Epidemiology and chemotherapy of parasitic infections in wild omnivores in the Mahendra Choudhury Zoological Park, Chhat Bir, Punjab

P. Singh [1], L.D. Singla [2], M.P. Gupta [3], S. Sharma [1] & D.R. Sharma [1]

[1,2,3] College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Email: [2] (corresponding author) ldsingla@rediffmail.com; [3] mp2gupta@rediffmail.com

The presence of as many as 150 recognized zoonotic diseases of infectious origin in wild animals maintained under a single facility in a zoo always poses a risk for domestic animals as well as man in its periphery and vice-versa (Acha & Szyfres 1987). Parasitic diseases of wildlife are still in infancy in India and data are still on the base line (Islam 2006). These diseases constitute one of the major problems in management causing mortality and morbidity in wild animals in captivity (Rao & Acharjyo 1984). Little work has been done to understand the epidemiology of different parasitic diseases in wild animals kept in Indian zoos (Goswami et al. 1994; Goswami & Chakraborty 1996; Chhangani et al. 2001; Kumar et al. 2005; Singh et al. 2006). Parasites can affect host survival and reproduction directly through pathological effects (blood loss, tissue damage, spontaneous abortion, congenital malformations and death) and indirectly by reducing host condition. Through these proximate mechanisms, parasites can potentially regulate host populations (Gregory & Hudson 2000; Hochachka & Dhondt 2000).

Keeping in view the importance of parasitic infections in wild omnivores and their potential for transmission to domestic animals and man, this study was conducted to investigate the occurrence of various gastrointestinal parasitic infestations in various species of omnivores alongwith their chemotherapeutic control at the Mahendra Choudhury Zoological Park, Chhat Bir in Punjab (29°49'-30°47'N & 75°58'-76°54'E) India.

Date of online publication 26 January 2009
ISSN 0974-7907 (online) | 0974-7893 (print)

Editor: Jacob V. Cheeran

Manuscript details:
Manuscript # o1767a; Received 27 April 2007; Final revised received 18 November 2007; Finally accepted 21 February 2008

Citation: Singh, P., L.D. Singla, M.P. Gupta, S. Sharma & D.R. Sharma (2009). Epidemiology and chemotherapy of parasitic infections in wild omnivores in the Mahendra Choudhury Zoological Park, Chhat Bir, Punjab. *Journal of Threatened Taxa* 1(1): 62-64.

Acknowledgements: Authors are thankful to Director, M.C. Zoological Park, Chhatbir, Punjab for permission to carry out the work at the Zoo and Guru Angad Dev Veterinary and Animal Sciences University for facilities provided.

Materials and Methods

Three-hundred-and-seventeen fresh faecal samples of 13 different omnivore species belonging to Primates, Ursidae, Suidae and Viverridae were collected over a period of six months to know the occurrence and intensity of gastrointestinal parasitism. The samples from the enclosures in which animals were housed in groups were pooled together, and individual faecal samples were taken from animals kept singly. Regular Copro-parasitoscopic analysis (CPS) was done using standard qualitative (sedimentation and floatation) and quantitative tests (Mc Master counting technique) (Soulsby 1982). An arbitrary designation was assigned to denote the intensity of infection as done by Nashiruddullah & Chakraborty (2001). One part of the faecal sample was preserved in 10% formalin for proper analysis, identification, micrometric analysis and microphotography. The identification of eggs was based on the morphology and the micrometric studies (Bowman 1999).

To see the chemotherapeutic response of appropriate drugs, animals were divided into three species groups, sex, age, type of enclosure and the type of parasitic infection (single or mixed) found in these animals (Table 2). The drug was given at a slightly high dosage so as to cover up the wastage of drug when given mixed in feed. The EPG was calculated on day 0, i.e., before treatment and days 1, 2, 3, 5, 7, 15, 30 and 55 post treatment (DPT) to record the reduction or re-occurrence of parasitic infection. The percent reduction in the faecal egg count after treatment was calculated to know the efficacy of the drug used.

Results and Discussion

Out of 317 samples taken from 13 different omnivore species, 92 were found to be positive for helminthic eggs giving a prevalence of 29.02%. Species-wise prevalence is given in Table 1 and Image 1. The parasite load was more in the animals kept in large groups suggesting transmission of infection from one animal to another whereas animals kept in isolation or small groups were relatively free or had less infection.

The various parasitic eggs detected in omnivores were of *Trichuris* spp, *Hymenolepis diminuta*, *Strongyloides* spp, *Ascaris suum*, *Ascaris* spp which were similar to the findings of Gorman et al. (1986), and Varadharajan & Pythal (1999). The most common parasitic infection (86.96%) seen in omnivores specially the primates was of *Trichuris* spp. Present findings are comparable with those of Munene et al. (1998), and Yang & Gong (1998). Mixed infection of *Trichuris* spp. and *H. diminuta* (60%) was recorded in Assamese Macaques *Macaca assamensis*.

Intensity of parasitic infections

Highest intensity of infection was in Assamese Macaques with mean EPGs ranging between 100-7500 for various parasites, *viz*., *Trichuris* spp., *H. diminuta* and *Strongyloides* spp. followed by Rhesus Macaques *Macaca mulatta* for *Trichuris* spp., Wild Boar *Sus scrofa* for *A. suum*, Capped Langur *Trachypithecus pileatus* for *Trichuris* spp., Common Langur *Semnopithecus* sp. for *Trichuris* spp., and Sloth Bear *Melursus ursinus* for *Ascaris* spp. (Table 1). The intensity of infection among primates was more in Assamese Macaques than other primates as they were kept overcrowded in cages. These animals were undergoing treatment for tuberculosis, so the parasitic infection in these animals was concurrent to tuberculosis which made them more prone to infection than other primates. The humidity in the cages of the Assamese Macaques was comparatively higher as there was less access to direct sunlight.

Based on morphology and the micrometric reading (Soulsby 1982)

Table 1. Mean micrometric readings of eggs and intensity of parasitic infections

S.No.	Animal Species	Samples positive/ tested (Prevalence)	Parasitic eggs detected (Percent Prevalence)	Length (µm) Mean ± SE	Breadth (µm) Mean ± SE (range)	Intensity of Infection (range)	EPG (Mean ± SE)
1.	Assamese Monkey (*Macaca assamernsis*)	30/62 (48.38)	*Trichuris* spp. (100)	54.52 ± 0.42 (51.70-56.40)	25.85 ± 0.00	+ to + + + +	1800–7500 (3350 ± 484.72)
			Hymenolepis diminuta (60)	79.66 ± 0.74 (75.20-82.25)	76.42 ± 1.10 (70.50-79.90)	+ to + +	250–750 (383.33 ± 70.38)
			Strogyloides spp. (10)	-	-	-	100
			Mixed infection* (60)	-	-	-	-
2.	Rhesus Monkey (*Macaca mulatta*)	42/119 (35.29)	*Trichuris* spp. (35.29)	50.53 ± 0.50 (47.00-51.70)	26.09 ± 0.22 (25.85-28.20)	+ to + +	50–1650 (450 ± 145.69)
3.	Common Langur (*Semnopithecus sp.*)	3/12 (25)	*Trichuris* spp. (25)	-	-	+	100–200 (150 ± 23.56)
4.	Capped Langur (*Trachypithecus pileatus*)	5/8 (62.50)	*Trichuris* spp. (62.50)	52.17 ± 1.21 (44.65-54.05)	21.86 ± 0.86 (22.33-25.85)	+	100–300 (240 ± 32.86)
5	Wild Boar (*Sus scrofa*)	10/10 (100)	*Ascaris suum* (100)	56.64 ± 0.97 (51.70-61.10)	50.29 ± 1.11 (47.00-58.75)	+ +	850–1500 (1165 ± 63.44)
6	Sloth Bear (*Melursus ursinus*)	2/24 (8.33)	*Ascaris* spp. (8.33)	-	-	+	100

** Trichuris* spp *and Hymenolepis diminuta*

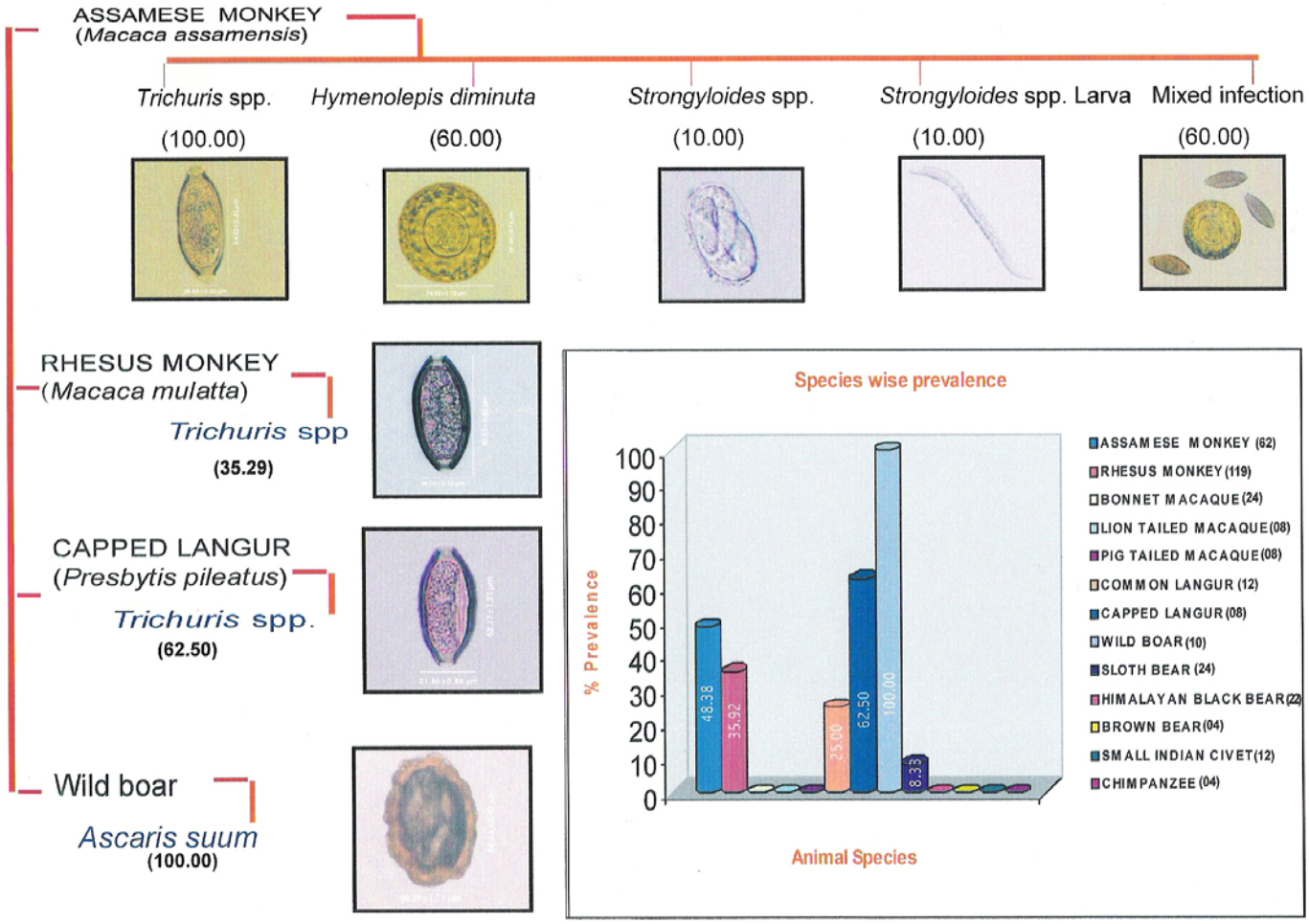

Image 1. Species wise prevalence of parasitic eggs/larvae in different animal species

the eggs of *Trichuris* spp. detected in Assamese Macaques, Rhesus Macaques, Capped Langur and Common Langur were found comparable to those of *Trichuris trichuria*. Eggs of *H. diminuta* were also detected in Assamese Macaques as per morphology and micrometric study (Bowman 1999). Similarly *Ascaris suum* eggs were identified in Wild Boars.

Therapeutic Studies

The animals of group I (Assamese Macaques 31(11 adult females + 9 young ones +11 adult males)) having mixed parasitic infection

Table 2. Faecal egg count reduction after treatment (efficacy) in different parasitic infections in omnivores

Group and Species		Treatment done	Egg detected	Mean EPG ± SE (% reduction in faecal count)				
				Pre-treatment	Days post treatment			
				0	5	7	15	30
Group-I Assamese Monkey (*Macaca assamensis*)		Tab Prazital (praziquantal-50mg, pyrantal pamoate-144mg and fenbendazole 150 mg) @1½ tab/ animal x 3 days in feed	*Trichuris* spp	3350±484.72	25 ± 14.56 -99.25	25 ± 19.04 -99.25	10 ± 6.32 -99.7	Zero -100
			Hymenolepis diminuta	230±72.87	Zero -100	Zero -100	Zero -100	Zero -100
Group-II Rhesus Monkey (*Macaca mulatta*)	Subgroup-1 (adult males)	Tab Nemocid (pyrantal pamoate) @ 15mg/kg body w t once	*Trichuris* spp	200 ± 50.99	Zero -100	Zero -100	Zero -100	Zero -100
	Subgroup-2 (females and young ones)			700 ± 220.9 -94.29	40 ± 26.07 -95.71	30 ± 26.83 -100	Zero -100	Zero
Group-III Wild Boars (*Sus scrofa*)		Tab Nemocid (pyrantal pamoate) @ 15mg/kg body wt once	*Ascaris suum*	1325 ± 123.74	Zero -100	Zero -100	Zero -100	Zero -100

with *Trichuris* spp. and *H. diminuta* were housed together in an enclosure. The animals were treated with Prazital® tablets (each tab having praziquantal-50mg, pyrantal pamoate-144mg and fenbendazole 150mg; Ranbaxy India Ltd.) @ 1.5 tablets/animal x 3days mixed in feed. The results revealed that reduction in faecal egg count for *Trichuris* spp. and *H. diminuta* was 72.68% and 93.47% on day one post treatment and 99.25% and 100.00% on day 5 post treatment, respectively (Table 2). There was no re-occurrence of infection till 55 DPT, so the drug was found to be highly efficacious in limiting these parasitic infections in Assamese Macaques.

The animals of group II (Rhesus Macaques) had single *Trichuris* spp. infection. This group was further subdivided into 2 subgroups. Subgroup 1 constituted of 6 adult males and Subgroup 2 of 3 females and 4 young ones. Both subgroups were treated with pyrantal pamoate (Tab Nemocid® 250mg each; IPCA) @15mg.kg^{-1} body weight mixed in feed as a single dose treatment. The reduction in faecal egg count was 95% and 92.85% for subgroup 1 and subgroup 2 on day two post treatment and was 100% and 94.29% on day 5 post treatment, respectively. In subgroup 2, the reduction in faecal egg count was 100% by 15DPT and it was seen that there was no recurence of infection till 55DPT (Table 2).

The animals in group III (two Wild Boars) had a single *A. suum* infection. The animals were treated with pyrantal pamoate (Tab Nemocid 250mg each; ICPA) @ 15mg.kg^{-1} body weight in feed. The reduction in faecal egg count was 66.04% by day one post treatment, 77.36% by 2DPT and 100% by 3DPT (Table 2). There was no recurence of infection till 30DPT. It was concluded that pyrantal pamoate was 100% effective in eliminating the infection of *Ascaris suum* from Wild Boars.

It was observed that regular faecal examination for parasitic ova/ larva along with assessment of parasitic load and administration of desired anthelmintics, when warranted, at regular intervals would be able to curtail parasitic infection. Quarantine measures for parasitic disease control need to be standardized in Indian zoos. Chakraborty (1991) opined that the infection with the parasites having a direct life cycle is common while those having indirect life cycle occur rarely in their natural hosts in captivity as the chances of transmission are reduced when intermediate hosts have little chance to come in contact with animals.

References

Acha, P.N. & B. Szyfres (1987). *Zoonoses and Communicable Diseases Common to Man and Animals*. Pan American Health Organisation Scientific publication No 503 Washington, D.C.

Bowman, D.D. (1999). *Georgis' Parasitology for Veterinarians* 7th Edition. WB Saunders, Philadelphia.

Chakraborty, A. (1991). Incidence and etiopathology on the mortality of captive wild herbivores in Assam. Ph.D. Thesis. Assam Agricultural University.

Chhangani, A.K., B.R.J. Mathur & S.M. Mohnot (2001). First record of mange (sarcoptic mange) in hanuman langur (*Somnopithecus entellus*) and its treatment around Jodhpur (Rajasthan). *Intas Polivet* 2(2): 261-265.

Gorman, T.R., V. Riveros, H.A. Alcaino, D.R. Salas & E.R. Thiermann (1986). Helminthiasis and toxoplasmosis among exotic mammals at the Santiago National zoo. *Journal of American Veterinary Medical Association* 189(9): 1068-1070.

Goswami, S. & A. Chakraborty (1996). Studies on the prevalence of pathological conditions of captive non human primates. *Zoos' Print Journal* 11(10): 10.

Goswami, S., S. Islam & A. Mukit (1994). Pathology of naturally acquired *Oesophagostomum* infection in captive hoolock gibbon (*Hylobates hoolock*) from Assam. *Zoos' Print Journal* 9(11): 17-18.

Gregory, R.D. & P.J. Hudson (2000). Population biology: parasites take control. *Nature* 406: 33-34.

Hochachka, V.W. & A.A. Dhondt (2000). Density-dependent decline of host abundance resulting from a new infectious disease. *Proceedings of the National Academy of Science of the United States of America* 97: 5303–5306.

Islam, S (2006). Parasites and parasitic diseases of wildlife. Proceedings of XVII National Congress of Veterinary Parasitology and National symposium on "Strengths, challenges and opportunities in Veterinary Parasitology (Nov. 15-17, 2006), 43-52pp.

Kumar, A., L.D. Singla, N. Singla, G.S. Aulakh, and J. Singh (2005). Managemment of piperazine resistance toxocariosis with ivermectin in lions (*Panthera leo*). *Journal of Parasitic diseases* 29(2): 156-160.

Munene, E., M. Otsyula, D.A. Mbaabu, W.T. Mutahi, S.M. Muriuki and G.M. Muchemi (1998) Helminth and protozoan gastrointestinal tract parasites in captive and wild-trapped African non-human primates. *Veterinary Parasitology* 78 (3): 195-201.

Nashiruddullah, N. & A. Chakraborty (2001). Parasites of captive wild carnivores of Assam State Zoo. *Intas Polivet* 2(1): 173-181.

Rao, A.T. & L.N. Acharjyo (1984). Diagnosis and classification of common diseases of captive animals at Nandankanan zoo in Orissa (India). *Indian Journal of Animal Health* 23(2): 148-152.

Singh, P., M.P. Gupta, L.D. Singla, N. Singh & D.R. Sharma (2006). Prevalence and chemotherapy of gastrointestinakl helminthic infections in wild carnivores in Mahedra Choudhury Zoological Park, Punjab. *Journal of Veterinary Parasitology* 20: 17-24.

Soulsby, E.J.L. (1982). *Helminths, Arthropods and Protozoa of Domesticated Animals*.7th Edition. Blackwell Scientific Publications, London.

Varadharajan, A. & C. Pythal (1999). Parasites of wildlife –I: A preliminary investigation on the parasites of wild animals at the zoological garden, Thiruvanathapuram, Kerala. *Zoos' Print Journal* 1-14(3-12): 159-164.

Yang, M.H. & G.J. Gong (1998). Examination and analysis of parasitic eggs in animal faeces in Beijing Zoo. *Chinese Journal of Veterinary Medicine* 24(7): 19-20.