Research Journal of Veterinary Sciences

ISSN 1819-1908

Academic Journals Inc.

www.academicjournals.com

Research Journal of Veterinary Sciences 5 (3): 69-74, 2012
ISSN 1819-1908 / DOI: 10.3923/rjvs.2012.69.74

Toxoplasma gondii and Intestinal Helminth Infections among Owned and Strayed Cats in Sokoto, Nigeria

[1]M.O. Alayande, [2]L.D. Edungbola, [1]J.P. Fabiyi, [3]O.O. Faleke, [4]S.K. Babatunde, [2]A.A. Akanbi II and [2]A. Nyamngee

[1]Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria

[2]Department of Medical Microbiology and Parasitology, Faculty of Basic Medical Sciences. University of Ilorin, Nigeria

[3]Department of Public Health and Preventive Medicine, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria

[4]Department of Microbiology and Parasitology, Ajayi Crowther University, Oyo, Nigeria

Corresponding Author: M.O. Alayande, Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria

ABSTRACT

Seroprevalence of *Toxoplasma gondii* was determined on sera obtained from 200 (125 owned and 75 strayed) cats, within Sokoto, North west Nigeria. The sera were tested by Toxo-latex slide agglutination test (Toxo-LSAT) and antitoxoplasma antibodies titres (Toxo-LSAT>1.8) were found in 14 (7.0%) of the strayed cats while none of the owned cats was positive for *T. gondii* infection. Out of the 14 positive cats, 9 (64.3%) were male, none of the kittens less than 6 months old was positive while infection occurred in 6 (42.9%) young cats (6 months-1 year old) and 8 (57.1%) adults. There were no significant differences in infection, gender and age ($p>0.01$). No *T. gondii* cysts was detected in any of the fecal samples examined but 92 (46.0%) had the following helminth ova as single or mixed infection: *Taenia taeniaeformis* (16.5%), *Toxocara cati* (10.9%), *Dipylidium caninum* (8.0%) and *Ancylostoma tubaeforme* (11.5%). The presence of *T. gondii* antibodies in strayed cats in this study is of concern as such cats have maximum interaction with their environment shedding faeces indiscriminately and this can precipitate transfer of infection to susceptible animals including man.

Key words: Cats, *Toxoplasma gondii*, intestinal helminths, seroprevalence, Sokoto

INTRODUCTION

Cats and other felines are critical in the epidemiology of toxoplasmosis, since they are definitive reservoirs of *Toxoplasma gondii* (Dubey *et al*., 1970), in which the parasite completes the sexual stage of their life cycle, producing oocysts that are excreted in the faeces and infect other hosts through fecal contamination of soil, food or water (Frenkel *et al*., 1970). The oocysts are excreted in a short period of time (Dubey, 1994). Cats and other animals such as wild mice and wolves, wild rats and small to medium-sized herbivores ingest oocysts from the contaminated environment and become infected (Dubey *et al*., 1970). Contact with affected cats and consumption of undercooked meat were the most common risk factors for man in high risk areas (Nissapatorn, 2007). Cats are kept in most households worldwide for companionship (Turner and Bateson, 1988) while strayed

cats in most instances are ownerless and found in public places such as parks, uncompleted buildings, street corners and refuse dump sites. The strayed cats, especially those known to be feral have been associated with perpetuation of the cat-mouse cycle of *Toxoplasma gondii* (DeFeo *et al.*, 2002). Apart from being the definitive host of the infection, cats also known to function as intermediate host. Affected cat rarely shows signs of *T. gondii* infection but in some cases there may be fever, anorexia, lethargy, ocular inflammation, abdominal discomfort and neurological abnormalities. Transplacentally, infected kittens are always severely affected and die of pulmonary or hepatic complications (Gyorke *et al.*, 2011). Diagnosis of toxoplasmosis is largely based on detection of oocysts in faeces by microscopy, this is less sensitive as its difficult to differentiate the oocysts from *H. hammondi* oocysts. Likewise the affected cats excrete oocysts for a short period of two weeks which is an episode once in life time after active primary infection (Gyorke *et al.*, 2011). IgG antibodies are initially absent during primary infection but rise steadily to a protective level after some weeks and persist for years at detectable level. IgM antibodies on the other hand rise within days of infection and gradually wane over a few weeks, but can persist for years in some chronic conditions (Dubey and Lappin, 1998). The first report of toxoplasma infection in animal population in Nigeria was in dogs in 1978 followed by serological evidences in some food animals in 1981 (Aganga *et al.*, 1985). Since, then there had been few reports based on detection of oocysts in cats' faeces (Aganga *et al.*, 1986) and detection of antibodies to infection with resultant higher detection rates (Kamani *et al.*, 2010). Worldwide infection rates in cats ranged between 5.4-86% (Jones and Dubey, 2010) and the variation is attributed to diagnostic technique used, sample size, the source and health status of cats, the geography of study area and degree of exposure to infective agents. Report on toxoplasma infection is none existence in the present study area, thus this study was embarked upon to determine the presence of toxoplasma infection in cat hosts and also the prevalence of some intestinal helminth parasites.

MATERIALS AND METHODS

Sokoto is located in the extreme north-western part of Nigeria on geographic coordinates 13°04'N and 5°14'E with human population of 427,760. Sokoto is one of the major livestock producing areas of Nigeria and lies within the Sudan Savannah vegetation belt. There are three distinct seasonal variations in Sokoto i.e., cold dry (Nov-Feb), hot dry (March-May) and warm wet (June-Sept.) seasons. The mean annual rainfall ranges between 500-1300 mm with average humidity of below 40% most parts of the year (sometimes it may rise to 60% during the rainy season).

Cats were obtained from all the ten distinct divisions of Sokoto (as stratified by Sokoto Urban and Regional Planning Board). Households with cats in each unit were identified and all available ones were sampled. Strayed cats were obtained through the use of modified iron cage traps with baits which were placed in strategic locations such as refuse dump sites, uncompleted buildings, bush paths, health care facilities within the ten divisions. The strayed cats caught at every point in time were taken to the cattery at the Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto for collection of blood and faeces. The cats were marked with indelible ink to avoid multiple sampling of individual cat. Five millimeters of blood was collected from each cat through the cephalic vein or marginal ear vein (Nottidge, 1999). The blood was centrifuged at 2000-5000 rpm for 5 min and the obtained sera stored at -20°C when not analysed immediately. Likewise, 2 g of faeces was collected per rectum from each cat and stored at 4°C and age was determined through dentition (Harvey and Emily, 1993).

Latex slide agglutination test was used to analyse the obtained sera using Toxo-latex kit (Linear Chemical, Cromodest, Jeanguim Costa, 18.2 Planta 08390 Montgat, Barcelona, Spain). The presence of anti-toxoplasma antibodies in the sera was detected by rapid slide agglutination procedure and the result read under a strong light source at 5-8 min as recommended by the manufacturer. The positive sera were further assayed to determine the antibody titre using a two-fold serial dilution from 1:2-1:64 of sera in phosphate buffered saline and a titre of >1:8 was considered positive.

The coprological examination for *T. gondii* oocysts and helminth ova from faeces was conducted using flotation technique with sucrose and sodium chloride solutions respectively (Dubey *et al*., 1972; Urquhart *et al*., 2003). The prevalence of infection was given as the percentage parasitological positive cats in the total population examined. Chi-square test was used to determine the association between infection, age, sex and sources of cats.

RESULTS

A total number of 200 cats comprising of 125 (62.5%) owned and 75 (35.5%) strayed were examined in this study and the overall prevalence obtained was 7.0%. All the positive sera were from the strayed cats and the age group of between 6 months and one year were more affected (9.5%) while male cats had higher number of positive cases (10.3%) (Table 1). The highest helminthic infection rate of 43.0% was obtained in owned cats above one year old likewise, the owned female cats were most affected (41.6%) (Table 1, 2). Helminth ova identified in the faeces

Table 1: Prevalence of antibodies to *T. gondii* infection and occurrence of intestinal helminth ova in owned and strayed cats in Sokoto

		Owned cats						Strayed cats					
		No. examined		*T. gondii*		Ova +ve		No. examined		*T. gondii*		Ova+ve	
Variables	Total No. of cats +ve	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age													
<6 month	33	21	63.6	0	0	0	0.0	12	36.4	0	0.0	0	0.0
6 month-1 year	74	49	66.2	0	0	22	29.7	25	33.8	7	9.5	12	16.2
>1 year	93	64	68.8	0	0	40	43.0	29	31.2	7	7.5	18	19.4
Gender													
Male	87	32	36.8	0	0	15	17.2	55	63.2	9	10.3	21	24.1
Female	113	93	82.3	0	0	47	41.6	20	17.3	5	4.4	9	7.9

Ova +ve: Helminth ova positive

Table 2: Latex slide agglutination titre distribution among strayed cats

	Titres				
Parameters	1:8	1:16	1:32	1:64	p-value
Age					
<6 month	0	0	0	0	>0.01
6 month-1 year	1	3	1	2	
>1 year	1	2	1	3	
Gender					
Male	1	2	3	3	>0.01
Female	0	2	1	2	

Table 3: Prevalence of intestinal helminth ova obtained in the faeces of cats examined in Sokoto

Parasites	No. infected	Age positive (%)
Taenia taeniaeformis	33	16.5
Toxocara cati	20	10.0
Dipylidium caninum	16	8.0
Ancylostoma tubaeforme	23	11.5
No. of intestinal helminth/cat (n = 92)		
One spp.	4	4.3
Two spp.	13	14.1
Three spp.	33	35.8
More than three spp.	42	46.6

of examined cats include *Taenia taeniaeformis* (16.5%), *Toxocara cati* (10%), *Dipylidium caninum* (8%) and *Ancylostoma tubaeforme* (11.5%). Majority of the cats examined had mixed helminthic infection with cats harbouring more than three species predominated (46.6%) (Table 3).

DISCUSSION

The obtained 7.0% prevalence rate in this study is significant as this is the first time that this type of investigation shall be conducted in Sokoto. This is in agreement with higher seroprevalence rate of 36.2% (n = 105) obtained by Kamani *et al.* (2010) using latex agglutination test, whose work on cats was based in the north-eastern part of Nigeria. These are in contrast to Aganga *et al.* (1986) that obtained an overall prevalence of 0.5% (n = 920) in cats from three northern states of Nigeria through detection of *Toxoplasma gondii* oocysts from fecal samples. Latex agglutination test as used in this study is known to be superior to a number of tests for diagnosis of toxoplasma infection rates (Chakrabarti, 2007).

All the positive samples were from the strayed cats in this study and this lend credence to Gyorke *et al.* (2011) that reported that strayed and feral cats are highly susceptible to toxoplasma infection. Strayed cats by their feral nature come in contact often with wild rodents (the intermediate host) in the tissue of which are tachyzoites or bradyzoites (Urquhart *et al.*, 2003). The absence of infection among the owned cats may be attributed to provision of minimal food and shelter that encourage the cats to stay in-door and around the premises of the household. This prevented them from straying far away from their domiciles thus reducing their contact with the intermediate host rodents (Frenkel *et al.*, 1995). Though, it was observed in this study that male cats had higher seroprevalence, it has been observed that toxoplasma infection in cats is not gender related (Gauss *et al.*, 2003). Male cats however, are known to have territorial dominance which increased their chances of roam-about thus liable to come in contact with infected rodents (Smith *et al.*, 1992).

No oocysts of *T. gondii* was found in this study possibly because cats usually excrete oocysts for a short period of time (1-3 days) after primo-infection (Dubey, 1994) and this could make oocysts to be readily missed on faecal examination.

The strayed and owned cats examined in this study harboured different types of helminths ova. The strayed cats are highly liable to contract infection as they have unlimited access to dump sites and other contaminated environment. On the other hand, lack of routine deworming activities among the owned cats may be responsible for the presence of intestinal helminth ova. Care for pets in the study area seemed to receive little attention as obtained in most African setting probably as a result of poverty. Some of the obtained helminths ova are zoonotic e.g., *Toxocara cati* which can

be acquired via contaminated soil and environment. In view of this study it is highly imperative for cat owners to embark on routine veterinary health care programmes that will enhance the health status of their cats and also prevent them from contracting zoonotic infections.

ACKNOWLEDGMENTS

We appreciate the co-operation of the cat owners whose accessibility was obtained through the efforts of the director and some staff of the Veterinary Services Department, Ministry of Animal Health and Forestry, Sokoto, Sokoto State, Nigeria.

REFERENCES

Aganga, A.O., J.U. Umoh, E.K. Kyewalabye and C.C. Ekwempu, 1985. Detection of *Toxoplasma gondii* antibodies in some pregnant and non-pregnant women in Zaria, Nigeria. Nig. J. Parasitol., 62: 106-112.

Aganga, A.O., J.U. Umoh, E.K. Kyewalabye and C.C. Ekwempu, 1986. Prevalence of *Toxoplasma gondii* oocysts in naturally infected cats of Nigeria. Proceedings of the Annual Conference of the Nigerian Society for Parasitology, September 24-27, 1986, University of Ibadan, Nigeria.

Chakrabarti, A., 2007. A Textbook of Preventive Veterinary Medicine. 4th Edn., Kalyani Publishers, India, ISBN-13: 978-81-272-3972-5, pp: 682-688.

DeFeo, M.L., J.P. Dubey, T.N. Mather and R.C. Rhodes, 2002. Epidemiologic investigation of seroprevalence of antibodies to *Toxoplasma gondii* in cats and rodents. Am. J. Vet. Res., 63: 1714-1717.

Dubey, J.P. and M.R. Lappin, 1998. Toxoplasmosis and Neosporosis. In: Infectious Diseases of Dogs and Cats, Greene, C.E. (Ed.). W.B Saunders, Philadelphia, USA., pp: 493-503.

Dubey, J.P., N.L. Miller and J.K. Frenkel, 1970. The *Toxoplasma gondii* oocysts from cats faeces. J. Exp. Med., 132: 636-662.

Dubey, J.P., G.V. Swan and J.K. Frenkel, 1972. A simplified method for isolation of *Toxoplasma gondii* from the feces of cats. J. Parasitol., 58: 1005-1006.

Dubey, J.P., 1994. Toxoplasmosis. J. Am. Vet. Assoc., 205: 1593-1598.

Frenkel, J.K., J.P. Dubey and N.L. Miller, 1970. *Toxoplasma gondii* in cats: Fecal stages identified as coccidian oocyst. Science, 167: 893-896.

Frenkel, J.K., K.M. Hassanein, R.S. Hassanein, E. Brown, P. Thulliez and R. Quintero-Nunez, 1995. Transmission of *Toxoplasma gondii* in Panama City, Panama: A five year prospective cohort study of children, cats, rodents, birds and soil. Am. J. Trop. Med. Hyg., 53: 458-468.

Gauss, C.B.L., S. Almeria, A. Ortuno, F. Garcia and J.P. Dubey, 2003. Seroprevalence of *Toxoplasma gondii* antibodies in domestic cats from Barcelona, Spain. J. Parasitol., 89: 1067-1068.

Gyorke, A., M. Opsteegh, V. Mircean, A. Iovu and V. Cozma, 2011. *Toxoplasma gondii* in Romanian household cats: Evaluation of serological tests, epidemiology and risk factors. Prev. Vet. Med., 102: 321-328.

Harvey, C.E. and P.P. Emily, 1993. Small Animal Dentistry. Mosby, St. Louis, ISBN-13: 9780801660764, pages: 413.

Jones, J.L. and J.P. Dubey, 2010. Waterborne toxoplasmosis-recent developments. Exp. Parasitol., 124: 10-25.

Kamani, J., A.U. Mani, H.A. Kumshe, J.P. Yidawi and G.O. Egwu, 2010. Prevalence of *Toxoplasma gondii* antibodies in cats in Maiduguri, Northwestern Nigeria. Acta Parasitol., 55: 94-95.

Nissapatorn, V., 2007. Toxoplasmosis: A silent threat in Southeast Asia. Res. J. Parasitol., 2: 1-12.

Nottidge, H.O., 1999. Epidemiological survey of parasites of cats in Ibadan, Oyo State. Tropical Vet., 17: 63-66.

Smith, K.E., J.J. Zimmermoni, S. Patton, C.W. Beron and H.T. Hill, 1992. The epidemiology of toxoplasmosis in Iowa swine focus with an emphasis on the roles of free living mammals. Vet. Parasitol., 42: 199-217.

Turner, D.C. and P. Bateson, 1988. The Domestic Cats the Biology of its Behaviour. University Press, Cambridge, UK.

Urquhart, G.M., J. Armour, J.L. Duncan, A.M. Dunnand and F.W. Jennings, 2003. Veterinary Parasitology. 2nd Edn., Book Power and Blackwell Science, UK., pp: 276-284.