

## Prevalence of Toxoplasmosis in non-pregnant women in Tripoli, Libya.

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### Abstract

Toxoplasmosis is a parasitic disease caused by protozoan, *Toxoplasma gondii*. Infections of human are common and are usually asymptomatic. The infection may be serious if it is transmitted to the fetus during pregnancy. Prophylactic measures, early detection of the infection and treatment can avoid congenital toxoplasmosis and many long term effects. Seroepidemiological study in non-pregnant women is useful to determine the prevalence of infection and to design prevention policies for them during their pregnancy. This study was carried out in the years 2006-2007 in Tripoli, in Libya, as a descriptive, analytic and cross sectional study.

**Methods:** Serum Samples of 474 women were collected from non-pregnant women and studied by enzyme linked immunosorbant assay (ELISA). The positive and negative controls were also used. The seroprevalance rate of toxoplasmosis 18.14% in all participants. Some variables including age, nutritional habits and contact with domestic cats were studied.

**Conclusion:** The seroprevalence of toxoplasmosis in non pregnant women in Tripoli is different and it may be related to the level of hygiene in different parts of Tripoli. Water and food contamination with cat stool in regions with high contact with domestic cats can play an important role in infection rates. People of such areas should eat well-cooked meat to reduce infection.

### Introduction

Toxoplasmosis is an infection caused by the intracellular protozoan parasite *Toxoplasma gondii*. It is found in humans worldwide and in mammals and birds as intermediate hosts. The cat is the main host of the parasite. Human infection results from ingestion of soil contaminated with cat litter, ingestion of raw or insufficient cooked meat (lamb, pork, and beef) and transmission from a mother to a fetus through the placenta (congenital infection) or by blood transfusion or organ trans-plantation. Most cases of primary infections are asymptomatic. The incubation period is 1 to 2 weeks. Congenital toxoplasmosis is caused by acute infection with *Toxoplasma gondii* in a pregnant woman for the first time. One-third of primary toxoplasmosis cases occurring during pregnancy lead to transplacental transmission and involvement of the fetus with pathological effects such as

microcephaly, hydrocephaly, blindness, calcification of brain cells and even death in utero. Signs of congenital infection may be observed at birth or develop over the first few months of life and its severity depends on the duration of infection in pregnant women (Dubey *et al.*, 1998, Dubey and Beattie 1988 and Tenter *et al.*, 2000). The prevalence rate of the disease is different in various parts of the world and is related to various factors such as age, sociocultural and nutritional habits and contact with domestic cats. Seroepidemiological studies of female toxoplasmosis before delivering age will be very useful for designing prevention policies during child bearing age. 15-18 year old girls are suitable groups for such study. Premarital examinations are conducted to diagnose previously infected women from women who have not been previously infected (Dubey *et al.*, 1998, Dubey and Beattie 1988 and Tenter

*et al.*, 2000). Toxoplasmosis sero-surveys have been held in many countries. Seropositivity in women of childbearing age in France, Germany, Belgium and Switzerland is as high as 37-58%, while in the Latin American countries such as Argentina, Brazil and Cuba is 51-72% (Tenter *et al.*, 2000 and Luyasu 1997).

In Iran, seropositivity in high school girl students aged 15-19 y in Isfahan province in central part and Robotkarim district near Tehran were 17.5% and 17.7%, respectively and general seroprevalence was estimated to be about 51.8% (Mahmoodi, *et al.*, 2003 and Soleimani *et al.*, 2003).

### Material And Methods

A cross-sectional sero-survey of Toxoplasma IgG-antibodies in 474 non-pregnant women was conducted. Their ages between 18 to 23 years. All of participants appeared healthy, attended Alsebaa Hospital, from February 2006 to March 2007. Questionnaire forms were filled by all participants or caretakers. Blood sampling was performed without anticoagulant according to standard techniques and after 30 min, the tubes were centrifuged at 2,000 rpm for 5 min and then sera were aliquoted in several labeled vials and kept frozen at -20°C. All serologic tests were performed after field work was done. Enzyme linked immunosorbent assay (ELISA) was done to measure IgG antibody (RADIM Toxo IgG Diagnostic kit, Italy). A serially diluted serum was poured in the Toxoplasma antigen-coated wells and incubated at 37 °C for 60 min. If anti-*T. gondii* antibody exists in sera of samples, it binds to the specific antigen, while unbound antibody and other serum proteins were removed by washing. Then 100µl of enzyme tracer was added to the microplate wells and incubated for 30 min at 37 °C. IgG-antibody-Toxoplasma-antigen complexes attached to the microplate well and unbound conjugate were then washed. A chromogen solution

containing tetramethyl-benzidine with citrate-phosphate buffer and DMSO was then added and incubated at 37 °C for 10 min to develop the color and the reaction was stopped by an acid solution. The optical density was read at 450 nm by ELISA reader and converted into IU/mL of *T. gondii* IgG antibody through a standard curve. Each commercial microplate unit contained negative and positive standard control serums. Results lower than 6 IU/mL were considered negative for *T. gondii* IgG antibodies. Data were recorded and analyzed using SPSS 6.0 software. Once data consistency was checked out, frequencies and seroprevalence rates were calculated. Some variables including age, nutritional habits, contact with domestic cats and other pets and level of education were also studied. The correlation between selected variables and seropositivity was analyzed by Chi square test.  $P < 0.05$  was considered significant.

### Results

From February 2006 to March 2007, blood samples of 474 non-pregnant women aged between 18 to 23 years were analyzed for *T. gondii* IgG antibody using ELISA method. 86 cases (18.14%) were found to be seropositive. According to age, seropositive cases were highest in 18-year old group with an average of 29.06% (25 of 86 seropositive cases) and lowest in 23-year old group with an average of 5.81% (5 of 86 seropositive cases). Figure 1 shows the relationship between *T. gondii* seroprevalence and age. Among seropositive cases, about 60% had close contact with cats. Raw meat consumption was not observed and not well-cooked meat consumption was very rare in all studied groups. A relationship between *T. gondii* seroprevalence and the level of education was also studied. 50% (43 cases) of seropositive women were illiterate, 34.88% (30 cases) had average education and 15.12% (13 cases) had university education.

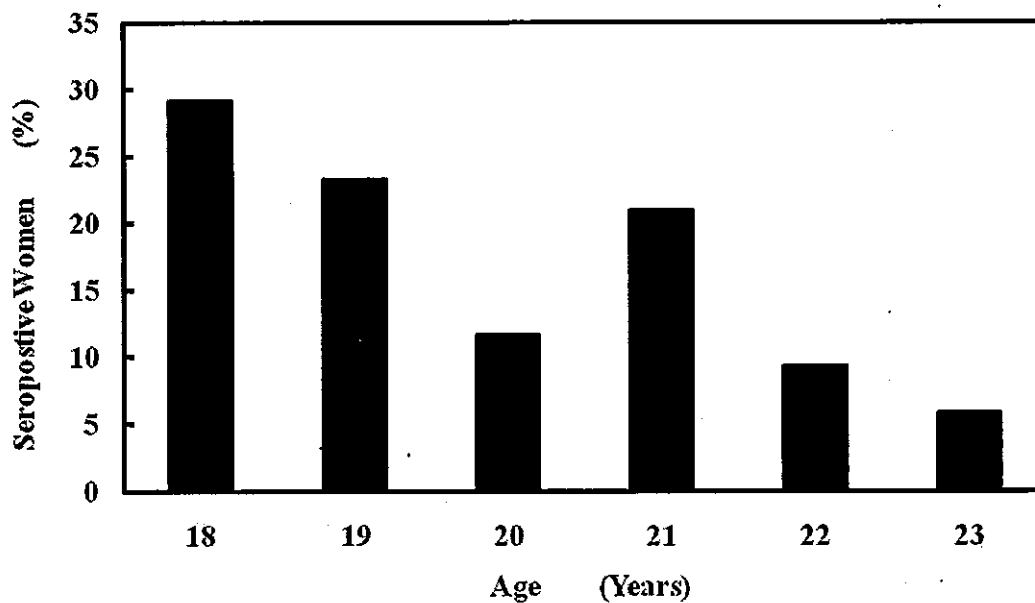


Figure 1 Relationship between *Toxoplasma gondii* seroprevalence and age.

## Discussion

Seroepidemiological survey in different parts of the world indicates that the prevalence rates range from zero to 98% (Abdulbaset, 1982). Most studies are focused on childbearing age and pregnant women and also infants and immunodeficient patients (Tenter *et al.*, 2000, Mahmoodi, *et al.*, 2003, Soleimani *et al.*, 2003 and Abu-Zeid, 2002).

The main infection route of toxoplasmosis in Libya is probably through soil and water because in Libyan nutritional habits raw meat is not consumed as common habit in Islamic countries (Assmar *et al.*, 1997).

These study groups are representative of variable income groups. As a cross-sectionally designed study, our data refers only to prevalence rates, and incidence rates should be assessed through a separate study. Studies of toxoplasmosis seroprevalence have shown a statistical correlation with close contact with cats (Dubey and Beattie, 1988 and Tenter *et al.*, 2000).

In our population a significant association was found between *T. gondii* seroprevalence and close contact with pets including cats in all studied groups,

but not for each group alone. Of those groups which showed seropositivity of about 60%, had close contact with cats. Raw meat consumption was not observed and insufficiently cooked meat consumption was very rare in all study groups. Therefore no relationship could be found between raw meat consumption habits and *T. gondii* IgG seropositivity in these groups. In geographical regions with raw meat consumption habits, there is a significant correlation between raw or undercooked meat consumption and increasing seroprevalence of toxoplasmosis (Dubey and Beattie, 1988 and Tenter *et al.*, 2000).

A statistical association was found between *T. gondii* seroprevalence and the level of education. 50% of seropositive women were illiterate, 34.88% were of average education and 15.12% had university education. The total prevalence rate was estimated to be 18.14% in our study groups. Such studies on non-pregnant women are very useful because examination before pregnancy are necessary to distinguish previously infected women from women who had not been previously infected. When a previously uninfected

woman becomes pregnant, testing is programmed at her first prenatal examination. In addition, women are educated about prevention methods during pregnancy. Education of women at childbearing age about minimizing their risk for infection is another approach to prevent toxoplasmosis. Educational interventions assume that increased knowledge results in awareness, which consequently results in changes in risky behavior and decline in infection rates. Health managers should emphasize the importance of avoiding raw or undercooked meat, handling raw meat safely, washing hands after gardening and preventing close contact with cats ( Foulon *et al.*, 1994).

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دراسة على مدى انتشار مرض التوكسوبلازما بين السيدات غير الحوامل في طرابلس  
بالجمهورية الليبية

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مرض التوكسوبلازما هو مرض طفيلي يسبب بطفيل التوكسوبلازما قو ندى. غالبا العدوى بهذا لطفيل ما تكون بدون أعراض إكلينيكية ولكن الخطورة تكون في حالة العدوى خلال الحمل وانتقال لطفيل من الأم إلى الجنين. الكشف المبكر عن العدوى بهذا لطفيل والوقاية والعلاج المبكر يمكننا من التغلب على الآثار الكارثية للتوكسوبلازما الولادية. الدراسة المصلية الوبائية على السيدات غير الحوامل يمكن أن تكون ذو فائدة في مثل هذه الحالة.

تمت هذه الدراسة في مدينة طرابلس بالجمهورية الليبية على 474 سيدة غير حامل وتم الكشف في أمصالهم عن الأجسام المضادة من النوع (ج) باستخدام الأليزا وقد أثبتت الدراسة أن نسبة انتشار الأمصال الايجابية لهذه الأجسام المضادة هي 18٪. بين المشاركات في البحث. تم الأخذ في الاعتبار بعض المتغيرات مثل الاحتكاك بالقطط ونوعية الأكل والعمر وقد وجدنا أن نسبة الانتشار اقل من أماكن أخرى في العالم وهذا يمكن أن يعزى إلى الاختلاف في الظروف البيئية والصحية والتعليمية وان العادة السائدة في المشاركات هي استهلاك اللحوم المطهوه جيدا.