BIOCHEMICAL EFFECT OF TOXOPLASMA INFESTATION ON IMMUNITY AND INFLAMMATORY MARKERS IN ABORTED WOMENS

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ABSTRACT

This study was performed to investigate the effect of toxoplasmosis on several biochemical parameters in aborted women (aborted due to toxoplasma) 43 women were classified into four groups. The first group contains 10 women with full term of pregnancy and normal delivers kept as control group. The second group composed of 16 women aborted one time the third group contain 10 women aborted for two time. Fourth group contain 7 women aborted for three time. Blood sample were collected from all women. The obtained result reveled that a significant increase of serum toxoplasma IgG, IgM and cortisol, on aborted groups (G2, G3 and G4) compared with control group (G1). While, there was none significance difference in cancer antigen 125 (CA125) in serum compared with control group. Also, Results showed a significant increase of immunoglobulin IgG, IgE, IgA, IL2 and IL6 and on aborted groups (G2, G3 and G4) compared with control group (G1). While, there was no significant difference of IgM between in group G4 compared with control group (G1).

Keywords: Toxoplasma, Immunity, CA125, abortion.

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1. INTRODUCTION

Pregnancy as begin at time of implantation, its wastage can take place at any time after implantation of the blastocyst. First, fetal loss may occur after the time of expected viability for reasons as fetal anomalies and intrauterine or neonatal death. Second, spontaneous abortion may occur usually within the first trimester. Third, pregnancy loss may occur before or at about the time of the next anticipated menstruation, in such cases the pregnancy is not clinically recognized (Cunningham et al., 2001).

Once a live embryo is detected by ultrasonography in normal-pregnant women, the rate of fetal loss is 5%. However, in women with recurrent pregnancy loss, the rate of loss after detection of fetal cardiac activity is 4-5 times higher (Van Leeuwen et al., 1993).

Toxoplasmosis, caused by Toxoplasma gondii, is worldwide in distribution and is most common in warm, moist areas. It has been reported from man, pigs, sheep cattle, horses, dogs, cats and other domestic animals, as well as rodents, wild carnivores, and birds *(*Suzuki et al., 2003*)*.

Toxoplasma gondii is an obligate intracellular coccidian protozoan capable of infecting and multiplying in all warm-blooded animals, birds and humans making it one of the most 'successful' protozoan parasites on earth *(Innes, 2010)*.

In pregnant women, primary Toxoplasma infection or reactivated chronic infection, secondary to immune-suppression can lead to transplacental transmission with potential risk of serious fetal damage *(Antoniou et al., 2004)*. Congenital toxoplasmosis results in manifestations of varying severity ranging from asymptomatic to spontaneous abortion or fetal death to severe congenital defects *(Robert-Gangneux and Dardé, 2012)*.

Diagnosis of toxoplasmosis in the laboratory is based on serological testing, isolation of the parasite, demonstration of the parasite in the tissues and detection of the specific DNA particles by polymerase chain reaction (Rorman et al., 2006).

Serological assay of *Toxoplasma* specific antibodies is the initial and primary method of diagnosis that can differentiate between recent and chronic infection especially in pregnant women (Weiss and Kim, 2007).

The isolation of the organism from amniotic fluid, placenta and fetal blood as well as its inoculation in mice is specific, but requires 4-6 weeks for diagnosis (Tenter et al., 2000). Due to its higher sensitivity and specificity, mice bioassay is considered a standard test to detect *T. gondii* in tissues (Homan et al., 2000).

Adult acquired toxoplasmosis is normally mild to asymptomatic, but disease can be severing in the immunosuppressed. In addition, the ability of sex and pregnancy-associated hormones to influence the severity of its infection is of particular public health interest due to the ability of the parasite to cause congenital disease if infection occurs during pregnancy, moreover, female is more vulnerable than male to infection by *T. gondii* and the susceptibility to pathogens also varies according to the stage of the menstrual cycle in non-pregnant women and varies according to stage of gestation in pregnant women (Roberts et al., 1996).

The main objective of this work was to indicate the effect of Toxoplasma on immunity and some inflammatory markers.

2. MATERIAL AND METHODS

2.1. Patients:

The study taken out on as survay on 43 women, with age range between 20 and 40 years, they came to Gynecological and Family Planning Departments in Samalot General Hospital in El-Minya Governorate to follow up their pregnancy. The examined womens were classified into three groups according to the obstetric history of pregnancy:

Group I: (Control healthy group) these cases presented: 10 cases of full term of pregnancy and normal delivery and their clinical data suggestive negative Toxoplasma infection.

Group II: It composed of 16 cases who aborted for one time.

Group III: (Second abortion) (n = 10) the group included with clinical data suggestive of Toxoplasma infection. These cases presented: 10 cases of abortion for two times.

Group IV: It composed of 7 cases who aborted for three times. There is a suggestion of Toxoplasma infection in the 2nd, 3rd and 4th group.

2.2. Blood sample and biochemical analysis:

2.2.1. Collection of sample:

Peripheral blood samples of all parturient women and aborted women were collected. The collected samples were transferred to 5 ml vacutainer tubes, left to stand about 30 minutes in room temperature, then centrifuged (at 3000 r.p.m for 5 minutes) and all available sera were stored at -20°C, vials, until being analysis.

2.2.2. Biochemical tests:

- Serum Toxoplasma IgG, and IgM were determined according to *Fiore et al. (1988).*
- Serum cortisol level was determined by using immunoradiometric method according to Mullner et al. (1991).
- Serum cancer antigen 125 (CA125) was determined according to Niloff et al. (1984).
- Immunoglobulin profile (IgG, IgE, IgA, IgM) were determined by ELISA according to descript (Mineo, 1980, Lin et al., 1986, Fiore et al., 1988).
- Serum IL2 and IL6 were determined by ELISA according method described with Everekliogluet al. (2002).

2.3. Statistical analysis

The Statistical analysis was carried out using ANOVA with two factors under significance level of 0.05 for the whole results using SPSS (ver. 19). Data were treated as complete randomization design according to Steel et al. (1997). Multiple comparisons were carried out applying LSD.

3. RESULTS

The present data in tables (1) and illustrated in Figure (1) showed a significant increase of serum toxoplasma IgG, IgM and cortisol, on aborted groups (G2, G3 and G4) compared with control group (G1). While, non-significance difference in CA125 in serum of (G2, G3 and G4) compared with control group.

Results in Table (2) and illustrated in Figure (2) revealed that a significant increase of immunoglobulin IgG, IgE, IgA, IL2 and IL6 and on aborted groups (G2, G3 and G4) compared with control group (G1). While, there is no significant difference of IgM between G4 and control group (G1).

Table 1: Effect of Toxoplasma on immunoglobulin profile Toxoplasma IgG, Toxoplasma IgM, Cortisol and CA125,

Parameter	Group			
	G1 (control)	G2 (First abortion)	G3 (Second abortion)	G4 (Third abortion)
Toxoplasma IgG (mg/dL)	10.57 ± 1.15^{a}	106.70 ± 9.88^{c}	93.77 ± 6.11^{c}	59.95 ± 4.75^{b}
Toxoplasma IgM (mg/dL)	7.15 ± 0.87^{a}	70.81 ± 6.75^{c}	$55.75\pm8.11b^{c}$	39.81 ± 4.11^{b}
Cortisol (mg/dL)	11.52 ± 0.97^{a}	31.89 ± 2.98^{b}	56.81 ± 3.81^{c}	77.70 ± 5.18^{d}
CA125 (U/mL)	16.31 ± 1.11^{a}	17.31 ± 2.00^{a}	15.31 ± 1.87^{a}	17.11 ± 2.31^{a}

a, b & c: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

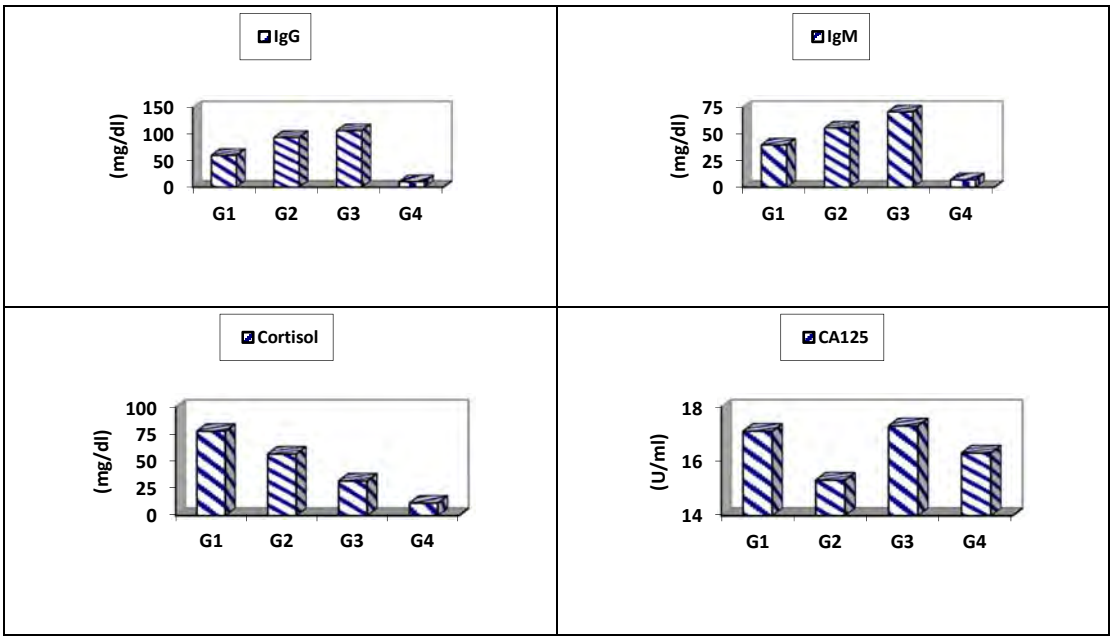

Fig. (1): Effect of Toxoplasma on immunoglobulin profile Toxoplasma IgG, Toxoplasma IgM, cortisol and CA125

Table 2: Effect of Toxoplasma on immunoglobulin profile (IgG, IgA, IgM, IgE). IL2 and IL6.

Parameter	Group			
	G1 (control)	G2 (First abortion)	G3 (Second abortion)	G4 (Third abortion)
IgG (mg/dL)	915.82±5.97[a]	1003.75±8.97[b]	1110.81±10.51[c]	1290.89±15.31[d]
IgA (mg/dL)	230.51±3.51[a]	319.57±4.59[b]	411.59±7.18[c]	669.81±8.92[d]
IgM (mg/dL)	170.57±4.42[a]	176.31±6.75[b]	183.81±8.92[c]	169.81±8.75[a]
IgE (mg/mL)	35.71±4.42[a]	166.58±7.52[b]	198.75±8.89[c]	216.8±9.11[d]
IL2 (Pg/ml)	1.14±0.11[a]	3.95±0.21[b]	3.69±0.35[b]	3.71±0.31[b]
IL6 (Pg/ml)	7.75±0.93[a]	14.82±1.75[b]	19.63±2.11[b]	19.53±3.08[b]

a, b & c: There is no significant difference (P>0.05) between any two means, within the same row have the same superscript letter.

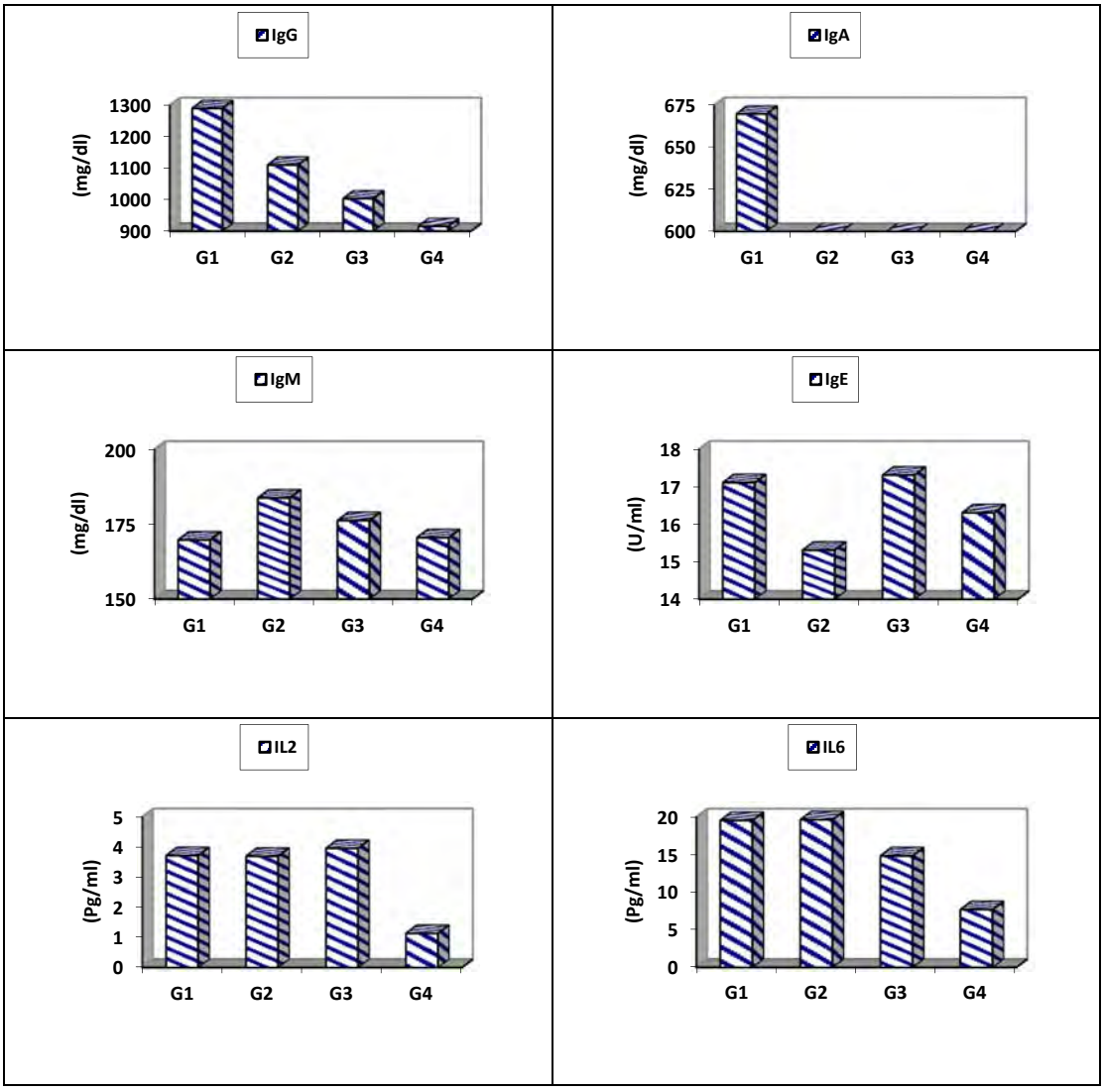

Figure (2): Effect of Toxoplasma on immunoglobulin profile (IgG, IgA, IgM, IgE). IL2 and IL6.

4. DISCUSSION

Toxoplasma IgG and IgM *T. gondii* infection which is generally initiated by ingestion of either the tissue cyst stage, found in the meat of infected animals, or the oocyst stage, released in the feces of infected cats (Zeibig, 1997).Whereas adult-acquired toxoplasmosis which can be classified into acute, sub-acute and chronic according to the anti- *T. gondii* antibodies (IgG and IgM) (Decoster et al., 1988).

Serum toxoplasma IgM concentration value was in the aborted groups. Similar results were reported by (Mousa et al., 2011) who stated that genetic, uterine abnormalities, hormonal dysfunctions and infectious agents are the most essential ones. TORCH infection and others such as (Syphilis, Varicella-Zoster, and Parvovirus B19) were the most common maternal infections associated with fetal loss or malformations.

Regarding, the above report, it seems that there was a relationship between infected individuals by toxoplasmosis and stress hormones increase. It must be noted that stress hormones increase can lead to behavioural challenges in individuals. The aim of this survey was effect of chronic Toxoplasma infection on testosterone and cortisol changes also behavioural changes include: depression, anxiety, stress, in the infected men and women (Raquel- Coelhoal, 2003).

Studies done by Suzuki (2002) have defined IL-12 as the key cytokine produced by tachyzoite-activated macrophages and it was responsible for induction of T-cell independent INF-γ synthesis by NK cells. The authors cleared that the induction of INF-γ synthesis by NK cells following Toxoplasma infection was indirect, involving a secondary synergistic effect of IL-12 with TNF-α and IL-1β, rather than direct stimulation by the parasite.

In the present work serum IgA concentration value was significant increase in the aborted groups. This result was similar to that reported by Meek et al. (2000) who mentioned that tears of many individuals chronically infected with toxoplasmosis, contained IgA antibodies against *T. gondii*. The investigators suggested that these frequently observed antibody responses were the result of the common mucosal immune response against *T. gondii*. Also, Pinon et al. (1990) cleared that Toxoplasma-specific IgE were detected early during infection while, IgM antibodies were present, slightly preceding the presence of specific IgA antibodies and it never persisted for longer than 4 months. Foudrinier et al. (2003) confirmed the previous study and deduced that maternal IgE does not cross the placenta, and in congenital toxoplasmosis, specific IgE was found at birth and during the first few months of life Gross et al. (1997).

In conclusion an association between an immunity and abortion caused by toxoblasama in women. There is increase in toxoplasma (IgG, IgM) crotsion, sicytokine (IL2, IL6) and immunglpuline profil (IgG, IgA, IgE). We recommend pregnant women should be taken anti toxoplasmaic drags. Whatever they are positive or negative toxoplasmaic.

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