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Serum-Glutamic-Pyruvic-Transaminase (SGPT) and Serum- Glutamic-Oxaloacetic-Transaminase (SGOT) Estimation in Different Groups of Women Infected with Toxoplasmosis

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Abstract

The aim of this study was to investigate the disturbances of some liver enzymes like GPT and GOT level in different groups of women infected with toxoplasmosis. This study was performed on 600 apparently healthy women (pregnant, miscarriage and single) collected from different hospitals in Baghdad, AL-Yarmouk Teaching Hospital and Fatima AL-Zahra Hospital for Obstetric and children and Hay Hiteen clinic during November 2013 till April 2014. The detection of toxoplasmosis was done by a preliminary screening test LAT and the positive percentage was (29.55%), (30.36%) and (40.08%) for pregnant, miscarriage and single women respectively. While, the confirmation of positive results of LAT was done by ELISA-IgG and the results were (40%), (41.81%) and (18.19%) respectively. The disturbances of GPT and GOT liver function enzymes in those women were evaluated and the result showed that only miscarriage women revealed high significant increase of GPT in comparison to all groups while there was no disturbances of GOT happened in any group of women infected with toxoplasmosis.

Keywords: Toxoplasmosis, GPT and GOT enzymes, aborted women.

تقدير نشاط بعض أنزيمات الكبد وهما الألانين اسبارتاتيت وألالانين ترانسفيريز في مجاميع مختلفه من ألنساء المصابات بداء المقوسات الكونديه

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الخلاصه

هدفت ألدراسه ألحاليه للتحري عن الخلل في مستوى بعض أنزيمات ألكبد مثل GPT و GOT في مجموعه من ألنساء المصابات بداء ألمقوسات ألكونديه. أجريت ألدراسه على 600 أمرأه ظاهريا" سليمه مكونه من (حوامل ، مجهضات وغير متزوجات) من مستشفيات مختلفه من بغداد (مستشفى اليرموك ألتعليمي، مستشفى فاطمه ألزهراء للنسائيه وألأطفال، مستوصف حي حطين). خلال ألفتره من تشرين ألثاني 2013 ولغايه نيسان 2014. ألتحري عن داء ألمقوسات ألكونديه تم بأجراء فحص مسحي أولي بواسطه أختبار ال LATوكانت ألنتائج (29.55%) ، (30.36 %) و (40.08%) للنساء ألحوامل وألمجهضات وألغير متزوجات على ألتوالي . بينما أظهر ألفحص ألتأكيدي ELISA– IgG للنتائج ألموجبه بال LAT نسب أخرى وهي (40 %) ، (41.81%) و (18.19%) على ألتوالي. ألاضطرابات في أنزيمات ألكبد GPT و GOT في أولئك ألنساء تم تقييمه وبينت ألنتائج أنه ألمجهضات فقط تميزت بأزدياد معنوي في مستوى أنزيم GPT

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مقارنه بالمجاميع ألاخرى في حين لم يشهد أنزيم ال GOT أي تغيير في أي مجموعه من ألمجاميع ألمصابه بالمقوسات ألكونديه.

Introduction

Toxoplasmosis is caused by infection with the obligate intracellular protozoan parasite *Toxoplasma gondii*. It is one of the most prevalent chronic infection affecting one third of the world`s human population [1]. *Toxoplasma gondii* may be contracted by consuming contaminated meat or by coming in contact with cat feces containing oocysts, and infects a large proportion of the world`s population. Individuals at risk include fetuses, newborns, and immunologically impaired individuals [2]. Concurrent parasitic infections are common among individuals living under poor sanitary conditions in developing countries. It has been suggested that infection can influence health both negatively, i.e., by worsening protective responses against in HIV- infected individuals [3], ,and positively, by improving the adaptive immune response against inflammatory diseases [4].Enzymes are specific biologic proteins that catalyze biochemical reactions without altering the equilibrium point of reaction or being consumed or undergoing changes in composition [5].Enzymes are released into the systemic circulation as a result of: I. Increased rate of cell turnover during active growth or tissue repair or cancer [6]. II. Necrosis or severe damage to cells [7]. III. Induction by disease or drugs [8]. Occasionally, increased enzyme levels in serum are caused by increased rates of intracellular synthesis and the subsequent diffusion of these secreted enzymes into the circulation [9]. Transaminases also called aminotransferase, which catalyze the conversion amino acids to the corresponding α-keto acid and vice versa transfer of amino group (NH2) from one molecule to another [10]. These enzymes are important in the production of various amino acids, and measuring the concentration of various transaminases in the blood is important in the diagnosis and tracking many diseases. Characteristic high values are seen in myocardial infarction and viral hepatitis. The presence of elevated transaminases can be an indicator of liver damage [11]. Some liver function enzymes showed a significant disturbance with many parasitic diseases such as: Sarcocystosis [12] : leishmaniasis [13]; [14] toxoplasmosis [15] amoebiasis [16] hydatidosis [17]. So the aim of this study was to investigate the disturbances of some liver enzymes like GPT and GOT in different groups of women infected with toxoplasmosis.

Materials and Methods

A total of 600 blood samples were collected from apparently pregnant, miscarriage, and single women with age range between 15-35 year, during the period from November 2013 till April 2014. The samples were collected from different hospitals in Baghdad, AL-Yarmouk Teaching Hospital, Fatima AL-Zahra Hospital for Obstetric and children Hospital and Hay Hiteen Clinic. Before blood sampling, some information from all women were collected according to a questionnaire sheet prepared previously included [name, age, duration of pregnancy, number of miscarriages and history of abortion] . Five ml of venous blood were drowned from redial vein of each woman. The blood was placed in plain tube and allowed to clot at room temperature. Then centrifuged at 3000 rpm for 10 minutes and then sera were dispensed into 3-4 (Eppendrof-tubes) by using micropipette and stored at -20°c until use.

Latex agglutination test (LAT)

A rapid latex agglutination test for qualitative and semi –quantitative detection of *Toxoplasma gondii* antibodies in serum was run for all samples using (Toxo latex kit, spectrum).

Detection of IgG anti- *T.gondii* antibodies by ELISA

The bio check *Toxoplasma* IgG ELISA (BC-1085, Sgpain) kit was used. This test was done only for LAT positive samples, according to the manufacturès instructions. Final results were recorded by ELISA reader at 450nm.

Determination of serum alanine transaminase (GPT)

The syrbio(SGPT) kit was used. Enzyme level was measured according to the manufacturer`s instructions, and the color measured at 546nm.

Determination of serum aspartate transaminase (GOT)

The syrbio(SGOT) kit was used. Enzyme level was measured according to the manufacturer`s instructions, and the color measured at 546nm.

Statistical Analysis

The Statistical Analysis System- SAS [18] ,was used to effect of different factors in study parameters. Chi-square test was used to significant compare between percentage &Least significant difference-LSD test (and Duncan multiple range) was used to significant compare between means in this study.

Results and discussion

Prevalence of toxoplasmosis in studied subjects

A total of 600 apparently healthy women (pregnant, miscarriage and single) were included in the present study. 247 of them showed latex sero-positive toxoplasmosis by Latex agglutination test (LAT) giving an incidental rate of 41.16 % as shown in Figure -1.

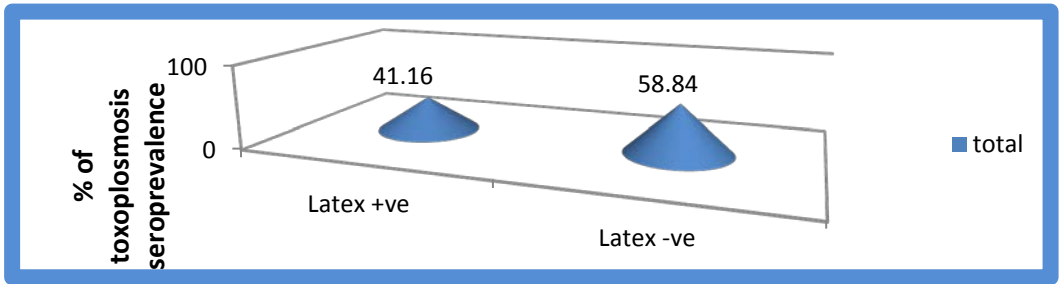

Figure 1- The percentage distribution of toxoplasmosis antibodies in different groups of women by LAT.

The present results were close to the results of some other previous studies of AL-Obeady [19] and AL-Shikhly [20] who revealed the percentage of toxoplasmosis (41%) and (43%) respectively. While the results disagreed with Saleh [21] who found the percentage of infection by LAT was 47%.

The infection with *T.gondii* distributed in the studied subjects by LAT test as follow: 73/247 (29.55 %) pregnant, 75/247 (30.36%) miscarriage and 99/247 (40.08 %) in single women. Figure -2 .

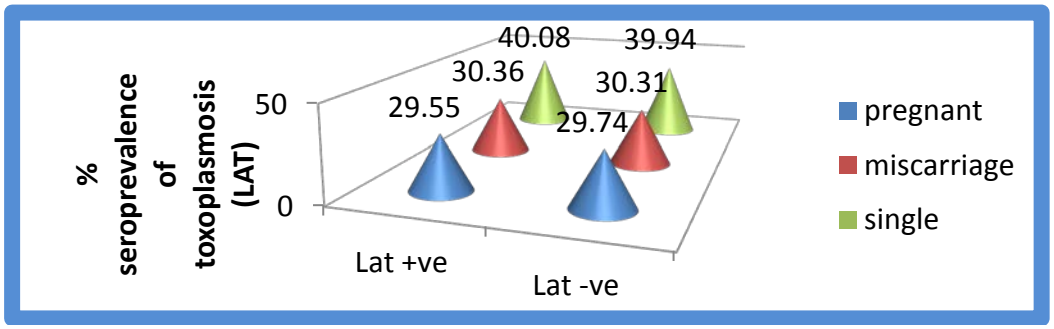

Figure 2- Seroprevalence of toxoplasmosis in different groups of women (pregnant, miscarriage and single) by LAT.

The statistical analysis showed that there were high significant differences ($p<0.01$) in LAT sero +ve between single and pregnant women and also between single and miscarriage women. Single women characterized by the lowest percentage of *Toxoplasma* infection.

LAT test were considered as an primary screen test for detection of *Toxoplasma gondii* antibodies globally. The differences between this result and other results by different authers may be due to the seroprevalence estimated for human population which vary greatly among different countries, different geographical areas within one country, and among ethnic groups living in certain areas [22], or may be attributed to several other factors including cultural level, nutritional habits, age or rural and urban area [23].

The use of LAT as a screening test in the sero diagnosis of toxoplasmosis is more common because this test is relatively simple, cheap and specific but less sensitive than other serological tests [24]. So ELISA test were used for estimate more reliable results.

ELISA -IgG test.

All positive samples 247 in LAT were subjected to more specific test ELISA, IgG test to confirm the infection. The results revealed different percentage of seroprevalence of toxoplasmosis by this test, both miscarriage and pregnant women characterized by high significant ($p<0.01$) percentages 69/165 (41.81%) and 66/165 (40.00%) respectively of toxoplasmosis in comparison to single infected women 30/165 (18.18%). Figure -3.

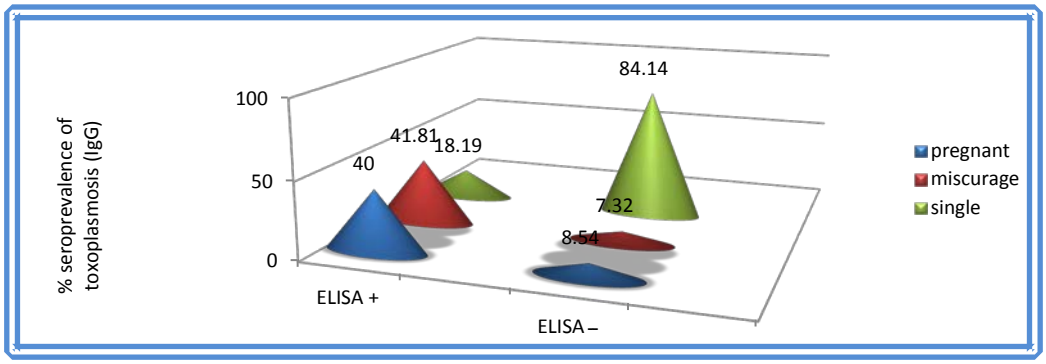

Figure 3- Seroprevalence of toxoplasmosis in different groups of women (pregnant, miscarriage and single) by ELISA IgG test according to LAT sero+ve.

The total true positive percentage of toxoplasmosis by ELISA-IgG according to LAT sero+ve was 165/247 (66.80%) figure -4.While the percentage of toxoplasmosis according to the total samples was 165/600 (27.5%) figure -5.

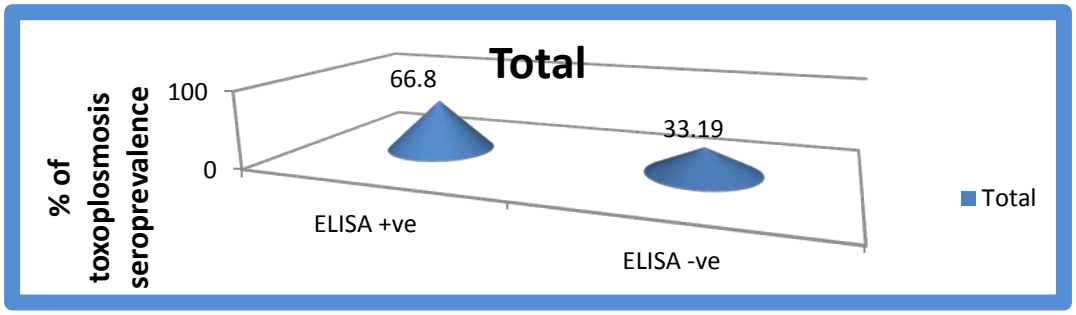

Figure 4- The percentage distribution of toxoplasmosis in different groups of women by IgG test according to LAT sero+ve.

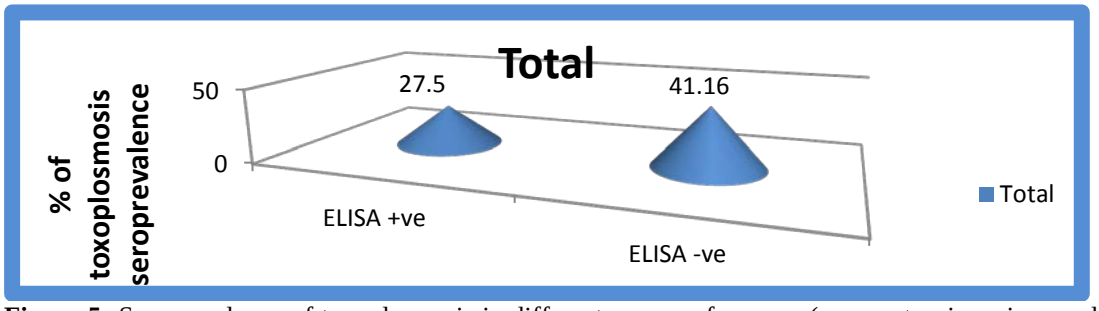

Figure 5- Seroprevalence of toxoplasmosis in different groups of women (pregnant, miscarriage and single) by ELISA-IgG according to the total samples.

The seoprevalence of toxoplasmosis among pregnant women by ELISA technique was 40.00 % which was in line with the results of Abdulla [25] among pregnant women in Mosul province which was 56.6%. While the results higher than Falih [26] who found that the rate of infection in Baghdad province among pregnant women was 18%, and by Kareem[27] who found the percentage of infection among pregnant women was 31.04%, and lower than Abdul-Razzaq [28] who found the rate of infection was 61.2% in AL-Tameem province.

The percentage of toxoplasmosis among miscarriage women in this study was 41.81 % which was lower than Yacoob *et al* [29] who they found that the rate was 52.1% among aborted women by using

ELISA in Basrah province, and by AL-Shikhly [20] who found the rate of infection in aborted women was 60%, and in line with Kareem [27] who found the rate of infection in aborted women was 46.5% in Baghdad province. The current results recorded among miscarriage women was higher than that recorded by Razzaq *et al* [30] who found that the rate of toxoplasmosis among aborted women was 0.79% in Dohuk province, and by AL-Dalawi [31] who found the rate of toxoplasmosis among aborted women was 31.6% in Baghdad province, and by AL-Obeady [19] who found the rate of toxoplasmosis was 34% among aborted women in Baghdad province.

Positive ELISA test for specific IgG antibody against *T.gondii* was 18.19% in single women, this results in agreement with AL-Dalawi [31] and Kareem [27] who they found the rate of toxoplasmosis among single women was 21.8% and 20% respectively in Baghdad province. While the result was lower than the results of AL-Shikhly[32] who found the rate of infection among premarital females was 33.3% in Baghdad province, and by AL-Dalawi[31] Khalil [33] and Kareem [27]who they showed that the percentage of infection was 29.02%, 27.1% and 31.4% respectively.

These variable results may be due to the differences in the specimens used by each researcher and their variable condition and date of studied, or may be due to differences in sensitivity and specificity of the used techniques AL-Dujaily [34]. Different laboratory methods in addition to number of samples, time of sampling and to geographical location play an important role in difference in the seroprevalence rate of toxoplasmosis, nutrition, habitate, economic state, procedures [35 - 37]. Higher prevalence is classically observed for tropical countries with a humid and warm climate, and conversely, lower prevalence is found for arid countries or for colder countries. However, anthropogenic factors also explain a large part of variations in human seroprevalence, including dietary habits (method of cooking meat, hand washing, kinds of meat or vegetables consumed and vegetable cleaning, ect) economic, social, or cultural habitis, quality of water, and sanitation coverage [38].

In relation to age groups of infection with *T.gondii* the highest distribution of infection was recorded at (25-29) years in both pregnant and miscarriage women, and it represents 45.45%, 36.23% respectively Table -1 , while the most frequent age group for single women was (15-19) years , and represent 40.00% of the total number of this group. This result is coincided with other results by Abdullah [25] who concluded that the main age of seropositive of toxoplasmosis cases were between (11-20) years, and with [39, 31,27 , 40] who concluded that the main age of seropositive of toxoplasmosis cases were between (20-30) years.

These differences in the percentages of infection according to age groups may be related to the different number of each infected women group at each age group, also the women may be contact with *Toxoplasma* in childhood and adolesance, through cats contact, soil exposure may led to accumulation of anti – *Toxoplasma* antibodies at different percentages within human being [41].

Table 1- The percentage distribution of toxoplasmosis in different group of women (pregnant, miscarriage and single) according to age group by ELISA-IgG test.

Studied group		ELISA + VE					Chi-square- χ^2
		15-19	20-24	25-29	30-35	total	
Pregnant group	N	8	16	30	12	66	9.24 **
	%	12.12 b	24.24 a	45.45 a	18.18 b	40.00 a	
Miscarriages	N	9	15	25	20	69	7.53 **
	%	13.04 b	21.73 a	36.23 b	28.98 a	41.81 a	
Single	N	12	8	7	3	30	9.69 **
	%	40.00 a	26.66 a	23.33 c	10.00 c	18.18 c	
Chi-square- χ^2		9.024 **	1.079 NS	7.838 **	7.102 **	9.512 **	---
** (P<0.01).							

Percent having different small letter in columns are significant difference.

GPTand GOT enzymes level in *Toxoplasma* women.

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 [42]. The infection may cause

elevated alanine transferase, creatinekinase, alkaline phosphatase, hyperbilirubinemia and hyperproteinemia [43]. The relation between the results of ELISA IgG antibodies against *Toxoplasma* antigens and the mean concentrations of GPT enzyme in the sera of women (miscarriage, pregnant, single) was mentioned in Table-2.

Table 2 - The relationship between ELISA-IgG antibodies and the mean concentration of SALT(GPT) in the sera of women group (pregnant , miscarriage and single) by syrbio test kit.

N = 100						
Test	miscarriage	miscarriage	pregnant	pregnant	Single	Single
	IgG + ve	IgG -ve	IgG +ve	IgG-ve	IgG+ ve	IgG-ve
No	20	20	20	20	20	20
Mean IU/ml	7.72 ± 0.82 A	4.58 ± 0.35 B	4.74 ± 0.46 B	4.50 ± 0.32 B	4.45 ± 0.27 B	4.41 ± 0.19 B

Means having different letter in row are significant difference.
LSD value = 1.379* . (P<0.05).

The results showed that only miscarriage women had significant (p<0.05) increase level of GPT (7.72 ± 0.82IU/ml) in comparison to all studied groups (+ve and –ve) and there was no significant differences (p>0.05) among all studied groups as shown in Table-3. But miscarriage women characterized by a high non-significant increase of GOT mean concentration (9.97 ± 0.86 IU/ml) in comparison to all studied groups.

Table 3- The relationship between ELISA-IgG antibodies and the mean concentration of SAST (GOT) in the sera of women group (pregnant, miscarriage and single) by Syrbio kit.

N =100						
Test	miscarriage	miscarriage	pregnant	pregnant	Single	Single
	IgG+ve	IgG-ve	IgG+ve	IgG-ve	IgG+ve	IgG-ve
No	20	20	20	20	20	20
Mean IU/ml	9.97 ± 0.86 A	8.60 ± 0.46 A	9.81 ± 0.89 A	9.54 ± 0.63 A	9.25 ± 0.59 A	8.82 ± 53 A

Means having similar letter in row are non-significant difference. LSD value = 2.831 .

The GOT or GPT (also known as aspartate aminotransferase (AST) and alanine aminotransferase (ALT). The actual amount of the measured values, the time course of transaminases and the relation to each other, but also the comparison with other parameters are of diagnostic importance *[*44]. The result of the current study showed only miscarriage women with high levels of both GOT, GPT enzymes in comparison to all studied groups included in this study. Such elevation was showed by AL-Kaysi *et al* [45]in mice infected with toxoplsmosis but the result not agreed with AL-Dujaily [34] who observed an increase level of these enzyme in infected pregnant womem. The increased serum GOT and GPT activities would be related to abnormal liver function. On the other hand, this study observed hypoalbuminemia in infected women. Such result confirm liver function disturbances because, low albumin concentration indicates impaired liver function [46]

Elevation in GPT and GOT are usually secondary to tissue damage. This is because such damage results in the leakage of these enzymes from their intracellular stores into plasma. GPT is most prevalent in the liver whereas GOT may also be found in heart, skeletal muscle and liver to nearly the same extent. Toxoplasmosis causes extensive and progressive damage to the liver, remarkable proliferations of organisms such damage in the liver brought changes in the liver metabolism [47] Changes of protein fractions, ALT, AST varied according to the qualitative difference in intensity of inflammation by strains of *Toxoplasma* and host [48]. Significant increases in the transaminases commonly accompany such liver disease as toxic hepatitis, acute liver necrosis or hepatic cirrhosis. Increases in GOT are often seen in hemolytic anaemia, myocardial infarction and cholestatic diseases of the liver [49 -51]. Although the relation of enzymatic host-cell and organism has been stated in varies reports [51]. Remarkable changes of enzymes in sera showed a tendency to increase after infection which might reflect the degree of damage of liver, albumin production in the reticuloendothelia tissue of the liver , kidney and gamma globulin in some tissues [52].

Results of the present study also revealed an inverse relationship between albumin and liver enzymes ALT and AST (negative), globulin and ALT/AST (positive) in infected women; however, no correlation was observed for the other protein fractions and liver enzymes.

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