Prevalence of *Buxtonella sulcata* Infection in Bovines of Southern Haryana

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ABSTRACT

Buxtonella sulcata is considered as an opportunistic ciliate protozoan inhabiting the large intestine especially the colon of bovines. In this study, the prevalence of B. sulcata in bovines of southern Haryana is reported according to season, age and health status of animals. Coprological examination of faecal samples from cattle and buffaloes for B. sulcata revealed a prevalence rate of 25.69% and 34.65%, respectively. It was found that the highest prevalence was among heifers (52.90% and 33.84%), followed by calves (29.28% and 25.71%) and adults (8.69% and 13.63%) in both the species. The prevalence of this protozoan infection among diarrhoeic buffaloes and cattle were found as 38.18% and 31.57%, respectively with a statistical significance ($p<0.05$) when compared to non-diarrhoeic bovines. The seasonal prevalence study revealed highest incidence of B. sulcata infection in rainy season (45.13% and 35.84%) followed by winter season (37.96% and 28.57%) in both buffaloes and cattles of the study area. B. sulcata was considered as non pathogenic or commensal protozoa till recently, but its increased association with diarrhoea among animals suggests the need of further studies regarding its pathogenecity capacity.

Key Words: Buffaloes, *Buxtonella sulcata*, Cattle, Haryana, Prevalence

INTRODUCTION

Buxtonella sulcata is considered as an opportunistic ciliate protozoan inhabiting the large intestine especially the colon of bovines (El-Ashram *et al*., 2019). *Buxtonella sulcata* possess a dorsal ridge running in a sweeping curve from one end to the other end of body with a groove running down the middle. Outside the organism, they can survive in the form of a cyst, which is an endosporic form, but invasive in nature. The roundish oval cyst of this protozoan varies with a size of 80-100 µm in length by 60-80µm in width and is covered by a two layered capsule (Omeragic and Crnkic, 2015; Tomczuk *et al*., 2005). The consumption of fodder and water which is contaminated by cysts may lead to infection and the trophozoites are released from the cysts in the distal area of small intestine. In young and immunocompromised animals, it can become virulent and intensify the diarrhoeic symptoms, resulting in the reduction of the performance of animals and may leads to life threatening situation (Goz *et al*., 2006; Hasheminasab *et al*., 2015; Dianso *et al*., 2018). *Buxtonella sulcata* in bovines is often misdiagnosed as *Balantidium coli*, another pathogenic ciliate

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for animals and man. The present study was conducted to know the prevalence of *B. sulcata* in bovines of southern Haryana and to analyze the association of this parasite with regard to health status and age of animals and season of the locality.

MATERIALS AND METHODS

A total of 548 faecal samples brought routinely to the Disease investigation Laboratory, Mahendragarh, Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana were examined for the presence of *Buxtonella sulcata* from a period of June 2018 to May 2019. Among these, 144 and 404 faecal samples were from cattle and buffaloes, respectively. The animals were categorized into three age groups, viz. calves (under 1 year of age), heifers (1-3 years) and adults (above 3 years). The health status of the animals were recorded into two categories *viz*., diarrhoeic and non-diarrhoeic. The whole year study period was divided into four seasons *viz*., summer, winter, spring/autumn and rainy. All the faecal samples were processed by floatation and sedimentation methods (Soulsby, 1982). The data obtained were compiled and tabulated for finding out the prevalence of the parasite as per their age, health status and climatic seasons. The data was analyzed using chi-squared ($\chi 2$) test with a p value of <0.05 for calculating the statistical significance.

RESULTS AND DISCUSSION

Buxtonella sulcata cysts were identified based on the morphological features (Fig.1). The cysts of *B. sulcata* are round or oval shaped, slight yellowish coloured and have macronucleus, contractile vacuoles surrounded by a two layered capsule. The cysts are the resting stage of ciliated protozoan inhabiting the caecum and colon of bovines. Coprological examination revealed the presence of *B. sulcata* in 37 (25.69%) and 140 (34.65%) faecal samples from cattle and buffaloes, respectively in the current study. Studies from different parts of world also reported a wide range with regard to prevalence of *B. sulcata* infection. Al-Saffar *et al*. (2010) reported 24.5% prevalence of *B. sulcata* from Iraq, while Adhikari et *al.* (2013) reported 27% prevalence in cattle from Nepal. Ganai *et al*. (2015) reported 23.6% and 18.5% of *B. sulcata* infection from Jammu in cattle and buffaloes, respectively. Maharana *et al*. (2016) found an incidence of 4.57% and 15.79% of *B. sulcata* in cattle and buffaloes of Gujarat, respectively. They further reported that the highest incidence rate was of *B. sulcata* among all age groups, breed, sex and seasons when compared to all other gastrointestinal parasites undertaken in the study. Kumar *et al*. (2017) reported an incidence of 35% from buffaloes of Gujarat. Edith *et al*. (2018) reported an incidence rate of 35.48% and 54.48% in organized and unorganized dairy farms in Tamilnadu. The incidence rate as high as 87.9% was also reported from Poland in diarrhoeic cattle (Tomczuk *et al*., 2005). These differences in prevalence of infection from all over the world could be due to many different factors such as animal health status, farm management, environmental conditions and stress factors.

Fig. 1. Cysts of *Buxtonella sulcata* (10X)

Statistical analysis showed significant differences between age groups with the highest prevalence among heifers (52.9% and 33.84%) animals when compared to calves (29.28% and 25.71%) and adults (8.69% and 13.63%) (Table 1). Al-Saffar *et al*. (2010) reported significant differences of *B. sulcata* infection between various age groups of cattle in their study, with highest prevalence in young animals. Ganai *et al*. (2015) reported significantly higher infection rate in young bovines (33.1%) than the adults (13.9%). Das and Dekha (2017) reported lowest prevalence of *B. sulcata* in Assam as of 0.74%, 0.78% and 0.85% among calves, heifers and adult cattle, respectively.

Table-1. Age-wise prevalence of *B. sulcata* infection in bovines of Southern Haryana

Species	Age of animals	Samples examined	Samples positive	Prevalence (%)
Buffalo	< 1 year	140	41	29.28[b]
	1-3 year	172	91	52.90[a]
	> 3 year	92	8	08.69[c]
Cattle	< 1 year	35	9	25.71[b]
	1-3 year	65	22	33.84[a]
	> 3 year	44	6	13.63[c]

Groups with different superscripts differ significantly (p <0.05)

The current study documented a high incidence rate of *B. sulcata* infection in animals with diarrhoea. The prevalence of this protozoan infection among diarrhoeic buffaloes and cattle were found as 38.18% and 31.57%, respectively with a statistical significance when compared to non-diarrhoeic bovines (18.91% and 14.28%). High intensity of *B. sulcata* was associated with diarrhoea in animals (El-Ashram *et al*., 2019). Similar reports were documented by various researchers (Goz *et al*., 2006; Al-Saffar *et al*., 2010; Ganai *et al*., 2015; Hasheminasab *et al*., 2015; Kumar *et al*., 2017) and all of them found a significantly higher infection rate in diarrhoeic animals than the bovines with normal faeces. The presence of *B. sulcata* cysts in the faecal samples of diarrhoeic animals clearly indicates its close association with the enhancement of motility of digestive tract contents (Edith *et al*., 2018). *Buxtonella sulcata* can lead to pH changes of intestinal content of animals and multiplication of this protozoa causes a cytotoxic effect, resulting in lesions of intestinal mucosa followed by secondary bacterial infections (Das and Deka, 2017).

The seasonal prevalence study revealed highest incidence of *B. sulcata* infection in rainy season (45.13% and 35.84%) followed by winter season (37.96% and 28.57%) in both buffaloes and cattles of the study

area (Table 2). Maharana *et al*, (2016) also reported highest prevalence in monsoon in both cattle and buffaloes, followed by winter and summer in buffaloes and summer and winter in cattle, even though their data didn't differ significantly. Edith *et al*. (2018) also reported higher prevalence in unorganized dairy farms due to the poor hygiene and managemental practices followed. The seasonal variations in the prevalence of infection were reported by Fox and Jacobs (1986) also. The epidemiology of any infection varies according to the climatic conditions and managemental practices followed in that particular area. The humidity or moisture content along with optimum temperature during monsoon favours the growth and survival of parasitic infections. The lower and lowest prevalence in winter and summer respectively may be accorded due to the lack of moisture and optimum temperature during cold and hot climatic conditions (Laha *et al*., 2013; Maharana *et al*., 2018).

Table-2. Season-wise prevalence of *B. sulcata* infection in bovines of Southern Haryana

Season*	Species	Samples Examined	Samples Positive	Prevalence (%)
Rainy	Buffalo	113	51	45.13
	Cattle	53	19	35.84
Spring/Autumn	Buffalo	85	26	30.58
	Cattle	34	08	23.52
Winter	Buffalo	108	41	37.96
	Cattle	21	06	28.57
Summer	Buffalo	98	22	22.44
	Cattle	36	04	11.11

*__Season__ 1. Rainy-July, August, September. 2. Spring/Autumn-October, November, March. 3. Winter-December, January, February. 4. Summer-April, May, June.

CONCLUSION

Buxtonella sulcata may be considered to be a factor for persistent diarrhoea in animals. In the current study also, no clinical sign reported other than diarrhoea among the animals and no other gastrointestinal parasites were also diagnosed. The *B. sulcata* infection associated with diarrhoeal symptoms affected the optimal growth and cause reduction in productivity of bovines in the study area. *Buxtonella sulcata* was considered as non pathogenic or commensal protozoa till recently, but its increased association with diarrhoea among animals suggests the need of further studies regarding its pathogenic capacity.

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