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RESEARCH ARTICLE

RATE OF INFECTIONS WITH TOXOPLASMOSIS IN BAQUBA CITY, DIYALA PROVINCE, IRAQ

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ABSTRACT

To determine the infection rates with Toxoplasmosis in Baquba city, sera of women, ewes and does, cats, rabbits and birds from different discrete of Baquba city, Diyala, Iraq were examined for presence of toxoplasma antibodies. Latex agglutination test and ELISA were used. It was found that 17.33%; 23.39%; 63.29%; 67.86%; 50% and 21.43% of women, ewe, does, rabbits, cats and birds had toxoplasma antibodies in their sera respectively. It is suggested that Ovine, Caprine, Feline, Rabbits and birds toxoplasmosis may be a substantial health problem in Diyala.

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INTRODUCTION

Toxoplasmosis is an important zoonotic parasitic disease that affects millions of people and is caused by the protozoan *Toxoplasma gondii* in immune competent individuals, *T. gondii* preferentially infects tissues of central nervous systems (Reischl *et al*., 2003; Xiao *et al*., 2010). It is a contagious disease affecting man, cattle, sheep, pigs, birds, dogs, cats, foxes and several other rodents. Nearly one third of humanity has been exposed to *T. gondii* (Hill and Dubey, 2002). This parasite is able to develop on a wide variety of vertebrate hosts but its definitive host is the house cat and certain other Felidae (Markell *et al*., 1999). Toxoplasmosis is a ubiquitous obligate intracellular protozoan parasite, infection widespread throughout the world, occurring naturally in all warm- blooded animals including man (Dodds, 2006; Weiss and Kim, 2007). Toxoplasmosis is an aberrant feline coccidial infection which also occurs in other vertebrates (Radostits *et al*., 2007; Osiyemi *et al*., 1985) including wild animals (Ocholi *et al*., 1989), zoo animals (Murasta, 1989) and man (Frenkel, 1990). Toxoplasmosis causes different pathological conditions (Radostits *et al*., 2007; Osiyemi *et al*., 1985; Ocholi *et al*., 1989; Murasta, 1989; Frenkel, 1990; Beverley and Henry, 1977) and gynecological disturbances such as retained fetal membranes, still birth and abortion in ewes and does (Dubey *et al*., 1980; Stalheim *et al*., 1980; Dubey, 1986). Diagnosis of toxoplasma infection is seldom made by recovery of the parasite; usually it is done by serological tests (Markell *et al*., 1999). A wide range of serological tests are available for serological diagnosis of toxoplasma (Wilson *et al*., 1990). ELISA is one of the new frequently used methods in detection of *T. gondii* infection in humans and animals. In the ELISA test, soluble antigen is coated to micro titer plates and sample serum is added to form an antigen- antibody complex. A secondary enzyme- linked antibody specific to the host species is added to detect antigen- antibody complex. This test requires an ELISA reader and enzyme conjugation to the secondary antibodies (Dubey and Beattie, 1988). The Latex agglutination test is internationally recommended for the screening of toxoplasmosis in small ruminants (Klun *et al*., 2007). In Diyala, our knowledge about its prevalence among human and animals, either in latent or clinical form is scanty. The aim of this study was to determine the rate of infections with toxoplasma of ewes, does, cats, rabbits, birds, in addition to women.

MATERIALS AND METHODS

Serum samples from 450 women suffering from a history of abortion, 124 sheep, goat 79 from flocks suffering from abortion, 20 stray cats, 28 indoor rabbits, and 28 birds were collected from different discrete of Baquba, central of Diyala province, Iraq. The sera were submitted for ELISA enzyme-linked immunofluorescence technique; latex agglutination test for detection of toxoplasma antibodies. The antibody titer was also estimated by serial serum dilution.

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RESULTS

A higher Toxoplasma infection rate was found among rabbits, where it was 67.86%, goats (63.29%), cats (50%), sheep (23.39%) and Birds (21.43% by latex test. In women, it was 17.33% by ELIZA (Table-1). The higher percentage in sheep was in ½ dilution (37.93%), followed by ¼ (31.03%), 1/8 (13.79%), 1/16 (6.90%), then by 1/32, 1/216, and 1/512 (3.43%) each respectively. While in goat the highest percentage was in, 1/16 (36%), 1/8 (26%), ¼ (20%), 1/32 (8%0, ½ (6%), 1/64(4%). In cats ½ titer was the highest (66.67%), and 1/8 (33.33%). Rabbits, 1/8 (26.32%), 1/32 (21.05%), ¼, 1/8, 1/16 (15.79%),1/2 (5.26%). Birds ¼ (50%), 1/8 (33.33%), 1/32 (16.67%). While in women ¼ (40%) then ½, 1/8 and 1/16 (20%) each (Table-2).

Table 1. The total number and percentage of infection with toxoplasma in women, sheep, goats, rabbits, cat and birds

Sample from	Total No.	Positive	%	Negative	%	Test used
Women	450	78	17.33	372	82.67	ELISA
Sheep	124	29	23.39	95	76.61	Latex
Goats	79	50	63.29	29	36.71	Latex
Rabbits	28	19	67.86	9	32.14	latex
Cats	20	10	50	10	50	latex
Birds	28	6	21.43	22	78.57	Latex

Table 2. The titer level of anti-toxoplasma by latex test

Animal		Dilution								
		1/2	¼	1/8	1/16	1/32	1/64	1/128	1/256	1/512
Sheep	Total No.	11	9	4	2	1	-	-	1	1
	%	37.93	31.03	13.79	6.90	3.45	-	-	3.45	3.45
Goats	Total No.	3	10	13	18	4	2	-	-	-
	%	6	20	26	36	8	4	-	-	-
Cats	Total No.	2	-	1	-	-	-	-	-	-
	%	66.67	-	33.33	-	-	-	-	-	-
Rabbits	Total No.	1	3	5	3	4	3	-	-	-
	%	5.26	15.79	26.32	15.79	21.05	15.79	-	-	-
Birds	Total No.	-	3	2	-	1	-	-	-	-
	%	-	50	33.33	-	16.67	-	-	-	-
Women	Total No.	1	2	1	1	-	-	-	-	-
	%	20	40	20	20	-	-	-	-	-

DISCUSSION

The results of the study revealed that the rate of infection in women was (17.33%) by ELISA test. In Iraq, (Niazi *et al*., 1988) found out that the prevalence of Toxoplasma antibodies among women in Baghdad was 39%, whereas (Niazi *et al*., 1992) reported low rate of 8.6% positively from eight governorates in Iraq. Meanwhile (Mohammed and AL-Naisry, 1996) reported a prevalence rate of 20.4% toxoplasmosis in Iraqi women. In a study carried out in Basrah (Yacoub *et al*., 2006), the prevalence of toxoplasmosis had been shown to be (41.1 to 52.1%), whereas a previous study by (AL- Hamdani and Mahdi, 1997) showed low rate of 18.5% of Toxoplasmas antibodies in Basrah population. (Karem, 2007) found out that the seropositivity was (32.6%) by ELIZA between women in Sulaimania. In Baghdad (Juma and Salman, 2011) found the infection of *T. gondii* in women to be (19.17%). In Tikrit (AL-Doori, 2010) showed the presence of infection around (49- to 95%) and higher rate of infection lies among those of (25 to 31) years of age in women and their husbands. (Al- Se'adawy, 2010) reported that total infection in Al-Muthanna province – Iraq was (44.5%). The overall seroprevalence of Toxoplasma among both couples in Ramadi city was (38.4%) (Mohammed *et al*., 2013). Overall seropositivity for *T. gondii* among women of childbearing age has been reported as 20%- 25% in the UK to 50%- 60% in Belgium and 70%-80% in France (Giofangrandi *et al*., 1994). Despite the limitations, serum testing is still used for the diagnosis (Cantos *et al*., 2000). Commercial kits for detection of toxoplasma anti bodies are increasingly being used. In general in Duhok (Razzak *et al*., 2005) found all 187 women tested by Latex agglutination test were positive for *T. gondii* antibodies. (AL- Doski, 2000) studied 320 persons in Duhok province and found that 134 were positive by latex agglutination test. (Al- Sim'ani, 2000) reported a seropositivity of (39.33%) by the latex agglutination test and (45.33%) by the indirect hemagglutination test in Mosul province. These results are very similar to the finding of (Rai *et al*., 1998) who studied (345) pregnant Nepalese women and found an overall prevalence of 55.4% by the latex agglutination. (Hiro, 2014) reported that ELISA test is significantly more sensitive than Latex with the rate of (36.53%) positive samples for ELISA compared with (21.5%) by Latex test in women in Kirkuk city -Iraq. (Rabab, 2014) reported that (21.94%) of students in college of science, university of Thi- Qar were carried anti-toxoplasma antibodies, and there is significant variance between male and female (7.52%) in male and (14.42%) in females. (Saja, 2012) reported that (23%) of aborted women were infected with Toxoplasmosis in Thi Qar province. The results of our study revealed that infection rates with toxoplasma were; 23.39%; 63.29%; 67.86%; 50% and (21.43%) in ewe; does; rabbits, cats and birds respectively. (Nada, 2012) reported high infectivity percentage with toxoplasmosis in slaughtering rams and ewes submitted from different points of north and central Baghdad – Iraq, mature ewes and rams were highly infected with toxoplasmosis the infectivity percentage was (38%) for total animals. (Ali, *et al*., 2014) reported that the infection ratio of the Iraq's provinces for all animals (sheep, goats, cows, buffaloes and camels) is (19.5%). (Ahmed, 2012) reported that the overall percentage of toxoplasma infection in goats in Diyala province – Iraq was (34%, 12% and 11.5 %) by LAT, ELISA and IFAT respectively. The highest percentage of positive reactors was recorded in aborted goats by all tests, (41.66%, 25% and 33.33%) by LAT, ELISA and IFAT respectively. (Alexandra *et al*., 2013) reported sero- prevalence

of (30.4%) for stray cats –Iraq. Feral cat overpopulation is a global significance, feral cats roam freely and often form colonies of animals that live and feed in close proximately to humans (Robertson, 2008). Conditions in Iraq have enabled the proliferation of such colonies, because cultural and religious beliefs cause many Iraqi to forbid cats from entering their homes.

The percentage of Toxoplasma infection in animals and women of our study are nearly dissimilar. The highest percentage was in cats. The easy access of cats to birds and rodents, wasted of slaughtered house, and waste feed from human appears to provide ideal circumstances for cats to become infected and to excrete oocysts that lead to infection of other hosts as sheep rabbits, birds. The difference in infection rates in our study and those of others can be attributed to the cultures of persons from whom samples were took, their health conditions, and the difference in sensitivity of ELISA and Latex tests.

Conclusion

Ovine, Caprine, feline, rabbits and birds toxoplasmosis may be a substantial health problem in Diyala, and the cats play a major role.

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