INCIDENCE OF TOXOPLASMA ANTIBODIES AMONG WOMEN OF BENJAWAD, LIBYA

1SALIMAOMRAN BOSHAPOR, 2HAMED H. KASSEM

Abstract- The present study was conducted in Benjawad, Libya. It is the first study on the incidence of T. gondii among women from Benjawad region. Blood samples were collected from participants including 280 pregnant and 250 non-pregnant women. The samples (anti-Toxoplasma IgGandIgM antibodies) were tested by using ELISA Kits. Information and data on women were obtained using questionnaire. Overall incidence rates of T. gondii antibodies were 37.17% and 3.58% for IgG and IgM positive, respectively. The study revealed that 37.14% and 3.57% were positive for IgG and IgM anti-T. gondii among pregnant women while the incidence rates were 37.20% and 3.60% for anti-T. gondii IgG and IgM antibodies among non-pregnant women. According to the results, there was no significant association between incidence of T. gondii and the age. The results also revealed that incidence rates of T. gondii IgG antibody associated with symptoms were 7.1% repeated abortion, 3.0% for still birth and asymptomatic was 89.8%. This association was not statistically significant. No statistically significant relation was observed between incidence T. gondii antibodies and the other variable factors studied. Transmission of T. gondii in this study is possible by containers, knives or cutting boards or other preparation surfaces contaminated with raw meat. This study indicates that there is a considerable rate of T. gondii IgG and IgM antibodies infection among women in Benjawad and village near it. Moreover, it shows the need to provide health education to pregnant women in order to prevent primary infection during pregnancy.

Keywords- Toxoplasma, Anti-Toxoplasma Antibodies, ELISA, IGG, IGM.

INTRODUCTION

Toxoplasma gondii is an obligatory intracellular a picomplexan protozoan parasite with a heterogeneous life cycle in humans and other vertebrates animals. This parasite can infect all mammal and bird species. Members of the family Feliidae are the only known definitive hosts for T. gondii. Toxoplasmosis is one of the most common human infections throughout the world. Most infections in humans are asymptomatic but at times the parasite can produce devastating disease. It has been estimated that up to one billion people have been exposed to this parasite worldwide. In adults, most Toxoplasma infections are subclinical, but severe infection can occur in immune compromise patients (El-Awady et al., 2000).

Humans are infected with T. gondii by four major routes: ingesting food or water contaminated with the faeces of infected cat ingesting or handling undercooked or raw of meat contains tissue cysts, receiving organ transplants or blood products from donors with acute or latent toxoplasmosis. However, infected fœtuses and immunodecient individuals may present with serious or even fatal clinical outcomes (Ribeiroetal., 2008).

Toxoplasmosis maybe more sever in pregnant women and can lead to fetal abortion or congenital malformation. Person to person spread has not been described, but chronic sub clinical human infection become activated if the immune system becomes weakened.

Most healthy people who acquire Toxoplasma infection do not experience any significant symptoms, but often give flu-like symptoms in the acute stages. Lymphadenopathy is the most common manifestation. Toxoplasma gondii has emerged as one of the most common opportunistic infections in patients with AIDS. Toxoplasmosis in AIDS patients is considered to be a result of reactivation of latent infection, but the mechanisms of reactivation are unknown.

Toxoplasma gondii is responsible for the toxoplasmosis disease. Toxoplasma infects a host but keeps the host alive so it can use their immune system and keep by itself alive. It does this by releasing a molecule that increases the number of T-cells. An increased number of T-cell results in a massive elimination of T. gondii cells. Parasitic cells that are encased in a tougher outer layer are able to evade destruction by the immune systemsmacrophages. The ability of the tachyzoite stage to invade any nucleated cell, replicate and then lyse the host cell before invading neighbouring cells is an important element that underlies the pathogenesis of this cytolytic infection. In the absence of aprotective immune response, the parasite will replicate and destroy infected tissues (Hunter and Reichmann, 2001 and Vyas and Sapolsky, 2010). Most patients who become infected with T. gondii and develop toxoplasmosis do not know it. In some immunocompetent patients, the infection enters a latent phase, during which only bradyzoites are present, forming cysts in nervous and muscle tissue. Most infants who are infected while in the uterus have no symptoms at birth but may develop symptoms later in life.

Congenital infection results from a primary infection of the mother during pregnancy. T. gondii and congenital form is one of the most important clinical aspects of this disease (Fouladvand et al., 2010).

Toxoplasmosis in Libya:
In Tripoli Khadrream-El- Nageh (1987) revealed that Toxoplasma antibodies were found at a titer of 1:16 or above in 51.6% of 2000 adult males, in 43.4% of 300 adult females, and in 43.7% of 1980 schoolchildren (7-18 years of age), Abu Setta and Yamani (2008) The seroprevalence rate of toxoplasmosis was 18.14% among non-pregnant women and Gashout et al. (2008) recorded that 45% and 17.6% of chronic and acute toxoplasmosis.

Materials and Methods
-Place of study:
Benjawad area located on the Gulf at east of Sirt city, away from it 150 km² and distance away from Benghazi approximately 450Km² having a population of about 9482 and consisting of patches of agricultural land. The subjects for this study were women, these women were came to laboratory of Qarwi Benjawad hospital for blood analysis. This hospital accept cases of about 9482 and consisting of patches of agricultural land. The subjects for this study were women, these women were came to laboratory of Qarwi Benjawad hospital for blood analysis. This hospital accept cases of about 9482 and consisting of patches of agricultural land.

Collection of Samples:
Blood samples were obtained from 530 women, including 280 pregnant and 250 non-pregnant women were randomly collected of patient and outpatient during routine serological tests. Blood samples were collected in a labeled 5mlplain tubes by venipuncture and allowed to clot at room temperature. After centrifuged for 5 minutes, serum can be stored in eppendorf tubes at -20°C till testing, for longer periods samples should be frozen at -20°C. Data of tested women was collected by a questionnaire were including age and nationality. Serological testing: Serum specimens were tested by ELISA to detect anti-Toxoplasma IgG and IgM antibodies using bioelisa TOXO IgG and IgM (biokit, Spain) according to manufacturer’s instructions for detecting IgG and IgM antibodies for both analytical parameters for IgGT. gondii.

Results:
The sera of five hundred and thirty women including 280 pregnant and 250 non-pregnant women from Benjawade were tested by ELISA test to determine the T. gondii specific antibodies (IgG and IgM antibodies for T. gondii). The results showed that overall incidence rates of T. gondii antibodies, 197 (37.17%) were positive for anti-T. gondii IgG antibodies and 19 (3.58%) were positive for anti-T. gondii IgM antibodies (Table1). The results showed that, 37.14% (104) and 3.57% (10) of T. gondii IgG and IgM antibodies among pregnant women. Incidence rates among non-pregnant women 37.20% (93) and 3.60% (9) were anti-T. gondii IgG and IgM respectively (Table 2).

Comparison of results of IgG and IgM by ELISA test positive T. gondii IgG antibodies (n=197) and positive for T. gondii IgM antibodies (n=19). The results revealed that IgGT. gondii were 77.66% (153) strong positive and 22.33% (44) weak positive and were 15.78% (3), 84.21% (16) of strong and weak positive of T. gondii IgM (Table 3).

Table 1: Serorelevance of anti-T. gondii IgG and IgM antibodies:

<table>
<thead>
<tr>
<th>Antibodies</th>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgG</td>
<td>197</td>
<td>37.17%</td>
<td>333</td>
<td>62.83%</td>
<td>530</td>
</tr>
<tr>
<td>IgM</td>
<td>19</td>
<td>3.58%</td>
<td>511</td>
<td>96.41%</td>
<td>530</td>
</tr>
</tbody>
</table>
The incidence of Toxoplasma gondii infection among pregnant and non-pregnant women was investigated. The results revealed that the sero-incidence of T. gondii IgG was highest among the age group 46-60 (43.4%) followed by 36-45 (40.7%), 26-35 (38.1%), and 15-25 (29.8%). The sero-incidence rate of T. gondii IgM was (4.2%) in the age group 26-35. The relationship between incidence and different age groups was not statistically significant ($\chi^2 = 4.313$, $p$-value = 0.230) (Table 4).

The study showed that overall incidence rates of T. gondii IgG and IgM antibodies by ELISA among women from Benjawad were 37.16% and 3.5% respectively. This result is comparable to results previously reported in Libya as follows: from Tripoli were 43.4%, 18.14%, 45%, and 17.6% of chronic and acute infections (Khadre and El-Nageh, 1987; Kassemand Morsy, 1991; Swalem and Feturi, 1994; Bader, 2002; Al-Ghariane, 2006; El-Zaidi, 2007; Abu setta and Yamani, 2008 and Gashou et al., 2008), as well as from different countries of the world (AL-Harthi et al., 2006; Bouhamdan et al., 2010; Emelia et al., 2010 and Fouladvar et al., 2010).

The present study included 530 cases of which 280 were pregnant women and 250 non-pregnant women. The results revealed that the sero-incidence of T. gondii IgG antibodie was detected in both pregnant and non-pregnant women. This finding is in agreement with findings in reported previously from Benjawad region and villages near by, and considered one of a few studies carried out in Libya on T. gondii infection.

Toxoplasma gondii is estimated that 20-90% of adults throughout the world have come into contact with the parasite during their lifetime (Galvan-Ramirez et al., 1998). Depending on the sanitary conditions of the country considered, the percentage of infection varies. In fact, toxoplasmosis infection is related to several factors including socioeconomic level, nutritional habits, age and rural or urban setting (Spalding et al., 2005).

Such variation in the obtained data may be due to the differences in environmental conditions and lifestyle of the population. The prevalence of toxoplasmosis in Arab countries like Aba, Saudi Arabia, in pregnant women was 31.6%, Makkah was 29.4% (El-Hady, 1991 and Al-Harthi et al., 2006), in Beirut the seropositivity of IgG and IgM was 62.2% and 6.8% (Bouhamdan et al., 2010).

Several studies in different countries and cities around the world have indicated that seroprevalence rate of Toxoplasma antibodies have a wide range as in India 36.8%, Krowasi 36.4%, Ireland 12.8%, Thailand 21.7%, Turkey 49.4%, Paris 83% and USA 31.7% (Fouladvar et al., 2010). The average prevalence rate of T. gondii

### Table 1: Sero-incidence of T. gondii infection among pregnant and non-pregnant women.

<table>
<thead>
<tr>
<th>Antibodies</th>
<th>Total Examined</th>
<th>No. pos.IgG</th>
<th>%</th>
<th>No. Pos.IgM</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant women</td>
<td>280</td>
<td>104</td>
<td>37.14%</td>
<td>10</td>
<td>3.57%</td>
</tr>
<tr>
<td>Non-pregnant women</td>
<td>250</td>
<td>93</td>
<td>37.20%</td>
<td>9</td>
<td>3.60%</td>
</tr>
<tr>
<td>Total</td>
<td>530</td>
<td>197</td>
<td>37.16%</td>
<td>19</td>
<td>3.58%</td>
</tr>
</tbody>
</table>

### Table 3: The intensity of anti-T.gondii in the test specimen.

<table>
<thead>
<tr>
<th>ELISA results</th>
<th>Strong positive(%)</th>
<th>Weak positive(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic (IgG +)</td>
<td>77.66 % (153)</td>
<td>22.33 % (44)</td>
<td>197</td>
</tr>
<tr>
<td>Acute (IgM +)</td>
<td>15.78 % (3)</td>
<td>84.21 % (16)</td>
<td>19</td>
</tr>
</tbody>
</table>

### Discussion:

To our knowledge, this is the first study to be carried out on the incidence of T. gondii infection among women from Benjawad region and villages near by, and considered one of a few studies carried out in Libya on T. gondii infection.

Incidence and age groups:

The results revealed that high sero-incidence of rate T. gondii IgG was detected among age groups 46-60 (43.4%) followed by age groups 36-45 (40.7%), 26-35 (38.1%) and 15-25 (29.8%). The sero-incidence rate of T. gondii IgM was (4.2%) in age group 26-35. The results showed that high incidence rate of IgG increased with age. The relationship between incidence and different age groups was not statistically significant ($\chi^2 = 4.313$, $p$-value = 0.230) (Table 4).

Several studies in different countries and cities around the world have indicated that seroprevalence rate of Toxoplasma antibodies have a wide range as in India 36.8%, Krowasi 36.4%, Ireland 12.8%, Thailand 21.7%, Turkey 49.4%, Paris 83% and USA 31.7% (Fouladvar et al., 2010). The average prevalence rate of T. gondii...
most parts of the world which is 20-30%. Low prevalence rates of 10% were reported in the United Kingdom and Norway (Al-Harthi et al., 2006); from Zair at 29.1% and 0.8% among chronic and a cutaneous (Ishakuet al., 2009); in Malaysia at 28% and 11% of active and chronic toxoplasmosis (Emeliea et al., 2010). These differences in results may be due to sensitivity of the different test methods used in seroprevalence studies or to the size of tested individuals (Naotet al., 1981).

These differences of infection may be due to the variation in the prevalence of human Toxoplasma infection among different regions, countries and populations worldwide. These include: consumption of raw or undercooked meat (e.g. lamb & beef), having a pet cat at home or living in an area with stray cats living in close proximity, inadequate hand washing after handling contaminated garden soil or kitty litter, frequent consumption of raw vegetables outside the home, unsanitary feeding habits, climatic conditions, poor sanitation and hand hygiene, and increased age (Cook et al., 2000; Fayeretal., 2004 and Montoya and Lisenfeld, 2004; Nash et al., 2005; Elsheikha, 2008 and Elmore et al., 2010).

Consumption of under cooked meat remains the major risk factor for acute infection in women in Serbia (Bobic et al., 2007). T. gondii infection from ingested tissue cysts in undercooked meat. For example, in France the prevalence of antibody to T. gondii is very high in humans. Though 84% of pregnant women in Paris have antibodies to T. gondii, only 32% in New York City and 22% in London have such antibodies. The high incidence of T. gondii infection in humans in France appears to be related to part of the French habit of eating some meat products raw or undercooked. In contrast, the high prevalence of T. gondii infection in Central and South America is probably due to high levels of contamination of the environment by cysts (Hill and Dubey, 2002).

An increased prevalence of T. gondii was (40.7%) observed in women who consume raw meat, vegetables, reported from Slovakia (Studenicova et al., 2006). On the other hand, transmission of T. gondii infection through uncooked meat in Libya is uncommon because most people prefer to eat well cooked meat (Swalem and Feturi, 1994 and Bader, 2002). The same observations were previously reported from other countries (Todd et al., 1980 and Ramirez et al., 1999).

The present study revealed that, high rate of positivity of T. gondii was detected among the old age group (46-60 years). This is consistence with other results previously reported from Libya (Kassem and Morsy, 1991; and Bader, 2002) and other countries (Ghorbanieh et al., 1978; Avelino et al., 2004; Gharavat et al., 2005; Jumaian, 2005; Al-Harthi et al., 2006; Cavalcante et al., 2006; Ishakuet al., 2009; Lopes et al., 2009; Bouhamdan et al., 2010 and Solbbo et al., 2010 and Sheet Saleh et al., 2010). Disagreement with results reported from Benghazi (Al-Ghariane, 2006) and other countries (Zardiu et al., 1980 and Griffin and Williams, 1983). These differences may be due to wide variations in age groups used and these results reflected the contact with cats or infected materials and vegetables in these age groups. In addition, this may be due to decrease of immunity in old ages, and increase the chance for more exposure to infection.

REFERENCES


[28] Hide, G.; Morley, E.; Hughes, J. M.; Gerwash, O.; Elmahashui, M.; Elmahashki, K.; Thomasson, D.; Wright, E. A.; Williams, R.; Murphy, R. and Smith, J. E. (2010): Centre for Parasitology and Disease Research, School of Environment and Life Sciences, University of Salford, Salford, MS 4WT, UK. Misurata Central Hospital, PO Box 65 Misurata, Libya. Faculty of Biological Sciences, University of Leeds, Leeds, LS2 9JT, UK.


Incidence Of Toxoplasma Antibodies Among Wo Benjawad, Libya


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