Investigation of anti-*Toxoplasma gondii* antibodies in goats in Kilis province

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Summary: This study was conducted to determine the seroprevalence of *Toxoplasma gondii* infection in Kilis and Halep goats in Kilis province. 105 serum samples of goats were examined by Sabin Feldman Dye Test (SFDT) and 95.24% of seropositivy have been found. These results show that toxoplasmosis is quite common in goats in the region of study.

Keywords: *Toxoplasma gondii*, Sabin-Feldman, seroprevalence, goat, Kilis.

Kilis yöresi keçilerinde anti-*Toxoplasma gondii* antikorlarının araştırılması

Özet: Bu çalışma Kilis yöresindeki Kilis ve Halep keçilerinde *Toxoplasma gondii* seroprevalansını belirlemek amacıyla yapılmıştır. 105 keçiye ait serum örneği Sabin Feldman Dye Testi (SFDT) ile incelenmiş ve %95,24 oranında seropozitifliğe rastlanılmıştır. Bu sonuçlar çalışmanın yapıldığı bölgede keçilerde toxoplazmozisin oldukça yaygın olduğunu göstermektedir.

Anahtar Kelimeler: *Toxoplasma gondii*, Sabin-Feldman, seroprevalans, keçi, Kilis.

Introduction

Toxoplasmosis is important zoonotic infection that affects both humans and animals. It is caused by *T.gondii* which is obligate intracellular parasite. The definite hosts are domestic cats and other felidae family and intermediate hosts are warm-blood animals and humans (4,6,22). The disease is transmitted by ingestion of oocysts in contaminated food and water or ingestion of bradyzoites with undercooked or raw meat (5,6).

Toxoplasmosis is commonly subclinical altought shows a few general symptoms such as fever, increase of body temperature, degenaration of retina and ataxi (6,9).

Infective animals harbour cysts in their tissues particularly muscle. They would constitute infectious reservoirs for other animal species and humans. So the determination of prevalence of *T.gondii* infection in goats may be of epidemiological importance (4,6,7).

Toxoplasma gondii infection can be detected using serological and histological examinations. Sabin-Feldman Dye Test (SFDT), Indirect Hemagglutination (IHA), Indirect Fluorescent Antibody Test (IFAT), Enzyme Linked Immunosorbent Assay (ELISA), Complement Fixation Test (CFT) and Latex Agglutination Test (LAT) are commonly used serological tests. Sabin-Feldman Dye Test is considered the most specific, sensitive and gold standart test for the detection of antibodies to *T.gondii* (6,8).

The shami and kilis goats are is distributed East Meditarrean and Southeast Anatolia region of Turkey. The prevalence of toxoplasmosis in goats investigated with some studies and it is 12.1-88.17% (2,11,13,25) in Turkey.

The purpose of this study was to detect the prevalence of *T.gondii* in Shami and Kilis goats from the Kilis province of Turkey.

Material and Methods

The study was carried out on 105 adult goats (53 Kilis and 52 Shami) from Kilis province of Turkey. Kilis is located in the Southeast Anatolia region of

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Turkey. It is in Turkey-Syria border and between 360 N latitude and 320 E longitude. The age and sex of goats were recorded. All of were female except two of Kilis goats. The age ranged from 1 year to 10, with 52 animals from 1 to 3 years, 22 from 3 to 5 years and 13 animals older than 5 years. Sheep and goats of less than 6 months of age were not included in the study to avoid measuring antibodies passively transferred in colostrum. Serum samples were collected following centrifugation at 3000 rpm for 10 min of 5 ml of blood samples obtained from the jugular vein of goats. All sera were stored a -20ºC and later assayed for *Toxoplasma* antibodies.

Sabin-Feldman Dye Test (SFDT) for Toxoplasmosis: Serum samples were tested for toxoplasmosis with the Sabin Feldman Dye Test (SFDT), using live tachyzoites and methylene-blue dye. positive and negative controls, and test sera were diluted with saline in a series of 4-fold serial dilutions (1/16; 1/64; 1/256; 1/1024). Each dilution, 25 µl, was transferred to a tube and an equal volume of activator sera which is seronegative for *T.gondii* and rich in C2, C3, C4, Mg_2 and properdin was added. For antigen, 48 hours passage of *T.gondii* Rh strain derived from periton fluid of 3-4 week aged white swiss albino mice were used and per tube. The tubes were then incubated at 37 °C for 50 min. Then 10 min. incubation at 37 °C was performed in the presence of 25 µl of alkaline methylene blue (pH 11). After incubation, 20 µl of each sample was examined under a 40 objective. Dilutions for which ≥ 50% of the observed *T.gondii* tachyzoites remained unstained were considered positive. An antibody titer of 1:16 or higher was considered positive.

Statistical Analyses: The chi-square test (x2) was performed to assess the correlation between Kilis and Shami goats. The differences were considered statistically significant when probability (p) value ≤0.05.

Results

Among the 105 goats tested, 100 (95.24%) were detected to be seropositive. All of the Shami goats were found positive (100%) while Kilis goats were 90.38%. From 100 positive samples with SFDT, 76 samples (76%) were seropositive at 1:16 dilution, 22 samples (22%) at 1:64 dilution and 2 (2%) samples at 1:256 dilution (Table 1). A total of 49 serum samples from 1-3 years old, 17 serum samples from 3-5 years old and 10 serum samples from 5-10 years old were examined. The seropositivity of *T.gondii* was found 93.88%; 94.12% and 90% respectively.

No statistically significant difference was observed between the Kilis and Shami goats using the Chi Square test (p>0.05).

Table 1. Goat species and SFDT results with dilutions

Goats	1:16	1:64	1:256	Negative	Total
Shami	40	12	1	-	53
Kilis	36	10	1	5	52
Total	76	22	2	5	105

Discussion and Conclusion

Toxoplasmosis is one of the most important zoonotic infections that affect both humans and animals. The frequency of infection is variable in the different regions of the world. Depending on factors such as age, education, sanitation, life and aliment style the seroprevalence of the disease range from 0% to 90% in humans (6). As well as all other the world toxoplasmosis is common in Turkey and the seroprevalence has been reported in humans 23.1-57.6% (15).

Antibodies against to *T.gondii* in goats have been reported by using different serological methods. In previous studies carried out in different parts of Turkey, the seroprevalence of toxoplasmosis among goats varied between 12.1% and 88.17%.

The SFDT used in this study is known to be the most reliable and sensitive method for the diagnosis of toxoplasmosis. Its main disadvantages are its high cost and the human hazard of using live organisms (6). The prevalence of toxoplasmosis in goats by using SFDT was found 63.15% in Cankırı (1); 43.87% in Eskisehir (2); 80.61% in Van (13); 54% in Ankara (25) and 81.75% (23); 88.17% in Hatay (11); 41.30% in Nigde (14); 27.9% in Diyarbakır (21); 51.6% in Ankara, Cankırı, Kastamonu, Adana and Yozgat (24). Seroprevalence was found 15% by IHA and 12.1% by ELISA in in goats in Adana (18). The overall prevalence recorded in goats in the present study is higher (95.24%) compared to the previous reports from Turkey. But the prevalence of toxoplasmosis in Hatay (88.17%) which is in the

same region of Kilis is near to our study, the reason of this may be geographical.

In other countries mainly the other serological methods were used to detect to antibodies against *T.gondii*. It was found 51.82% in Zimbabwe by IFA (12); 66% in Chech Republic by ELISA (3); 28.93% by LAT (19) and 19-19.5% by IHA, ELISA and IFA in Brazil (10); 24-25.9% in Ethiopia by MDAT and ELISA (17); 59.8% in Bulgaria by IHA (20) and 34.2-78.3% in Poland by DAT (16). Also our result is higher than these reports, even though a different serological method was used.

The results of the present study further confirm the high prevalence of *Toxoplasma* infections in goat populations in Kilis, Turkey. May be some reasons of that in this region are presence of reservoir cats and farm animals; suitable temperature and humidity; potentiality of environment for sporulation of oocytes; traditional breeding systems and suitable pastures.

Toxoplasmosis in goats results economic losses because of abort and reduction of reproduction. Goat meats are not widely consumed in Turkey but contaminated meats are also risk for human toxoplasmosis. So some precautions should be taken to decrease the prevalence of *T.gondii* in this region.

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