

INCIDENCE OF *BUXTONELLA SULCATA* IN JAFFRABADI BUFFALOES  
OF SOUTH-WESTERN GUJARAT, INDIA**Binod Kumar<sup>1,\*</sup>, Biswa Ranjan Maharana<sup>1</sup>, Amit Prashad<sup>2</sup>, Joice P. Joseph<sup>2</sup> and Bhavika R. Patel<sup>2</sup>****ABSTRACT**

Present study was conducted to investigate the incidence of *Buxtonella sulcata* infection in Jaffrabadi buffaloes presented at Teaching Veterinary Clinical Complex (TVCC), Veterinary College, Junagadh during January 2013 to December 2014. A total of 206 rectal faecal samples of buffaloes was collected and processed in laboratory. The  $\chi^2$  test was used to statistically analyse the significant differences ( $P \leq 0.05$ ) among variables observed. The overall incidence of ciliated protozoa infection was 35.0%. A significant difference ( $P < 0.001$ ) of *B. sulcata* infection was recorded in diarrhoeic (54.7%) and non-diarrhoeic (14.0%) animals. However, the intensity of infection was recorded higher in diarrhoeic than non-diarrhoeic animals. Moreover, a significantly ( $P < 0.001$ ) higher incidence of other gastrointestinal (GI) parasites were recorded in non-diarrhoeic (30.0%) animals with very low intensity of infection. Only small number of diarrhoeic animals showed *B. sulcata* infection along with other parasite i.e., mix infection (5.7%) whereas, no mix infections were recorded in non-diarrhoeic animals. The incidence of *B. sulcata* infection in older

animals (33.3%) was higher than young (18.2%) and adult (33.3%) animals. Similarly, incidence of *B. sulcata* infection in winter was recorded highest (43.8%) followed by monsoon (31.0%) and summer (31.0%). Statistically, no significant difference ( $P > 0.05$ ) was observed among the different season and age groups of animals. The present study demonstrated the higher incidence of *B. sulcata* infection in Jaffrabadi buffalo which is having problem of frequent diarrhoea.

**Keywords:** *Buxtonella sulcata*, ciliates, diarrhoea, *Bubalus bubalis*, buffalo, Junagadh

**INTRODUCTION**

According to the Directorate of Animal Husbandry, Gandhinagar, Gujarat state (2014), the state stands 4<sup>th</sup> position with 9.55% of total buffalo population of India (108 million). Buffalo contribute the major part in total milk production of Gujarat (55.61%) as well as the country (50.92%). Junagadh is having the rich population of Jaffrabadi buffalo as this place is coming within the breeding tract of Jaffrabadi buffalo. General animal health

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and any deviation in digestive process severely affects the animal production. *Buxtonella sulcata* which is morphologically similar to *Balantidium coli*, inhabits in gastrointestinal (GI) tracts of ruminants (Jameson, 1926). It was first reported and named by Jameson (1926) from caecum of the cattle.

Taxonomically, the *B. sulcata* was classified as: Kingdom: Protozoa, Phylum: Ciliophora, Class: Kinetofragminophora, Order: Trichostromatida, Family: Pyenotrichidae, Genus: *Buxtonella* (Al-Saffar *et al.*, 2010). Though *B. sulcata* supposed to be non-parasitic but different authors described it as parasites (Vasily and Mitchell, 1974; Henriksen, 1977). It is supposed that the increased invasion of the protozoon may result in the acceleration of the passage of alimentary contents in the digestive tract of dairy cows, thus causing clinical disorders such as diarrhoea or poor condition of animals. The prevalence of GI parasites and its severity of infection vary considerably depending on local environmental condition like humidity, temperature, rainfall, vegetation and management practices (Regassa *et al.*, 2006). The incidence of parasitic infections especially the *B. sulcata* in buffalo has not been studied yet in this region of Gujarat. Therefore, the aims of the present study were to determine the incidence of *B. sulcata* in Jaffrabadi buffalo in relation to age, season and digestive health.

## MATERIALS AND METHODS

During January 2013 to December 2014, 206 faecal samples were collected from Jaffrabadi buffaloes presented at Teaching Veterinary Clinical Complex (TVCC), Veterinary College, Junagadh with a various ailments like diarrhoea,

anorexia, weakness and others. Regularly, animals are brought to hospital for disease diagnosis and management from different parts of Junagadh district of Gujarat.

The faecal samples were directly collected from rectum of animals in a clean plastic container. The samples were subjected for direct smear examination and sedimentation technique to detect the trophozoite and cyst of *B. sulcata* and other gastro-intestinal (GI) parasites under compound microscope. Differentiation of *Buxtonella* cyst or trophozoites was based on morphological specific feature and by microscopic measurement by using ocular micrometer (Fox and Jacobs, 1986; Hong and Youn, 1995; Aayiz, 2005). To determine the degree of intensity of infection, number of trophozoites and /cysts were counted from about 20 microscopical fields for each sample (Cox, 1999). Randomly, few blood samples were also collected from the animals along with faecal sample and processed through standard procedure of Giemsa stained peripheral blood smear examination (Coles, 1986) to rule out the haemoprotozoan infections.

The case sheets of individual animals were maintained in laboratory which have the information regarding address of owner, date of sample collection, gender, age, sex, breed and clinical problems. Normal feces of buffalo is semi-solid in consistency. Watery or loose feces were considered as diarrhoeic. Buffaloes were also classified in three age group like below 1 year (young), 1 to 8 years (adult) and more than 8 years (old) based upon maturity. To study the effect of temperature and humidity on parasitic prevalence, study period was classified into various seasons like summer (March-June), monsoon (July-October) and winter (November-February).

### Statistical analysis

Statistical analysis was performed by SPSS 13.0 software on data of parasitic incidence in buffaloes in relation to age, season and digestive health. The  $\chi^2$ -test was used to compare parasitic incidence and were considered significant when  $P \leq 0.05$ .

## RESULTS AND DISCUSSION

The overall incidence of parasitic infections in buffalo was recorded as 58.3% which includes *Buxtonella sulcata*, other GI parasitic infections and mix infection (*B. sulcata* with other parasitic infections) at the rate of 35%, 20.4% and 2.9%, respectively. Faecal samples of 106 buffaloes were found loose or watery and classified as diarrhoeic. A significant difference ( $P < 0.001$ ) in parasitic infections between diarrhoeic (71.7%) and non-diarrhoeic (44.0%) animals had been observed (Table 1.)

Present study reveals that diarrhoeic buffaloes have higher intensity of *B. sulcata* infections with a history of chronic diarrhoea and mucus production, reduced appetite and milk production. The incidence of *B. sulcata* infection were recorded significantly higher ( $P < 0.001$ ) in diarrhoeic animals (54.7%) than animals without diarrhoea (14.0%). This finding coincides with the finding of Ganai *et al.* (2013) where animals with diarrhoeic faeces had a significantly higher ( $P < 0.0001$ ) infection rate (38.5%) than the animals with normal faeces (9.9%). Gastrointestinal parasite produce detrimental effects on the health and productivity of the animals. Usually they produce digestive disturbance which is manifested as diarrhoea, indigestion, dehydration, anorexia, weakness and loss of productivity. Though the *B. sulcata* is considered as non-pathogenic, some of the recent publications reports its role in pathogenesis (Tomczuk *et al.*, 2005; Roy *et al.*, 2011). However, there is a general view that the ciliated protozoon is a commensal of the alimentary tract of ruminants

Table 1. Incidence of *Buxtonella sulcata* and other parasitic infections in buffaloes of south-western Gujarat, India. Comparison of diarrhoeic Vs non-diarrhoeic animals.

Animal Group	Total Sample	<i>B. sulcata</i> positive (%)	Other parasitic infections (%)	Mixed infections <sup>c</sup> (%)	Total (%)
Diarrhoeic animal	106	58 (54.7)	12 <sup>a</sup> (11.3)	6 (5.7)	76 (71.7%)
Non-diarrhoeic animal	100	14 (14.0)	30 <sup>b</sup> (30.0)	0 (0.0)	44 (44.0%)
$\chi^2$ value		37.522*	11.061*	5.830**	6.233*
Total	206	72 (35.0)	42 (20.4)	6 (2.9)	120 (58.3)

<sup>a</sup>animals infected with GI parasites like *Eimeria* spp. and *Moniezia* spp.

<sup>b</sup>animals infected with parasites like Amphistomes, *Fasciola* spp., Strongyle, *Trichuris* spp., *Babesia* spp.

<sup>c</sup>animals infected with other parasites along with *B. sulcata*.

\* $P < 0.001$ , \*\* $P < 0.05$

and participates in the digestion of plant material (Becker and Hsiung, 1929; Vasily and Mitchell, 1974; Tomczuk *et al.*, 2005). Cysts of *B. sulcata* were round with a diameter ranging 69 to 104  $\mu\text{m}$  and vegetative forms 87 to 111  $\mu\text{m}$  x 65 to 94  $\mu\text{m}$ , with a curved groove running from the anterior end to the posterior end, recorded from faecal sample of buffalo (Figure 1). The present finding agreed with the previous report (Adhikari *et al.*, 2013; Pomajbikova *et al.*, 2013).

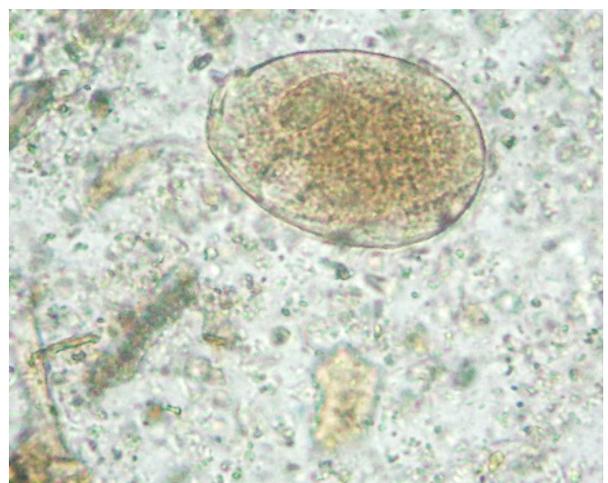
Though, the non-diarrhoeic animals were recorded with higher percentage of other parasitic infections (30.0%) like *Fasciola*, Strongyle, Amphistome, *Trichuris* and *Babesia*, the intensity of infection was very-very low. Non-diarrhoeic animals had the history of anorexia and reduced milk production. Data reveals that major cause of diarrhoea in buffalo was due to infection with *B. sulcata* followed by other parasite like *Eimeria* and *Moniezia*. Similar studies were performed in different parts of India (Ganai *et al.*, 2013) and world over (Tomczuk *et al.*, 2005; Al-Saffar *et al.*, 2010; Roy *et al.*, 2011; Al-Zubaidi and Al-Mayah,

2011; Adhikari *et al.*, 2013; Biswas *et al.*, 2014) show variable level of *B. sulcata* infection ranging from 21 to 71%. The differences in the percentages of infection could be due to many different factors, such as environmental conditions, animal, farm management practices and stress factors.

A higher rate of infection were recorded in winter season compare to summer and monsoon but the difference is statistically insignificant ( $P>0.05$ ) (Table 2). Fox and Jacobs (1986) showed that seasonal fluctuations in the prevalence of the infection and cyst excretion rates were related to changes in the diet and opportunities for transmission, furthermore, the delivery rate may be lead to an increase in prevalence of infection. Similarly, statistically insignificant ( $P>0.05$ ) higher incidence of *B. sulcata* infection was recorded in older animals compare to young and adults (Table 2). The present findings contradict the reports of Ganai *et al.* (2013) who reported the higher incidence *B. sulcata* infections in younger animals compare to adults. The cause of variation on the basis of age is difficult to explain, but it might



A



B

Figure 1. Cyst (A) and Trophozoite (B) of *Buxtonella sulcata* isolated from faeces of Jaffarabadi buffalo.

Table 2. Age and season wise incidence of *Buxtonella sulcata* infection in buffaloes of south-western Gujarat, India.

Season	Parameters	Total sample	Positive sample	Incidence (%)
	Monsoon		84	26
Summer		58	18	31.0
Winter		64	28	43.8
$\chi^2$ value			3.161*	
Total		206	72	35.0
Age	< 1 year (Young)	22	4	18.2
	1-8 years (Adult)	126	42	33.3
	> 8 years (Old)	58	26	44.8
$\chi^2$ value			5.355*	
Total		206	72	35.0

\*P&gt;0.05

be due to exhausted immune system, difference grazing area and managerial variation of the animals.

In this study, our observation was based on detection of the *B. sulcata* cysts/trophozoites in animals which have signs of diarrhoea and those with normal faeces. Observation reveals that the majority of buffalo having a symptoms of chronic diarrhoea in all the seasons and age infected with ciliated protozoa, *B. sulcate*, this indicates that *B. sulcata* can be considered as one of the agents of unexplained aetiology of diarrhoea in Jaffrabadi buffalo. Further studies are required to establish the role of this parasite in pathogenesis, its economic significance and to find out effective control strategies against it.

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