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Investigation of *Toxoplasma gondii* Antibodies in Sport Horses Bred in Ankara Province

Zeynep GÜÇLÜ[1], Zafer KARAER[2], Cahit BABÜR[3], Selçuk KILIÇ[3]

[1]Gülhane Askeri Tıp Akademisi, Tıbbi Parazitoloji Bilim Dalı, Ankara; [2]Ankara Üniversitesi Veteriner Fakültesi, Parazitoloji Anabilim Dalı, Ankara; [3]Refik Saydam Hıfzıssıhha Merkezi Başkanlığı, Salgın Hastalıklar Araştırma Müdürlüğü, Ankara

SUMMARY: The aim of this study was to determine the seroprevalence of *Toxoplasma gondii* in horses bred for sportive purposes in the province of Ankara. Sera collected from a total of 100 clinically healthy horses were tested for the presence of anti-*Toxoplasma gondii* antibodies using the Sabin-Feldman dye test and a seropositivity of 28% was found. The distribution of seropositivity among dilutions showed that 23 samples were positive at a dilution of 1:16 (82.1%), and 5 samples, positive at 1:64 (17.8%).

Key Words: *Toxoplasma gondii*, Sabin-Feldman dye test, horse

Ankara Yöresinde Sportif Amaçlı Yetiştirilen Atlarda *Toxoplasma gondii* Antikorlarının Araştırılması

ÖZET: Bu çalışma, Ankara Yöresinde sportif amaçlı yetiştirilen atlarda *Toxoplasma gondii*'nin seroprevalansını saptamak amacıyla yapılmıştır. Klinik olarak sağlıklı toplam 100 attan elde edilen serumlar Sabin-Feldman dye testi ile anti-*Toxoplasma gondii* antikorları yönünden incelenmiş ve %28'lik seropozitiflik tespit edilmiştir. Seropozitifliğin dilüsyon basamaklarına dağılımı ise 1/16'da 23 (%82,1), 1/64'de 5 (%17,8) örneğin pozitif olduğu belirlenmiştir.

Anahtar Sözcükler: *Toxoplasma gondii*, Sabin-Feldman Dye Testi, At

INTRODUCTION

Toxoplasma gondii is an intracellular protozoan capable of infecting most tissues in mammals and various tissues in avian species. This parasite is widespread across the world and bears significance for both human and veterinary medicine. Despite being able to cause symptoms including fever, ataxia, retinal degeneration and severe encephalomyelitis, in some cases, the disease may not be evident (6, 26). The definitive host of the protozoan is an animal from *Felidae* family (cat, bobcat, puma) and man, domestic or wild animals, as well as birds are intermediate hosts (12, 17). The disease may contaminate with the consumption of uncooked or raw meat containing parasite cysts; contact with food, water or sand involving the oocysts that are spread by infected cats (12).

Since *T. gondii* infections generally display subclinical course in horses, serological techniques for the detection of specific antibodies produced in the body against the parasite have great diagnostic value (12, 31).

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Yazışma /Correspoding Author: Zeynep Güçlü
Tel: - Fax: -
E-mail: zeynepguclu@hotmail.com

Equine toxoplasmosis has been reported to be diagnosed with serological methods including the Sabin-Feldman Dye Test (SFDT), Indirect Fluorescent Antibody Test (IFAT), Enzym Linked Immunosorbent Assay (ELISA), Indirect Hemagglutination (IHA), Modified Agglutination Test (MAT), Direct Agglutination Test (DAT), Latex Agglutination Test (LAT) and Complement Fixation Test (CFT) both in Turkey and various countries across the world (5, 10-13, 15, 18-21, 24, 25, 28, 32, 36). The aim of the present study was to determine seroprevalance of toxoplasmosis in sport horses bred in Ankara province.

MATERIALS AND METHODS

Ten ml blood samples were collected in accordance with the routine method, from a total of 100 horses between the age of 3-18 years, including 25 female and 75 male animals bred for sportive purposes in the province of Ankara in January and March 2004. Sera were harvested from the blood samples by being centrifuged at 4000 rpm for 10 minutes at room temperature. Serum samples were kept at -20°C until to analyze.

Serum samples were tested by the Sabin-Feldman Dye test (SFDT) using vigorous antijen and methylen-blue dying in Refik Saydam Hygiene Center. Antibody titer of 1/16 and

over was accepted to be positive (29).

Statistical analysis: A chi-square (χ^2) test was used to detect significant differences between proportions, and a probability of less than 0.05 was considered to be statistically significant.

RESULTS

Among the 100 horses tested for the presence of anti-*T. gondii* antibodies, 28 (28%) were found to be seropositive. Among the 28 seropositive horses, *T.gondii* antibodies were detected at a 1:16 dilution in 23 (82.1%) and a 1:64 dilution in 5 (17.8%) animals.

Table 1. Distribution of SFDT titers according to genders.

Gender	No of tested	SFDT Titer – 1/				
		No of positivity	16	64	256	1024
Female	25	5	3	2	-	-
Male	75	23	20	3	-	-
Total	100	28	23	5	-	-

The positive rate was 30.7% (23/75) in male and 20% (5/25) in female and no statistically significant difference was observed between genders (yates corrected chi-square:0.6, p:0.44).

Table 2. Distribution of SFDT titers according to ages.

SFDT Titers	Age					
	3-5	6-8	9-11	12-14	15-18	Total
1/16	3	11	1	5	3	23
1/64	2	1	-	1	1	5
1/256	-	-	-	-	-	-
1/1024	-	-	-	-	-	-
Positive/No of	5/16	12/37	1/16	6/18	4/13	28/100

DISCUSSION

Although toxoplasmosis generally causes subclinical infections in horses, it may also lead to symptoms including progressive neurological findings such as ataxia, paralysis and blindness. Horses display low susceptibility to the disease. However young animals and animals with immunosuppression (sick, pregnant and aged animals) are more susceptible to toxoplasmosis.

The disease has been reported to be diagnosed by serological methods in a wide variety of countries. Dubey et al. (16) have detected seropositivity rates of 0.36% in wild horses in the state of Wyoming, and 6.9% among 1788 horses slaughtered in North America using MAT (14), whereas the same technique has revealed seropositivity rates of 15% in Brazil (15), and 13.1% in Argentina (13). ELISA results indicate seropositivity of 65.6% in donkeys in Egypt (18), 1% in horses in Sweden (33) and 7% in horses in the Netherlands (34), 38.1% in horses in Egypt (19). Seropositivity rates of 11.8% in India (11) and 37.1% in Nigeria (35) have been detected by means of IHA. Furthermore, Riemann et al. (28) have reported seropositivity rates in horses to be 20% and 11.8% in Northern India, using IHA and direct haemagglutination, respectively (10), 9% in Ontario using SFDT (32), 7.7% among 2886 animals using SDFT and 4.1% among 2818 animals using CFT in the Czech Republic (21).

Research on equine toxoplasmosis in Turkey has been generally carried out by SDFT and the first report belongs to Weilland and Dalchow (1) in 1970 with a *T. gondii* seropositivity rate of 14%. Studies conducted in 8 different regions of Turkey have revealed a seropositivity range of 1.74-42.2% (2-4, 6-9, 22, 23, 27, 30, 32, 36).

In this study, *T.gondii* antibodies were found to be 28% in sport horses breed in Ankara and there were no statistically significant differences in prevalence between genders ($p>0.05$). The seroprevalence rate in the present study is consistent with the results of previous serological studies performed by Akca et al.. The reasons for these discrepancies may be explained by spatial, temporal and many other factors determining the prevalence of Toxoplasmosis in animals as well as possible differences among laboratories and testing procedures. Higher seroprevalence rate obtained in the present study may be due to partly to the small number of the animals examined. It has been observed that the seropositivity rates are profoundly influenced by differences in serological methods performed, in the areas that the studies conducted and in number of the samples. It has been established that serological methods such as SFDT and IFAT considered to be more sensitive for the diagnosis of the disease offer more accurate results (10, 11, 13-15, 18, 21, 28, 29, 32-35).

It is conceivable that high seroprevalence rates for toxoplasmosis in horses is a result of environmental contamination with *T.gondii* oocysts. However, horses examined in this study were bred in farm and village houses, this decreases the risk of exposure to animal of felidae family and feces of cats. Therefore, we concluded that the consumption raw or unproperly processed is mainstay for transmission of *T.gondii.*

The comparative highness of the rate for seropositivity of 28% detected in this study with respect to values previously determined in Turkey and other countries, has indicated the necessity of research on the ability of *T. gondii* to form cysts, in horses for slaughter.

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