

## Toxoplasmosis and Luteinizing Hormone in Women with and without Recurrent Abortion in Baghdad

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### Abstract

To determine the overlaps of toxoplasmosis infection with serum luteinizing hormone level (s. LHL); we carried out this study on Baghdad women who suffered recurrent spontaneous abortion. Herein, a group of pregnant women aborted once (group I), and a second group who had multiple abortions (group II) were compared with a third group of normal pregnant women, which involved to serve as a control (group III). All were conducted to the Public Al-Karakh Hospital in Baghdad, Capital of Iraq, and subjected to have positive and negative-IgG tests, and s. LHL test. Out of 45 patients of the first group, 53% have shown a non-significant increase value of positive-IgG, while 47% of those patients had a negative-IgG stayed within normal, if compared with normal pregnancy women. 73% of the second group have displayed a significant increase of positive-IgG level, and the corresponding s. LHL was significantly high. In addition, notable significant elevation of s. LHL recorded from the second group who had negative-IgG. These results might reveal a significant contribution of hyper s. LHL to the repetition of spontaneous abortion occurrence in Baghdad.

**Keywords:** Iraqi pregnancy women; Spontaneous abortion; Toxoplasmosis; LH

**Abbreviations:** *T. gondii*: *Toxoplasmosis gondii*; s. LHL: Serum Luteinizing Hormone Level; ELISA: Enzyme Link Immune Sorbent Assay; IFA: Indirect Fluorescent Antibody; IgM, IgG, and IgA: Immunoglobulin M, G and A

### Introduction

*Toxoplasma gondii* (*T. gondii*) is considered a symptomatic and self-limiting infection among healthy humans. However, severe complications may occur between infected pregnant women and immune compressed patients [1,2]. It is mainly caused by the uptake of either meat of the infected animals or the oocyst-contaminated food [3]. Several studies serve to show that *T. gondii* attacks about nearly one third of humanity [4]. In spite of this parasite's ability to develop in a variety of vertebrate hosts, house cats and certain other felidae are still the mainly hosts [5].

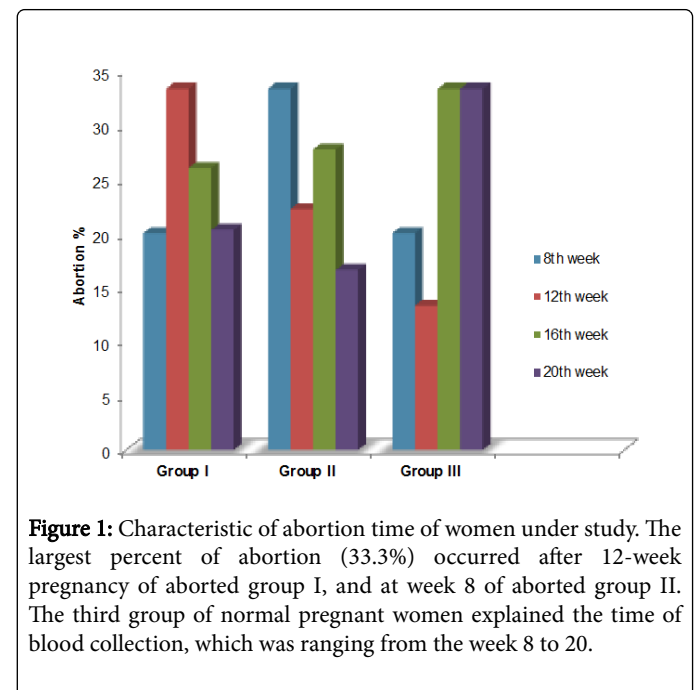
The severity of *T. gondii* infection and its influence on sex and pregnancy associated hormones were of particular public health interest; in early pregnancy stages, fetal toxoplasmosis can cause several symptoms including miscarriage, in addition to incomplete growth of stillbirth such as birth defect babies with a degree of brain and eyes damage depending on the gestational age [6,7].

The high concentration of glycoprotein hormone, such as LH, FSH, and PRL is deriving the temporary insulin resistance, which appears in pregnant and many patients with physiological conditions [8].

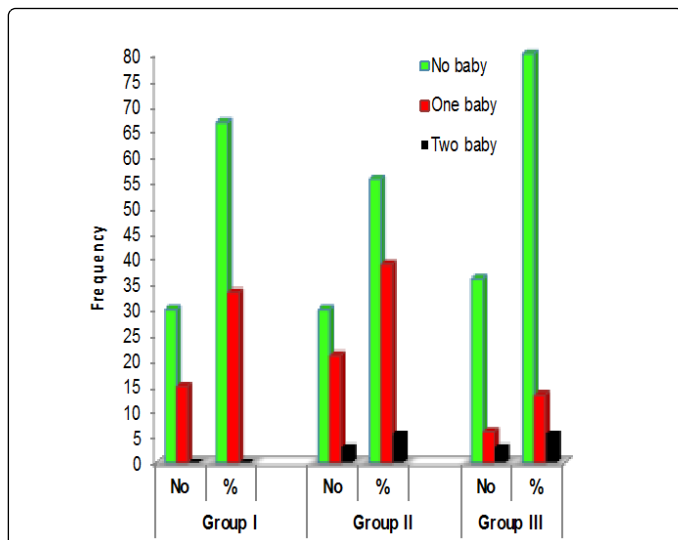
We previously indicated that repeated abortion might happen due to hyperglycemia-associations rather than infection by *T. gondii* [9]. In this study, we investigated the truth behind the overlaps between

toxoplasmosis infection and increased serum Luteinizing hormone level (s. LHL) hormone, to shed a light on the real cause of recurrent spontaneous abortion in Baghdad women.

The major information of the spontaneous habitual abortion women groups (both group I and II) and the normal pregnancy group (control) are compared in Figures 1-3.



**Figure 1:** Characteristic of abortion time of women under study. The largest percent of abortion (33.3%) occurred after 12-week pregnancy of aborted group I, and at week 8 of aborted group II. The third group of normal pregnant women explained the time of blood collection, which was ranging from the week 8 to 20.

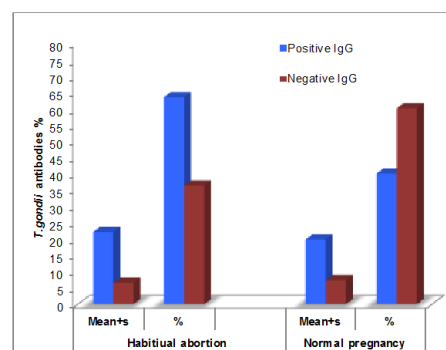


**Figure 2:** Statics of healthy born baby of women under study. Group I (66%) had no borne babies, but 33.3% patients had only one baby before the current abortion and only 3% had 2 healthy babies. For the 2nd group, 54% were without previous babies, 39% had only one, and only 6% had two babies when compared with normal pregnant. 80% of normal group (III) was without babies, 13% with one borne baby and 6% were with two babies (No: number of women).

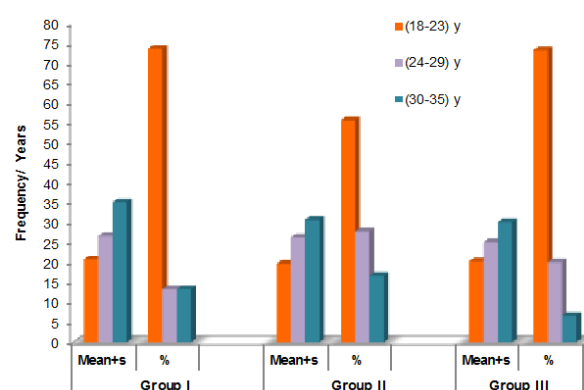
We have found that 33% of group I have lost their babies after 12 weeks of pregnancy, while group II suffered abortion after 8 weeks (Figure 1). Furthermore, 66% and 54% of the 1st and 2nd groups, respectively, were had no baby, while 33% and 39%, respectively, had only one healthy baby (Figure 2). Very low percent of aborted women in group I, and II had 3 healthy babies (3% and 6%, respectively).

Figure 3 revealed that the occurrence of toxoplasmosis in habitual abortion groups, which had a positive-IgG (64%) was significantly higher than normal values ( $22.16 \pm 6.25$  vs.  $19.83 \pm 4.10$ ,  $p < 0.05$ ), simultaneously, positive-IgG value was much higher than negative-IgG value in both the habitual and normal groups,  $p < 0.01$ .

According to the results of serological tests of the current investigation, multiple spontaneous abortions are indeed considered endemic in Baghdad women. A huge proportion of women under study who were suffering abortion has localized between 18-23 years old. 73% were suffered from abortion once, and 55% aborted twice. Whilst, a smaller ratio of aborted women occurred around 24-29 years of age, where 13% aborted once, and 28% aborted twice. The smallest ratio of abortion (13-17%) appeared from the older women (Figure 4). These results clearly indicated a weak link between abortions causes and age as the higher ratio of abortion has been indicated in the younger group. Our finding is in line with other data, which proved a lack of association between the pregnant women's age and Toxoplasmosis [10,11]. Meanwhile, previous reports in Ghana indicated the prevalence of 68% and 82% of toxoplasmosis in pregnant women occurred around 15-25 and 31-40 years of age, respectively [12].

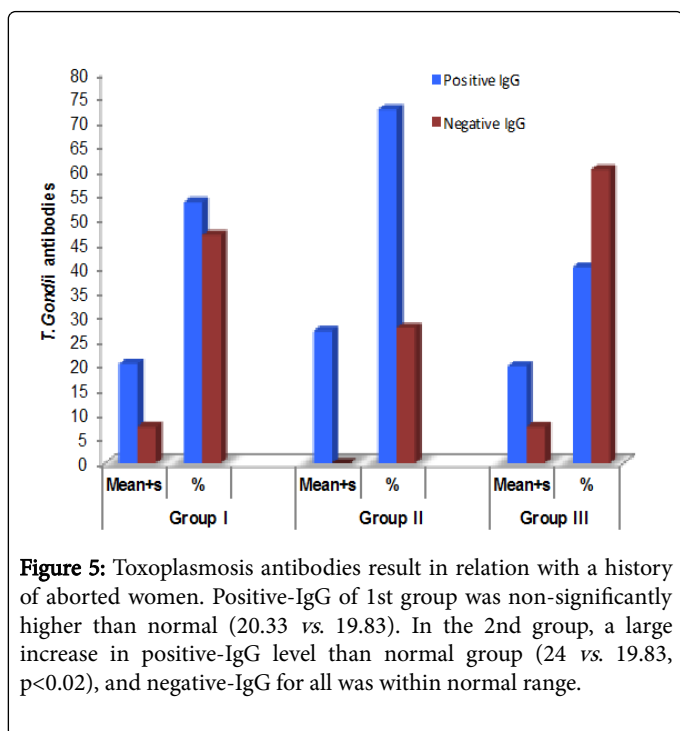


**Figure 3:** Toxoplasmosis results of women under study. Positive-IgG in toxo-habitual aborted group (both once and twice abortion) was significantly higher than normal (mean  $22.6$  vs.  $19.83$ ,  $p < 0.04$ ), and no significant difference negative-IgG ( $6.57$  vs.  $7.37$ ).



**Figure 4:** Age characteristic of abortive and healthy pregnant women. Large proportion (73.4%) of group I was within 18-23 years old (mean 20.71), the largest percent of group II was also between 18-23 y old (mean 19.63), while the smallest percent was within 30-35 y old (mean 30.6). Similarly, in the control group, the largest contribution of pregnant women has been located around 18-23 y old (mean 20.22) and the lowest appeared within 30-35 y age (mean 30).

To further explain how the prevalence rate of toxoplasma antibody is related to the history of abortion time, Figure 5 showed that patients in group I was approximately equally had the positive and negative-IgG levels (53% and 47%, respectively), although a little rise of positive-IgG value over normal ( $20.33 \pm 5.00$  vs.  $19.83.03 \pm 4.10$ ). The appearance of high percentage of negative-IgG (47%) among aborted women could be attributed to previous infections by *T. gondii* prior the pregnancy time. The serological tests of group II explored a significant high positive-IgG, if compared with the normal pregnancy group III women ( $24.00 \pm 7.5$  vs.  $19.83.03 \pm 4.10$ ).



**Figure 5:** Toxoplasmosis antibodies result in relation with a history of aborted women. Positive-IgG of 1st group was non-significantly higher than normal (20.33 vs. 19.83). In the 2nd group, a large increase in positive-IgG level than normal group (24 vs. 19.83,  $p < 0.02$ ), and negative-IgG for all was within normal range.

The current study mainly depends on the positive and negative values of IgG antibodies as a diagnostic marker of toxoplasmosis infection rather than IgM antibodies. A previous study revealed that IgG reflected the earlier infection with *T. gondii* five times more common than IgM antibodies [13], while IgM antibodies reflects the active recent infection [14].

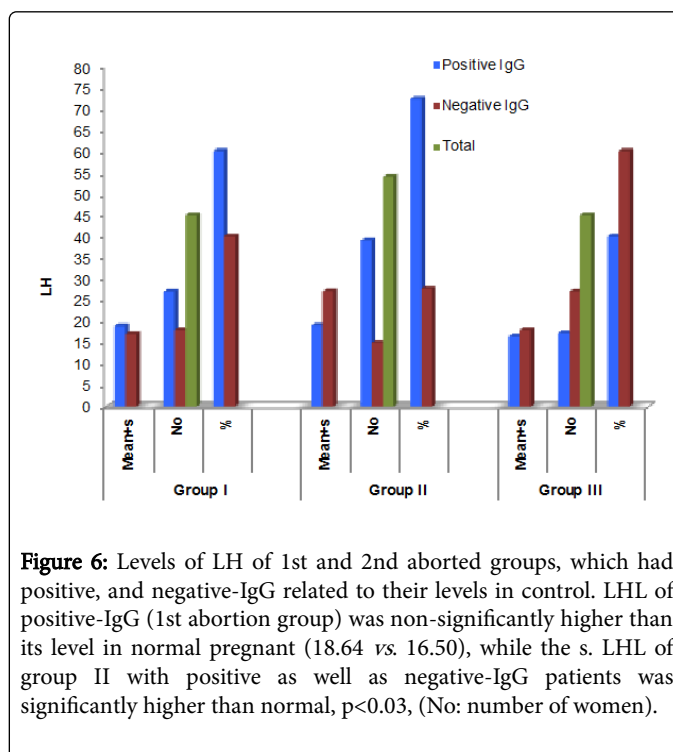
Several studies refer to the risk of prevalence of *T. gondii* varies substantially between one region and another according to the geographic location of the country. Thus, there are many infections, which have been recorded in Iran [15], Qatar [13], Lebanon [16] and Saudi Arabia [17].

Levels of s. LHL of different toxoplasmosis groups are shown in Figure 6. In which, s. LHL of group I that has a positive anti-IgG participant (60%), was notably not significantly higher than the normal values in group III. Serum LHL of group II with positive-IgG (72%) was significantly higher than normal ( $19.14 \pm 9.65$  vs.  $16.5 \pm 7.23$ ,  $P = 0.02$ ). On the other hand, s. LHL of group II with negative-IgG patients (27%) was also significantly higher comparing to normal values ( $27.1 \pm 7.23$  vs.  $17.28 \pm 7.38$ ;  $P < 0.015$ ), contrariwise, that s. LHL of group I (with both the positive and negative -IgG patients) stayed within normal values.

Now the point under discussion whether high s. LHL strongly contributes to habitual abortion or infection of *T. gondii* does. The serological results of the present study indicated a non-significant relevant of toxoplasmosis on aborted groups, in spite of high values of respective IgG (Figures 3 and 5). Previous studies have showed compatible findings, which indicate that the effect of toxoplasmosis on spontaneous abortion is much lower than previously estimated among aborted pregnancies [18-21]. In contrast, other reports found a clear relationship between abortion and toxoplasmosis [22,23].

On the other hand, result of s. LHL in group II with positive-IgG was significantly higher than normal, while the corresponding s. LHL of group I was statistically non-significantly higher than normal (18.46

$\pm 8.17$ , 60% vs.  $16.5 \pm 7.23$ , 40%) (Figure 6). Previous and recent studies concluded that s. LHL increases significantly in women with unexplained recurrent spontaneous miscarriage; thereby, s. LHL might play a major role of pathogenesis of that miscarriage [24,25]. This type of miscarriage was explained by the fact that hyper secretion of s. LHL in women with recurrent abortion will induce the premature oocyte maturation or endometrial either directly or indirectly which leads to spontaneous abortion [26,27].



**Figure 6:** Levels of LH of 1st and 2nd aborted groups, which had positive, and negative-IgG related to their levels in control. LHL of positive-IgG (1st abortion group) was non-significantly higher than its level in normal pregnant ( $18.64$  vs.  $16.50$ ), while the s. LHL of group II with positive as well as negative-IgG patients was significantly higher than normal,  $p < 0.03$ , (No: number of women).

In conclusion, interestingly, our results have presented a significant increase of s. LHL in toxoplasmosis patients with multiple abortion, suggesting that number of pregnancy losses may be due to this factor rather than affection by *T. gondii*. Such a work could have a benefit in controlling this type of spontaneous abortion.

## Experimental

This study was performed on 144 women who have been submitted to a gynecologist of the Public Al-Karakh Hospital in Baghdad (Capital of Iraq) with a history of abortion. They classified into three groups: Group I, 45 women who spontaneously aborted once and aged for 18-37 years. Group II, 54 women suffering from spontaneous abortion twice, aged for 17-32 years. Group III, 45 healthy pregnant women, aged for 18-30 years who were included as control subjects.

A gynecologist, covering age and the fate of every pregnancy, as well as the health status of her live-born babies, recorded a full history of patients. Clinical examination and laboratory investigations were applied in order to discharge other causes of fetal wastage such as: the genital tract malformation, diabetes mellitus, hypertension, renal disorder or incompatibility of Rhesus factor. All the target women were interviewed to obtain some certain information about their socio demographic, medical and obstetric data. This study has been authorized by the ethical committee of the Faculty of gynecology, the

Public Al-Karakh Hospital; consent in advance supplied from all individuals.

Five mL of venous blood from each patient was collected and sera separated at 3000-rpm centrifugation for 5 min, and then samples stored at -10°C until needed. LH hormone level testing was done using Human-laboratories kit.

The *Toxoplasma* specific IgG (positive and negative-IgG) antibodies for all participants were studied using a set of Biocheck reagents by ELISA technique according to the manufacturer's instructions [28]. Serum LH concentrations of the positive and negative-IgG participants of all groups measured using mini-VIDAS (Human Co., Germany). Results are expressed as mean  $\pm$  SD. The significance of differences studied by Students *t*-test for groups of non-paired observations. Frequency and ratio occurrences of each group were recorded. All the statistical analyses were assisted by SPSS 17th version software.

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