

ORIGINAL ARTICLE

**Prevalence and associated factors of balantidiasis in buffaloes of Bhola district, Bangladesh**

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**Abstract**

**Background:** *Balantidium coli* is an important enteric protozoan disease of livestock. This study has been undertaken to investigate the prevalence and associated factors of balantidiasis in buffaloes of Bhola district, Bangladesh.

**Methods:** A cross sectional study was carried out from March 2018 to February 2019. A total of 200 buffalo fecal samples were examined through direct smear method. The difference of the prevalence among different variables was evaluated by chi-square test.

**Results:** The overall prevalence of balantidiasis was observed to be 39.0%. Prevalence of *B. coli* infection was relatively higher in adult buffaloes (44.44%) aged more than 5 years than young (42.65%) aged > 2- ≤ 5 years and buffalo calves (25.49%) aged ≤ 2 years. Higher prevalence of *B. coli* was observed in female (43.31%) than male (31.51%) buffaloes. Significantly higher prevalence of *B. coli* infection was observed in rainy season (52.22%) than summer 25 (31.25%) and winter season (20%).

**Conclusions:** Preventive and therapeutic measures against balantidiasis should be undertaken in rainy season.

**Keywords:** Prevalence, Factors, Balantidiasis, Buffaloes

## **Introduction**

Livestock resources necessarily encompass animal health care and welfare, quality production factors, and effective rearing to keep pace with expansion of entrepreneurship related to concerned industries. The population of livestock in Bangladesh is currently estimated to comprise 25.7 million cattle, 0.83 million buffaloes, 14.8 million goats, 1.9 million sheep, 118.7 million chicken and 34.1 million ducks (DLS, 2019). Buffaloes play an important role in the national economy and trade of Bangladesh. In Bangladesh, most of the buffaloes are reared in coastal region due to very much fond of water to take bath in hot weather as they have fewer sweat glands. Most of the buffaloes in Bangladesh are reared in free range condition. Some household buffaloes are also found. In most of the cases, the hygienic condition is very poor in their management system. Most of the buffaloes of Bangladesh are weak, unhealthy, emaciated and their production performance is not satisfactory due to various diseases and disorders. Among many constraints, parasitism is thought to be a major cause that hinders the development of livestock population including buffaloes in Bangladesh. Among the parasitic diseases, protozoan diseases have great importance in ruminants and other animals. Balantidiasis is protozoan disease caused by *Balantidium coli*: a common disease of ruminants (cattle, buffaloes, sheep and goats), pig, monkey, chimpanzee, orangutan, guinea pig and man (Samad, 1996a). *B. coli* naturally stay in the caecum, colon and rectum of apparently healthy animals, but under certain circumstances it produces clinical disease (Samad, 1996a). It has two developmental stages, a trophozoite stage and a cyst stage and usually affects the large intestine from the caecum to the rectum. The trophozoite is motile having two nuclei (macro and micronucleus) and contains cilia around its ovoid shaped body, naturally voided with feces of the affected animals and contaminates food and water (Soulsby, 1982). Infection occurs through ingestion of food or water contaminated with cysts and pass through the digestive system of the host and excystment occurs in large intestine. *B. coli* also produces hyaluronidase (Temple and Lipenko, 1957)

which potentially enhances its ability to invade the intestinal mucosa, causing enteritis manifested by loose feces to watery persistent foetid diarrhea, dehydration, loss of appetite, retarded growth, loss of body condition and reduced production performance of the animals. The organism has cosmopolitan distribution and zoonotic importance. Transmission in humans occurs via the faecal-oral route from the normal host- pigs, where it is asymptomatic (Schuster and Ramirez, 2008). In 1904, the first case of balantidiasis has been reported in Philippines. Globally less than 1% of the human population is infected with this protozoa. Pigs are a major reservoir of the parasite, and infection of humans occurs more frequently in areas where pigs are come in contact with people. The geo-climatic condition of Bangladesh is favorable for the development and survival of various parasites including *B. coli* (Datta *et al.* 2004). Prevalence of *B. coli* in domestic animals and pig is very high in the developing countries. Islam *et al.*, (2000) and Haque *et al.* (1998) found 3.5% and 2.19% of clinical balantidiasis in water buffaloes and cattle, respectively. Motaleb (1996) recorded 1.5% and 2.2% prevalence of *B. coli* in cattle and buffaloes, respectively. The prevalence of *B. coli* in cattle was reported to be 25% in Pakistan (Bilal *et al.*, 2009). Palanivel *et al.* (2005) also reported 45.45% and 51.43% of *B. coli* in cattle and buffaloes, respectively. There are scant reports on the epidemiology of *B. coli* infection in buffaloes of Bangladesh. The investigation of balantidiasis has not been performed yet in the selected coastal regions of Bangladesh. So, present study has been undertaken to investigate the prevalence and associated factors of balantidiasis in buffaloes at some selected coastal areas of Bhola district, Bangladesh.

## **Materials and Methods**

### **Study area and duration**

The study was carried out in different selected areas of Bhola district, Bangladesh. The study

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was conducted during March 2018 to February 2019.

### **Study Population and Sampling**

A total of 200 diarrheic buffaloes were examined throughout the study time to determine the prevalence of balantidiasis. Samples were selected randomly irrespective of age, sex, health status, management system and seasons of the year. The age of the buffaloes was determined by examination of teeth as well as interviewing the farmers (Rahman and Hossain, 1997). According to age, buffaloes were categorized into three groups, namely, buffalo calf ( $\leq 2$  years), young ( $2 < \leq 5$  years) and adult ( $> 5$  years). The health status of buffaloes was categorized into three groups, namely, poor, medium and healthy buffaloes (according to eye inspection and body condition score) (Rahman and Hossain, 1997). The body condition score 1 indicates emaciated, 2 indicates thin, 3 indicates average, 4 indicates fat and 5 indicates obese condition (Anitha *et al.* 2011). The year was divided into conventional three seasons, namely, summer (March-June), rainy (July-October) and winter (November-February). The herd size were divided into three groups-small (1-10), medium (11-50) and large sized ( $>50$ ).

### **Collection of fecal samples**

The fecal samples were collected directly from the rectum of selected animals by wearing of apron, hand gloves and gumboot to avoid contamination. The fecal samples were kept in plastic vials and brought to the laboratory keeping them into ice box in presence of 10% formalin and examined as early as possible.

### **Examination of feces samples**

The collected fecal samples were examined by simple smear method with light microscope to identify the morphological features of trophozoites and cysts (Hendrix and Robinson, 2012).

## **Results and Discussion**

### **Prevalence of balantidiasis in buffaloes according to host factor**

Among 200 buffaloes, 78 buffalos were found positive with balantidiasis in study area. The overall prevalence of balantidiasis was 39.0% (95% Confidence Interval: 32.7-46.2) (Table 1). Roy *et al* (2011) reported 45.03% balantidiasis infection in Bangladesh. Palanivel *et al* (2005) also reported the prevalence of *B. coli* infection as 45.45% and 51.43% in cattle and buffaloes, respectively. Motaleb (1996) reported very low prevalence of balantidiasis in cattle (1.5%) and buffaloes (2.2%) Bangladesh. The variations of the findings might be due to difference in the sample size, geographical locations/topography, climatic condition, management and nutritional factors of the animals.

Prevalence of *B. coli* infection in buffaloes was relatively higher in adult (44.44%) than young (42.65%) and buffalo calves (25.49%) (Table 1), but the results were statistically non significant. Similar to this finding, Roy *et al* (2011) also reported balantidiasis in adult (49.52%), young (39.29%) and buffalo calves (27.78%). Islam *et al* (2000) also reported the highest prevalence *B. coli* infection in buffaloes of above 5 years age group (4.0%) than in animals 2-5 years (3.48%) and below 2 years of age (3.24%). Various stress conditions (pregnancy, lactation, parturition, transportation of goods etc.) in adult buffaloes and faulty management system might be responsible for higher prevalence of *B.coli* infection (Roy *et al.*, 2011).

In this study, the prevalence of *B. coli* infection was relatively higher in female (43.31%) than male (31.51%) buffaloes (Table 1). Paul *et al.*, (2019) also reported higher prevalence of balantidiasis in female (58.8%) than male (45.8%) cattle. Roy *et al.*, (2011) reported higher prevalence of balantidiasis in female (47.32%) as compared with male (38.46%) buffaloes. The physiological alteration of the females during pregnancy, lactation and parturition (hormonal influences) and insufficient feed supplement may lead to lowering of the body resistance and suppression of immune system (Kourtis *et al.*, 2014). It has been reported that higher levels of prolactin and progesterone hormones make the female individual more susceptible to any infection (Lloyd, 1983).

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Table 1. Prevalence of balantidiasis in buffaloes according to host factor

Variable	Category	No. of observation	Balantidiasis (+) N (%)	Chi square value	P value
Age	Calves ( $\leq 2$ years)	51	13(25.49%)	2.71	0.25
	Young ( $> 2 - \leq 5$ years)	68	29(42.65%)		
	Adult ( $> 5$ years)	81	36(44.44%)		
Sex	Male	73	23(31.51%)	2.71	0.10
	Female	127	55(43.31%)		
Total		200	39%		

**Prevalence of balantidiasis in buffaloes according to management factor**

The health status of hosts had a profound effect on the prevalence of *B. coli* infection in buffaloes. Prevalence of *B. coli* infection was relatively higher in poor health buffaloes (41.03%) than that of medium (33.33%) and healthy buffaloes (30.77%) (Table 2). Roy *et al.*, (2011) reported significantly higher prevalence of balantidiasis in poor health buffaloes (78.95%) than that of healthy buffaloes (24.47%). Higher prevalence of *B. coli* infection in poor health animals might be due to malnutrition and lead to suppression of immune system (Lloyd, 1983). Lapage (1962) also reported that malnourished animals are more susceptible to any infection as they are immunocompromised to microbial agents. The fecundity of parasites is usually increased in immunosuppressed animals (Etter *et al.* 1999).

The prevalence of *B. coli* infection was found to be higher in buffaloes which were provided drinking water from pond source (43.75%) than river (42.11%) and tube well water (21.88%) as shown in Table 2. Buffaloes in the coastal areas

usually take bath in the river and pond water. For this reason, pond and river water are the common source of infection (Alua *et al.*, 2018).

The higher prevalence of balantidiasis was observed in Bathan area (40.94%) as compared with household buffaloes (33.33%). The buffaloes of the Bathan area are reared without adequate balanced feed, water and medication. The greater exposure to surface water and inadequate feed supply might be responsible for relatively higher prevalence of balantidiasis in the buffaloes of the Bathan area.

The highest prevalence of balantidiasis was observed in larger sized herd (more than 50) than small (1-10) 33.33% sized herd (Table 2). Most of the buffaloes in large farm group were reared in Bathan system (free grazing site) in Bangladesh. The close contact in larger herds may increase the risk of infection.

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Table 2. Prevalence of Balantidiasis according to the management factors

Variable	Category	No. of observation	Balantidiasis (+) N (%)	Chi square value	P value
Health status	Poor	156	64 (41.03%)	0.63	0.73
	Medium	18	6 (33.33%)		
	Good	26	8 (30.77%)		
Sources of water	River	152	64 (42.11%)	1.04	0.59
	Pond	16	7 (43.75%)		
	Tube well	32	7 (21.88%)		
Sources of buffaloes	Bathan area	149	61 (40.94%)	0.92	0.34
	Family source	51	17 (33.33%)		
Farm size	Large	68	32 (47.06%)	2.89	0.24
	Medium	81	29 (35.80%)		
	Small	51	17 (33.33%)		

**Season wise prevalence of *B. coli* infection in buffaloes**

Significantly higher prevalence of balantidiasis in buffaloes were observed during rainy season (52.22%) followed by summer (31.25%) and winter (20.00%) season (Table 3). Mamun (2008) who also observed the higher prevalence of *B. coli* infection in buffaloes during rainy season (54.72%), followed by winter season (33.64%) and summer season (30.14%). Islam *et al* (2000) reported the highest prevalence of clinical balantidiasis during summer season (4%) followed by rainy (3.69%), autumn (3.44%) and winter (3.07%) in water buffaloes at Madhupur

Thana of Tangail district, Bangladesh. Roy *et al* (2011) reported balantidiasis were significantly higher in buffaloes during rainy season (60%) followed by summer (42.10%) and winter (32.76%) season. The difference between present and previous findings can be explained by the variation in the geographical location (topography) of the experimental area, techniques used in sample examination, contamination of feed and water etc. However, the highest prevalence of *B. coli* in rainy season might be due the high humidity and heavy rain fall which increasing the chance of contamination of feed and water with organism.

Table 3. Prevalence of balantidiasis according to the season

Level	No. of observation	Balantidiasis (+) N (%)	Chi square value	P value
Summer	80	25 (31.25%)	5.41	0.02
Winter	30	6 (20.00%)		
Rainy	90	47 (52.22%)		

**Acknowledgement**

The authors are grateful to the Research and Training Centre (RTC), Patuakhali Science and Technology University, Patuakhali, Bangladesh for funding.

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