

SEROPREVALENCE OF TOXOPLASMA GONDII AMONG CANCER PATIENTS IN BASRAH PROVINCE/IRAQ

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ABSTRACT

The current study was done in Basrah province during the period from January 2017 to September 2017, the aim of the study was to determine the prevalence of anti-Toxoplasma gondii antibodies among cancer patients whom under chemotherapy using latex agglutination and ELISA tests, and explored on the association of T. gondii seropositivity with gender, age and type of cancer in Basrah province. The results show that 56 (37.3%) were positive by latex test and 13 (23.2%), 46(82.1%) were positive by IgM and IgG respectively There is no statistically significant difference between genders but there are significant role between IgM positive and age.

KEYWORDS: Toxoplasma gondii, cancer patients, Basra province, Iraq.

INTRODUCTION

Toxoplasma gondii is a worldwide protozoan parasite that can infect virtually all warm-blood animals including humans, It is opportunistic pathogen in patients who are immunocompromised that having cancer disease.^[1]

Toxoplasmosis is still a risk on human health in the world and it is still uncontrolled until now due to it's a complex lifecycle which include a sexual cycle in epithelial cells of felines intestine and asexual cycle in birds & Mammals including humans.^[3,2] Each stages of the life cycle have several virulence factors, give it the ability to manipulate the immune system and establish a chronic infection, also there is no approved human vaccine exists against toxoplasmosis until now.^[4,5]

Most infections in immunocompetent patients are usually asymptomatic, but the risk of toxoplasmosis in its ability to differentiate from a rapidly replicating (tachyzoite stage) during acute infection into non-immunogenic (bradyzoite stage) contained in tissue cysts, these bradyzoite cysts can reconvert back to tachyzoites in years later causing serious pathology such as encephalitis and pneumonia and leading to death if a person becomes immunocompromised such as AIDS or neoplastic disease (leukemia and lymphoma) where the infection can be devastating in brain and eye, as well as in congenitally infected fetuses and newborns may cause severe disease.^[6,7]

Little is known about the seroprevalence of *T. gondii* infection in patients who are immunocompromised especially cancer patients, so the aim of the present study was to determine the frequency of serologic evidence of *T. gondii* infection among immunocompromised patients including leukemia and lymphoma and other type of cancer patients whom under chemotherapy in Basra province.

MATERIAL AND METHODS

The study is carried out in Basrah province south of Iraq, blood samples were collected from Center of Oncology and Specialized Hematology in Basrah, during May 2017 to September 2017, The work was done in Immunology Laboratory in Biology department/ College of Education for Pure Sciences / University of Basrah.

Blood collection

A total of 150 venous blood samples were collected from different type of cancer patients whom under chemotherapy out of them (45 Chronic myeloid leukemia (CML), 10 Chronic Lymphoblastic Leukemia (CLL), 9 Acute Lymphoblastic Leukemia (ALL), 5 Acute myeloid leukemia (AML), 3 Mantle cell Lymphoma (MCL), 12 Non Hodgkin's Lymphoma (NHL), 7 Acute promyelocytic Leukemia (APL), 8 Hodgkin's Lymphoma (HL), 17 Multiple myeloma (MM), 11 Myeloproliferative neoplasia (MPN), 3 prostate cancer (PSA), 19 breast cancer and 1 brain cancer), For each patient complete information were taken using designed questionnaire.

After taking the consent patients and ensure that all patients have undergone chemotherapy, three ml of venous blood was taken from patients and drawn into gel tube containing clot activator for serum separation, and left for about 10 minutes, then the tubes transported into

centrifuge (which fixed on 3000 rpm for about 5 minutes), the sera were separated and stored at -20° to use in subsequent latex and ELISA testes.

Serological tests to detection of *T. gondii* infection

All sera samples were tested serologically directly by the commercial kits (Toxo-latex-Spinreact) for detection of *T. gondii* specific antibodies by latex test, then only positive cases were tested by ELISA to detection anti-Toxoplasma IgG and IgM antibodies by using the commercial kits (Toxo IgM, Human, Germany), (Toxo IgG, Human, Germany) and the manufacturer instructions were followed for all testes. The optical density for all samples and for the cut off sample was read. (The ratio greater than cut-off indicated positive sample, ratio lower than cut-off indicated a negative sample).

Statistical analysis

The data obtained was analyzed using Chi-square test to find out the significant differences among the data, the differences were recorded as significant whenever the probability (p) was ≤ 0.05 .

RESULTS

The result showed that 56 (37.3%) of cancer patients were positive by latex test and 13 (23.2%), 46 (82.1%) were positive by IgM and IgG respectively (Table1).

According to the type of cancer the highest percent of positive latex was seen in brain cancer (100) whereas the less percent (12.5 %) was seen in HL. The high percent of IgM positive (66.6%) were seen in APL, whereas the high percent of IgG positive (100%) were seen in CLL, ALL, MCL. NHL, APL, PSA and Bra. Cancer (Table 2).

According to the gender the prevalence of positive latex in both male and female of cancer patient was (35.8%). but the highest percent of IgM was seen in female (25%), whereas the IgG in both male and female were equal, according to the age the highest positive latex (54.5%) were seen in (41-50) age group, and less percent (29.4%) in (61 and above) but a significant effect ($P < 0.05$) wasn't observed, and the highest percent of IgM (42.8%), were seen in age groups (21-30) with significant effect and highest percent of IgG (100%) was seen in (10-20) respectively (Table 3).

Table 1: seroprevalence of Toxoplasmosis among cancer patients.

Testes	Patients		
	%	Positive	No.
Latex	37.3	56	150
IgM	23.2	13	56
IgG	82.1	46	56
IgM & IgG	16	9	56

Table 2: Toxoplasmosis among cancer patients under treatment in relation with type of cancer.

Type of cancer	Total No. Exam. Toxo latex +ve & %			Total No. Exam. IgM +ve & %			Total No. Exam. IgG +ve & %			Total No. Exam. IgM & IgG +ve & %		
	No.	Ve+	%	No.	Ve+	%	No.	Ve+	%	No.	Ve+	%
CML	45	20	44.4	20	5	25	20	15	75	20	3	15
CLL	10	5	50	5	2	40	5	5	100	5	2	40
ALL	9	3	33.3	3	0	0	3	3	100	3	0	0
AML	5	3	60	3	1	33.3	3	2	66.6	3	0	0
MCL	3	2	66.6	2	0	0	2	2	100	2	0	0
NHL	12	2	16.6	2	0	0	2	2	100	2	0	0
APL	7	3	42.8	3	2	66.6	3	3	100	3	2	66.6
HL	8	1	12.5	1	0	0	1	0	0	1	0	0
MM	17	3	17.6	3	0	0	3	2	66.6	3	0	0
MPN	11	4	36.3	4	1	25	4	3	75	4	1	25
PSA	3	1	33.3	1	0	0	1	1	100	1	0	0
Bre. Cancer	19	8	42.1	8	2	25	8	7	87.5	8	1	12.5
Bra. cancer	1	1	100	1	0	0	1	1	100	1	0	0
Total	150	56	37.3	56	13	23.2	56	46	82.1	56	9	16
(P ≤ 0.05)												

Table 3: Toxoplasmosis among cancer patients in relation with gender and age

		Total No. Exam. Toxo latex +ve & %			Total No. Exam. IgM +ve & %			Total No. Exam. IgG +ve & %			Total No. Exam. IgM & IgG +ve & %		
		No.	Ve+	%	No.	Ve+	%	No.	Ve+	%	No.	Ve+	%
gender	Female	75	28	35.8	28	7	25	28	23	82.1	28	5	17.8
	Male	75	28	35.8	28	6	21.4	28	23	82.1	28	4	14.2
Age	10-20	5	2	40	2	0	0	2	2	100	2	0	0
	21-30	20	7	35	7	3	42.8	7	6	85.7	7	1	14.2
	31-40	28	11	39.2	11	2	18.1	11	8	72.7	11	2	18.1
	41-50	22	12	54.5	12	3	25	12	11	91.6	12	2	16.6
	51-60	41	14	34.1	14	3	21.4	14	10	71.4	14	2	14.2
	61 >	34	10	29.4	10	2	20	10	9	90	10	2	20
(P ≤ 0.05)													

DISCUSSION

Toxoplasma gondii is an opportunistic parasite that usually not pathogenic in a healthy host but may cause an infection in immunocompromised patients, although the most frequent cause of an opportunistic infection is immunodeficiency due to HIV infection, but the immunodeficiency induced by anticancer treatment cannot be ignored.^[8,9]

The neoplastic disease (leukemia and lymphoma) and other type of cancer have form large percentage of Iraq community especially in Basra province and the causes of these disease remain largely unknown^[10], and there are no studies within reach about the percentage of toxoplasmosis in immunocompromised patients, so, this study focused on prevalent of toxoplasmosis in this group of patients.

Recently, studies in the world have indicated a possible association of *T. gondii* infection with leukemia, lymphoma and other different types of cancer such as lung, cervical, endometrial, breast and brain cancer.^[11,12] The present study suggest a high prevalence of *T. gondii* antibodies among cancer patients this agree with several studies which indicating that the seroprevalence of toxoplasmosis is significantly higher in patients with cancer than non-cancer patients In Egypt,^[13] In china,^[14] in Saudi Arabia.^[15]

According to the gender the present study agree with^[16] who found that IgM in female highest than male in in chronic myeloid leukemia and acute myeloid leukemia patients, but^[17] found no significant differences between sex in Iran. This difference variation between male and female seroprevalence of anti-*Toxoplasma* antibody may be due several factor such as sex differences in immune responses, social activities and different occupational, and differences in exposure of toxoplasmosis infection.^[18]

According to the age the highest anti-*Toxoplasma* IgM and IgG antibody were seen in age group 21-30 and 10-20 years respectively, the exact reason for this finding is unclear. However, this disagree with.^[17,15]

It has become clear that there is a relationship between the prevalence of toxoplasmosis and cancer patients, Our finding indicated that cancer patients under immunosuppressive condition should not disregard them, and this parasite can cause life-threatening disease in immunocompromised patients, where can present as hepatitis, and chorioretinitis, encephalitis, lethal meningoencephalitis, focal lesions of the CNS and less commonly,

myocarditis or pneumonitis.^[19,20,21] and this high case-fatality rates result if these syndromes are not recognized and treated promptly, and the severe infection among these patients due to the low level and the efficiency of the immune system have as a result of cancer and receiving chemotherapy and that leads to reactivation of chronic infection but also can result from acute infection.^[22,23]

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