TÜBİTAK

Short Communication

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Isospora species (*I. canaria, Isospora* sp.) in canaries (*Serinus canarius*, Linnaeus)

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Abstract: Of 64 canaries with diarrhea in Elazığ Province between May 2002 and May 2006, 18 (28.1%) had Isospora oocysts in their feces. It was determined that the oocysts, examined morphologically before and after sporulating, were *Isospora canaria* and *Isospora* sp. Among the infected animals, 8 (44.4%) were concurrently infected with both species. Total numbers of *I. canaria* oocysts were greater than those of *Isospora* sp. A total of 2 canaries showing severe clinical signs were necropsied. Liver, spleen, and lung preparations and peripheral blood smears of the necropsied animals were examined for *Atoxoplasma*, and no development forms were seen. For this reason it was concluded that the developing forms seen in intestinal tissue preparations belonged to *Isospora*. Determination of the coccidiosis agents in canaries in Turkey was first revealed with this study.

Key words: *Isospora*, canary

Kanaryalarda (*Serinus canarius*, Linnaeus) *Isospora* (*I. canaria, Isospora* sp.) Türleri

Özet: 2002 yılının Mayıs ayından 2006 yılının Mayıs ayına kadar geçen dönemde, Elazığ yöresinde parazitolojik muayenesi yapılan 64 ishalli kanaryanın 18 (% 28,1)'inin dışkısında Isospora ookistleri tespit edildi. Sporogoni evresinden önce ve sonra mikroskopta morfolojik özellikleri incelenen ookistlerin *Isospora canaria* ve *Isospora* sp. oldukları anlaşıldı. Enfekte kanaryaların 8 (% 44,4)'inde her iki tür birlikteydi. Tek türle enfekte olan kanaryaların 7 (% 39)'sinde *I. canaria*, 3 (% 17)'ünde ise *Isospora* sp. tespit edildi. *Isospora* sp.'ye göre *I. canaria* ookistleri daha fazla sayıdaydı. Klinik semptomları şiddetli olan iki kanaryanın otopsisi yapıldı. Otopsisi yapılan hayvanların perifer kan frotileri ile karaciğer, akciğer ve dalak preparatları *Atoxoplasma* yönünden incelendi ve herhangi bir gelişme formuna rastlanmadı. Bu nedenle, bağırsak doku preparatlarında görülen gelişme formlarının *Isospora*'ya ait olduğu anlaşıldı. Türkiye'de kanaryalarda coccidiosis etkenlerinin tespiti ilk olarak bu çalışma ile ortaya konuldu.

Anahtar sözcükler: *Isospora*, kanarya

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Introduction

Isosporiasis is a disease that causes diarrhea in various animals. In canaries (*Serinus canarius*, Linnaeus) there are 2 species of *Isospora*: *Isospora serini* (Aragao 1933) and *Isospora canaria* (Box 1975) in *Isospora lacazei complex* (1-3). In addition, the presence of another species, *Isospora* sp., is mentioned in the literature (1,2,4).

Infection occurs with oral intake of sporulated oocysts. *I. serini* grows asexually in the mononuclear phagocytes of the liver, lungs, and spleen and sexually in intestinal epithelium cells. *I. canaria* grows sexually and asexually in intestinal epithelium cells (2,5,6). *Atoxoplasma* is similar to *Isospora* sp., but differs from *Isospora* in terms of the region of asexual development and merogony (1,7,8).

Detailed knowledge about morphology, biology, diagnosis, prevalence, clinical signs, and treatment in canarian Isosporiasis is revealed by the studies performed on both species (*I. canaria* and *Isospora* sp.) (1-3,5-7,9).

Until now there has been no study of coccidiosis in canaries in Turkey. The aim of the present study was to determine the presence of coccidian species in canaries in Turkey.

In this study fresh fecal samples were taken from 64 canaries with diarrhea between 2002 May and 2006 May; the canaries came from sales shops and private homes in Elazığ Province. Each sample was brought to the laboratory in a plastic bag. Preparations made by centrifuge-floatation method were examined for parasites under a light microscope (10). Samples positive for *Isospora* were mixed with 2.5% potassium dichromate and were left to sporulate as a thin layer in petri dishes in incubators. The samples were examined daily until the oocysts were completely sporulated. Morphological features of sporulated oocysts were determined by light microscope (1-3,5,6).

Giemsa-stained peripheral blood smears of 2 canaries that excreted 2 different oocysts in vast amounts were examined for *Atoxoplasma*, and then they were necropsied. The liver, lungs, spleen, and intestines were fixed in 10% formaldehyde, and hystopathologic sections were prepared and stained with hematoxylin eosin. These preparations were examined for *Atoxoplasma* and *Isospora*.

Of the 64 canaries, 18 (28.1%) were found to be infected with *Isospora* oocysts, and 8 (44.4%) of the infected canaries had 2 different oocysts. Among the animals infected with a single species, 7 (39%) had *I. canaria* and 3 (17%) had *Isospora* sp. oocysts. In some of the unsporulated oocysts micropyle could be seen and polar granules could not; this shows the presence of 2 different species (Figures 1, 2).

Characteristics of the sporulated oocysts of one species were as follows: oocysts round, wall 1-layered and thin, polar granules present, micropyle and oocyst residuum absent, oocyst measurement 22.4 (17.0-27.0) × 25.2 (19.0-31.0) µ, sporocysts lemon shaped and 10.7 (9.5-13.0) × 19.0 (16.0-21.0) micron-sized. Stieda body and sporocyst residuum present. Oocysts were sporulated in 32-36 h. Because of these established features, the species was identified as *I. canaria* (Figure 3).

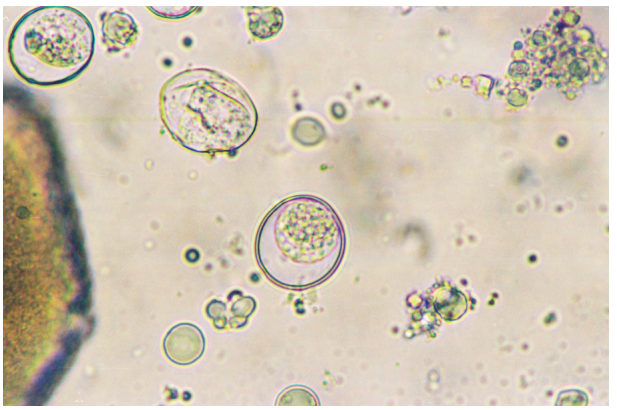

Figure 1. Unsporulated oocyst of *I. canaria* (×1037).

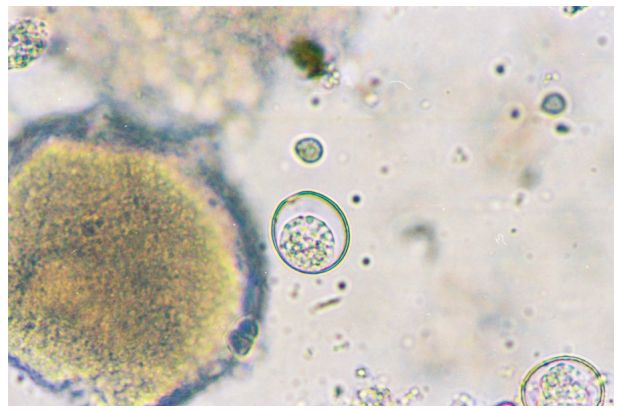

Figure 2. Unsporulated oocyst of *Isospora* sp. (×1000).

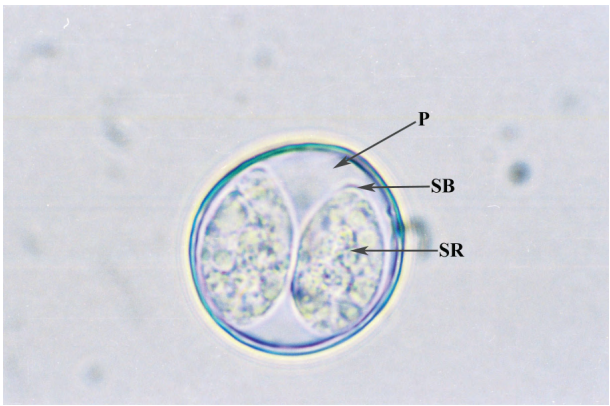

Figure 3. Sporulated oocyst of *I. canaria* (×962). P: polar granule, SB: Stieda body, SR: sporocyst residuum.

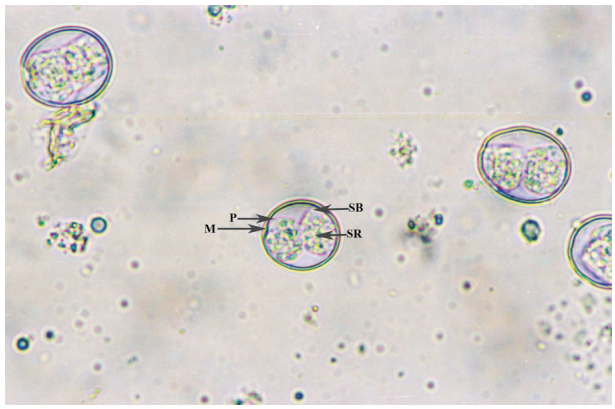

Figure 4. Sporulated oocyst of *Isospora* sp. (×928). M: micropyle, P: polar granule, SB: Stieda body, SR: sporocyst residuum.

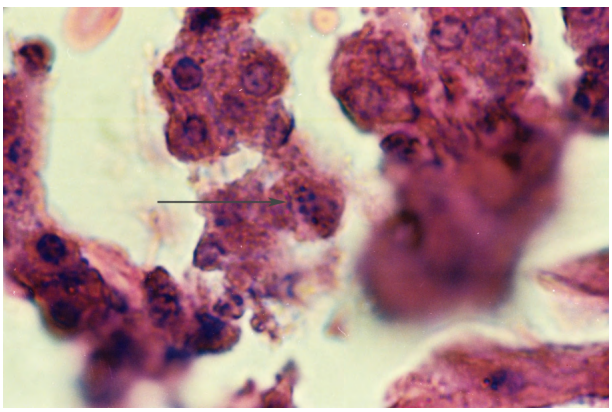

Figure 5. Schizont in small intestine (×2000) (arrow).

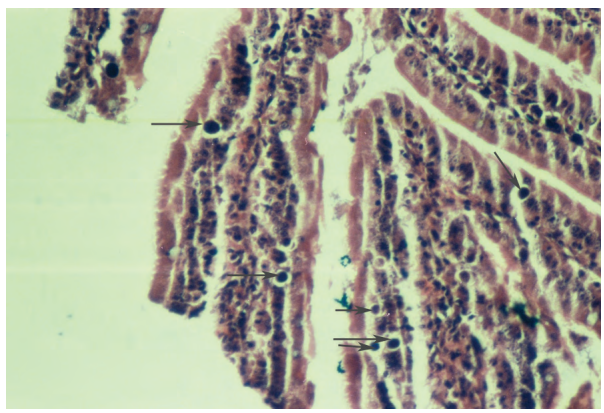

Figure 6. Gametocytes in small intestine (×416) (arrow).

Morphologic characteristics of the sporulated oocysts of the other species were as follows: oocysts ellipsoidal, wall 1-layered and thin, oocysts 23.6 (22.0-25.0) × 27.5 (25.0-29.0) micron-sized, micropyle present, oocyst residuum and polar granules absent, sporocysts ellipsoidal and 15.4 (12.0-17.0) × 21.2 (19.0-23.0) µ. Stieda body and sporocyst residuum present. Oocysts were sporulated in 36-42 h. Due to these features it was identified as *Isospora* sp. (Figure 4).

Oocysts of *I. canaria* were more common than those of *Isospora* sp. in the fecal samples of both species.

No development forms of *Atoxoplasma* were encountered in the examinations of peripheral blood smears and tissue preparations of the 2 necropsied canaries. However, schizonts and gametocytes were seen in intestine preparations. It was determined that these development forms belonged to *I. canaria* and *Isospora* sp. because they had none of the extraintestinal development forms seen in the biology of Atoxoplasma. Schizonts were 4.5 × 6.5 µ (n: 5) (Figure 5), and gametocytes were 10.6 × 11.9 µ (n: 20) (Figures 6, 6a).

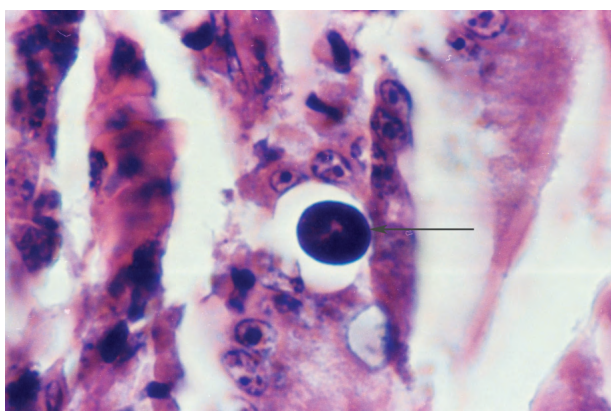

Figure 6a. Gametocyte in small intestine (×1416) (arrow).

In Brazil the prevalence of coccidiosis in canaries was 50.5% (9). In our study *Isospora* oocysts were seen in 18 of 64 canaries (28.1%). This rate seems to be significant.

I. serini grows asexually in mononuclear phagocytes and sexually in bowel epithelium cells; *I. canaria* grows both asexually and sexually in small intestine epithelium cells (2,5,6). Since no growth forms were seen in the peripheral blood, liver, lungs, or spleen of the 2 necropsied canaries, it was understood that *I. serini* did not exist, and schizonts and gametocytes seen in the small intestine epithelium belonged to the other *Isospora* species.

Isospora sp. may exist beside *I. serini* and *I. canaria*, as defined in canaries (1,2,4). The sporulated oocysts of *I. canaria* vary in shape from round to ellipsoid. Oocysts that have a 1-layered smooth wall that is thinner than 1 μ have an average size of 24.6 × 21.8 μ. No oocyst residuum and micropyle are present and polar granules were found in the oocysts. Lemon shaped sporocysts are on average 18.1 × 11.5 μ. Sporocyst residuum and Stieda bodies are found in sporocysts (1). In this study no oocysts similar to *I. serini* oocysts, as defined in the literature, were seen (1). However, 2 different species were differentiated. One of these looked like *I. canaria* oocysts, as defined in the literature (1); the other oocysts were different. According to criteria such as the existence of micropyle, lack of polar granules, and the other features, it was determined that this species was *Isospora* sp.

Consequently, the presence of 2 coccidiosis agents—*I. canaria* and *Isospora* sp.—were determined in this study from Turkey. However, it is essential to determine whether *Isospora* sp. belongs to canaries, and biological studies are needed for this purpose.

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