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Studies on Toxoplasmosis in HIV Patients Attending a Health Facility in Port Harcourt, Rivers State, Nigeria

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Abstract

Toxoplasmosis is caused by an obligate protozoan parasite called *Toxoplasma gondii*. Human infections are particularly serious if they occur in immunocompromised persons like HIV/AIDS patients and may result in disorders in the central nervous system. This study assessed the seroprevalence, and associated risk factors of toxoplasmosis among HIV patients attending the HIV clinic of the University of Port Harcourt Teaching Hospital, Rivers State. 200 sera of HIV infected patients randomly selected were tested for IgG and IgM *Toxoplasma gondii* antibodies using ELISA technique. CD4 cell counts were also determined. Demographic and risk factors associated with toxoplasmosis were determined using well-structured questionnaire. Overall seroprevalence of Toxoplasmosis for IgG and IgM toxoplasma antibodies was 69(34.5%) and 6(3.0%) respectively. The IgG seroprevalence was found to be statistically significant with P values of less than 0.05.Females 46(23.0%) IgGE, 4(2.0%) IgGR ($P < 0.05$) had a higher seroprevalence than males 23(11.5%) IgGE, 2(1.0%)IgGR ($P < 0.05$) for IgG and IgM *Toxoplasma* antibodies respectively. Age group 30-34showed the highest seroprevalence of 20(10%) for IgG antibodies while the age group 20-24 showed the least seroprevalence of 7(3.5%) for IgG antibodies. Age group 20-24 3(1.5%) ($P > 0.05$) recorded the highest seroprevalence for IgM antibodies and subjects above 40 showed the least seroprevalence of 0(0.0%) for IgM antibodies. Occupational related prevalence showed that the traders had the highest seroprevalence 38(19%)($P < 0.05$) for IgG toxoplasma antibodies while students 2(1.0%) showed the highest seroprevalence for IgM toxoplasma antibodies.14(7.0%) ($P > 0.05$) of the seropositive patients had CD4 cell counts of less than 200 cells/µl, indicating no correlation between seroprevalence and CD4 cell counts of HIV/AIDS patients. Demographic factors affecting the transmission of Toxoplasmosis in this study include history of living with pets, engaging in gardening and farming and eating improperly washed fruits and vegetables. It is suggested that HIV patients should be educated on the risk factors of Toxoplasmosis and the institution advised to include Toxoplasmosis test for IgG antibodies as one of the routine tests for baseline HIV patients.

Keywords: Toxoplasmosis, seroprevalence, HIV patients, seropositive, antibodies.

1.0 Introduction

Toxoplasmosis, a cosmopolitan disease in humans and most mammals, is caused by the opportunistic protozoan *Toxoplasma gondii* mainly through peroral infections, blood stream infections and congenital infections. It is estimated that one third of the world's population is infected (Alvarado-Esquive*et al.,* 2012). Even though infection with *Toxoplasma gondii* in immunocompetent individuals normally is asymptomatic, it can lead to serious pathological effects in both immunocompromised patients and congenital cases (Alvarado-Esquive *et al.,* 2012). Considering the increasing number of immunocompromised patients including HIV positive patients, cancer patients and organ transplant recipients, the parasite can lead to life threatening conditions for those individuals due to its opportunistic nature (Daryani*et al.,* 2011). For appropriate diagnosis, treatment and control of infections caused by *Toxoplasma gondii*, it is necessary to provide comprehensive information regarding the seroprevalence rate of toxoplasma antibodies in immunocompromised persons, based on ELISA, commonly considered as the gold

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standard for *Toxoplasma gondii* specific antibodies IgG and IgM (Dimie *et al.,* 2013). The objective of this study was to determine the seroprevalence and risk factors of *Toxoplasma gondii* IgG and IgM antibodies in HIV/AIDS patients using ELISA technique in Port Harcourt, Rivers State, Nigeria.

2.0 Methodology

2.1 Description of Study Area

Rivers state ($4^0$49'27''N,$7^0$2'59''E), southern Nigeria, comprising the Niger River delta on the Gulf of Guinea is bounded by the states of Anambra and Imo on the north, Abia and AkwaIbom on the east, and Delta on the west.Its capital Port Harcourt is situated within latitude 4.45^0N and 4.50^0 N and longitude 6.55^0E and 7.02^0E.Port Harcourt is one of Nigeria's major cities due to rapid industrialization, oil boom and high population density owing to migration. The University of Port Harcourt teaching hospital, Port Harcourt is located in East-West Road, a few kilometres from the University of Port Harcourt, Port Harcourt. The hospital is owned by the government and therefore it is visited by a vast majority of people.

2.2 Collection of Samples and Serological Testing

Two hundred immunocompromised (HIV positive) subjects were randomly enlisted in this study for test. 2ml - 5ml of venous blood was collected from each of the 200 participants between February and June 2016. Blood samples were collected and centrifuged for 5 minutes. Serum was then collected and stored at 2°C.The developing plates cards, reagents and specimen were all brought to a temperature between 22°C and 26°C before they were tested using Bio Check *Toxoplasma* IgG and IgM enzyme immunoassay test kit following the manufacturer s guidelines Well-structured questionnaire capturing information regarding age, sex, occupation, possession of pets and other risk factors were administered to individuals enlisted in this study.

2.3 Ethical Considerations

The work was approved by the ethical committee of University of Port Harcourt teaching hospital as part of their follow up for the hospital including obtaining individual patients oral / written consent. This was achieved by educating the people on the objectives of the study.

2.4 Data Analysis

A two way factor ANOVA was used to analyse the data generated from this study.

3.0 Results

Out of the 200 sera examined 69 (34.5%) and 6 (3%) were seropositive for both IgG and IgM toxoplasma antibodies respectively. The seroprevalence of IgG was found to be statistically significant ($P < 0.05$) while that of IgM was insignificant ($P > 0.05$). The overall prevalence of *Toxoplasma gondii* in this study was 75(37.5%). The Age group 30 -34 had the highest seroprevalence of 20(10%) for IgG toxoplasma antibodies. Age groups 20 -24 7 (3.5%) and 25 - 29 9(4.5%) statistically have similar seroprevalence for IgG (Table1).Age group 20-24 3(1.5%) ($P > 0.05$) recorded the highest seroprevalence for IgM antibodies and subjects above 40 showed the least seroprevalence of 0(0.0%) for IgM (Table 1). Seroprevalence for males (11.5%) IgGE, (1.0%) IgGR and females (23.0%) IgGE, (2.0%) IgGR are statistically significant ($P <0.05$) for IgG and IgM antibodies (Figure 1). Traders had the highest seroprevalence (17%) followed by Artisans (7.5%) for IgG toxoplasma antibodies while students 2(1.0%) showed the highest seroprevalence for IgM (Figure 2). The different risk factors associated with toxoplasmosis are shown in Table 2. The relationship between toxoplasmosis and CD4 cell count is shown in Figure 3.

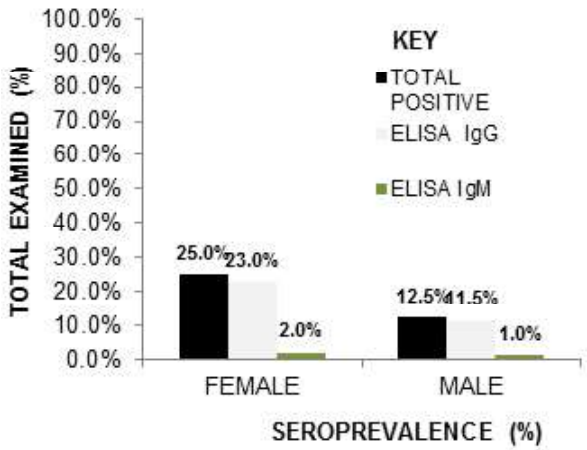

Figure 1: Sex related seroprevalence of toxoplasmosis among HIV patients.

Table 1: Age related seroprevalence of toxoplasmosis in HIV patients.

Age	Total Examined	Total Positive	ELISA IgG (%)	ELISA IgM (%)	Mean ELISA IgG	Mean ELISA IgM
20-24	23	10	7(3.5%)	3(1.5%)	2.3^{fgh}	1^{ijk}
25-29	22	10	9(4.5%)	1(0.5%)	3^{efg}	0.3^{k}
30-34	52	21	20(10.0%)	1(0.5%)	6.7^{b}	0.3^{k}
35-40	42	15	14(7.0%)	1(0.5%)	6.7^{b}	0.3^{k}
>40	61	19	19(9.5%)	0(0.0%)	4.7^{cd}	0.3^{dk}
Total	200	75	69(34.5%)	6(3.0%)	6.3^{b}	0^{k}

Means that do not share a letter are significantly different (P< 0.05)

Table 2: Bivariate and multivariate analyses of lifestyle factors associated with seroprevalence of *Toxoplasma gondii* among HIV patients

Variables	Total Examined	Total Positive	Elisa IgG	Elisa IgM	Elisa IgG (%)	Elisa IgM (%)
Engage in farming						
Yes	157	63	59	4	29.5%	2.0%
No	43	19	16	3	8.0%	1.5%
Wash Fruits						
Yes	41	16	16	0	8.0%	0.0%
No	159	66	59	7	29.5%	3.5%
Drink Treated Water						
Yes	1	0	0	0	0.0%	0.0%
No	199	82	75	7	37.5%	3.5%
Grew Up With Pets						
Yes	145	60	58	2	29.0%	1.0%
No	55	22	17	5	8.5%	2.5%
Possess Pets						
Yes	16	5	5	0	2.5%	0.0%
No	184	77	70	7	35.0%	3.5%
Consume Suya						
Yes	15	4	4	0	2.0%	0.0%
No	185	78	71	7	35.5%	3.5%

4.0 Discussion

In the present study, the overall seroprevalence of toxoplasmosis in the 200 HIV/AIDS patient examined was 75(37.5%). This was found to be statistically significant with a P-value of less than 0.05. This result is similar to reports of the other studies of seroprevalence rate of 38.01% in Mashasd (Rahimi *et al.,* 2015) and 32.4% in Zaria Nigeria (Dimie *et al.,* 2013). However, the seroprevalence of toxoplasmosis in HIV-positive patients varied in other studies including 22.2% in Abuja, Nigeria (Dimie *et al.,* 2013); 96.3% in Mazandaran Iran (Rahimi *et al.,* 2015). These variations may be due to different climatic conditions and prevailing demographic factors influencing the transmission of the parasite in these locations.

IgM toxoplasma antibody response to toxoplasma infection is short lived and it is frequently suppressed to undetectable levels in the settings of severe immunosuppression (Nissapatorn *et al.,* 2002).In agreement our study revealed lower rates of IgMseropositivity6(3%) P>0.05 compared to IgG

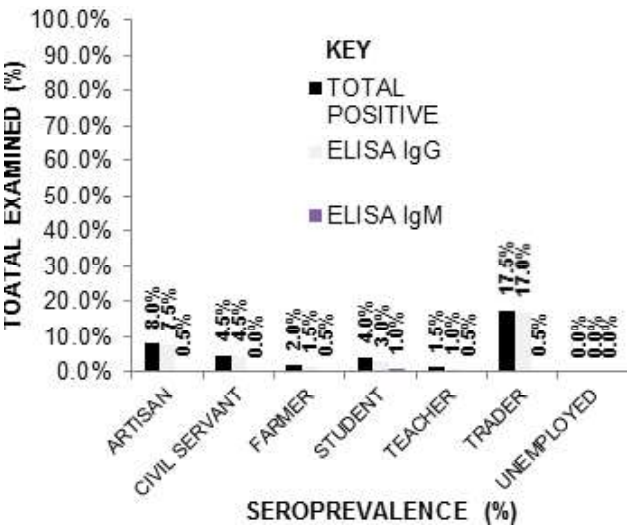

Figure 2: Occupational related seroprevalence of toxoplasmosis among HIV patients.

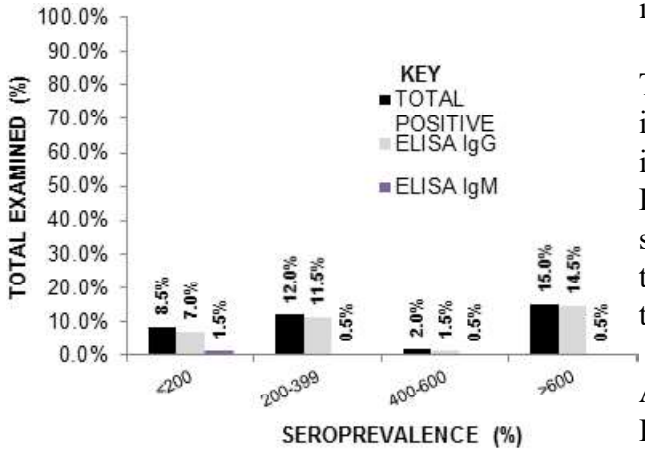

Figure 3: CD4 cell count related seroprevalence of toxoplasmosis among HIV patients.

seropositivity 69 (34.3%)P< 0.05.Similar observations of lower IgM seropositivity compared to IgG seropositivity in HIV patients have been reported by other studies from India (Sukthana *et al.,* 2006, Sarvi *et al.,* 2011),Mexico (Gongora *et al.,* 1998)South Africa (Hari *et al.,* 2007)and Northern Nigeria (Dimie *et al.,* 2013).These low rates of detection of IgM antibodies in HIV positive patients lend support to the view that the screening for this antibody in the routine diagnosis of toxoplasmosis in non-pregnant HIV infected patients may be of limited value (Meisha *et al.,* 1997; Nissapatorn *et al.,* 2002).

Toxoplasmosis seroprevalence increased with age and was not sex related. Similar findings were made in Abuja (Uttah *et al.,* 2013), Malaysia (Nissapatorn *et al.,* 2002), Northern Mexico (Alvarado-Esquive*et al.,* 2012). Seropositivity was not significantly influenced by occupation in this study. This is similar to observations made by Dimie *et al.,* (2013). Factors like history of living with pets, engaging in gardening and farming and eating improperly washed fruits and vegetables were found to significantly influence the transmission of toxoplasmosis in this study. This is supported by findings reported in other studies (Tekkesin *et al.,* 2012; Gongora *et al.,* 1998; Alvarado-Esquive *et al.,* 2012). Studies from Mexico (Gongora *et al.,* 1998) Malaysia (Nissapatorn *et al.,* 2002), and northern Nigeria (Dimie *et al.,* 2013) reported that there is no correlation between CD4 cell count and seroprevalence of toxoplasmosis. This observation is also supported by this study.

Toxoplasmosis is prevalent in HIV positive patients in Port Harcourt and manifest as latent asymptomatic infections .We recommend routine education among HIV patients in our study area as well as routine screening of all HIV infected patients for IgG anti-toxoplasma antibodies to identify patients at risk of toxoplasma encephalitis.

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References

Alvarado-Esquive C., Liesenfeld O., Burciaga-lopez, B.D. Ramos-Nevarez A., Estrada- Martinez, S., Cerrillosoto S.M., Carrete-Ramirez. F.A. Lopez Centeno M., and Ruiz- Martinez M.M. 2012, "Seroepidermiology of *Toxoplasma gondii* infectiom in elderly people in a Northern Mexican City", *Vector-borne* and *Zoonotic Diseases* **12(7),** 568-574.

Daryani A., Sharif M. and Meigouni M. 2011, "seroprevalence of IgG and IgM anti-*toxoplasma*

antibodies in HIV/AIDS patients northern Iran", Asian Pacific *J Trop Med*. **4(4),** 271-274.

Dimie O., Geoffrey C., Onyemelukwe, Bolanle Omusa, Reginald O. 2013, "Seroprevalence of IgM and IgG antibodies to *toxoplasma* infection in healthy and HIV positive adults from Northern Nigeria. *J. Infet Dev Cirricles*", **20B 7(5),** 398-403.

Dubey J.P., Jones J.L. 2008, "*Toxoplasma gondii* infectious in humans and animals in United States", *International Para* **38(1),** 1275 -78.

Gongora-Biach R.A., Gonzalez-Martinez P., Castr-Sansones C., Alvarez- Moquel R. and Pavia –Ruz N. 1998, "Antibodies against *toxoplasma gondii* in patients with HIV in Yucatan", *Rev Invest Clin* **50,** 419-222.

Hari K.R., Modi M.R., Ochan A.H., Modi G. 2007, "Reduced risk of *Toxoplasma* encephalitis in HIV infected patients- a prospective study from Gauteng, South Africa", *Int J STD AIDS* **18,** 555-558.

Meisha Y.V., Mehta S. and Petel U. 1997, "A prospective study of toxoplasmosis in general population and in HIV/AIDS patients in Bombay India", *J Postgrad Med* **43,** 93-97.

Nissapatorn V., Kamaru I., Zaman A., Init L., Tan L.H., Rohela M. Norzila A., Chan L.L., Latt H.M., Anua A.K., Quek K.F. 2002, "Seroepidemiology of toxoplasmosis among HIV infected patients and healthy blood donors", *Med J* Malaysia **57,** 304-310.

Rahimi M., Mahdovi S., Javadian B., Razael R., Moosadeh M., Khademlou M., Seyedpour S. and Syadapbanah A. 2015, "High seroprevalence of *Toxoplasma gondii* Antibody in HIV/AIDS individual in Northern Iran", Iran *J. Parasitol* **10(4),** 384-389.

Sarvi S., Daryani, A., Aaraba M., Mizani A., Ahmadpour E., Shori A., Rahimi M.T. and Sharif M. 2011, "Seroprevalence of *Toxoplasma gondii* in Iran general population. A systematic Review and meta –analysis", *Acta Tropica* **137,** 185-194.

Sukthana Y. 2006, "Toxoplasmosis; beyond animals to humans", *T. parasitology* **22,** 137-142.

Tekkesin N. 2012, "Diagnosis of toxoplasmosis in pregnancy - A review", *HQAJ Biology* **1(1) 9**

Uttah C., Ajang R., Ogbeche J., Etim L. 2013, "Comparative seroprevalence among three sub group in Nigeria", *Journal of natural science research* **3 (8),** 2224 - 3186.