

Prevalence of *Toxoplasma gondii* among immunocompromised patients (hemodialysis and cancer) in the province of Thi-Qar-Iraq

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Abstract:

The current study was conducted in Thi-Qar province to investigate of *Toxoplasma gondii* prevalence among renal dialysis and cancer patients by using anti-Toxoplasmosis IgG and IgM by ELISA also the study determined of some factors that may affected the prevalence of infection, such as age, sex, marital status, place of residence and a number of chemical dosing that exposed to it cancer patient or the number of times the dialysis for renal dialysis patients.

The results of the current study showed that the prevalence of toxoplasmosis in Thi-Qar province in both renal dialysis and cancer patients and control group were 28% and 36% and 24% respectively. recorded results of Enzyme Linked Immunosorbent Assay ELISA test results for a positive antibody IgG in both renal dialysis and cancer patients and control group 25% , 30% , 22% respectively. As for the IgM antibody study did not record any positive result in both categories of the study (dialysis and cancer) only control group was 2%. The result of IgG & IgM together in renal dialysis and cancer and control group 3%, 6%, 0% respectively.

The study found that the increase in the number of times the dialysis increased incidence of infection prevalence it was 25.53% for patients who conducted the dialysis treatment more than six times and 16.66% for patients who have less than six times. For factor chemical dosing show high infection rates in patients who have been exposed to more than one dose of a chemical 37.63% As for those who were not exposed to any chemical dose was ratios have 14.29% .

Keywords: Toxoplasmosis, Hemodialysis, immunocompromised patients, Lipid profile , ELISA Test.

Introduction:

Toxoplasma gondii, the causal agent of toxoplasmosis, is an important water and food borne protozoan parasite ubiquitous throughout the world . Approximately one-third of the world's population is infected by *T. gondii* (Nelson and Williams, 2014). This parasite occurs as a result of the transmission of one of its three phases of intermediate and final intermediates, Oocysts, with contaminated food, water, or tissue transferred by infected meat or through the rapid propagation of Tachyzoites transmitted to the fetus by the infected mother (Montoya and Remington, 2008). (Immunity in two kinds, Innate and Acquired Immunity, plays an important role in controlling the infection and giving the individual immunity against its return. However, the immune system

may work to limit the infection and convert the parasite into dormite cyst inside the tissue. This condition may be dangerous because in the case of an immune system malfunction The parasite is a oppertunistic behavior that moves from chronic to acute. The parasite returns to the active form and thus returns the infection (Joyanson, 1999).

Immune deficiency patients, especially those with cellular immunity deficiency , are at risk of worsening chronic disease and sudden onset of illness. Patients with cancer, lymphoma, Transplant Recipient who take immunosuppressive therapy, hemodialysis patients with chronic renal failure, and AIDS patients have a lack of cellular immunity, which makes them susceptible to several diseases (Yazar *et al.*, 2003). For several decades, this parasite has been found to be rampant

in patients with lymphoma and organ transplant patients and is mainly concentrated in people with AIDS (Ferreira and Borges, 2002).

Materials and methods:

Collection of information:

The study was conducted on patients with immunodeficiency. The study included two groups (renal dialysis patients and cancer patients) of different age groups and both sexes. One hundred blood samples were collected from renal dialysis patient and one hundred samples others were collected from cancer patient collected from Al-Hussein Educational Hospital and Al-Haboubi Hospital from the beginning of October 2015 until the end of 2016. Questionnaire included (age, marital status, sex, blood type, place of residence).

ELISA test:

This assay was performed by using two kinds of ELISA kits. First, for the detection of IgG and the second for the detection of IgM specific antibodies against *T. gondii* antigens in the patient’s serum (Humen Gesellschaft für Biochemica und Diagnostica, Germany).

Results:

Study of parasite spread:

The results of the immunological diagnosis of both classes of dialysis patients and cancer patients in Thi- Qar governorate for the period from the beginning of October 2015 to the end of March 2016 showed that among the 100 blood samples collected from renal dialysis patients, 28% samples were positive for the ELISA test, and 72% negative samples, , 36% were positive, and 64% were negative among 100 blood samples collected from cancer patients. In comparison with the results of 50 blood samples collected from non-two groups, the comparison group (healthy) 12 positive samples for ELISA testing, 24% and 38 negative samples 76%.

Table 1: *Toxoplasma gondii* in patients with cancer and renal dialysis patients compared to comparison group (healthy).

Groups	Anti-Toxoplasma IgG & IgM					
	Positive		Negative		Total	
	Number	%	Number	%	Number	%
Control	12	24	38	76	50	100
Heamodialysis	28	28	72	72	100	100
Cancer	36	36	64	64	100	100
Statistical analysis	$\chi^2 = 17.392$					
	Tab. χ^2 : df,2; α , 0.05 = 7.9941					

Distribution of infection with *Toxoplasma gondii* by type of antibody using ELISA:

Table (2) shows the ELISA test for 100 serum samples for both classes of dialysis patients and cancer patients, as well as 50 samples for the comparison group (healthy) for the detection of toxoplasmosis by type of immunosuppression.

In the three categories, dialysis patients, cancer patients and comparison group were 28%, 36%, and 24%, respectively. The rates of infection in both study groups were dialysis patients and cancer patients were higher than the comparison group (healthy).

In the control group IgG 22% and IgM 2% and IgG & IgM 0% showed a significant difference at $P < 0.05$. In the dialysis group, IgG 25% ,IgM 0% and IgM & IgG 3% had a significant difference. Level $P < 0.05$. In the cancer class, IgG, IgM ,IgG&IgM 30%, 0% and 6% respectively had significant differences at $P < 0.05$.

Table 2: Distribution of toxoplasmosis by type of antibody using ELISA.

Group	Antibodies	Anti-Toxoplasmosis IgG&IgM					
		Positive		Negative		Total	
		Number	%	Number	%	Number	%
Control	IgG	11	22	39	78	50	100
	IgM	1	2	49	98	50	100
	IgG&IgM	0	0	50	100	50	100
Statistical analysis	$\chi^2=8.33$; $df=2$						
Hemodialysis	IgG	25	25	75	75	100	100
	IgM	0	0	100	100	100	100
	IgG&IgM	3	3	97	97	100	100
Statistical analysis	$\chi^2=17.286$; $df=2$						
Cancer	IgG	30	30	70	70	100	100
	IgM	0	0	100	100	100	100
	IgG&IgM	6	6	94	94	100	100
Statistical analysis	$\chi^2=16$; $df=2$						

Tab. χ^2 : $df,2$; $\alpha, 0.05 = 5.9914$

The number of positive cases was 24 samples and 29.27% of the 82 samples in the city, while the number of positive cases in the countryside was 4 samples and 22.22% of the 18 samples. The highest incidence was 25.84% among married people and 45.45% for non-married adults. $P < 0.05$ was also observed. The number of cases of infection increased by 24.53% of the 94 samples of patients who underwent The renal dialysis was six times higher and the incidence rate was 1-6 times

16.66%. The results were significant with $P < 0.05$.

Table 3: Distribution of toxoplasmosis by influencing factors (renal dialysis patients)

ELISA Test					
Case	Non-infected sample	%	Infected sample	%	Total
1- Living region					
Countryside	14	77.78	4	22.22	18
City	58	70.73	24	29.27	82
Statistical analysis $\chi^2=14.286$; $df=1$					
2- Marital Status					
Married	66	74.16	23	25.84	89
Unmarried	6	54.55	5	45.45	11
Statistical analysis $\chi^2=11.571$; $df=1$					
3- number of dialysis					
1-6	2	33.33	4	16.67	6
6<	70	74.47	24	25.53	94
Statistical analysis $\chi^2=14.286$; $df=1$					

Tab. χ^2 : $df,1$; $\alpha, 0.05 = 3.8414$

For the place of residence, the results showed a significant difference at $P < 0.05$. The number of positive cases was 33 samples and 45.21% of the 73 samples inhabited by the city, while only 3 samples and 11.11% out of 27 samples from the countryside. The highest infection rate among married couples was 37.90%, while unmarried men did not have a conical parasitic parasite infection. Therefore, there was a significant difference at $P < 0.05$. In the chemical dose effect factor, we observed an increase in the number of patients exposed to more than one chemical dose. Of 93 The total number of positive

cases was 35 (37.63%). Patients who were not exposed to any of the seven samples were only 14.2% and the results were significant at $P < 0.05$.

Table 4: Distribution of toxoplasmosis by influencing factors (cancer patients)

ELISA Test					
Case	Non-infected sample	%	Infected sample	%	Total
1- Living region					
Countryside	24	88.89	3	11.11	27
City	40	54.79	33	45.21	73
Statistical analysis		$\chi^2=25$; df=1			
2- Marital Status					
Married	59	62.10	36	37.90	95
Unmarried	5	100	0	0	5
Statistical analysis		$\chi^2=31.22$; df=1			
3- Chemical dose					
Yes	58	62.37	35	37.63	93
No	6	85.71	1	14.29	7
Statistical analysis		$\chi^2=32.11$; df=1			

Tab. χ^2 : df,1 ; α , 0.05 = 3.8414

Discussion:

The current study, conducted by the ELISA immunosorbent assay, showed that the incidence of congenital disease in both classes of patients with dialysis and cancer patients plus the comparison group (healthy) was 28.36% and 24%, respectively. Abd -Aziz and Zghair (2014) conducted in Baghdad on patients with renal dialysis where rates were high 88.88% compared with the comparison group (healthy) 11.11% and

also agreed with the study of Abbas *et al.* (1996) that included patients infected with washing and Nimir *et al.* (2010) completed on cancer patients and AL-Kalaby (2008) completed in the province of Najaf on patients with renal dialysis where the rates of infection in all studies reported high compared to the comparison group (healthy). The study also showed that the highest rate of infection in the category of cancer patients by 36% followed by dialysis group by 28% and comparison group 24%. The rates of infection were high in the two categories of disease compared to the comparison group. The study coincided with each of the studies of AL-Kalaby. (2008) and Solhjo *et al.* (2010) and Nissapatorn *et al.* (2011), which were included on dialysis patients, which showed that the infection rates were high compared to the comparison group (healthy). The study also agreed with Nimir *et al.* (2010) and Ghasemian (2007). Both studies have shown that the rates of infection in cancer patients are higher than the comparison group.

Where renal dialysis patients are suppressed in cellular and intercostal immunity and thus decrease in T-Cell and the patient becomes unable to recover the weakness of the immune system (Schollmeyer and Bozurt, 1988). In patients with cancer tumors the use of treatment inhibits the immune system helps to develop or reactivate the conical parasite (Israelki and Remington, 1993).

IgG antibody was observed in all study groups compared to other antibodies. This is consistent with Yazar *et al.* (IgG) and IgM (1.73% and 56.09%), The study differed with Nuha (2011) in Dhi Qar, which showed IgM 40% and IgG 11%.

IgG increases more than IgM because it may remain for a long time and increase, indicating an initial infection, reactive activation, or persistent response to underlying injury (Remington *et al.*, 2001). The study showed that there was a relationship between the length of washing and treatment with positive parasitic infection, where the infection in patients who had repeated washing more than six times and above the proportion of infection (25.53%), but the lower

rate of infection (16.66%), With Abdul-Aziz (2014), who noted that as washing times increased, the ELISA for toxoplasmosis was increased and also with Abbas et al. (1996) in Egypt and Ocak *et al.* (2005) & Yazar *et al.* (2003)) in Turkey.

Where patients with chronic renal failure gradually get cellular and amniotic immunity and get a lack of T-Cell cells and thus are susceptible to several diseases (Schollmeyer and Bozkurl, 1988)

In patients with cancer, the study showed that the increase in chemotherapy given to the patient increases the incidence of parasite. This is because taking chemical doses for a long time reduces or weakens the functioning of the immune system and thus the patient is susceptible to several diseases.

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