

Original Research Article

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Gastro-intestinal Helminthic Infection in Herbivore Safari at Nandankanan Zoological Park

S. Das¹, M. Dehuri^{2*}, M.R. Panda², N. Sahoo³, B.N. Mohanty² and T. Mahapatra¹

¹Fisheries and Animal Resource Department, Government of Odisha, India

²Department of Veterinary Parasitology, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

³Department of Preventive Medicine and In charge of Regional Centre for Wildlife Health, Orissa University of Agriculture and Technology, Odisha, India

*Corresponding author

ABSTRACT

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A study on the prevalence of gastrointestinal parasites of herbivores was undertaken in herbivore safari at Nandankanan Zoological Park, Odisha by collecting a total number of 509 faecal samples of 4 species which includes Spotted deer (*Axis axis*), Sambar (*Cervus unicolor*), Chausingha / four-horned antelope (*Tetracerus quadricornis*), and Barking deer (*Muntiacus muntjac*). 210 faecal samples were positive for helminthic infection indicating a total prevalence of 41.26%. Coprological examination of the faecal samples revealed four types of helminths; Amphistomes (17%), Strongyles (16%), *Strongyloides* sp(2%) and *Trichuris* sp(1%). The prevalence of gastrointestinal helminths in Sambar, Spotted deer, Barking deer and Chausingha were found to be 68.8%, 42.61%, 17.12% and 16.28% respectively. Highest percentage of infection was observed during the rainy season 56.36% followed by winter (43.75%) and summer (23.81%).

Introduction

India is unique in having immense natural beauty and possessing a rich and diverse wildlife. Wild animals usually suffer from a wide range of various infectious agents like bacteria, viruses and parasites from time to time. A number of factors threaten the existence of wild animals in our country including wildlife diseases, in particular those arising from gastrointestinal parasites

(Thawait and Maiti, 2015). In nature, practically no animal is free from parasites. In spite of quarantine measures, the parasitized animals when brought from wild to captivity, the new conditions of zoos are usually unfavorable for the animal but favorable to the parasites. Although the wild animals are usually infected with many species of parasites, yet massive death of epizootics because of them rarely occur (Banerjee *et al.*, 2005). Epidemiological studies are essential to

know the status and establish a data base of parasites in wild animals. Our study provides an overview of parasites present in the herbivore safari of Nandankanan Zoological Park.

Materials and Methods

This study was undertaken during August 2015 to July 2016 in Herbivore Safari at Nandankanan Zoological Park. A total of 509 faecal samples were collected randomly from 4 species of wild herbivore viz. Spotted deer (*Axis axis*), Sambar (*Cervus unicolor*), Chausingha or four-horned antelope (*Tetracerus quadricornis*), and Barking deer (*Muntiacus muntjac*). During the study period, 125, 230, 111 and 43 number of faecal samples were collected from Sambar, Spotted Deer, Barking deer and Chausingha respectively. Freshly dropped pooled faecal samples were collected in a clean, dry and individually labeled polythene bag and extreme care was taken to avoid extraneous contamination. The faecal samples were brought to the departmental laboratory for further investigation. Examination of faecal sample was done by Direct smear method, Sedimentation method, Flootation method using MgSO₄ and identification was based on morphological features of the parasitic ova (Soulsby,1982). The counting of eggs was done by Stoll's dilution technique and Mc Master Technique. Faecal culture was done to know the species of the parasite infecting the herbivores. Statistical analysis were carried out by Statistical Package for Social Science (SPSS) version 22 using chi- square test.

Results and Discussion

Out of the total 509 faecal samples examined, 210 faecal samples were positive for helminthic infection while 299 were negative for presence of any parasitic ova indicating a total prevalence of 41.26%. Faecal sample

examination from 210 positive samples, showed 76.66% of samples having single infection while there was presence of mixed infection with two species of helminths in 23.33% of total positive samples. Coprological examination of the faecal samples revealed four types of helminths; Amphistomes (17%), Strongyles (16%), *Strongyloides* sp (2%), *Trichuris* sp (1%). The prevalence of gastrointestinal helminths in Sambar, Spotted deer, Barking deer and four horned antelope were found to be 68.8%, 42.61%, 17.12% and 16.28% respectively.

In sambar, prevalence of amphistomes and strongyles were 45% and 18.4% respectively. There was no record of *Strongyloides* sp and *Trichuris* sp in Sambar, while mixed infection was seen in 5.6 % of positive samples. Strongyles showed highest prevalence (20.43%) in Spotted deer followed by amphistomes (11.3%) and *Trichuris* sp. In Barking deer, the highest prevalence was recorded for ova of strongyles (8.1%) followed by *Strongyloides* sp.(7.21%) while amphistomes showed a mere prevalence of 0.9 % only. Mixed infection was seen in 0.9% of positive samples. In Chausingha, Amphistomes had a higher presence followed by Strongyles and *Strongyloides* sp (Figure 1).

Highest percentage of infection was observed during the rainy season 56.36%, winter prevalence was 43.75% while during summer season there was only 23.81% (Table 1) with high significance in summer and significance during rainy season.

Overall prevalence of gastro-intestinal parasites in Herbivore Safari was 41.26%, which is more or less similar to findings by Mohan and Coumarene (2007) from Puducherry; Sahoo *et al.*, (2009) from the same zoo and Thawait and Maiti (2015) in Kanan Pandari Zoo of Bilaspur. A survey of gastro-intestinal parasites in herbivores by

Gupta *et al.*, 2011 around forests of Jabalpur as well as Rahman *et al.*, (2014) at Dhaka National Zoological Garden detected a much higher prevalence (70-80%). The variation could be due to difference in number and distribution of animals and variation in topography and climatic factors. A lower prevalence of 25.71% was reported by Singh *et al.*, (2006) in wild herbivores at Mahendra Choudhury Zoological Park, Punjab. The conflicting report might be due to inclusion of more number of animal species (sixteen different herbivore species) and differences in geographical condition. The prevalence of

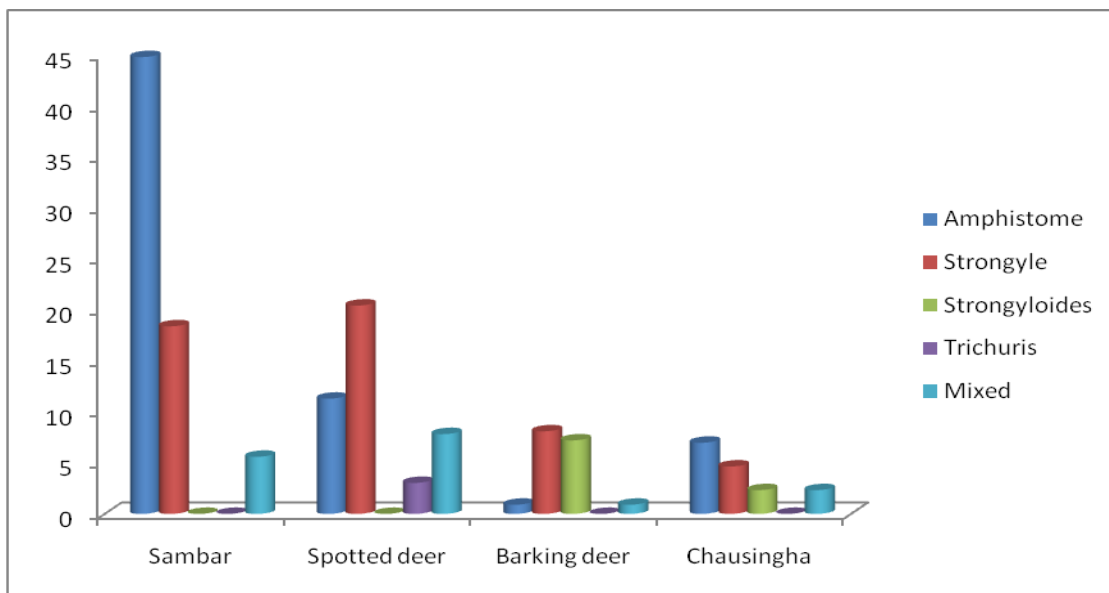
mixed infection was seen in 22.33% of the total sample while Singh *et al.*, 2006 from Punjab reported a higher rate, which could be due to differences in sample size and managemental condition. The most common infection during our survey was found to be of amphistomes (41%) followed by Strongyles (39%), *Strongyloides* sp (4%) and *Trichuris* sp (3%). In wild herbivores at Mudumalai Wildlife Sanctuary, TamilNadu highest infection of Strongyles (41.7%), followed by amphistomes (15.6%) and *Strongyloides* sp. (11.5%) has been reported by Mandal *et al.*, (2002).

Table.1 Prevalence of gastro-intestinal helminths in different seasons in Herbivore Safari

Name of the Season	No. of total sample collected	No. of Positive samples	No. of negative samples	Chi square test (p value)
Rainy	165	93	72	0.02644*
Winter	176	77	99	2.642
Summer	168	40	128	0.0001516**
Total	509	210	299	

Highly significant**(p< 0.01); Significant*(p<0.05); Non-significant (p>0.05)

Fig.1 Prevalence of gastro-intestinal helminths in different animals of herbivore safari



In Van Vihar National Park, Bhopal Singh *et al.*, (2009), noted the highest prevalence for Strongyles (26.15%) followed by *Strongyloides* sp. (7.13%), amphistomes (1.98%) and *Trichuris* sp. (1.84%) in free ranging herbivores. The predominance of amphistomes in our study could be due to evidence of presence of snail intermediate host i.e. aquatic snails (*Indoplanorbis* spp and *Lymnea* spp) in the fodder farm at the back side of the Safari, from where fodder is supplied to the animals.

As per our research, the overall prevalence of parasites was higher in the rainy season which supports the findings of Modi *et al.*, (1997) in Bihar, Dharmarajan *et al.*, (2005) in South India and Singh *et al.*, (2009) in Bhopal detecting a higher prevalence of parasites in the rainy season in herbivores. The increase can be attributed to higher humidity and favourable condition with increased larval survival and increase in intermediate host population. Jadhav *et al.*, (2010) and Hussain *et al.*, (2002) have reported higher prevalence of gastro-intestinal parasites in rainy season which agrees with our findings in spotted deer.

The study concluded that trematodes and nematodes, though of low intensity were prevalent in the herbivore safari of Nandankanan Zoological Park. The existing infection can be controlled by adopting suitable anthelmintic therapy while ensuring proper administration of drug, along with proper management practices. Elimination of snail intermediate host could also help in reducing the parasitic burden on the animals.

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