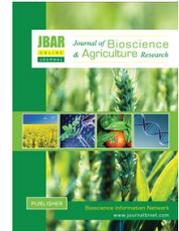


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Impact of age and gender of camels (*Camelus dromedarius*) and their breeders on the prevalence of *Balantidium Coli*

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ABSTRACT

The present work could represent the first report of parasitic infections with *Balantidium Coli* in camel and their breeders in Iraq. Results showed highest estimations of prevalence in camels (50%) and their breeders (40%). The differences between infection rates due to gender was not significant ($P=0.055$) in camels whereas, the differences in infection rates was significant ($P=0.04$) due to gender. On the other hand, the differences in the infection rate of were significant due to age ($P=0.04$) and due to age ($P=0.04$) in camels breeders. The difference in the prevalence between camels and males breeders was not significant ($P=0.61$) and this could be considered as an evidence of the associated infection. Hence, it is very imperative to adopt a regular test for camels and their breeders and using deworming for camels to prevent the risk of its zoonotic potentials on public health particularly in Najaf province as it consists of the largest population of camels in Iraq.

Key Words: Camel, Zoonotic, *Balantidium Coli*, Breeders and Iraq

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I. Introduction

Camel is an essential source of food and milk in many parts of the world especially in developing countries (Oujid and Kamel, 2009). It suffers from various endo and ecto-parasitic diseases which are major constraints in improvement of camel health. These diseases cause substantial economic losses in terms of decrease in working capacity, growth and productivity (Parsani et al., 2008). Moreover, Balantidiasis is considered a neglected disease with zoonotic potential and it is associated with pigs as reservoirs. Although it is considered to be rare, a high prevalence of *B. coli* persists in tropical and subtropical areas (Pomajbikova et al., 2013). Thus, animals play an essential role in maintaining zoonotic infections in nature. A major factor contributing to the appearance of zoonotic pathogens in human populations is increased contact between humans and animals (Daszak et al., 2001). Several zoonotic diseases are transmitted to humans directly via contact with an animal or indirectly via

exposure to the urine or feces of infected animals or the bite of a bloodsucking arthropod (Temmam et al., 2014).

Balantidium coli is a parasitic species of ciliate protozoan that causes the disease Balantidiasis. It is the only member of the ciliate phylum known to be pathogenic to humans (Ambili, 2003). Recently, balantidiasis has appeared to be a serious problem in immunocompromised persons (Pomajbikova et al., 2013). Since *B. coli* infections is most commonly reported worldwide in pigs, it is generally accepted that pigs are the main natural reservoir hosts of this zoonotic protozoa disease for humans (Schuster and Ramirez-Avila, 2008). Whoever, several reports confirmed that, *B. coli* could be emerge as a significant pathogen that is able to cause disease in horses (Headley et al., 2008), buffaloes (Tarrar et al., 2008) and cattle (Randhawa et al., 2010). Some reports had been confirmed the presence of *B. coli* in camel fecal samples (Abubakr et al., 2000; Cox, 2005; AL-Tayib, 2014). Moreover, the results of Tajik et al. (2013) about *Balantidium* support the proposed role of camels as a reservoir host of *Balantidium* in Iran. Zoonoses are of interest because they are often previously unrecognized diseases or have increased virulence in populations lacking immunity. If a pathogenic is able to adapt in its new human host, transmissions of human-to-human may occur, possibly resulting in an epidemic. Thus, predicting emerging zoonotic infections is an important challenge for public health officials in the coming decades (Temmam et al., 2014).

Balantidium coli is likely to occur in places where humans live closely with pigs and where water sanitation is poor or non-existent (Slifko et al., 2000). Although, balantidiasis can pose a serious health problem, a little information is available about the prevalence of *Balantidium coli* in camels and their breeders. Hence, this study was aimed to investigate the rate infection of *Balantidium coli* in camels and their breeders along with identifying the association infection between them. This research could represent a first step for further work on Balantidiasis in camels and their breeders.

II. Materials and Methods

A total of 100 camel fecal samples (5-10 grams) and 25 breeder fecal samples were collected from different ages and sexes in the Najef province/ South of Baghdad/Iraq. All samples were collected during the period from November- 2014 to May -2015. The fecal samples were collected directly from the rectum, in a clean plastic containers (100ml size) and were tightly closed and given sequential numbers. All information of the animal and breeders included age and sex 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/ University of Baghdad. After that, a portion of stool was examined by direct wet mount and Lugol's iodine staining technique to identify the *Balantidium coli*. Data were subjected to analysis using SAS program (Statistical Analysis System) version 9.1 (2010). Comparisons among proportions were performed using Chi-Square test. $P < 0.05$ was considered significant.

III. Results and Discussion

Results showed that the presence of *B. coli* in 50% of camels and 40% of their breeders. However, our estimation in camel is higher than 11.9% reported by Tekle and Abebe, (2001) in camels from Ethiopia and 43.53% reported by Hamza (2007) in camels from Iraq but it is closed to 53% reported in camels from India (Ghoke et al., 2010). The result of the present study suggests that *Balantidium* can occur considerably in camels. It is well known that pigs are generally considered as the most important reservoir hosts of *B. coli* for human and other animals (Tajik et al., 2013). In Islamic countries like Iraq, pigs are not breeding, thus, human and animal infection expects to be nonexistent. The results of the present study confirmed that our conclusion is not correct. The high estimations of prevalence in the camels and their breeders could reflect the little attention to *Balantidium Coli* because it can live as a commensal organism in healthy human and animals. However, under certain circumstances, it is believed that *B. coli* could be act as an opportunistic pathogen via the invasion of intestinal epithelium damaged by other infectious agents (Headley et al., 2008) besides infection by *B. coli* usually associated with no signs of illness (Esteban et al., 1998). The results of the present study supported by Solaymani-Mohammadi and Petri (2006) who reported the presence of human balantidiasis in Iran

which seems quite extraordinary. Cox (2005) considered that camel as a reservoir host for *B. coli* in Islamic countries. Moreover, there are several reports about the presence of *B. coli* in fecal samples of camels (Vosdigh and Vanniasingham, 1969; Ali and Abdelaziz, 1982; Abubakr et al., 2000; Tekle and Abebe, 2001; Hamza, 2007; Tajik et al., 2013; AL-Tayib, 2014). Based on the foregoing it is not surprising to get a high prevalence such as our findings.

Statistical analysis shows that the difference of infection rates in males (36.36%) and females (56.71%) was not significant ($P=0.055$) in camels (Table 01). Similar result obtained by Hamza (2007) who reported that the infection rates in males and females camels were 42.69%, 43.68% respectively. Concerning the differences in the infection rate of *B. Coli* according to age, results showed that the differences were significant ($P=0.04$). The highest infection rate was found in camels of age group 3-<6 years while the lowest infection rate was recorded for group age ≥ 9 years. The trend of infection rate fluctuated up and down across age categories of camels. The results of the present study confirmed the previous results obtained by Hamza (2007) who found the lowest infection rate in age less than two years (26.82%) and the highest in age group ≥ 10 years (59.37%). However, the trend of infection was differed as compared with our study as it increased along with advanced age.

Table 01. Infection rate of *B. Coli* according to gender in camels

Gender	No.	+ve No.	Percentage %
Male	33	12	36.36
Female	67	38	56.71
<i>Chi-square value</i>		3.66	
<i>P</i>		0.055	
Total	100	5050	

Table 02. Infection rate of *B. Coli* according to age in camels

Age/year	No.	+ve No.	Percentage %
<3	42	18	42.85
3-<6	24	17	70.83
6-<9	25	13	52.00
≥ 9	9	2	22.22
<i>Chi-square value</i>			7.84
<i>P</i>			0.04

The infection rate in male breeders (53.33%) differed significantly ($P=0.04$) as compared with female (10%). These differences could be attributed to that males are more dealing and contact with camels than females as the Herding camels and this will increase the opportunity of their infection occurrence. Moreover, the non-significant ($P= 0.61$) difference of infection rates between males breeders (57.14%) and camels (50%) support our conclusion and in the same time give an evidence about the zoonotic balantidiasis. Results demonstrated that the younger breeders are more at risk to get infection as compared with the older breeders. This could be attributed to low immunity in younger breeders as compared with older breeders.

Table 03. Infection rate of *B. Coli* according to gender in breeders

	No.	+ve No.	Percentage %
Male	14	8	57.14
Female	11	2	18.18
<i>Chi-square value</i>			3.98
<i>P</i>			0.04
Total	25	40	40

Table 04. Infection rate of *B. Coli* according to age in breeders

	No.	+ve No.	Percentage %
1-<30	11	6	54.54
30≤	14	3	21.42
<i>Chi-square value</i>			4.16
<i>P</i>			0.04

Table 05. Comparison the infection rates between camels and their male breeders

	No.	+ve No.	Percentage %
Camels	100	50	50
Male breeders	14	8	57.14
<i>Chi-square value</i>			0.25
<i>P</i>			0.61

IV. Conclusion

These results demonstrate the high prevalence of *B. coli* in camels and their breeders. In view of this study, strategic treatment and control program must be adopted to control *B. coli* infections in the camels and their breeders. The application of health education is also required for all people in rural regions along with applying environmental hygiene that would help to prevent the infection in animals and humans.

Conflict of Interest

We declare that we have no conflict of interest.

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