

Toxoplasmosis in Ghana: Seroprevalence study in the coastal population



Godwin Kwakye-Nuako

Godwin Kwakye-Nuako is a microbiologist/biomedical scientist and has worked as a Senior Researcher and Teaching Assistant at the Department of Microbiology of the University of Ghana Medical School. His research interests include but are not limited to: epidemiology of tropical diseases; public health impact of tropical diseases; zoonotic diseases such as *Toxoplasmosis*, *Babesiosis*, etc; neglected tropical diseases such as *Leishmaniasis*, *Trypanosomiasis*; parasite-vector-host interactions of *Leishmania*, *Trypanosomes*, etc; and molecular analysis of parasites, among others.

He is currently working under Prof. Paul Bates (*Leishmania Research Lab*) on a Wellcome Trust funded training and research fellowship at the Division of Biomedical and Life Sciences, School of Health and Medicine, Lancaster University, UK.

¹Godwin Kwakye-Nuako, MPhil, Principal Investigator; ¹Patrick Osei-Owusu, MPhil, Co-Investigator; ²Daniel Amoako-Sakyi, MPhil, Co-Investigator; ²Docas Obiri-Yeboah, MBChB, Co-Investigator; ¹Patrick F. Ayeh-Kumi, PhD, Supervisor; ³Claudia Munoz-Zanzi, DVM, MPVM, PhD, Supervisor, Collaborating/ Co-Principal Investigator

¹ Department of Microbiology, University of Ghana Medical School, College of Health Sciences, Korle-Bu, Accra, Ghana

² Department of Microbiology, School of Medical Sciences, University of Cape Coast, Cape Coast, Ghana

³ Division of Epidermiology and Community Health, School of Public Health, University of Minnesota, USA

Introduction

Blood borne parasites are of paramount public health concern to developing countries like Ghana, due to the system of management and health practices [1]. *Toxoplasma gondii*, a blood borne parasite, occurs world-wide and is one of the most common parasitic infections [2]. The organism is an intracellular protozoon with non host specificity; it infects a wide variety of hosts including birds, mammals and humans. Infection is acquired by ingestion of viable cysts in undercooked meat, or oocysts excreted by cats [3, 4].

Previous studies carried out in parts of Africa have documented high prevalence of toxoplasmosis in people and animals. In Ethiopia for instance, a survey carried out using two different test kits; the Modified Direct Agglutination Test (MDAT) and ELISA Enzygnost IgG Test on a total of 116 sheep and 58 goats revealed significant seroprevalence of 52.6% and 24% in sheep and goats by the MDAT and 56% and 25.9% in sheep and goats by the ELISA respectively. Prevalence rates in humans ranging from 11.5% to 39% have been recorded in various African countries including Ethiopia [5]. *Toxoplasma*-specific seropositivity of 43.7% was recorded in Nigerian women, with 25% observed in age 15-18 years and 71.4% seropositivity in age 39-42 years. The incidence or seroconversion rate varied from 0.5% in the 15-year-old women to 5.3% in age 37 years [6]. A seropositivity of 57.8% has been recorded earlier in varying ages of Nigerian population of the Niger Delta State [7].

Studies in Ghana

Scanty information about the incidence of toxoplasmosis in humans exists in Ghana, however, significant evidence about toxoplasmosis in livestock have been made available in through the effort of some researchers [9]. Their studies have revealed a high prevalence of toxoplasmosis in livestock, consequently, possible sources of transmission to humans through consumption of undercooked meat from domestic animals could be anticipated.

An overall prevalence of 92.5% (147/159), serum anti- *Toxoplasma* IgG (73.6%), IgA (64.8%) and IgM (76.1%), as estimated by ELISA, has been found in pregnant women in Greater Accra, Ghana [10]. A study performed in three ecological zones of Ghana revealed that significant proportion of pigs in Ghana are exposed to *T. gondii* infection, an indication of environmental contamination with oocysts [11]. The study disclosed further that about one third of market pigs (age 6 - 12 months) had antibodies against *T. gondii*, signifying pork as a potential source of transmission to humans in Ghana. The prevalence of the study in pigs in Ghana stood at 39% [11]. In another work done on sheep and goats, the prevalence stood at 33.2% and 26.8% respectively while the overall prevalence was estimated as 30.5%. *Toxoplasma* antibody prevalence was found to be higher in the Coastal and Forest zones but lower in the savannah zone [9]. This high prevalence rates of toxoplasmosis is attributable to warm, moist environments which enhance longer viability of *T. gondii* oocysts in such environments [5, 9]. The evidence of *Toxoplasma* sp. in some animals, and the norm of human-cat and human-animal interactions in most communities

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in Ghana, raises public health concerns. There is the potential source of transmission to humans in Ghana through consumption of meat from these animals found to have had the infection as well as ingestion of oocysts through contaminated soil by droppings from felids.

Knowledge about the incidence of toxoplasmosis in a population is essential in the formulation of appropriate preventive options. Moreover, serological screening and health education have been found to be effective in preventing microbial infection. These will be more cost effective in the management of toxoplasmosis in pregnancy, immunosuppressed and the general population. Very little information exists on the prevalence of *Toxoplasma gondii* infection in the general population in Ghana, therefore, this study seeks to obtain a preliminary estimate of the seroprevalence of infection in the general population.

Current Study

The study was conducted in the Cape Coast municipality, the capital of the Central Region as phase one study. Samples were collected from the two main hospitals in Cape Coast municipality. Demographic, personal, clinical information and data on general and specific risk factors for Toxoplasmosis were obtained from study participants following consent. Five ml of blood were collected from each of the subjects involved in the study. The sera were separated and stored at -20°C until ready to use. Anti-*Toxoplasma* sero-positivity ELISA procedures were performed to detect IgG and IgM. Univariate and multivariable logistic regression models were used to assess risk factors for the disease.

A total of 229 subjects between the ages of 13 and 50 years including males and females were recruited into the study. The overall IgG seroprevalence in the Cape Coast municipality was 72.49% in this current study, with a very low IgM seroprevalence of 0.87%. IgG seroprevalence was higher in high school graduates compared to university graduate, and highest in recruits with no education. Prevalence of the disease significantly increased with increasing age ($P < 0.001$). Presence of a cat in a house and sex did not show any association with serostatus. The type of meat consumed did also not show any association with Toxoplasmosis, however the likelihood of seropositivity increased significantly with increasing number of different types of meat consumed ($P < 0.001$). Though there is little evidence of current infection at the time of sampling in this small size study, there is considerable evidence of exposure in greater majority of the population in Cape Coast. Public education on basic hygienic practices (ie hand washing with soap) will help reduce the exposure significantly. There is therefore the need to sustain this study to cover a greater spectrum of the Ghanaian population and also to genotype the strains of *Toxoplasma gondii* circulating in the country.

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