

Scientific Report

Investigation of seroprevalance of toxoplasmosis in mares and stallions in Ankara province, Turkey

Gazyacı, S.^{1*}; Macun, H. C.¹ and Babür, C.²

¹Department of Clinical Sciences, Faculty of Veterinary Medicine, Kirikkale University, 71450 Yahsihan, Turkey; ²Department of Communicable Diseases Research, Refik Saydam National Hygiene Center, Ankara, Turkey

*Correspondence: S. Gazyacı, Department of Clinical Sciences, Faculty of Veterinary Medicine, Kirikkale University, 71450 Yahsihan, Turkey. E-mail: gazyagciserkal@gmail.com

(Received 18 Dec 2010; revised version 9 Apr 2011; accepted 19 Apr 2011)

Summary

The aim of this study was to determine the seroprevalence of *Toxoplasma gondii* in mares and stallions in the province of Ankara. Sera from 168 clinically healthy horses were tested for the presence of *Toxoplasma gondii* antibodies using the Sabin Feldman dye test. *Toxoplasma gondii* infection was determined in 62 (36.9%) of 168 horses with the titers ranging from 1:16 to 1:256.

Key words: Antibody, Mare, Sabin-Feldman dye test, Stallion, *Toxoplasma gondii*

Introduction

Toxoplasmosis is one of the more common parasitic zoonoses worldwide. Its causative agent, *Toxoplasma gondii*, is a protozoon that has developed several potential routes of transmission within and between different host species (Akça *et al.*, 2004). During pregnancy, *T. gondii* may be transmitted vertically to the foetus via the placenta. *Toxoplasma gondii* is an obligate and intracellular parasite. Transmission may also occur via tachyzoites contained in blood products, tissue transplants, or raw milk (Karatepe *et al.*, 2010). Although, infection is generally asymptomatic in healthy human beings, the parasite may cause important health problems in pregnant women and in immunocompromised people (Hosseininejad and Hosseini, 2011). Toxoplasmosis may cause fever, ataxia, retinal degeneration and severe encephalomyelitis (Güçlü *et al.*, 2007).

Equine toxoplasmosis has been reported to be diagnosed with serological methods including the Sabin-Feldman dye test (SFDT), indirect fluorescent antibody test (IFAT), enzyme 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 (Dubey *et al.*, 1999c; Güçlü *et al.*, 2007; Karatepe *et al.*, 2010).

The aim of the present study was to determine the seroprevalance of antibodies against *T. gondii* in mares and stallions in Ankara province, Turkey.

Materials and Methods

Sampling of horses and blood collection

10 ml blood samples were collected in accordance with the routine method, from a total of 168 apparently healthy horses between the ages of 3-12 years, including 77 female (none of the animals included had prior abortion history) and 91 male animals bred in the province of Ankara. Sera were harvested from the blood samples by being centrifuged at 4000 rpm for 10 min at room temperature. Serum samples were kept at -20°C until tested.

Sabin Feldman dye test

The SFDT described by Sabin and Feldman (1948) was performed in the Parasitology Laboratory of Refik Saydam Epidemic Diseases Research Directorate. An antibody titre of 1/16 and over was accepted to be positive

Statistical analysis

A Chi-square test (χ^2) was used to detect significant differences between genders and a probability of less than 0.05 was considered to be statistically significant.

Results

Out of 168 sera examined, 62 were positive at the titers $\geq 1:16$. Thirty six sera samples were positive at 1:16 dilution and 15 sera samples at 1:64 dilution and 11 sera at 1:256 dilution.

Table 1 shows gender-related prevalence obtained using samples from 77 females and 91 males. No statistically significant difference was observed between genders ($P > 0.05$).

Table 1: Seropositivity of horse toxoplasmosis assessed by SFDT in Ankara

Titers	Female	%	Male	%	Total	%
<1:16	41	53.3	65	71.5	106	63.1
1:16	20	26	16	17.5	36	21.4
1:64	10	13	5	5.5	15	8.9
1:256	6	7.7	5	5.5	11	6.6
Total	77	100	91	100	168	100

Discussion

The disease has been reported to be diagnosed by serological methods in a wide variety of countries. Dubey *et al.* (2003) 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 (Dubey *et al.*, 1999b). The same technique has revealed seropositivity rates of 15% in Brazil (Dubey *et al.*, 1999a) and 13.1% in Argentina (Dubey *et al.*, 1999c). ELISA results showed seropositivity of 38.1% in horses in Egypt (Ghazy *et al.*, 2007), 1% in horses in Sweden (Uggla *et al.*, 1990) and 7% in horses in the Netherlands (Van Knapen *et al.*, 1982). Seropositivity rates of 11.8% in India (Chhabra *et al.*, 1985) and 37.1% in

Nigeria (Aganda *et al.*, 1983) have been detected by IHA. Seropositivity rates in horses are reported to be 20% and 11.8% in Northern India, using IHA and DAT, respectively (Riemann *et al.*, 1975), 9% in Ontario using SFDT (Tizard *et al.*, 1978), 7.7% among 2886 animals using SFDT and 4.1% among 2818 animals using CFT in the Czech Republic (Hejlíček and Literák, 1994).

There has been limited epidemiological data available regarding toxoplasmosis infection in horses in Turkey. In horses residing in Niğde, anti-*Toxoplasma gondii* antibodies were detected in 9 (7.2%) out of 125 sera samples (Karatepe *et al.*, 2010). In a previous study performed on 100 sport horses in Ankara, 28 (28%) were found to be positive for *T. gondii* antibodies by SFDT (Güçlü *et al.*, 2007). In another seroprevalence study in Kars, of the 189 horse sera tested by SFDT, 39 (20.6%) were found to be seropositive against toxoplasmosis (Akça *et al.*, 2004). In the present study a seropositivity rate of 36.9% (62/168) was found for toxoplasmosis. We found a higher prevalence rate than previous reports.

The difference in seroprevalence rates in horses between the present work and the previous studies from Turkey may result from the difference in geographic localities where the samples were taken. The results of the present study confirmed the presence of toxoplasmosis infections in horse populations in Ankara.

It is concluded that the detection of anti *T. gondii* antibodies in horses does not imply a direct risk for human health since horse meat is not consumed by humans in Turkey. As horse carcasses are being used for carnivore food in the zoo and are fed to stray dogs and cats in villages, it may contribute to the disease transmission between animal species and thus indirectly to the human. We suggest that *T. gondii* infection is prevalent and should be taken into consideration by veterinarians and public health officers.

References

- Aganda, AQ; Kwanashie, GG and Belino, ED (1983). *Toxoplasma* antibodies in polo horses of Nigeria. Int. J. Zoonoses., 10: 155-158.

- Akça, A; Babür, C; Arslan, MO; Gıcık, Y; Kara, M and Kılıç, S (2004). Prevalance of antibodies to *Toxoplasma gondii* in horses in the province of Kars, Turkey. *Vet. Med. Czech.*, 49: 9-13.
- Chhabra, MB; Gupta, SL and Gautam, OP (1985). *Toxoplasma* seroprevalance in animals in northern India. *Int. J. Zoonoses.*, 12: 136-142.
- Dubey, JP; Kerber, CE and Granstrom, DE (1999a). Serologic prevalence of *Sarcocystis neurona*, *Toxoplasma gondii* and *N. caninum* in horses in Brazil. *J. Am. Vet. Med. Assoc.*, 215: 970-972.
- Dubey, JP; Mitchell, SM; Morrow, JK; Rhyan, JC; Steward, LM; Granstrom, DE; Romand, S; Thulliez, P; Saville, WJ and Lindsay, DS (2003). Prevalence of antibodies to *Neospora caninum*, *Sarcocystis neurona* and *Toxoplasma gondii* in wild horses from central Wyoming. *J. Parasitol.*, 89: 716-720.
- Dubey, JP; Thulliez, P; Romand, S; Kwok, OCH; Shen, SK and Gamble, HR (1999b). Serologic prevalence of *Toxoplasma gondii* in horses slaughtered for food in North America. *Vet. Parasitol.*, 86: 235-238.
- Dubey, JP; Venturini, MC; Venturini, L; McKinney, J and Pecoraro, M (1999c). Prevalence of antibodies to *Sarcocystis neurona*, *Toxoplasma gondii* and *Neospora caninum* in horses from Argentina. *Vet. Parasitol.*, 86: 59-62.
- Ghazy, AA; Shaapan, RM and Abdel-Rahman, EH (2007). Comparative serological diagnosis of toxoplasmosis in horses using locally isolated *Toxoplasma gondii*. *Vet. Parasitol.*, 145: 31-36.
- Güçlü, Z; Karaer, Z; Babür, C and Kılıç, S (2007). Investigation of *Toxoplasma gondii* antibodies in sport horses bred in Ankara province. *Turkiye Parazitol. Derg.*, 31: 264-267.
- Hejlícek, K and Literak, I (1994). Prevalence of antibodies to *Toxoplasma gondii* in horses in Czech Republic. *Acta Parasitol.*, 39: 217-219.
- Hosseininejad, M and Hosseini, F (2011). Seroprevalence of *Neospora caninum* and *Toxoplasma gondii* infection in dogs from west and central parts of Iran using two indirect ELISA tests and assessment of associate risk factors. *Iranian J. Vet. Res.*, 12: 46-51.
- Karatepe, B; Babür, C; Karatepe, M and Kılıç, S (2010). Seroprevalence of toxoplasmosis in horses in Niğde province of Turkey. *Trop. Anim. Health Prod.*, 42: 385-389.
- Riemann, HP; Smith, AT; Stormont, C; Ruppner, R; Behymer, DE; Suzuki, Y; Franti, CE and Verma, BB (1975). Equine toxoplasmosis: a survey for antibodies to *Toxoplasma gondii* in horses. *Am. J. Vet. Res.*, 36: 1797-1800.
- Sabin, AB and Feldman, HA (1948). Dyes as microchemical indicators of new immunity phenomenon affecting a protozoon parasite (*Toxoplasma*). *Science*. 108: 660-663.
- Tizard, IR; Harmeson, J and Lai, CH (1978). The prevalence of serum antibodies to *Toxoplasma gondii* in Ontario mammals. *Can. J. Comp. Med.*, 42: 177-183.
- Uggla, A; Mattson, S and Juntti, N (1990). Prevalence of antibodies to *Toxoplasma gondii* in cats, dogs and horses in Sweden. *Acta Vet. Scand.*, 31: 219-222.
- Van Knapen, F; Franchimont, JH and Van Der Lugt, G (1982). Prevalence of antibodies to *Toxoplasma* in farm animals in the Netherlands and its implication for meat inspection. *Vet. Q.*, 4: 101-105.