PREVALENCE OF Cryptosporidium AND Eimeria INFECTIONS IN DROMEDARY (Camelus dromedarius) IN ABATTOIR OF MASHHAD, IRAN

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ABSTRACT

This research was conducted to determine the prevalence of Eimeria spp. and Cryptosporidium spp. oocysts in camels. Faecal samples of 306 dromedaries (Camelus dromedarius) in abattoir of Mashhad, a city in north east Iran and the capital of Khorasan province between October 2007 and September 2008 were analysed for Cryptosporidium oocysts by microscopic examination of smears stained by modified Ziehl-Neelsen technique. The parasite was detected in 6 camels (1.95%). The same samples were examined by saturated solution of sodium nitrate flotation technique for Eimeria oocysts. During the laboratory examination of faecal samples, Eimeria spp. oocysts were identified in 57 (18.62%) of the dromedaries examined. Eimeria dromedarii was the most prevalent and Eimeria camelit the least. The prevalence of Eimeria was highest during the winter (p<0.05). This is the first report of cryptosporidiosis in dromedary camel (Camelus dromedarius) in Iran.

The mucosa of the ileum, cecum and colon of infected camels were edematous, congested and ulcerated. Histopathological examination of this ileum revealed distended, disorganised villi and crypts due to developmental stages of Eimeria, and moderate to severe inflammatory reaction was seen mainly by infiltration of eosinophils and lymphocytes.

Key words: camel, cryptosporidium, eimeria, mashhad, Iran

Cryptosporidiosis is a waterborne protozoan disease of public health significance. Cryptosporidium spp. is a protozoan parasite that can cause gastrointestinal illness in a wide variety of mammals, including humans, cattle, sheep, goat, pig, horses and camels world-wide (Fayer et al, 2000). For camel farms, Cryptosporidium has become a concern not only because of the direct economic losses associated with the infection, but also from a public health perspective because of the potential for environmental contamination with Cryptosporidium oocysts. It is well known that most data on the prevalence of Cryptosporidium infection in animals concern cattle. In comparison, there is less information on the occurrence of cryptosporidiosis in dromedary camel (Soltane et al, 2007).

Eimeria spp. is the most economically important protozoan pathogens of animals which causes coccidiosis. Several species of coccidia have been reported in camelids (Soulsby, 1982). No cross-transmission studies between camelids and other domestic animals have been reported. Reported clinical signs of coccidiosis in South American camelids include anorexia of a few days duration, sudden death, and diarrhoea (Chigerwe, 2007). However, published diagnosis in prevalence rate of Eimeria spp. among camels are rare (Chineme, 1980, Hussein et al, 1987; Yagoub,1989; Kinne and Wernery, 1997; Partani et al, 1999; Whitehead and Anderson, 2006). In Iran, few studies have been carried out to determine the prevalence of Eimeria spp infection in camel (Yakhchali and Cheraghi, 2007).

Hence, the major objective of the present study was to determine the recent prevalence and pathological lesion of Eimeria spp and Cryptosporidium in dromedary camel in Iran.

Materials and Methods

This study was conducted on 306 dromedary camels of different age and sex. Camel slaughtered in Mashhad abattoir, a city in northeast Iran during October 2007 to September 2008. After slaughtering of the dromedaries, faecal samples were collected directly from the rectum and put in a sterile plastic bag.
and were taken to laboratory within a few hours of collection and were stored at 4°C.

Faeces were determined by the Clayton lane technique using saturated solution of sodium nitrate as the floating medium to assess oocyst per gram (Anon, 1977; Soulsby, 1982). To confirm the presence of Cryptosporidium, a fraction of each faecal sample was smeared on a microscope slide and stained using a modified Ziehl–Neilsen technique (Henriksen and Pohlenz, 1981).

Oocysts were examined using an oil-immersion 100 X objective on a Leitz microscope. Species identification was based on oocyst size, shape, and internal structure.

The gastrointestinal organs of infected camels were examined for gross pathological changes. The gross damage was recorded. Tissue samples were collected, preserved in 10% formalin solution, processed and stained with Haematoxylin and eosin (Anon, 1984) and were examined histopathologically.

Statistical evaluation of results was done with SPSS 15 (SPSS for Windows ver. 15 © SPSS Inc., USA). The Chi-square test was used to adjudge the effects of season along with their possible interactions with Eimeria.

Results

Out of the 306 of camels examined during the study period, 57 (18.62%) were shedding oocyst in their faeces (Table 1 and Table 2). Most of camels examined during the present survey had low to moderate oocysts per gram (OPG <30).

The result of Chi-square test implicated that the correlation between prevalence of the disease and season were statistically significant (p < 0.001). The prevalence of Eimeria infection was high in winter than other seasons (Table 1). Cryptosporidium spp. was identified in 6 (1.9%) of camels.

Gross lesions were seen mostly in the ileum, caecum and colon. The mucosa of the ileum, caecum and colon were oedematous, congested and ulcerated. The most prominent macroscopic lesions were multifocal thickening of the mucosa in the jejunum, ileum, caecum, and colon with severe haemorrhage (Fig 1). In cases with marked lesions, the gut lumina generally contained fibrin strands and varying amount of blood.

Histopathological examination of the ileum revealed distended, disorganised villi and crypts due to developmental stages of Eimeria, and moderate to severe inflammatory reaction mainly by infiltration of eosinophils and lymphocytes. The developmental stages of Eimeria included microgametocytes, macrogametocytes, mature and giant schizonts. The giant schizonts were easily discernible in histological sections of the small intestine (Fig 2). Affected crypts were disorganised or obliterated due to the growth of the large schizonts. Villi were short, blunt, or fused and the tips were ulcerated. Oedema of the lamina propria and blunting and erosion of the villi associated with goblet cell hyperplasia and haemorrhage were marked (Fig 3).

In large intestines, the ridges were blunt, rounded and coalesced or flattened. The intestinal mucosa was denuded, ulcerated, or completely destroyed. The lesions in the colon were patchy in distribution and generally less severe than those in the caecum. While some glands were denuded and lined by attenuated or cuboidal epithelium, others were long, tortuous and hyperplastic. Macro and microgamons and oocysts were the main forms seen at this stage (Fig 4). The surface was ulcerated with neutrophils, eosinophils and necrotic debris. In some cases, there was almost total destruction of crypts in the mucosa.

Discussion

Prevalence and pathological lesions of Eimeria and Cryptosporidium of dromedary in Iran is scarcely reported. In the present work, 1 year abattoir survey determined the prevalence and seasonal incidence of Cryptosporidium and Eimeria spp. of camel.

In the present study, the prevalence of the Eimeria spp. infection in camel was 18.62%. These oocysts were identified as Eimeria dromedaria, Eimeria canetti and Eimeria ravidshani. Similarly, prevalence of Eimeria infection baqtrani and dromedary camels in

<table>
<thead>
<tr>
<th>Season</th>
<th>Sample size</th>
<th>Infection number and rate</th>
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<tbody>
<tr>
<td>Spring</td>
<td>89</td>
<td>10 (11.23%)</td>
</tr>
<tr>
<td>Summer</td>
<td>32</td>
<td>3 (15.62%)</td>
</tr>
<tr>
<td>Fall</td>
<td>138</td>
<td>2 (17.39%)</td>
</tr>
<tr>
<td>Winter</td>
<td>47</td>
<td>18 (38.30%)</td>
</tr>
<tr>
<td>Total</td>
<td>306</td>
<td>57 (18.62%)</td>
</tr>
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</table>

Table 2. Protozoan parasites found in dromedary in abattoir of Mashhad (n=306).

<table>
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<tr>
<th>Protozoa</th>
<th>The number of infected dromedary</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Eimeria spp.</td>
<td>57</td>
<td>18.62</td>
</tr>
<tr>
<td>Cryptosporidium spp</td>
<td>6</td>
<td>1.96</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>20.58</td>
</tr>
</tbody>
</table>
Miandoab region of Iran was 12.8% (Yakhchali and Cheraghi, 2007). In previous study, *Eimeria bactriani*, *Eimeria rajasthani*, *Eimeria pellerdyi*, *Eimeria cameli* and *Eimeria dromedarii* were identified in camels. Prevalence of *Eimeria* infection in camels at Rajasthan was 29.19% (Partani et al., 1999). *Eimeria* species recorded were *Eimeria dromedarii*, *E. cameli*, *E. pellerdyi*, *E. rajasthani* and *E. rolleri*. Cocccidial oocysts were detected in 40 (17.4%) out of 230 fecal samples obtained from camels in the Eastern Region of Sudan (Yagoub, 1989). These oocysts were identified as *Eimeria rajasthani*, *Eimeria dromedarii* and *Eimeria cameli*. Severe outbreak of camel coccidiosis in the United Arab Emirates is reported by Kinne and Wernery (1997). The observed hemorrhagic-eosinophilic enteritis associated with a massive invasion of *Eimeria cameli* suggests that this species is more pathogenic. The prevalence of *Eimeria* infections in camels in Saudi Arabia was 41.6% and *Eimeria dromedarii* was the most prevalent and *Eimeria cameli* the least (Hussein et al., 1987; Kasim et al., 1985). The gross and histopathologic lesions caused by *Eimeria cameli* showed lesions in the small intestine which had swollen mucosa on which were numerous whitish-grey foci. Histologically, giant schizonts in various developmental stages were seen in the lamina propria of the jejunum. The associated inflammatory cellular response in these areas was predominantly mononuclear and eosinophilic in character (Chineme, 1980). Most of animals examined during the present survey had low to moderate OPG, suggesting that the
infections were usually sub-clinical. However, the economical consequences of the sub-clinical infections are of importance. Sub-clinically infected animals appear normal outwardly, but possibly suffer from reduced feed consumption, feed conversion and growth performance.

In the present study, oocysts of Cryptosporidium spp. were detected in 1.9% of 306 faecal specimens. Examination of faecal samples obtained from sheep, goats, horses, rabbits, camels, broiler chicken and turkeys in Tunisia showed the parasite in 10 sheep (11.2%) and 9 broiler chickens (4.5%) (Soltane et al., 2007). Cryptosporidium has been reported in South American camelds including alpacas (Lama pacos), llamas (Lama glama) and guanacos (Lama guanicoe) (Whitehead and Anderson, 2006; Stewart et al., 2005; Shapiro et al., 2005; Cebra et al., 2003; Bidewell and Cattell, 1998).

The occurrence of Eimeria and Cryptosporidium infection in camels has implications for epidemiology and transmission in animals and humans. These findings point to need for effective control programs, especially for young camels.

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References


