### Open Peer Review History:

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Original Research Article

Received: 12/01/2023

Accepted: 20/01/2023

Published: 27/01/2023

## ABSTRACT

To conduct coproscopical studies to assess the current epidemiological state of bovine paramphistomiasis, 60 fecal samples were collected from different areas, of Babuganj upazila, Barishal, Bangladesh between 17<sup>th</sup> August to 5<sup>th</sup> January 2023. The sedimentation method was applied for the detection of parasitic eggs in the fecal contents. The overall prevalence rate of paramphistomiasis was 28.3%. Indigenous [28.6%, 95% CI: 1.06 (.24-4.61)] and older cattle had a slightly higher prevalence of paramphistomiasis than cross-bred (27.3%) and younger ones. Furthermore, the males [25%, 95% CI: 0.75 (.23-2.42)] were found to be less susceptible to *paramphistomum* 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.

\*Corresponding author: E-mail: a.sayedpstu@gmail.com;

**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]. In addition, 25.7 million cattle population in Bangladesh 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 parasitic infections in cattle caused a yearly financial loss of approximately \$1400 at the military farm, Savar, Dhaka [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 this country is very conducive to parasite development and proliferation [7-8]. Amongst several trematode-induced diseases, 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 infestations. 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, hemorrhage, and anemia [13] that results in anorexia,

diarrhea, polydipsia, weight loss, reduced productivity, and eventually deaths [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].

Extensive researches have been conducted on *Paramphistomum* spp. epidemics in several divisions of Bangladesh; however, the occurrence of this parasite in Barishal region was 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

All the fecal samples were obtained from different areas of Babuganj upazila (sub-district) of Barishal district, Bangladesh.

### 2.2 Study Period

The study was carried out from 17<sup>th</sup> August to 5<sup>th</sup> January 2023.

### 2.3 Sample Collection and Examination

60 fecal samples of 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 parasitic eggs in fecal contents, the centrifugation method was performed. The techniques followed for conducting centrifugation methods were described by Atia, [21].

### 2.4 Identification of Egg of Parasites

The eggs were identified on basis of their morphological characteristics described by Hazzaz et al. [22].

### 2.5 Statistical Analysis

The collected data were imported and analyzed using 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. RESULTS AND DISCUSSION

Among 60 fecal specimens, 17 cases (28.3%) tested positive and the overall prevalence rate of the disease was 28.3% (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%), Moulvibazar (44.87%), and Habiganj (48.28%) [23] and Bogra (29.90%) [24].

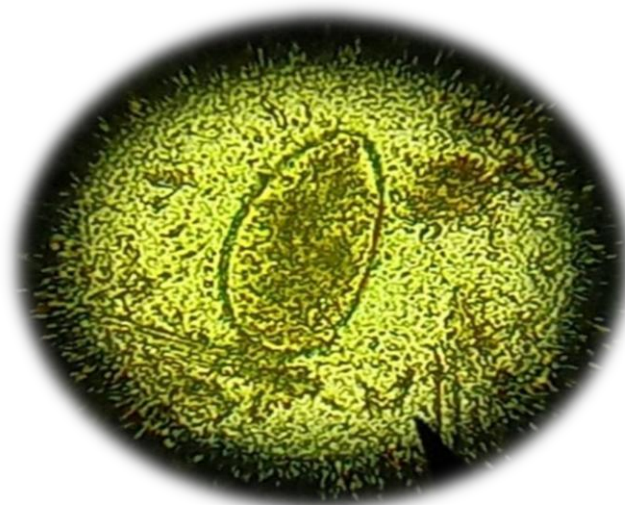
60% of the total population of our study was female, and the remaining 40% was male. The prevalence of paramphistomiasis in local cattle [28.6%, 95% CI: 1.06 (.24-4.61)] was slightly

higher than in the cross-breed cattle (27.3%) (Table 2). Contrary to our present study, Ghosh et al. reported that the occurrence of *paramphistomum* infestations is 40.54% in cross-breed and 24.28% in the native breed which do not satisfy our research findings [24]. This variation may be due to the high population density of indigenous cattle reared by the farmers in this area than the crossbreed cattle.

Older animals were found to be more affected by *paramphistomum* spp. than the Youngers. Likewise, Paul et al. 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., 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 [25]. However, Ghosh et al. found young cattle as more susceptible to paramphistomiasis which is contradictory to our study results [24].

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

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



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

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

<b>Paramphistomiasis</b>		<b>Breed</b>			<b>χ<sup>2</sup> statistics</b>				
<b>Case (P/N)</b>	<b>Indigenous</b>	<b>Cross Breed</b>	<b>Total</b>						
<b>Positive</b>	14	3	17	<b>χ<sup>2</sup> -Value</b>		.008			
<b>Negative</b>	35	8	43	<b>df</b>		1			
<b>Prevalence rate (%)</b>	28.6%	27.3%		<b>P-value</b>		.93			
<b>OR (95% CI)</b>		1.06 (.24-4.61)							
<b>Total</b>	49	11	60						
<b>Paramphistomiasis</b>		<b>Age</b>						<b>χ<sup>2</sup> statistics</b>	
<b>Case (P/N)</b>	<b>2-2.6 years</b>	<b>2.7-3 years</b>	<b>3.1-3.6 years</b>	<b>3.7-4 years</b>	<b>4.1-4.6 years</b>	<b>4.7-5 years</b>	<b>Total</b>		
<b>Positive</b>	3	5	3	5	0	1	17	<b>χ<sup>2</sup> Value</b>	4.808
<b>Negative</b>	5	12	13	8	4	1	43	<b>df</b>	5
<b>Prevalence rate (%)</b>	37.5%	29.4%	18.8%	38.5%	0%	50%		<b>P- value</b>	.44
<b>Total</b>	8	17	16	13	4	2	60		
<b>Paramphistomiasis</b>		<b>Sex</b>			<b>χ<sup>2</sup> statistics</b>				
<b>Case (P/N)</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>						
<b>Positive</b>	6	11	17	<b>χ<sup>2</sup> -Value</b>		.219			
<b>Negative</b>	18	25	43	<b>df</b>		1			
<b>Prevalence rate (%)</b>	25%	30.6%		<b>P- value</b>		.64			
<b>OR (95% CI)</b>	0.75 (.23-2.42)								
<b>Total</b>	24	36	60						

In our study, we found that the males [25%, 95% CI: 0.75 (.23-2.42)] were more resistant than the females (30.6%) to paramphistomiasis. A study conducted by Chowdhury et al. also recorded a higher prevalence rate in females (39.46%) than in males (27.13%), which is consistent with our findings [23]. The variability in rates of infection between male and female cattle may be influenced by sample size variation, hereditary host susceptibility, stress, and malnutrition.

No significant relation was established between the prevalence rate and the following factors throughout the study (Table 2). Accordingly, Ahmed et al. 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 these elements as potential risk factors for bovine paramphistomiasis [20, 26]. These variations might 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 [24, 27].

#### 4. CONCLUSIONS

The study reveals that the overall prevalence of paramphistomiasis in cattle was 28.3%, 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.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. IFPRI. AES Levant. Annual Report. Available from (2015 Annual report | IFPRI : International Food Policy Research Institute); 2015.
2. DLS. Department of Livestock Services: An Overview. Ministry of Fisheries and Livestock, Government of the People Republic of Bangladesh, Dhaka; 2013.
3. BBS. Bangladesh Bureau of Statistics; 2021-2022. Available: <http://www.bbs.gov.bd/site/page/b588b454-0f88-4679-bf20-90e06dc1d10b/>
4. Khan T, Nasreen N, Shater AF, Khan W, Khan A, Kamal M, Vinueza R, Leon R, Alhimaidi AR, Al-Jabr OA. Risk factor analysis for the prevalence of gastrointestinal parasites found in large ruminants in Lower Dir Khyber Pakhtunkhwa Pakistan. Saudi J. of Bio. Sci. 2021;28(12):7022–7026. DOI:<https://doi.org/10.1016/j.sjbs.2021.07.078>
5. Afazuddin M. General incidence and therapeutic measures of parasitic diseases in cattle of saver Military Dairy Farm. M. S. Thesis. Submitted to the Department of Medicine, Bangla. Agri. Uni., Mymensingh.
6. Jabber MA, Green DA. The status and potential of livestock within the context of Agricultural Development policy in the Bangladesh. The University of Wales. InHelm. Abstr. 1983;40:2267.
7. Dey AR, Begum N, Biswas H, Alam MZ. Prevalence and factors influencing gastrointestinal parasitic infections in sheep in Bangladesh. Ann. of Para. 2021;67(2):187–194. DOI:<https://doi.org/10.17420/ap6702.328>
8. Hossain M, Sultana N, Akter S, Labony S, Anisuzzaman A. A retrospective survey of gastrointestinal parasites in livestock of hilly areas in Mymensingh. J. of Bang. Agri. Uni. 2021; 19(3):332. DOI:<https://doi.org/10.5455/jbau.93883>
9. Elelu N, Ambali A, Coles GC, Eisler MC. Cross-sectional study of *Fasciola gigantica* and other trematode infections of cattle in Edu Local Government Area, Kwara State, north-central Nigeria. Par. and Vect. 2016;9(1):1–11. DOI:<https://doi.org/10.1186/s13071-016-1737-5>
10. Khedri J, Radfar MH, Borji H, Mirzaei M. Prevalence and intensity of *Paramphistomum* spp. In cattle from south-eastern Iran. Ira. J. of Par. 2015;10(2):268–272.
11. Boray JC. Studies on intestinal amphistomosis in cattle. Aus. Vet. J. 1959;35(6):282-7.
12. Soulsby EJ. The evasion of the immune response and immunological unresponsiveness: parasitic helminth infections. Immunology Letters. 1987 Dec 1;16(3-4):315-20.
13. Pfukenyi DM, Mukaratirwa S. Amphistome infections in domestic and wild ruminants in east and southern Africa: A review. Onder. J. of Vet. Res. 2018;85(1):1–13.

- DOI:<https://doi.org/10.4102/ojvr.v85i1.1584>
14. Elelu N, Eisler MC. A review of bovine fasciolosis and other trematode infections in Nigeria. *J. of Helm.* 2018 Mar;92(2):128-41.
  15. Sintayehu M, Mekonnen A. Prevalence and intensity of Paramphistomum in ruminants slaughtered at Debre Zeit industrial abattoir, Ethiopia. *Global Veterinaria.* 2012;8(3):315-9.
  16. Ahmed R, Biswas PK, Barua M, Alim MA, Islam K, Islam MZ. Prevalence of gastrointestinal parasitism of cattle in Banskhalia upazilla, Chittagong, Bangladesh. *J. of Adv. Vet. and Ani. Res.* 2015;2(4):484–488.  
DOI:<https://doi.org/10.5455/javar.2015.b113>.
  17. Alim MA, Das S, Roy K, Sikder S, Mohiuddin, Masuduzzaman M, Hossain MA. Prevalence of gastrointestinal parasitism in Cattle of Chittagong Division, Bangladesh. *Wayam. J. of Ani. Sci.* 2012; P 2aro012-578.  
Available:<http://www.wayambajournal.com>
  18. Akanda MR, Hasan MMI, Belal SA, Roy AC, Ahmad SU, Masud AA, Das R, Masud. A survey on prevalence of gastrointestinal parasitic infection in cattle of Sylhet Division in Bangladesh. *Vet. Par.* 2013;27(2):31–49.
  19. Chowdhury TA, Shanzana P, Akter M. A questionnaire survey on common animal husbandry and hygiene practices among the small scale livestock farmers in Suburban Area of Sylhet, Ban. *Agri. & Vet. Sci.* 2018;2(1):38–48.
  20. Paul A, Talukder M, Begum K, Rahman M. Epidemiological investigation of Paramphistomiasis in cattle at selected areas of Sirajgonj district of Bangladesh. *J. of the Ban. Agri. Uni.* 2012;9(2): 229–232.  
DOI:<https://doi.org/10.3329/jbau.v9i2.10992>
  21. Atia HHA. Prevalence and risk factors of cattle paramphistomiasis in Omdurman locality, Khartoum State, Sudan; 2015.
  22. Hazzaz M, Kabir B, Sabrin MS, Islam M, Maqsud M, Mahmud MS. Studies on the degree of infection of gastrointestinal parasites in cattle at Sher - e - Bangla Nagar Area , Dhaka , Bangladesh. *Int. J. of Life Sci. and Eng.* 2017;10(10): 2381–6988.
  23. Chowdhury TJ, Hossain MT, Akhter S, Uddin MB, Chowdhury MSR, Rahman MM, Hossain MM. Coproscopic and slaughter house study of paramphistomiasis in cattle at sylhet division of bangladesh. *J. Adv. Parasitol.* 2019;6(3):35-40.
  24. Ghosh KK, Mony TJ, Jalal MS, Islam MS. Study on paramphistomiasis in cattle at sonatala upazila, bogra, Bangladesh. (*abulmoschus esculentus* L.). *J. Adv. Parasitol.* 2014;1(1):4 – 5.
  25. Sarder SA, Ehsan MA, Anower AKMM., Rahman MM, Islam MA. Incidence of liver flukes gastro-intestinal parasites in cattle, Bang. *J. of Vet. Med.* 2006;4(1):39–42.
  26. Arowolo OB, Mohammad BR. Prevalence of Paramphistomum Species in Cattle Slaughtered At Gwagwalada Abattoir, Abuja, Nigeria. *Паразитология.* 2020;54(6):514–521.  
DOI:<https://doi.org/10.31857/s123456780606005x>
  27. Okafor FC, Mbata G, Anosike J. Studies on Patamphistomum cervi (Schrank, 1790) infection of ruminants in Imo state, Nigeria with special reference to the role played by *Bulinus b. forskalii* (Ehrenberg) in their transmission. *Bull. of Ani. Heal. and Pro. in Africa.* 1988;38:142-146.

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