



## ***Eimeria leuckarti* (Flesch, 1883; Reichenow, 1940) from worker horses and donkeys of Shahrekord , Iran**

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### **ABSTRACT**

The aim of this study was to determine the prevalence of *Eimeria leuckarti* in worker horses and donkeys of Shahrekord and suburb villages, Iran. Study was done on 52 horses and donkeys in January to 2013 in Shahrekord and suburb villages located in South west of Iran. Out of 52 specimens of fecal samples 4(7.6%) were positive for *Eimeria leuckarti*. The present study is second report of this parasite in Iran. although it has been frequently reported in other countries. These differences were probably linked to geographical variations and various ages.

**Key words:** *Eimeria leuckarti*, Donkeys, Horses, Shahrekord

### **INTRODUCTION**

*Eimeria* is the largest genus in the family Eimeriidae containing well over 1000 named species, with a number of important species affecting domestic mammals and birds. Several species of coccidia have been reported from horses. little information is available on the life cycles, pathogenesis and epidemiology. Similarly, little is also known about treatment and control of equine coccidiosis, but by analogy with other hosts, sulphonamides can be tried (Taylor.M.A, Coop.R.L and Wall.R.L 2007). Infection with *Eimeria* species (*E. leuckarti*, *E. solipedum*, and *E. uniungulsti*) infection is a worldwide protozoal disease of horses (Hirayama.K et al. 2002). *E. leuckarti* is the only coccidium in horses noted in Japan(Sutoh.M et al. 1976). The species *Eimeria leuckarti*, has been described in African countries (Levine, 1986); Australia (Reppas and Collins, 1995); Canada (Barker and Remmler, 1972); Germany (Bauer and Bu`rguer, 1984; Epe et al., 1993; Beelitz et al., 1994); Ireland (Sheahan, 1976); Italy (Battelli et al., 1995); Japan (Sutoh et al., 1976) and New Zealand (Johnstone et al., 1982).

Although the infection by *E. leuckarti* has been observed occasionally in adult animals, the disease prevalence rate is higher among foals and it is found in animals up to one year of age (Bauer, 1990). *E. leuckarti*, has been described in Iran (Tavassoli.M, Dalir-Naghadeh.B and Esmaeili-Sani.S 2010) that first has been reported in Iran. *E. leuckarti* was believed to have caused a case of cecocolic intussusception in an equine, although the connection between the lesion and functional alteration of the intestine caused by that protozoa and the consequent disease is not clear (White.M.R, Crowell.W.A and Guy.B.L 1988, Gaughan.E.M and Hackett.R. 1990, Beelitz.P, Gobel.E and Gothe.R 1996).

This study examined the occurrence of *E. leuckarti* oocysts in fecal samples of horses and donkeys in Shahrekord and suburb villages.

## MATERIAL AND METHODS

### Study area

Shahrekord is the capital city of Chaharmahal va Bakhtiari Province, South West of Iran. Sharekord is the Iran's highest capital city at 2,070 m (6,790 ft) above the sea level. This led to be known as "Roof of Iran". Shahrekord is about 100 km (62 mi) from Iran's third largest city of Isfahan and 521 km (324 mi) from Tehran. Its weather is dry, cold in winter and mild in summer. Due to lack of any information about the prevalence of *E. leuckarti* in the Shahre kord and suburb villages.

### Characterization of the studied equines and handling systems

Fecal samples from two equine species, kept under different handling and breeding systems, were collected (horses,donkeys). Sampling of 52 animals from Shahre kord and suburb villages, that consisted 26 horse and 26 donkeys, with average 6 years old, varying from six months to 20 years old. Group horses consisted of 26 horse, that 17 were females and 9 were males, and other group consisted of 26 donkeys, that contain 20 males and 6 females. The animals were all apparently healthy. They were regularly fed commercial food.

### Sample preparation

This survey was carried out in January 2013 in Shahrekord and suburb villages. A total of 52 specimens of fecal samples were collected from the rectum of all animals and stored at 4°C in 2.5% (w/v) potassium dichromate solution. (Carli.De and G.A. 2000). The fecal samples were examined microscopically after flotation, using saturated zinc sulfate solution. The identification was carried through following the key of (Levine.N.D 1986. ) and (Soulsby.EJL 1977).

### Flotation procedure

Approximately 4 gr of each specimen was placed in a test tube. Distilled water was added to within 1 cm of the top of the tube, and the suspension was thoroughly mixed with applicator sticks. The suspension was centrifuged at 500 x g for 1 min (2,000 rpm with a table model centrifuge), the supernatant was decanted, and zinc sulfate (specific gravity, 1.190) was added to the tube to within 1 cm of the top. The tube was placed in the centrifuge, and saturated zinc sulfate was added to the rim of the tube. A cover slip was placed gently on the top of the tube and in contact with the suspension. The tube was centrifuged with the cover slip in place at 500 x g for 1 min (2,000 rpm with a table model centrifuge). After centrifugation, the cover slip was gently removed and placed on a small drop of saline or iodine solution on a slide. The flotation procedure was performed in duplicate so that both iodine-stained and unstained preparations could be examined(Allan.L.T et al. 1981). An Olympus CH-20 microscope coupled with a

micrometric ocular K-15 PZO was used for morphometric analysis of oocysts.

## RESULTS

The oocysts of *E. leuckarti* were found in faeces collected from 4 (7.6%), Two donkey, two-years old and another with estimated age of 10 years old, two Stallion, 14 and 18 months old were infected by *E. leuckarti*. In addition, the majority of the examined faecal samples demonstrated the occurrence of *Parascaris equorum* (19.23%) eggs of all stages belonging to Strongylidae sp.(67.3%) and *Oxyuris equi* (7.69%). Detailed results of coproscopic examinations performed using various methods are shown in Table 1&2. Measurements were taken from 30 sporulated oocysts. The mean largest diameter obtained was 66–81  $\mu\text{m}$  and the mean smallest diameter 49–71  $\mu\text{m}$ .

## DISCUSSION

The results of the present studies indicate a prevalence of *E. leuckarti* in horses and donkeys in shahrekord,Iran. The prevalence of *E. leuckarti* was about 7.69%, similar to earlier reports (Studzinska.B.M, Tomczuk.K and Sadzikowski.A 2008) of 7%. However, whereas used a larger sample size. Our result disagrees with (Bauer.C and Rguer.H.J 1984) and (Souza.P.N.B. et al. 2009), because those found a prevalence rate of *E. leuckarti* smaller than 1% during a survey of infection by this parasite in European countries and Rio de Janeiro, Brazil. But in another study, the prevalence of *Eimeria leuckarti* in horses of Lublin region(Studzinska.B.M et al. 2008) were larger than the results of the present study. The Widespread *E. leuckarti* infection in several countries has been ranging from 2% to 80% (Germany 64.9%–80.0, Greece 3.1%, Poland 6.7 %, Turkey 4.5%–5.88%, USA 41.0%), this wide dispersion of the data may probably result from various ages of examined horses and coproscopy methodes used(Studzinska.B.M et al. 2008), It is believed that the infection of coccidian concerns mainly young horses and especially foals. Although it has been reported that *E. leuckarti* is more prevalent among young foals and only occasionally is detected in adult animals (Souza.P.N.B. et al. 2009), but in this investigations from four cases, 3 animals under two years old were infected, and only one animal was 10 old, that conform with idea of (Souza.P.N.B. et al. 2009) about is more prevalent among young animals. Moreover, according to Souza et al. 2009 that infection by *E. leuckarti* was found in females only, in our study, two, two horses and one donkey were males and a donkey was female. In the present study all of the cases, no clinical signs are documented in the animals excreting *E. leuckarti* oocysts. These findings were supported by our observation revealing. Beelitz.P et al. 1994 reported diarrhea only in two of 24 foals excreting *E. leuckarti* oocysts, while there is some doubt about the pathogenicity of *E. leuckarti*, diarrhea of several days duration, and acute massive intestinal hemorrhage leading to rapid death have been described in foals and young horses(Radostits.O.M et al. 2006) The present study is in close agreement with other studies in other countries. But infestation rate to this parasite in world are very different. These differences were probably linked to geographical variations and various ages. However, the infection is rarely evidenced by clinical signs. Difficulties in the diagnosis of coccidia infection in horses cause that the parasitosis is not diagnosed in a routine coproscopical examination.

**Table 1.** Prevalence of *E. leuckarti*. and other parasites of horses and donkeys in Shahrekord

Parasite/animal	Horses male(Stallion)	Mare	Donkey male (Jackass)	Donkey female	Total
<i>Parascaris equorum</i>	3	6	0	1	10(19.2%)
<i>Oxyuris equi</i>	1	0	1	2	4(7.6%)
<i>Strongylus spp</i>	7	11	13	4	35(67.3%)
<i>Eimeria leuckarti</i>	2	0	1	1	4(7.6%)

**Table 2.** Parasites found in 52 horses and donkeys from Shahrekord and suburb villages, Iran

Parasite/animal	<i>Parascaris equorum</i>	<i>Oxyuris equi</i>	<i>Strongylus spp</i>	<i>Eimeria leuckarti</i>
<b>Horse</b>	9(34.61%)	1(3.84%)	18(69.23%)	<b>2(7.68%)</b>
<b>Donkey</b>	1(3.84%)	3(11.53%)	17(65.38%)	<b>2(7.68%)</b>

## REFERENCES

Allan.L.T, Stephen.H.E, Michael.T.K & Jerome.H.S (1981) Comparison of Formalin-Ethyl Ether Sedimentation, Formalin-Ethyl Acetate Sedimentation, and Zinc Sulfate Flotation Techniques for Detection of Intestinal Parasites. *J.of clinical Microbiology*, 13(5), 882-884.

Bauer.C & B. Rguer.H.J (1984) Zur biologie von *Eimeria leuckarti* (FLESCHE,1883) der Equiden. Berl. Muench. *Tieraerztl Wochenschr*, 97, 367–372.

Beelitz.P, Gobel.E & Gothe.R (1996) Spectrum of species and incidence of endoparasites of foals and their mother mares from breeding farms with and without antihelminthic prophylaxis in upper Bavaria. *Tierarztliche Praxis*, 24, 48–54.

Carli.De & G.A.( 2000). *Diagnostico Laboratorial das Parasitoses humanas–Metodos e Te' cnicas*. Rio de Janeiro Medsi.

Gaughan.E.M & Hackett.R. (1990) Cecocolic intussusception in horses, 1990. Cecocolic intussusception in horses: 11 cases (1979–1989). *J. Am. Vet. Assoc*, 179, 1373–1375.

Hirayama.K, Okamoto.M, Sako.T, Kihara.K, Okai.K, Taharaguchi.S, Yoshino.T & Taniyama.H (2002) Eimeria Organisms Develop in the Epithelial Cells of Equine Small Intestine. *Vet Pathol* 39, 505–508.

Levine.N.D (1986. ) The taxonomy of Sarcocystis (Protozoa, Apicomplexa) species. *Protozool.*, 72, 372–382.

Radostits.O.M, Gay.C.C., Hinchcliff.K.W. & Constable.P.D. 2006. *Veterinary Medicine*. Saunders.

Soulsby.EJL. (1977). Helminths, arthropods and protozoa of domesticated animals. Lea and Febiger, Philadelphia.

Souza.P.N.B., D., Bomfimb.T.C.B., Huber.F, Abboud.L.C.S. & Gomes.R.S. (2009) Natural infection by Cryptosporidium sp., Giardia sp. and Eimeria leuckarti in three groups of equines with different handlings in Rio de Janeiro, Brazil. *Veterinary Parasitology*, 160, 327–333.

Studzinska.B.M, Tomczuk.K & Sadzikowski.A (2008) Prevalence of Eimeria Leuckarti in horses and usefulness of some coproscopical methods for its detection. *Bull Vet Inst Pulawy*, 52, 541-544.

Sutoh.M, Saheki.Y, Ishitani.R, Inui.S, Narita.M, Hamazaki.H & Yokota.T (1976) Eimeria leuckarti infection in foals. *Natl Inst Anim Health* 16, 59–64.

Tavassoli.M, Dalir-Naghadeh.B & Esmaeili-Sani.S (2010) Prevalence of gastrointestinal parasites in working horses. *Poland Journal of Veterinary Science*, 13(2), 319-324.

Taylor.M.A, Coop.R.L & Wall.R.L.(2007). *Veterinary Parasitology*. Garsington Road, Oxford: Blackwell Publishing Ltd.

White.M.R, Crowell.W.A & Guy.B.L (1988) Cecocolic intussusception in a foal with Eimeria leuckarti infection. *Equine Pract*, 10, 15-18.