

The Impact of Low Hygiene and Domestic Cats in Transmission of Toxoplasmosis to Human Using ToxoIgG/IgM Rapid Test

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Abstract Objective: This study had been done to investigate the epidemiological role of the low hygiene and existence of domestic cats in the incidence of asymptomatic toxoplasmosis in human. **Material and method:** Serodiagnosis of *Toxoplasma gondii* using toxo (IgM, IgG) combo rapid test to detect the immunoglobulin M and G in sera collected from 60 restaurant male and female workers ranging between (15-69) years in Khartoum town. **Result:** 20% of participant gave positive results for immunoglobulin against *Toxoplasma*, three individual were IgM positive (5%). 9 individual were IgG positive (15%) only 2 female were diagnosed and they were negative. The highest positivity was given by the age group (37-47) years 50%. 5% were IgM positive and this means they are recently infected. 15% were IgG positive and this means they were either infected or have been immunized after infection. **Conclusion:** Low hygiene, existence of domestic cats and the Sudanese habit of eating raw meat have a potential epidemiological role in the transmission of toxoplasmosis to human.

Keywords: toxoplasmosis, immunoglobulin, *Toxoplasma gondii*

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1. Introduction

Toxoplasma gondii an intracellular parasite related to members of the phylum Apicomplexa. typical coccidian. Toxoplasmosis is one of the most prevalent and globalized infections caused by parasitic protozoa *Toxoplasma gondii*. The infection is mostly benign in healthy individuals, but it can become life threatening when the host became immunocompromised or immunosuppressed [1]. Also acute toxoplasmosis in pregnant women can results in devastating complications in fetus such as ocular toxoplasmosis and CNS complications [2]. The prevalence of the chronic infection is considerably high, but the acute infection is less prevalent in most societies [3]. It's found in a wide variety of animals including birds and humans, only one species exists .the essential resevior host of *T.gonodii* is the common house cat or other felines. Unsprolated oocysts shed by cats soon become infective in the environment. If intermediate hosts including a wide variety of animals, human and also cat ingest the oocysts the acute infection will occurs [4]. Human and other animals can acquire the infection by ingesting raw or undercooked meat, water and vegetables contaminated by sprolated oocysts [5]. Nowadays by increasing the prevalence of some disease causing immune deficiencies

such as HIV/ AIDS and intentional manipulation of human immune system for organ transplantation, the population at risk is increasing too. It is necessary to study the prevalence of *Toxoplasma* infection in every region in every time period to conduct better updated health strategies in each area.

Toxoplasma gondii was discovered a little over 100 years ago, but knowledge of its biological life cycle and its medical importance has grown in the last 40 years. This obligate intracellular parasite was identified early as a pathogen responsible for congenital infection, but its clinical expression and the importance of reactivations of infections in immunocompromised patients were recognized later.

2. Materials and Methods

2.1. Study Design

Descriptive, cross sectional study.

2.2. Study Area and Duration

The study was conducted at different restaurants in Khartoum town (Sudan) from August to December 2016.

2.3. Study Population

Restaurant workers (waiter, cooks and other workers).

2.4. Sample Size

(n=60) participant's were enrolled in this study.

2.5. Data Collection Technique

2.5.1. Data Collection Tools

Pre tested structured interview, for evaluation of the participant's characteristics as related to age, sex, origin, duration of the work. Sample taking was contemporary with interview with the participants. The study had been approved by the college research committee. Regulations of All participant's were a were them informed a consent was taken. Data was collected through interview using self-administered interview.

2.5.2. Sample Collection

5 ml of venous blood was taken from participant's using Sterile vacutainers and centrifuged as soon as possible at 3000rpm for 10 minutes, 2 ml of serum was taken in plain container and preserve at -20°C for 2 weeks for subsequent analyses.

2.6. Data Analysis

Collected data described in tables by calculation of different percentages

2.7. Ethical Consideration

Ethical approval was obtained from ethical committee of Al-Neelain University, and informed consent was taken from all the participants prior to their inclusion in the study.

2.8. Method

2.8.1. Principle

The toxoIgG/IgM combo rapid test cassette (serum/plasma) (Figure 1) is qualitative, lateral flow immunoassay for the detection of IgG and IgM immunoglobulins against *Toxoplasma gondii* in serum of participants. In this test, mouse anti-human IgG and mouse anti-human IgM are coated in the test line regions. During testing, the serum specimen reacts with *T.gondii* antigen coated particles in the test strip. The mixture then migrates forward on the membrane by capillary action and reacts with the mouse anti-human IgG and mouse anti-human IgM on the membrane in the test line region respectively. The presence of a colored line in the test region indicates a positive result for *T. gondii* infection, while its absence indicates a negative result for that infection.

The test pouch was brought to the room temperature before opening, then the test cassette was removed from the sealed pouch and used immediately. To obtain best results the assay was performed within one hour.

The test cassette was placed on a clean surface, the dropper was held vertically as the instructions in the

leaflet of the kits,the specimen was drawn up to the fill line as shown in illustration below (approximately 10ul). The specimen was transferred to each well,then 2drops of buffer was added (approximately 80ul) and the timer was started.

The results were read after 15 minutes. This period is enough for colored line to appear according to the instructions given by the kits producer corporation.

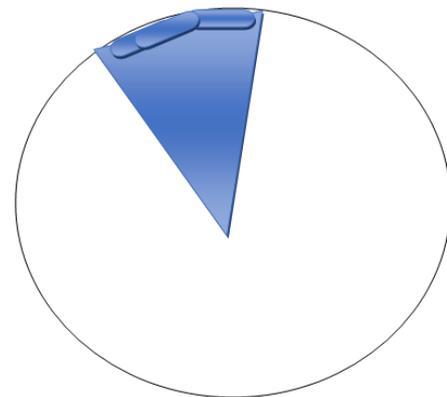
There were no interpretations of results after 20 minutes.

Serum samples were collected randomly from 60 workers in different restaurants in Khartoum state. Examined for presence of immunoglobulin γ gama (IgG) and immunoglobulin μ , (IgM) against *Toxoplasma Gondii* by using serological rapid test.

A total of 60 workers {58 male (96,6)% and 2 female (3,33)% of participants} were enrolled in this study for investigation 12 males (20%) were positive by rapid test.

All participants were categorized into various age group.

3. Results



20% of participants were positive

Figure 1. Pie - chart 1. Results of serodiagnosis of *Toxoplasma gondii* among restaurant workers

Table 1. Results of serodiagnosis of *Toxoplasma Gondii* according to gender

Gender	Positive	Negative
Male	12(20,7)%	46(79,3)%
Female	0(0)%	2(100)%
Total	12	48

No female was positive in serodiagnosis.

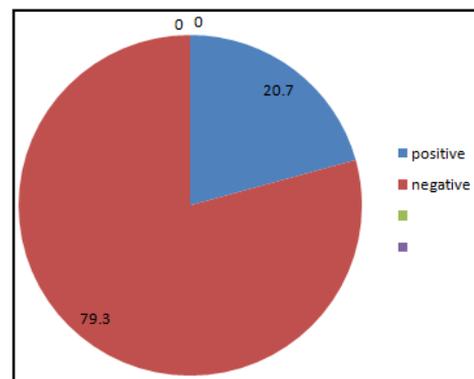


Figure 2. Pie- chart2: .Results of serodiagnosis of *Toxoplasma Gondii* according to gender

Table 2. Detection of IGM and IGG against *Toxoplasma Gondii* among restaurant's workers

test	No of participants	No of positive.	% From positive	% From participants
IgM	60	3	25	5
IgG	60	9	75	15
Total	60	12	100	20

Table 3. Results of serodiagnosis of *Toxoplasma Gondii* according to ages

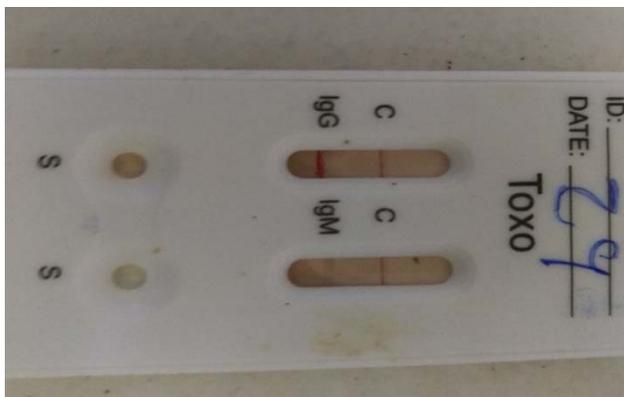
Age groups	No of individual	Positive	Percent
15 – 25	21	3	5%
26 – 36	17	2	3.33%
37- 47	13	6	10%
48-58	3	0	0%
59-69	6	1	1.66%
Total	60	12	100

The highest positivity was given by the age groups (37-47) years (50) %.

4. Interpretation of Results

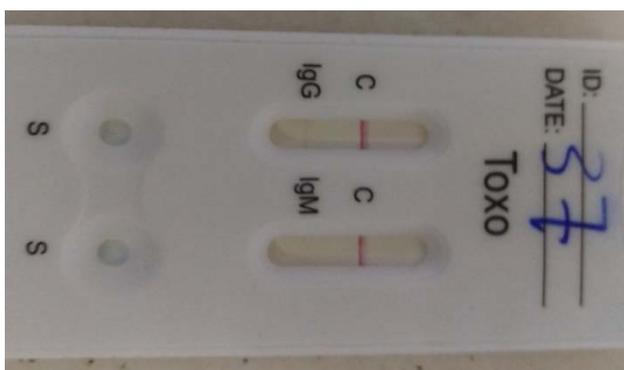
4.1. Positive

When 2 colored line appeared.one colored line in the control region (c) and another colored line in the test region this was clearly considered as positive results.



4.2. Negative

When one colored line appeared in the control region (c) and no line appeared in the test region this was clearly considered as negative results.



5. Discussion

Human toxoplasmosis has well been studied worldwide including Africa. The parasite, *Toxoplasma gondii*, that causes the disease Toxoplasmosis and belongs to the phylum Apicomplexa, is considered to be a most important pathogen that emerges recently especially after proving its role in modulating the immune status of HIV infected persons and other immune compromised patients by increasing CD8 T cells expressing CD38 HLA-DR (Ondrej 2015).

Although the first report of human toxoplasmosis in Sudan was done by Carter and Fleck, (1966), the *situation* of the disease is not clear and it may be more than expected and its risk cannot be excluded, particularly, when the human contact directly with the final hosts (cats) and intermediate hosts (Sheep, goats, camels), or indirectly by eating undercooked or raw meat and drinking unboiled milk. (Astrid 2000) strongly recommended future epidemiological studies on *Toxoplasma gondii* infections considering the role of oocysts as potential sources of infection for humans. The disease is widely spreading around the world affecting human and animals (Buxton, 1990). In the last few years the situation of the disease is unclear in the Sudan. Few studies were done in some states to clarify the situation, but still more studies are needed to understand the situation.

In this study the toxoIgG/IgM combo rapid test was used to examine a total of 60 serum samples. The study findings showed that 48 (79,3%) negative result and 12 (20,7%) positive result of which 5% were IgM positive and this means recently acquired active infection according to Remington, (1974) who stated that presence of *Toxoplasma* specific IgM indicates recent infection. 15 % were IgG and this means either infected or immunized after infection.

Toxoplasma rapid test as quick procedure, easy to perform, specific, and requires no equipment. However, it is less sensitive

6. Conclusion

To prevent human infection, all meat should be cooked well before consumption and gloves should be worn while gardening to prevent exposure to soil contaminated with *T. gondii* oocysts excreted in cat feces. Care should be taken when dressing game animals to prevent exposure to raw meat and tissue fluids, also care should be taken in our houses especially kitchens and restaurants and keep all tools away from cats.

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Statement of Competing Interests

The authors have no competing interests.

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