Preliminary investigation on the parasites of mammals at Padmaja Naidu Himalayan Zoological Park , Darjeeling

Sunita Pradhan*, Deepak Sharma, Bharkha Subba, Vikash Chettri

Abstract

There is now a growing consensus that issues, problems and management of high altitude Indian zoos are seminally different from the low land zoos in India. However, dearth of documented information on various aspects, including that of parasitic infection in animals of high altitude zoos was observed. The present report is a simple attempt to respond to this lack of information on the parasitic infection in animals of high altitude zoos in India.

698 stool tests reports from the zoo were consulted for the present compilation of the parasitic loads and infection in 19 mammal species of Padmaja Naidu Himalayan Zoological Park (altitude: 2137 meters) a high altitude zoo in Darjeeling hills. Only 121 (17%) of the 698 stool reports, indicated positive parasitic infection in the mammals. The animals were specifically positive for *Trichomonas sp*, *Toxocara sp* and *Ascarids*. Among the infected animal groups, the primates showed almost no infection, whereas others exhibited parasites to a varying degree, the highest being among the Felidae. Parasitic infection (28%) in snow leopard was higher than the other felids, but was, closely followed by the leopard cat (23%) and the Royal Bengal tiger (15%). Out of the 15 red panda, only seven animals tested positive for parasites out of which five animals (33%) were interestingly all old animals above the age of 11 years. No distinct seasonal pattern of parasitic infection in the mammals at Padmaja Naidu Himalayan Zoological Park was seen from this very basic and preliminary investigation.

Key Words: High altitude zoo, high altitude mammals, parasitic investigation

Introduction

Parasitic investigation is important for management of animals and animal diseases in captivity. Substantial information existed on this aspect from lowland (plains) Indian zoos. However, published information on the parasitic investigation of captive animals in high altitude Indian Zoos was found to be almost nonexistent. This was specifically noticed during a training course for zoo keepers of high altitude zoos of India held in Darjeeling in 2007. Some of the high altitude zoos are in Uttaranchal, Uttarakhand, Gangtok, Himachal Pradesh and Darjeeling in West Bengal. The specific high altitude zookeepers training program was held with a consensus that issues, problems and management of high altitude zoo are different from that of the low land zoos. This report investigates the parasitic infection of captive mammals in Padmaja Naidu Himalayan Zoological Park, Darjeeling (henceforth referred to as PNHZP). It is a simple attempt to respond to this lack of information on the parasitic infection in animals in captivity at high altitude zoos in India.

Padmaja Naidu Himalayan Zoological Park, popularly known as Darjeeling Zoo is a high altitude zoo situated at an altitude of 2137 m (6500ft). PNHZP is categorized as a small zoo (Anon 2001). Located at 27° 03´32" N and 88°15´47" E, it covers an area of 67 acres. PNHZP presently holds 13 mammal species, eight bird species and one amphibian species. The zoo has an animal collection plan which enlists 22 high altitude mammal species, seven Himalayan pheasants and partridges and one amphibian species to be housed in the zoo.

Methodology

Prophylactic measures like stool test of animals in PNHZP is carried out on a regular basis following a stool tests schedule. 698 reports of these stool tests from the year 2004 – 2007 were taken for the present compilation of the parasitic loads and infection in mammals at PNHZP. Stool test of the animals for parasitic infection in PNHZP is done following the standard sedimentation and flotation techniques . We did not attempt any statistical analysis for the present report.

Results and discussion

Out of the 698 stool tests consulted, 121 stool reports indicated an infection which amounted to only 17% positive for parasitic infection in the mammals in the zoo. The animals were specifically positive for *Trichomonas sp.*, *Toxocara sp* and Ascarids. Among the infected animal groups, the Primates showed almost no infection, whereas members of other taxa exhibited parasites to a varying degree, the highest being among the Felidae. The results of the investigation are presented in Table 1.

Hanuman langur, *Presbytis entellus* and slow loris, *Nycticebus coucang* are the two primate species at PNHZ Park. Hanuman Langur is reported to harbor nematodes such as *Anatrichosoma cutaneum*, *A. cynomologis* and protozoan parasites such as *Entamoeba hystolytica, Balantidium coli, Giardia lamblia* and *Toxoplasma gondii.* (Wolff, 1993). No infection was reported in the two species at PNHZP, throughout the year (Table 2).

Cannidae is represented by Jackal, *Canis aureus* and Tibetan wolf, *Canis lupus chanco* at PNHZP. Common parasites such as *Dioctophyme renale, Dirofilaria immitis, Ancyclostoma caninum, Capillaria aerophila, Crenosoma vulpis,Toxocara canis, Uncinaria stenocephala , Dipylidium caninum, Taenia* spp*., Echinococcus* spp. has been reported from these species or related species of canids (Varadharajan and Pythal 1999, Kennedy-Stoskopf 2001). *Toxocara* sp. in Jackal was the only parasite reported from the cannids from PNHZP. Tibetan Wolf was found negative for parasitic infection during the whole year (Table 2).

Felidae is represented by common leopard, *Panthera pardus*, clouded leopard, *Neofelis nebulosa*, Snow leopard, *Uncia uncia*, leopard cat, *Felis bengalensis*, Indian Tiger, *Panthera tigris tigris*, and Siberian Tiger, *Panthera tigris altiaca*. Internal parasites that has been reported from different members of the family felidae is a rather long list, some of which are *Toxocara cati, Toxocaris leonina, Toxocara canis, Spirocerca lupi, Dirofilaria immitis, Ancyclostoma* spp*., Uncinaria stenocephala, Gurltia paralysans, Aelurostrongylus* sp*., Physaloptera* sp*., Trichinella spiralis, Macracanthorhynchus catulinums, Taenia* sp*. Echinococcus* sp*., Paragonimus westermani, , Eimeria* sp*, Toxoplasma gondii,* Stongyloides, Diphyllbothrium and Paragonimus (Varadharajan, A and C. Pythal 1999, Wach 2003). However, only common parasites such as *Toxocara cati, T. leonina and Toxascaris* sp. were reported from the Felidae in PNHZP (Table 1).

Padmaja Naidu Himalayan Zoological Park, Darjeeling 734 101, West Bengal

*** Corresponding Author: sunitaprad@yahoo.com**

Table 1 Prevalence of parasitic infections in mammals at Padmaja Naidu Himalayan Zoological, Park, Darjeeling

Species	Scientific name	No of animals examined	No of stool reports examined	Sample showing infection	Eggs/oocyst detected In a field? ***
Primates					
Hanuman Langur	*Presbytis entellus*	3	3	0 (0)	None
Slow Loris	*Nycticebus coucang*	1	13	0 (0)	None
Cannidae					
Jackal	*Canis aureus*	2	19	2 (11%)	*Toxocara* sp. (2)
Tibetan Wolf	*Canis lupus chanco*	9	4 (Group sample)	0 (0)	None
Felidae					
Clouded Leopard	*Panthera pardus*	1	7	1 (14%)	*Toxascaris* sp. (1)
Common Leopard	*Neofelis nebulosa*	5	49	2 (4%)	*Toxascaris* sp. (1),*Toxocara* sp (1)
Indian Tiger	*Panthera tigris tigris*	4	26	4 (15%)	*Toxocara* sp. (3)
Leopard Cat	*Panthera bengalensis*	2	30	7 (23%)	*Toxocara* sp (7)
Siberian Tiger	*Panthera tigris altiaca*	2	14	4 (14%)	*Toxascaris* (4)
Snow Leopard	*Uncia uncia*	18	173	48 (28%)	*Toxocara* spp.(46), *Toxascaris* (2)
Procyonidae					
Red Panda	*Ailurus fulgens*	13	195	34 (17%)	*Trichomonas* sp. (19)** *Schistosoma* sp. (1), *Ascaris* sp. (14)
Vivveridae					
Palm Civet	*Pamuga larvata*	4	36	2(6%)	*Ascaris sp. (2)*
Ursidae					
Himalayan Black Bear	*Selenarctos thibetanus*	5	79	7 (9%)	*Toxocara* sp. (7)
Sussidae					
Wild Boar	*Sus scrofa*	2	3	1 (33%)	*Ascaris sp. (1)*
Cervidae					
Barking Deer	*Muntiacus muntjak*	5	15 (group sample)	2 (13%)	*Dictyocaulus sp. (2)*
Himalayan Tahr	*Hemitragus jemlahicus*	2	5	0 (0)	None
Musk Deer	*Moschus moschiferus*	3	3	2 (67%)	*Dictyocaulus* sp. (2)
Sambar Deer	*Cervus unicolor*	2	8	2 (25%)	*Trichomonas* sp. (2) **
Bovidae					
Yak	*Bos grunniens*	3	16	3 (19%)	*Ascaris sp. (2), Fasciola sp. (1)*
TOTAL			**698**	**121 (17%)**	

** = Protozoa

Table. 2 Seasonal prevalence of percent parasitic infection among the mammal species in PNHZP, Darjeeling

Animal Species	Pre-Monsoon	Monsoon	Autumn	Winter
	Mar-May	June-Aug	Sep-Nov	Dec-Feb
Hanuman Langur	Nil	Nil	0 (n=3)	Nil
Slow Loris	0 (n=3)	0(n=2)	0(n=4)	0 (n=4)
Jackal	0 (n=6)	0 (n=0)	0(n=3)	20(n=10)
Tibetan Wolf	0 (n=2)	Nil	0 (n=2)	Nil
Clouded Leopard	50 (n=2)	0 (n=1)	0 (n=2)	0 (n=2)
Common Leopard	13 (n=17)	0 (n=5)	0 (n=15)	0(n=12)
Indian Tiger	0 (n=6)	29 (n=7)	17 (n=12)	0 (n=1)
Leopard Cat	0 (n=7)	100 (n=4)	25 (n=4)	14 (n=14)
Siberian Tiger	75 (n=4)	0 (n=2)	25 (n= 4)	25 (n= 4)
Snow Leopard	41 (n=51)	26 (n=23)	27 (n=52)	15 (n=47)
Red Panda	12 (n=73)	33 (n=30)	20 (n=71)	14 (n=21)
Palm Civet	0 (n=8)	100 (n=2)	0 (n=13)	0 (n=13)
Himalayan Black	10 (n=31)	0(n=0)	9 (n=22)	8 (n=26)
Wild Boar	100 (n=1)	Nil	0 (n=2)	Nil
Sambar Deer	Nil	100 (n=2)	0 (n=4)	0 (n=2)
Barking Deer	1 (n=9)	2 (n=5)	Nil	0 (n=1)
Musk Deer	50 (n=2)	Nil	Nil	100 (n=1)
Himalayan Tahr	Nil	Nil	0 (n=5)	Nil
Yak	0 (n=2)	0 (n=3)	0 (n=7)	100 (n=4)

Number of sample in parenthesis; Nil = no samples were tested

It has been reported that compared to other feline species, faecal sample from captive snow leopards showed higher incidence of and prevalence of *Toxocara cati* and *Toxascaris leonina* eggs (Wharton and Mainka,1997). Parasitic infection (27%) in snow leopard in PNHZP was higher than the other felids, but was, closely followed by the leopard cat (23%) and the Royal Bengal tiger (15%). (Table 1 and 2).

The sole representative of the family Procyonidae at PNHZP is red panda, *Ailurus fulgens*. Red panda in PNHZP tested positive for protozoa *Trichomonas* sp., *Schistosoma* sp. and *Ascaris* sp. Apart from cestodes, nematodes and coccidian, lung worm such as *Angiostrongylus* sp. and *Crenisomatidae* has been reported from Red panda elsewhere (Montali et al 1984).

The Himalayan Black Bear, *Selenarctos thibetanus* is the only representative of the family Ursidae at PNHZP. Some of the parasites reported in this group are *Ancyclostoma malayanus, Dicrocoelium lanceolatum, Hemaphysalis megapinosa, Tetrapetalonema akitensis, Toxocaris leonina, Trichinella spiralis, Trichodectes pinquis, Strongyle* (Varadharajan & Pythal 1999; Ramsay 2003). The captive Himalayan Black Bear in PNHZP tested positive for *Toxocara* sp. only.

Cervidae represented by musk deer, *Moschus moschiferus,* sambar deer, *Cervus unicolor*, Barking Deer *Muntiacus muntjak* and Himalayan Tahr, *Hemitragus jemlahicus* was reported with *Ascaris* and *Trichomonas* sp. In PNHZP. In Thiruvananthapuram zoo (Kerela), sambar deer tested positive for parasites like Stongyle, Strongylids, Amphistone, Spiruid and Ascarid (Varadharajan & Pythal 1999) with parasitic infection ranging from 24 to 33 % all round the year. Similarly barking deer and nilgiri thar, were also reported with Stongyle and Spiruid (Varandharajan & Pythal 1999). In PNHZP, himalayan tahr was not found positive for any parasites throughout the year, while *Dictyocaulus* sp. was reported in Musk Deer and in the barking Deer. Sample size in this group of herbivores was however small as can be seen from Table 1 and 2.

Wild pigs of family Suidae and related species are reported with parasites such as *Ascaris suum, Strongyloides ransomi, Oesophagostomum sp, Metastrongylus sp, Trichinella sp., Hyostrongylus sp., Ascarops sp., Physocephalus sp., Macrocanthorhyncus hirudinaceus, Stephanurus dentatus, Echinicoccus granulosus, Taenia acinonyxi, T. multiceps, T. regis, T. solium, Fascioloides magna* and *Dicrocoelium dendriticum* (Fowler, 1993) .Wild boar in PNHZP tested positive for *Ascaris* sp.

As can be seen from table 2, very low incidence of parasitic infection was found in the clouded leopard, common leopard, jackal, palm civet and the Tibetan Wolf. The herbivores in PNHZP also showed very low rate of parasitic infection during the whole year. However, the Snow leopard, followed by the tiger species, leopard cat and the red panda had almost a year round prevalence of parasites.

As for the red panda, it was found that out of the 15 individuals tested for parasitic infection from 2004 to 2007, only seven animals tested positive for parasites out of which five animals (33%) were interestingly all old animals above the age of 11 years. The other two were a breeding pair. As for the snow leopards, out of the 18 animals, one animal (house name: Prabhat) showed the highest rate of infection of 67 percent among the snow leopards. No distinct seasonal pattern of parasitic infection in the mammals at PNHZP was seen from this very basic and preliminary investigation.

Conclusion

Apart from the documentation of these results on the parasitic infection in the mammals at PNHZP, we have not attempted to infer or discuss the results further. The parasitic infection recorded in mammals in PNHZP was a low of 17%. Similar information from other high altitude zoos in India could help in generating a comparative database. This would in turn aid in producing a comprehensive understanding of the parasitic infection in captive animals and their management in high altitude zoos of India. It could also be helpful in knowing as to how different these zoos and their management can be from the low land zoos.

Reference

Anon (2001). *Zoos – Instrument for Conservation. National Zoo Policy and Statues and Guideline Related with Zoo Management*. Central Zoo Authority, New Delhi.

Fowler M (1993). Wild swine and peccaries, pp. 210-233. In: Fowler M.E., & R.E. Miller (eds). *Zoo and Wild Animal Medicine (fifth edition)*. WB Saunders, Philladelphia, USA, 782pp.

Kennedy-Stoskopt, S. (2003). Canidae, pp. 482-491. In: Fowler M.E. & R.E. Miller (eds). *Zoo and Wild Animal Medicine (fifth edition)*. WB Saunders, Philladelphia, USA, 782 pp.

Montali, R. J., M. Roberts, R A Freeman, & M. Bush (1984). Pathology survey of the Red Panda (*Ailurus fulgens*), pp.128-140. In: Ryder, O.A. & M.L. Byrd (eds). *One medicine*. Springer-Verlag, Berlin.

Ramsay, E.C. (2003). Ursidae and Hyaenidae, pp. 523-538. In: Fowler M. E. & R.E. Miller (eds). *Zoo and Wild Animal Medicine (fifth edition)*. WB Saunders, Philladelphia, USA, 782pp.

Varadharajan, A & C. Pythal (1999). A preliminary investigation on the parasites of wild animals at the Zoological Garden, Thiruvananthapuram, Kerela. *Zoos' Print Journal* I-XIV(3-12): 159-164.

Wack, R.F. (2003). Felidae, pp.491–501. In: Fowler M.E. & R.E. Miller (eds). *Zoo and Wild Animal Medicine (fifth edition)*. WB Saunders, Philladelphia, USA, 782pp.

Wharton, D. & S. A. Mainka (1997). Management and husbandry of the Snow Leopard *Uncia uncia. International Zoo Yearbook* 35(1): 139–147.

Wolff P.L. (1993). Parasites of New World Primates, pp. 378-389. In: Fowler M.E (eds). *Zoo and Wild Animal Medicine (fifth edition)*. WB Saunders, Philladelphia, USA, 782pp.

Acknowledgement

The encouragement and support of the Director, Mr. A.K. Jha, IFS, for the preparation of this report is thankfully acknowledged.