Nigerian Veterinary Journal
Vol 36 (2) 1158-1164
ARTICLE

Prevalence of Gastrointestinal Parasites of Rodents in Ibadan, Nigeria

AYINMODE, A.B.[1], NDUDIM, N.F.[1] and OBEBE, O.O.[1]

[1]Departrment of Veterinary Microbiology & Parasitology, University of Ibadan, Nigeria.*Corresponding author: E-mail: ayins2002@yahoo.com, Phone: +2348052115020

ABSTRACT

A survey on gastrointestinal parasites of intensively managed rodents was conducted between December2012 and November 2013 at two tertiary institutions in Ibadan, Nigeria. Samples werecollected from 246 rodents comprising 100 brown field rats (Rattusnorvegicus), 100 grasscutters(Thryonomysswinderianus) and 46 African giant rats (CricetomysgambianusWaterhouse). Out of 246 samples examined, 54% (133/246) were infected with gastrointestinal parasites. Prevalence of infection in the grasscutters, brown field rats and African giant rats were 24%, 86% and 50% respectively. The prevalence of nematodes, cestodes and protozoans were 30.89%, 34.14% and 10.26% respectively. Nematodes were detected in all rodents examined, while cestodes and protozoans were not found in grasscutters and brown field rats respectively. Nematode and cestode infections were significantly ($p<0.05$)associated with brown field rats, while protozoan infection was significantly ($p<0.05$) associated with grasscutters. Gastrointestinal parasitism was significantly($p<0.05$) associated with female rodents than with male. Parasites identified were *Strongyloidesratti, Nippostrongylusbrasilensis, Trichuris sp., Trichosomoidessp,Ascarida sp., Hetarakisspumosa, Hymenolepis nana, Eimeria sp. and Isospora sp.*

INTRODUCTION

Rodents are of great importance in understanding the processes that occur in living tissues of man and animals (Casebolt *et al,* 1988; Dillehay *et al,* 1990). They are also used in carrying out safety evaluation of drugs made for use in humans (Clark *et al.,* 1997). Rodents are also exploited as source of animal protein in several parts of the world, especially in developing countries (Clark *et al.,* 1997). Rodents are often infected with parasites and sometimes serve as their reservoir hosts or source of infection to humans and animals (Okorafor *et al.,* 2012).

The occurrence of gastrointestinal (GIT) parasites in different rodents species has been described in different parts of the world (Awah-Ndukum *et al,* 2001; Yeboah and Simpson 2004; Rezan *et al.,* 2012; Tadesse *et al.,* 2012) and reports from Nigeria showed that occurrence of GIT parasites vary with species and management systems (Opara and Fagbemi, 2008; Okorafor *et al.,* 2012; Ademola and Ola-

fadunsin, 2012). However, more studies are needed to investigate the prevalence of parasites of rodents, thus the need for this study in Ibadan, Nigeria.

MATERIALS and METHODS

Study Area

This study was carried out in the University of Ibadan and Federal College of Animal Health and Production Technology, both within Ibadan the capital of Oyo State in Nigeria. Ibadan, one of the largest cities in West Africa is located between 7° and 9° 30' east of prime meridian, the mean total rainfall for Ibadan is 1420.06 mm (approximately 109 days), with two peaks between, June and September. The mean maximum temperature is 26.46° C, mean minimum 21.42° C and the relative humidity is 74.55% (ZODML, 2013).

Sample Collection and Laboratory Examination

Rodents sampled were African giant rat (Cricetomysgambianus Water House), brown field rat (Rattusnorvegicus) and the grass cutter (Thryonomysswinderianus) intensively managed at the University of Ibadan and the Federal College of Animal Health and Production Technology, Moor Plantation, Oyo State.

About 3 grams of faecal samples were randomly collected from each of 246 rodents, comprising of 46 Africa giant rats, 100 grasscutters and 100 brown field rats, into labeled sample bottles, transported on ice to the Parasitology Laboratory of the University of Ibadan and stored at 4°C until processed.

Coproscopicalexamination was done for the presence of helminth eggs and/or protozoan oocysts by saturated salt flotation technique as described by Foryeth (2001). Identification of parasitic eggs and oocysts was carried out as described by Kassai (1999) and Zajac and Conboy (2012). Eggs and oocysts were also counted using the modified McMaster technique, as described by Hansen and Perry, (1990).

Statistical analysis

Statistical analysis of data was performed by online statistical computation software VassarStats (Richard Lowry, U.S.A.) Differences between groups of animals were analyzed by Fisher exact test or by Chi square test, as appropriate. Significance was confirmed at a "p" value of less than or equals to 0.05.

TABLE I: PREVALENCE OF GIT PARASITES AMONGST 246 RODENTS EXAMINED

GIT Parasites	No. (%) detected
Nematodes	76(30.9)
Cestodes	84(34.1)
Protozoa	25(10.2)

TABLE II: DISTRIBUTION OF GIT PARASITES AMONGST RODENTS EXAMINED

Rodents	No. examined	No. (%) Infected	No. (%) infected with;		
			Nematodes	Cestodes	Protozoa
Overall	246	133(54.0)	76(30.9)	84(34.1)	25(10.2)
Grasscutter	100	24(24.0)	6(6.0)	- (-)	25(25.0)
Brown field rat	100	86(86.0)	52(52.0)	82(82.0)	- (-)
African giant rat	46	23(50.0)	17(36.9)	6(13.0)	- (-)

RESULTS

This study showed that 54% (133/246) of the rodents examined were positive for gastrointestinal parasites, comprising of nematodes, 30.89% (76/246), cestodes, 34.14% (84/246) and protozoa, 10.16% (25/246) respectively (Table I).

The distribution of gastrointestinal parasites is shown in Table II. Grass cutters examined had 24% (24/100) prevalence with 6.0% (6/100) positive for nematodes, 25.0% (25/100) for protozoan parasites and 0% for cestodes. In brown field rats 86% (86/100) were positive with nematodes having 52 (52.0%), cestodes 82 (82.0%) and Protozoa with 0(0.0%). African giant rats had 23 (50.0%) prevalence with 17(36.9%) for nematodes, 6(13.0%) for cestodes and 0(0.0%) for protozoa.

Table III shows the prevalence of GIT parasites based on the sex of rodents examined. Male rodents had 44.5% (49/110) prevalence, comprising of 4(8.2%) for grass cutters, 37(75.5%) for brown field rats and 8(16.3%) for African giant rats; while females had 61.8% (84/136) prevalence comprising of 20(23.8%) for grass cutters, 49(58.3%) for brown field rats and 15(17.9%) for African giant rats.

Statistical analysis showed a significant association between gastrointestinal infection and the female rodents (p=0.004, 95% C.I: 0.287 – 0.795). Nematode infection was significantly associated with the brown field rat (p<0.0001, 95% C.I: 7.083 – 44.065) compared with the African giant rat and the grass cutter, while infection with cestodes and protozoa were only significantly (p<0.0001) associated with the brown field rat and grass cutter respectively.

Table 4 shows the prevalence of GIT parasites based on their species and the egg/oocyst per gram of faeces of the rodents examined. In the brown field rat, the nematodes found were ***Heterakiss pumosa,*** 33% (33/100); ***Nippostrongylus brasilensis,*** 11% (11/100); ***Trichosomoide ssp,*** 7% (7/100) and ***Strongyloides ratti,*** 1% (1/100). No protozoan parasite was found and ***Hymenolepis nana*** was the only cestode found with an infection rate of 82% (82/100). In the African giant rat the nematodes identified were ***Nippostrongylus brasilensis,*** 6.25% (3/46);Trichuris species, 10.9% (5/46) and ***Heterakiss pumosa,*** 19.57% (9/46), while the only detected cestode was Hymenolepsisdiminuta with 4.35% (2/46). The highest epg of 44.49 x $10^2$was observed for *H. nana* in the brown field rat. Fig1 (A-J) shows the photomicrographs of eggs and oocysts of GIT parasites isolated from the faeces of rodents examined in this study.

TABLE III: PREVALENCE OF GIT PARASITES BASED SEX OF THE RODENTS EXAMINED

Sex of rodent	No. examined	No. (%) +ve	Grasscutter	Brown field rat	African giant rat
Male	110	49(44.6)	4(8.2)	37(75.5)	8(16.3)
Female	136	84(61.8)	20(23.8)	49(58.3)	15(17.9)

TABLE IV. PREVALENCE OF GIT PARASITES BASED ON THEIR SPECIES and MEAN EGG/OPG IN RODENTS EXAMINED

	Grasscutter (Total =100)		**African Giant rat** (Total =46)		**Laboratory rat** (Total =100)	
	no +ve (%	Average epg x10^2	no +ve (%)	Average epg x10^2	no +ve (%)	Average epg x10^2
Nematodes						
Strongyloidesratti	-	-	-	-	2(2)	3.0
Nippostrongylusbrasilensis	3(3)	3.0	3(6.52)	2.5	11(11)	1.72
Trichuris sp.	1(1)	1.0	5(10.9)	4.0	-	-
Trichosomoidescrassicauda	-	-	-	-	7(7)	1.14
Ascarida sp.	2(2)	2.0	-	-	-	-
Hetarakisspumosa	-	-	9(19.57)	5.2	33(33)	3.69
Cestodes						
Hymenolepis nana	-	-	2(4.35)	2.0	82(82)	44.49
Protozoan						
Emeriasp	20(20)	4	-	-	-	-
Isosporasp	5(5)	1	-	-	-	-

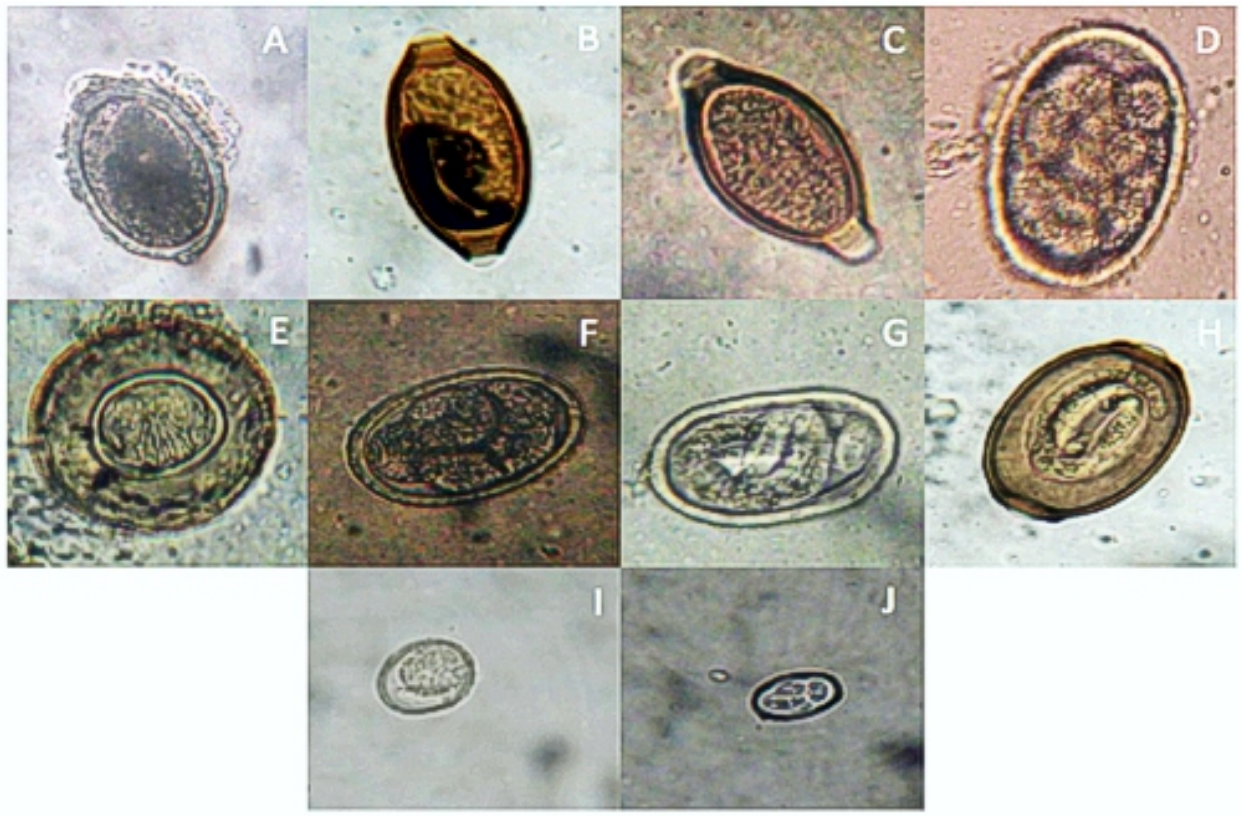

Fig1. Ova and cyst detected in examined rodents:*Heterakis sp* in AGR, B. *Trichuris sp* in AGR, C. *Trichuris sp* in GC, D. Nippostrongylus sp in AGR, E. *Hymenolepis* nana in LR, F. *Nippostrongylus* sp in LR, G. *Strongyloides ratti* in LR, H. *Trichosomoides ratti* in LR .I *Eimeria sp* in GC, J. *Isospora sp* in GC,

DISCUSSION

This study reports a relatively high prevalence rate of GIT parasites in all the rearing facilities sampled in Ibadan, Nigeria. However, an overall prevalence of 54% obtained in our study is lower than the 76% and 79% reported in Iraq (Rezan *et al.,* 2012) and Ethiopia (Tadesse *et al.,* 2012) respectively. Previously investigators in Nigeria reported prevalence ranging between 50 and 100% (Odumodu, 1999; Ajayi *et al.,* 2007; Okoye *et al,* 2008; Okorafor *et al.,* 2012; Ademola and Ola-fadunsin, 2012). All these findings corroborate the fact that GIT parasitism is common in rodents.

This study observed that GIT parasitism was higher in brown field rats than African giant rats and grasscutters. This agrees with Tadesseet al., (2012) who observed a similar infection in rats than other type of rodents studied. Infection with cestodes and nematodes were significantly associated with brown field rats than other types of rodents studied and they had a higher odd of getting infected with cestodes and nematodes than the other rodents. The only cestode found in the present study was *Hymenolepis nana.* Rats are known as the natural mammalian host of *Hymenolepis nana* and the parasite multiplies rapidly due to its direct life cycle (Rezan *et al.,* 2012).

This study like some other previous studies (Tanideh *et al.,* 2010; Tadesse *et al.,* 2011) noted a significance association of gastrointestinal infection with females than the males. Stress related to lactation and pregnancy in females has been suggested as possible cause of immune suppression thereby allowing better survival of gastrointestinal parasites in the females than males.

The epg/opg values were huge and this implies

that the parasites were able to mature and reproduce in the infected rodent hosts efficiently and may also indirectly suggests the absence of effective deworming programmes at the rearing facilities.

Interestingly, Hymenolepis nana the only cestode detected in this study is a zoonotic parasite of public health importancewith a worldwide distribution (Sinniah *et al.* 1978). Detection of high prevalence of H. nana in the brown field rats and African giant rats in this study suggests that these rodents constitute a public health risk to human health and also to in-contact animals.

REFERENCES

ADEMOLA, I. O. and OLA-FADUNSIN, S.D. (2012). Prevalence of gastrointestinal parasites of Laboratory animals in Ibadan, *Nigeria. Trop. Vet.* 30 (1): 32 - 38.

AJAYI, O.O., OGWURIKE,B.A., AJAYI, J.A, OGO, N.I. and OLUWADARE, A.T.(2007). Helminth parasites of rodents caught around human habitats in Jos PlateauState, Nigeria. Int. *J. Nat. Appl. Sci.*, 4(1), 8– 13.

AWAH-NDUKUM, J., TCHOUMBOUE, J. and TONG, J.C. (2001).Stomach Impaction in Grasscutter (Thryonomysswinderianus) in Captivity; Case Report.*Trop. Vet.*19 (2), 60- 62.

CASEBOLT, D.B., LINDSEY, J.R. and CASELL, G.H. (1988). Prevalence rates of infectious agents among commercial breeding populations of rats and mice. *Lab. Anim. Sci.* 38, 327-329.

CLARK, H.E., COATS, M.E., EVA, J.K., FORD, D.J., MILINER, C.K., O´ DOROGUE, P.N.SCOTT, P.P. and WARD, R.J. (1997). Dietary standards for Laboratory animals: Report of Laboratory Animals Centre Diets Advisory Committee, *Lab. Anim. Rep.* 11, 1- 4.

DILLEHAY, D.L., LEHNER, N.D.M. and HUERKAMP, M.J. (1990). The effectiveness of Micro-isolator cage system and sentinel mice for controlling and detecting MHV and Sendai virus infection. *Lab. Anim. Sci.* 40, 367- 370.

FORYETH, J.W. (2001): *Veterinary Parasitology*: Reference Manual. 5th ed. Blackwell Inc. India, Pp. 38-39.

HANSEN, J. and PERRY, B. (1990): *The epidemiology, diagnosis and control of gastrointestinal parasites of ruminants in Africa.* P.O. Box-30709, Nairobi, Kenya: The InternationalLaboratory for Research on Animal Diseases, Pp. 107.

KASSAI, T. (1999): *VeterinaryHelminthology*. Butterworth-Heinemann, Boston, MS. Pp. 102–103.

ODUMODU, I.O. (1999): A Survey of the Intestinal Helminthes and Blood Parasites of Rats in Ihiala LGA, Anambra State, Nigeria. M.Sc. Thesis, Unpublished. Imo StateUniversity, Owerri, Nigeria.

OKORAFOR, K.A., ODAIBO,A.B., ELENG, I.E., OKETE,J.A. (2012): Occurrenceand prevalence of ecto- and gastrointestinal parasites in wild cane rats' (Thryonomysswinderianus) from Oyo State, south-western Nigeria. *Eur. J. Zoo. Res.* 1 (3), 70-76.

OKOYE, I.C. and ROSE, N.N. (2008): Survey of the gut parasites of rodents in NsukkaEcological Zone. *Anim. Res. Int*. 5(2), 846 – 847.

OPARA, M.N. and FAGBEMI, B.O. (2008): Occurrence and prevalence of gastrointestinal helminthes in the wild grasscutter (Thryonomysswinderianus, Temminck) fromSoutheast Nigeria. *Life Sci. J*. 5(3), 50-56.

REZAN, K.A., QARAMAN, M.K.K. and AZOHAIR, I.F.R. (2012): Intestinal Parasites of Experimental Rodents with Testing the Efficacy of DiagnosticMethods. *Int. Res. J. of Pharm.* 2(3), 77 -78.

SINNIAH, B., SINNIAH, D., SINGH, M. and POON, G.H. (1978): Prevalence of parasites infections in Malaysian oil-palm estate workers. *Southeast Asian J. Trop. Med. Public Health*9, 272 - 276.

TADESSE, G., HAILU, M., ALEMU, V. and HAILELEUL, N. (2011): Prevalence of gastrointestinal parasites of laboratory animals at Ethiopian Health and Nutrition Research Institute (EHNRI), Addis Ababa. *J. Infect. Dis. Immun.* 3(1), 1 - 5.

TANIDEH, N., SADJJADI, S.M.,

MOHAMMADZADEH, T. and MEHRABANI, D. (2010): HelminthicInfections of Laboratory Animals in Animal House of Shiraz University of Medical Sciencesand the Potential Risks of Zoonotic Infections for Researchers. *Transgenic. Iran. RedCrescent Med. J.* 12(2), 151-157.

YEBOAH, S., P.K. SIMPSON (2004). A preliminary survey of the ecto and endoparasites ofthe grasscutter (ThryonomysswinderianusTemminck): Case study in Ekumfi, Central Region of Ghana. *J Ghana Sci. Assoc.* 3(3), 2-5.

ZAJAC, A.M. and CONBOY. G.A. (2012): Veterinary clinical parasitology 8th edition, John Wiley & Sons: 40-87.

ZaccheusOnumbaDibiaezue Memorial Libraries. 2013. The free Library ZODML.org/Nigeria