Seroprevalence of Neospora caninum Infection in Dairy Cattle in Tabriz, Northwest Iran

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ABSTRACT

Background: The aim of this study was to determine the seroprevalence of antibody to Neospora caninum in healthy and aborted dairy cattle in Tabriz, capital of East-Azarbaijan in northwest of Iran.

Methods: In this cross-sectional study serum samples were collected from 266 healthy and aborted Holstein-Friesian cows from September 2008 to August 2009. The sera were analyzed to detect of antibody against N. caninum using the commercially ELISA kit.

Results: Seroprevalence of antibody to N. caninum was 10.5% in Tabriz dairy cattle. Also the abortion rate in all cattle sampled was 33.6% but percentage of seropositive aborted cattle was 18.4%.

Conclusion: Neosporosis could be one of the possible causes of abortion in dairy cattle in Tabriz and regarding the distribution in dogs as definitive host for the parasite, further studies in dog and cattle are recommended.

Keywords: Neospora caninum, Seroprevalence, Dairy cattle, Iran
Introduction

N. caninum is one of the most important causes of abortion in cows worldwide (1). The first report of the disease was from Norway in 1984 in a dog with neuro muscular degeneration leading to hind limb paralysis (2). The development cycle of the parasite is indirect and dogs and coyotes are definitive host which sexual phase of development, resulting from the shedding of oocysts in the feces. Intermediate hosts such as bovine are infected by oocysts shedding of infected dogs (3). In many countries neosporosis is the major cause of reproductive failure, with considerable economic losses. Abortion is the main clinical manifestation of bovine neosporosis in cattle (4). Since the presence of antibody activity specific to N. caninum is indicative of infection, detect of antibody of N. caninum in sera samples of aborted bovine is the major methods for study of epidemiology of neosporosis (5). For this purpose a number of serological tests have been described, including indirect fluorescent antibody test (IFAT), the direct agglutination test (DAT) and Enzyme-Linked immunosorbent assay (ELISA) and immunoblots(6).

Although neosporosis has been reported from many parts of the world by investigations there are a few published reports on its occurrence in Iran (7-10). The province has an estimated 70,000 cattle. Since the prevalence of neosporosis in Tabriz has not yet been reported, the prevalence of infection was assumed 50%. Furthermore, desired sample size by using a 95% level of confidence and 6% precision, was 266(11). Sampling were done by random cluster sampling method. Blood samples from Holestein-Friesisn cows were collected by disposable needles and were transported to the parasitology laboratory and centrifuged at 1000 rpm for 10 min. All sera were stored at -20 °C until testing. Cow’s age, season of abortion outbreak and semester of pregnancy in aborted cows were recorded.

ELISA method

For serological analysis, an indirect noncomparative ELISA described by Crowther was used (12). The sera were analyzed for detecting antibody to N. caninum by using the commercially ELISA kit (IDEXX, USA) according to the manufacture's instruction. OD of 0.15 was considered as cut-off based on the instruction of manufacture and, the ratio of sample for positive control was ≥0.2OD.

Statistical analysis

A chi-squared test was used to analyze the association between infection to N. caninum and factors such as season of probable abortion outbreak and trimester of abortion. For the statistical analysis SPSS (Version 14) software was also used.

Results

From 266 cattle sampled, 28 (10.5%) were seropositive to N. caninum. The percentage of seropositive aborted cattle was 18.4%.
The most rate abortion due to neosporosis was occurred in 4-6 years age group and the relationship was significant (P<0.05) (Table 1). In addition there was a significant difference between abortion and winter as well as trimester of pregnancy (P<0.05). The highest risk of abortion due to neosporosis is in winter and during the third trimester of pregnancy gestation. But this difference is not significant.

Table 1: Season of abortion, semester of abortion and age in 76 aborted cows

<table>
<thead>
<tr>
<th>Season of abortion</th>
<th>Semester of pregnancy</th>
<th>Age(Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (% )</td>
<td>No. (%)</td>
<td>No. (%)</td>
</tr>
<tr>
<td>Spring</td>
<td>Summer</td>
<td>Autumn</td>
</tr>
<tr>
<td>10 (13.1)</td>
<td>13 (17.1)</td>
<td>26 (34.2)</td>
</tr>
<tr>
<td>Summer</td>
<td>Autumn</td>
<td>Winter</td>
</tr>
<tr>
<td>27 (35.5)</td>
<td>(0)</td>
<td>(44.7)</td>
</tr>
<tr>
<td>Autumn</td>
<td>Winter</td>
<td>&lt;4</td>
</tr>
<tr>
<td>26 (34.2)</td>
<td>27 (0)</td>
<td>34 (44.7)</td>
</tr>
<tr>
<td>Winter</td>
<td>&lt;4</td>
<td>34 (44.7)</td>
</tr>
<tr>
<td>34 (44.7)</td>
<td>27 (0)</td>
<td>42 (55.2)</td>
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<tr>
<td>&lt;4</td>
<td>34 (44.7)</td>
<td>42 (55.2)</td>
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<tr>
<td>34 (44.7)</td>
<td>42 (55.2)</td>
<td>&gt;6</td>
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<tr>
<td>42 (55.2)</td>
<td>27 (0)</td>
<td>12 (15.7)</td>
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<tr>
<td>&gt;6</td>
<td>27 (0)</td>
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<td>27 (0)</td>
<td>34 (44.7)</td>
<td>12 (15.7)</td>
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</table>

Discussion

The present study is the first to report on the seroprevalence of N. caninum in cattle in Tabriz. This study showed that the seroprevalence of antibody to N. caninum is 10.5% in dairy cattle in Tabriz. Also percentage of seropositive aborted cattle was 18.4%. Although the presence of antibodies to N. caninum in cattle only indicate exposure to the parasite, probability of abortion in seropositive cattle is twice higher than in seronegative cattle (13).

In other investigation in Iran with N. caninum, serological results showed a considerable variance. The prevalence of infection in the present study seemed comparable with Sadrebazzaz et al. (2004) and Hajikolaei et al. (2008), in which they presented the seroprevalence of N. caninum in dairy cattle was 18% and 21% in Ahvaz and Mashhad (7,10). This difference may be due to type of test used, their cut-off points and other characteristics. In other studies in Iran about N. caninum the seroprevalence of the parasite was denoted in healthy and aborted cattle.

The results of this study showed that there was a significant relationship between abortion and age in neosporosis. The highest risk of abortion due to neosporosis was in the 4-6 years old of cattle. Relationship between neosporosis and abortion is a speculative. Jensen et al. reported that seroprevalence increases with age (3). Razmi et al. reported the highest risk of abortion due to neosporosis in 1-2 years old cattle, and Sanderson et al. reported it in cows above 6 years of age (4,9). In contrast, Hajikolai et al. and Sadrebazzaz et al. showed no significant difference between age and seropositivity to neosporosis (7, 10).

The results of this study showed that was a significant difference between abortion and winter as well as trimester of pregnancy. The highest risk of abortion due to neosporosis is in winter and during the third trimester of pregnancy gestation. This result is not in agreement by Ortega and Yaeger et al. who presented that most abortions due to neosporosis occur during mid-gestation (6, 14). In other studies it is indicated that cows of any age may abort from 3 months of gestation to term (1).

It is concluded that neosporosis could be one of the possible causes of abortion in dairy cattle in Tabriz and regarding the distribution in dogs as definitive host for the parasite,
further studies in dog and cattle are recommended.

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References