



Effect of Toxoplasmosis Infection on Liver and Kidney Functions among Pregnant Women in Abo-Gharib District- Iraq

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Abstract

The effect of toxoplasmosis infection on liver and kidney functions among pregnant women in Abo-Gharib District- Iraq was studied. Forty women that had positive test for toxoplasmosis by ELISA test were participated in this study. Also control group of apparently healthy women was selected (ten total women). This group had negative test for toxoplasmosis (ELISA test). The venous blood was collected from each patient and control individual to obtain serum. Liver function was evaluated by the estimation of serum aspartate aminotransferase (AST/GOT), serum alanine aminotransferase (ALT/ GPT) and serum alkaline Phosphatase (ALP) activities. Kidney function was evaluated by the estimation of serum creatinine and urea concentrations by the enzymatic methods.

The results show that there is a significant ($P < 0.05$) increase in the means of AST, ALT and ALP activities as well as urea and creatinine concentrations in the serum of toxoplasmosis women compared with control group.

In conclusion, this study indicates that toxoplasmosis affects liver and kidney functions as evidenced by the significant increase in the levels of some biochemical parameters in patients group; this may possibly affect some specific enzyme systems, which can, consequently, exhibit serious pathology, including hepatitis, pneumonia, blindness and severe neurological disorders.

Key words: Toxoplasmosis, aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, urea, creatinine.

تأثير الإصابة بداء المقوسات الكونيدية على وظائف الكبد والكلية بين النساء الحوامل في قضاء أبي غريب - العراق

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الخلاصة

درس تأثير الإصابة بداء المقوسات الكونيدية على وظائف الكبد والكلية بين النساء الحوامل في قضاء أبي غريب - العراق. شاركت في هذه الدراسة أربعون امرأة ذات نتيجة موجبة لداء المقوسات الكونيدية باختبار الاليزا، واختيرت كذلك مجموعة السيطرة بعدد عشرة نساء أصحاء وذات نتيجة سالبة لداء المقوسات باختبار الاليزا. جمع الدم الوريدي من أفراد السيطرة والمرضى للحصول على المصل. تم تقييم وظيفة الكبد بقياس فعاليات أنزيمات اسبارتيت الناقل لمجموعة الامين AST والالانين الناقل لمجموعة الامين ALT والفسفاتيز القاعدي ALP، أما وظيفة الكلى فقد تم تقييمها بقياس تراكيز كرياتينين ويوريا المصل بالطرق الأنزيمية.

أظهرت النتائج بأن هناك زيادة معنوية ($P < 0.05$) في معدلات فعاليات ALP, ALT, AST وكذلك في تركيزي اليوريا والكرياتينين لمصل النساء المصابات بداء المقوسات الكونيدية مقارنة بمجموعة السيطرة. يستنتج من هذه الدراسة بأن داء المقوسات الكونيدية يؤثر في وظائف الكبد والكلية وذلك بالزيادة المعنوية في مستويات بعض المتغيرات الكيموحياتية في مجموعة المرضى، والذي من المحتمل أن يؤثر على بعض الأنظمة الأنزيمية النوعية فيسبب في ظهور أمراض خطيرة كالتهاب الكبد والرئة والعمى واضطرابات عصبية حادة.

الكلمات المفتاحية: داء المقوسات الكونيدية، إنزيم اسبارتيت الناقل لمجموعة الأمين، إنزيم الالانين الناقل لمجموعة الأمين، إنزيم الفوسفاتيز القاعدي، اليوريا، الكرياتينين.

Introduction

Toxoplasmosis is an important infection caused by single celled parasite *Toxoplasma gondii* which is one of the world's most common parasites [1]. This parasite appears to have broad host specificity. Cats and wild Felines are the only definitive host while all other worm-blooded animals including humans are intermediate hosts [2- 4].

Human infection may be acquired in several ways: ingestion of undercooked infected meat containing *Toxoplasma* cysts; ingestion of the oocyst from focally contaminated hands or food; blood transfusion and transplacental transmission [5, 2, 1, 6].

Most people affected never develop signs and symptoms. But for infants born to infected mothers and for people with compromised immune systems, toxoplasmosis can cause extremely serious complications [1].

This disease affects women in different countries of the Arab world. For example, in Iraq, it has been reported an infection rate with toxoplasmosis of 34.7% among pregnant women in Baghdad [3]. Women infected with *Toxoplasma* before conception with rare exception do not transmit the infection to their fetuses, while women infected with *Toxoplasma* after conception (during pregnancy) may transmit the infection across the placenta to their fetuses [2, 6].

However, under some conditions toxoplasmosis can cause serious pathology, including blindness, pneumonia, hepatitis and severe neurological disorders in patients with human immunodeficiency virus (HIV) or malignancies [5].

Furthermore, toxoplasmosis has serious effects on animal health because it infects vital organs in the body such as liver, kidney, muscle and heart leading to their damage, impairment of their function and increase or decrease the release of their enzymes according the stage of infection [7]. For example, it has found that the activity of serum ALT, AST and the level of urea were significantly increased in *T. gondii* infected ewes, sheep and mice [8-10]. While, toxoplasmosis significantly decreased the serum level of urea and the activity of serum AST as well as it has no significant effect on serum activity of ALT on goat [10].

Thus, these serious changes of toxoplasmosis in blood metabolites can be used as indicators for the infection with these parasites and consequently help in their diagnosis [10].

The diagnosis of infection can be made directly by identifying the parasite in tissue sections or in body fluid or indirectly by serological and biochemical techniques [11]. Therefore, the present study was performed to estimate the changes in liver and kidney functions in toxoplasmosis women from Abo-Gharib District/ Iraq.

Materials and Methods

Experimental Design

Forty women that had positive test for toxoplasmosis by ELISA test were participated in this study. These samples were collected the period between March 2013 and May 2013 from Abo-Gharib District. Also control group of apparently healthy women was selected (ten total women). This group had negative test for toxoplasmosis (ELISA test). The healthy women were free from acute or chronic pathologies, clinically evident at the moment of examination. The patient and control women's had age that ranged between 18 - 45 years old.

Blood Sample Collection

Three ml of venous blood was collected from each patient and control individual. The blood was placed in a plain tube and left to stand at room temperature to clot. Then, the tubes were centrifuged at 3000 rpm for 10 minutes to collect the serum, which was frozen at -20°C until analysis [5].

Biochemical tests

- Liver function was evaluated by the estimation of:
 - Serum aspartate aminotransferase (AST/GOT) (Kit: Biomaghreb, Tunis).
 - Serum alanine aminotransferase (ALT/ GPT) (Kit: Biolabo Reagents, France).
 - Serum alkaline Phosphatase (ALP) (Kit: BioMerieux, France).
- Kidney function was evaluated by the estimation of serum creatinine and urea by the enzymatic methods (Kit: BioMerieux, France) [12].

Statistical Analysis

Statistical analysis was performed using SPSS program, version 17. Variables were expressed as mean \pm standard deviation (SD). Data were analyzed using independent sample Student's "t" test. Significance was assigned for p values < 0.05 [13].

Results and Discussion

Toxoplasmosis infection appears to affect both liver and kidney functions illustrated in infected group compared with control group.

The results show that there is a significant ($P < 0.05$) increase in the means of AST, ALT and ALP activities in the serum of toxoplasmosis women compared with control group. The AST, ALT and ALP activities are 31.22 ± 4.28 , 29.87 ± 3.80 and 58.97 ± 4.96 U/L, respectively in toxoplasmosis infected women, while they are 20.90 ± 2.54 , 15.60 ± 2.73 and 41.40 ± 2.76 U/L, respectively in control group.(Figure 1).

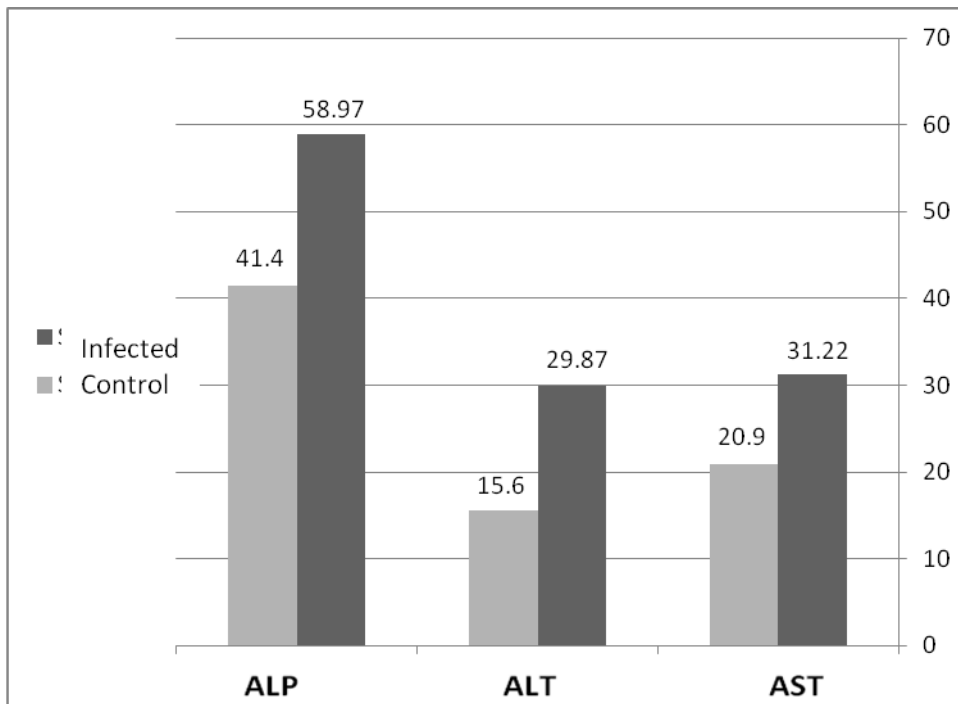


Figure 1- Effect of toxoplasmosis on liver function (ALP, ALT and AST).

Concerning the effect of toxoplasmosis on kidney function, the results in figure (2) also demonstrate that there is a significant ($P < 0.05$) increase in the means of urea and creatinine concentrations in infected group compared with control group. The urea and creatinine means are 68.55 ± 5.22 and 2.02 ± 0.56 mg/dl, respectively, while they are 16.8 ± 2.85 and 0.73 ± 0.22 mg/dl, respectively in control group.

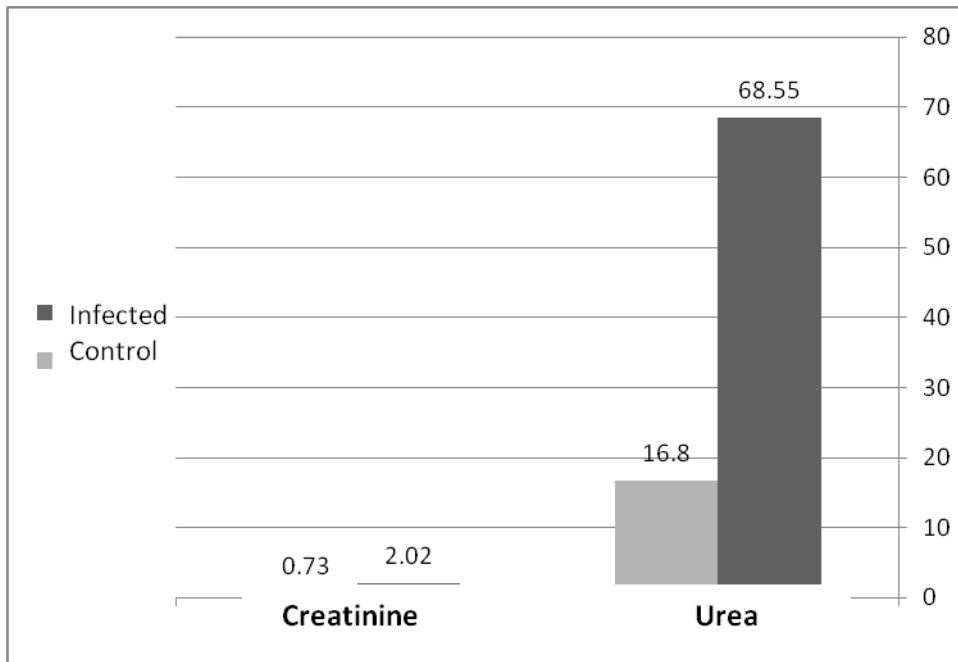


Figure 2- Effect of toxoplasmosis on kidney function (Creatinine and urea).

It is well known that the function of the liver is closely related to the storage and movement of nutrition, the detoxification and the metabolism of water and electrolytes at varies enzymes activation. Toxoplasmosis causes extensive and progressive damage in the liver owing to remarkable proliferations of organisms, such damage in the liver brings about changes in the liver metabolism [8, 9, 11].

Serum AST and ALT activities are excellent markers of hepatocellular injury, and serum ALT activity is more specific than serum AST for assessing liver injury [7].

It has been found that the remarkable changes of enzymes in sera showed a tendency to increase after infection which might reflect the degree of damage of liver [8]. This liver damage leads to metabolic changes causing decrease in hepatic protein synthesis [11]. In addition, it is well established that infection with toxoplasmosis can cause round cell infiltration in the portal areas, cholestasis, swollen endothelial cells and focal necrosis of liver cells [14].

It has found that the changes of protein fractions, AST and ALT varied according to the qualitative difference in intensity of inflammation by strains of toxoplasma and host [9].

The increase in the level of ALP is in agreement with that reported by several studies [8, 9] and could be explained by the presence of *T. gondii* parasites in the bile duct cells since hepatic ALP is reported to be present in the canalicular and luminal domain on bile duct epithelium [14].

Furthermore, the increase in urea and creatinine concentrations in infected group may be explained as *Toxoplasma* parasite causes glomerular lesions and urinary abnormalities which lead to renal failure. Renal failure is described as a decrease in glomerular filtration rate. Biochemically, renal failure is typically detected by an elevated serum creatinine level in the urine [15].

While the increase in the urea concentration may due to *Toxoplasma* deleterious effects on the kidney which decrease the excretion of urea from the body and subsequently increased its serum level [10]. *Toxoplasma* cysts were found in the kidneys of the infected mice and led to many pathological changes in their tissues [15]. *Toxoplasma* may infect and damage kidney, which increase protein excretion in the urine and lead to hypoalbuminemia [11].

In conclusion, this study indicates that toxoplasmosis affects liver and kidney functions as evidenced by the significant increase in the levels of some biochemical parameters in patients group; this may possibly affect some specific enzyme systems, which can, consequently, exhibit serious pathology, including hepatitis, pneumonia, blindness and severe neurological disorders [3].

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