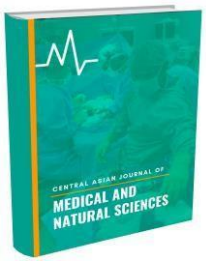

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Article

Comparison and Survey Study of Toxoplasmosis Between Karbala and Babylon Governorates

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Abstract: Language proficiency is a fundamental component of effective communication, particularly in educational and professional settings. In the context of Arabic grammar, understanding syntactic structures is essential for linguistic accuracy and fluency. The study of grammatical structures, particularly those related to verbs, remains a critical area of research in Arabic linguistics. Certain verb forms present unique challenges in interpretation and application, influencing both written and spoken discourse. While previous studies have explored various grammatical structures in Arabic, there is a lack of comprehensive analysis regarding the classification and syntactic functions of specific verb forms, leading to inconsistencies in linguistic interpretation. This study aims to analyze the syntactic structures of selected Arabic verb forms, identifying their grammatical roles and classification to enhance linguistic clarity and educational methodologies. The findings reveal key distinctions in verb classifications and their syntactic functions, highlighting patterns that contribute to a more precise understanding of Arabic grammar. These results provide valuable insights into the structural intricacies of the language. Unlike conventional studies that focus on broad grammatical categories, this research offers a detailed examination of specific verb structures, shedding light on their unique syntactic behaviors and functional variations. The study contributes to Arabic linguistic scholarship by refining grammatical classification systems, facilitating improved language instruction, and supporting more accurate syntactic analysis in both academic and professional contexts.

Keywords: Toxoplasmosis, Parasite, Abortion, Immunoglobulins

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1. Introduction

Unicellular obligate intracellular parasite Toxoplasma gondii. Apart from being one of the worldwide diseases that propagate opportunistically, particularly in immunocompromised people, this parasite causes toxoplasmosis, sometimes known as cat disease, which is one of the diseases shared between humans and animals. Depending on the diagnosis of anti-parasite antibodies (anti-Toxoplasma antibodies) in the serum, immunocompromised individuals—immunocompetent—have asymptomatic global infection rate ranging from less than 10% to about 90% [1].

Parasites can enter and attack all body cells with nuclei, multiply within them, and migrate to different organs, crossing many life barriers like the placenta, brain, and eye to spread infection. It outperforms the parasite immunologically because it avoids the antibody flood. The parasite causes scrofula by attacking trophoblast cells, which control the exchange of gases and nutrients between mother and fetus [2]. Pregnant women,

particularly in cases of infection during the first three months of pregnancy (first trimester) following the parasite's ability to pass through the placenta, run a risk for the disease; subsequently, the fetus may suffer from different congenital abnormalities, which could cause abortion [3].

The Toxoplasma gondii parasite appears in three phases during its life cycle (rapid vegetative phase, slow vegetative phase, and egg sac). The tachyzoite phase, also known as the trophozoite phase, proliferative form, feeding form, or endozoite phase, is the stage of the parasite. This phase is characterized by its crescent shape, a tapered front end, and a circular back end, with dimensions of 2 x 6 microns, and contains various organelles. Inclusion bodies, and the nucleus is usually centrally located. This phase does not have a visible means of movement but moves by means of gliding, twisting, undulating, and rotating. This phase is often accompanied by acute injury [4]. Bradyzoite's slow vegetative phase is a slow-reproducing phase and differs from the rapidly reproducing phase in its more elongated and thinner shape and its nucleus located near the posterior end, in addition to containing 1-3 rhoptries that are denser than those in the fast phase, and the dimensions of this phase are 1-3 x 5-8.5 microns. This stage reproduces through the process of internal budding (endodyogeny) [5]. Oocyst egg sacs are produced by sexual reproduction within the epithelial cells of the intestine of cats. The immature sacs are excreted in the feces and are unsporulated oocysts, spherical in shape (10 x 12 microns) and surrounded by a two-layer wall [6]. The egg sacs of the Toxoplasma gondii parasite are highly resistant to freezing and are not killed by chemical treatments [5]. The parasite's life cycle consists of two stages: the sexual stage, the gametogony, which occurs in the epithelial cells of the intestines of the cat family, and the asexual stage, the schizogony, which occurs in the intermediate hosts that include both species, including humans and birds. Cats become infected with the parasite by eating meat containing tissue cysts, in addition to eating the reservoir hosts. Parasites such as rats, mice, and birds, while humans can become infected when they eat food or water contaminated with sporulation egg sacs excreted in the feces of infected cats or eat meat that has not been cooked well and contains tissue cysts. In addition to the possibility of infecting humans through blood transfusions or organ transplants from infected people, as well as the transmission of the parasite from the infected pregnant mother to the fetus [7].

Congenital toxoplasmosis is caused by primary infection with the mother's Toxoplasma gondii parasite during pregnancy, which transmits the 14 rapidly replicating stages to the fetus. Transmission is lowest in the first three months of pregnancy (5-25). Last three months of pregnancy have the highest transmission rate, around 90% [8]. The balance between some immune factors and their genes (like how cells move, how chemicals move, their receptors, and adhesion molecules) and the parasite's virulence factors affects these ratios. Understanding this balance may shed a lot of light on the pathogenesis of the parasite in the pregnant mother and its transmission to the fetus [9].

The aim of the study was to assess the levels of IgG and IgM in women who suffered from previous abortions. The study also aimed to compare the prevalence of toxoplasmosis between the governorates of Karbala and Babylon.

2. Materials and Methods

1. Collection of specimens: The samples were collected from Babylon Teaching Hospital for Women and Children and the Obstetrics and Gynecology Hospital in Karbala for the period from (27/09/2024) until (14/1/2025).

2. Eliza Procedure: Agar gel plates were used in this test to estimate the concentration of the immunoglobulins (IgG and IgM). One plate contains 12 holes, the capacity of each of which is 5 microliters, and according to the method of Mancini, the plates were taken out of the refrigerator and left for five minutes at the same time. After taking the previously prepared blood serum out of the freezer and leaving it in the lab

until it thaws, put 5 microliters in each hole using a micropipette from each serum sample, leave it for 10 minutes for the serum to be completely absorbed, then tightly close the plates with their covers and place them in a container with wet cotton for 48 hours in a dark place. After that, the antibody spreads radially in a circle as its concentration increases. Then, using a special eyepiece graduated 18 from 1 to 20 millimeters, the agar plate ring diameter is measured and compared. With the antibody concentrations in the test kit tables

3. Examination of samples: Blood samples were taken from women who experienced recurrent abortion and who had abortions and were referred to the hospital for the intent of examination and treatment.

4. Immunological tests: Using an enzyme-linked immunosorbent assay (ELISA), blood samples taken from women were investigated to gauge immunoglobulin (IgG and IgM) level.

Statistical Analysis

As would be seen in a scatter plot, the data were statistically examined using descriptive statistics and correlation coefficients, which gauge the strength of the linear relationship between two interval- or ratio-scale variables (as opposed to categorical or nominal-scale variables).

3. Results and Discussion

Shani found that IgG, IgM, C3, and C4 titers rose while IgA did not when compared to the control group, see Table 1. We noted from the table that the levels of immunological criteria IgG and IgM have raised from the usual ranges of these women [10]. Through the tables mentioned in our study, we observed an increase in the immune levels of immunoglobulin IgA and IgM when infected with Toxoplasmosis in women, and this is consistent with the Ermanno's study who mentioned that the levels of IgA antibody in patients with acute acquired toxoplasma infection rises later than does the level of IgM antibody, see Table 2 and Table 3 [11]. The current findings demonstrated an elevation in the titers of IgG and IgM antibodies in the sera of infected women compared to the titers in control sera, see Table 4. This indicates established levels of immunoglobulins, specifically the roles of IgG and IgM during Toxoplasma gondii infection, as corroborated by Mandlle et al, who indicated that immunoglobulins of classes IgG, IgM, IgA, and IgE are synthesized in response to infection, see Table 5 [12], [13]. Found a link between infection and a strong humoral response involving IgM, IgG, IgA, and IgE. B-cells are necessary for vaccination-induced immunity against virulent tachyzoites (Table 6), according to Sayles et al. [14]. Since IgG can remain detectable for decades, elevated IgG levels indicate that the person has had toxoplasmosis, see Table 7 [10].

Elevated IgM levels may signify a current or recent infection, as this immunoglobulin generally remains detectable for six to nine months post-infection and is instrumental in diagnosing acute infections see Table 8 and Table 9 [10].

Table 1. Levels of immunoglobulins in women who suffered from previous abortion in Karbala governate.

IgG (397.000- 765.000)	IgM (6.000-21.000)
1361.2	170.1
1277.4	174.7
1220.6	168.8
1203.1	165.9
1172.5	166.1
1183.7	155.7
1335.9	151.4
1341.1	153.6

1282.7	144.2
1130.3	141.7
1134.3	162.3
1261.8	143.4
1234.4	186.3
1233.3	160.3
1472.6	173.7
1118.7	132.9
1235.2	150.1
1121.1	155.3
1025.9	130.2
1263.4	144.6
1127.8	147.6
1337.7	175.9
1256.9	160.2
1246.4	154.3
1282.3	162.7

Table 2. Levels of immunoglobulins in women who suffered from previous abortion in Babylon governate.

IgG (397.000- 765.000)	**IgM (6.000-21.000)**
1313.5	150.3
1391.1	159.7
1328.8	148.6
1325.5	144.2
1436.4	146.2
1432.6	139.8
1322.4	152.1
1255.3	149.9
1266.7	1334.5
1330.6	1343.4
1261.2	140.1
1451.3	129.4
1278.7	149.8
1384.9	149.5
1429.3	137.6
1672.1	151.8
1762.7	144.1
1415.3	145.6
1286.1	133.1
1347.4	123.4
1412.5	129.3
1551.1	150.2
1398.5	137.2
1318.2	140.1
1429.8	156.2
1324.3	144.5

Table 3. Distribution of Toxoplasma Gondi in Karbala Governate.

No. of negative (Aborted woman)	No. of positive (Aborted woman)	% of positive woman
4	25	80

Table 4. Distribution of Toxoplasma gondii in Babylon Governate.

No. of negative (Aborted woman)	No. of positive (Aborted woman)	% Of positive woman
3	27	70

Table 5. Age distribution of Toxoplasma gondii infected individuals in Karbala governate.

Age /years	No. of infected women	%
18-24	8	32%
27- 33	12	48%
35-40	5	20%
total	27	

Table 6. Age distribution of Toxoplasma gondii infected individuals in Babylon governate.

Age /years	No. of infected women	%
18-24	10	37%
27-33	14	51%
35-40	3	11%
Total	27	

Statistical Analysis Of The Data:

Table 7. Paired Samples Statistics.

Std. Error Mean	Std. Deviation	N	Mean
19.29525	96.47623	25	1234.4120 IgG (397.000- 765.000) Kerbala Pair 1
24.43958	122.19791	25	1392.0800 IgG (397.000- 765.000) Babylon
2.76495	13.82474	25	157.2800 IgM (6.000-21.000) Kerbala pair 2
66.20607	331.03037	25	239.4440 IgM (6.000-21.000) Babylon

Table 8. Paired Samples Correlations.

Sig.	Correlation	N
0.891	- 0.029	25 IgG (397.000- 765.000) Kerbala & Pair 1
0.145	- 0.300	25 IgG (397.000- 765.000) Babylon
		IgM (6.000-21.000) Kerbala & Pair 2
		IgM (6.000-21.000) Babylon

Table 9. Paired Samples Test.

P - Value	d f		Paired Differences 95% Confidence Interval of the Difference		Std. Error Mean	Std. Deviation	Mean
			Upper	lower			
0.000	24	-4.994	-92.50318	-222.83282	31.57366	157.86828	-157.66800 IgG (397.000- 765.000) Pair 1

0.233	24	-1.225	56.29995	-220.62795	67.08854	335.44272	Kerbala - IgG (397.000-765.000) Babylon -82.16400 IgM (6.000-21.000) Pair 2 Kerbala - IgM (6.000-21.000) Babylo

4. Conclusion

We can conclude from our study the following:

1. T. gondii infection may be regarded as a potential risk factor for abortion.
2. The multivariate logistic regression analysis indicated that owning a cat at home or in the vicinity, the intake of undercooked or raw meat, and a history of blood transfusions were statistically significant risk factors correlated with toxoplasmosis seroprevalence in pregnant women.
3. Increased levels of immunoglobulins (IgM, IgG) in women afflicted with toxoplasmosis.

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