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Prevalence of IgM and IgG antibodies to *Toxoplasma gondii* among blood donors in Thi-Qar governorate.

Nuha Jaboory Hadi

Science college - Biology Department - Thi-Qar university

Abstract

Current study performed for the first time in Thi-Qar governorate to evaluate the seroprevalence of toxoplasmosis infection among blood donors This is may be causes transmission the infection to another person by blood transfusion. Detection IgM antibody in early stage of infection and IgG in latent stage of infection by using (ELISA BioCheck company kit).

From the total serum samples (90) collected from healthy persons donated in the central blood banks in the city, Results show IgM and IgG antibodies seropositive was 13 (14.4%),25 (27.8%) respectively **,**the higher percentage in IgM was 6(27.3%) was in age group 31-40 years and the lower percentage was 1(5.9%) in age group 41- 50 years, while IgG antibody recorded higher value 9(52.9%) in age group 41-50 years and the lower value in age group ‹ 20 years that was 3(15%).

The statistical analysis results show significant difference between age group in IgM antibody and there is a significant difference between age group in IgG antibody. The aim of this study to evaluate the seroprevalence of toxoplasmosis among the healthy blood donors that may be cause transmission of infection to another peoples by blood transfusion by detection early and latent stages of infection.

Introduction

Toxoplasma gondii is an intracellular parasite related to the phylum Apicomplexa. Its life cycle can be completed only in cats and other felids(lions, tigers, jaguars and leopards) which are the definitive hosts. However, *T. gondii* also infects a wide variety of intermediate hosts including humans. In many mammals, *T. gondii* is known to be an important cause of abortions and stillbirths and to selectively infect muscle and brain tissue. A variety of neurologic symptoms, including in coordination, tremors, headshaking, and seizures, have been described in sheep, pigs, cattle, rabbits, and monkeys infected with *T. gondii* (Wastling *et al*.,2000). Nicolle and Manceaux(1908) found a protozoan in ssues of a hamster like rodent(Louis and Kami ,2007) There are four forms of *T. gondii* :The tachyzoite, bradyzoite, merozoite and sporozoite. Tachyzoites and bradyzoites with the intermediate host, while merozoites and sporozoites with definitive host. Tachyzoites and merozoites are responsible for the expansion of the population within a host, while the bradyzoites and sporozoites are capable of environmental transmission to new host (Grawford *et al.,* 2000).

You can get Toxoplasmosis by eating undercooked, infected meat, or handling soil or cat feces that contain the parasite. Swelling of the lymph nodes or a mononucleosis (fever, fatigue, and sore throat) illness may be seen. Most adults have no symptoms. In most cases, once you have gotten toxoplasmosis, you cannot get it again (Cook,2000) Contamination of the environment by oocysts is widespread as oocysts are shed by domestic cats and other members of the Felid **(**Dubey and Bea e,1988; Mead *et al*., 1999)Domestic cats are probably the major source of contamination since oocysts formation is greatest in domestic cats. Cats may excrete millions of oocysts after ingesting only one bradyzoite or one tissue cyst, and many tissue cysts may be present in one infected mouse (Dubey and Frenkel,1972; Dubey,2001). Congenital toxoplasmosis only occurs when the mother has an active infection during pregnancy. In general, there is no increased risk to the fetus when toxoplasmosis occurs more than six months prior to conception. If you had toxoplasmosis in the past, you are usually immune, and the fetus is not at risk. If you have a weakened immune system, such as in AIDS, you can develop another active infection(Matsui,1994).Infants with congenital toxoplasmosis usually don't appear any different at birth. Yet, long-term studies show that up to 90 percent develop problems including vision loss, hearing loss, or developmental delays. These symptoms can occur months or even several years after birth. For this reason, infants with congenital toxoplasmosis should be treated for the infection during the first year of life and then should be periodically screened for problems(Lynfield and Eaton,1995) . Humans may be infected either by eating cysts in meat or by ingestion of sporulated oocysts from contaminated soil (Frenkel *et al*., 1995). Transmission of *T. gondii* may also occur through blood transfusions and organ transplants. Of these routes, transmission by transplantation is most important. Toxoplasmosis may arise in two ways in people undergoing transplantation: (i) from implantation of an organ or bone marrow from an infected donor into a non-immune, immunocompromised

recipient and (ii) from induction of disease in an immunocompromised, latently infected recipient. Tissue cysts in the transplanted tissue or in the latently infected transplant patient are probably the source of the infection. In both cases, the cytotoxic and immunosuppressive therapy given to the transplant recipient is the cause of the induction of the active infection and disease (Mele *et al*., 2002,Wulf *et al*., 2005).

During infection, IgM antibodies may appear earlier and decline more rapidly than IgG antibodies and are frequently the first class of antibodies detected after primary infection (Montoya,2000).Infection by Toxoplasmosis causes humeral immune response by forma on specific an bodies IgM an body appears within 1-2 weeks a er infec on ,IgG an body appears within 2-3 weeks a er IgM and IgA antibody can be synchronization elevation with IgM and can arrived to high peak in six months (Sahwi *et al*.,1995;A a *et al*.,1996;Mcleod and Dowel ,2000).

Detection of *T. gondii* antibody in patient may assistance diagnosis infection. There are numerous serological procedures available for detection of humoral antibodies; these include the Sabin–Feldman dye test, the indirect hemagglutination assay, the indirect fluorescent antibody assay (IFA), the direct agglutination test, the latex agglutination test (LAT), the enzyme-linked immunosorbent assay (ELISA), and the immunosorbent agglutination assay test (IAAT). The IFA, IAAT and ELISA have been modified to detect immunoglobulin M (IgM) antibodies (Remington *et al*., 1995). Public health is important to prevent infection and self control, the hands of people handling meat should be washed thoroughly with soap and water before they begin other tasks (Lopez *et al*.,2000). All cutting boards, sink tops, knives and other materials coming in contact with uncooked meat should be washed with soap and water also. Washing is effective because the stages of *T. gondii* in meat are killed by contact with soap and water (Dubey and Bea e,1988).

Materials and methods

Study group

A total number of 90 serum samples collected from a healthy blood donors whom attending to the central blood bank in Al-Nassiriyah city .The ages of the study groups are between ‹ 20 – 50 years .No one have a history of toxoplasmosis infection.

Samples

A single blood sample was taken from each donor and separated the serum from the blood ,serum samples were then stored in freezing at -20C0 till testing it by ELISA.

Serological testing

Serum specimens were tested by using ELISA (BioCheck company) to detect IgM and IgG antibodies anti Toxoplasma gondii parasite .The Toxoplasma antigen is coated on the surface of microwell. Diluted donors serum added to the wells, and the Toxoplasma IgM or IgG antibody, if present ,binds to the antigen. All unbound materials are washed away . Horse peroxidase(HRP)conjugate is added which binds the antibody-antigen complex. Excess of (HRP) washed off and a solution of Tetramethylbenzi dine (TMB) reagent is added. The enzyme conjugate catalytic reaction is stopped at a specific time. The intensity of the color generated is proportional to the amount of IgM or IgG in the sample .The results are read by a microwell reader.

Statistical analysis

In current study we used sta s cal program (SPSS16.0) to study the rela on between age group in each type of antibodies IgM and IgG ,We used T-test and Chisquare test and appropriate P ‹0.05 were consider significant.

Results

Seroprevalence of IgM anti *Toxoplasma gondii*:

Table one show the seroprevalence of IgM antibody specific to *Toxoplasma gondii* to blood donors, the higher value recorded in age groups 21-30 and 31-40 years with percentage was 12.9% and 27.3% respectively and the lower value was in age group 41-50 years 10%,The significant difference between ages groups was higher (P< 0.05).

Table(1): Toxoplasmosis seroprevalence IgM antibodies among blood donors in Thi-Qar governorate.

Seroprevalence							
Age groups	Positive		Negative		Total		P.value
	n	%	N	%	N	%	
‹ 20	2	10	18	90	20	100	P=0.009
21-30	4	12.9	27	87.1	31	100	
31-40	6	27.3	16	72.7	22	100	
41-50	1	5.9	16	94.1	17	100	
Total	13	14.4	77	85.6	90	100	

Seroprevalence of IgG anti *Toxoplasma gondii*:

The distribution of toxoplasmosis seroprevalence of IgG antibody among the age groups show in table(2). The higher value was in age group 41-50 years with percentage 52.9% and 31-40 years with percentage 36.4% whereas the lower percentage 15% was in age group ‹ 20 years, and there is a significant difference between age groups with probability value was (P<0.05).

Table(2)Toxoplasmosis seroprevalence IgG antibodies among blood donors in Thi-Qar governorate.

Seroprevalence							
Age groups	Positive		Negative		Total		P.value
	n	%	N	%	N	%	
‹ 20	3	15	17	85	20	100	P=0.019
21-30	5	16.1	26	83.9	31	100	
31-40	8	36.4	14	63.6	22	100	
41-50	9	52.9	8	47.1	17	100	
Total	25	27.8	65	72.2	90	100	

Discussion

The present study was carried out with blood donors of Thi-Qar governorate to explore prevalence Toxoplasmosis . The seroprevalence of Toxoplasma gondii IgM and IgG an bodies was 13(14.4%),25(27.8%) respec vely. This result was similar to that of Hadi(1991) who reported 31.6% posi ve rate in the kingdom Saudi Arabia ,also was comparable to results of AL-Qurashi *et al*.(2001) were reported IgM 5% ,IgG 25% and similar to Abdalla *et al.* (1994) when reported seroprevalence 23.1% in KSA. Our results was correspondent with previous reports 29.4% in kingdom Saudi Arabia Saeed *et al*.(2006), 15.3% Catar *et al*.(1992), 15% in India (Bowerman,1991),
10.6-17.5% in Malaysia Hakim *et al*.(1994),12.4% in Bangladesh Samad *et al*.(1997) . The study results are differs from Al-Amari(1994) who recorded 52.1% in KSA and from results Pinlaor *et al*.(2000) who reported 4.1%,4.3% for IgM and IgG respectively and Morakote *et al*.(1984) recorded low seroprevalence in Chang Mai city 4.6% ,like this prevalence 7.4%,8% ,6.3% and 6.4% reported from Bangkok Maleewong *et al.*(1989) .Yang *et al* .(2000) results differ from our study results when they reported prevalence rate 5.6%-8.8% in Korea. The reason of similar and different refer to the regional variations in the incidence of *T.gondii* rates from one to another country or even within the same country. This variation has been attributed to clime,culture differences regarded hygienic and feeding habits (Remington *et al.*,2001) . Age group 31-40 years was recorded highly percentage 6(27.3%) and the age group 41-50 years was lowest percentage 1(5.9%) for prevalence IgM an body ,the higher prevalence percentage in IgG was 41-50 years 9(52.9%) and lowest percentage in age group < 20 was 3(15%). We observe in our current study the infection increase with age increasing, the IgM

antibody was in middle age group that meaning the donors in this group have recent infection by Toxoplasma gondii this infection may be came from drinking contaminated water or vegetable or by eating raw infected meat. Whereas the previous infec on IgG an body was in old age group 41-50 years that mean the donors in this age were had previous infection by infective agent Toxoplasma parasite that causes immune response and making memory cell to the parasite (Suzuki, 1999).Our results comparable with result Pinlaor *et al.* (2000) higher prevalence in IgM was in age group 31-40 years 9(7%) out of 129 serum sample for this group. The significant relation showed in the present study between Toxoplasma prevalence rate and the donors age confirms the really that seroprevalence of Toxoplasma gondii is well known to increase with age (Remington *et al.*,2001,Dupouy-Camet *et al.*, 2003).

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انتشار الأجسام المضادة نوع (IgM) و (IgG)

للمقوسة الكونيدية بين المتبرعون بالدم في محافظة ذي قار

نهى جبوري هادي

جامعة ذي قار - كلية العلوم – قسم علوم الحياة

الخلاصة

أجريت الدراسة الحالية لأول مرة في محافظة ذي قار لتقدير مدى انتشار الإصابة بداء المقوسات بين المتبرعون بالدم وهذا قد يسبب إمكانية انتقال الإصابة من شخص لأخر عن طريق نقل الدم.تم الكشف عن الأضداد المناعية IgM في المراحل المبكرة من الإصابة و الأضداد المناعية IgG في المراحل المتأخرة من الإصابة باستعمال طريقة الامتصاص المناعي المرتبط بالإنزيم (الاليزا).

مجموع العينات المصلية 90 عينة جمعت من أشخاص أصحاء تبرعوا بالدم في مصرف الدم الرئيس في المدينة أظهرت النتائج انتشاراً لكلا الضدين IgM و IgG كانت 13 (14.4%) و 25 (27.8%) على التوالي ، النسبة المئوية الأعلى للضد المناعي IgM كانت 6(27.3%) في الفئة العمرية 31-40 سنة وأدنى نسبة كانت 1(5.9%) للفئة العمرية 41-50 سنة ،بينما سجل الضد المناعي نوع IgG أعلى نسبة إصابة 9 (52.9%) في الفئة العمرية 41-50 سنة واقل نسبة إصابة كانت في الفئة العمرية الأقل من 20 سنة 3 (15%).

أظهرت نتائج التحليل الإحصائي وجود فروق معنوية للإصابة بين الفئات العمرية للضد IgM وفروقا معنوية بين الفئات العمرية للضد IgG.

الهدف من الدراسة الحالية هو تقييم مدى انتشار الإصابة بداء المقوسات بين الأشخاص الأصحاء المتبرعون بالدم والذي قد يسبب انتقال الإصابة من شخص لأخر خلال عملية نقل الدم وذلك بالكشف عن المراحل الحديثة والمتأخرة من الإصابة.