PARASITIC INFECTIONS IN WILD HERBIVORES IN THE MAHENDRA CHOUDHURY ZOOLOGICAL PARK, CHHATBIR, PUNJAB

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ABSTRACT

The present investigation was undertaken to study the parasitic infections in herbivores kept at Mahendra Choudhury Zoological Park, Chhatbir in Punjab, India. The occurrence and intensity of gastrointestinal parasitic load in 169 animals of 16 different herbivore species belonging to the families Cervidae, Bovidae, Hippopotamidae, Elephantidae, Rhinocerotidae and Equidae was determined by standard qualitative and quantitative parasitological techniques. The overall occurrence of gastrointestinal parasites based on 389 samples examined for helmithic eggs/oocysts of protozoa was found to be 25.71 per cent. The various parasitic eggs/oocyst detected were of strongyles, amphistomes, Trichuris *spp. and* Eimeria *spp. The most commonly detected parasitic infection (89%) was of strongyles followed by* Trichuris *spp.,* Eimeria *spp. and amphisotomes. Mixed infection was noticed in majority of the herbivores. The intensity of eggs of different parasites in various species of animals ranged from 50-4200 eggs per gram (epg). It was found that treatment of animals with appropriate drugs based on the species of parasites present in these animals was reported to be 100 per cent effective in majority of cases based on reduction in faecal egg count which reached zero by day three post treatment while in some groups it was reached by day five post treatment. No re-occurrence of parasitic infection was reported till day 55 post treatment.*

KEYWORDS

Chemotherapy, M.C. Zoological Park, parasitic infections, prevalence, treatment, wild herbivores

Parasitic diseases constitute one of the major managemental problems causing mortality and morbidity in wild animals in captivity (Rao & Acharjyo, 1984). Some work has been done to understand the epidemiology of different parasitic diseases of captive herbivores in Indian zoo animals and a systematic study for this purpose have been under taken earlier by a few workers (Chakraborty *et al.*, 1994; Chakraborty & Goswami, 2001; Nashiruddullah & Chakraborty, 2001; Varadharajan *et al*., 2001).

Keeping in view the importance of parasitic infections in wild herbivores, the study has been conducted to investigate the occurrence of various gastrointestinal parasitic infections in various species of herbivores along with their management by different drugs at the Mahendra Choudhury Zoological Park, Chhatbir, Punjab.

MATERIALS AND METHODS

Three-hundred-and-eighty-nine fresh faecal samples were collected from 16 different herbivore species belonging to the families Cervidae, Bovidae, Hippopotamidae, Elephantidae, Rhinocerotidae and Equidae to know the occurrence and intensity of gastrointestinal parasitism. The samples were collected randomly in clean polythene bags and pooled together from the animal enclosures in which the animals were kept in groups, and individual faecal samples were taken from the animals kept individually. Copro-parasitoscopic analysis (CPS) examination was done for a period of six months using sedimentation and floatation tests and McMaster counting technique (Soulsby, 1982). An arbitrary designation was assigned to denote the intensity of infection as done by Nashiruddullah and Chakraborty (2001). The positive samples for coccidian oocyst were subjected to sporulation for identification of oocysts. 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 morphology and micrometric studies (Bowman, 1999). For scanning electron microscopy, the worms recovered were processed as described by Sharma *et al.,* (1994).

For treatment the various animals were divided into three groups on the basis of species, sex, age, type of enclosure and the type of parasitic infection (single or mixed) in these animals. The animals were treated based on type of parasitic infection with appropriate commonly available drugs. The drug was administered at a higher dose (15%) so as to cover up the wastage of drug when given mixed in feed. Eggs per gram (EPG) was calculated on day 0 (i.e. before treatment) and on 1, 2, 3, 5, 7, 15 and 30 days post treatment (DPT) to see for reduction or reoccurrence 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

Of the 389 samples taken from 16 different herbivore species 100 were found to be positive for helmithic eggs/oocysts of protozoa (25.71% prevalence; species-wise prevalence is given in Fig 1). The most commonly detected parasitic infection (89.00%) in herbivores was strongyle spp. followed by *Trichuris* spp, *Eimeria* spp. and amphisotomes. Mixed infection was found in a majority of herbivores.

In elephants the most common infection was strongyle (85.71%) followed by amphistome eggs (14.29%) and mixed infection (14.29%) of strongyle and amphistome egg. In black bucks (46.25%) and spotted deer (50.00%) only strongyle spp. eggs were present in faeces. In Sambar strongyle spp. (80.00%), amphistome eggs (80%) and mixed infection (60%) with *Trichuris* spp., strongyle spp. eggs and *Eimeria* spp. oocysts were found. In all the chinkara mixed infection with *Trichuris*

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Manuscript 1519; Received 06 February 2006; Revised received 13 July 2006; Finally accepted 10 October 2006; Date of publication 21 October 2006

Table 1. Mean micrometric readings of eggs and intensity of parasitic infections in various herbivore species in zoo animals

S.No.	Animal Species	Parasitic eggs/ oocysts detected	Length (µm) Mean ± SE (range)	Breadth (µm) Mean ± SE (range)	Intensity of Infection	EPG (Mean ± SE)
1.	Black Buck (*Antelope cervicapra*)	Strongyle spp.	82.60 ± 0.58 (79.90-86.95)	47.35 ± 0.60 (44.65-49.35)	+ to + + + +	50– 4200 (1205 ± 445.10)
2.	Ladakhi Goat (*Capra ibex*)	Strongyle spp.	72.85 ± 0.70 (68.15- 75.20)	48.53 ± 0.50 (45.85-51.70)	+	50- 200 (116.66 ± 19.25)
		Trichuris spp.	70.97 ± 0.93 (65.80-75.20)	35.84 ± 0.45 (32.90-37.60)	+ to + +	500- 750 (633.33 ± 38.49)
3.	Chinkara (*Gazella benetti*)	*Trichuris* spp.	72.50 ± 0.60 (69.33-75.20)	35.60 ± 0.49 (32.90-37.60)	+ to + +	450 – 850 (695 ± 42.45)
		Eimeria spp.	44.06 ± 0.65 (42.30-49.35)	32.55 ± 0.37 (30.55-35.25)	+++	2200-2800 (2595 ± 66.50)
		Strongyle spp.	-	-	+	50 – 300 (165 ± 29.12)
4.	Blue Bull (*Boselophus tragocamelus*)	Strongyle spp.	81.28 ± 0.76 (77.25-84.60)	44.42 ± 0.46 (41.13-47.00)	+	50
		Trichuris spp.	-	-	+	50-150 (83.33 ±15.22)
5	Sambhar (*Cervus unicolor*)	Strongyle spp.	78.26 ± 0.89 (72.85-82.25)	39.01 ± 0.66 (35.25-42.30)	+	50 – 250 (137.5 ±17.40)
		Amphistome eggs	119.97 ± 0.97 (113.68-124.55)	65.45 ± 0.55 (62.28-68.15)	+	-
6	Spotted Deer (*Axis axis*)	Strongyle spp.	75.08 ± 0.48 (72.85-77.55)	44.30 ± 0.47 (41.13-47.00)	+	50 – 300(125 ± 23.20)
7.	Elephant (*Elephas maximus*)	Strongyle spp. Amphistomes	- -	- -	+ +	50 – 300 (142.86 ± 31.03) -

ovis, strongyle and *Eimeria* spp. was noticed. Blue bulls were found infected with *Trichuris* spp. (75%) and strongyle eggs (25%) and a ladhaki goat with mixed infection of *Trichuris* spp and strongyle eggs. The results of various parasitic eggs/ oocyst detection were more or less similar to those reported by Gorman *et al.* (1986), Chakraborty *et al.* (1994), Varadharajan and Pythal (1999), Xavier *et al.* (2000), and Varadharajan and Kandasamy (2000) in various wild animals.

The size and morphology of *Trichuris* spp. egg recovered from blue bull, ladakhi goat and chinkara (Table 1; Images 1&2[w]) was comparable to those of *Trichuris ovis* (Soulsby, 1982; Bowman, 1999) where as the strongyle eggs noticed in other species of animals could not be identified. In chinkara, two morphologically and micrometrically different oocysts were detected and both were identified as belonging to *Eimeria* spp. (Image 3[w]). Zebra, hippopotamus, rhinoceros, barking deer, Manipur deer, hog deer, swamp deer, mithun and cape buffalo were negative for parasitic infection.

Intensity of parasitic infections

It was seen that the highest intensity of infection was in black bucks for strongyle infections with EPG ranging from 50-4200 (1205 ± 445.10) followed by chinkara for various parasitic eggs/ oocysts, *viz*., strongyle, *Trichuris* spp and *Eimeria* spp., Ladhakhi goat for strongyle and *Trichuris* spp. and the rest of the herbivores had low intensity of infection (Table 1).

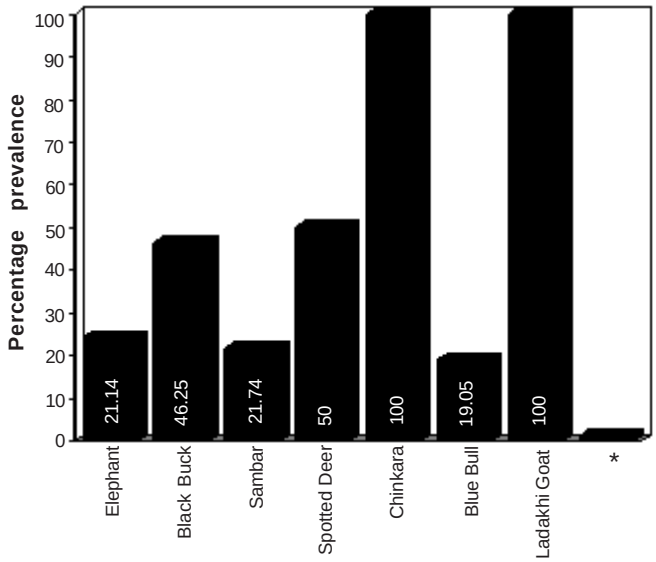
[w] See Images in the web supplement at www.zoosprint.org

Therapeutic studies

The animals of group I (12 black bucks (*Antelope cervicapra*) were having single strongyle spp. infection so they were treated with albendazole (Tab. Suprazole 3g, Ranbaxy Pvt. Ltd.) at 15mg/ kg body weight x 3 days mixed in feed. The reduction in faecal egg count was 100% by day three post treatment and no reoccurrence of infection was reported till day 55 post treatment. Thus drug albendazole was found to be 100% effective in eliminating the strongyle infection in black bucks as seen based on coprological examination.

The animal in group II, a ladakhi goat (*Capra ibex*) housed alone and found to be having a mixed infection with *Trichuris* spp. and *Strongyle* spp. was treated with fenbendazole (Vetfen 600 pelleted feed having fenbendazole @ 600mg/100gm feed, Indian Immunologicals) at 100g for three days. The reduction in faecal egg count was 100% by day three post treatment for *Strongyle* spp. whereas it was 100% by day five post treatment for *Trichuris* spp. This pelleted medicated feed was found to be effective in limiting the infection as no eggs were detected till 30 days post treatment and it had added benefit that it was more palatable than the other medication given mixed in feed.

The animals of the group III, one pair of chinkaras (*Gazelle gazelle*) were found to be having a mixed infection with *Trichuris* spp., *Strongyle* spp. and *Eimeria* spp. The animals were treated with fenbendazole (Vetfen 600 pelleted feed having @ 600mg/100gm feed, Indian Immunologicals) at 150g for three days and Sulphadimidine at 100mg/kg body weight for four



* Hippopotamus, Rhinoceros, Barking Deer, Manipur Deer, Zebra, Hog Deer, Swamp Deer, Mithun, Cape Buffalo

Figure 1. Species-wise prevalence of parasitic infections

days in feed. The reduction in faecal egg count was 100% by day three post treatment for strongyle eggs whereas it was 100% by day five post treatment for *Trichuris* spp. and *Eimeria* spp. This pelleted medicated feed was found to be effective in limiting the infection as no eggs were detected till 30 days post treatment and sulphadimidine was found to be equally effective in limiting the infection of *Eimeria* spp.

Anoplocephala magna was recovered from the small intestine and stomach of rhinoceros on post mortem (Images 4&5[w]) and were identified by light and scanning electron microscopy (Image 6[w]). *Murshidia sp.* was passed out in the faeces on day two after treatment with Panacur in elephants and they were identified (Images 7&8[w]) as per characters described in Soulsby (1982). The ectoparasites like *Haematomyzus elephantis* (Image 9[w]) were found on neck and ears of elephant, *Ctenocephalides felis* (Images 10&11[w]) on hog deer and ticks *Boophilus microplus* (Image 12[w]) on sambar.

It was observed that it is impossible to eliminate parasitic population in herbivores at the zoo because of confinement, changed environmental conditions and the movement of keepers from one enclosure to another. Hence, attempts should be made to keep the parasite load to preimmunity level. For this, regular examination of faecal sample for parasitic ova/larva and assessment of parasitic load and administration of desired anthelmintics when warranted and/or at regular intervals would be able to curtail parasitic infection. Chakraborty *et al.* (1994) opined that the infection is common with the parasites of a direct life cycle while those having indirect life cycle occur rarely in their natural hosts in captivity as the chances of transmission are reduced when the intermediate hosts have little chances to come in contact with animals.

[w] See Images in the web supplement at www.zoosprint.org

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Acknowledgments

Authors are thankful to Director, M.C. Zoological Park, Chhatbir, Punjab for permission to carry out the work at the zoo and Punjab Agricultural University for facilities provided.