

Serological detection of *Toxoplasma Gondii* parasite for some animal breeders in Baghdad

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ABSTRACT

This study included investigating infections by *Toxoplasma gondii* parasite from different groups of men and some animals in various places in Baghdad in the year 2023, the study contrasted the relationship of infection to age and educational level of breeders and the type of their animals. The results showed that 84 blood samples from animal breeders detected the infection rate was 36.90%. In addition, there is a relationship between infection and age. The case study shows that the highest age for infection is 26-30 years, and the percentage was 66.66%. also, the study included examining 138 blood samples from animals divided into 68 sheep and 70 cows' infection parasite rate was also 41.30%, and through examining the collection of 120 samples of soil from different areas in the city of Baghdad, the percentage of infection with the *Toxoplasma gondii* parasite reached 32.50%, addition to the infection rate in cats was 50% by examining 112 stool samples collected from different areas in the same city. the importance of this study to detect the direct and indirect carriers of infections in *Toxoplasma Gondii* parasite women, through their husbands for some animal breeders in Baghdad

INTRODUCTION

The *Toxoplasma gondii* parasite is considered one of the causes of toxoplasmosis, characterized as one of the common diseases in the world between humans and animals at all stages of life. The rate of infection by *Toxoplasma gondii* is more than 40% of the world's population (Mohammed & Al-Janabi2019), and the risk of infection with this parasite is infecting pregnant women during pregnancy (Majeed & Abbas 2018), transmitted from the mother to her fetus through the placenta (Wassef & Abdel-Malek 2019) and causes miscarriage in pregnant women, Fetal malformation, or even serious disease symptoms in the fetus (Salih *et al.* , 2020).), and the greatest danger is that toxoplasmosis is without clinical signs in most of those infected (Abdullah & Al-Ubbyde, 2012). The statistics of epidemiology on the spread of this disease vary between countries of the world (Tonouhewa *et al.*, 2017), as an epidemiological study conducted in Saudi Arabia indicated that a percentage of 37% of pregnant women are infected with this disease (Wallander 2016). also, the study was conducted in Qatar in 2008, which showed that the highest prevalence rate was among people under 45 years of age, reaching 41.2%. (Guo *et al.*, 2016) As for Iraq, several studies and epidemiological research were recorded on the spread of the disease in Iraq, and the first person to record the disease in 1939 was the researcher Machattia, who isolated the parasite from the loose spleen of dogs. (Shallal 2017; Al-Kappany *et al.*, 2018 conducted an epidemiological study in which they explained that the infection rate reached 45.3% using the indirect hematological agglutination test (IHAT). A study conducted by the researchers Al-Sanjary& Hussein 2012, found that the infection rate among women of childbearing age reached 66.3%, and the highest infection rate was in the age group 20-24 years, with a percentage of 32.8%.

Saleem & Al-Samarai, 2018. also found that the rate of transmission of the parasite from the mother to the fetus varies during the months of pregnancy (Noori 2021). as found that transmission occurs at a rate of (15%) in the first three months of pregnancy, (30%) in the middle three months, and (60%) in the last three months of pregnancy Wassef & Abdel-Malek 2019. Pregnancy, meaning that the rate of parasite transmission increases as the months of pregnancy increase or advance, depending on the placental blood flow Madjeed *et al.*,2022; Saleem *et al.*, 2022.

Therefore, we tried to detect specific antibodies by ELISA in the serum of animal breeders and to find the relationship between toxoplasmosis and carriers of antibodies to cardiac lipids (anti-cardiolipin Abs) type IgM in animal breeders, the types of their animals, and the place where they are raised. As well as studying the effect of some factors, such as age, profession, raising animals (cats) and other types, and the extent of the spread of this parasite among sheep and cows that are in direct contact with humans, and because of their major role in transmitting the disease, as well as the extent of the spread of the parasite also in cat feces and soil, to find out the sources of infection with this disease. To plan services and health programs, especially to prevent and lass the spread of parasitic infections and health and economic damage to society.

Mattertal and method

Collecting and examining blood samples from animal breeders: the collection (82) samples of blood were collected from breeders of animals suspected of being infected with toxoplasmosis, ages ranging between (16-45 years) as mentioned in table 2, in different seasons of the 2023 year in various areas of Baghdad

Governorate as a show in table 4, At the same time, to record information about as the age, place of residence, type of animal raised, and the type of breeding used for the animal, where a blood sample was taken intravenously (4 ml) using a sterile syringe, and the sample drawn (blood) from the breeder was placed in special test tubes to leave for 10-30 minutes. In a water bath. Immediately after extraction, the samples are placed in the centrifuge for 5 minutes to isolate the serum. A kit produced by the Spanish company Bio Kit-Sa, called Toxo-Cell-late to detect the presence of specialized antibodies against the *Toxoplasma gondii* parasite in the patient's serum. The compound 2-mercaptoethanol (2ME) was used for positive samples in the latex agglutination test to diagnose the type of infection, acute or chronic. The ASO test (Anti-Streptolysin-O) was used, which depends on the interaction of antibodies present in the patient's serum with the antigen called Streptolysin-O, which covers the latex granules in the latex reagent for the test. A kit produced by the Spanish company Bio kit-SA was used in this test.

Collecting and examining animal blood samples: collected Blood samples from sheep and cows, 68 sheep, and 70 cows as shown in tables 3, by drawing blood from the jugular vein at a rate of (5 ml). The serum was isolated in the same manner mentioned above, and a direct agglutination test was performed on to detect animals infected with the toxoplasma parasite.

Collect and examine cat stool samples: collected 112 samples of cat feces from different areas in Baghdad city. used the Plastic bottles with tight lids to contain potassium dichromate solution 5% was placed in them as a preservative and examined in the laboratory using a flotation method using zinc sulfate (331 grams of 1 milligram of sulfate salt were dissolved Zinc in a liter of distilled water) by adding 1 gram of feces to 10 milliliters of warm water in test tubes suitable for placing in the centrifuge for minutes. Then, the sediment was taken and the process of suspending it in clean water was repeated, ignoring the suspended part. Finally, add 2 milliliters of zinc sulfate, to purify the precipitate, The tube was filled to the upper end with the solution and covered with a slide cover. Another deposition process was

performed at the same speed. Then the slide cover was transferred to a slide containing a drop of local iodine dye and was examined microscopically at two powers (10x) and (40x), noting that three smears were prepared.

Collecting and examining soil samples: collected 120 soil samples from different areas in a city in Baghdad and placed them in plastic bottles. The above-mentioned circumvention method was used to investigate the egg sacs (Oocysts) of the *Toxoplasma* parasite, due to the possibility of the presence of egg sacs in the soil to a large extent because the cats bury their feces in the soil, and if conditions are present the appropriate environment, including temperature and humidity, will cause to sporulate, and thus will remain resistant to environmental changes for approximately a year.

statistical analysis: The results were analyzed statistically using standard methods to calculate the average, standard deviation, number, ratio, and percentage. And using the Fisher-Freeman-Halton test to find differences between the groups. The results were considered significant at a probability level of 0.05 or less

Results and discussion

The table No. 1 shows the rate of infection by *Toxoplasma* parasite among breeders of animals of all types, ages, and locations, which is 36.90% through 84 blood samples, and the infection rate among animals combined as a whole reached 41.30% of the total number of 138 animals. The statistical analysis also shows significant differences between Blood samples of breeders and animals $p < 0.05$. This high percentage of infections among animal breeders includes active and latent cases of the disease, and if this percentage is compared to the infection rates found by Abdullah researcher (Abdullah & Al-Ubbyde2012) in a study on the prevalence of toxoplasmosis in animal breeders reached (43.6%), as did the researcher Abdullah (Abdulla 2021). who gave an infection rate of 56.6%. The researchers Rufash & Yousif 2018 indicated that the infection rate in females (66%) and in males 51% in animal breeders' patients in Mosul, so we find the incidence of this disease is constantly increasing year after year,

Table 1: the infection percentage of the - *Toxoplasma Gondii* of blood samples from breeders and all animals in the city of Baghdad

Sample type	No. of sample	No. of Infection	Infection %
animal breeders	84	31	36.90
All animals	138	57	41.30

Table no. 2 shows the relationship of the infection rate with the age of the animal breeder, where the highest infection rate was 66.66% in the age group 26-30 years, and the lowest infection rate was 25% in the age group 36-40 years as mention **Figure No. 1**. The statistical analysis showed that there were significant differences with age, $p < 0.05$. and this is consistent with the saleem study and the Abbas study in the Babylon and Salah al-Din governorates, and the Fatohi study (2018) in the Anbar governorate as the highest infection rate of 43.47% was recorded in the age group 33-26 years The reason is that this age is one of the appropriate stages for childbirth, and this leads to the danger of the disease because causes miscarriage due to the infection being transmitted through the umbilical cord to the fetus or causing birth defects if the disease occurs in the last stages of pregnancy from animals

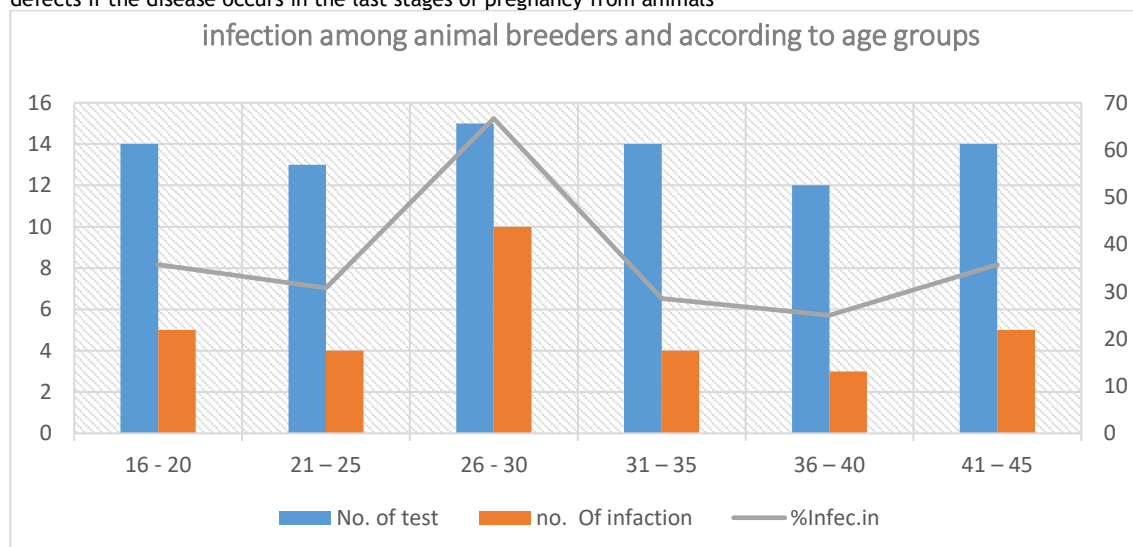


Figure No. 1. Percentage of *Toxoplasma Gondii* parasite infection among animal breeders and according to age groups

Table 2: Percentage of *Toxoplasma Gondii* parasite infection among animal breeders and according to age groups.

Age by years	No. of sample test	No. of Infection	%Infection
16 - 20	14	5	35.71
21 - 25	13	4	30.76
26 - 30	15	10	66.66
31 - 35	14	4	28.57
36 - 40	12	3	25
41 - 45	14	5	35.71
Total	82	31	

The results of the study showed a total infection in animals of 41.30% with *Toxoplasma gondii* as a show in Table 3 through examining 138 samples from all animals. The infection rate in sheep was 38.57% lower compared with higher cows in the rate of 44.11%. These results agree with Wilson's study, in the city of Tikrit (Wilson *et al.*, 2017). The high infection rate in cows and

sheep is due to the large presence of cats in breeding fields and pastures that shed egg sacs and animals ingest them Dubey 2010. Also, relying on fodder stored by sheep and cow breeders helps the spread of infection as a result of this fodder being exposed to rot and the presence of mycotoxins that work to suppress the immune system in these animals (Jawetz, M.2007)

Table 3. Percentage of infection with *Toxoplasma Gondii* for blood samples taken from animals in the different regions of Baghdad Governorate

Type sample	No. of sample	No. of Infection	Infection %
Sheep	70	27	38.57
Cow	68	30	44.11
Total	138	57	41.30

also shows that Table No. 4, by examining 120 soil samples from different areas in Baghdad Governorate, the total infection rate was 32.50%, and the highest infection rate, was 57.14% in the AL-

Dora region, while the AL-Mashtal region the lowest infection rate, 11.11%.

Table No. 4 The number of test and infected soil samples and the percentage of infection with the parasite - *Toxoplasma Gondii*, were collected from different areas in Baghdad Governorate

Area	No. of sample test	No. of Infection	% Infection
AL-Mashtal	18	2	11.11
AL-Kadhimiya	20	4	20.00
AL-Dora	21	12	57.14
Baghdad Al Jadeeda	19	6	31.57
AL-Ameria	24	12	50.00
Sadr City	18	3	16.66
Total	130	39	32.50

While in Table 5 shows the percentage of Infection among cats by examining 112 fecal samples from different areas of Baghdad Governorate. appearing the highest infection rate was 60.71% in

the AL-Dora area also, and the lowest in the AL-Mashtal area, at a rate of 16.66%, with statistically significant differences $P < 0.05$. The total infection rate among the examined cats reached 50.00.

fecal samples of examined and infected cats and the percentage of infection parasite

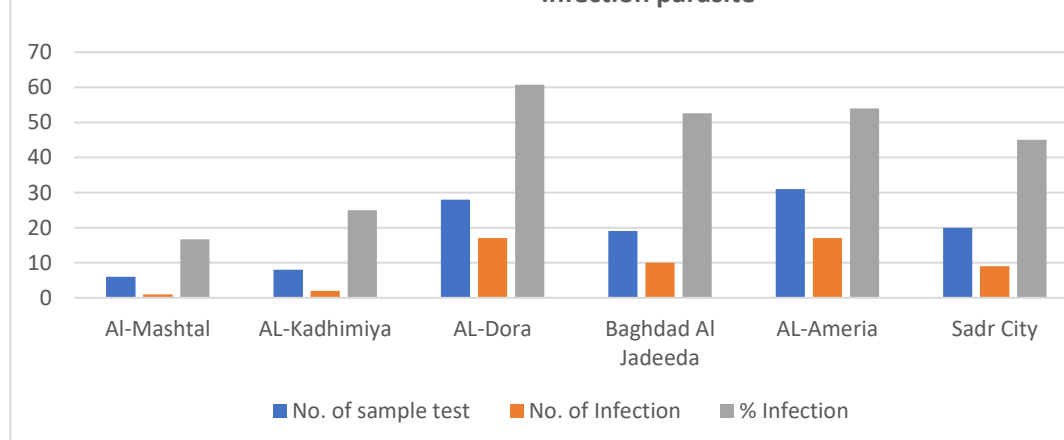


Figure No. 2. fecal samples of examined and infected cats and the percentage of infection with the parasite *Toxoplasma Gondii*.

As for the relationship of infection to the location of animals and animal breeders, appears that animal breeders are more susceptible to infection in one place and less in another. This is consistent with the Al-Bayati study in 2021 in Anbar Governorate. This is attributed

to the lack of healthawareness, lack of interest in individual and collective hygiene, and ignorance of public health rules (Al-Bayati *et al.*, 2021).

Table 5. The number of fecal samples of examined and infected cats and the percentage of infection with the parasite - *Toxoplasma Gondii*, which were collected from different areas in Baghdad Governorate

Area	No. of sample test	No. of Infection	% Infection
AL-Mashtal	6	1	16.66

AL-Kadhimiya	8	2	25.00
AL-Dora	28	17	60.71
Baghdad Al Jadeeda	19	10	52.63
AL-Ameria	31	17	54.00
Sadr City	20	9	45.00
Total	112	56	50.00

As well as indifference in their daily dealings with the sources of infection surrounding them, and the infection rate among animal keepers in areas where there is less cultural awareness is more than in civilized areas, and this is agreed with a study by Saleem in a different area from Baghdad city and a study by Sroka *et al.*, 2020. The cause directly concerns tissues and infected animals as high infection rates in cats and other ruminants (Saleem *et al.*, 2021). Also, breeders in uninhabited areas work in activities related to agriculture with jobs that require contact with hosts. As mentioned by Alobaidy *et al.*, 2022, Therefore, for animal breeders who work cleaning animal pens, cats, and ruminants, and direct exposure to soil in agriculture, exposure to the disease is more dangerous through the egg sac parasites.

With all of that, the reason for this increase may be due to poor health conditions, the large number of stray cats, the accumulation of dirt, the low degree of health education, and ignorance of the sources of infection for the disease and the attempt to avoid them, as it was noted through the study that a large number of women raise cats in their homes. They do not know that cats are the source President of the disease.

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