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Prevalence of *Balantidium coli* in cattle and cattle breeders in some regions of Baghdad in Iraq

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Abstract

A study was carried out to determine the prevalence of *Balantidium coli* infection in cattle and their breeders and related risk factors including the gender, age and region. A total of 200 cattle faecal samples were collected from different ages, sexes and regions of Baghdad (Hor-rageb, Abu Ghraib, AL-Jaderiya, AL-Makaseb, AL-Dowanem and AL-Hamdaniaa) and 88 breeder faecal samples from AL-Makaseb, AL-Dowanem and AL-Hamdaniaa during the period from November 2014 to May 2015. The results showed that the prevalence of *Balantidium coli* were 29.50% and 9.09% in cattle and their breeders, respectively. The association between infection and all studied factors was not significant except between infection and regions in cattle which were significant (P<0.01). Based on the results of this research, it can be concluded that cattle are highly susceptible to balantidiasis irrespective of sex and age.

Key words: cattle, cattle breeders, prevalence, *Balantidium coli*

Introduction

In cattle, the disease problems especially caused by protozoa lead to loss of productivity in terms of mortality, reduced milk, and meat (Kaltungo and Musa, 2013). Therefore, it is necessary to identify the type of protozoa causing infection in the cattle to prevent, control and adopt the effective treatment. No doubt, the topic becomes more importance when the effect of protozoa is not limited to only cattle but extend to include humans also. Among the protozoan diseases, Balantidiasis caused by *B.coli* considered as one of an important disease that could infect animals and humans (Levine, 1995; Schuster and Ramirez-Avila, 2008). Several reports confirmed that, *B. coil* could be emerge as a significant pathogen that is able to cause disease in horses (Headley et al., 2008), buffaloes (Tarrar et al., 2008), cattle (Randhawa et al., 2010) and camels (Abubakr et al., 2000; AL-Tayib, 2014; Cox, 2005). However, the Balantidiasis did not represent a serious problem in Japan according to the conclusion demonstrated by Nakauchi (1999) who found a low rate of infections in 56 mammalian species.

Moreover, Thompson and Smith (2011) stated that, although, *Balantidium* is known to cause infections in humans and is considered to be zoonotic but its role in zoonotic transmission is likely to be minimal. The same situation exists in Arabian countries, although, Balantidiasis is a zoonotic disease, a few researchers gave it their attention. This could be attributed to two reasons: Firstly, this disease can be found wherever pigs are found and in Islamic countries like Iraq, pigs are not breeding because their religious beliefs prohibit consumption of pork. Secondly, *Balantidium* could infect pigs and other mammals along with humans, but its effect on the gastrointestinal tract usually not serious. It can thrive there in balance with its host without causing dysenteric symptoms, such as severe diarrhoea and bloody stools. However, the problem could arise with the existence of malnutrition, alcoholism, or a compromised immune system virus [HIV]/AIDS, etc.). Those act to upset the balance in favor of the ciliate, leading to disease (Anargyrou et al., 2003; Vasilakopolou et al., 2003; Ferry et al., 2004).

On the other hand, there are other reasons can tip the balance in favor of estimate the prevalence of balantidiasis according to Schuster and Ramirez-Avila, (2008), there are some fears

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of balantidiosis that can be expressed as the probability of increasing the prevalence of balantidiosis due to the warming of the earth's surface that could provide appropriate environment, particularly in the temperate areas of the world, for survival of trophozoite and cystic stages of *Balantidium*. Moreover, Solaymani-Mohammadiet al., (2004) reported that wild boars were a reservoir for *Balantidium* in rural Western Iran, and it could be the source of infection in livestock and humans. The wild boars are existed in Iraq (Ministry of Environment, 2010). However, its role in infection was not studied.

As water is the vehicle for most cases of balantidiosis, disease could represent a problem in developing countries, as the opportunity of water sources to contaminate with porcine or human faeces (Schuster and Ramirez-Avila, 2008). The information available is scanty about the prevalence of *Balantidium coli* in cattle and their breeders. Hence, this study was aimed to investigate their prevalence of *Balantidium coli* along with their associated risk factors.

Materials and Methods

A total of 200 cattle faecal samples were collected from different ages, sexes and regions of Baghdad (Hor-rageb, Abu Ghraib, AL-Jaderiya, AL-Makaseb, AL-Dowanem and AL-Hamdaniaa) and 88 breeder faecal samples from AL-Makaseb, AL-Dowanem and AL-Hamdaniaa. All samples collected during the period from November 2014 to May 2015. The faecal samples were collected directly from the rectum, in a clean plastic containers (100ml size) and were tightly closed and given sequential numbers. All information for the animal and breeder included age, sex and the name of region were recorded on a special form bearing the number of the sample. Then the samples were transported in refrigerated bag to the zoonotic unite at the College of Veterinary Medicine in Baghdad University. The samples were examined at the laboratory of the Department of Parasitology in the same College by direct wet mount, Lugol's iodine staining technique and modified Ziehle–Nelseen staining to identify the *Balantidiumcoli*as described by Soulsby, (1982) and Levine, (1995).

Results and Discussion

Results revealed that the prevalence of *Balantidium coli* in cattle from different regions of Baghdad, Iraq was 29.50% (Table 1). The present estimation is higher than 27.5% in India (Niphadkar and Raote, 1994), 25.29% in Bangladesh (Rahman and Samad, 2010), 25% in Pakistan (Bilal, 2006), 17.19% in Indonesia (Wisesa et al., 2015) and 6.6% in Kenya (Kanyari et al., 2010) and lower than 45.45% in India (Palanivel et al. 2005) and 45.03% in Bangladesh (Roy et al., 2011).

Table 1. Infection rate of *B. coli* according to gender in cattle

Gender	Total (number)	Percentage of positive numbers
Male	65	32.30
Female	135	28.14
Chi-square		0.37
P value		0.55
Total	200	29.50

The variation in estimations of prevalence could be attributed to several factors such as breed, sample size, selection of samples, the technique of sample examination, agro-ecological, geo-climatic conditions, management and nutrition (Hussin, 2015). Table 1 showed the infection rates in male and female cattle were 32.30% and 28.14%, respectively. The association between gender and infection was not significant. The result is consistent with the result obtained by Kanyari et al., (2010) and Singh et al., (2012) in cattle which supported to the earlier finding of Azhar et al., (2002) who reported both male and female buffalo have the same chance of being infected with the *Fasciola sp*. However, the result of this study contrasted with the result obtained by Wisesa et al., (2015) who found that the infection rate of balantidiasis in cattle was significantly ($p<0.05$) higher in male (23.20%) than female (13.72%). On the other hand, opposite results were found by Bachal et al., (2002) who reported the infection rate of *Balantidium coli* in the female buffalo (48.30%) was higher than the male buffalo (45.12%). Roy et al., (2011) found the similar result and reported a higher prevalence of balantidiasis in

female buffalo (47.32%) compared to male buffalo (38.46%).

Table 2. Infection rate of *B. coli* according to age in cattle

Age/year	Total (number)	Percentage of positive numbers
<1	58	29.31
1-<3	49	26.53
3-<6	47	27.65
6≤	46	34.78
Chi-square		0.90
P		0.82

The inconsistencies in the results could be belonged to the differences in the physiological condition of cattle (pregnancy, lactation and parturition and lower feed supplements for production) which may cast a shadow on infection rate and lead to decreasing the resistance of animal (Roy et al., 2011).

Table 3. Infection rate of *B. coli* according to regions in cattle

Regions	Total (number)	Percentage of positive numbers
Hor-Rageb	31	0
Abu- Ghraib	34	20.58
AL-Jaderiya	26	0
AL-Makaseb	38	34.21
AL-Dowanem	37	56.75
AL-Hamdaniaa	34	52.94
Chi sq		47.75
P		<0.01

The levels of prolactin and progesterone hormones affect the female. Higher levels of those hormones may fall female more susceptible to any infection (Lloyd, 1983). Meanwhile, male cattle are also susceptible to stress and this will decrease its resistance to infection (Mamun et al., 2011).Concerning the difference among age groups, results showed that the differences were not significant (Table 2). These results supported the previous results obtained by Kanyari et al., (2010) and Wisesa et al., (2015). Meanwhile, our results disagreed with the results of Roy et al., (2011) who reported that age was significantly influenced the infection rate of balantidiasis. The effect of regions on the infection rate of balantidiasis of cattle in the present study was significant (P<0.01) while no infection of Balantidium was found in two regions (Hor-ragab and Al-Jaderia). Similar results reported by Kanyari et al., (2010) and Wisesa et al., (2015). The differences could be attributed to variation in herd size, status of animal, types of food and water, food supply systems, hygienic conditions, the level of veterinary care, and drugs or vaccinations (Hussin, 2015).

Table 4: Infection rate of *B. coli* according to gender in cattle breeders

Gender	Total (number)	Percentage of positive numbers
Male	33	12.12
Female	55	7.2
Chi-square		0.58
P		0.44
Total	88	9.09

Results shown in Table (4) showed that the prevalence of *Balantidium coli* in breeders (9.09%) was higher. 1.4% in Thailand (Chavalittamrong and Jirapinyo, 1984), 2.4% in children of India (Kaur et al., 2002) and 6.67 % in Bangladesh (Al-Hasan et al., 2015). Although there are several factors could be responsible for these differences but contact with animals could play a big role for these variations.

The infection rates in male and female breeders were 12.12% and 7.20%, respectively. However, the association between gender and infection was not significant. The present finding disagreed with results obtained by Biu et al. (2008) who reported that prevalence of balantidiasis was higher in male (11.5%) than female (3.4%). The non-significant effect of gender on the rate of infection is anticipated because, in rural regions, both males and females are contacted with cattle and exposed to same pathogenic agents (Hussin, 2015).

Table 5: Infection rate of *B. coli* according to age in breeders

Age/year	Total (number)	Percentage of positive numbers
<10	38	13.15
10 -<30	27	7.40
30≤	23	4.34
Chi-square		1.47
P		0.47

Despite the infection rate showed a decreasing trend with advanced age but the association between age category and infection was not significant (Table 5). These results disagreed with

results reported by Biu et al. (2008) and Al-Hasan et al., (2015) who confirmed the significant effect of age on infection rate of *Balantidium coli.*

Table 6. Infection rate of *B. coli* according to age in cattle breeders

Age/year	Total (number)	Percentage of positive numbers
AL-Makaseb	27	11.11
AL-Dowanem	32	12.50
AL-Hamdaniaa	29	3.44
Chi-square		1.70
P		0.42

Results also revealed that the association between infection and regions was not significant (Table 6). Based on the results of this research, it can be concluded that the high prevalence of *Balantidium coli* infection in cattle (29.50%) indicated that cattle are highly susceptible to balantidiasis irrespective of gender and age. On the other hand, the prevalence of *Balantidium coli* in breeders is also high (9.09%), that will double the adverse effect of infection because it is known, that the presence of pathogenic bacteria (e.g., Salmonella) in the intestine can worsen an infection by invading colonic lesions caused by *Balantidium coli* (Levine, 1961; Skotarczak, 1997a, 1997b; Sestak et al., 2003). The results also reflect the poor sanitary condition, drinking of contaminated water and lack of knowledge about health and hygiene.

Conflict of interest statement

We declare that we have no conflict of interest.

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