

RESEARCH NOTE

Prevalence of *Toxoplasma gondii* antibodies in cats in Maiduguri, Northeastern Nigeria

Joshua Kamani^{1*}, Aliyu U. Mani², Hussaini A. Kumshe², James P. Yidawi³ and Godwin O. Egwu²

¹Parasitology Division, NVRI PMB 01 Vom, Plateau State, Nigeria; ²Department of Veterinary Medicine, University of Maiduguri, PMB 1069 Maiduguri, Borno State, Nigeria; ³Mohamet Lawan College of Agriculture, PMB 1427 Maiduguri, Borno State, Nigeria

Abstract

Cats play an important role in the spread of *Toxoplasma gondii* because they are the only animals that excrete resistant oocysts into the environment. Prevalence of *T. gondii* antibodies in cats in Maiduguri, Northeastern Nigeria was determined using the latex agglutination test (LAT). Thirty eight cats (36.2%) were seropositive using a cut off point of 1:64 with antibody titer ranging from 1:64 to 1:1024. Seroprevalence was higher in older animals and stray cats. Age and ownership status of cats were identified as risk factors but not gender or area of capture.

Keywords

Toxoplasma gondii, seroprevalence, latex agglutination test, cats, Nigeria

Toxoplasma gondii is an obligate intracellular parasite that infects almost all warm-blooded animals and humans (Tenter *et al.* 2000). *Toxoplasma gondii* infection in cats is both of epidemiological and clinical significance. Cats play an important role in the spread of toxoplasmosis because they are the only animals that excrete resistant oocysts into the environment (Silva *et al.* 2002). For epidemiologic surveys, seroprevalence data for cats are more useful than results of fecal examination because cats with antibodies have probably already shed oocysts and are an indicator of environmental contamination (Dubey and Jones 2008).

A recent review summarized worldwide prevalence of *T. gondii* infection in cats, but no report from Nigeria (Jones and Dubey 2009). In the present study, the seroprevalence of *T. gondii* in cats in Maiduguri, Borno State, Northeastern Nigeria was investigated for the first time.

The location of Borno State, the study area has been described elsewhere (Kamani *et al.* 2009). Blood from 105 cats, 77 being stray cats and 38 from households from different districts of Maiduguri Metropolitan, Borno State was withdrawn by intravenous or intracardiac methods after intramuscular injection of animals with a Xylazine (1 mg/kg, Rompun)-Ketamine (10 mg/kg, Ketalar) combination as approved by the American Veterinary Medical Association Panel of Euthanasia and Institutional Animal Care and Use Committee (Beaver

et al. 2001). Blood was allowed to clot, centrifuged. The serum collected was labelled and stored at –20° C until further examination. Data such as age, sex, area of capture, ownership status and date of blood collection was noted. Cats were classified as owned or stray.

The presence of *T. gondii* antibodies was analyzed by the latex agglutination test (LAT) kit (TOXOREAGENT-Mast Diagnostics, Mast House, Derby Road, Bootle, L20 1EA, UK) according to the manufacturer's instructions. The cut-off titer for cats for this test was 1:64; the end point was decided in each positive sample.

Chi-square and Fisher's exact tests were used to compare seroprevalence values relative to gender, age, area of capture and ownership status. Odds ratios (OR) at Confidence intervals (CI_{95%}) were used to determine possible factors of exposure. Analyses were done with Statistix 8, and MedCal statistical softwares, with a probability (P) value <0.05 as statistically significant.

Toxoplasma gondii antibodies were detected in 38 (36.2%) of 105 cats, 33.1% in males, and 33.8% in females. There was not significant difference in seroprevalence between sex of cats as earlier reported by Salant and Spira (2004), but contrary to Besne-Merida *et al.* (2008) and Sathaporn *et al.* (2007). The antibody titers were 1:64 in 13, 1:128 in 10, 1:256 in 7, 1:512 in 6, and 1:1024 in 2 cats. Age and ownership status were iden-

*Corresponding author: shapumani@yahoo.com

Table 1. Seroprevalence of *T. gondii* infection in cats (n = 105) from Maiduguri, Nigeria by gender, age, area of capture and ownership status

Variable	n	Relative distribution (%)	LAT positive	Prevalence (%)	OR (CI95%)	P
Gender						
Male	42	40.0	14	33.3	1.00	0.62
Female	63	60.0	24	38.1	1.23 (0.54–2.79)	
Age group (years)						
≤1	18	17.1	3	16.7	1.00	0.13
>1≤5	67	63.8	24	35.8	2.79 (0.73–10.62)	
>5	20	19.0	11	55.0	6.11 (1.33–27.96)	
Area of capture						
Household	39	37.1	10	25.6	1.00	0.14
Fish market	10	9.5	5	50.0	2.9 (0.69–12.15)	
Abattoir	9	8.5	3	50.0	1.45 (0.30–6.90)	
Hospital	28	26.7	12	42.9	2.17 (0.77–6.14)	
Restaurant	19	18.1	8	42.1	2.11 (0.66–6.73)	
Ownership status						
Owned	39	37.1	10	25.6	1.00	0.04
Stray	66	62.9	28	42.4	2.39 (0.99–5.73)	
Total	105	100	38	36.2		

tified as risk factors for *T. gondii* infection in the study area (Table 1). The results of the present study showed a progressive increase in prevalence with age, being lowest in cats below one year followed by those between 1–5 years and highest in those above five years. Similar reports have been made elsewhere (Salant and Spira 2004, Lopes *et al.* 2008). This suggests continuous exposure to *T. gondii* in the environment with age. Stray cats are two times more likely to be infected than owned cats (OR = 2.39, CI = 0.99–5.73, P = 0.04). However, cats captured in different areas did not significantly differ in prevalence rate (Table 1). This may be explained by the fact that owned cats are being fed by their owner while stray cats roam about freely and fend for themselves mostly hunting rodents or feeding animal carcasses. Thus hunting and feeding habits differs between the two groups. In the present study infection was higher in older cats, supporting the view that most cats acquire *T. gondii* infection post natally (Jones and Dubey 2009).

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References

- Besne-Merida A., Figueroa-Castillo J.A., Martinez-Maya J.J., Luna-Pasten H., Calderon-Segura E., Correa D. 2008. Prevalence of antibodies against *Toxoplasma gondii* in domestic cats from Mexico City. *Veterinary Parasitology*, 157, 310–313. DOI: 10.1016/j.vetpar.2008.06.019.
- Beaver B.V. *et al.* 2001. 2000 Report of the AVMA Panel on Euthanasia. *Journal of the American Veterinary Medical Association*, 218, 669–696. DOI: 10.2460/javma.2001.218.669.
- Dubey J.P., Jones J.L. 2008. *Toxoplasma gondii* infection in humans and animals in the United States. *International Journal for Parasitology*, 38, 1257–1278. DOI: 10.1016/j.ijpara.2008.03.007.
- Jones J.L., Dubey J.P. 2009. Waterborne toxoplasmosis – Recent developments. *Experimental Parasitology*, (In press). DOI: 10.1016.exppara.2009.03.013.
- Kamani J., Mani A.U., Egwu G.O., Kumshe H.A. 2009. Seroprevalence of human infection with *Toxoplasma gondii* and the associated risk factors, in Maiduguri, Borno state, Nigeria. *Annals of Tropical Medicine and Parasitology*, 103, 317–321. DOI: 10.1179/136485909X435094.
- Lopes A.P., Cardoso L., Rodrigues M. 2008. Serological survey of *Toxoplasma gondii* infection in domestic cats from northeastern Portugal. *Veterinary Parasitology*, 155, 184–189. DOI: 10.1016/j.vetpar.2008.05.007.
- Silva J.C.R., Gennari S.M., Ragozo A.M.A., Amajones V.R., Magnabosco C., Yai L.E.O., Ferreira-Neto J.S., Dubey J.P. 2002. Prevalence of *Toxoplasma gondii* antibodies in sera of domestic cats from Guarulhos and Sao Paulo, Brazil. *Journal of Parasitology*, 88, 419–420. DOI: 10.1645/GE.1268R.1.
- Salant H., Spira D.T. 2004. A cross-sectional survey of anti-*Toxoplasma gondii* antibodies in Jerusalem cats. *Veterinary Parasitology*, 124, 167–177. DOI: 10.1016/j.vetpar.2004.07.011.
- Sathaporn J., Burin N., Nongnuch P., Wissanuwat C., Hidenori K., Soichi M. 2007. Seroprevalence of *Toxoplasma gondii* antibodies in stray cats and dogs in the Bangkok metropolitan area, Thailand. *Veterinary Parasitology*, 145, 138–141. DOI: 10.1016/j.vetpar.2006.10.021.
- Tenter A.M., Heckeroth A.R., Weiss L.M. 2000. *Toxoplasma gondii*: from animals to humans. *International Journal for Parasitology*, 30, 1217–1258. DOI: 10.1016/S0020-7519(00)00124-7.