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## Letter to the Editor

# Serological Survey and Risk Factors of *Neospora caninum* Infection in Dog Population of Qom, Central Iran

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## Dear Editor-in-Chief

*N*eospora caninum is an apicomplexan parasite diagnosed in a wide range from the Canidae family and herbivore animals. Furthermore, it causes many clinical signs at all ages of dogs (1,2). Consequently, dogs can contaminate the environment by shedding oocysts in their feces. Besides, intermediate hosts are mainly contaminated by trans-placental infection, ingesting contaminated food (3). Clinical signs, histopathology, molecular and serological methods diagnose neosporosis. The most important serological tests are ELISA and immunofluorescent antibody test (IFAT), which have a high sensitivity and specialty (4).

The current study was performed from Nov to Dec 2020 on 215 dogs in Qom. Qom Province is the seventh largest city in Iran with co-ordinates 34°38'24"N 50°52'35"E. Moreover, dogs randomly were selected by a veterinarian who was not aware of the study. They were selected from veterinary hospitals, veterinary breeding centers, and veterinary shelters. Furthermore, dogs had different conditions, including age, gender, living type, breeds, pregnancy, vaccination status, and clinical signs considered in this study.

After clinical examination the whole blood was taken from dogs and centrifugation (1000 ×10min) then stored at -20 °C till laboratory analysis with commercial ELISA kits which performed according to guideline (ID-Vet Company, France) (5).

**T**he data were analyzed using the trial version of StatDirect statistical software available from the public domain, i.e.,

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http://statdirects.com. Descriptive statistics (frequency and relative frequency), the association between the infection rate and different variables were assessed with the chi-square test ($\chi2$) test at the significance level of 0.05 were used to analyze the collected data.

The study was approved by the Ethics Committee of the university.

The results showed that the seroprevalence of neosporosis in Qom was 13.95% (CI 95%, 9.61– 19.31) (Table 1) was lower than the Iran prevalence (19.9%) reported in a systematic review and meta-analysis study in Iran (1). Besides, the prevalence in neighboring provinces such as Tehran (33%) and Isfahan was 24.4% (2), while in a previous study in Qom it was 4% (6). Furthermore, these differences can be in using different serological methods, climatic conditions, humidity, the different lifestyle of dogs, the percentage of contact with the contaminated environment, and their feedings amount of raw meat (4).

**Table 1:** The Infection Rate of *Neospora caninum* in dogs in Qom, central Iran

| Risk Factors | | P% (Infected/total) | Statistical Analysis |
|---|---|---|---|
| Gender | Male | 16.10 (19/118) | $\chi2= 0.97$, *P*= 0.324 |
| | Female | 11.34 (11/97) | |
| Age | <12m | 2.77 (3/108) | $\chi2= 3.31$, *P*= 0.481 |
| | 1-2 | 4.76 (4/84) | |
| | 2< | 16.66 (25/150) | |
| living type | Stray | 21.29 (23/108) | $\chi2= 7.78$, *P*= 0.020 |
| | Household | 13.63 (3/22) | |
| | Farm | 10.58 (9/85) | |
| Food type | Homemade | 9.61 (5/52) | $\chi2= 13.82$, *P*= 0.001 |
| | Commercial food | 6.66 (1/15) | |
| | Mixed | 33.10 (49/148) | |
| Breed | Pure | 10.71 (3/28) | $\chi2= 0.28$, *P*= 0.595 |
| | Mixed | 14.43 (27/187) | |
| Vaccination | Yes | 12.35 (11/89) | $\chi2= 0.32$, *P*=0.57 |
| | No | 15.07 (19/126) | |
| Pregnancy status | Yes | 14.28 (1/7) | $\chi2= 0.07$, *P*= 0.798 |
| | No | 11.11 (10/90) | |
| Contact with other animal | Yes | 14.64 (29/198) | $\chi2= 1$, *P*= 0.316 |
| | No | 5.88 (1/17) | |
| Clinical sign | Yes | 12.5 (2/16) | $\chi2= 0.26$, *P*= 0.613 |
| | No | 14.57 (29/199) | |
| Total | | 13.95 (30/215) | CI 95%= 9.61% – 19.31% |
| CI: Confidence interval | | | |

The results showed living types and food affect the prevalence of neosporasis. In this regard, dogs by feeding raw foods infected by oocysts of *N.caninum* had raised the risk. Thus, stray dogs are the most prevalent in terms of feeding on infected carcasses or tissues of intermediate hosts. On the other hand, the household dogs that probably have taken antiparasitic drugs had minimized the infection risk. The results of food types and living types are consistent with another study (7).

The results showed the other risk factors including gender, pregnancy situtation,

vaccination status, contact with other hosts, clinical sign, breed, and age had no significant relationship with seroprevalnce in Qom. The number of pets is increasing, and regarding their close relationship with humans, serious approaches to joint health and diseases are needed. Therefore, all dogs with different conditions were all victims of *N. caninum*, and regarding the economic losses and the potential of zoonosis due to its close biological association with *Toxoplasma gondii* and the observation of antibodies in immunosuppressed people (5), needs further studies using gold standard tests and consider more factors for prevention and using anti-*Neospora* compounds for treatment.

## Conflict of interest

The authors declare that there is no conflict of interest.

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