

Original Article

Seroprevalence of *Neospora caninum* Infection in Rural and Industrial Cattle in Northern Iran

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Abstract

Background: *Neospora caninum* is an intracellular parasite which causes abortion in cattle worldwide. The aim of this study was to determine the seroprevalence of *N. caninum* in cattle in Babol City, North of Iran.

Methods: Blood samples were collected from 237 cattle for determining the seroprevalence of *N. caninum*. A total of 237 serum samples were tested for anti-*Neospora* antibodies. Serum samples were analyzed for antibodies against *N. caninum* antigen using a commercial *N. caninum* ELISA kit.

Results: Antibodies to *N. caninum* were found in 76 of 237 total cattle (32%), 40 of 155 industrial cattle (25.8%) and 36 of 82 rural cattle sera (43.9%) based on ELISA test results.

Conclusion: This study is the first report of *Neospora* infection in this area. Significant difference was observed regarding infection in industrial and rural cattle ($P < 0.01$).

Key words: *Neospora caninum*, ELISA, Cattle, Iran

Introduction

N*eospora caninum* is an obligate intracellular protozoon that infects a wide variety of mammals and causes the disease neosporosis. Neosporosis is an infectious disease primarily of dogs and cattle. The disease was first described in dogs in Norway in 1984 causing neuromuscular degeneration leading to hind limb paralysis (1) and later in 1988 it was described as a cause of abortion in cattle (2). The structure and lifecycle of the

parasite resembles *Toxoplasma gondii* with the exception that the definitive hosts here are dogs and canids. The parasite is transmitted via ingestion of oocysts passed in feces, congenital transfer of the rapidly multiplying developmental stage of the parasite, called tachyzoites, from the mother across the placenta, to the fetus has been documented as well (3). Congenital transmissions of *Neospora* can frequently occur in the same animal. The disease in cattle can cause fetal death in utero, mummification and birth of infected calves with

or without clinical signs. Reduction in milk yield and underweight calves has also been reported in dairy and beef cattle (4).

The aim of this study was to determine the seroprevalence of infection in Mazandaran, north part of Iran.

Material and Methods

A cross-sectional study was performed in the first half of year 2008. Two hundred and thirty seven serum samples of cattle were collected, with refer to Babol Veterinary Center and calculated of rural and industrial cattle in this area using 'n' formula indicated numbers of control case. Blood samples were taken using disposable needles. All samples were immediately transported to the Parasitology laboratory of Veterinary Faculty, Babol Azad Islamic University. Serum was removed after centrifugation (KOKUSAN H-11N) at 1000×g for 15 min. All sera were stored at -70 °C until laboratory testing.

The samples were analyzed for antibodies to *N. caninum* using ELISA kit. Anti-*Neospora* antibodies were detected using a commercially available *N. caninum* ELISA kit (Herdcheck, IDEXX's, USA). The kit was used according to the

manufacturer's instructions. Sera were diluted 1:100 and investigated for antibody presence. The presence or absence of antibody was determined by calculating of sample to positive ratio (S/P ratio according to the formula mentioned inside the manual). S/P ratio more than 0.5 and less than 0.5 was considered positive and negative, respectively. Quantitative data (S/P) resulted for each group, were applied for statistical analysis using Student *t* test and the SPSS computer program.

Results

Two hundred and thirty seven sera of 155 industrial cattle (65. 4%) and 82 rural cows (34. 6%) were tested. Prevalence of positive sera in total, industrial and rural cattle is given in Tables 1. Antibodies to *N. caninum* were found in 76 of total cattle (32%), 40 of the 155 industrial cattle (25. 8%) and 36 of 82 rural cattle (43. 9%) samples based on ELISA results (Table 1).

There was statistically significant difference between seroprevalence of infection regarding to rural and industrial cattle ($P < 0. 01$).

Table1: Prevalence of *N. caninum* antibody in total, rural and industrial cattle in Babol, Mazandaran, Iran 2008

Cattle	Industri	Rural	Total
Number	155	82	237
Positive	40	36	76
Seropositive rate	25. 8%	43. 9%	32%

Discussion

N. caninum is considered as one of the major causes of abortion in cattle worldwide. There are reports of infection in other animals including sheep, goat, deer and horse. Yearly economic loss due to neosporosis in Australia in beef and dairy cattle is considered 85 and 25 million \$ respectively. The estimation for New Zealand in dairy cattle is 17. 8 million \$ (5). According to Dubey the loss for California is 35 million \$ but the real economic loss should be more than this estimation (5).

The first cases of confirmed neosporosis in aborted bovine fetuses in dairy cattle from Mashhad were reported in 2007, from total 810 tested sera, 123 (15. 8%) were positive with IFA test (6). The climatic difference between Mashhad and Mazandaran and better diagnostic sensitivity and specificity of the detection method may be the explanation for the higher rate of infection determined in this study. In a preliminary study, *N. caninum* DNA had been detected by polymerase chain reaction (PCR) in brains from four out of six aborted fetuses. Antibodies to *N. caninum* were found in 36 of the 285 (12. 6%) sera based on ELISA test results in Kerman (7). The overall prevalence of *N. caninum* infection in the buffaloes from the south-western region of Iran was 37% (43. 36% in females and 15% in males) (8) which is the same as what is calculated in the present study for rural cattle. In a study in South Vietnam done on 215 cows with ELISA, 88 samples (41%) were positive (9). In the same study 25 (19%) out of 130 calves were infected. From 2002 to 2006 Jing Liu performed a study in 9 regions in China on 300 cattle. Totally the infection was 20% but in different regions it was reported to be from

5 to 35 percent regarding the humidity and presence or absence of dogs and other canids in the farms (10).

In 2005 in Brazil, Minerrino randomly collected 10 samples from every 16 farms. In general 40 dairy cattle and 120 beef cattle were tested with IFA; the mean infection was 19% (11). In a study in Mashhad, on 174 dogs feces with Mini Parasep technique, 3 samples (3. 3%) were positive and oocyst find in feces (12). Antibodies were seen in 10 (20%) of 50 household dogs and in 23 (46%) of 50 farm dogs and there were significant statistical differences in seropositivity between these two groups (13).

Regarding the distributed information available for some regions of Iran and geographic distribution of the country and the presence of dogs and other canids in farms as definitive host, a comprehensive study determining the risk factors and thus designing control strategies is highly recommended.

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