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## Studying of Kidney, Liver Functions and Some Blood Ions In Toxoplasmosis Patients

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### ABSTRACT

The present study was conducted to investigate the effects of toxoplasmosis on liver, kidney and some blood ions such as (calcium, potassium & sodium). A total of 100 blood samples were obtained from pregnant women in several health centers in Baghdad city, which consist of (70 seropositive & 30 seronegative/control group), aged between 20 – 47 years old from September 2013 till September 2014. All of these cases were tested to specific antibody to *Toxoplasma gondii* by using Latex agglutination test and ( IgM & IgG) antibodies using ELIZA technique. The serum samples were examined for liver function (serum aspartate aminotransferase[AST/GOT], serum alanine aminotransferase[ALT/GPT] and serum alkaline phosphatase ALP); kidney function (serum creatinine and blood urea), in addition to( calcium, potassium and sodium) ions. The results showed that the mean levels of ALT, AST and ALP in addition to urea and creatinine were highly significant increased in the seropositive pregnant women compared with control group. On the other hand, decreased calcium level and increased of potassium level was observed, while no significant effects on the level of sodium. We conclude from this study, the toxoplasmosis affects liver, kidney and some blood ions due to the changes on many biochemical parameters in patients group.

### الخلاصة

اجريت الدراسة الحالية لغرض التحري عن مدى تأثير الإصابة بداء المقوسات الكوندية على وظائف الكبد، الكلى وبعض ايونات الدم مثل الكالسيوم والبوتاسيوم والصوديوم بين النساء الحوامل في مدينة بغداد. تم جمع ودراسة 100 عينة دم لنساء حوامل من مراكز صحية متعددة في مدينة بغداد، حيث تضمنت (70 عينة لامصال موجبة و 30 عينة لامصال سالبة وهي مجموعة السيطرة) لفئات عمرية بين 20-47 سنة، والفترة من ايلول 2013 ولغاية ايلول 2014. فحصت جميع العينات بأختبار التلازن المناعي اضافة الى اختبار الأدمصاص المناعي المرتبط بالانزيم ELIZA، اجريت فحوصات امصال الدم الخاصة بوظائف الكبد والمتمثلة ب(انزيم الأسبارتيت الناقل لمجموعة الأمين AST والالانين الناقل لمجموعة الأمين ALT والفسفاتيز القاعدي ALP، ووظائف الكلية والمتمثلة ب(تراكيز اليوريا والكرياتينين)، اضافة الى قياس بعض ايونات او عناصر الدم مثل الكالسيوم، الصوديوم والبوتاسيوم. بينت النتائج وجود زيادة معنوية في معدلات فعاليات ALT و AS T و ALP اضافة الى تركيزي اليوريا والكرياتينين في مصول النساء الحوامل المصابات بالمرض مقارنة مع مجموعة السيطرة. من جهة اخرى فإن معدل الكالسيوم اظهر انخفاض عالي المعنوية، بينما ازداد معدل البوتاسيوم بشكل عالي المعنوية في حين لم يظهر معدل الصوديوم اي تأثير في هذه الدراسة مقارنة مع مجموعة السيطرة. نستنتج من الدراسة بأن لطيفلي المقوسات الكوندية تأثير كبير على وظائف الكبد والكلى وبعض ايونات الدم نتيجة للتغيرات التي ظهرت في مستويات بعض المتغيرات الكيموحياتية والتي تمت دراستها في مجموعة المرضى.

### INTRODUCTION

Toxoplasmosis is a well known protozoal infection caused by obligate intracellular parasite *Toxoplasma gondii* which is one of the world's most common parasites[1]. It is now believed to be a coccidian parasite but an unusual one, having an intestinal phase in its homologous host like family felidae, particularly domestic cat, and an extra-intestinal phase in its heterologous host, such as man, mouse and other animals[2]. Toxoplasmosis is a globally distributed zoonosis with a clinical impact in the unborn fetus and in the immunosuppressed individual[3]. A clear understanding of how this parasite moves through the environment between wildlife, domestigated animals and humans, is critical in informing risk assessment and

identifying potential interventions to reduce the burden of disease[4,5]. *Toxoplasma gondii* could be either congenital where it is transmitted through placenta[6], or acquired in several ways including contact with contaminated food or ingestion of undercooked infected meat, dust soil and it can be also acquired via blood transfusion[7,8]. It infects man and other warm-blooded animals on every continent, this disease is of economic importance in regard to animal reproduction and has become a public health concern since it leads to abortion and neonatal complications in humans, on the other hand educational programs focused on reducing *T. gondii* environmental contamination are essential for the congenital infection control[9].

The aim of the present study is to determine the kidney, liver functions and some blood ions in toxoplasmosis women from different areas in Baghdad city.

**MATERIALS AND METHODS**

**Sample Collection:-**

100 blood samples were carried out on pregnant women aged between (20-47) years old (70 seropositive & 30 seronegative for toxoplasmosis disease), from september 2013 to september 2014. These samples were taken from patients and control, which were collected from several health centers in Baghdad City, then centrifuged and sera were collected then kept frozen at (-20°c) until analyzed.

**Serological tests:-**

This tests were used for detection of specific antibody of Latex Agglutination test and IgM & IgG antibodies using Enzyme-Linked Immunosorbent Assay (ELIZA) technique (BioTek) USA.

**Laboratory tests:-**

1-Liver function tests: This tests were evaluated by estimation of activates of:-

a-Serum alanine aminotransferase (ALT/GPT): (kit, LINEAR CHEMICALS, S.L., SPAIN), by UV enzymatic method.

b-Serum asparate aminotransferase (AST/GOT): (kit, LINEAR CHEMICALS, S.L., SPAIN), by UV enzymatic method.

c-Serum Alkaline Phosphatase (ALP): (kit, BioMerieux, France), by Colorimetric determination of alkaline phosphatase activity [10].

2-Kidney function tests: This tests were evaluated by estimation of :-

a-Serum Creatinine (kit, LINEAR CHEMICALS, S.L., SPAIN), by Kinetic colorimetric method.

b-Blood Urea (kit, LINEAR CHEMICALS, S.L., SPAIN), by Enzymatic colorimetric method.

3-Blood Ions:-

a-Calcium level was determined by using (kit, LINEAR CHEMICALS, S.L., SPAIN)(Total colorimetric method)[11].

b-Potassium level (kit, Human Gesellschaft for Biochemica and Diagnostica mbH), by Phtometric Turbidimetric Test.

c-Sodium level (kit, Human Gesellschaft for Biochemica and Diagnostica mbH), by Phtometric Determination of Serum Sodium Mg-Uranylacetate Method, Colour Test[12].

**Statistical Analysis**

The Statistical Analysis System- SAS, was used to effect of different factors in study parameters. Least significant difference –LSD test was used to significant compare between means & Chi-square test was used to significant compare between percentage in this study[13].

**RESULTS AND DISCUSSION**

This study appeared the affect of toxoplasmosis infection on (liver & kidney) functions, and some blood ions such

as (sodium, potassium & calcium) in infected group compared with control group.

As shown in Table-1-, the IgG & IgM antibodies were increased in the sera of women with toxoplasmosis in the percent (68.57% & 21.43%) respectively, while this result appeared (10.00%) for (IgG & IgM) antibodies. So the chi-square test here showed highly significant(11.094)(p<0.01) for this result.

**Table 1: Distribution of Toxoplasma sample study according to (IgG , IgM & IgG+IgM) antibodies**

Antibodies	No.	Percentage (%)
IgG	48	68.57
IgM	15	21.43
IgG+IgM	7	10.00
Total	70	100%
Chi-square - $\chi^2$	---	11.094 **
(P<0.01)**		

Table-2-, shows the effect of toxoplasmosis on kidney function so, this result apperead increased in the mean of urea concentration (69.48±1.85)mg/dl, compared with control group (30.73±0.79)mg/dl. On the other hand, the mean of creatinine also showed increased in highly significant in infected group (1.564±0.045)mg/dl, compared with control group (0.646±0.023)mg/dl, so when we copared between two groups by T-test apperead highly significant in these concentrations (5.745&0.141).(p<0.01). Renal failure means decreased in glomerular filtration for this reason, in biochemical tests the renal failure appeared typically by an elevated serum creatinine[14]. Toxoplasmosis and many other parasites cause to glomerular lesions and urinary abnormalities such as proteinuria, lymphocyturia and pyuria were occurred[15]. This result was similar to[16].

**Table 2: Compare between Toxoplasma (+ve) and control group (-ve) in BloodUrea & Serum Creatinine**

Group	No.	Mean ± SE	
		Blood Urea Mg/dl	Serum Creatinine Mg/dl
Toxoplasma (+ve)	70	69.48 ± 1.85	1.564 ± 0.045
Control (-ve)	30	30.73 ± 0.79	0.646 ± 0.023
T - test value	---	5.745 **	0.141 **
(p<0.01)**			

Table-3- appeared that increased in the means of ALT, AST and ALP activities in infected group (Toxoplasmosis women)(15.95±0.26, 15.97±0.27 and 104.61±1.11)IU/L respectively, while they were showed (7.56±0.23, 6.67±0.27 and 73.47±1.37)IU/L respectively in control group. So, the T-test value here showed highly significant differences (0.855, 0.903 & 3.801)(p<0.01), when we compared between two groups. Toxoplasmosis could be associated with abnormal liver function tests, round cell infiltration in the portal areas, swollen endothelial cells and/or focal necrosis of liver cells.[17]. It causes progressive and extensive damage to the liver,

remarkable proliferations of organisms like damage which occurred about changes in the liver metabolism[18]. Changes of ALT & AST varied according to the qualitative difference in intensity of inflammation by strains of *Toxoplasma* & host[19]. This result agreement with [16,20,21].

**Table 3: Compare between *Toxoplasma* (+ve) and control group (-ve) in GPT, GOT & ALP**

Group	No.	Mean ± SE		
		GPT(IU/L)	GOT(IU/L)	ALP(IU/L)
<i>Toxoplasma</i> (+ve)	70	15.95 ± 0.26	15.97 ± 0.27	104.61 ± 1.11
Control (-ve)	30	7.56 ± 0.23	6.67 ± 0.27	73.47 ± 1.37
T-test value	---	0.855 **	0.903 **	3.801 **
** (P≤0.01).				

On the other hand from this study, table-4- showed the effect of toxoplasmosis on many concentrations of blood ions such as calcium, potassium & sodium, this result appeared decreased in mean of calcium concentration(4.97±0.06)mg/dl and increased in potassium concentration(6.00±0.11)mmol/L, while showed not changes in sodium concentration(142.34±0.58)mmol/L in all positive cases compared with control group(8.44±0.07, 4.72±0.06 and 143.86±0.84) respectively, for this reason when we compared between two groups by T- test showed highly significant in calcium & potassium concentrations(0.228 & 0.348), while appeared non significant in sodium(2.064). The reduced of calcium concentration may be due to that the cases with hypocalcaemia may be more susceptible to invasion by *Toxoplasma gondii* especially during pregnancy, which is leads to calcium decrease as a result of the more require to calcium for the fetal skeletal during pregnancy which is a time of increased need for calcium[22]. In addition to inverse relationship between calcium concentration in the cytoplasm of host cell and the ability of this parasite to invade the cells, so the increase of host cell calcium leads to decreased invasion of parasite[23]. This result was similar to[24]. Furtherly, the present study appears change in potassium concentration due to the *Toxoplasma* has the ability to respond to changes in the concentration of ions such as potassium[25]. In addition this study showed increased level of urea & creatinine which mentioned above, so this result may be leads to impaired excretion of potassium resulting to hyperkalemia[26].

**Table 4: Compare between *Toxoplasma* (+ve) and control group (-ve) in S. Calcium, S. Potassium & S. Sodium**

Group	No.	Mean ± SE		
		S. Calcium(mg/dl)	S. Potassium(mmol/L)	S. Sodium(mmol/L)
<i>Toxoplasma</i> (+ve)	70	4.97 ± 0.06	6.00 ± 0.11	142.34 ± 0.58
Control (-ve)	30	8.44 ± 0.07	4.72 ± 0.06	143.86 ± 0.84
T-test value	---	0.228 **	0.348 **	2.064 NS
** (P≤0.01), NS: Non-significant.				

In conclusion, the toxoplasmosis affects liver, kidney functions which were evidenced by increase levels (concentrations) of ALT, AST & ALP activities, in addition to urea & creatinine concentrations in patient's group. Furtherly, it also causes (decrease calcium, and increase of potassium, but not affect on sodium) concentrations according to some biochemical parameters.

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