The Relationship between Neonatal Lamb Mortality and Toxoplasmosis

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Abstract: In this study, it was aimed to reveal the relationship between neonatal lamb mortality and toxoplasmosis. The study was carried out in a sheep farm that declared the death of lambs. Brood ewes (N= 50) were included into the study and they were divided into 2 groups. The first group consisted of 25 sheep whose lambs had died, and the second group consisted of 25 sheep whose lambs were alive. Blood samples were collected from the two groups and the blood sera were obtained. The sera were examined with the Sabin-Feldman Dye Test for the antibodies against Toxoplasma gondii (T. gondii). Of the 50 blood sera examined, 29 (58%) were positive for T. gondii, 20 (80%) of which were from the sheep whose lambs had died. On the other hand, only 9 (36%) of 25 blood sera from the sheep with healthy lambs were found to be positive. The frequency of T. gondii infection was statistically evaluated by chi-square test and the difference between the two groups was found to be significant. (p<0.05). The results of the study showed that toxoplasmosis can play an important role in lamb mortality.

Keywords: Neonatal lamb, Sheep, Toxoplasma gondii.

Introduction

Toxoplasmosis is a zoonotic infection affecting almost all organisms including mammals, reptiles and poultry (Soulsby, 1986). The disease causes encephalitis in addition to it’s effect on other organs and tissues. The disease is commonly subclinical in mammals. However clinical toxoplasmosis can be seen in immuno-deficient patients. In addition to neurological symptoms such as undefined ataxia, pain, fever, headache and drowsiness other symptoms including growth in lymph nodes, muscle pain, fatigue, sore throat, urticaria, pneumonia, blindness, liver, heart and lung problems may also be seen in patients with toxoplasmosis (Tüzer and Toparlak, 1999).

Toxoplasma gondii is a protozoon that appears in all mammals, reptiles and poultry. The agent is an obligatory intracellular parasite and may grow in all cells except for erythrocytes (Soulsby, 1986). Toxoplasmosis is a zoonotic disease and can infect humans in addition to farm animals. It was reported that sero-positivity for T. gondii increases with the advancing ages of all animals. Felines are the most important contagious source of toxoplasmosis. The known habits of felines to bury their stool play a major role in the continuity of the parasite’s life cycle since this prevents the oocysts from being directly exposed to sunlight. In addition, cockroaches, houseflies and other arthropods also help spread the oocysts in stools (Dubey, 2009).

Toxoplasmosis is reported in people of all ages and sex and socio-economic groups from every region of Turkey (Tüzer and Toparlak, 1999).

According to the data of Turkish Statistics Institution there are 31.507.934 sheep in Turkey. There are 277.439 sheep in the province of Isparta. There are 124.262 sheep in the Yalvaç district. As being among the major sources of subsistence of people in villages sheep breeding has great...
contribution to economy of Turkey (Anonymous, 2016). Success in economic sheep breeding is measured by the number of lambs grown and sold. This success is greatly decreased by lamb mortality during the growing period. Neonatal lamb mortality causes serious economic losses in our country. In a study conducted in the province of Kars, the morbidity rate of the lambs was reported to be 48.6% (Gökçe and Erdoğan, 2009). Ovine morbidity rate of the lambs was reported to be during the growing period. Neonatal lamb mortality within the first week of lambing. Post mortem examinations of the lambs did not reveal any gross pathological findings. This study was carried out on a sheep farm raising 200 ewes in Yalvaç district of Isparta province in 2016. The breeder reported a high lamb mortality in the sheep whose lambs had died, were found to be positive for T. gondii. On the other hand, 9 (36%) of 25 blood sera collected from the sheep with healthy lambs were found to be positive (Table 1). The difference between the two groups was significant when the frequency of T. gondii was statistically assessed by the chi-square test. (X²:9.93 p<0.05)

Table 1. Distribution of Toxoplasma gondii incidence according to the study groups.

| Study Groups | T. gondii (+) | T. gondii (-) | Total |
|--------------|---------------|---------------|-------|
| I. Group Sheep |                |               |       |
| whose lambs had died | 25 (100) | 0 (0) | 25 (100) |
| II. Group Sheep |                |               |       |
| whose lambs were alive | 25 (100) | 0 (0) | 25 (100) |
| Total | 50 (100) | 2 (42) | 52 (100) |

Of the 50 blood sera examined, 29 (58%) were positive. 20 (80%) of 25 blood sera collected from the sheep whose lambs had died, were found to be positive for T. gondii. The other hand, 9 (36%) of 25 blood sera collected from the sheep with healthy lambs were found to be positive (Table 1). The difference between the two groups was significant when the frequency of T. gondii was statistically assessed by the chi-square test. (X²:9.93 p<0.05)

Table 2. The rates of T. gondii seropositive blood sera at different titers.

| Titer rates | Number | Alive % | Dead % | Mortality % |
|-------------|--------|---------|--------|-------------|
| <1/16 | 21 | 42 | 16 | 76.19 | 10 | 23.8 |
| 1/16 | 18 | 36 | 8 | 44.44 | 10 | 55.6 |
| 1/64 | 8 | 16 | 1 | 12.50 | 7 | 87.5 |
| 1/256 | 3 | 6 | 0 | 0.00 | 3 | 100 |
| Total | 50 | 100 | 25 | 25 | 100 |

As can be seen in the Table 2 the mortality rates of the lambs showed an increase along with the maternal antibody titers.

Discussion and Conclusions

Sheep breeding is very important for the economy of Turkey. Therefore, lamb mortality causes considerable economic loss in the sheep breeding enterprises (Yumuşak and Aksoy, 2014). Besides other infectious diseases such as brucellosis and campylobacteriosis, toxoplasmosis also plays an important role in lamb mortality (Aköz et al., 2009; Ağaç et al., 2000; Arda et al., 1987; Mabuk et al., 2013; Sevinç et al., 2000). Many studies have indicated that lamb mortality is associated with...
toxoplasmosis (Castano et al., 2019; Dubey and Kirkride, 1990; Dubey et al., 1990; Edwards and Dubey, 2013; Liu et al., 2014; Innes et al., 1995, Mainar et al., 1996; Verhelst et al., 2015). In this study, the toxoplasmosis detected in the ewes with lambs died and those with healthy lambs compatible with the above studies.

Numerous studies have been carried out to screen for the prevalence of *T. gondii* in sheep in our country. The studies and the determined rates are given in Table 3.

Table 3. The prevalence of *T. gondii* infection in sheep in different provinces of Turkey.

| Cities      | Test   | Seropositivity % | Reference No |
|-------------|--------|------------------|--------------|
| Konya       | IFAT   | 13.78(aborted)   | Sevinç et al., 2000 |
| Elazığ      | SFDT   | 46.8             | Aktaş et al., 2000 |
| Kars        | SFDT   | 51.4             | Aslantaş and Babür, 2000 |
| Amasya      | SFDT   | 66.6             | Karatepe et al., 2003 |
| Afyon       | SFDT   | 54.65            | Çiçek et al., 2004 |
| Yalova      | SFDT   | 66.66            | Öncel et al., 2005 |
| Şanlıurfa   | SFDT   | 65.08            | Öncel et al., 2005 |
| Şırnak      | SFDT   | 55.66            | Seygili et al., 2005 |
| Kars        | SFDT   | 90.9             | Mor and Adan, 2007 |
| Mersin      | ELISA  | 95.7             | Acro et al., 2008 |
| Konya       | IFAT   | 13               | Aktaş et al., 2009 |
| Nevşehir    | ELISA  | 10               | Özmüttu and Karatepe, 2017 |
| Nigde       | ELISA  | 6.28             | Güler, 2011 |
| Kırıkkale   | SFDT   | 88               | Yıldız et al., 2014 |
| Şirnak      | SFDT   | 97               | Leblebicier and Yıldız, 2014 |
| Sivas       | ELISA  | 53.8             | Muz et al., 2013 |

In our study; the prevalence of toxoplasmosis positive sera (58%) was lower than that observed in Kars (Aslantaş and Babür, 2000), Amasya (Karatepe et al., 2001), Yalova provinces (Öncel et al., 2005) and the Şırnak province. 

The results of this study showed that toxoplasmosis can play an important role in lamb mortality. Besides, toxoplasmosis causes serious pathological disorders in humans, especially in pregnant women or immuno-deficient people. In addition, it causes significant yield losses in sheep breeding. Farmers and students of veterinary medicine should be informed on the methods of prevention from the disease by emphasizing the zoonotic nature of the disease.

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