



Toxoplasmosis and its Associated Risk Factors among Pregnant Women in Two Communities of Kebbi State, Nigeria.

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ABSTRACT:

A cross-sectional study to determine the seroprevalence and risk factors associated with toxoplasmosis was carried out in Bunza and Gwandu Local Government Area of Kebbi State. A total of 200 pregnant women were randomly selected and screened for *T.gondii* IgG and IgM for this study. Of the 200 blood samples screened collected from the participants, 78 (39.0%) were found to be positive. The prevalence of the infection was significantly associated with a community ($P = 0.015$). The findings of this study also show an intimate association between the prevalence of the infection and other risk factors such as possession of cat ($P < 0.0001$), direct contact with a cat ($P < 0.0001$), eating raw/undercooked vegetables/meat ($P < 0.0026$) and eating raw or unwashed fruits/vegetables ($P = 0.0346$). It was concluded that ignorance, poor personal and environmental hygiene as well as keeping cats were factors found to be associated with the high prevalence rates recorded in this study area. Health education, personal and environmental hygiene, regular mass treatment program and proper cooking and washing of food are recommended.

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INTRODUCTION

Toxoplasmosis is a zoonotic parasitic disease cause obligate protozoan parasite *Toxoplasma gondii* which belongs to the phylum Apicomplexa (Ogoina *et al.*, 2013). The parasite is a facultative heteroxenous parasite whose definitive host is a cat of the genus *Felidae*. The parasite is capable of infecting almost all warm-blooded animals as intermediate hosts (Kristiah, 2009). *T. gondii* belongs to phylum Apicomplexa, class Sporozoasida, and order Eucoccidiida (Török *et al.*, 2013).

Toxoplasmosis during pregnancy might cause severe damage to the foetus.

The clinical manifestations of congenital toxoplasmosis include intracranial calcification, microcephalus, hydrocephalus, convulsion and severe restriction of intrauterine growth as observed by Dubey and Jones (2008). In neonates, extensive studies by Di Carlo *et al.* (2008) and Brown *et al.* (2009) revealed that delay in treatment of toxoplasmosis could lead to the development of severe sequelae, including neurological abnormalities and mental impairment. Severe toxoplasmosis, causing damage to the brain, eyes, or other organs, can develop from an acute *Toxoplasma* infection or one that had



occurred earlier in life and is now reactivated (CDC, 2013). Transmission to humans occurs through direct contact with faecal material infected with *T. gondii* oocysts, consumption of vegetables and food contaminated with *T. gondii* oocysts and congenital transmission from an infected mother to the unborn foetus (Muhie and Keskes, 2014).

It is estimated that more than one billion people worldwide are infected by toxoplasmosis (Switaj, *et al.*, 2005). Ayeh-Kumi *et al.* (2010) reported that between 30% and 65% of the global population are infected with toxoplasmosis. In Sudan, Musa and Mohamed (2014) recorded 26.7% prevalence of *Toxoplasma gondii* infection among pregnant women attending antenatal clinics in Khartoum and Omdurman Maternity Hospitals, Sudan. A study of Ayinmode *et al.*, (2015) in Ekiti and Ondo, revealed 20.0% prevalence of the infection in dogs. About 22.0% prevalence among pregnant women attending antenatal care in Maiduguri, Borno state was reported by Oyinloye *et al.* (2014). Uttah *et al.*, (2013), recorded 32% prevalence among pregnant women, immune-compromised and immune-competent in FCT Abuja. Alayande, *et al.*, (2013) reported 27.7% prevalence of the infection among pregnant women in Sokoto.

Despite the consequences associated with congenital toxoplasmosis, pregnant women are not screened for toxoplasmosis in most clinics in this country probably for reasons of cost and lack of knowledge about toxoplasmosis. It is in the light of the above that this research was carried out to determine the seroprevalence of *T. gondii* infection among pregnant women in two communities of Kebbi state. No documented information on toxoplasmosis in this study area, instead of this, this study was carried out to provide

current epidemiological information on toxoplasmosis in area.

Aim and Objectives

This study aims to determine the seroprevalence of *T. gondii* infection among pregnant women in Bunza and Gwandu LGA of Kebbi State and the specific objectives are to;

- i. Determine the prevalence of toxoplasmosis among pregnant women concerning their community.
- ii. Investigate the seroprevalence of toxoplasmosis concerning the duration of pregnancy.
- iii. Examine the risk factors associated with toxoplasmosis among pregnant women in the study area.

MATERIALS AND METHODS.

This study was carried out in Bunza and Gwandu local government areas of Kebbi State. The state has a total landmass of 36,800 square kilometres and a population of 3,630,931 peoples (NPC, 2005). The state comprises of four Emirates, namely: Argungu, Yauri, Zuru and Gwandu emirate.

The study population comprised of 200 pregnant women from 4 primary health care centres selected using cluster sampling in Bunza and Gwandu. In each of the selected health centres, 50 pregnant women were randomly selected for this study.

A structured questionnaire was administered to obtain information on demographic data and risk factors of acquiring toxoplasmosis. Ethical approval for the study was obtained from the Ethics and Research committee of Kebbi State University, Aliero. Permission to conduct the study in the health care centres was sought from the Ministry of health, Head



primary health care centres and the participants.

About 5ml venipuncture blood samples were collected from each participant and quickly transferred to sample bottles without anticoagulant. The blood in the sample bottles was left for 3 - 4hrs at room temperature to allow for clotting. The serum formed was then be transferred into labelled vials and stored at 40°C until used, which was not later than 36 hours as described by Cheesbrough.

Laboratory analysis of blood samples collected was carried out in Zoology laboratory of Kebbi State University of Science and Technology, Aliero. Serodiagnostic tests were performed on the collected sera. Toxo-Latex kit by linear chemicals (Cromatest, Jeanquim Costa. Barcelona.Spain.REF2740005; 2740010), which is a rapid slide agglutination procedure developed for the direct detection of antibodies anti-*Toxoplasma* in human serum was used. The principle of the test is based on antigen-antibody reaction directly as shown in the figure. The sensitivity of the test is 10-15 IU/ml (Roller *et al.*, 1987). The test was done according to Johnson *et al.*, (1985).

The data collected were analyzed using SPSS (V 20.0). The prevalence of the infection was calculated and expressed in percentages. Multivariate logistic regression was used to confirm a possible association

between the infection and other risk factors. P-value of ≤ 0.05 is considered significant at 95% CI.

RESULTS

Of the 200 pregnant women screened in this study area, 78 women were found positive with *Toxoplasma gondii*. An overall prevalence of 39.0% was obtained in this study (Table 1). Peak prevalence was recorded in Gwandu with the prevalence of 47.0% while the low prevalence of the infection was recorded in Bunza (31.0%) as shown in Table 1.

Breakdown of result concerning health care facilities showed that Bunza primary health care had the highest prevalence of 24.0%, followed by Raha primary health care 46.0%, Masama primary health care (34.0%) and Gwandu primary health care with the prevalence of 28.0% (Table 2). These differences among the health care centres were statistically not significant at 95% confidence level ($P = 0.1217$).

Table 3 depicts the prevalence of the infection concerning the trimester of pregnancy. The result shows that prevalence is high among women with second-trimester pregnancy (48.5%) than those with first trimester and third-trimester pregnancy which recorded 37.8% and 32.6% prevalence respectively.

Table 1: Community Based Prevalence of Toxoplasmosis in the Study Area.

LGA	No examined	No Positive (%)	Chi-square	Odds Ratio	P-value
Bunza	100	47(47.0)	4.73	1.97	0.015*
Gwandu	100	31(31.0)			
TOTAL	200	78(39.0)			

* Statistically significant



Table 2: Seroprevalence of Toxoplasmosis concerning Primary Health Care (PHC) centres.

PHC	Not examined	No Positive	Percentage	Chi-square	DF	P-value
Bunza PHC	50	24	48.0	5.801	3	0.1217ns
Raha PHC	50	23	46.0			
Gwandu PHC	50	14	28.0			
Masama PHC	50	17	34.0			
TOTAL	200	78	39.0%			

Ns = statistically not significant

Table 3: Seroprevalence of Toxoplasmosis concerning pregnancy trimester of the pregnant women in the study area.

Trimester	Not examined	No Positive	Percentage	Chi-square	P-value
First	45	17	37.8	4.064	0.1311ns
Second	66	32	48.5		
Third	89	29	32.6		
TOTAL	200	78	39.0%		

Keys: ns = not significant.

A noticeable disparity was observed among the women that know about toxoplasmosis and those that were not aware of the disease, where prevalence varied from 15.8% - 41.4%. The prevalence of the infection among that are aware of the disease was 3(15.8%) out of 19. Prevalence of the parasite was high among women that do not know about toxoplasmosis (41.4%) as shown in Table 4.

Possession of cat played a significant role in determining the seroprevalence of the infection among various pregnant women. A high prevalence of 62.2% was recorded among pregnant women who possessed cat, while 25.4% prevalence was observed among those that have no cats. The result of the study shows the intimate association of the infection and possession of cats (O.R = 4.83, P <0.0001) as shown in Table 4 below.

Table 4: Seroprevalence of Toxoplasmosis concerning Demographic Risk Factors Associated with the infection in the study area.

RISK FACTOR	Not examined	No Positive (%)	Chi-square	Odds Ratio	P-value
Awareness:					
No	181	75(41.4)	3.74	3.77	0.027*
Yes	19	3(15.8)			
TOTAL	200	78(39.0)			
Possess Cat					
Yes	74	46(62.2)	24.965	4.83	<0.0001***
No	126	32(25.4)			
TOTAL	200	78(39.0)			

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Contact with cats					
Yes	63	59(93.7)	112.14	91.61	<0.0001***
No	137	19(13.9)			
TOTAL	200	78(39.0)			
Eating Raw vegetable					
Yes	87	44(50.6)	7.832	2.39	0.0026**
No	113	34(30.1)			
TOTAL	200	78(39.0)			
Washing vegetable before eating					
No	49	25(51.0)	3.301	1.926	0.0346*
Yes	151	53(35.1)			
TOTAL	200	78(39.0)			

Keys: * = significant, ** = strongly significant, *** = extremely significant

Direct contact with cats also played a significant role in determining the prevalence of the infection. Among the 63 pregnant women that said they have direct contact with a cat, 59(93.7%) were tested positive, while those that have no direct contact with cats had lower prevalence 19(13.9%) out of 137, (Table 4).

The result of this study shows a high prevalence of toxoplasmosis among pregnant women that regularly eat raw vegetables or undercooked meat (50.6%) than those who do not eat raw vegetables regularly (30.1%). Table 4 also shows the seroprevalence of toxoplasmosis concerning food hygiene among pregnant women in the study area. High prevalence of 51.0% was recorded among the pregnant women that don't wash vegetable regularly before eating while the low prevalence of 35.1% prevalence was recorded among the pregnant women that always wash vegetables before eating.

DISCUSSIONS

Out of the 200 pregnant women screened toxoplasmosis in this study area, 78 women were tested positive. An overall

prevalence of 39.0% was obtained in this study. The result of this study is higher than that of Alayande *et-al* (2013) in Sokoto with 27.7% prevalence. However, the result is less than 40.8% obtained by Akinbami *et al.*, (2010) in Lagos. This variation may probably due to the study area which was in the North-western zone of the country with the extremely high-temperature condition, which consequently hinders the survival and development of the *Toxoplasma gondii* oocyst. It has been reported that pregnancy itself is a risk and may add to the unfavourable condition of life (Alvenino *et al.*, 2004) and this increases the vulnerability of pregnant women to parasitic infection.

Concerning location, the infection was significantly related to the community in question (Chi-square value of 4.73 and P-value of 0.015). Differences in community practice may likely be the cause of differences in the rate of prevalence between the communities.

A significant association was found to exist between *gondii* oocyst infection and trimester in which a higher prevalence was recorded among women with second-



trimester pregnancy (48.5%) than those with first trimester and third-trimester pregnancy which recorded 37.8% and 32.6% prevalence respectively. This may be attributed to low immune response associated with pregnant women. According to Lopes, *et al.*, (2012), the risk of transmission is lower in the first trimester and higher in the last trimester of pregnancy.

The finding of this study reveals that *T.gondii* infection in the study area may be attributed to the consumption of contaminated food products usually eaten or drunk which might inadequately or improperly be washed and consumption of undercooked or raw food materials such as suya/roasted meat, vegetables, carrots, garden eggs which are commonly eaten in the country especially by pregnant women. The finding of this study also shows the intimate association of Toxoplasmosis and keeping and coming into contact with domestic animals like cats as well as poor personal hygiene.

CONCLUSION

The result of this study highlights the public health challenges represented by Toxoplasmosis in Bunza and Gwandu local government area in particular and the state in general, and the needs to be addressed to decrease its burden on health care. The high prevalence may be attributed to poor environmental management, poor personal hygiene and lack of public health education.

RECOMMENDATIONS:

Based on the findings of this research work, the following recommendations were made; Public health education, improved sanitary conditions in our environment and proper cooking and washing of food are the key success to the prevention of the spread of Toxoplasmosis in the study area.

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