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### Short Communication

## Seroprevalence of *Neospora caninum* Infection in Camels (*Camelus dromedarius*) in Isfahan Province, Center of Iran

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### Abstract

**Background:** The aim of this study was to investigate the sero-prevalence of *Neospora caninum* infection in *Camelus dromedarius*; the most popular camel species in Iran.

**Methods:** Totally, 310 serum samples were collected from camels in Isfahan Province during 2008 and tested in Shahrekord University using indirect fluorescent antibody test (IFAT) for serodiagnosis of anti-*N. caninum* IgG antibodies as a cross-sectional study.

**Results:** Among evaluated serum samples, 10 (3.22%) had anti-*N. caninum* antibodies detectable in dilutions of 1:50 and 1:100. to rule out false positive results due to cross-reactivity of this protozoan parasite with the closely related protozoan parasite *Toxoplasma gondii*, an IFA was also performed for *T. gondii* infection in dilution of 1:16 for positively reacted serum samples against *N. caninum*. No concordant infections of these two protozoan parasites were detected.

**Conclusion:** Presence of anti-*N. caninum* antibodies in camels in Iran emphasizes the necessity of further studies to detect the role of this organism as a pathogen and possibly economic importance in camels population.

**Keywords:** *Camelus dromedarius*, *Neospora caninum*, IFAT, Iran

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## Introduction

*Toxoplasma gondii* and *Neospora caninum* are two closely related protozoan parasites that are distributed worldwide. Both organisms can infect a wide range of animal species and have an indirect life cycle with carnivores as the definitive hosts; domestic cats and other felidae for *T. gondii*, dogs, and coyotes for *N. caninum* (1-3).

*N. caninum* is one of the most important causes of abortions in ruminants (4). Participation of *N. caninum* and *T. gondii* in abortion cases of South American camelids was investigated. Results of this investigation showed that these two closely related protozoan parasites were important causes of abortions in camel population (5). Base on serologic tests, South American camelids (6, 7) and *Camelus dromedaries* (8, 9) are suggested to be potential intermediate hosts for *N. caninum* and *T. gondii*.

The aim of this study was to investigate sero-prevalence of *N. caninum* infection in *C. dromedarius*; the most popular camel species in Iran.

## Materials and Methods

### Animals

In this cross-sectional study, blood samples were collected from 310 camels in a slaughterhouse in Isfahan Province, Iran during 2008. Samples were centrifuged immediately and collected sera were kept in -20°C until use. The study procedure was carried out in veterinary faculty of Shahrekord University, Iran.

### IFA Test

NC1 strain of *N. caninum* (10) and RH strain of *T. gondii* (11) were cultured in Vero cells and purified when they were enough for preparation of IFAT slides (12). Cell culture

derived tachyzoites were used immediately for preparation of IFAT slides.

Serum samples were diluted using phosphate buffer saline (PBS) pH 7.4 in dilutions of 1:50 and IFA test was performed. Positive samples were diluted two times more and tested again. FITC labeled anti-camel antibody that was made and evaluated in Shahrekord University, Iran was used as conjugate. Positive and negative controls were also taken from this study (13).

## Results

Among 310 samples, *N. caninum* antibodies were detected in 10 (3.22%) of serum samples in dilution of 1:50. positively reacted serum samples were re-examined with a two-fold dilution. From positive serum samples, 3 (1%) had detectable IgG antibodies in dilution of 1:100.

Positively reacted serum samples with *N. caninum* tachyzoites were subjected to an indirect fluorescent antibody test to detect possible cross-reaction with *T. gondii*. None of 10 positive serum samples showed positive results in this test.

## Discussion

The number of camels in Iran is more than 145000, among which a high percent are in central provinces and belongs to *C. dromedarius* species (14). These animals play a relatively important economic role in these areas as a meat source.

Serological studies suggest that camelids could potentially act as intermediate hosts for *N. caninum* (15). Investigation for determination of *N. caninum* and similar protozoan parasite; *T. gondii* as causes for abortion in Peruvian llamas showed that *N. caninum* was detected by either immunohisto-

chemistry or specific PCR in 14 out of 50 fetuses (28%) while *T. gondii* DNA was not detected in any of the analyzed fetuses (5).

A few studies have been performed for serodiagnosis of *N. caninum* in camels; 6 of 161 (3.72) camels from Egypt (8), 4.6% of 308 camels from Argentina (16) and 7 of 120 camels in Mashhad Iran were reported infected (9).

Relatively high seroprevalence of this infection in dogs in Iran (17) suggest possible role of the dogs as definitive hosts of the parasite and a possible infection source for camels in investigated area.

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The authors declare that they have no conflicts of interest.

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