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Prevalence of *Balantidium coli* infection in man in Mymensingh, Bangladesh

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ABSTRACT

An epidemiological survey of *Balantidium coli* infection (balantidiasis) in man was studied during July to November, 2010. A total of 150 samples were examined through Stoll's ova counting technique of which 6.67 % were found to be infected with *B. coli*. In this study, prevalence of balantidiasis in relation to age, sex, socio-economic status and month of the year was also studied. Prevalence of *B. coli* was significantly higher in adult aged >6 years (10.77%) than in young aged < 6 years (3.53%). Higher prevalence was observed in male than that of female. Relatively higher prevalence of *B. coli* was observed in July and September months. Prevalence of *B. coli* was significantly ($p<0.05$) higher in lower class than middle class people. The cysts of *B. coli* per gram of stool were 100-600 with a mean value of 232.0±12.18 cysts per gram stool. The occurrence of *B. coli* infection in man indicating a significant health threat of this zoonotic parasite in Bangladesh. Further extensive research is needed to understand the transmission dynamics of this parasite for taking necessary steps in controlling balatidiasis in Bangladesh.

Key words: Prevalence, *Balantidium coli*, man, Bangladesh.

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INTRODUCTION

Balantidium is the only ciliated protozoan known to infect humans and is the largest protozoan infecting humans and non human primates. *B. coli* have two developmental stages, a trophozoite stage and a cyst stage and usually affect 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 faeces of the affected individuals and contaminates food and water (Samad, 1996). Cysts are round shaped, smaller than trophozoites and have a tough, heavy cyst wall made of one or two layers and formed during the adverse climatic condition. Infection occurs when the cysts are ingested with contaminated food or water and pass through the digestive system of the host where excystment (in large intestine) takes place to produce trophozoites. *B. coli* fundamentally affect the colon and causes clinical manifestation from asymptomatic to serious dysenteric forms (Lazar et al., 2004). *B. coli* also produces hyaluronidase (Tempels and Lipenko, 1957) which potentially enhancing its ability to invade the intestinal mucosa causing enteritis.

Balantidiasis is a zoonotic disease and is acquired by humans via the fecal-oral route from the normal host, the pig, where it is asymptomatic. Water is the vehicle for most cases of balantidiasis. Human-to-human transmission may also occur. *B. coli* habitats in humans remain in cecum and colon. Humans may remain asymptomatic, as does the pig, or may develop dysentery similar to that caused by *Entamoeba histolytica*. Total dysentery caused by *B. coli* in male patient a fatal case is reported from Costa Rica (Hernandez et al., 1993). *B. coli* may also cause acute cecal appendicitis in

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man (Onzalez, 1978). Another fatal of *B. coli* case is also reported in a woman suffering from anal cancer (Vasilakopolou et al., 2003). Pneumonia has also been reported in patients with chronic lymphocytic leukemia (cancer) related immunosuppression and has not always been associated with direct contact of pigs (Anargyrou et al., 2003). Death is an infrequent consequence of balantidiosis, but in developing countries with under nourished and over parasitized populations; it can make the difference between a healthy life and chronic debilitation.

The geo-climatic condition of Bangladesh is favourable for the development and survival of various parasites including *B. coli* (Datta et al., 2004). In India, Kaur et al. (2002) reported 2.4% prevalence of *B. coli* in children. In many developed countries, the data on the prevalence of *B. coli* were published in an efficient manner as an aid to combat balantidiasis more efficiently. Several reports on the epidemiological surveys of protozoan parasites in animals and humans are available in Bangladesh but only a few reports of balantidiasis in man have been published. A detailed study of the disease pattern is necessary. Therefore, the present study was undertaken with the aim to study the prevalence of *B. coli* infection of man in relation to age, sex and socio- economic condition and months of the year in man in Bangladesh.

MATERIALS AND METHODS

Study area

Fecal samples of man were collected from different sites of Mymensingh Sadar, Muktagachha and workers of Bangladesh Agricultural University Dairy Farm (BAUDF). Morphological examination was done in the Department of Parasitology, Bangladesh Agricultural University, Mymensingh, Bangladesh. The research activities were carried out for a period of five months, from July to November, 2010.

Selection of sample

One hundred and fifty (150) stool samples (one sample from one man) were collected randomly irrespective of age, sex, health, socio-economic status and months of the year from the study areas. Most of the man live in the rural areas and reared livestock in their house. The age and sanitary condition was determined from interrogating the farmers.

Collection and examination of stool samples

Plastic bottles were supplied to the selected farmers who kept their stool in the supplied bottles. In the next morning, the stool containing bottles were collected and labeled properly. Then the samples were brought to the laboratory in presence of 10% and examined as early as possible. The stool samples were examined by Stoll's Ova counting technique for counting the number of cysts or trophozoites per gram of stool. The cyst and trophozoite were identified by their characteristic morphological features as described by Soulsby (1982).

Statistical analysis

F test was performed to compare two variables in this study by using the Statistical Package for Social Sciences (SPSS) program. Odds ratio were calculated according to the formula given by Schlesseman (1982).

RESULTS

Prevalence of *B. coli* infection in man

The prevalence of *B. coli* was 6.67%. The total cyst per gram of faeces was 100-500 with an average count 232.0±12.18. The result is in accordance with the study of Bouree et al. (1984) who found 6% prevalence of balantidiasis in man. The findings in the present study is much higher than the earlier reports of Pampiglione et al. (1987) and Adekunle et al. (2002) who recorded 0.1% and 0.8% prevalence of balantidiasis in Itali and Nigeria; respectively. The variations between the present and previous findings might be due to difference in geographical locations, period of study, climatic condition of the research area, and nutritional factors of the man.

Age related prevalence of *B. coli* infection

The age specific prevalence of *B. coli* infection was presented in the table 1. The prevalence of *B. coli* was higher (10.77%) in aged >6 years than aged <6 years (3.53%). The calculated odds ratio reveals that man > 6 years were 3.33 times more likely to be infected by *B. coli* than that of < 6 years. It is observed that the age of the man had significant effect ($p<0.01$) on the prevalence of *B. coli* infection. Man aged > 6 years are more susceptible (10.77%) to balantidiasis than young aged < 6 years (3.53%). This report is supported to the earlier findings of Biu et al. (2008) who reported the prevalence of balatidiasis more in human aged > 6 years (12.3%) than aged ≤ 6 years (3.4%). It is assumed that man aged > 6 years gets more exposure in environment, so as they take more contaminated food and water as a source of infection. On the other hand, man aged ≤ 6 years had little opportunity to get contaminated food and water as they are mostly depend upon the mother milk.

Sex related prevalence of *B. coli* infection

Prevalence of *B. coli* was higher in male (10.00 %) than female (2.86%) and males were 3.77 times more likely to be susceptible to balantidiasis than that of female (Table 1). The present finding was supported by Biu et al. (2008) who reported that prevalence of balantidiasis was higher in male (11.5%) than female (3.4%).

Table 1
Age related prevalence of balantidiasis in man

Factors	Age	No. of positive cases		Cyst per gm for stool		Odds ratio
		No.	Prevalence (%)	Range	Mean±SD	
Age	<6 years (n=85)	3	3.53	100-500	300.0±26.5	>6 years Vs < years = 3.33
	>6 years (n=65)	7	10.77	200-200	250.0±19.1	
Sex	Female (n=70)	2	2.86	100-500	400.0±30.0	Male Vs female = 3.77
	Male (n=80)	8	10.00	100-200	250.0±14.3	
Class	Medium (n=52)	2	3.85	100-400	300.0±24.2	Low Vs Medium = 2.22
	Lower (n=98)	8	8.16	100-500	393.0±22.2	
Total	150	10	6.67	100-600	125.0±4.50	
P-value				0.0256*		

[1] n= Total number of samples examined
** Indicates significant ($p<0.01$)

Table 2
Monthly prevalence of balantidiasis in man

Months (n)	No. of positive cases		Cyst per gm for stool	
	No.	Prevalence (%)	Range	Mean±SD
July (45)	5	11.11	100-500	300.0±26.5
August (58)	3	5.17	100-200	220.0±16.4
September (9)	1	11.11	100-600	240.0±20.7
October (28)	1	3.57	100-100	250.0±19.1
November (10)	0	0.00	0.00	0.00
P-value			0.0025**	

[1] n= Total number of samples examined.
** Indicates significant ($p<0.01$)

Month related prevalence of *B. coli* infection

The prevalence of *B. coli* in man was significantly higher during the July and September (11.11%) followed by August (5.17%), October (3.57%) No infection was observed in November (Table 2). This finding is supported to the report of Biu et al. (2008) who observed the higher prevalence of *B. coli* in man during July (10.8%), followed by August (6.10. %) and September (10.5%) in Nigeria. The present finding is differed from the finding of Ogunba (1977) who reported higher prevalence of balantidiasis in November This difference might be due to difference in geographical location with different settings of environment and hygiene

Effect of socio-economic status on prevalence of *B. coli* infection

The prevalence of *B. coli* infection in relation to socio-economic status was presented in the Table 1. It was observed that the prevalence of *B. coli* was significantly ($P<0.05$) higher in lower class man (8.16%) than medium class man (3.85%). The calculated odds ratio revealed that lower class man was 2.22 times more likely to be infected by *B. coli* than middle class man. This finding is supported to the report of Adekunle et al. (2003) who observed the higher prevalence of balantidiasis in lower class (37.1%) than medium (33.4%) class man. Lapage (1962) found that malnourished animals are more susceptible to any infection as they are immunocompromised. However the higher prevalence of *B. coli* in lower class people is probably due to the poor dietary habit, poor sanitary condition, drinking of contaminated water and lack of knowledge about health and hygiene.

Balantidiasis is a zoonotic disease, it is necessary to study the transmission dynamics of the parasite in Bangladesh in order to control the disease.

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