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ORIGINAL ARTICLE

Serological Study of Prevalence Toxoplasmosis in Different Animals in Basra Province, Iraq

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Abstract

The current study is designed to identify *Toxoplasma gondii* at animals in Basra province - Iraq, (109) blood samples in all were collected from cows, sheep, goats and cats in urban domestic and Al-zubair abattoir (sheep n = 42, goats n = 19, cows n = 24, and cats n = 24) at Basra province were tested using a serological test to the identification of anti-Toxoplasmosis antibodies in animals during beginning of October 2022 until the end of April 2023, this research demonstrated that the overall infection rate was (19%), the highest rate observed in cats (33%), followed by sheep and goats (21%), the findings of the present investigation demonstrated that *T. gondii* IgG is present in each specimen that is infected.

Keywords: Parasites, Toxoplasmosis, Animals, Serological, Basra, Iraq

Introduction

Toxoplasma gondii is obligate intracellular protozoan parasite, may infect nearly all animals with warm blood including humans and domestic animals (Boughattas et al., 2011). The phylum Apicomplexa, which includes this protozoan, is known to infect at least one-third of human (World Organization for Animal Health — and OIE, 2017), (Rostami et al., 2020) *Toxoplasma gondii* has an asexual life cycle in intermediate hosts, such as all warm-blooded mammals, and a sexual life cycle in definitive hosts, felids (Al-Malki, 2021). Human toxoplasmosis can be contracted via tainted water and food, organ transplants, blood transfusions, and mother-to-fetus transfer through the placenta (Almeria & Dubey, 2021), it has been reported that one significant route for human illness is foodborne transmission, the main food borne transmission sources include fruits and vegetables, which are infected with oocysts from cat feces, undercooked meat harboring tachyzoites or tissue cysts, and unpasteurized milk containing tachyzoites (Vilares, 2019), infection occurs when animals consume grain, grass, or hay that has been contended by infected cats and feces rough the lymph nodes after passing via the small intestine before spreading throughout the animal's system via the bloodstream. A *Toxoplasma gondii* infection may cause early embryonic demise (Marõn-Garcõ et al., 2022), (Stelzer et al., 2019a) or mummification of the fetus (Nayeri et al., 2021), (Çulbasan et al., 2023). The point in pregnancy when the doe or ewe develops the disease has an impact on the outcome; the sooner the infection develops during the gestation period, the more serious the outcome (Dubey, 2009) besides the loss of progeny (Lv & Cui, 1994), (Dubey et al., 2020) milk production is also affected; it significantly harms local businesses and farmers' livelihoods, farm animals, particularly sheep and goats, are thought to be a major source of *T. gondii* infection in humans and other carnivores (Stelzer et al., 2019b). Iraq has the majority of the causes of infertility in tiny ruminants are unknown, although toxoplasmosis is expected to play an important function in decreases in productivity and reproduction (Ranucci et al., 2020), (Franc et al., 2018), although recent research conducted in Iraq has shown a substantial correlation relationship *Toxoplasma gondii* seropositivity and miscarriage in sheep and goats (Al-Barwary & Mikail, 2014), (Al-Dabagh et al., 2014).

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According to serological data, Anti-*T. gondii* IgM develops during acute primary infection with *Toxoplasma gondii* and typically declines within a few months, whereas *Toxoplasma gondii* IgG typically develops within one to two weeks after infection and peaks occur between one to two months (Alhamada et al., 2017), this antibody's existence indicates a prior illness, and it has been often utilized as a diagnostic indicator for chronic disease ever since. However, this antibody is still unable to differentiate between recent and previous illness, it has been developed a second IgG-based test to distinguish between an acute and chronic infection in an asymptomatic patient (Al Hamada et al., 2019), (Ybañez et al., 2020), additional testing using IgE and IgA exist during the first several weeks of illness, these antibodies are created, but they quickly dissipate, claim (Montaya, 2002), occurrence of IgG enables the identification of immunocompromised patients who are in danger for the rest of their lives. in order to cause a latent infection to reactivate.

Material and method

Collections of serum sample

In this study, which was conducted in the parasitological laboratory of the Technical Institute in the province of Basra, (109) samples of blood from urban domestic and Al-Zubair abattoirs were taken from sheep (n = 42), goats (n = 19), cows (n = 24), and cats (n = 24) into sterile screw-capped tubes. Each sample was identified, and the tubes were then left at room temperature in a sloping position before being concentrated at 10,000 rpm for 5 min to extract the serum.

Serological testing

According to manufacturer procedure commercial Onsite Toxo IgG/IgM Rapid Test (USA, catalog number Ro 234 C2 Rev. E3.0) was used to detect anti-*Toxoplasma gondii* IgG and IgM in animals' serum by utilizing *Toxoplasma gondii* specific antigens, the test can be completed in 10 min by minimally skilled persons without the use of laboratory equipment.

Statistical analysis

Chi-square analysis was executed to analyses the questionnaire data and see whether there was a correlation between the animal species, differentiations were considered to be statistically significant when the P- value was less than 0.05.

Ethical approval

Research was approved by the Basra Technical Institute, Southern Technical University (No. 7/27/7116, 2022/12).

Result and discussion

Toxoplasmosis in sheep is diagnosed based on clinical symptoms, tissue samples that show *Toxoplasma gondii* presence, or bodily fluids is very challenging (LOPES et al., 2007). As a result, the various serological assays may identify antibody reactions more accurately. The current investigation's findings confirmed that analyzed sheep serum from various Basra provincial locations had antibodies against *Toxoplasma gondii*. The results of the study showed a total infection in animals of 19% with *Toxoplasma gondii* through examining 109 samples from all animals (Table 1, Fig. 1). The results were higher than those recorded in Iran using nested PCR tests, which amounted to (11.6%) (Robert-Gangneux et al., 2012) and in Bangladesh (15.52%) (Buxton et al., 2007) while lower than what was found in West Africa (55.8%) (Bahreh et al., 2021).

Results showed the infection rate in cats was 33%, that lower than what was found (Sah et al., 2019) in the province of Baghdad (50%) and lower than what was found in three Mid-Euphrates governorates (Babylon, Najaf and Diwanyia) (47.4%) (Pereira et al., 2020), in Qater (28%) (Shatti, 2024), and in Indonesia (47.5%) (Al-Ramahi et al., 2010), the difference in toxoplasmosis prevalence between

Table 1. The total ratio of anti-Toxoplasma gondii antibodies (IgG) detection in the studied animals.

Animal	Total No.	Positive	
		No.	Percentage %
Cats	24	8	33%
Sheep	42	9	21%
Goats	19	4	21%
Cows	24	0.0	0.0%
Total	109	21	19%

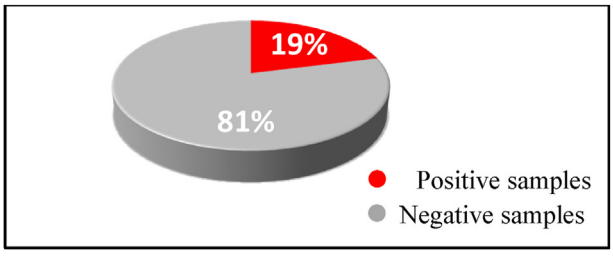

Fig. 1. The total ratio of toxoplasmosis in the studied animals.

studies may be due to various factors, such as the method used for diagnosis, or because the prevalence of parasites varies from year to year and from one area to another within the same country or depending on traditions, hygienic habits, and sanitary environment of people who were living there (Boughattas et al., 2016).

The investigation of the cow sera showed no infection when compared to the cats (33%), sheep and goats (33%) (Table 1, Fig. 2), that may be attributed to the fact that adult cows are often less susceptible to infection and they are not carriers of the parasite for a long time because of the rapid elimination of the parasite from their tissues (Subrata et al., 2021).

Toxoplasmosis is diagnosed by detecting two types of antibodies (IgM and IgG), each of which has a different interpretation. A positive IgM antibody test indicates that parasites may be present; when IgM is detected, animals may have recurrently been infected, while found IgG indicates a past infection (Radostitis et al., 2000, pp. 1317–1322). The findings of investigation demonstrated that *T. gondii* IgG is present in each specimen that is infected (Figs. 3 and 4).

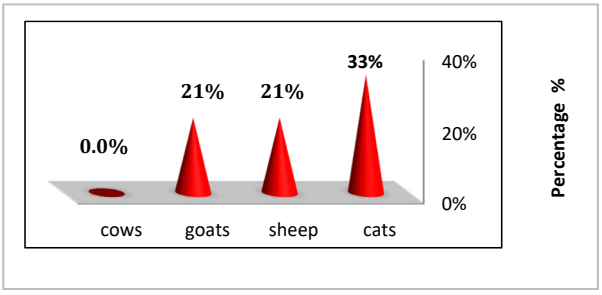

Fig. 2. The total ratio of toxoplasmosis according to species of the studied animals.

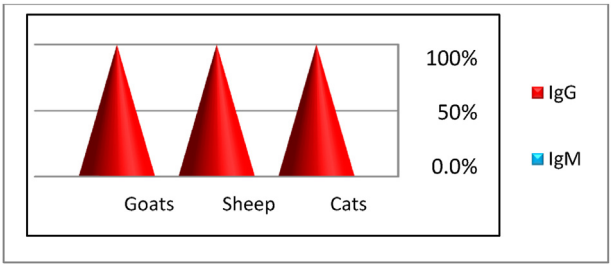

Fig. 3. The ratio of anti-Toxoplasma gondii IgM and IgG according to species of the studied animals.

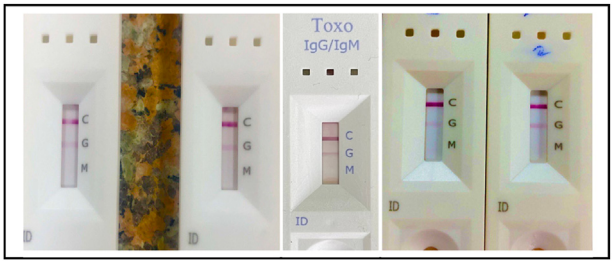

Fig. 4. Anti-IgG antibody detection in the studied samples.

Conclusion

The results of this study can be used by academics, medical experts, and veterinary specialists to implement control measures in the region, more have to be carried out to instruct individuals about toxoplasmosis, particularly among those who interact with cattle. The results suggest that more research is required to create techniques for avoiding infection in flocks and hence in the human population.

This research suggested using molecular approaches (PCR) to diagnose toxoplasmosis in different animals including mammals and birds, the teaching campaign needs to be improved and it should look into socioeconomic effects of the disease on Basra's residents.

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Ethical

Research was approved by the Basra Technical Institute, Southern Technical University.

Conflict of interest

No conflict of interest.

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