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RESEARCH ARTICLE

EVALUATION OF THE SEROPREVALENCE OF THE COCCIDIAN PARASITE *TOXOPLASMA GONDII* IN AL-AJAILAT REGION, LIBYA.

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ABSTRACT

Background: *Toxoplasma gondii* is a tissue-cyst-forming coccidian, ubiquitous, and an obligate intracellular parasite where felids are the definitive hosts with complex life cycles. There are three infective stages of *T. gondii* which exist in the environment. Tachyzoites, crescent to oval shape, are seen in acute infection and are transmitted through the placenta from mother to fetus, blood transfusion, or organs transplantation *T. gondii* can also be transmitted not only between intermediate and definitive hosts (sexual cycle) but also between intermediate hosts via carnivorous (asexual cycle). **Objectives**: The aim of this study is to determining the seroprevalence of txoplasmosis among different ages and genders. **Methods:** Blood samples were collected from 630 persons, samples collected from different locations in Al-Ajailat region from different ages, and genders. Samples were examined for the presence of antibodies of *T.gondii* infection by ELISA bioassay test. **Results:** Out of 630 tested samples, the seropositivity by ELISA IgM and IgG recorded (22.5%) and (12.4) among (16-26) group, (27.5%) and (17.6) among (27-37) group, (50.0%) and (17.6) among (38-48) group, and (0.0%) and (11.8) among (49-59) group and (38-48) group, (0.0%) and (6.7) among (≤60) group. On the other hand, seropositivity by ELISA IgM and IgG recorded (25.0%) and (41.2) among males and (75.0%) and (58.5) among females. Moreover, Seropositivity by ELISA IgM and IgG were (50.0%) and (17.6) among singles and (50.0%) and (82.4) among marred samples. The seropositivity IgM and IgG recorded (50.0%) and (50.0%) In perversely aborted group**,** and the same rates in non-aborted ones. Seropositivity by ELISA IgM and IgG recorded (00.0%) and (10.0) for congenital malformation syndrome group and (100.0%) and (90.0%) for no congenital malformation group. **Conclusion:** The highest prevalence of *T. gondii* infection recorded in the age groups of (38-48) followed by (27-37) years estimating 39.5%, and 20.5%, respectively with (x^2= 52.59**). The seropositivity among males and females recorded 40% and 60% respectively with (x^2= 9.21**). On the other hand, the seropositivity among singles and married recorded 25% and 75% respectively with (x^2= 3.72*). The seropositivity among women who had previously abortion recorded 50% with (x^2= 0.2^{NS}) while the prevalence in congenital malformation recorded 9.1% with (x^2= 17.74**).

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INTRODUCTION

Toxoplasma gondii is an obligate intracellular protozoan parasite and is distributed globally. It was estimated that one third of the world's human population is exposed to the threat of this parasite **(**Montoya and Liesenfeld, 2004). *T. gondii* is an opportunistic pathogen, which is generally asymptomatic in the immunocompetent individual. However, the infection of this parasite can result in severe complications or even death in people who are severely immunocompromised, such as patients with neoplastic disease, organ transplantation, and AIDS (Conrath *et al,* 2003). Since its first description in rodent from North Africa, by Nicolle and Manceaux in1908 (Nicolle and Manceaux 1908), the parasite was progressively recognized as the agent of a widespread zoonosis. However, its entire life cycle was definitively understood only in the late 1960s (Hutchison *et al*, 1969). Infection with the protozoan parasite *T gondii* is one of the most common parasitic infections of man and other warm-blooded animals. It has been found worldwide from Alaska to Australia.

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Nearly one-third of humanity has been exposed to this parasite. In most adults it does not cause serious illness, but it can cause blindness and mental retardation in congenitally infected children, blindness in persons infected after birth, and devastating disease in immunocompromised individuals (Dubeyand and Beattie, 1988). The majority of horizontal transmissions to humans is caused either by the ingestion of tissue cysts in infected meat or by the ingestion of soil, water, or food contaminated with sporulated oocysts derived from the environment or, less frequently, directly from felid feces (Cook *et al*., 2000). The prevalence of *T.gondii* infection in a representative sample of the US population was determined, the authors tested sera from participants in the third national health and nutrition examination survey (1988-1994) for immunoglobulin G antibodies to *T.gondii* .Of 27145 persons aged ≥12 years, 17658(65%) had sera tested. The overall age-adjusted seroprevalence was 22.5%; among women aged 15-44 years, seroprevalence was 15.0% age-adjusted seroprevalence was higher in the Northeast (29.2%) than the South (22.8%), Midwest (20.5), or West (17.5%). In multivariate analysis, risk for *T.gondii* infection increased with age and was higher among persons who were foreign-born and persons with low educational level (Jeffery *et al*., 2001).

Toxoplasmosis is caused by infection with the protozoan parasite *T.gondii*. Acute infection in pregnant women can be transmitted to the fetus and cause severe illness (e.g., mental retardation, blindness, and epilepsy). An estimated 400-4000 cases of congenital toxoplasmosis occur each year in USA. Of the 750 death attributed to toxoplasmosis each year, 375 (50%) are believed to be caused by eating contaminated meat, making toxoplasmosis the third leading cause of food borne death in this country **(CDC, 2000)** but because toxoplasmosis is not nationally reportable disease, the true magnitude of disease is not known. The annual economic impact of toxoplasmosis in USA is estimated to be 7.7 billion (Buzby and Roberts., 1996). Although *Toxoplasma* infections are associated either with eating contaminated meat or with ingesting oocysts passed in the feces of cats, no laboratory test that can determine the origin of *Toxoplasma* infection in a specific person and whether it was associated with food borne, cat borne, or soil borne transmission. Epidemiologic studies of the transmission of toxoplasmosis have been hindered to determine the origin of isolated infection (CDC, 2000). Only 10–30% of new toxoplasmosis infections in humans cause clinical symptoms. Symptoms may range from subclinical lymphadenopathy to the fatal central nervous system disease as well as other pathologies inimmunodeficient patients. In some congenital infections, some symptoms such as seizures and mental retardation may occur (Weiss and Dubey 2009).

Serum samples of 300 psychiatric patients in Alrazi neuropsychiatry hospital, Tripoli, and 300 control volunteers, were examined for the presence of antibodies of *T.gondii* by using (ELISA) and latex test. Results showed that the seropositivity rate of *T.gondii* IgG antibodies by latex was 61.7% in patients and 46.7% in control samples, while by ELISA was 50.3% in patients and 33.0% in control samples (Azbida, 2009). A study in Benghazi conducted by Kassem and Morsy, 1991 cleared that, 369 pregnant women with manifestation suggesting toxoplasmosis was tested for anti- *T. gondii* antibodies by the IHA test. The overall positivity was (47.4) and the high rate of positivity was among the old age group meant (63.3).

On the other hand, a total of 1000 pregnant women, (569 from Tripoli medical center and 431 from Al-Jala maternity hospital) were tested to detect anti- *T. gondii* antibodies. The seropositivity at Tripoli medical center was (41.30 %) while at Al-Jala maternity hospital was (47.80 %) by using LHA test (t3oxo latex) and ELISA (Magrhi *et al* 2003). *T. gondii* antibodies were found in (51.6 %) of 2000 adult males and in (43.4 %) of 300 adult females (Khder and Elnageh 1987). The main risk factors associated with *T. gondii* infections were animal breed, age, and the presence of cats in the farm. Seroprevalence was higher in animals older than three years and in purebred versus mixed breed animals (Hotea *et al,* 2021). Mousavi-Hasanzadeh *et al.* (2020) concluded that, the mean prevalence of *T. gondii* infection in the age groups of 20-40, and ≥ 40 years was estimated to be 24.7%, and 40.8%, respectively. Ibrahim, 2013 studied the total prevalence of *T. gondii* specific IgG in south areas and found that, the total prevalence recorded (23.6%), Ghat region contained the highest seroprevelance (30.5%), followed by Wadi Alajal region (24.9%), Wadi Alshati region (24.0%) and Sabha city (19.6%). The seroprevelance in hemodialysis patients of toxoplasmosis was (51.1%). Infection with *T. gondii* seems mainly associated with different geographic features and the presence of cats in the environment, low hygiene water systems and livestock that are mostly dependent on outdoor drinking and grazing. There was no significant association between IgM and age grouping ($\chi 2 = 6{:}660$, $P = 0{:}840$ nor for IgG ($\chi 2 = 8{:}136$, $P = 0{:}43$) (Abid Ali.*et al,* 2021). Out of 200 investigated samples, 91(45.50%) were *T. gondii* seropositive while 109(54.50%) were seropositive. There was insignificant difference between age groups of patients concerning *T. gondii* infection rates (P=0.05). The toxoplasmosis rate was (35.92 %) in males and (55.67 %) in females, with a significant difference (P=0.004). according to the water source risk factor, the highest rate of infection recorded in persons using untreated water and who eating unwashed fresh vegetables or fruit. Cats contact has shown to be an important risk factor for infections (Zaed *et al*., 2021). Al-Feitury, 2014 estimated the percentage of the *T. gondii* infection, in Tripoli-Libya among school's students in the age group (6-18). The study was conducted on (1037) blood samples which were collected from 18 schools from various regions of Tripoli City using (ELISA) test. Percentage of the IgG anti-bodies recorded (17.6%). Therefore, the present study was carried out to highlight the risk factors associated with *T. gondii* infection in Libya.

MATERIALS AND METHODS

Samples collection and preservation: A total number of 630 persons from different ages, and genders were included in this study. Single blood samples were taken from each person in this investigation. Blood samples were collected aseptically in a sterilized 5ml disposable tubes. Samples were labeled and delivered in 10c cool containers to the laboratory. The sera were separated by centrifugation for 5 minutes at 3000 R.P.M, and stored at 20c until tested.

Analysis of samples

ELIZA test: Blood samples were obtained and serum was separatedand stored at -20°C until processing. The following kits were available:

- Toxoplasma IgG ELISA kit from BIOTEC Laboratories Ltd. (UK).
- Toxoplasma IgM ELISA kit from BIOTEC Laboratories Ltd. (UK).
- Instructions supplied by the manufacturers were followed exactly as described.

Epidemiological assessment (questionnaire): A questionnaire was designed to assess some of the main risk factors which may influence the prevalence of Toxoplasma infection among people involved in this investigation. Data from the questionnaire were harvested by interviews with each participant according his (here) medical and social circumstances.

Statistical analysis: Data obtained from the serological tests and questionnaire were analyzed statistically. All statistical analysis was undertaken using software for biostatistics analyses (SPSS).

RESULTS

The present study aimed to evaluate the serroprevalence of toxoplasmosis among people in different ages and genders. The study also evaluated some parameters to estimates a probable risk factors.

The frequency and percentage distributions of the results of ELISA tests according to the age are shown in Table (1).

Table 1. Seroprevalences of *T. gondii* with respect to age by Elisa Test

Age (Year)	Elisa $X^2=^{**}52.59$			
	Positive		Negative	
	No.	%	No.	%
26-16	30	15	187	43.5
27-37	41	20.5	72	16.7
38-48	79	39.5	110	25.6
49-59	20	10	31	7.2
≥60	30	15	30	7
Total	200	100	430	100

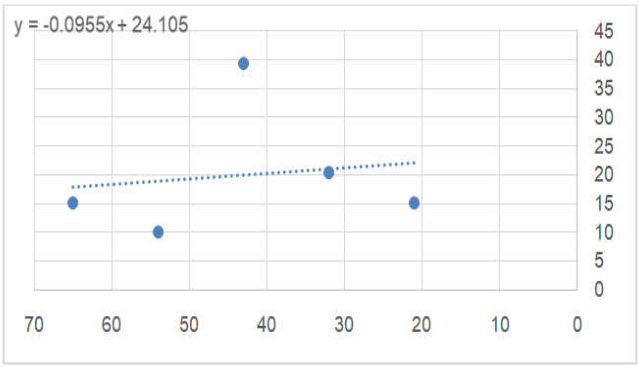

Fig. 1. Regression between Seroprevalences of *T. gondii* and age

The first group (26-16): A total of 217 tested samples, the seropositivity by Elisa recorded30 (15.0%) while, the seronegativity recorded 187 (43.5%) respectively.

The second group (27-37): A total of 113 tested samples, the seropositivity by Elisa recorded 41 (20.5%) while, the seronegativity recorded 72 (16.7%) respectively.

The third group (38-48): A total of 189 tested samples, the seropositivity by Elisa recorded 79 (39.5%) while, the seronegativity recorded 110 (25.6%) respectively.

The fourth group (49-59): A total of 51 tested samples, the seropositivity by Elisa recorded 20 (10.0%) while, the seronegativity recorded 31 (7.2%) respectively.

The fifth group (≤60): A total of 60 tested samples, the seropositivity by Elisa recorded 3 (15.0%) while, the seronegativity recorded 30 (7.0%) respectively.

Table 2. Seroprevalences of *T. gondii* with respect to age using both of the IgM and IgG of Elisa Test

Age (Years)	Elisa IgM $X^2=^{**}17.16$				Elisa IgG $X^2=61.70^{**}$			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
26-16	09	22.5	208	35.3	21	12.4	196	42.6
27-37	11	27.5	102	17.3	30	17.6	83	18
38-48	20	50	169	28.6	69	40.6	120	26.1
49-59	00	00	51	8.6	20	11.8	31	6.7
≥60	00	00	60	10.2	30	17.6	30	6.5
Total	40	100	590	100	170	100	460	100

Data presented in table (2) shows Seroprevalences of T. gondii with respect to age using both of the IgM and IgG of Elisa Test

Table 3. Seroprevalences of *T. gondii* and sex by Elisa Test

Gender (Sex)	Elisa $X^2=^{**}9.21$			
	Positive		Negative	
	No.	%	No.	%
Male	80	40	120	27.9
Female	120	60	310	72.1
Total	200	100	430	100

Table 4. Seroprevalences of *T. gondii* and sex using both of the IgM and IgG of Elisa Test

Gender (Sex)	Elisa IgM $X^2=0.89^{NS}$				Elisa IgG $X^2=9.55^{**}$			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Male	10	25	190	32.2	70	41.2	130	28.3
Female	30	75	400	67.8	100	58.8	330	71.7
Total	40	100	590	100	170	100	460	100

As shown in table (4) the seropositivity by Elisa IgM and IgG recorded 10 (25.0%) and 70 (41.2%) while, the seronegativity by Elisa IgM and IgG recorded 190 (32.2%) and 130 (28.3%) for males respectively.

On the other hand, seropositivity by Elisa IgM and IgG recorded 30 (75.0%) and 100 (58.8%) while, the seronegativity recorded 400 (67.8%) and 330 (71.7%) by Elisa IgM and IgG for females respectively

Table 5. Seroprevalences of *T. gondii* and marital status by Elisa Test

Marital Status	Elisa $X^2=3.72^{*}$			
	Positive		Negative	
	No.	%	No.	%
Single	50	25	170	39.5
Married	150	75	260	60.5
Total	200	100	430	100

Data presented in table (5) shows that, a total of 630 tested samples, the seropositivity by Elisa recorded 50 (25.0%) and 150 (75.0%) for singles and marriedcases while, the

seronegativity recorded 170 (39.5%) and 260 (60.5%) for singles and married respectively.

Table 6. Seroprevalences of *T. gondii* and Marital Status using both of the IgM and IgG of Elisa Test

Marital Status	Elisa IgM X^2=4.*27				Elisa IgG X^2=30.56**			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Single	20	50	200	33.9	30	17.6	190	41.3
Married	20	50	390	66.1	140	82.4	270	58.7
Total	40	100	590	100	170	100	460	100

As shown in table (6) the seropositivity by Elisa IgM and IgG recorded 20 (50.0%) and 30 (17.6%) while, the seronegativity by Elisa IgM and IgG recorded 200 (33.9%) and 190 (41.3%) for singles respectively. On the other hand, seropositivity by Elisa IgM and IgG recorded 20 (50.0%) and 140 (82.4%) while, the seronegativity by Elisa IgM and IgG recorded 390 (66.1%) and 270 (58.7%) for married persons respectively.

Table 7. Marital Status of tested persons

Marital Status	Gender (Sex)			
	Male		Female	
	No.	%	No.	%
Single	100	50	120	27.9
Married	100	50	310	72.1
Total	200	100	430	100

It could be seen from table (7) that, out of 630 tested samples, 100 (50.0%) and 120 (27.9%) were single males and females respectively while, 100 (50%) and 310 (72.1%) were married males and females respectively presented in table (10) shows the relation between Congenital Malformations and *T. gondii* infection studying 2 groups.

Table 9. Seroprevalences of *T. gondii* and abortion using both of the IgM and IgG of Elisa Test

Abortion	IgM X^2=02^{NS}				IgG X^2=0.15^{NS}			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Yes	10	50	140	48.3	50	50	100	47.6
No	10	50	150	51.7	50	50	110	52.4
Total	20	100	290	100	100	100	210	100

Yesgroup: Out of 70 tested samples, the seropositivity by Elisa recorded 10 (9.1%) while, the serronegativity recorded 60 (30.0%).

No group: Out of 240 tested samples, the seropositivity by Elisa recorded 100 (90.9%) while, the serronegativity recorded 140 (70.0%).

Table 9. Seroprevalences of *T. gondii* and Congenital malformations using of Elisa Test

Congenital Malformations	Elisa X^2=17.74**			
	Positive		Negative	
	No.	%	No.	%
Yes	10	9.1	60	30
No	100	90.9	140	70
Total	110	100	200	100

Data presented in table (11) shows the relation between Congenital malformations and *T. gondii* infection by Elisa IgM and IgG studying 2 groups.

Yes, group: Out of 70 tested samples, the seropositivity by Elisa IgM and IgG recorded 00 (00.0%) and 10 (10.0%) respectively, while the seronegativity by Elisa IgM and IgG recorded 70 (24.1%) and 60 (28.6%) respectively.

Table 8. Seroprevalences of *T. gondii* and abortion by Elisa Test

Abortion	Elisa X^2=0.58^{NS}			
	Positive		Negative	
	No.	%	No.	%
Yes	50	45.5	100	50
No	60	54.5	100	50
Total	110	100	200	100

Data presented in table (8) shows the relation between abortion and *T. gondii* infection studying 2 groups.

Yes, group: Out of 150 tested samples, the seropositivity by Elisa recorded 50 (45.5%) while, the serronegativity recorded 100 (50.0%).

No, group: Out of 160 tested samples, the seropositivity by Elisa recorded 60 (54.5%) while, the serronegativity recorded 100 (50.0%).

Table 9. Seroprevalences of *T. gondii* and abortion using both of the IgM and IgG of Elisa Test

Abortion	IgM X^2=02^{NS}				IgG X^2=0.15^{NS}			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Yes	10	50	140	48.3	50	50	100	47.6
No	10	50	150	51.7	50	50	110	52.4
Total	20	100	290	100	100	100	210	100

Data presented in table (9) shows the relation between abortion and *T. gondii* infection by Elisa IgM and IgG studying 2 groups.

Yes, group: Out of 150 tested samples, the seropositivity by Elisa IgM and IgG recorded10 (50.0%) and 50 (50%) respectively, while the seronegativity by Elisa IgM and IgG recorded140 (48.3%) and 100 (47.6%) respectively.

No, group: Out of 160 tested samples, the seropositivity by Elisa IgM and IgG recorded10 (50.0%) and 50 (50.0%) respectively,while the seronegativity by Elisa IgM and IgG were 150 (51.7%) and 100 (52.4%) respectively.

Table 10. Seroprevalences of *T. gondii* and Congenital malformations using of Elisa Test

Congenital Malformations	Elisa X^2=17.74**			
	Positive		Negative	
	No.	%	No.	%
Yes	10	9.1	60	30
No	100	90.9	140	70
Total	110	100	200	100

Data presented in table (10) shows the relation between Congenital Malformations and *T. gondii* infection studying 2 groups.

Yes group: Out of 70 tested samples, the seropositivity by Elisa recorded 10 (9.1%) while, the serronegativity recorded 60 (30.0%).

No group: Out of 240 tested samples, the seropositivity by Elisa recorded 100 (90.9%) while, the serronegativity recorded 140 (70.0%).

Table 11. Seroprevalences of *T. gondii* and Congenital malformations using both of the IgM and IgG of Elisa Test.

Congenital malformations	IgM X2=6.23**				IgG X2=13.36 **			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
Yes	00	00	70	24.1	10	10	60	28.6
No	20	100	220	75.9	90	90	150	71.4
total	20	100	290	100	100	100	210	100

Data presented in table (11) shows the relation between Congenital malformations and *T. gondii* infection by Elisa IgM and IgG studying 2 groups.

Yes, group: Out of 70 tested samples, the seropositivity by Elisa IgM and IgG recorded 00 (00.0%) and 10 (10.0%) respectively, while the seronegativity by Elisa IgM and IgG recorded 70 (24.1%) and 60 (28.6%) respectively.

No group: Out of 240 tested samples, the seropositivity by Elisa IgM and IgG recorded 20 (100%) and 90 (90.0%) respectively, while the seronegativity by Elisa IgM and IgG were 220 (75.9%) and 150 (71.4%) respectively.

DISCUSSION

The present study targeted (630) blood samples from different locations, ages and genders in **Al-Ajailat** region. Samples were examined for the presence of antibodies of *T.gondii* infection by ELISA bioassay test.

As show on in table (1) and figure (1), high significance was recorded between age and *T. gondii* infection regardless to the gender among the targeted samples, the highest prevalence recorded 39.5% in the age group (38 - 48 years), while the lowest prevalence recorded 10% in the age group (49– 59 years) with X^2= 52.59**. The influence of patient age on various features of toxoplasmosis has previously studied in several times and countries. Holland 2009 concluded that, the age at which *T gondii* infection occurs in different populations is related to socioeconomic factors and studies suggest that ocular toxoplasmosis is a more severe disease at the extremes of age. The prevalence of ocular involvement is markedly different between individuals with congenital and those with post-natally acquired infections. Even among those with post-natally acquired infections, age influences the risk and timing of ocular involvement. The severity of toxoplasmosis (in terms of lesion size, location and associated inflammation) is also affected by patient age at the time of initial infection or recurrence.

According to our finding, female toxoplasmosis is higher than males. A soil exposing job conditions specially farming and livestock husbandry may be a possible reason of higher infection rate among women specially in the rural communities where our investigation took place. With regard to the special characters of the Libyan society, women are more exposure to the pollutant conditions when shopping, working and handling vegetables, livestock animals, meat and other home needs. Also eating undercooked meat and barbeque during the social journeys may be a possible reason for *T. gondii* infection. Fan *et al*. 2012reported that, no significant gender difference in seroprevalence was found between boys (62.6%, 77/123) and girls (63.6%, 84/132) (OR = 1.1, 95%CI =0.6–1.7, p = 0.9). The older age group of 10 years had insignificantly higher seroprevalence (69.9%, 58/83) than that of the younger age group of 8 year olds (67.7%,21/31) (ORs = 1.1, 95% CI = 0.5–2.7, p = 0.8). this finding is supporting our data thus the younger age group (16-26) had a low seroprevalence (15%) so, an older males and females could be exposed to a significantly riskcircumstances. Seropositivity by Elisa recorded 80 (40.0%) for males and 120 (60.0%) for females with X^2= 9.21**. The seropositivity by Elisa recorded 50 (25.0%) and 150 (75.0%) for singles and married respectively X^2= 3.72*. It could be seen that, marred persons recorded relatively higher *T. gondii* infection compared with singles. On the other hand, Women in childbearing age are more susceptible to acute infestation with *T. gondii* (johns *et al* 2001).Another possible explanation is that, home activities are in somehow related to women, so marred women are more exposed to infection. On the other hand, women are more exposure to health problems and parasitic infection in the cases of abortion, blood transfusion and childbirth. Out of 150 tested samples, the seropositivity by Elisa recorded 50 (45.5%) while, the serronegativity recorded 100 (50.0%) with X^2 = 0.58^{NS}.

The seropositivity by Elisa IgM and IgG recorded 10 (50.0%) and 50 (100%) respectively among women who had previously abortion. According to the present data the rat of toxoplasmosis among women who had previously abortion is insignificant. May be because a considerable heathy considerations are established during pregnancy and childbirth operations. On the other hand, women who were interviewed did not give an additional information about the reasons of the abortion and whether toxoplasmosis was the real factor behind the abortion or not. These results are in agreement with those of (Pfaff, *et al*. 2007). Nowakowska *et al*., 2006 reported that, Among the total of 4916 pregnant women (aged 19–46 years, mean 26.7 years), 2030 (41.3%) had Toxoplasma IgG antibodies. The prevalence of specific IgG increased significantly with age, from 37.4%(488 ⁄ 1304) in the group aged 19–24 years to 55.1%(65 ⁄ 118) in the group aged 40–46 years (p <0.001)**.** these results are also in line with ours. Data presented in table (10) shows the relation between Congenital Malformations and *T. gondii* infection. Out of 70 Congenital malformation individuals tested samples, the seropositivity by Elisa recorded 10 (9.1%) while, the serronegativity recorded 60 (30.0%). On the other hand, the seropositivity by Elisa recorded 100 (90.9%) while, the serronegativity recorded 140 (70.0%) in no congenital Malformation individuals with X^2=17.74**.

Montoya, 2004 reported that, *Toxoplasma gondii* is one of the few protozoan parasites that cross the placenta and infect the fetus. Consequences of congenital infection range from spontaneous abortion or prematurity to asymptomatic or overt congenital toxoplasmosis. It could be seen from our data that; toxoplasmosis may be a considerable reason for Congenital malformation. On the other hand, Onadeko *et al* 1996 found that, the prevalence rates for the pregnant women ranged from 72.5% to 88.8% with an overall rate of 75.4%; whilst for the postpartum women, the prevalence rates ranged from 75.0% to 94.4% with an overall rate of 80.5%. The toxoplasma antibody titres of the sera from the live-born babies as well as stillbirths and congenitally malformed babies ranged from 1:16 to

1:1024. Nogareda *et al*., 2013 reported that, in pregnant women, primary infection can cause congenital toxoplasmosis resulting in severe malformations in the newborn, they also concluded that, for women aged 30 years the modelled incidence decreased from 7·5/1000 susceptible women in 1980 to 3·5/1000 in 2000. In 2010 the incidence was 2·4/1000. The predicted incidence and prevalence for 2020 was 1·6/1000 and 27%, respectively.

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