

Prevalence of *Toxoplasma gondii* in aborted ewes and does in Duhok province of Iraq

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Abstract

This study aims to investigate prevalence of *Toxoplasma gondii* and the role of the parasite in the naturally aborted ewes and does in Duhok province of Iraq. Ninety two blood samples (39 from ewes and 53 from does) were collected, during two breeding seasons between 2009 and 2010. The collected serums were tested by latex agglutination test (LAT) and ELISA (IgM) to detect the anti *Toxoplasma gondii* antibodies. The results revealed that prevalence of *T. gondii* antibodies were 95.65% and 27.17% by using LAT and ELISA respectively. In ewes, *T. gondii* antibodies were detected by LAT 97.4% and 33% by ELISA. In does, 94.33% and 22.64% samples were positive by LAT and ELISA respectively. The highest seropositive was in animals aborted recently. The results appear that *T. gondii* infection plays an important role in abortion of ewes and does in Duhok area Iraq.

Keywords: Toxoplasmosis, Abortion, Ewes, Does

Introduction

Toxoplasma gondii is a widespread protozoan parasite that can determine serious disease in humans, small ruminants, and many other warm-blooded mammals (Smith and Rebeck, 2000). Toxoplasmosis is caused by an obligate intracellular, protozoan parasite *T. gondii* (Buxton, 1991). The disease is a common infection of sheep and goats worldwide (Dubey and Towel, 1986; Dubey, 1990) and is recognized as one of the major causes of infectious reproductive failure in many countries (Blewett and Watson, 1984; Dubey and Beattie, 1988; Freyre et al., 1999). Toxoplasmosis causes foetal resorption, abortion at any stage of pregnancy, foetal mummification, stillbirth, or birth of live but weak offspring in sheep and goats (Dubey and Beattie, 1988; Freyre et al., 1999).

The diagnosis of *T. gondii* abortion is based on the detection of specific antibodies in the adult population by serological tests and the visualization of characteristic histological lesions in the placenta and brain of the aborted fetuses (Buxton, 1991, Burg et al. 1989, Dubey and Desmonts, 1987).

The incidences of abortions were very high in Duhok area during 2009-2010. The present study aimed

to estimate the prevalence of the *T. gondii* antibodies in naturally aborted ewes and does, and to evaluate the role of this parasite in the sheep and goat abortion in Duhok area of Iraq.

Material and Methods

Over two years (from 2009 to 2010) abortions in reported, from flocks of Duhok province were investigated in terms of the main cause; thus, 92 blood samples were collected from aborted ewes and does. Blood sample were collected from ewes and does during two different periods of abortion. Nineteen samples were taken from recently aborted ewes and does, while another 20 samples and 34 from ewes and does respectively were collected from animals which had case history of abortion more than two month).

The collected samples were centrifuged at 3500 RPM for five minutes and the supernatants were used for detection of antibodies against *T. gondii* by LAT and the positive samples were frozen at -20 °C until the examinations were performed by ELISA.

The positive samples were tested by LAT for presences of antibodies (IgM) against *T. gondii* by ELISA. The ELISA was performed with a commercial

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kit (ID Vet Innovative Diagnostic, France) according to the manufacturer's instructions. The results expressed the percentage of the mean absorbance values of the sample (S) to the mean absorbance value of the positive (P) control sample provided with the diagnostic kit. The resultant S and P ratio was expressed as a percentage (S/P %). According to manufacturer's recommendation, sera with S/P% ≤ 40%, 40% and 50% and ≥ 50% were regarded as negative, suspicious, and positive, respectively.

Results

As show in Table 1, out of 92 serum samples tested, 88 (95.65%) samples were positive for *T. gondii* by LAT and only 25(27.17%) were positive by ELISA (IgM). Out of 39 samples from aborted ewes, 38(97.4%) were positive by LAT and 13(33%) positive by ELISA. In the case of goats, 53 out of 53 serum samples collected from aborted does 50(94.33%) were positive by LAT and only 12 (22.64%) were positive by ELISA. The highest positive samples by ELISA were found among the samples collected within one month from abortion in both species as shown in Tables 2 and 3.

Table 1: Seroprevalence of toxoplasmosis among aborted ewes and does

| ELISA | | LAT | No of samples | Animal species |
|------------------|--|------------------|---------------|----------------|
| Positive samples | | Positive samples | | |
| 13(33%) | | 38(97.4%) | 39 | Sheep |
| 12(22.64%) | | 50(94.33%) | 53 | Goat |
| 25(27.17%) | | 88(95.65%) | 92 | Total |

Table 2: Seroprevalence of toxoplasmosis among aborted does

| Serological tests | | No. of samples | Date of collecting samples | Animal species |
|-------------------|-----|----------------|----------------------------|----------------|
| ELISA (IgM) | LAT | | | |
| 11 | 19 | 19 | 1 month | |
| 1 | 31 | 34 | 2-6 month | |
| 12 | 50 | 53 | | Total |

Table 3: Seroprevalence of toxoplasmosis among aborted ewes

| Serological tests | | No. of samples | Date of collecting serum samples | Animal species |
|-------------------|-----|----------------|----------------------------------|----------------|
| ELISA (IgM) | LAT | | | |
| 9 | 19 | 20 | 1 month | |
| 4 | 19 | 19 | 2-6 month | |
| 13 | 38 | 39 | | Total |

Discussion

T. gondii is a protozoan that mainly infects the cat as a definitive host. The sheep and goats are very

important intermediate host. In ewes and does, this parasite is now considered to be the major cause of abortion worldwide (Dubey and Beattie, 1988). Because direct observation of cysts in live animals in tissues is not a suitable for diagnosis, serological techniques are considered as effective methods (Hashemi-Fesharki, 1996; Nieto and Melendz, 1998). There are several reports on the prevalence of toxoplasmosis in the small ruminants (ODonoghue et al., 1987; Figueiredo et al., 2001).

In this study, the prevalence rate of toxoplasma antibodies was 95.65% by LAT and only 27.17% samples were positive by ELISA. Among species the results showed that out of 39 samples from aborted ewes 97.4% were positive by LAT and 33% positive by ELISA. Whereas out of 53 serum samples collected from aborted does 50(94.33%) were positive by LAT and only 12 (22.64%) were positive by ELISA. This finding is in agreement with Tenter et al. (2000) who reported that sheep showed high seroprevalences in many areas of the world up to 92%. Similar, high prevalence was reported in sheep and does in Egypt (Nahed et al., 2009). In the island of Grand Canary, Dodriguez-Ponce et al. (1995) detected 63.3% seroprevalence rate of Toxoplasma IgG in goats. In Ethiopia, 52.6% and in Sudan 63% were reported by Negash et al. (2004) and Zain Eldin et al. (1985), respectively. During 2006-2008, Khadi et al. (2009) reported prevalence rate of *T. gondii* antibodies (IgG) in naturally aborted ewes by ELISA test in four governorates of Misan, Basra, Al-muthanna and Thiqr to be 25%, 18.6%, 16.06% and 12.71%, respectively. In addition, Ghazaei (2005) reported 30% (60/200) and 15% (30/200) seroprevalence rate in sheep and in goats respectively *T. gondii* antibodies by ELISA in Ardabil state in Iran. In Ghana, 33.2% prevalence was reported by Van der Puije et al. (2000), whereas (Zedda et al., 2009) in Italy reported 28.71% prevalence rate of *T. gondii* IgM in ewes.

The difference between obtained results of the serological tests during the present study and those reported by other investigators may be attributed to the host-parasite relationship which depends upon the virulence of *T. gondii* strain, the immune status, age and management of the sheep and goat in different localities, as well as, the time of the exposure to infection and the biology of the parasite (Frenkel et al. 1970; Malife et al.1990). According to Malife et al. (1990), the prevalence of the infection may vary strongly in some countries from one locality to another due to difference in certain ecological factors and breeding system.

Our study showed that prevalence of *T. gondii* in ewes and does was high, thus *T. gondii* may be one of the important agents leading to abortion in ewes and does in Duhok province of Iraq, and the consequent risk

for humans of acquiring toxoplasmosis from consumption of sheep and goats' meat exists. The high prevalence of *T. gondii* infection in sheep and goats may be due to free range livestock associated with *T. gondii* infection. Sheep and goats are kept on pastures with an increased pressure of infection due to contamination of environment with oocysts. The frequency of stray cats in a humid rainy climate favouring the survival of oocysts may have contributed to the high *Toxoplasma* prevalence. This finding is in agreement with Frenkel et al. (1970). In Duhok, stray cats are widely spread in livestock rearing areas, thus raising the issue of cats easily entering the environment of sheep. This result is consistent with Malife et al. (1990) and Frenkel et al. (1970). According to Frenkel et al. (1970), the grazing pasture plays an essential role in the epidemiology of toxoplasmosis than domestic cats.

It may be concluded that the seropositive ewes and goats harboured *T. gondii* tissue cyst. Therefore, such animals could be important sources of transmission of the infection to man through consumption of incompletely cooked meat. The results of this study also indicate that *T. gondii* has an important role in the abortion of ewes and does.

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