Balantidiasis in a dromedarian camel

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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 (15 000/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
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 × 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 × 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 (1200/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.

Table 1: The CBC results at the first and third days of the treatment

<table>
<thead>
<tr>
<th>Treatments</th>
<th>PCV (%)</th>
<th>RBC count (10^12/L)</th>
<th>Total WBC (10^7/L)</th>
<th>Neutrophile (10^7/L)</th>
<th>Lymphocyte (10^7/L)</th>
<th>Monocyte (10^7/L)</th>
<th>Eosinophil (10^7/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>27</td>
<td>8.36</td>
<td>12.35</td>
<td>5.681</td>
<td>6.298</td>
<td>0</td>
<td>0.371</td>
</tr>
<tr>
<td>Day 3</td>
<td>27</td>
<td>7.00</td>
<td>11.00</td>
<td>12.160</td>
<td>3.200</td>
<td>0</td>
<td>0.760</td>
</tr>
</tbody>
</table>

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
non-pathogenic 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[8], 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.

**Acknowledgements**

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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.

References