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Balantidiasis in a dromedarian camel

Javad Tajik^{1*}, Saeid R Nourollahi Fard², Amin paidar¹, Samaneh Anousheh¹, Elahe Dehghani¹¹Department of Clinical Studies, School of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran²Department of Pathobiology, School of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

PEER REVIEW

Peer reviewer

Dr. H. Radfar, Associated Professor, Department of Pathobiology, Parasitology section, School of Veterinary Medicine, Shahid Bahonar University of Kerman, P.O. Box 76169133 Kerman, Iran.
Tel: +98-341-3202900
Fax: +98-341-3222047
E-mail: radfar@uk.ac.ir

Comments

This is a good scientific report in which the authors proposed the role of camel as a reservoir host for *B. coli* in Islamic countries, and new treatment method has been used for camel balantidiasis. This is the first report of camel balantidiasis occurrence in Iran.

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ABSTRACT

A 3 years old male dromedarian camel was examined because of anorexia and diarrhea. The affected camel was depressed, tachycardic, eupnic, and had a body temperature of 38.8 °C. Mucous membranes were hyperemic and faeces was soft and mucous coated but of normal colour and odour. Faecal examination revealed a large number of *Balantidium coli* trophozoites and cysts (15000/g) and no other parasite could be detected in faecal sample. Seven days after the onset of treatment using intramuscular antibiotic (ampicillin) and anti inflammatory agent (flunixin meglumine), the food consumption, clinical signs and faecal consistency were normal, and faecal examination revealed no parasite. Presence of no other pathogen in faecal samples, and concurrent disappearance of clinical signs and absence of the parasite in the faeces confirmed a diagnosis of balantidiasis. There are only two previous reports about the balantidiasis in camel and the current report is the first report of camel balantidiasis in Iran and supports the proposed role of camels as a reservoir host for *Balantidium coli* in Iran.

KEYWORDS

Balantidium coli, Dromedarian camel, Balantidiasis

1. Introduction

Balantidium coli (*B. coli*) is a ciliate protozoan and is frequently found in the intestinal tract of over 50 species of vertebrates, such as swine, human, non-human primates, and ruminants^[1,2]. In most cases, *B. coli* lives as a commensal organism in healthy human and animals. However, it is believed that under certain circumstances, *B. coli* may act as an opportunistic pathogen via the invasion of intestinal epithelium damaged by other

infectious agents^[3].

Pigs are generally considered as the most important reservoir hosts for human infection and *B. coli* infection has been found in 20%–100% of pigs in various populations^[4]. There are also few reports about the balantidiasis infectious disease caused by *B. coli* in uncommon mammalian hosts such as dog, sheep and horse^[5]. Additionally, there are few reports about the presence of *B. coli* in camel faecal samples^[6].

In Islamic countries like Iran, pig farming and

*Corresponding author: Dr. J. Tajik, Assistant Professor of Large Animal Internal Medicine, Department of Clinical Studies, School of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, P.O. Box 76169133, Iran.

Tel: +98-341-3202900

Fax: +98-341-3222047

E-mail: tajik@uk.ac.ir

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Table 1

The CBC results at the first and third days of the treatment

Treatments	PCV (%)	RBC count ($10^{12}/L$)	Total WBC ($10^9/L$)	Neutrophile ($10^9/L$)	Lymphocyte ($10^9/L$)	Monocyte ($10^9/L$)	Eosinophil ($10^9/L$)
Day 1	27	8.36	12.35	5.681	6.298	0	0.371
Day 3	27	7.00	11.00	12.160	3.200	0	0.760

consumption is prohibited and human infection seems to be nonexistent. However, human balantidiasis has been reported in Iran and seems quite extraordinary[5]. Camel has been proposed as a reservoir host for *B. coli* in Islamic countries[6].

However, there are only two previous reports about the presence of *B. coli* in faecal samples of camels[7,8], and there are two reports about the balantidiasis in camels[1,9].

Although two cases of camel balantidiasis have been reported previously, to the best of our knowledge, there is no previous report of camel balantidiasis in Iran and there is a little information about clinical signs and treatment of camel balantidiasis. This paper describes the occurrence and successful treatment of camel balantidiasis in a 3 years old dromedarian camel, and is the first report of camel balantidiasis occurrence in Iran and supports the proposed role of camel as a reservoir host for *B. coli* in Iran.

2. Case report

In October 2012, a 3 years old male dromedarian camel from research farm of the Veterinary School of Shahid Bahonar University of Kerman, Central Iran, showed anorexia and diarrhea.

The case was housed in a group pen with ten dromedary camels from both sexes and with different ages (between 3–8 years old) 30 months ago and had no history of environmental stress or previous disease.

The affected camel was depressed, tachycardic (84 beats/min), eupnic (10 breaths/min), and had a body temperature of 38.8 °C. Stronger heart tone than normal was detectable by stethoscope and mucous membranes were hyperemic. Feces was soft and mucous coated but of normal colour and odour. Urine was normal in appearance. A complete blood count (CBC) revealed no abnormality in leukogram (a total white cell count of $12.35 \times 10^9/L$ and normal neutrophile, lymphocyte, monocytes and eosinophil counts). Although, hematocrit was at the lower normal range (27%), the red blood cell count was in normal range ($8.36 \times 10^{12}/L$). No band cell or blood parasite was observed in blood smear.

Faecal sample was collected directly from rectum and examined by floatation method using saturated sucrose solution. Faecal examination revealed a large number of *B.*

coli trophozoites and cysts (15 000/g), which were identified using morphological characteristics[10]. No other parasite could be detected in faecal sample.

Examination of faecal samples from other camels in the group pen revealed no presence of *B. coli*, however, *Nematodirus* eggs were found in 4 out of the examined samples.

Treatment consisting of antibiotic (ampicillin, Daana pharma, Iran, 10 mg/kg) and anti inflammatory agent (flunixin meglumine 5%, Razak, Iran, 2 mg/kg) were administrated intramuscularly for 7–consecutive day. Two doses of Alphos[®] (injectable vitamin B12 and phosphorus, Razak, Iran, 10 mL) were also administered intramuscularly at Day 1 and Day 3 of the treatment.

At Day 3 of the treatment, the food consumption increased and the faecal number of *B. coli* trophozoites and cysts decreased (1 200/g). The heart rate and respiratory rate were 64 breaths and 10 beats per min, respectively, and the body temperature was 38.5 °C. However, the mucous membranes were hyperemic. The CBC results at Day 1 and Day 3 of the treatment are shown in Table 1.

At Day 4 of the treatment, the food consumption returned to normal and the body temperature and heart rate were decreased (56 beats/min and 38 °C, respectively). The feces was normal in consistency, colour and odour, and the number of faecal *B. coli* trophozoites and cysts was decreased to 100/g.

Seven days after the onset of the treatment, the food consumption, clinical signs and faecal consistency were normal, and faecal examination revealed no parasite.

3. Discussion

There are a few reports about the presence of *B. coli* in camel faecal samples. Tekle and Abebe reported presence of *B. coli* in 11.9% of camel faecal samples in Ethiopia[8] and Abubakr *et al.* found this parasite in camels suffering from diarrhea in Bahrain[7]. However, to the best of our knowledge, there are only two reported cases of camel balantidiasis in Malaysia[1] and Sudan[9], and this is the first report of the camel balantidiasis in Iran. Presence of no other pathogen in faecal samples, concomitant decrement in the number of *B. coli* in faecal samples

with improvement of clinical signs, and concurrent disappearance of clinical signs and absence of the parasite in the faeces confirmed a diagnosis of balantidiasis.

B. coli presence in the intestinal tract, mostly as a nonpathogenic organism, has been reported in over 50 species of vertebrates^[1], however, enteric disorder caused by *B. coli* has been reported in swine, dog, non-human primates, human and camel. The capacity of *B. coli* as a primary enteropathogen in domestic animals is in controversial^[3], and it is believed that this organism acts as an opportunistic pathogen via the invasion of intestinal epithelium damaged by other infectious agents^[3]. However, enteric disease due to the *B. coli* has been reported without any concomitant infection in camels^[1,9], which is the same to the current case report. On the other hand, it is believed that various stress condition, immunodeficiency, and malnutrition can result in clinical disease occurrence in infected hosts^[2,11,12]. In this case, there was no history of environmental stress, ration change or concurrent disease 3 months ago.

Two previously reported cases of camel balantidiasis had been treated using a 53-day administration of chloroquine^[1] (an antiprotozoal drug mostly used as an antimalaria) and a 3-day administration of carbarasone^[9] (an arsenic-based antiprotozoal drug). In the current case, ampicillin was administrated in treatment of affected camel, which showed good therapeutic effects and complete elimination of faecal parasites at 7 d after the onset of treatment. We found ampicillin as an effective and available drug in treatment of camel balantidiasis and our results was similar to that of Tarrar *et al.* in buffaloes^[13]. However, Bonfiglio *et al.* reported that only 4% of *B. coli* strains were susceptible to ampicillin^[14].

In this case, the CBC revealed no abnormality in leukogram. Similarly, no hemogram abnormality was detected in two previously reported cases of camel balantidiasis^[1,9].

Although, human balantidiasis is not common^[4] and worldwide prevalence of human infection has been reported as 0.02%–1%^[15], acute disease with life threatening consequence may occur in people with malnutrition, alcoholism, or immunodeficiency^[12]. Domestic pigs have been introduced as the main natural reservoir hosts for human *B. coli* infection. Although, in Iran and other Islamic countries, pig breeding and consumption is prohibited, human balantidiasis occurs^[5]. Human to human transmission^[5], wild boars^[16], and camels^[6] have been proposed as the responsible for transmission of human infection in Iran. Solaymani–Mohammadi *et al.*

found ciliate parasites resembling *B. coli* in 25%–70% of wild boars in western Iran^[16]. Due to very little prevalence of human balantidiasis, the role of direct human to human transmission supposed negligible, and wild boars have been proposed as the probable source of human infection in Iran^[4]. On the other hand, Cox proposed camels as the probable source of human disease in Iran^[6]. Solaymani–Mohammadi *et al.* believed that in Islamic countries, the absence of a relationship between the prevalence of human balantidiasis and camel population rejects the role of camels as a reservoir host for human infection^[17]. Cyst of *B. coli* survives best in humid condition and protects from direct sun light^[12] and under high temperature that characterizes most parts of Islamic countries with camel husbandry, *B. coli* cyst loses its viability and infectivity^[18]. The geo-climatic condition of regions with camel harvests in Islamic countries may be the cause of the absence of a significant relationship between the prevalence of human balantidiasis and camel population.

The current report is the first report of camel balantidiasis in Iran and supports the proposed role of camel as a reservoir host for *B. coli* in Iran. Additionally, close working association between farmers and camels and contamination of soil and water by faeces of camels roam freely makes the role of camels as the source of human infection more likely than that of wild boars.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

B. coli has been found in the intestinal tract of over 50 species of vertebrates. There are only two previous reports regarding the the balantidiasis in camels and there is a little information about clinical signs and treatment of camel balantidiasis. As pig farming and consumption is prohibited in Islamic countries, the reservoir host for *B. coli* in Islamic countries is unknown.

Research frontiers

There is a little information about clinical signs and treatment of camel balantidiasis. Although, pig farming and consumption is prohibited in Islamic countries, human balantidiasis has been reported in Iran and seems quite extraordinary. As a result, the reservoir host for *B. coli* in Islamic countries is unknown. Camel has been proposed as a reservoir host for *B. coli* in Islamic countries, however, there are few documents.

Related reports

Although two cases of camel balantidiasis have been reported previously, there is no previous report of camel balantidiasis in Iran. There is a little information about clinical signs and treatment of camel balantidiasis and different treatment methods have been used in previous studies. Tekle and Abebe reported presence of *B. coli* in 11.9% of camel faecal samples in Ethiopia, and Abubakr *et al.* found this parasite in camels suffering from diarrhea in Bahrain. Solaymani–Mohammadi *et al.* found ciliate parasites resembling *B. coli* in 25%–70% of wild boars in western Iran.

Innovations & breakthroughs

New treatment method has been used in this report. Wild boars has been proposed as the responsible for transmission of human infection in Iran, however, this study as the first report of camel balantidiasis in Iran supports the proposed role of camel as a reservoir host for *B. coli* in Iran.

Applications

The study illustrates of clinical signs and new treatment method for camel balantidiasis. It also supports the proposed role of camel as a reservoir host for *B. coli* in Islamic countries.

Peer review

This is a good scientific report in which the authors proposed the role of camel as a reservoir host for *B. coli* in Islamic countries, and new treatment method has been used for camel balantidiasis. This is the first report of camel balantidiasis occurrence in Iran.

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