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## RESEARCH ARTICLE

### DETERMINATION OF SEROPREVALENCE OF TOXOPLASMOSIS AMONG RETINITIS PATIENTS IN KHARTOUM STATE- SUDAN

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#### ABSTRACT

*Toxoplasma gondii* is a unique intracellular parasite, which infects a large proportion of the world's population, but clinically uncommonly causes significant disease. The present study was performed to determine the prevalence of toxoplasmosis among retinitis patients in Khartoum state. Venous blood samples were collected from 90 patients whom are clinically diagnosed with retinitis from all ages during the period from October 2015 to January 2016. Enzyme linked Immunosorbent Assay (ELISA) was used to evaluate the presence of anti-*Toxoplasma* IgG antibodies. ELISA giving an incidental rate of toxoplasmosis of (24.6%) (P.value= 0.031). The results showed significant differences between males (40.9%) and females (59.1%) (p.value=0.047) and all of these patients were above 50 years with strong correlation between eating raw meat and toxoplasmosis infection (p.value=0.0000).

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## INTRODUCTION

Toxoplasmosis is a zoonotic disease caused by the protozoan parasite *Toxoplasma gondii*, human and other warm blooded animals are its hosts (Steven *et al.*, 2008). The infection has a worldwide distribution. Approximately one-third of all humanity has been exposed to this parasite, but the seroprevalence varies considerably between countries (from less than 10% to more than 90%) and population group (Rosso *et al.*, 2008). Humans may remain infected for life and will stay asymptomatic unless immunosuppression occurs (Herrmann *et al.*, 2010). All mammals, including humans, and birds are intermediate hosts, whereas Felidae (cats) are intermediate and definitive host, they are the only animals that pass oocyst in their feces. Sheep and goat meats are important infection sources for toxoplasmosis (Sevgili *et al.*, 2005).

Primary infection of toxoplasmosis in immunocompetent subject is usually asymptomatic or associated with self limited symptoms such as fever, malaise, and cervical lymphadenopathy. Infection acquired during pregnancy is frequently associated with transmission of *T.gondii* to the fetus, resulting in congenital disease. In immunocompromised patients, *T. gondii* infection causes severe manifestation, including splenomegaly, chorioretinitis, pneumonitis, encephalitis, multisystem organs failure, and even death (Montoya and Liesenfeld, 2004). *T.gondii* are recognized by IgG, IgM, IgA and IgE antibodies in patients with acute and chronic toxoplasmosis depending on the strain and the stage of the parasite (Singh, 2003). This work conducted to determine the prevalence of toxoplasmosis among retinitis patients in Khartoum, to calculate anti-*Toxoplasma* antibodies IgG by Enzyme Linked Immune Sorbent Assay (ELISA) in patient's

serum, to correlate between toxoplasmosis infection and retinitis and to correlate between retinitis infection and patient's age, eating raw meat and gender.

## MATERIALS AND METHODS

**Study area:** The study was conducted at Makkah hospital for Eyes (Omdurman and Khartoum branches).

**Study period:** Blood samples collection were started on October 2015 to December 2015.

**Study population:** All patients clinically diagnosed with retinitis were included in the study.

**Inclusion criteria:** All patients diagnosed with retinitis.

**Exclusion criteria:** No exclusion criteria

**Study design:** It was descriptive case study.

**Sample size:** The samples were simple random samples and the size calculated as:-

$$N = Z^2 P (100 - P) / d^2$$

Where was:

N= sample size

Z = normal distribution 1.96 at 95 confidences

P= expected prevalence from the previous study

d= degree of accuracy according to the expected prevalence ( $\pm 2$ )

**Sampling technique:** Before collection of samples, an information sheet was prepared and designed according to a questionnaire which was covered different information. Five ml of venous blood were drawn from radial vein of each person by using disposable syringes and then the blood was placed in plain tubes and allowed to clot at room temperature. They centrifuged at 3000 round per minute (rpm) for 10 minutes and then sera were dispensed into 5 Eppendorf tubes by using micropipette and then stored at  $-20^{\circ}\text{C}$  until further analysis was performed.

**Data analysis:** The serological results and other information gathered during this investigation such as location, sex and age of the sampled patients were edited and analyzed statistically using statistical package of social sciences (SPSS) version 13.

**Ethical consideration:** Declaration letter from research committee of the community department at Elzaem Elazhari University was obtained. Written consent from medical director of Makkah Hospital for Eyes was obtained. Also, consent was obtained from the patients and confidentiality of human subject data was ensured.

## METHODS

### Detection of anti-*Toxoplasma gondii* antibody (IgG) by Enzyme linked Immunosorbent Assay (ELISA) technique

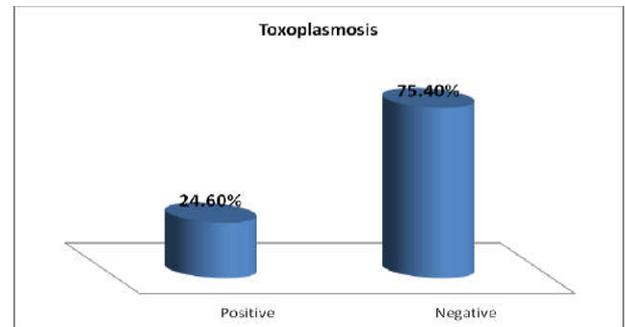
The bioCheck *Toxoplasma* IgG ELISA (BC-1085) kit was used. The *Toxoplasma* IgG ELISA was intended to evaluate a patient's serologic status to *T.gondii* infection.

## RESULTS

Out of 90 patients with mean age of 53 years old and clinically diagnosed with retinitis in Makkah hospital for Eyes, 22

**Table 1. The overall prevalence rate of Toxoplasmosis among retinitis patients**

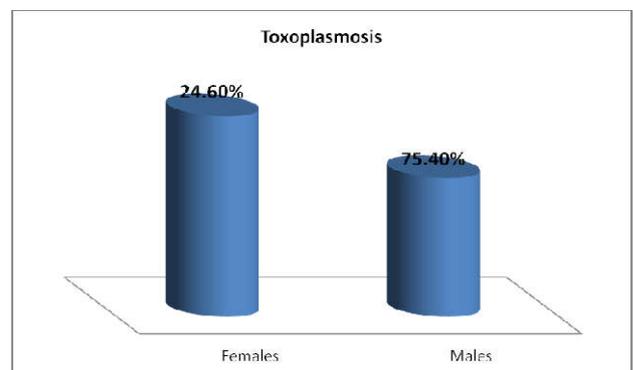
Number examined	Frequency	Rate of infection (%)	P.value
Positive	22	24.6	
Negative	68	75.4%	0.031
Total	90	100%	



**Figure 1. The overall prevalence rate of toxoplasmosis among retinitis patients**

**Table 2. Prevalence rate of toxoplasmosis among retinitis patients according to gender**

Gender	Number examined	Number infected	Rate of infection	P.value
Females	41	13	59.1%	0.047
Males	49	9	40.9%	
Total	90	22	100%	



**Figure 2. Prevalence rate of toxoplasmosis among retinitis patients according to gender**

**Table 3. Prevalence rate of toxoplasmosis among retinitis patients according to age groups**

Age groups (Years)	Number examined	Number infected	Rate of infection
>50	81	22	100%
<50	9	0	0
Total	90	22	100%

**Table 4. Prevalence of toxoplasmosis among retinitis patients according to eating raw meat**

Correlations		Toxoplasmosis	Eating row meat
Toxoplasmosis	Pearson Correlation	1	.650
	Sig. (2-tailed)		.000
	N	90	90
Eating row meat	Pearson Correlation	.650**	1
	Sig. (2-tailed)	.000	
	N	90	90

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 5. Relationship between *Toxoplasma* infection and raw meat eating**

	Toxoplasmosis	P.value
Eating row meat	.650 (rho)	0.0000

(24.6%) were found positive for toxoplasmosis and 68 (75.4%) were negative at  $p$ .value= 0.031. Out of the positive toxoplasmosis patients, the highest infection rate (59.1%) was found among females at  $p$ .value= 0.047. The results showed strong positive relationship between *Toxoplasma* infection and raw meat eating habit, the correlation coefficient (rho) was found to be (+0.650) at  $p$ .value=0.0000.

## DISCUSSION

The current study tried to estimate the actual percentage of toxoplasmosis patients clinically diagnosed with retinitis by using specific tests ELISA IgG. Out of 90 patients only 22 (24.4%) were had a chronic toxoplasmosis characterized by the presence of positive IgG antibodies. The statistical analysis showed highly significant ( $P < 0.05$ ) differences in ELISA sero +ve and sero-ve. Many studies were done in Sudan concerning the prevalence of toxoplasmosis, but there's no previous documented data on prevalence of ocular toxoplasmosis. Globally the incidence of ocular toxoplasmosis varies in different countries. In this study the prevalence rate was 24.4%. This rate was lower than the rate (69%) reported by Mohamed *et al.* (2017) in Wad Madani- Gezira State and higher than the rate (20.2%) reported by Abdel-Raouff and Elbashir (2014) military hospital in Khartoum state. The explanation of these differences stated by other researcher may relate to the sero-prevalance estimated for human population varies greatly among different countries, among different geographical areas within one country, even within a same city. These differences may be related to several other factors, including cultural level, nutritional habits, age and rural or urban area, or may due to different manufacture origins of the kits used.

Out of the 22 patients diagnosed with ocular toxoplasmosis 9 (40.9%) were males and 13 (59.9%) were females, where there were significant difference between the two groups ( $p < 0.05$ ). This result go in the same line with results obtained by other study among ophthalmology clinics in United States by Jones and Dubey (2010) who reported that females (54%) and male (46%) males. This completely agreement may be attributed to physiological reasons such as low immunity during pregnancy or eating under cooked meat (morning thickness) and females were more closed to cats than males another possible explanation is that female population are higher than males population. The present study showed that the prevalence rate reported among age group above 50 years old, this finding was in disagreement with finding obtained by Frimpong *et al.* (2017) in Lusaka, Zambia who reported the highest prevalence rate (59.6%) was in the age group of 26-35 years. The role of handling or consumption of raw meat in the acquisition of *Toxoplasma gondii* infection has not always been clear. In the present study the association between eating raw meat and infection by *Toxoplasma gondii* was found highly significant ( $p < 0.001$ ), this result agree with several studies that identified an association between eating raw meat and *Toxoplasma gondii* sero-positivity (Cook *et al.*, 2000; Alvarado-Esquivel *et al.*, 2011). And disagree with other studies that found no association (Peterson *et al.*, 1972; Riemann *et al.*, 1975;

Alvarado-Esquivel *et al.*, 2011). The explanation of this difference is attributed to the difference in the study population And in the type of consumed meat.

## Conclusion

Toxoplasmosis was prevalent among retinitis patients in Khartoum province by rate of 24.6% which was significant figure especially among females.

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