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Epidemiological investigations of *Buxtonella sulcata* in buffaloes of Karnal district, Haryana

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Abstract

The present study was done for epidemiological investigations of *Buxtonella sulcata* in buffaloes of Karnal district. Epidemiological factors like location, age, sex, housing and clinical manifestation (Diarrhoeic or non-diarrhoeic) were studied. A total of 400 faecal samples were collected and screened using sedimentation technique. Pearson's chi-squared test was used to find out the relationship between various epidemiological factors and the presence of *B. sulcata* in the faecal samples. The overall prevalence of *B. sulcata* was 63.7% and in four blocks were Karnal 64.0%, Gharaunda 65.0%, Indri 65.0% and Nilokheri 61.0% of Karnal district. Sex wise prevalence in male and female were 76.13% and 60.25%, respectively. Age-wise prevalence between 1-6 months and above 6 months age of buffaloes was 64.28 and 63.15%, respectively. We studied the association of either Kutcha (mud) or Pukka (brick and concrete) floor on infection with *B. sulcata* and buffaloes kept on Kutcha floor showed 64.28% prevalence and those on Pukka floor showed 63.68% prevalence. We studied the association of *B. sulcata* infection with diarrhoea which revealed animals with diarrhoea were more positive 86.56% than those without diarrhoea 38.34%. The difference was significant.

Keywords: Buffaloes, *Buxtonella sulcata*, diarrhoea, Karnal and Haryana

Introduction

Protozoa which occur in the digestive system of ruminants are most frequently associated with digestive processes taking place in the rumen. Also, the colon is often inhabited by protozoa of the Ciliophora type, whose full role has not been fully explained. Protozoa that cause diarrhoea in animals are *Eimeria* spp, *Entamoeba histolytica*, *Balantidium coli*, *Buxtonella sulcata*, *Giardia lamblia*, *Cryptosporidium parvum*, *Isoospora* spp., etc. *Buxtonella sulcata* is considered as an opportunistic ciliate protozoan inhabiting colon of bovines (Levine, 1985; Bhatia, 2000) [13, 16]. In neonates and immuno compromised calves it multiplies fast, become virulent and cause clinical disease, characterized by debilitating diarrhoea that sometimes becomes severe and life-threatening in untreated animals (Fox and Jacobs, 1984; Goz *et al.*, 2006; Al-Zubaidi and Al-Mayah, 2011) [7, 8, 5]. Although, controversy about the pathogenicity of *B. sulcata* still present. However, a detailed study on the *B. sulcata* in buffaloes of Haryana has not been carried out so far.

Materials and Methods

A total of 400 faecal samples were collected from buffaloes of Karnal districts. Multi-stage stratified random sampling was done while collecting faecal sample. Four blocks were randomly selected from Karnal district and from each block four villages were randomly selected and 25 samples were collected from each village. Only one faecal sample was taken from each willing household covering a cross-section of the village. Common parasitological techniques like direct smear examination and sedimentation methods were used for faecal sample examination. The trophozoites and cysts were identified based on morphological features as described by Kalkal and Sangwan 2019. Effect of location (District), age (1-6 months and above 6 months), sex (male and female), floor (Kutcha and Pukka) and clinical manifestation (Diarrhoea and non-diarrhoea) on *B. sulcata* (present/absent) was epidemiological investigated. The data generated were statistically analysed using IBM SPSS software (version 20). Pearson's Chi-square test was applied for epidemiological investigations.

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Results

Majority of the *B. sulcata* positive animals showed cysts in the faecal samples but many fresh samples checked immediately also showed trophozoites (Fig. 1). The overall prevalence of *B. sulcata* was 63.7% and prevalence in four blocks was Karnal 64.0%, Gharaunda 65.0%, Indri 65.0% and Nilokheri 61.0% of Karnal district and details are also shown in Table 1. There was no significant difference in prevalence among the blocks. Age-wise prevalence of *B. sulcata* in Karnal district had a non-significant difference between the two age groups i.e. below 6 months 64.28% and above 6

months 63.15% and other details are shown in Table 2. Sex wise prevalence in male and females were 76.13% and 60.25%, respectively and the difference was not significant. Other details are shown in Table 3. The buffaloes kept in Kutcha floor had 64.28% of infection and those reared on Pukka floor had 63.68% of infection with a non-significant difference and other details is shown in Table 4. In Karnal district buffaloes having diarrhoea had 83.33% higher association of *B. sulcata* infection compared with those not having diarrhoea 54.74% with a significant difference and other details are shown in Table 5.

Table 1: Prevalence of *Buxtonella sulcata* in buffaloes in the various block of district Karnal, Haryana

Sr. no	Districts	Blocks	Total samples examined	Number of <i>Buxtonella sulcata</i> Positive samples	Per cent prevalence	Chi-square value	P value
1	Karnal	Karnal	100	64	64.0	0.465	.926
2		Gharaunda	100	65	65.0		
3		Indri	100	65	65.0		
4		Nilokheri	100	61	61.0		
Total			400	255	63.7		

Table 2: Host age association with *Buxtonella sulcata* infection in buffaloes in Karnal, Haryana

Location	Objects	Total samples examined	Number of <i>Buxtonella sulcata</i> Positive samples	Per cent prevalence	Chi-square value	P value
Karnal	Below 6 months	210	135	64.28	0.055	.815
	Above 6 months	190	120	63.15		

Table 3: Host sex association with *Buxtonella sulcata* infection in buffaloes in Karnal, Haryana

Location	Objects	Total samples examined	Number of <i>Buxtonella sulcata</i> Positive samples	Percent prevalence	Chi-square value	P value
Karnal	Male	88	67	76.13	7.490	.006
	Female	312	188	60.25		

Table 4: Floor type association with *Buxtonella sulcata* infection in buffaloes in Karnal, Haryana

Location	Floor type	Total samples examined	Number of <i>Buxtonella sulcata</i> Positive samples	Percent prevalence	Chi-square value	P value
Karnal	Pukka	358	228	63.68	0.006	.939
	Kutcha	42	27	64.28		

Table 5: Association of *Buxtonella sulcata* infection with diarrhoea in buffaloes in Karnal, Haryana

Location	Clinical manifestation	Total samples examined	Number of <i>Buxtonella sulcata</i> Positive samples	Per cent prevalence	Chi-square value	P value
Karnal	Diarrhoea	126	105	83.33	30.52	.001
	Non-diarrhoea	274	150	54.74		

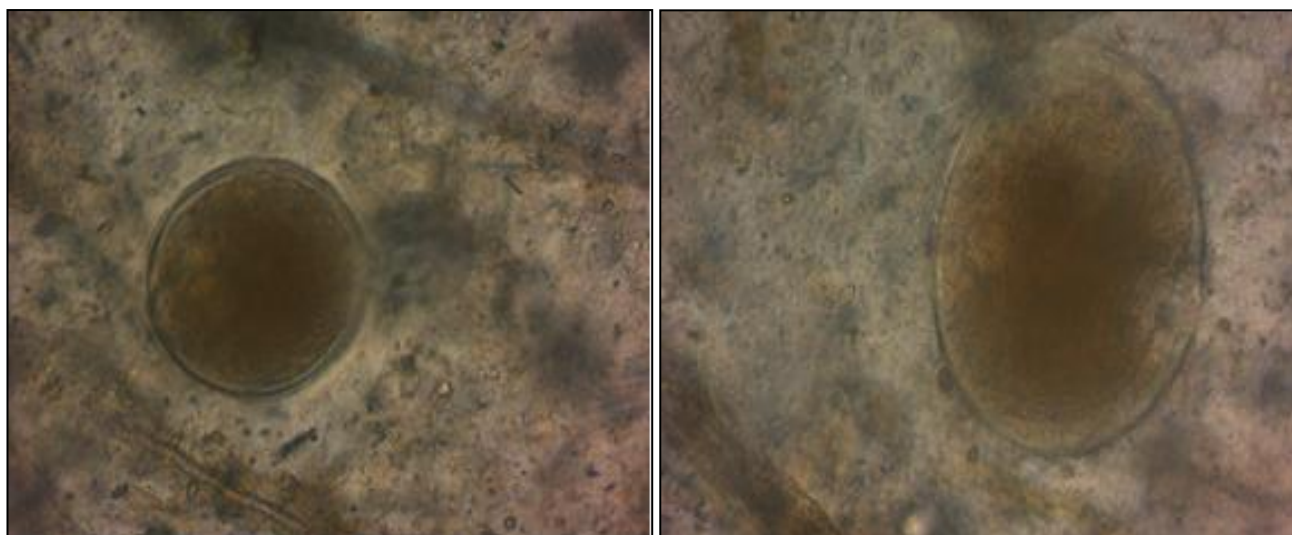


Fig 1: Picture showing cyst (Right) and trophozoites (Left) of *Buxtonella sulcata* with double-wall at (40x)

Discussion

The prevalence of *B. sulcata* in buffalo in Karnal districts was 63.7% districts of Haryana. Al-saffar *et al* (2013) [13] have reported an overall prevalence of 35% in buffaloes of Mosul, Iraq. In another study, carried out by Adhikari *et al* (2013) [1], a prevalence rate of 27% of *B. sulcata* in buffalo was reported in water buffalo in Chitwan Valley, southern Nepal. A more or less similar positivity rate 44.6% in cattle was also recorded by Fox and Jacobs, (1986) [7] in U.K. However, a higher positivity rate of 71.8% of *B. sulcata* in cattle of Denmark (Henriksen, 1977) [10] was reported. The prevalence rate varies in India from place to place as reported by earlier workers e.g. (Mamatha and Placid, 2006) [14] of 12.6% and 20.5% for cattle and buffaloes respectively. The reason for differences in the prevalence of infection could be due to many different factors, such as environmental factor, animal, farm management practices and stress factors (Al-Saffar *et al.*, 2010) [3]. Fox and Jacobs, (1986) [7] showed that seasonal variations 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 lead to an increase in the prevalence of infection. The high prevalence in Denmark would suggest that local environmental factors support the transmission and persistence of the parasite.

Host sex association with *B. sulcata* infection in buffaloes revealed that there was no significant difference between male 76.13%, female 60.25%. This finding is more or less similar to the one reported earlier by Hasheminasab *et al.*, (2015) [9], who recorded prevalence of *B. sulcata* was statistically higher in female 47.32% than male 38.46 in cattle. The possible reason for higher prevalence rate in female as compared to males may be the different management of females than males. Host age association with *B. sulcata* infection in buffaloes revealed that the difference between 1-6 months and above 6 months of buffaloes age had non- a significant difference. Our findings validate Al-Seady and Kawan, (2014) [4] who reported non-significant difference in infection rate between different age groups similarly Al-saffar *et al* (2013) [2] reported non-significant difference in infection rate between different age groups but Al-Saffar *et al.*, (2010) [3] reported significant difference between different age groups 3-8 months 11.36%, 2-7 years 35.29% and 4-8 years 28.75% similarly Hasheminasab *et al.*, (2015) [9] showed significant difference between different age groups. These findings indicate that animals of any age are susceptible to *B. sulcata* infections and age has little effect on the presence of *B. sulcata* infection.

We studied the association of either Kutcha or Pukka floor infection with *B. sulcata* in buffaloes. In the buffaloes kept in Kutcha floor showed 64.28% prevalence and those reared on Pukka floor showed 63.68% prevalence which had non-significant difference. Our finding is contrary to Hasheminasab *et al.*, (2015) [9] who reported prevalence of *B. sulcata* infection in cattle on Muddy (Kutcha) floor 50% was higher than cattle on concrete floor 24.32%. The difference in the results may due to high rainfall and type of Pukka floor like concrete or simple bricks in Karnal area but if we see the percentage of infection Kutcha floor is little higher than Pukka floor. This suggests concrete flooring reduces exposure to infection. Concrete flooring may be one of the factors to reduce prevalence of *B. sulcata*. Further investigation is needed as this study suggests it is a significant factor in reducing infection. Relationship of *B. sulcata* infection with the presence/absence of diarrhoea in buffaloes was studied.

Animals with diarrhoea were more likely to have *B. sulcata* infection. In Karnal district animals having diarrhoea had 83.33% higher association of *B. sulcata* infection from animals not having diarrhoea 54.74%. The difference was significant. These finding matches with several other researchers (Fox and Jacobs, 1986; Hong and Youn, 1995; Tomczuk *et al.*, 2005; Al-Saffar *et al.*, 2010; Al-Saffar *et al.*, 2013) [7, 11, 15, 3, 2] they also reported that *B. sulcata* can be one of the causative agents of diarrhoea in ruminants.

Conclusion

The prevalence of *B. sulcata* in Karnal was 63.7%. Age-wise prevalence of *B. sulcata* in Karnal district between the two age groups i.e. below 6 months 64.28% and above 6 months 63.15%. Sex wise prevalence in male and females were 76.13% and 60.25%, respectively. The buffaloes kept in Kutcha floor had 64.28% of infection and those reared on Pukka floor had 63.68% of infection. In Karnal district buffaloes having diarrhoea had 83.33% higher association of *B. sulcata* infection compared with those not having diarrhoea 54.74%. Further studies are required to establish the role of *B. sulcata* in pathogenesis, its economic significance and to find out effective control strategies against it.

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