

Level Of Interlukin 1 B, 2 and Total Ige in a Sample of Women in Baghdad Infected With Toxoplasmosis

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Abstract: The present study aimed at determine the seroprevalence of toxoplasmosis among women in Baghdad Province by detecting the level of IgE in and studied some immunological aspects in determining the levels of cytokines (IL-1 β , IL-2) and their effect on the different stages of the disease. A total of 82 serum samples were randomly collected from women with ages ranging from (17-47) years, started from the of 1st November 2011 till the end of march 2012, from two different hospitals in Baghdad: AL-alWayah Maternity Teaching Hospital and Kamal AL-samaray Hospital and the work done in Central Public Health Laboratory , Tests were conducted immune disease toxoplasmosis IgM, IgG and found from a total of 82 women who surveyed 60 (73.1%) have IgG positive and 22 (26.8%) had a negative IgG , and in the light of these findings were divided into two groups (+ve IgG anti toxoplasma group , - ve IgG anti toxoplasma group) .All sera were tested by using ELISA Technique for Abs detection and the results were tested for estimated IgE ,IL-1 β and IL-2 levels. The results indicated that the slightly high prevalence 21(35.0 %) with Toxoplasmosis were in the age group (26-34) year and there were no significant between occupation and infection with toxoplasma . A statistical analysis showed highly significant ($p < 0.05$) in mean level of IgE between +ve IgG anti toxoplasma group (96.42) Iu/ml and -ve IgG anti toxoplasma group (27.54) Iu/ml. the results showed high level of IL-1 β in cases with +ve IgG anti toxoplasma group (1.59860) Iu/ml while showed no significant in IL-2 ($p > 0.05$) . Depending on the results obtained in this study, it is possible to measure the level of interleukin-1 B, 2 for the diagnosis of patients with toxoplasmosis for being one of the indicators of this disease. Finally, depending on the results recorded in this study, the importance of early diagnosis for women and afflicted women with Toxoplasmosis to prevent the disease or alternation from acute to chronic moreover, it shows the need to provide health education to women in order to prevent primary infection during their lives.

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I. Introduction

Toxoplasma gondii is a wide spread protozoan intracellular parasite of animals and an important opportunistic pathogen in humans, causing disease in congenitally infected infants and in immunocompromised individuals. T. gondii belonging to Coccidae subclass is transmitted by cats and other felines which are the definitive host and infects a wide range of intermediate hosts(birds , reptiles and mammals including humans) . Humans are not a natural part of the life cycle but they become infected by ingestion of tissue cysts under cooked meat, or oocysts that are shed by cats and which can contaminate water and food. T. gondii occurs in three forms: tachyzoites, bradyzoites (in tissues), and sporozoites. In the intermediate host the parasite locates in the brain, heart, lungs, and most frequently in the lymph nodes (1) . Depression of the cellular immune response to Toxoplasma gondii has been reported in humans (2). The parasitic invasions occur in human (intermediate host) , an increase is observed in the production of IgE antibodies. This defect results from disturbances in the regulation of antibody production by T helper cells, which promotes local inflammatory reaction, Via release of mediators from mast cells IgE participates in the reaction of antibody-dependent cellular cytotoxicity (ADCC) (3) .Infections with Toxoplasma gondii may cause severe disease in immunocompromised patients. The treatment of these infections may be complicated by the side-effects of anti-toxoplasmic drugs . the enhancement of non-specific resistance to infection deserves investigation. Some substances such as Mycobacterium bovis strain Bacillus Calmette- Guerin (BCG), muramyl peptides and bacterial lipopolysaccharide (LPS) have been shown to increase natural resistance mechanisms in vivo. These substances have the ability to induce the synthesis and secretion of interleukin-1 β (IL-1 β), a family of related peptides which mediate the acute-phase response (2).

Interleukin- 1 (IL- 1 β) known previously as lymphocyte- activating factor (LAF) glycoprotein produced primarily by mononuclear phagocytes , including blood monocytes and tissue macrophages (lung,

peritoneal, synovial, osteoclastic, liver, spleen, kidney, bone marrow, and brain macrophages), as well as specialized dendritic cells scattered through various organ (4). IL1 β play a significant role in modulating the host's immune defence against *T. gondii* infection (5). IL2 is cytokine produced by Th and suppressor lymphocytes that functions to control the expansion and reactivity of T lymphocytes. IL-2 is part of the body's natural response to microbial infection. IL-2 mediates effects by binding to IL-2 receptors, which are expressed by lymphocytes, there is a reduction in the production of IL-2 which appears to mediate, in part, the observed downregulation of immunity to *T. gondii* (2).

In Murine the host immune response decreases the production of IL-2(6). The inhibitory response by exogenous IL-2 has been partially successful or ineffectual in evaluating the response of lymphocytes to *T. gondii* (7). The Aims of the study are, Determining the prevalence and Laboratory Diagnosis of Toxoplasmosis among sample of women in Baghdad and Studying some immunological aspects of *T. gondii* infection, such as to determine the level of IgE and for estimated cytokines (IL1-beta, IL2).

II. Materials and Methods

PATIENTS

This project was performed during the period between first, November, 2011 till the end of March, 2012. Eighty two patients sera sample were collected from married and non-married women with age ranging from (17 -47) years old in AL-Alwayah maternity Teaching Hospital (out-patient clinic) and Kamal Alsamaray hospital in Baghdad. Works were done in immunology unit in Central Public Health Laboratory. All the patients were voluntary accepted to participate in this study.

Blood Samples collection:-

Before collection of samples, sheet of information was prepared and designed according to a questionnaire which covers all information(see Appendix 1). 5 ml of venous blood was drawn from radial vein from each one. Sera were separated after leaving the sample at room temperature for about 15 – 30 minutes then centrifuged at 3000 rpm (revolution per minute) for 5 minutes. Finally sera were kept at -10 °c till use.

Estimation of serum anti- *T. gondii* Ab. (IgG) levels using Toxoplasma Ab(IgG)Enzyme immunoassay Test kit. (Biocheck) and estimation of Serum anti-Toxoplasma goudiiAb (IgM) levels using ToxoplasmaAb(IgM)Enzyme immunoassay Test kit. (Biocheck), Measuring IL-1 B Serum Levels, Measuring IL-2 Serum Levels were done by ELISA and the procedures were done according to the instructions of the kits. Also, A quantitative Determination of Total IgE in Human Serum was done by ELISA.

Statistical Analysis

The suitable statistical methods were used in order to analyze and assess the results, include the followings :1- Descriptive statistics: A) Statistical tables including observed frequencies with their percentages. B) Summary statistic of the readings distribution (mean, SD, S.E). C) Graphical presentation by (bar - charts). 2 – Inferential statistics: These were used to accept or reject the statistical hypotheses, and they include Chi-Square (χ^2). 3-Computer & programs: All the statistical analysis were done by using Pentium-4 computer through the SPSS(Statistical Package for Social Sciences) program (version-17) and Excel application.(2000).

III. Results and Discussion

Atotal of 82 sera sample were collected from women with age ranging from (17-47) years old in AL-Alwayah maternity Teaching Hospital (out-patient clinic) and Kamal Alsamaray hospital in Baghdad. A high prevalence of toxoplasma infection was observed among 60(73.2%), + ve IgG anti toxoplasma group while 22(26.8%) A - ve IgG anti toxoplasma group.

The current study is one of many studies in Baghdad to explore the prevalence of *Toxoplasma gondii* infection in women, If a woman gets infected with *T. gondii* for the first time in her life during pregnancy, she may pass infection to her fetus; a situation that ultimately could lead to a very serious fetal damage.(92) The frequency of stray cats in a humid rainy climate favouring the survival of oocysts has contributed to the high Toxoplasma prevalence in Central America (93).

Stray cats are widely spread in Baghdad city, however, the hot and dry weather conditions are not ideal for oocyst survival, compared to cooler and more rainfall environmental conditions in the north regions of Iraq, which are in favor of a higher prevalence. Farming and animal rearing are also common (94).

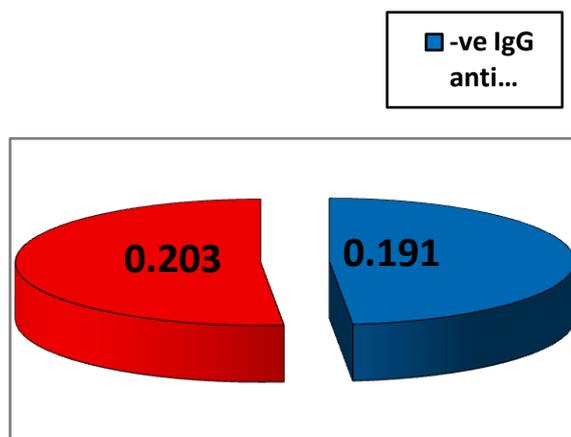


Figure 1: Mean distribution of anti-toxoplasmosis Ab (IgM) in study groups.

IgM are the first antibodies to appear, They are detected in the peritoneal fluid of mice at the surface of the *Toxoplasma* from the second day following infection. However, serum IgM only appears at the end of the first week following infection. These immunoglobulins are the best activators of the complement system(95).

In figure (1) was show no significant IgM in study group in apex table (1) , A negative IgM test strongly suggests that the infection was not recent,(96) and that was agreement with Ala`a Zanzal 2011(97), was explain positive IgM indicate recent infection, also negative IgM result may indicate so early that antibody response has not yet developed or is undetectable (98,99)also this result was agreement with Marawan A Abu-Madi *et al* (2008),when they showed IgG antibodies to *T. gondii* were found to be five times more common than IgM antibodies (29.8% versus 5.8% in the study group).(100)

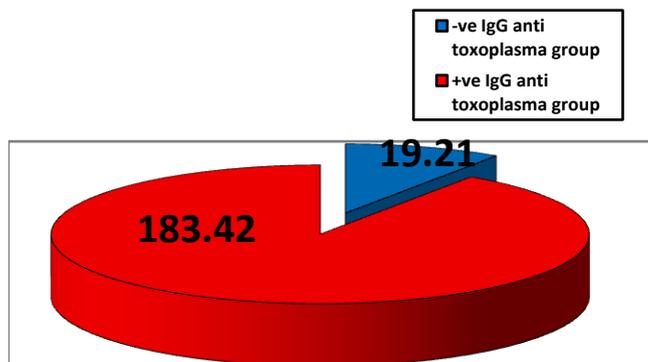


Figure 2: Mean distribution of anti-toxoplasma Ab (IgG) in study groups.

In a cute stage of Toxoplasmosis IgM Ab estimation appears early in the course of infection while IgG appears too late and reaches peak level within six months to one year and remains in a high level for long duration (101), in apex table (2). Anywhere in the host organs which may lead to persistence of high levels of IgG Abs (102) , Prigion *et al* 2000 who illustrated that Antigens secretion due to latent toxoplasmosis from the encysted form of *T. gondii* act as an excretory antigen and produce mechanisms that maintain long lasting immunity to Toxoplasmosis immunity either Ab depended or cell mediated (102).This fact is in agreement with Gaines, *et al* 1972 , who illustrated that *T.gondii* is known to cause latent infection and produce Ag stimulus for years(103) .

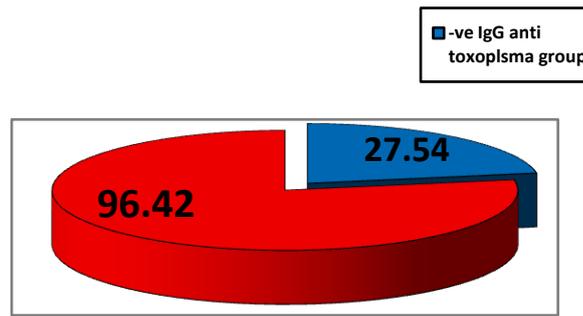


Figure: 3 Mean distribution of total (IgE) in study groups .

In parasitic invasions, an increase was observed in the production of IgE antibodies, This defect results from disturbances in the regulation of antibody production by Th cells, which promotes local inflammatory reaction. Via release of mediators from mast cells IgE participates in the reaction of antibody dependent cellular cytotoxicity (ADCC) (104). In our study, the concentration of IgE antibodies in patients infected with *T. gondii* was significant between patient group and control group, thus suggesting an chronic form of invasion. Increased IgE level correlates with early acute inflammation or with a reactivation of chronic (latent infection) . Our work was almost similar to that which was done by Villena *et al.*(1999) (105) .In other study showed elevated specific IgE antibody titers may be active infection, primary or reactivated, and may be a more useful diagnostic indicator of recent infection than IgM. Pinon *et al* (1990). Also in other study T. Seiskari, *et al* (2007) showed the levels of total IgE were analyzed in patient with *Toxoplasma gondii*. was higher in Russia (106).

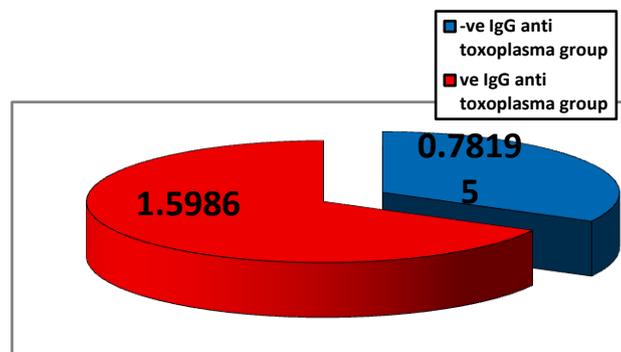


Figure 4: Mean distribution of (IL-1B) in study groups.

This study showed high level of IL-1 β in patient group and in control group recorded low level of this interleukin. This result was agreement with the study showed expression levels of proinflammatory cytokines, including IL-1 β are higher inthe brains of amouse strain in which tachyzoite of *T.gondii* proliferation occurs in this organ during the later stage of infection compared with the brains of another mouse strain that prevents tachyzoite T.gondii proliferation during chronic infection (107).

agreement with the result stated by Robyan E.Elmslie, *et al* 1991(108), showed that during an inflammatory response, IL-1 β induce synthesis and release of hepatic acute-phase protein, In addition, IL-1 β stimulates endothelial cell proliferation and induces procoagulant activity (107).

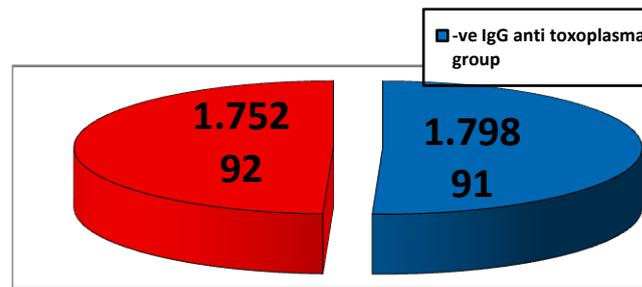


Figure 5: Mean distribution of (IL-2) in study groups

The mean level of interlukin 2 was low in patient group in compare with control group, and this result was agreement with A Haque and L Kasper *et al* (1994), that explain there is a reduction in the production of IL-2 which appear to mediate, in part, the observed downregulation of T-cell-derived cytokines (2). Also this result is agreement with Sakhina haqu *et al* 1995 showed A decline in IL-2 production was associated with the decrease in lymphocyte proliferation (107) . interleukin 2 (IL-2), during infection with *T. gondii*. other study done on mice show During infection with *T. gondii* it is thought that the production of IL-2 by CD4 T cells is required for the optimal production of IFN by CD8 T cells Results of these study demonstrate that IL-2 mice are susceptible to toxoplasmosis Shirahata T, *et al* (1993) (109). At present, it is recognized that IL-2 plays a role of anti-*T. gondii* infection by activating macrophages and enhancing the killing effects of NK cells (Araujo and Slifer, 2003) (110).

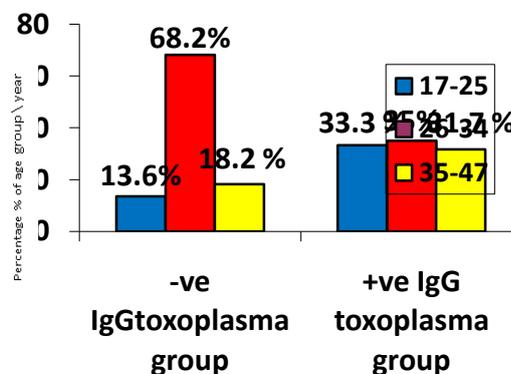


Figure 6: Distribution of study groups according to age groups/Year.

The significant relation showed in the current study between Toxoplasma prevalence rate and age group confirms the fact that seroprevalence of Toxoplasma is well known to increase with age(93).This association does not mean that older age is a risk factor predisposing to infection but might be explained by the older the person the longer time being exposed to the causative agent and may retain a steady level of anti-Toxoplasma IgG in serum for years (111). A contradictory result was reported in the Eastern Region where seropositivity declined with age (111,112). The percentage of infected women at (26-34) year's age range group was slightly higher than other age ranges, when we compare the age groups between control group and patient group. This result was in agreement with Dargham B. M *et al* (2011) (92) where they shows in their research the percentage of infected women at (20-30) year's age range group were higher than other age ranges also we agreement with Huda Ali Salih *et al* (2010) (80) where they show the infected women were increased(39.63%) in age group (25-34) this rate also were nearly similar to result recorded by Obeed (2007) (113). when he was used Elisa to detected seroprevalence toxoplasmosis among pregnant women (114). But we didn't agree with another study showed the prevalence of *T. gondii* was increase with age (>40 years), Joanna Matowicka-Karna *et al* (2009) (115). Higher ratio of infection were reported in neighboring countries like in Jordan was(40%) (116) and in Saudi Arabia was (21.8%) (113) . Lower prevalence ratio (0.79) in Korean pregnant women (117) while (20%) in Finland and(24 %) in Prague (118). We observed the variations and similarities in results could be due to the difference in serology tests which used , patients sampling , climate , feeding habits and other factors like (hygiene....etc) .

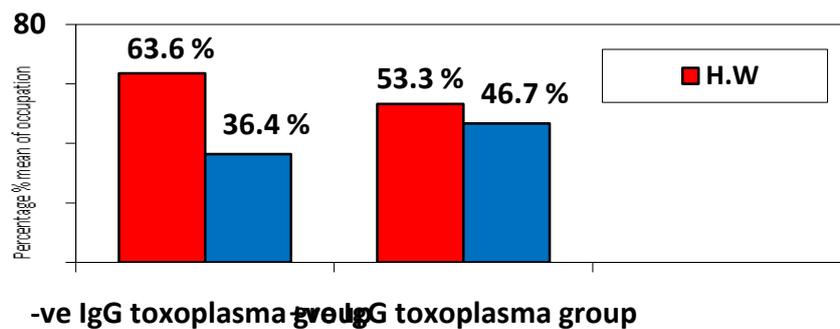


Figure 7: Relationship between occupation and study groups.

In this figure relationship between occupation and study group were show patient group housewife showed (53.3%), while patients group employed was (46.7%) in apex table (7) .There had no association between the prevalence of *Toxoplasma* and occupation of women ,education level of pregnant woman and knowledge of these identified risk factors for primary toxoplasmosis may be helpful to prevent the congenital toxoplasmosis (87,88) .This studied were agreement with Huda Ali Salih 2010 (113) , where her research documented in Alnajaf city and showed (51.76%) in housewife women infected with toxoplasma while (8.4%) was employed women. and also agreement with Al-Hamdani and Al-Mahdi (1996)(119). But didn't agreement with Mohammed A. Kadir *et al* (2011) (120).

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