Journal of Animal and Veterinary Advances 5 (3) : 188-190, 2006

Seroprevalence of *Toxoplasma gondii* in Cattle, Sheep and Goats Slaughtered for Food in Mazandaran Province, Iran, 2005

[1]M. Sharif, [1]Sh. Gholami, [1]H. Ziaei, [1]A. Daryani, [2]B. Laktarashi,
[3]S.P. Ziapour, [4]A. Rafiei and [4]M. Vahedi
[1]Department of Parasitology and Mycology, School of Medicine,
Mazandaran University of Medical Sciences, PC 48168-95475, Sari, Iran
[2]Department of Parasitology and Mycology, School of Medicine,
Mazandaran University of Medical Sciences, PC 48168-95475, Srai, Iran
[3]Department of Parasitology and Mycology, Amol Research Center,
Pasteur Institute of Iran, P.O.Box 139, Amol, Iran
[4]Department of Immunology and Microbiology, School of Medicine,
Mazandaran University of Medical Sciences, PC 48168-95475, Sari, Iran

Abstract: Serum samples from 290 cattle, 400 goats and 588 sheep slaughtered for food in various areas of the Mazandaran province, Iran were tested for antibodies to *Toxoplasma gondii* (*T.gondii*) by the indirect immunofluorescense antibody test (IFAT), from December 2004 to April 2005. Antibodies to *T. gondii* were found in 9% (26 out of 290) cattle, 30% (120 out of 400) goats and 35% (206 out of 588) sheep, at a dilution of 1:16 and more. The highest titres observed in cattle, goats and sheep were 1:64 (0.7%), 1:128 (1%), 1:64 (3%), respectively. These results indicate that *T. gondii* antibodies are widespread in animal populations and support that toxoplasmosis is a widely spread zoonotic infection in northern Iran.

Key words: *Toxoplasma gondii*, Sheep, Goats, Cattle, Epidemiology

INTRODUCTION

Toxoplasmosis is a world-wide zoonosis of increasing concern in both human and veterinary medicine. The disease caused by an obligate intracellular, protozoan parasite *Toxoplasma gondii*[1]. While the sexual life cycle of the parasite is confined to cats (the definitive host), the asexual cycle can take place in all warm blooded animals but causes disease only in certain species[2].

This Coccidian protozoan is widely prevalent in Iran[3-7]. Because there is little information on prevalence of infection in northern Iran, this study was done to determine the frequency of antibodies against *T. gondii* among cattle, goats and sheep in this area.

MATERIALS AND METHODS

Blood samples obtained from cattle, goats and sheep between December 2004 and April 2005 from the three main geographical zones of Mazandaran province. Randomly 9 slaughter houses were selected In Western, Central and Eastern regions. A total of 1278 animals (290 cattle, 400 goats and 588 sheep) from various locations in Mazandaran province were selected for the study (Table 1).

Table 1: Number of serum samples collected from different geographical regious of Mazandaran Province

	No. of samples			
Host animal	Western	Central	Eastern	Total
Sheep	298	186	104	588
Goat	148	136	116	400
Cattle	90	126	74	290

Table 2: Seroprevalence of *T. Gondii* among sheep, goats and cattle on 9 slaughter houses in Mazandaran Province, Iran

Host animal	Sera tested	Positive sera(%)
Sheep	588	206 (35)
Goat	400	120 (30)
Cattle	290	26 (9)

Approximately 5 mL of blood was drawn via the jugular vein from each animal. Samples were transferred to laboratory. Clear sera were separated by centrifugation at 2000×g for 10 min and stored at –20°C until required for test. The IFAT described by Voller and O'Neill (8) was used to detect anti-*T.gondii* antibodies in cattle, goats and sheep. *Toxoplsma* antigen (Rayyan Teb Co.) and anti-cattle, sheep and goat conjugated serum were

Coresponding Author: Dr. Mehdi Sharif, Department of Parasitology and Mycology, School of Medicine, Mazandaran University of Medical Sciences, PC 48168-95475, Sari, Iran

Table 3: Seroprevalence of anti-*T. gondii* antibodies in sheep, goats and cattle from the different geographical areas of Mazandaran Province, Iran as determined by IFAT

	Sheep		Goats		Cattle	
Region/area	No. tested	Prevalence No. (%)	No. tested	Prevalence No. (%)	No. tested	Prevalence No. (%)
Western	298	112 (37.6)	148	48 (32.4)	9010	(11.1)
Central	186	58 (31.9)	136	38 (27.9)	12610	(8.93)
Eastern	104	36 (34.6)	116	34 (29.3)	746	(8.1)

purchased (Hab Tak Co.). The test slides were observed at 500× magnification under a fluorescent microscope (Leitz, Germany). Initially sera were diluted (1:8 and 1:16) and screened for anti-*T. gondii* antibodies in the IFAT. Positive serum samples showing a titre of 1:16 were further diluted to determine the end point. Titres of 1:16 and more were considered as positive[2].

RESULTS

The prevalence of anti-Toxoplasma gondii antibodies in sheep, goats and cattle was 35, 30 and 9%, respectively (Table 2). This difference was statistically significant ($p<0.05$). The prevalence rate of antibodies against *T. gondii* for all 588 sheep, 400 goats and 290 cattle determined by IFAT is shown in Table 3. Statistically, no differences were found in prevalence between sheep from different areas and also for goats and cattle ($p>0.05$). However the prevalence rate in sheep, goats and cattle was higher in Western area in comparison with Central and Eastern regions.

DISCUSSION

This study was conducted with the aim of determining the prevalence of antibodies against *T. gondii* in sheep, goats and cattle in different areas of Mazandaran province with a humid environment in comparison with other areas of Iran.

In this study, the high seroprevalence of anti-*T. gondii* antibodies for sheep (35%) and goats (30%) may be due to the fact that cats were found almost everywhere. Higher prevalence rate of toxoplasmosis in warm and moist areas in comparison with cold or dry ones[9] is attributed to the longer viability of *T. gondii* oocysts in moist or humid environments[10]. This may be explained by the higher *Toxoplasma* antibody prevalence in northern Iran with a humid environment conditions in comparison with other parts of Iran with a relatively dry climate[6].

In the present study seroprevalence of *T. gondii* in sheep (35%) was found to be significantly higher ($p<0.05$) than that in goats (30%). Although the prevalence of *Toxoplasma* infection in sheep and goats in different parts of the world is variable, but in most studies that agree with present study, the prevalence rate of infection in sheep was higher than that of goats[6, 11-15]. In general, seropositivity of *T. gondii* in cattle is not high. In the present study the frequency of antibodies to *T. gondii* in cattle was 9%. In a study among cattle in Montana using a modified agglutination test, the prevalence was 3.2%[2]. In another study in Brazil, the rate of infection was 1.03% by the method of latex agglutination test[16]. In Vietnam, another study showed that the prevalence rate was 10.5% by latex agglutination test[17]. A study carried out on 2000 cattle by latex agglutination and indirect hemagglutination tests in Iran has been shown no positive reactions in their sera[6]. In central Ethiopia the prevalence rate of toxoplasmosis in cattle was 6.6%[14]. In a study in Indonesia, the seropositivity rate in 200 cattle was 9%[18]. In our survey like many other studies the prevalence rate in sheep is more than goats and much more than cattle. Fayer[9] indicated that differences in prevalence of toxoplasmosis in different animal species may be explained by differences in susceptibility to *T. gondii* infection and this view is also supported by work of Dubey and Streitel[19]. Thus, lower seropositivity in cattle in comparison with goats and sheep may be attributed both to differences in susceptibility and humoral responses to the parasite and to differences in management methods[16]. Also the differences in prevalence in sheep in comparison with goats may be due to differences in manner of feeding goats which usually eat top of the grass and small trees rather than the lower parts. In our study the prevalence of toxoplasmosis in sheep, goats and cattle in Western region of Mazandaran province was higher than Central and Eastern parts. In fact these differences observed in seropositivity between the three regions indicate that the goats, sheep and cattle in Western region exposed to an environment contaminated with more *T. gondii* oocysts, in comparison with those in Central and Eastern regions as a result of differences in level of humidity in these three areas.

In conclusion, the result of this study shows that the presence of anti-*T. gondii* specific antibodies especially in sheep and goats in northern Iran is relatively high. Thus, the risk of acquiring toxoplasmosis from eating sheep and goats meat (as a main meal for Iranians) may be great.

ACKNOWLEDGEMENTS

This research was made possible by grants received from the Research Deputy of Mazandaran University of Medical Sciences, Iran. The authors wish to thank Dr. Abolghasem Ajami and Mr. Oraz Mohammad Mirabi for their kind assistance.

REFERENCES

1. Buxton, D., 1990. Toxoplasmosis. Practitioner., 234: 42-44.
2. Dubey, J.P. and C.P. Beattie, 1988. Toxoplasmosis of animals and man. CRC Press, Boca Raton, Florida, pp: 220
3. Ghorbani, M. and A.H. Samii, 1973. Toxoplasmic lymphadenitis in Iran. The J. Trop. Med. Hygiene., 76: 156-160.
4. Ghorbani, M., A. Hafizi, M.T. Shegerfcar, M. Rezaian, A. Nadim, M. Anwar and A. Afsha , 1983. Animal toxoplasmosis in Iran. The J. Trop. Med. Hygiene., 86: 73-769.
5. Hoghooghi-rad, N. and N. Afraa, 1993. Prevalence of toxoplasmosis in human and domestic animals in Ahwas, Khozestan, south west Iran. The J. Trop. Med. Hygiene., 96: 163-168.
6. Hashemi-fesharki, R., 1996. Seroprevalence of *Toxoplasma gondii* in cattle, sheep and goats in Iran. Veterinary Parasitol., 61: 1-3.
7. Navidpour, Sh. and N. Hoghooghi-rad, 1998. Seroprevance of anti-*Toxoplasma gondii* antibodies in buffaloes in Khozestan Province. Veterinary Parasitol., 77: 191-194.
8. Voller, A. and P. O'Neill, 1971. Immunofluorescence methods suitable for large scale application to malaria. Bulletin of the World Health Organization., 45: 524-529.
9. Fayer, R., 1981. Toxoplasmosis update and public health implications. The Canadian Veterinary J., 22: 344-352.
10. Fleck, D.G., 1972. The Seroepidemiology of *Toxoplasma* infection in man. Proc. Royal Soci. Med., 65: 50.
11. Mirdha, B.R., J.C. Samantaray and A. Pandey, 1999. Seropositivity of *Toxoplasma gondii* in domestic animals. Indian J. Public Health, 43: 91-92.
12. Osiyemi, T.I., E.M. Synge, D.E. Agbonlahor and R. Agbaywe, 1985. The Prevalence of *Toxoplasma gondii* antibodies in man in Plateau State and meat animals in Nigeria. Transactions of the Royal Soci. Trop. Med. Hygiene., 79: 21-23.
13. Amin, A.M. and T.A. Morsy, 1997. Anti-*Toxoplasma* antibodies in butchers and slaughtered sheep and goats in Jeddah Municipal abattoir, Saudi Arabia. J. Egy. Soci. Parasitol., 27: 913-918.
14. Bekele, T. and O.B. Kasali, 1989. Toxoplasmosis in sheep, goats and cattle in central Ethiopia. Veterinary Research Communications, 13: 371-375.
15. van der Puije, W.N., K.M. Bosompem, E.M. Canacoo, J.M. Wastling and B.D. Akanmori, 2000. The prevalence of anti-*Toxoplasma gondii* antibodies in Ghanaian sheep and goats. Acta Tropica, 76: 21-26.
16. Pita Gondim, L.F., H.V. Jr. Barbosa, C.H. Ribeiro Fillho and H. Saeki, 1999. Serological survey of antibodies to *Toxoplasma gondii* in goats, sheep, cattle and water buffaloes in Bahia State, Brazil. Veterinary Parasitol., 82: 273-276.
17. Huong, L.T., B.L. Ljungstrom, A. Uggla and C. Bjorkman, 1998. Prevalence of antibodies to *Neospora caninum* and *Toxoplasma gondii* in cattle and water buffaloes in Southern Vietnam. Veterinary Parasitol., 75: 3-57.
18. Matsuo, K. and D. Husin, 1996. A survey of *Toxoplasma gondii* antibodies in goats and cattle in Lampung Province, Indonesia. The Southeast Asian J. Trop. Med. Public Health, 27: 554-555.
19. Dubey, J.P. and R.H. Streitel, 1976. Prevalence of *Toxoplasma* infection in cattle slaughtered at an Ohio abattoir. J. Am. Veterinary Med. Assoc., 169: 1197-1199.