

Seroprevalence of *Toxoplasma gondii* Infection in Cats, Dogs and Ruminant Animals in Al-Ahsa Area in Saudi Arabia

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Abstract: A cross-sectional study was conducted to identify the seroprevalence of *Toxoplasma gondii* infection in cats, dogs, sheep, goats, cattle and camels in Al-Ahsa area, Saudi Arabia. Serum samples were collected from cats, dogs and slaughtered ruminant animals and analysed for *Toxoplasma gondii* antibodies using ELISA. The seroprevalence was 90, 20, 19, 10, 22, 12, 4 and 8% in stray and household cats, stray and household dogs, sheep, goats, cattle and camels, respectively. Significantly higher value of prevalence was seen in stray cats compared to other animals. The presence of *Toxoplasma gondii* in slaughtered animals indicates that toxoplasmosis in this area poses an occupational risk to workers in the slaughter house and that toxoplasmosis could be a veterinary public health that necessitates integrated control measures.

Key words: *Toxoplasma gondii*, seroprevalence, antigen-coated, Al-Ahsa, Saudi Arabia

INTRODUCTION

Several cross-sectional studies carried out in Saudi Arabia have revealed a relatively high seroprevalence of *Toxoplasma gondii* infection in pregnant women (Al-Harthi *et al.*, 2006; Mohammad *et al.*, 2010), blood donors (Al-Amari, 1994) and among Saudi population (Al-Qurashi *et al.*, 2001). Ingestion of food or water contaminated with oocysts shed by cats or consumption of under cooked or raw meat containing tissue cysts are implicated as possible risk to infection (Dubey and Streitl, 1976; Dubey and Beattie, 1988). People living in rural areas with animals exposure are at higher risk for infection (Al-Harthi *et al.*, 2006; Al-Qurashi *et al.*, 2001). Animals by virtue of being the intermediate host could serve as potential risk to human public health. This study, therefore was designed to determine the seroprevalence of *T. gondii* in cats and ruminant animals in Al-Ahsa area, Saudi Arabia where high toxoplasmosis was reported in humans (Mohammad *et al.*, 2010).

MATERIALS AND METHODS

Blood samples were obtained from stray and house hold cats and dogs. For other animals, samples were obtained from slaughter houses in Al-Ahsa in summer 2010. Samples (2 mL) were collected from cats (156), dogs (42), sheep (400), goats (196), camels (210) and cattle (130) into plain tubes. Serum was separated and stored at -30°C until analysis.

Toxoplasma assay: The CIV-test *T. gondii* ELISA kit for animals (Shenzhen, China) was performed to determine antibodies to *T. gondii* according to the manufacturer's instructions. In brief, after incubation of antigen-coated microplates with the test sera diluted 1:100, *T. gondii* specific antibodies were detected through binding the antigen/antibody complex with a peroxidase-labelled anti-ruminant IgG monoclonal antibody conjugate for 90 min. Both the positive and negative controls were provided in the kit. A chromogenic enzyme substrate was added and the optical density at wave length of 450 nm was read using a photometer (Bio-RAD, Hercules, CA, USA). A relative rate percent value was calculated and sera considered positive to *T. gondii* if the value exceeds 2.1 as recommended by manufacturer.

Statistical analysis: Chi-square and Fisher's exact tests were used to compare seroprevalence values relative to animal species. Analysis shall be performed with SPSS software for windows with a ($p < 0.05$) as statistically significant.

RESULTS

The seroprevalence rate of antibodies against *T. gondii* for 156 cats, 92 dogs, 400 sheep, 196 goats, 30 cattle and 210 camels are shown in Table 1. The seroprevalence for stray and household cats and dogs, sheep, goats, cattle and camels was 90, 20, 19, 10, 22, 12, 4 and 8%, respectively. The overall prevalence for cats and dogs were 63 and 15%, respectively. Significantly

Table 1: Prevalence of antibodies to *Toxoplasma gondii* in animals

Animal	Total no. of samples	No. of positives	Positives (%)
Stray cats	96	86	90
Household cats	60	12	20
Stray dogs	52	10	19
Household dogs	40	4	10
Sheep	400	88	22
Goats	196	23	12
Cattle	130	6	4
Camels	210	17	8

($p < 0.05$) higher value of prevalence was seen in stray cats compared to other animals. Similar value of prevalence was seen in household cats, dogs and sheep. Significantly ($p < 0.05$) lower values of prevalence were observed in goats, camels and cattle. The cattle have the lowest prevalence rate among animals.

DISCUSSION

The overall seroprevalence of anti *T. gondii* in cats was 63% which was similar (Miro *et al.*, 2004) or higher than in other countries (Zhang *et al.*, 2009). The prevalence of antibodies *T. gondii* infection in stray cats was significantly higher than in household cats. Comparable results were reported in Iran (Haddadzadeh *et al.*, 2006), Spain (Gauss *et al.*, 2003) and China (Zhang *et al.*, 2009) which could be due to hunting habit of stray cats that their diet includes rodents, placenta, stillborn foeti and wild birds. Stray dogs too have access to similar diets (Lindsay *et al.*, 1990; Mineo *et al.*, 2001).

CONCLUSION

In this study the high seroprevalence of *T. gondii* in sheep, goats, cattle and camels may be attributed to the fact that stray infected cats (90%) were found almost every where in Al-Ahsa and to the viability of *T. gondii* oocysts in the environment (Fleck, 1972; Hilali *et al.*, 1995). Similar values of prevalence rate of toxoplasmosis in sheep and goats was reported elsewhere (Hashemi-Fesharki, 1996; Van Der Puije *et al.*, 2000; Daryani *et al.*, 2006). Likewise, toxoplasmosis was reported in cattle (Bekele and Kasali, 1989; Matsuo and Husin, 1996) and camels. The lower value of seroprevalence in these two later species may be due to differences in management methods (Pita Gondim *et al.*, 1999). The prevalence of *Toxoplasma* in slaughtered sheep, goats, cattle and camels indicates that toxoplasmosis in this area poses an occupational risk to veterinarians, animal owners, slaughter house workers who handle infected material (Radostitis *et al.*, 2000) and that toxoplasmosis could be a veterinary public health hazard that necessitates integrated control strategies.

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