



RESEARCH ARTICLE

Prevalence and pathologic study of *Eimeria cameli* in slaughtered camels

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Özet

Kheirandish R, Nourollahi-Fard SR, Faryabi Z. Kesime tabi tutulan develerde *Eimeria cameli* prevalansı ve patolojik araştırması. *Eurasian J Vet Sci*, 2012, 28, 3, 138-141

Amaç: Araştırmanın amacı mezbahada kesime tabi tutulan develerde *Eimeria* enfeksiyonunun varlığını araştırmak ve gastrointestinal kanalda histopatolojik lezyonlarını tanımlamaktır.

Gereç ve Yöntem: Kesilen 100 adet (68 erkek, 32 dişi, 6 ay - 8 yıl) deveye ait barsaklar *Eimeria* varlığı için mikroskopik olarak incelendi. Develer yaş (<2 yıl, 2-4 yıl, >4 yıl) ve cinsiyet (erkek, dişi) olarak 3 gruba ayrıldı. *Eimeria* spp. prevalansı ve gaitada ookist varlığı flotasyon ve sporulasyon teknikleri ile belirlendi. İntestinal kanaldan alınan doku örnekleri %10 formalinde sabitlendi. Örnekler parafine gömüldükten sonra 5 µm kalınlıkta kesilerek Hematoxylin-Eosin ile boyandı.

Bulgular: Araştırılan 100 devenin 29 (%29)'unda *Eimeria cameli* tespit. Develerde cinsiyet ve yaş grupları arasında hastalığın prevalansı açısından fark belirlenmedi ($p>0.05$). Mikroskopik incelemede eozinofilik enterit ve Lieberkuhn bezinin epiteli ile lamina propria'da giant sizont, mikrogamet, makrogamet ve ookistler belirlendi.

Öneri: *Eimeria cameli* enfeksiyonlarının İran'ın güney doğusunda yaygın olduğu ve kontrol programları düşünüldüğünde enfeksiyon varlığının değerlendirilmesinin faydalı olacağı ifade edilebilir.

Abstract

Kheirandish R, Nourollahi-Fard SR, Faryabi Z. Prevalence and pathologic study of *Eimeria cameli* in slaughtered camels. *Eurasian J Vet Sci*, 2012, 28, 3, 138-141

Aim: This study was carried out to determine *Eimeria* infection in slaughtered camel and describe the gross and histopathologic lesions caused by *Eimeria* species in the intestinal tract.

Materials and Methods: Slaughtered 100 camels (68 males, 32 females, 6 months to 8 years, Kerman) were investigated for the presence of *Eimeria* parasites microscopically in intestinal tracts. Camels were classified into 3 groups according to the age (<2 years, 2-4 years, >4 years) and sex (male, female). The prevalence of *Eimeria* spp. infection and the intensity of faecal oocysts were determined using floatation and sporulation techniques. Tissue samples were taken from the intestinal tracts and then fixed in 10% buffered formalin. They were processed and embedded in paraffin. Sections of 5 µm thickness were cut and stained with Hematoxylin and Eosin.

Results: *Eimeria cameli* were found in 29 (29%) of the 100 camels. Sex and age of camels did not have significant ($p>0.05$) effect on prevalence. Microscopic examination revealed eosinophilic enteritis and existence of developmental stages of the parasite such as giant schizonts, microgamont, macrogametocytes, and oocysts in the lacteals of lamina propria and in the epithelium of Lieberkuhn glands.

Conclusion: *Eimeria cameli* infection is prevalent in camels in the south-eastern part of Iran and the evaluation of infection potential can be useful when considering control programs.

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► Introduction

The camel is considered as an economically important animal in arid and semi-arid areas of the world. Twenty million old world camels inhabit in North and East Africa countries, and Middle and Far East countries (Duszynski et al 1999). According to the annual report of Iranian Veterinary Organization in 2009, the average population of camels was 154.000, distributed over too many flocks and camel-raising areas in Iran and a great amount of this population live in Kerman province. The coccidia genera *Eimeria* and *Isospora* infect camels, however, only *Eimeria* species were recognized as causing disease (Kaufmann 1996). Five *Eimeria* species are considered to have the capability of infecting camels of which *E. cameli* and *E. dromedari* are considered as major pathogens. All species parasitize the camels' intestine (Boid 1985, Lewine and Ivens 1986, Kaufmann 1996, Yakhchali and Cheraghi 2007).

Although there are several studies that showed the prevalence of camel coccidiosis in some regions of Iran, there are a few reported describing histopathologic changes of coccidiosis in camel. The purpose of the present research work was to describe the gross and histopathologic lesions of naturally occurring coccidiosis in camels as well as the frequency and diversity of *Eimeria* species in Kerman province, Iran.

► Materials and Methods

This study was carried out on slaughtered camel in Kerman abattoir. Kerman is located in at 30°17' 13"N and 57°04' 09 " E southeast of Iran. This city has a hot and arid climate, the average annual rainfall is 135 mm and because of its located close to the desert (*Kavir-e lut*) it has a great population of camel. During this study from camels which were slaughtered for human consumption in Kerman, 100 camels were investigated for the presence of *Eimeria* parasites. The animals included 68 males and 32 females and their ages ranged from 6 months to 8 years. The investigated camels were classified in to 3 groups according to the age (under 2 years, 2-4 years and over 4 years) and sex. The age was determined on the basis of eruption of permanent incisor teeth (Smallwood 1992). Fecal samples were collected directly from the rectum of each examined camel.

The prevalence of *Eimeria* spp. infection and the intensity of faecal oocysts were determined using floatation and sporulation techniques. Three grams of

each fresh fecal sample were mixed with 42 mL of tap water. The mixture was centrifuged at 2500 rpm for 2 minutes and floatation technique was done using standard Sheather solution. The oocysts were counted by the modified McMaster technique. Sporulation of oocysts was performed using Hendrix procedure (Hendrix 1998). The identification of *Eimeria* species was based on morphometry and morphology of oocysts (Dubey and Pande 1963, Kawasmeh and El-bihari 1983).

After systematic postmortem examination of each animal, the small and large intestines and also the mesenteric lymph nodes were opened and inspected carefully. Gross changes were noted and appropriate tissue samples of duodenum, jejunum, ileum, cecum, colon, rectum were fixed in 10% buffered formalin, embedded in paraffin, sectioned at about 5 µm, stained with Hematoxylin and Eosin (H&E) and studied microscopically.

Differences in age groups were evaluated with the Chi-square (X^2) test and differences in prevalence within age groups and sex were evaluated with the Paired t-test with CI (99%).

► Results

The prevalence of *E. cameli* in 100 camels in different sex and age groups is summarized in Table 1. Twenty nine out of 100 examined camels (29%) were found infected with *E. cameli*. There were not significant differences in prevalence between different age groups ($p < 0.05$). Nineteen (27.94%) of 68 male and 10 (31.25%) of 32 female examined camels had *Eimeria* infection. There was not significant differences in the prevalence between male and female all groups ($p < 0.05$). Laboratory findings showed that *E. cameli* was in the gastrointestinal tract of the examined camels (Figure 1). Microscopically, *Eimeria* stages were found in intestinal tracts in 29 out of the 100 camels. Gross lesions were seen mostly in the jejunum and ileum. These lesions varied from variable amount of hyperemia and fluid distention to severe pseudomembranous and hemorrhagic in affected segments. Microscopically, the affected villi and crypts were distended and disorganized due to developmental stages of *Eimeria*, and moderate to severe inflammatory reaction mainly by infiltration of eosinophils (Figure 2). The developmental stages of *Eimeria* such as giant schizonts, microgamont, macrogametocytes, and oocysts in the lacteals of lamina propria and in the epithelium of the Lieberkuhn glands were ob

Table 1. The prevalence of *Eimeria cameli* in slaughtered camel in different sex and age groups.

	Age (Years)			Sex	
	<2	2-4	>4	Male	Female
No. of camels	28	33	39	68	32
Percentage of infected camels (%)	6 (21.42)	10 (30.3)	13 (33.33)	19 (27.94)	10 (31.25)



Figure 1. Oocyst of *Eimeria cameli* with a micropilar cap (arrow, Bar=10 μ m).



Figure 4. Oval thick-wall oocyst with a micropilar cap is seen (H&E, Bar=25 μ m).

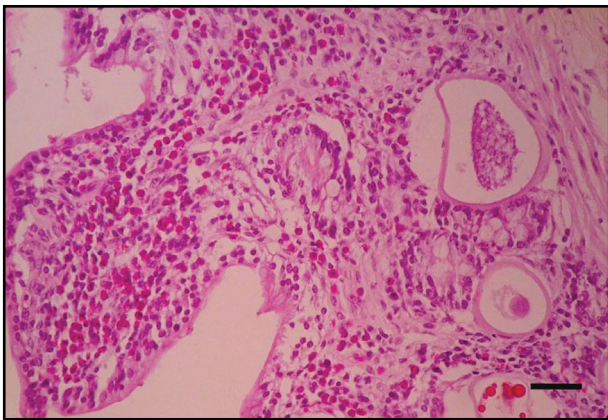


Figure 2. Eosinophilic enteritis with presence of developmental stages of *E.cameli* (H&E, Bar=25 μ m).

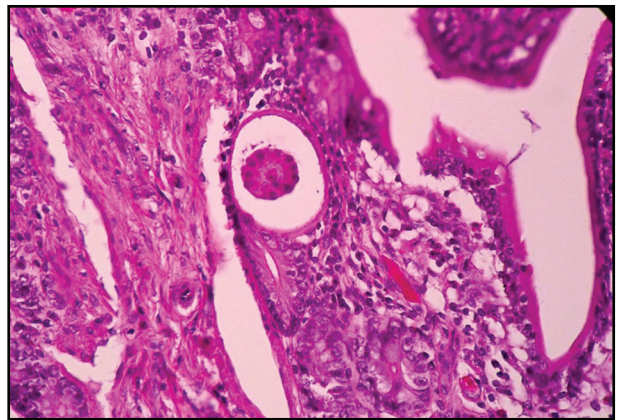


Figure 5. Macrogamont with a central nucleus and peripheral plastic granules is seen (H&E, Bar=25 μ m).

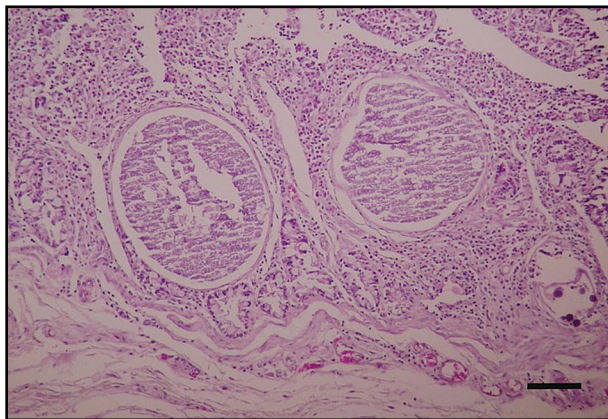


Figure 3. The crypts of Lieberkuhn are obliterated due to the growth of the giant schizonts (H&E, Bar=100 μ m).

served. The giant schizonts were seen mainly in the lamina propria of villi, particularly in the crypts of Lieberkuhn of the jejunum and ileum. Affected crypts were disorganized or obliterated due to the growth of the large schizonts (Figure 3), oocysts were oval and had refractile wall with a micropilar cap (Figure 4), and macrogamont were large with a central nucleus and peripheral plastic granules (Figure 5).

► Discussion

Coccidia comprise of a large group of obligatory intracellular parasites (Duszynski et al 1999). Coccidiosis is an economically important disease in many species of livestock. The symptoms of coccidiosis range from loss of appetite and slight, short-lived diarrhea to severe cases involving great amounts of dark and bloody diarrhea and, in some cases, death. For a successful and economical control of coccidiosis in camels, detailed knowledge about *Eimeria* species involved is essential (Yakhchali and Athari 2010). Therefore, the aim of the present study was to recognize the frequency and diversity of *Eimeria* species as well as describe the gross and histopathologic lesions of naturally occurring coccidiosis in camel slaughtered in Kerman Abattoir, Iran. *E. cameli* in the present study were formerly considered pathogenic species to young camel calves (Hussein et al 1987). With regard to the present study on camel coccidiosis, sex and age of camels did not have significant effect on prevalence (Table 1). These findings were not in agreement to Yakhchali and Cheraghi (2007).

Yakhchali and Athari (2010) reported the prevalence of high infection rate (75%) with concurrent

yellow-green diarrhea in <2 years of age camels indicated coccidiosis as the principal cause of the disease. Kaufmann (1996) reported that young camels are much more susceptible to *Eimeria* infections. Whereas, in the age group of over two years old with low infection prevalence (25%), normal feces formation with opg +1 indicated that they served as carriers and foci for infection to camel calves. In this study, the ileum and jejunum were the most common affected tissues with eosinophilic enteritis and existence of giant schizonts in the lacteals of lamina propria and in the epithelium of the Lieberkuhn glands. These pathological findings were in close agreement with Khodakaram Tafti et al (2001), Hussein et al (1987), Kasim et al (1985) and Borji et al (2009). Several studies showed the prevalence of different *Eimeria* species in camels. Chineme (1980) reported a case of camel coccidiosis caused by *E. cameli* in Nigeria. In other studies, Kawasmeh and Elbihari (1983), Yagoub (1989) and Kasim et al (1985) found one or more species (*E. rajasthani*, *E. dromedarii* and *E. cameli*) with an overall prevalence of 14% in Saudi camels, 17.4% in Sudanese camels and 41.6% in Saudi Arabian camels, respectively. The differences between *Eimeria* species and their prevalence depend on some factors such as environment, animal factors, farm management and other factors (illness and stress). However, understanding the life cycle of coccidia is an important step in learning what damage they do to the host. It will also help in understanding why they are so difficult to control. Camels' husbandry has been considered as an important sector for food supply of rural and sometimes urban people in this geographical area of Iran. Thus, their health status is of importance and epidemiological data on coccidial infections are of value.

► Conclusions

In conclusion, no data exists on the prevalence of eimeriosis in camels of south part of Iran. Knowledge of prevalence of eimeriosis and current *Eimeria* species would certainly help to minimize the economic losses in camel industry. Moreover, these findings may be useful to evaluate the infection potential when considering control programs, especially for young camel.

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