

**DIAGNOSTIC STUDY OF *BUXTONELLA SULCATA* IN BUFFALOES IN MOSUL, IRAQ**

T.M. AL-SAFFAR\*, A.F. AL-TAEE\*\*, E.D. HADI\* and E.G. SULEIMAN\*\*

\* Department of Internal and Preventive Medicine, \*\*Department of Microbiology, Collge of Veterinary Medicine University of Mosul, Mosul-Iraq.

---

**ABSTRACT**

---

**Received at: 2/12/2012**

**Accepted: 15/1/2013**

Through examination of one hundred fecal samples collected from buffaloes in different regions of Mosul city. The total percentage of infection with *Buxtonella sulcata* was (35%). No significant differences were recorded between different sexes and ages of animals. Cysts of *Buxtonella sulcata* were diagnosed in animals with or without diarrhea but large number of cysts appeared in feces of animals suffering from diarrhea (48.57%). Histological examination of large intestine revealed the presence of the *Buxtonella sulcata* associated with necrosis, hyperplasia of the intestinal epithelium, different degrees of hemorrhages, and infiltration of inflammatory cells.

---

**Key words:** *Buxtonella sulcata*, *Buffaloes*, *Diagnosis*

---

**INTRODUCTION**

The ciliophora which inhabits in the rumen and colon of ruminants are most considered to be commonsals participating in digestion plant feed which could be confirmed by their common incidence (Fox and Jacobs, 1986), *Buxtonella sulcata* is a ciliate lives in cysts form in the environment while its vegetative form lives in the colon of cattle and described as parasites (Hong and Youn, 1995). In some cases the ciliates may be responsible for incidence of diarrheal symptoms (Tomczuk *et al.*, 2005). *Buxtonella sulcata* can be cause of diarrhea in calves, since the rate of diarrhea was detected higher in calves having *Buxtonella sulcata* cysts compared with calves without the cyst (Hong and Youn, 1995). Infection with *Buxtonella sulcata* follows consuming cysts with fodder or drinking water (Tomczuk *et al.*, 2005). The increased invasion of alimentary tract of dairy cows could be resulted in clinician disorders such as poor condition (Tomczuk *et al.*, 2005). Many authors reported different perentage of infection. In different part of the world (Arslan *et al.*, 2001; Casemore, 1991; Henriksen, 1977; Jimenez *et al.*, 2007 and Wakers *et al.*, 1999). In Iraq the infection with *Buxtonella sulcata* recorded only in cattle in Al-Qadissiyha and Mosul city with percentage were 47%, 24.16% respectively (Aayiz, 2005 and Al-Saffar *et al.*, 2010). Buffaloes (*Bubalus bubalis*) in Iraq are an important economical resource for rural citizens, but in the same time received little attention of veterinary care. Little information are available about *Buxtonella sulcata* infection in Buffaloes in Iraq and its association with diarrheal condition in these animals. The aim of this study was to isolate *Buxtonella sulcata* from buffaloes with diarrheal

signs and the histopathological changes it induces in these animals.

**MATERIALS and METHODS**

One hundred buffaloes stool samples were collected from different regions of Mosul city and from intestinal tracts of slaughter buffalos in Mosul abattoir during the period from September 2011 to June 2012 for the detection of *Buxtonella sulcata* in these animals. These samples were subjected to gross and microscopic examination. Gross study was aimed to evaluate stool consistency, microscopic examination include direct and concentration methods (sedimentation by tap water, 10% formalin and by using ether -formalin) (Urquhart *et al.*, 2003; Thienpont *et al.*, 1974; Mollan and Saaid, 1982). Morphometric characterization of the parasites (trophozoites and cyst stage was also made (Fox and Jacobs, 1986; Rommel *et al.*, 2000 and Aayiz, 2005). Histological study of colon sections were sectioned at 4-6 m $\mu$  and stained by hematoxylin and eosin stain (Luna, 1968).

**RESULTS**

The results of this study revealed that the percentage of the total infection with *Buxtonella sulcata* were 35%, Trophozoites stage of the parasite were demonstrated in 4 animals (4%) while the cysts form in 31animals (31%) as shown in table (1).

Males of buffaloes show high percentage of infection (40%) than the female (30%), statistical analysis showed that no significant differences appeared

between males and females Table (2). The group of animal aged 2-3years showed the highest rate of infection (63.63%) among all infected animals and the lowest rate at the age group 3years-and more and there was no significant differences appeared between all ages of animals.

The correlation between *Buxtonella sulcata* infection and consistency of faeces (diarrheal or normal) presented in table (4), from this table it was indicated that most of the infected animals (48.57%) were diarrheic while in normal feces animal (27.69%) statistically analysis showed no significant differences between diarrheic and non diarrheic animals. Table (5) gives various intensity of infection according to the number of cysts in examined microscopic field, the highest rate of intensity in severe infection (5 cyst and more) were 47.5% in diarrheic animal and the low infection (one cyst) were (22.22%) in normal feces animals and there was significant differences appeared in intensity of infection in animals without diarrhea.

The morphological study and main characteristic features of the parasites were shown in Fig. 1,2 that the parasites appear with cyst form usually circular and varying in sizes from 60-68.6x60-68.8µ and the average (62.09µ) while the trophozoites usually ovoid shape and varying in size from about (84-127.4x68.6-84µ), surrounded by cilia and containing central nucleus with cytostom in the anterior end and a number of nutrition vacuoles in the cytoplasm. Histopathological changes accompanied with the *Buxotanella sulcata* infection was characterized by the presence of trophozoites and cysts in the lumen of the colon (Fig 3,4). Mucoïd epithelium degeneration, necrotic sloughing of the intestinal epithelium and submucosal glands with sever hyperplasia of the intestinal mucosa, inflammatory cells infiltration and mild haemorrhage were observed (Fig 5,6,7). Hyperplasia, elongation, necrosis and sloughing of the villi with sever mucosal and submucosal inflammatory cells infiltration (8,9).

**Table 1:** Percentage of *Buxtonella sulcata* infected buffaloes

No. of examined samples	No. of positive (cyst form)%	No. of positive (trophozoites) %	Total percentage
100	31(31%)	4(4%)	35%

**Table 2:** Percentage of *Buxtonella sulcata* infection in buffalo in relation to their sex

Sex of animal	No. examined	No .infected	Percentage
Female	50	15	30
Male	50	20	40
Total	100	35	35

No significant differences between males and females (p>0.05)

**Table 3:** Percentage of *Buxtonella sulcata* infection in buffalo in relation to their age

Age group	No .examined	No .infected	Percentage
Less than 1-year	35	15	42.85
1-2 year	11	3	27.27
2-3 year	11	7	63.63
3- and more	43	10	25.25
total	100	35	35

No significant association between percentage of infection and ages

**Table 4:** Percentage of buffalo infected with *Buxtonella sulcata* with or without diarrhea

Group of animal	No .examined	No .positive	Percentage
Animal with diarrhea	35	17	48.57
Animals without diarrhea	65	18	27.69
Total	100	35	35

No significant differences between animal with and without diarrhea

**Table 5:** Infection intensity with *Buxtonella sulcata* in buffaloes

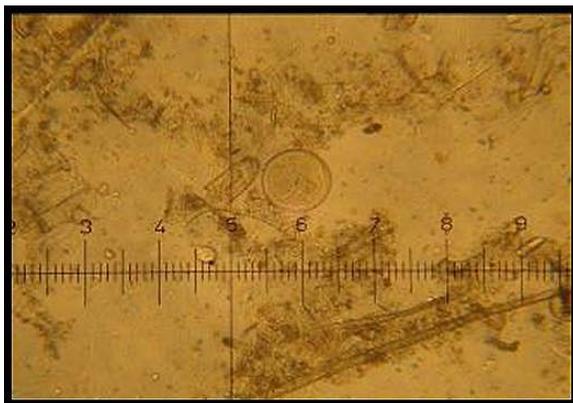
Group of animals	Low infection * No.of positive (%)	Moderate infection** No. of positive (%)	High infection *** No.of positive (%)	Total
Animals with diarrhea	5(29.4)a	4(23.5)a	8(47.5)a	17(48.6)
Animal without diarrhea	14(77.8)a	4(22.2)b	0(0)b	18(27.7)
Total	19(54.28)	8(22.85)	8(22.85)	35(35)

a , b different letters in each row refer to significant variation (P<0.05)

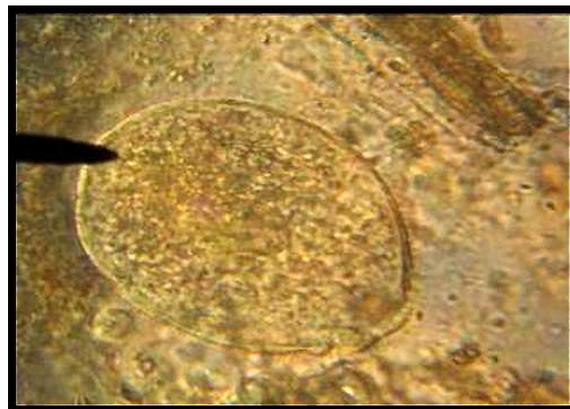
\* Low infection 1cyst\HPMF

\*\*Moderate infection 2-4cysts \HPMF

\*\*\* High infection 5 cyst and more \HPMF



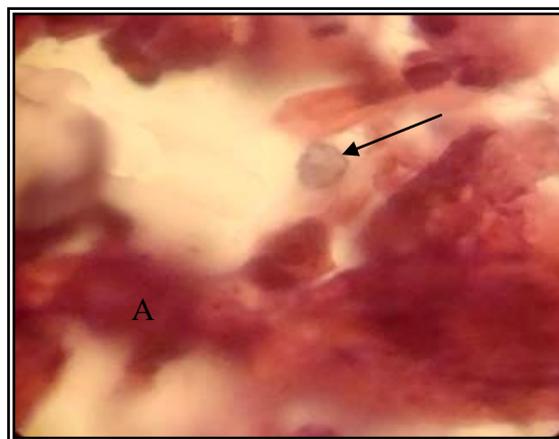
**Fig 1:** Cyst of *Buxtonella sulcata* in feces of buffalo ,40X, by using digital camera



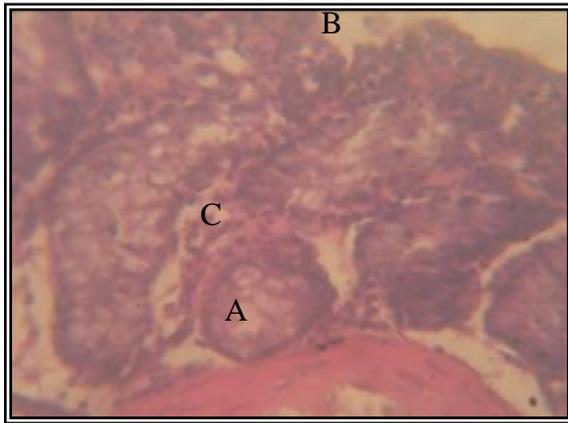
**Fig 2:** Trophozoites of *Buxtonella sulcata* in feces of buffalo, 760 X, by using digital camera



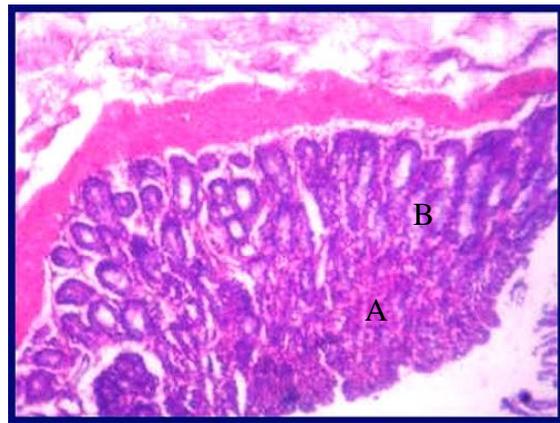
**Fig 3:** Presence of trophozoites at the lumen of colon H&E,100X



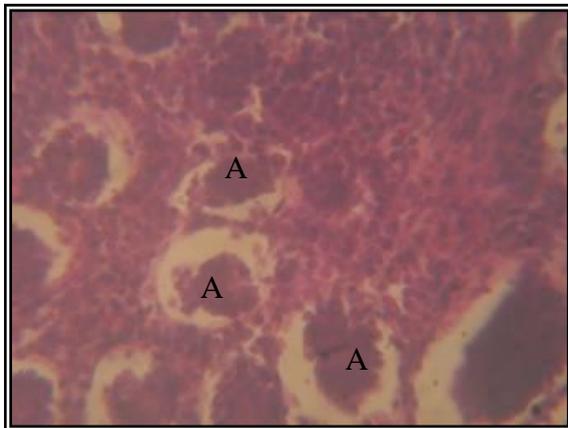
**Fig 4:** Presence of the cyst of *Buxtonella sulcata* in the lumen of the colon with slaughtering of necrotic intestinal epithelium (A) H&E,145X



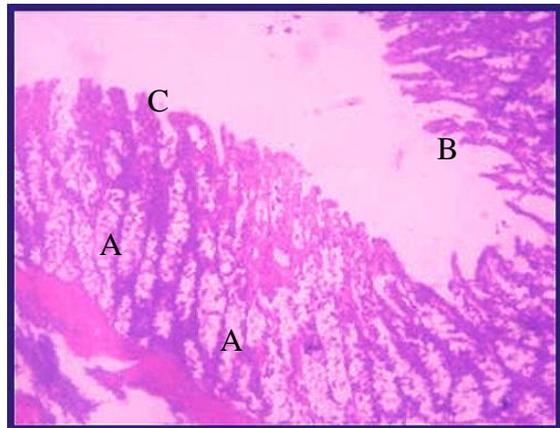
**Fig 5:** Presence mucoid degeneration(A) with sloughing of the intestinal epithelium(B) with mild infiltration with neutrophils(C), H&E,165X



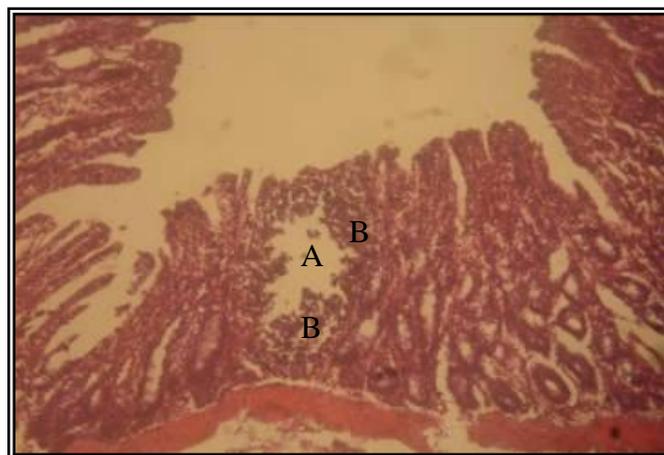
**Fig 6:** Epithelial hyperplasia of intestinal mucosa (A)with presence mucoid degeneration(B) ,inflammatory cells infiltration and mild hemorrhage (B) H&E,145X



**Fig 7:** Degeneration and necrosis, sloughing of the epithelial of submucosal glands(A) H&E, 165X



**Fig 8:** Mucoid degeneration(A), necrosis and sloughing of the intestinal epithelial(B), hyperplasia and elongation of the villi (C) H&E,165X



**Fig 9:** Necrosis and sloughing of the villi(A) with severe inflammatory cells infiltration (B)H&E,165X

## **DISCUSSION**

The protozoan parasites living in gastrointestinal tract of agricultural animals participate in symbiotic digestion of food stuffs with their hosts. (Tomczuk *et al.*, 2005). Any change in the microenvironment of the gastrointestinal tract may predispose to the change in the living manner of these parasites to those that secrete digestive enzymes, thereby negatively affecting the intestinal epithelium of the host. *Buxtonella sulcata* is one example for this conversion upon microenvironment change in the host gastrointestinal tract. Colon infection of this protozoan parasites in buffaloes resemble that of *Balantidiasis* and *Entamebiasis* in ruminants (Rommel *et al.*, 2000; Skokotarczak, 1997 and Al-Kennany *et al.*, 2009), causing diarrhoea, inflammation and ulcerative lesions. Our results of the samples gathered from buffaloes with or without diarrhoea, showed that the total percentage of infection was 35% with trophozoites (4%), and cysts (31%). When we compared our results with others, it appeared that our results were more than that reported in Banklaore in cattle of (17%); those found by (Mamatha and Souza, 2006) of (12.6%) and (20.5%) for cattle and buffaloes respectively; in Turkey with (9.5%) in calves (Altug *et al.*, 2006), those reported here in Mosul province by (Al-Saffar *et al.*, 2010) of (24.1%). In the other hand our results were less than those reported by (Aayiz, 2005) in cattle in Al-Qadissiyha province with cyst (47%) and infection of 71.8% in Danish cattle (Henriksen, 1977) while the prevalence which reported in Germany has been range from zero-73% (Wakers *et al.*, 1999). In this study many factors appeared to affect the percentage of infection with this protozoan parasite like age, since animals aged 2-3 years had the highest rate of infection of 63.63% over the rest of the studied ages. It could be said that progress in age may add immunity to the animals against the parasites (Urquhart *et al.*, 2003). Another factor is the health status, especially with those suffered from diarrhoea having a significant higher percentage of infection and being 48.57%, compared with non-diarrhoeal animals with infection of 27.69% (Tomczuk *et al.*, 2005; Altug *et al.*, 2006; Al-Saffar *et al.*, 2010 and Aayiz, 2005). A third relationship was recorded to the favour of cysts number and intensity of infection (Tomczuk *et al.*, 2005 and Al-Saffar *et al.*, 2010). It should be stressed that gender has no effect on the percentage of infection with *Buxtonella sulcata*. Our results were in agreement with the line of (Tomczuk *et al.*, 2005), who revealed that this protozoan parasite infection could result in GIT damage, which correlated with the virulence of parasite, host susceptibility, sensitivity to infection, microenvironment of the parasite, location in the GIT, and the secondary bacterial infection. Another study referred to what mentioned above and stressed on the change of the parasite microenvironment in the GIT especially pH changes. Parasite infection is usually results in profound damage in the GIT, lining leading to inflammatory process, as it is evident in the histopathological sections in colon (Urman and Kelly, 1968).

## **REFERENCES**

- Aayiz, N.N. (2005): Diagnostic study for cow infection with *Buxtonella sulcata* in Iraq. Al-Qadissiyha J. Vet. Sci., 4(2): 53-56.
- Al-Kennany, E.R.; Yahya, D.M. and Abd-Allua, A.N. (2009): Pathological and histochemical study in the large intestine experimentally infected with *Entamoeba histolytica* in mice. An. J. Vet. Sci., 2(2): 87-95.
- Al-Saffar, T.M.; Suleiman, E.G. and Al-Bakri, H.S. (2010): Prevalence of intestinal ciliate *Buxtonella sulcata* in cattle in Mosul, Iraq. J. Vet. Sci., 24(1): 27-30.
- Altug, M.N.; Yuksek, N. and Ozkan, C. (2006): Parasites defected in neonatal and young calves with diarrhea, Bull. Vet. Inst. Pulawy, 50: 345-348.
- Arslan, M.O.; Gicik, Y.; Erdogan, H.M. and Sari, B. (2001): Prevalence of *Cryptosporidium* spp. oocysts in diarrhoeal calves in kars province, Turkey. Turk. J. Vet. Anim. Sci., 25: 161-164.
- Casemore, D.P. (1991): Laboratory methods for diagnosing cryptosporidiosis. J. Clin. Path., 44: 445-451.
- Fox, M.T. and Jacobs, D.E. (1986): Patterns of infection with *Buxtonella sulcata* in British cattle. Res. Vet. Sci., 41: 90-92.
- Hang, K.O.; Youn, H.J. (1995): Incidence of *Buxtonella sulcata* from cattle in Kyonggi-do. Korean. Parasitol., 33: 135-138.
- Henriksen, S.A. (1977): *Buxtonella sulcata* an intestinal ciliate of apparently frequency occurrence in Danish cattle. Nord. Vet. Med., 29(10): 452-7.
- Jimencz, A.E.; Montenegro, V.M.; Hernandez, J.; Dolz, G.; Maranda, L.; Galindo, J.; Epe, C. and Schineder, T. (2007): Dynamics of infection with gastrointestinal parasites and *Dictyocaulus viviparus* in dairy and beef cattle from Costa Rica. Vet. Parasitol., 148: 262-271.
- Luna, L.G. (1968): Manual of histological staining methods of the armed forces institute of pathology 3<sup>rd</sup> ed., New York, McGraw Hill book Company, 38-76.
- Mamatho, G.S. and Souza, E.D. (2006): Gastro-intestinal parasitism of cattle and buffaloes in and around Bangalore. J. Vet. Parasitol., 20(2): 1-2.
- Mollan, A.A. and Saaid, E.S. (1982): Principles of manual parasitology. University of Mosul, 308P.
- Rommel, M.; Eckert, J.; Kutzer, E.; Korting, W. and Schneider, T. (2000): Veterinar medizinische Parasitologie. Parey Buchverlag, Berlin [cited Tomczuk *et al.*, 2005].
- Skotarczak, B. (1997): Bacterial flora in acute and symptom-free balantidiosis. Acta. Parasitol., 42: 230-233.

- Thienpont, D.; Rochette, F. and Janparijs, O.F.J. (1974): Diagnostic helminthiasis through coprological examination. Beerse Belgium. 34-36P.
- Tomczuk, K.; Kurck, L.; Stec, A.; Studzinska, M. and Mochol, J. (2005): Incidence and clinical aspects of colon ciliate *Buxtonella sulcata* infection in cattle. Bull. Vet. Inst. Pulawy, 49: 29-33.
- Urman, H.D. and Kelly, G.O. (1964): *Buxtonella sulcata*. Aciliate associated with ulcerative colitis in a cow and prevalence of infection in Nebraska cattle. Low state Univ. Vet., 27: 118-122.
- Urquhart, G.M.; Armour, J.; Duncan, J.I.; Dunn, A.M. and Jennings, F.W. (2003): Veterinary parasitology. 2<sup>nd</sup> ed., Black well Science Ltd., Oxford: 263-276P.
- Wackers, K.; Roffeis, M. and Conraths, F.J. (1999): Cow-calf herds in eastern Germany: status Que of some parasite species and a comparison of chemoprophylaxis and pasture management in the control of gastrointestinal nematodes. J. Vet. Med., 46(7): 475-483.

### دراسة تشخيصية لطفيلي *Buxtonella sulcata* في الجاموس في الموصل/العراق

طلال محمود الصفار ، احلام فتحي الطائي ، ايمن دحام هادي ، ايمن غاتم سليمان

تبين من خلال فحص 100 عينة براز جمعت من الجاموس وذلك من مناطق مختلفة في مدينة الموصل أن نسبة الإصابة الكلية بطفيلي *Buxtonella sulcata* بلغت 35% مع ملاحظة عدم وجود فرق معنوي في نسبة الخمج بين كل من ذكور وإناث الجاموس وكذلك بين الأعمار المختلفة إضافة إلى انه قد تم تشخيص أكياس الطفيلي في كل من الحيوانات التي تعاني في الإسهال والحيوانات ذات القوام الطبيعي للبراز وان طرح الأوكياس كان مرتفعا في الحيوانات التي تعاني من الإسهال إذ بلغت النسبة 48.57% كما أشارت الدراسة النسيجية إلى تواجد الطفيلي في الأمعاء الغليظة مع حدوث النخر وفرط تنسج الطبقة الظهارية للأمعاء مع حدوث درجات مختلفة من النزف وارتشاح الخلايا الالتهابية.