



PREVALENCE OF *BUXTONELLA SULCATA* IN NEONATAL AND YOUNG CALVES IN AL-NASIR STATION AND SOME REGIONS IN BAGHDAD (AL-SHUALA AND GAZALIYA)

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Abstract

Neonatal diarrhea of calves is a major cause of economic loss in rearing young calves. *Buxtonella sulcata* may be a potential cause of diarrhea in these animals. This study aimed to investigate the prevalence of *B. sulcata* infection and its role in diarrhea in neonatal and young calves. A total of 250 fecal samples were collected from calves (110 male and 140 female, ages ranged 1-30 day, among which 98 had diarrhea). Two laboratory tests were used to detect *B. sulcata* cysts and trophozoites in fecal samples which are direct wet film method and ether-formalin sedimentation method. The overall rate of infection was 43.2%. There is a significant difference in the rate and intensity of infection between calves with and without diarrhea. Calves over 10 days old had higher rate of infection than calves under 10 day old with significant difference. *B. sulcata* may be a potential cause of diarrhea in neonatal and young calves when there is suitable conditions in the intestinal lumen that promote the parasite multiplication.

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Introduction

Diarrhea continues to be single cause of death in neonatal and young calves. Many parasitic agents are involved in this field, most important of which are *Cryptosporidium parvum*, *Eimeria* species and *Giardia* species. The role of *B. sulcata* as a parasitic cause of diarrhea in calves is not fully documented. Some studies [1,2,3] showed higher incident of diarrhea in calves having *Buxtonella sulcata* cysts compared with calves without cysts. Other studies revealed a strong relationship between the intensity of infection with this parasite (number of cysts per gram of feces) and diarrhea in cattle [2]. The first reported infection from cattle with *B. sulcata* in Iraq (Al-Qadissiyah) was in 2005 [4]. Al-Saffar *et al* [5] found that 31.39% of cattle with diarrhea in mosul were infected with this parasite. This parasite belongs to the Kingdom: *Protozoa*, Phylum: *Ciliphora*, Class: *Kinetofragminophora*, Order: *Trichostromatidae*, Family: *Pyenotrichidae*, Genus: *Buxtonella* [2]. The present study aimed to investigate the prevalence of *B. sulcata* infection and its role as an etiological agent of diarrhea in neonatal and young calves in Al-Nasir station for cattle breeding and two regions in Baghdad, a study have never done before.

Materials and methods

The study was performed by using 250 calves (110 male and 140 female, ages of which ranged between 1-30 day, among which 98 had diarrhea). Animals were selected from Al-Nasir station (150 calves) and two regions in Baghdad which are Al-Shuala (50 calves) and Al-Gazaliya (50 calves) during the period from December 2009 to March 2010. Approximately five grams of fecal sample was taken directly from the rectum of each animal. Two laboratory methods were used to detect cyst and / or trophozoite of *B. sulcata* in fecal samples which are direct wet film method and ether-formalin sedimentation method [6]. The intensity of infection was estimated in positive cases with direct wet film method by counting cysts in 20 microscopical fields using high power magnification [7]. Identification of *B. sulcata* cysts and trophozoites was based on morphological specific feature and on measurement of dimensions of these structures using ocular micrometer. Chi square was used to compare the rate of infection between studied

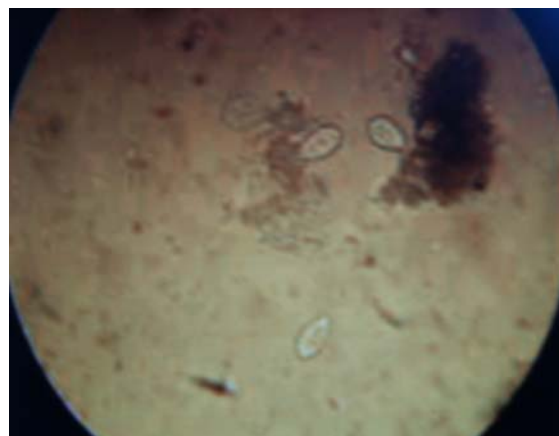
regions, sex, fecal status and age classes of calves. Statistical probability of $p < 0.05$ was considered significant.

Results

The overall rate of infection with *B. sulcata* in neonatal calves was 43.2%. The trophozoite of the parasite appeared oval in shape measured $100.5 - 108 \times 94.4 - 102.2 \mu\text{m}$ (mean $105.12 \times 98.44 \mu\text{m}$) and uniformly ciliated with prominent curved groove. It has vigorous movement in fresh samples examined with direct method. The cytostome is near the anterior end. The cysts have spherical shape $49.2 - 90.4 \mu\text{m}$ in diameter (mean $78.14 \mu\text{m}$) (Figure 1).



(A)



(B)

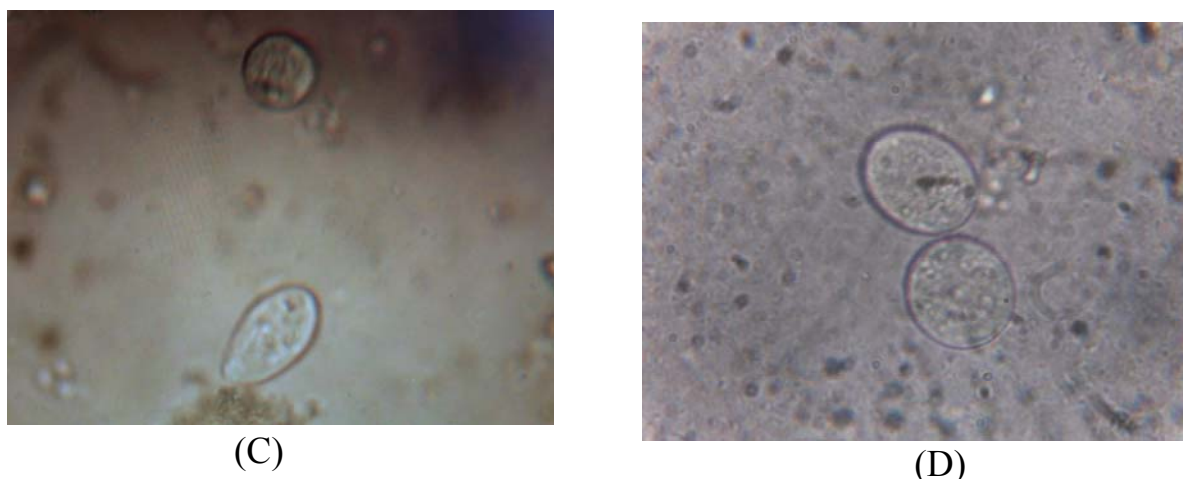


Figure 1: Structures of *B. Sulcata*. A: trophozoite x1000, B: four trophozoites x200, C: cyst (upper) and trophozoite (lower) x400, D: cyst x1000 .

Prevalence of infection with *B. sulcata* among studied regions showed that there is no significant differences between these regions , Al-Nasir station had the highest rate of infection 44.6%, whereas , the lowest rate of infection was in Al-Gazaliya 40% (table 1). The study also showed no significant difference in infection rate between male and female as these ratios were 43.6% and 42.8% respectively (table 2).

Calves with diarrhea had higher infection rate 74.49% than calves with normal feces 23.02% with significant difference (table 3). There were three degrees o infection according to the number of parasite under high power field (40x hpf), low: 1cyst/hpf, moderate: 2-4 cysts/hpf, and high : ≥ 5 cysts/hpf .In this study , most calves with diarrhea had high or moderate degree of infection and differed significantly from calves with normal feces (the majority of which had low degree of infection).

Table 1: Infection rate with *B. sulcata* in the three studied regions

Region	No. of samples	No. of positive samples	Infection rate
Al-Shuala	50	21	42
Al-Gazaliya	50	20	40
Al-Nasir station	150	67	44.6
Total	250	108	43.2

Table 2: Infection rate with *B. sulcata* in male and female calves.

Sex	No. of samples	No. of positive samples	Infection rate
Male	110	48	43.6
Female	140	60	42.8
Total	250	108	43.2

Table 3: Prevalence and intensity of infection with of *B. sulcata* according to the fecal status.

Fecal status	No. of samples	No. of positive samples	Infection rate	Intensity of Infection		
				Low degree	Moderate Degree	High Degree
Diarrheic	98	73	74.49	13	28	32
Normal	152	35	23.02	26	6	3
Total	250	108	43.2	32	39	37

Low degree : 1 cyst/ hpf , Moderate degree : 2-4 cyst / hpf , High degree ≥ 5 cyst/ hpf .

Table 4 shows the prevalence of *B. sulcata* among different age groups. The infection rate among calves over 10 days old are higher than that of 1-10 days old with significant difference.

The highest rate of infection was among the age group 16-20 day 68.1% followed by age class 26-30 day 58.1%. While the age group of 1-5 day had the lowest rate of infection 14.7%.

Table 4: Prevalence of *B. sulcata* according to the age groups.

Age class (days)	No. of samples	No. of positive samples	Infection rate
1-5	34	5	14.7b
6-10	45	10	22.2b
11-15	39	18	46.1a
16-20	44	30	68.1a
21-25	45	20	44.4a
26-30	43	25	58.1a
Total	250	108	43.2a

Groups with different letters have significant difference $p < 0.05$

Discussion

Many authors considered *B. sulcata* as a commensal of the alimentary tract of ruminants and participate in the digestion of plant aliments [1,8]. Therefore it is common to find high rate of infection with this parasite among calves.

A wide differences of infection rate between 2-87.9% has reported [1,9,10,11,12] with the majority of cases were associated with diarrhea. However, some authors [13] found high rate of infection without any association with clinical disease.

The highest rate of infection in Al-Nasir station as compared with the other studied regions may be related to the high density of calves within limited area of breeding which facilitates the transmission of the infection.

The non significant difference in the rate of infection between males and females is anticipated because there is no known factor that protects either of the two sex and absent in the other sex especially when males and females are raised together and are exposed to the same environmental conditions.

Both laboratory methods which were used in this study showed high efficiency in the detection of the parasite in fecal samples. Therefore it is reasonable to rely on direct wet film method alone to investigate the infection with this parasite in cattle as it is economical and easy to be achieved.

Calves with diarrhea exhibited higher rate and intensity of infection as compared with calves with normal feces. These results are in accordance with many previous studies [1, 5]. It seems that there is a limited number of vegetative form of this parasite in the intestinal

lumen beyond which the parasite may cause diarrhea and this may explain the high intensity of infection in calves with diarrhea. The ability of this parasite to cause diarrhea is not related to the invasiveness of the trophozoite in the intestinal mucosa rather the metabolic products which result from rapid multiplication of the parasite [2]. Regarding factors that enhance the parasite multiplication, studies done on *Balantidium coli* (similar ciliate living in large intestine of pig, man and many other mammals) indicate that the acidity of environment in which the protozoan lives promoted its multiplication [14]. The values of pH of intestinal environment depend on the changes in the feeding system as well as on the incidence of disorders in the motility and functioning of the digestive tract of ruminants. Peter and Constable [15] showed that intestinal pH of calves dropped to 6.6 after 2 hours of milk ingestion which predisposes neonatal calves to infect with *B. sulcata*.

The laboratory tests revealed that there were no other parasitic infection accompanied with *B. sulcata*, we can establish that the diarrhea in the studied calves is attributed to *B. sulcata*.

It is well known that neonatal calves receives maternal antibodies with colostrums during the first few days after birth. These antibodies may partially protect the calves from a variety of infection among which *B. sulcata* infection. As the calf grows, there is no more maternal antibodies. Therefore the infection rate was high among calves over 10 days old as compared with those under 10 days old. Furthermore, there is a phenomena which has been observed in Cryptosporidial infection which participates in

increasing calves infection, that is the increase shedding of parasite oocyst from the mother during the period around calving [16]. This phenomena may play a significant role in neonatal and young calves infection with *B. sulcata* also, but more comprehensive study should be done to illustrate this topic.

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