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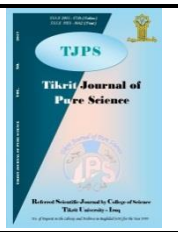

Investigation of the incidence of Toxoplasmosis and cytomegalovirus in patients with thalassemia

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Abstract

Blood transfusions was considered as a source of a number of infections in some cases if the donor is infected, especially the virus and parasitic ones, in which the blood is the main route of transport if it is contaminated from the environment or during the transport. The current study included testing (250) blood samples for Thalassemia patients and (100) blood samples from healthy subjects as a control , The samples included with (134) males and (116) females with mean age of (13.87 ± 9.37) years for patients and (14.08 ± 6.45) years for control samples. And for the period from February 2017 to July 2017 And patients who were diagnosed by specialists in Ibn al-Atheer teaching Hospital for Children in Nineveh Governorate. The study showed a high rate of infection with CMV infection in male thalassemia patients (42%) while in females (36.1%), the highest rate of infection was in the age group 16 years and above and the increase in the number of blood transfusions increases the rate of infection (46.5%) in patients received blood twice or more per month and decreased to (37.6%) in patients who receiving blood once a month. The highest rate of Toxoplasma infection was found in females (18.3%) while in males (15.6%). The highest age group (6-10) years showed the highest percentage of infection (19.1%). Blood infected patients with T. gondii recieving blood twice per month formed (21.9%) while those receiving blood one time per month decreased to (15.9%) .

Introduction

Blood transfusions is a source of a number of infections in some cases if the donor is infected with some serious diseases, especially the virus and parasitic ones, in which the blood is the main way of transport if it is taken from infected patients or contaminated from the environment or during the transfer, Toxoplasma gondii causes Toxoplasmosis, a member of the Sarcocystiadae family[1] . It is one of the parasites mandatory intrusions within the cells and affects most warm blooded animals such as aquatic animals and marine mammals and affects humans and this parasite was classified with in family of the catfish or cat the first host [2]. The parasite is transmitted by eating contaminated food bags parasite, also eating meat from infected animals, Or by contamination from infected cats, and was vertically transmitted from infected mother to fetus or through blood transfusion, It was detected for the first time after the transfer of the parasite through blood transfusion before more than 40 years white blood cells were transfered from the Grantor infected with leukemia, to a person of acute leukemia [3].

The term cytomegalovirus includes the Greek Cytomegalovirus two syllables cyto means the cell, Megalo great means due to the virus, viruses classified within the Herpes group in the family under Betaherpesvirus, The human pathogen is known as human cytomegalovirus , It is the largest virus in the herpes viruses that infect human, This virus infects a large group of the world's population and are particularly discouraged patients immunologically especially those with cellular immune deficiency. The spread of the virus ranges between (40-90) of the world communities with a high prevalence of serous% in developed countries[4]. The virus is transmitted through blood transfusions in thalassemic

patients, and evidence suggests that white blood cells in the peripheral blood is latent sites for it as it is observed that reducing the white blood cells count can prevent infection with this virus, injury of the monocytic cells of peripheral white blood cells and cells lining the circulatory system of infected host leads to the transfer of CMV virus to other locations in the host body[5].

Amis of study

The aim of the study is to detect the prevalence of Toxoplasmosis and cytomegalovirus among patients with thalassemia in thalassemia center Ibn- Alatheer hospital in Ninavha Governorate.

Patients and methods

All (250) patients with thalassemia are treated with blood transfusions periodically, Blood samples were taken and the following serological tests were performed using standard methods.

Serological tests

Detection of antibodies against *Toxoplasma gondii* using ELISA Technique

The ELISA technique was used to investigate the incidence of *Toxoplasma gondii*.

Princple of the test:

The Toxoplasma IgM assay is based on the principle of the capture of these immunoglobulins and subsequent identification of these, which are specific, making use of their ability to bind an antigen conjucated to peroxidase . The capture is performed using monodonal antibodies bound to the solid phase (microtitration strips). The antigen is composed of purified and inactivated *Toxoplasma gondii* antigen .

Detection of antibodies against Cytomegalovirus Using (ELISA) Technique.

Princple of the test:

The Cytomegalovirus IgM assay is based on the principle of the capture of these immunoglobulins and subsequent identification of those, which are specific, making use of their ability to bind an antigen conjugated to peroxidase. The capture is performed using monodonal antibodies bound to the solid phase (microtitration strips). The antigen is composed of purified and inactivated Cytomegalovirus antigen .

Statistical analysis:

The results showed that the calculated values were less than the calculated statistical value of 1.96 at the level of significance (p=0.05). The Kramer coefficient was used to find the correlation between the variables and the main variable (type of infection). Data was also entered into Minitab v. 14 and then perform statistical data analysis using T-test.

Results and Discussion

Table (1): Prevalence of toxoplasmosis in thalassemia patients and control samples in relation to their sexes.

sex	Sample Type	Infect with Toxoplasmosis		Non-infected		The total number and percentage	Z value	P value
		number	%	number	%			
male	patients	21	15.6	114	84.4	135 (%100)	0.233	P=0.05
	controls	13	43.3	17	56.7	30 (%100)		
female	patients	21	18.3	94	81.7	115 (%100)		
	controls	9	45	11	55	20 (%100)		

Table (1) shows the prevalence of toxoplasmosis in thalassemia patients and control samples and their relation to the patient's sex. The number of male patients infected with the toxoplasmosis was 21 with a prevalence rate of 15.6% The percentage of infection among females Thalassemia patients was 18.3%, the number of infected women was 21, with infection rate among off 45%. The number of infected control female was (9) Which is higher than the incidence of male control sample. Statistical analysis showed that the association between *Toxoplasma gondii* and thalassemia was non significant, with the value of the test (0.233).

Table 2: Rate of toxoplasmosis in Thalassemia patients and controls at different age groups

Age group	Sample Type	Infect with Toxoplasmosis		Non-infected with Toxoplasmosis		The total number and percentage
		number	%	number	%	
≤5 years	patients	6	11.5	46	88.5	(%100) 52
	controls	8	25	24	75	32 (%100)
6-10 years	patients	13	19.1	55	80.9	68 (%100)
	controls	8	33.3	16	66.7	(%100) 24
11-15 years	patients	10	18.1	45	81.9	55 (%100)
	controls	6	50	6	50	12 (%100)
≥16 years	patients	13	17.3	62	82.7	75 (%100)
	controls	3	20	12	80	15 (%100)

Table 2 showed the prevalence of toxoplasmosis in thalassemia patients at different age groups. Patients were divided into four age groups. The first group included patients aged 5 years and less. The second group includes patients aged between 6-10 years. The third and fourth group included patients aged between 11-15 years and the oldest age group for 16 years and above respectively. The disease showed the highest incidence in the second group, ranged between 6-10years, as the number of infected patients was (13)

at a rate of (19.1%) while the number of infected patients in the control samples for the same age group was (8) at rate (33.3%) followed by age group (11-15 years) as the number of cases was (10) at rate (18.1%), while the number of infected subjected from control groups was (6) and rate (50%), while the ages greater than or equal to 16 years. The number of infected Thalassemia patients was (13) at rate 17.3%, while the control samples for the same age group was (3) at rate 20%, age ≤ 5 years showed only six patients infected with toxoplasmosis at a rate of 11.5% while the 25% of the same had this infection in the same age group. The high incidence of IgM antibodies in the serum of infected thalassemia patients in the study indicates a recent parasitic infection. The main reason for this is that the T. gondii blood used for transfusion had not been tested before in blood banks. The reason for the increase in the number of infections in the age group between (6-10) years and above may be due to the frequency of transfusions compared to the age 5 years and less. Acute parasitic infection in thalassemia patients can develop into a chronic stage that causes disorders in patients who in some cases may sereous.

Toxoplasmosis is an opportunistic disease for patients immunocompromised patient such as thalassemia patients and caused severe interference[6].

Table (3): Relationship between Toxoplasmosis and blood transfusion in patients with thalassemia.

Number of blood transfusions / month	Number of patients with thalassemia	Infect with Toxoplasmosis		Non-infected with Toxoplasmosis		The total number and percentage	Z value	P value
		number	%	number	%			
One time	207	33	15.9	174	84.1	207(%100)	0.395	P=0.05
Twice or more	43	9	21.9	34	78.1	43(%100)		

Table (3) shows the relationship between the incidence of Toxoplasma gondii infection with the number of blood transfusion in patients with thalassemia. The number of infected patients who received blood one time in month was (33) patients and with prevlance rate (15.9%), The number of infected patients infected who are subjected to blood transfusion twice or more per month were (9) patients and by (21.9%), the statistical analysis showed that the correlation between the incidence infection with the parasites and blood transfusions in thalassemia patients was non significant. The Z value (0.716) At a level significans (p = 0.05), Transfusion transmission of toxoplasmosis was reported nearly 40 years ago, in a case where patients with acute leukemia were transfused with leukocytes from donors with chronic myelogenous leukemia. In an immunocompetent recipient, transfusion transmission is likely to go undetected, given the parasite's ability to readily invade and replicate in leukocytes[7]. the ability of the parasite to survive 50 days at 4ºC, establish an element of risk[8].

Table (4): Cytomegalovirus prevalence in patients with thalassemia and control samples and their relation to the patient's sex.

sex	Sample Type	Infect with Cytomegalovirus		Non-infected with Cytomegalovirus		The total number and percentage	Z value	P value
		Number	%	number	%			
male	patients	55	42	76	58	131(%100)	0.596	P=0.05
	controls	20	35.8	36	64.2	56 (%100)		
female	patients	43	36.1	76	63.9	119 (%100)		
	controls	10	22.7	34	77.3	44 (%100)		

Table (4) showed the prevalence of CMV infection according to sex. It is clear from the table that the number of infected male patients was (55) at rate (42%) compared to the number of male positive control samples (20) rate (35.8%), the number of female infected with the virus in Thalassemia patients reached (43) patients and prevalence rate reached (36.1%), while the number of female infected with the virus from the control samples (10) at rate (22.7%). Statistical analysis showed a significant difference between thalassemia patients and controls. High prevalence of IgM antibodies in patients with thalassemia under study indicates that the virus was newly acquired.

Table (5): Cytomegalovirus rates for Thalassemia patients and control samples by age groups under study

Age group	Sample Type	Infect with Cytomegalovirus		Non-infected with Cytomegalovirus		The total number and percentage
		number	%	number	%	
≤5 years	patients	17	34,7	32	65.3	49 (%100)
	controls	11	33.3	22	66.7	(%100) 33
6-10 years	patients	26	39.4	40	60.6	66 (%100)
	controls	9	37.5	15	62.5	24 (%100)
11-15 years	patients	22	39,3	34	60.7	(%100) 56
	controls	9	75	3	25	12 (%100)
≥16 years	patients	33	41.8	46	58.2	79 (%100)
	controls	1	25	3	75	(%100) 4

Table (5) showed the prevalence of CMV infection among thalassemia patients according to age groups. The age group of 16 years and above rate of infection with the virus, the number of infected patients was 33 at rate 41.8%, and the number for the same age group of the control was one patient and rate 25%., Followed by age groups (6-10 years) and (11-15 years), 26 (39.4%) and 22 (39.3%) respectively. The number of infected individuals of the same age group for control group was 9 for the two previous groups, respectively. Age group 5 years and the less, the number of infected patients was (17) with prevlance rate (34.7%). The number of infected controles of the same age group was(11) at rate (33.3%).

Table (6): Relationship between Cytomegalovirus and blood transfusion in patients with thalassemia.

Number of blood transfusions / month	Number of patients with thalassemia	Infect with Cytomegalovirus		Non-infected with Cytomegalovirus		The total number and percentage	Z value	P value
		number	%	number	%			
One time	207	78	37.6	129	62.3	207(%100)	0.716	P=0.05
Twice or more	43	20	46.5	23	53.5	43(%100)		

Table (6) showed the relationship between CMV infection and blood transfusion in thalassemia patients. The number of patients with CMV received blood monthly was (78) patients with prevalence rate (37.6%), The number of patients infected with the virus and those who undergo blood transfusion twice or more monthly was (20) at rate (46.5%). Statistical analysis showed non-significant difference between the two groups of patients at (P=0.05). White blood cells (WBCs) are the primary site of the CMV, which is transmitted through the blood and infection by the virus occurs when whole blood with its white blood cells is transferred to thalassemia patients, It was found that the rate of infection by the virus transmitted by whole blood in patients with thalassemia was higher by (36%) and the cause was attributed to blood transfusion with its components [9]. The virus appears in the blood of the patient as a cell-free virus or a virus multiplied by a related activity (Cell Activated Virus) or a latent virus associated with a latent virus. The differentiation of monocytic cells with short half-lives in peripheral blood into macrophage is the primary condition for reactivation and multiplication of CMV in the recipient [10].

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التحري عن الإصابة بداء القط والفايروس المضخم للخلايا لدى مرضى الثلاسيميا

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الملخص

تعد عمليات نقل الدم مصدراً لعدد من الإصابات في بعض الأحيان اذا كان المتبرع مصاباً ببعض الأمراض الخطيرة خصوصاً الفايروسية والطفيلية منها والتي يعد الدم وسيلة النقل الرئيسة لها اذا كان ملوثاً من البيئة او خلال عملية النقل. شملت الدراسة الحالية (250) عينة دم لمرضى الثلاسيميا و(100) عينة دم مأخوذة من أشخاص أصحاء كعينة سيطرة، وشملت العينات كلاً من الذكور والإناث إذ شملت (134) ذكراً و(116) أنثى ومن الذين تراوحت اعمارهم بين (3–57) سنة وبمعدل عمر (13.87 ± 9.37) سنة لعينات المرضى و(14.08 ±6.45) سنة لعينات السيطرة وللفترة من شباط 2017 ولغاية تموز 2017 والذين شخصوا من قبل الاطباء الاختصاص في مستشفى ابن الاثير التعليمي للأطفال في محافظة نينوى. اوضحت الدراسة ارتفاع نسبة الاصابة بالفايروس المضخم للخلايا CMV اذ بلغت نسبة الاصابة في ذكور مرضى الثلاسيميا 42 % بينما بلغت في الاناث 36.1% وكانت اعلى نسبة اصابة في الفئة العمرية 16سنة فاكبر وتبين انه بزيادة عدد عمليات نقل الدم تزداد نسبة الاصابة بالفايروس CMV اذ بلغت (46.5 %) لدى المرضى الذين يستلمون الدم مرتين او اكثر شهريا وانخفضت الى (37.6 %) لدى المرضى الذين يستلمون الدم مرة واحدة شهريا. واظهرت الدراسة ان اعلى نسبه للإصابة بداء القط عند الاناث كانت بنسبة (18.3%) بينما بلغت في الذكور (15.6%) واظهرت الفئة العمرية (6-10سنوات) اعلى نسبة اصابة والتي وصلت (19.1%) واظهرت الدراسة ايضا زيادة نسبة الاصابة بزيادة عدد مرات نقل الدم اذ بلغت نسبة الاصابة بالطفيلي T.gondii (21.9%) في المرضى الذين يستلمون الدم مرتين او اكثر شهريا وانخفضت الى (15.9 %) عند المرضى الذين يستلمون الدم مرة واحدة شهرياً .