

Prevalence of intestinal ciliate *Buxtonella sulcata* in cattle in Mosul

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Abstract

The current study was conducted to detect the presence of *Buxtonella sulcata* (an intestinal ciliate) in faecal samples of cattle suffering from diarrhea in Mosul city. One hundred and twenty faecal samples were examined, and collected from calves (44), beef cattle (34) and dairy cattle (42) these animals were divided into two groups those showed diarrhea (86) and (34) had no symptomatic diarrhea. Direct smear and formalin-ether sedimentation methods were used for detection of this parasite. The total percentage of infection with *Buxtonella sulcata* was 24.16%. There was no significant differences in the percentage of infection and intensity of infection between calves, beef and dairy cattle where as there were significant differences between diarrheic and non-diarrheic animals.

Keywords: *Buxtonella sulcata*, Diarrhea, Cattle.

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حدوث الخمج الطبيعي بطفيلي الهدبية المعوية *Buxtonella sulcata* في الابقار في الموصل

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الخلاصة

تضمنت الدراسة الحالية الكشف عن طفيلي *Buxtonella sulcata* (الهدبيات المعوية) في براز الابقار التي تعاني من الاسهال في مدينة الموصل. تم فحص 120 عينة براز ابقار جمعت من كل من عجول الابقار (44) و ابقار اللحم (34) و ابقار الحليب (42). جمعت العينات من (86) حيوان يعاني من الاسهال و (34) حيوان لم يلاحظ عليه علامات الاسهال. فحصت هذه العينات باستخدام كل من الطريقة المباشرة وطريقة الفورمالين - ايثر للتريسيب. بلغت نسبة الخمج الكلية 24,16%. لم يلاحظ وجود فرق معنوي في نسبة الخمج وكذلك شدته بين كل من عجول الابقار و ابقار اللحم و ابقار الحليب في حين تم تسجيل فرق معنوي في نسبة الخمج بين الحيوانات التي تعاني من الاسهال والحيوانات التي لا تعاني من الاسهال.

Introduction

Buxtonella sulcata is one of the parasitic protozoa (Ciliophora) type which inhabited in the colon of the ruminants and the original role for diarrhea or for classification has not been fully explained (1-5). *Buxtonella sulcata* is similar to *Balantidium coli* found in the swine and man, some authors included them into the same genus (6). However, the classification of *Buxtonella sulcata* is: Kingdom: Protozoa, phylum: Ciliophora, Class:

Kinetofragminophora, order: Trichostromatida, Family: Pyenotrichidae, Genus: *Buxtonella* (1).

Henrisken (7) reported that percentage of infection with *Buxtonella sulcata* in Danish cattle was (71.8%), Fox (2) recovered *Buxtonella sulcata* cysts in faeces of adult British cow from nine commercial dairy farms with a percentage of 44.6% and in Kynoggi-don the prevalence of *Buxtonella sulcata* during 1984 and 1994 were 33.6%, 34.5% respectively (8). A higher percentage 38.0%, 21.6% was reported in a dairy and beef cattle in Costa Rica (9). In

Germany a more controversial prevalence was reported which has been range from Zero-73% without any obvious association with clinical symptoms (10). The first recorded of infection with *Buxtonella sulcata* from cattle was in Al Qadissiyh city (Iraq) and the percentage of infection was 47% (11). The problem of Buxtonellosis in ruminants is not considered of importance yet, therefore the aim of this study was to diagnose this parasite in faeces of cattle in Mosul city and to examine the role of this parasite as etiological agent of diarrhea in calves, dairy and beef cattle.

Materials and Methods

Faecal samples were collected from 120 cattle (44 calves, 42 dairy frezinn cattle, and 34 beef cattle) from teaching veterinary Medicine College, farms of Agriculture College and Kogyali village and cattle market in Mosul city during October 2007 – April 2008, faecal samples were taken from animals with diarrheal disease (86) and apparently healthy animals (34), samples kept in a clean plastic container. Direct smear method (12), sedimentation methods by using ether-formalin (13,14) were used for detection *Buxtonella sulcata*. Differentiation of *Buxtonella* cyst or trophozoites was based on morphological specific feature and by microscopic measurement by using ocular micrometer (2,3,6,8,11). Coproscopical examination for detection the degree of intensity of infection according to (15,16) and examination of the 20 microscopical fields. The data were analyzed statistically by using Z-test, Fisher- test and χ^2 – test (17).

Results

During coproscopical examination of 120 faecal samples of cattle, infection with *Buxtonella sulcata* was appeared in 29 animals with a total percentage of 24.16% (Table 1), all of these animals infected with *Buxtonella sulcata* cysts. These cysts are round or oval in shape, yellow in color reach 68.6-107.8 μm in diameter with a mean of 74.58 μm , these cysts surrounded by a two layered capsule (Fig.1). Four positive samples which infected with trophozoites (vegetative forms) with a percentage of 13.79% (Table 1). The vegetative forms were oval, with diameters of 107.8-137.2X 49-102.9, with a mean of 121.25X94.06 μm . The surface of the cilliate's cell was evenly covered with short cilia, deep syncystoma was at the anterior pole and the nucleus lies in the centre of the vegetative form (Fig.2). From Table (1) statistical analysis showed significant differences between calves and beef cattle and between calves and dairy cattle while no significant differences between beef and dairy cattle. From Table (2) it is evident that there were three degree of infection, low 51.72%, moderate 24.13% and high 24.13% according to the number of parasites under high power field (40x hpf) there was no significant differences between calves, beef and dairy cattle. *Buxtonella sulcata* cysts were appeared in 27 animals with diarrhea symptom in a percentage of 31.39% while those show no diarrhea, the percentage were 5.88% (Table 3). Statistical analysis showed significant differences between animals with and without diarrhea.

Table (1): Incidence of *Buxtonella sulcata* of cattle in Mosul.

Animals	No. of samples	No. Of positive samples	Rate of infection	Infection with cyst No.(%)	Infection with Trophozoite No.(%)
Calves (3-8 months)	44	5	11.36 a	5(100.0)	0(0.0)
Beef cattle (2-7 years)	34	12	35.29 b	12(100.0)	3(25.0)
Dairy cattle (4-8 years)	42	12	28.57 b	12(100.0)	1(8.3)
Total	120	29	24.16	29(100.0)	4(13.79)

Rates with different letters have significant difference at $P < 0.05$ according to Z-test between two proportion.

Table (2): Distribution and intensity of infection with *Buxtonella sulcata* of cattle.

Infection Animals	No. of +ve samples	Low degree*	Moderate degree**	High degree**	Statistical group
Calves	5	4(80.0)	1(20.0)	0(0.0)	A
Beef cattle	12	5(41.6)	3(25.0)	4(33.33)	A
Dairy cattle	12	6(50.0)	3(25.0)	3(25.0)	A
Total	29	15(51.72)	7(24.13)	7(24.13)	

Groups with same letters have non-significant difference at $p < 0.05$ using Fisher Freeman Halton test.

Low degree: 1 cyst/hpf , Moderate degree: 2-4 cyst/hpf , High degree: 5 and more than 5 cyst/hpf

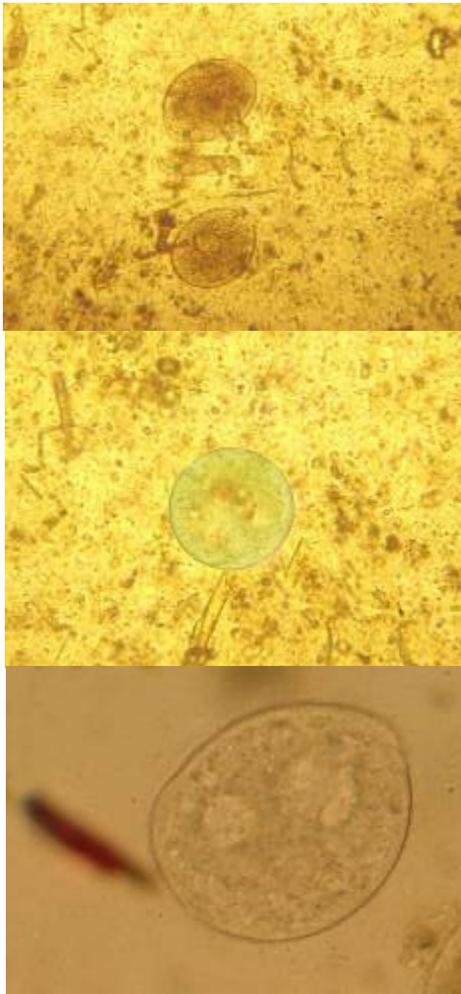


Figure (1): Cysts of *Buxtonella sulcata* (10X,40X) by using digital camera.

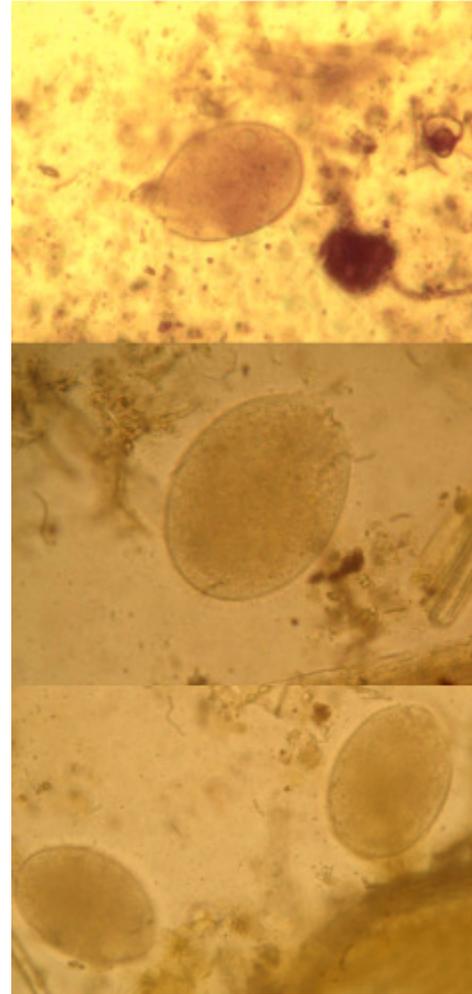


Figure (2): Trophozoites of *Buxtonella sulcata* (10X,40X) by using digital camera.

Table (3): Relationship of *Buxtonella sulcata* infection with diarrheal symptoms in cattle by using χ^2 – test.

Symptoms	No. of animals	No.of +ve <i>B.sulcata</i>	% of infection
Animals with diarrhea	86	27	31.39a
Animals with normal faeces	34	2	5.88b
Total	120	29	24.16

Groups with different letters have significant differences at $P < 0.016$.

Discussion

In this study, the total percentage of infection with *Buxtonella sulcata* was 24.16% and the infection with cysts appeared in all positive cases while the trophozoites appeared only in four positive cases from total of all positive number, while other study accomplished in Iraq by Ayaiz (11) reported that the percentage of infection was 47%. Other studies which performed in different part of world such as England, Poland, Costa Rica, Bangalore and Thailand (2,6,9,18,19) showed a wide differences in percentage and ranged between 2-87%.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. Fox and Jacobs (2) itself 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. The shape and size of the cysts and trophozoites which observed in this study are in agreement with those described by (3, 8,11).

The statistical analysis of infection with *Buxtonella sulcata* in our study showed a significant differences between the infection of calves, beef and dairy cattle, while no significant differences was noticed between beef and dairy cattle, moreover, no significant differences were observed in the intensity of the infection between calves, beef and dairy cattle. High rate of infection with *Buxtonella sulcata* cysts appeared in animals affected with diarrhea and which are found to have large number of cysts and trophozoites (Table 3), the result was in agreement with (2,6,11,19,20) who reported that *B. sulcata* can be one of the causative agent of diarrhea in ruminants. The pathogenic effect of this parasite has not been found to be of great interest and it is suggested that more comprehensive studies should be done in order to explain the cause of diarrhea. In an observations of Tomczuk et al., (6) they reported that the pathogenesis of *B. sulcata* may be compared with the incidence of similar ciliate *Balantidium coli* living in the large intestine of pig, man and many other mammals. In a different studies of Skotarczak and Zielinski, Urman and Kelky, and Skotarczak (21-24) was proved that especially significant effect of *Balantidium coli* in change in the pH of large intestine content on the intensively of invasion and the damaging effect on the mucosa of large intestine results in a secondary bacterial infection and increase in the pathological changes.

In this study, our observation was based on detection of the *B. sulcata* cysts in animals which have signs of diarrhea and those with normal faeces. All examined positive cases was affected with *B. sulcata* only, furthermore, no clinical signs observed other than diarrhea on the affected animals and no other parasitic agents were diagnosed, this indicates that *B. sulcata* can be considered as one of the agents of unexplained etiology of diarrhea in cattle.

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