Studies on prevalence of gastro-intestinal parasites in captive wild herbivores in Nandanvan zoo, Raipur


Abstract

The present study was undertaken to study the prevalence of gastro-intestinal parasitic infections (GIP) in captive wild herbivores in Nandanvan Zoo, Raipur with respect to species, age, sex and season to assess the intensity of gastro-intestinal parasitism in captive wild herbivores. A total of 145 faecal samples were collected from enclosures of various captive wild herbivores which were examined by direct, sedimentation, floatation method and McMaster technique. The overall prevalence of gastro-intestinal parasites in captive wild herbivores was reported to be 27.50%. Seasonal prevalence was reported to be 16.00% in summer season and 35.70% in pre-monsoon season respectively. Amongst all species studied, Blue bull showed highest prevalence (61.90%) of GI parasites. The gastro-intestinal parasitic infection was recorded to be higher in male (55.55%) than in female animals (50.00%). During the study, prevalence of trematodes was 37.10%, nematodes was 62.50% and mixed infection was recorded in 32.50% cases. Strongyle spp. was the most commonly observed GIP in 62.50% (25/40) animals while Paramphistomum was least reported species in 5.00% (2/40) animals. The highest EPG count was observed in Chausingha and blue bull during pre-monsoon season (EPG=700) and lowest EPG (100) count was recorded in Spotted deer during summer season.

Keywords: Captive herbivores, gastrointestinal parasites, prevalence

Introduction

Parasitic diseases represent a major concern in captive wild animals which are maintained in confined areas as there are chances of high environmental contamination resulting in loss of health condition. The health status of any wild animal in captivity depends upon many factors like feeding, managemental conditions and environmental conditions such as temperature, rainfall and humidity (Goossens et al., 2005) [1]. Wild animals have been found to be infested by different type of endoparasites leading to high morbidity and mortality (Singh et al., 2009) [2]. There are reports of wild animals succumbing to parasitic infection in captivity due to environmental stress such as change in living conditions and space limitations (Atanaska et al., 2011) [1].

Materials and Methods

Location of study

Nandanvan Zoo, Raipur is located between 21° 15’ N, 81° 41’ E in Chhattisgarh. The zoo is located at a distance of 16 km from Raipur city and has total land area of 10 hectares. This zoo was primarily established to serve as shelter to sick, injured and rescued wild animals. The present study was carried out to study the prevalence of parasitic infections in wild herbivores animals kept at Nandanvan Zoo, Raipur of Chhattisgarh. The study plan was carried out over a period of 05 months from March, 2018 to July, 2018 in different seasons viz. summer (March to May) and pre-monsoon (June to July).

Sample collection

Freshly passed faecal samples were collected from the zoo animal enclosure in a clean, dry interlocked polythene bags. The samples were labeled indicating animal information viz. species, age, sex and enclosure number respectively for easy identification of the samples for laboratory analysis.
Sedimentation method
About one gram of faeces was taken in pestle and mortar followed by addition of little amount of distilled water and mixed properly. The suspension was strained to remove any debris followed by centrifugation for 2 to 3 minutes @ 1500 rpm. The supernatant was discarded and a drop of sediment was placed on clean grease free glass slide and covered with a clean cover slip avoiding any air bubble. The slide was examined under low power objective (10X) of microscope (Soulsby, 1982) [12].

Floatation method
About one gram of faeces was taken in pestle and mortar and adequate amount of saturated solution of magnesium sulphate was added and mixed thoroughly. The suspension was strained to remove any debris and centrifuged @ 1500 rpm for 2 to 3 minutes. The surface layer was examined under low power objective (10X) of microscope for the presence of parasitic ova (Soulsby, 1982) [12].

Mc master method for EPG
About two gram of faecal sample was soaked in 20 ml water in a beaker for 30 minutes. Then the whole sample was mixed thoroughly in a pestle and mortar. The sample was transferred to 100ml beaker and 40 ml saturated salt solution was added and mixed thoroughly without forming bubbles (dilution factor is 1 in 30). Then the sample was charged in one ruled chamber of the McMaster slide and eggs were counted in the egg chamber examined under low power (10X) of the microscope (Skerman and Hillard, 1966) [11].

Area of each chamber = 16mm (Length) x 12.5mm (Breadth) x 1.5mm (Height) = 300mm = 0.3cc = 0.3 ml

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\text{Eggs of each chamber} = \frac{\text{Number of eggs counted}}{\text{Area of one chamber}} \times \text{Dilution factor}
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= \frac{\text{Number of eggs counted}}{0.3} \times 30
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= \text{Number of eggs counted} \times 100
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Results and Discussion
Ovaerall prevalence of GIP
The overall prevalence of gastro-intestinal parasites in captive wild herbivores at Nandanvan Zoo, Raipur was estimated on the basis of faecal sample examination. Out of 145 faecal samples examined, 40 samples were found to be positive for parasitic infection indicating an overall prevalence of 27.50%. The findings of our study are in concordance with prevalence rate of gastro-intestinal parasites of Spotted deer (28.57%) in Pench National Park, Maharashtra (Nighot et al. 2004) [7]. However, the species wise prevalence was observed to be comparatively lower than the findings of Mir et al. (2016) [4] who have reported prevalence rate in barking deer (100%), black buck (75.00%), sambar (66.00%), spotted deer (50.00%) of Bir Moti Bagh Mini Zoo (Deer Park), Patiala, Punjab.

Species-wise prevalence of GIP
Among different herbivores, Blue bull showed highest prevalence (61.90%) of gastro-intestinal parasites followed by hog deer (50%), barasingha (43.75%), black buck (29.98%), spotted deer (27.86%), sambar (26.78%), chausingha (19.23%), barking deer (15.78%), Indian gazelle (0%), thamin deer (0%) and mouse deer (0%) respectively. The findings of our study are in concordance with prevalence rate of gastro-intestinal parasites of Spotted deer (28.57%) in Pench National Park, Maharashtra (Nighot et al. 2004) [7].

Age-wise prevalence of GIP
The age wise prevalence of gastrointestinal parasitism was recorded to be 26.38% in adult and 43.47% in young animals in our study. The findings of our study regarding age wise prevalence of gastro-intestinal parasites in captive wild herbivores in adult animals (26.38%) is much lower than prevalence rate of 70.50% reported in adult captive wild animals of Thrissur Zoo, Kerala (Varadharajan et al., 2001) [14]. Similarly in our study 43.47% prevalence was reported in young animals which is also lower than prevalence of 54.00% in young animals of Thrissur Zoo, Kerala (Varadharajan et al., 2001) [14].

Sex-wise prevalence of GIP
The male and female captive wild herbivores (Nilgai) are kept in separate enclosure in Nandanvan Zoo, Raipur. Out of total of 26 samples of Nandanvan Zoo, Raipur, 18 faecal samples from male blue bull and 8 faecal samples from female blue cow were examined to study the effect of sex on the prevalence of gastro-intestinal parasites. Fecal examination revealed prevalence of 55.55% (10/18) in male and 50.00% (4/8) in female Nilgai respectively. The sex wise prevalence of gastrointestinal parasites was recorded to be 55.55% in male and 50.00% in female Nilgai in our study. The present study revealed that sex has no significant (p>0.05) effect on prevalence of gastro-intestinal parasites in captive wild herbivores. However, the sex wise prevalence infection (50.00%) was observed to be comparatively higher than the findings of Opara et al., (2010) [8] who have reported prevalence of 37.2% in female of Zoological Garden, Nekede Owerri, Southeast Nigeria.

Seasonal prevalence of GIP
Out of 145 fecal samples examined during the study period, 75 samples were collected in summer (March-May) season while 70 samples were collected in pre-monsoon (June-July) season. The findings of fecal sample examination revealed that 15 samples were found to be infected with gastro-intestinal parasites in summer season while 25 samples were found to be infected in pre-monsoon season, thereby indicating prevalence of 16.00% (15/75) in summer and 35.70% (25/70) pre-monsoon season respectively.

Over all prevalence of different GIP
The overall prevalence of nematode parasites was 62.50%
(25/40) while trematode parasites were reported in 5.00% (02/40) wild herbivores during the study. However, mixed infection was detected in 13 samples indicating an overall prevalence of mixed infection to be 32.50% (13/40). The findings revealed that single nematode infection was significantly (p<0.05) higher than trematode and mixed infection in captive wild herbivores in our study.

There are no specific findings related to trematode infection in captive wild herbivores. However, mixed infection rate of 42.3% has been reported in captive wild animals of Dhaka National Zoological Garden, Bangladesh by Rahman et al. (2014)[9].

Species wise prevalence of different GIP

Four types of eggs were recovered from the faecal samples during this study which included Paramphistomum spp., Strongyle spp., Oesophagostomum spp. and Strongyloides spp. A total of 40 faecal samples were found to be positive for gastrointestinal parasites from Nandanvan Zoo, Raipur. Infection of Paramphistomum spp. was recorded in 5.00% (2/40) animals while Strongyle was recorded in 62.50% (25/40) animals respectively. Mixed infection of Paramphistomum spp. along with Strongyle was observed in 10.00% (4/40) animals, Strongyle spp. along with Oesophagostomum spp. in 20.00% (8/40) animals and Paramphistomum spp. with Oesophagostomum spp. was reported in 2.50% (1/40) animals respectively. Mandal et al. (2002) have reported infection of Strongyle spp. (41.7%) followed by Paramphistomum spp. (15.6%), Strongyloides spp. (11.5%) respectively in wild animals of Mudumalai Wildlife Sanctuary, Tamil Nadu. Singh et al. (2009)[10] have reported highest prevalence for Strongyles spp. (26.15%) followed by Strongyloides spp. (7.13%) and Paramphistomes spp. (1.98%) in captive wild animals of Van Vihar National Park, Bhopal.

Season wise EPG count

The EPG count ranged from 100 to 700 during 02 different seasons. The highest EPG count was recorded in Chousingha and Blue bull during pre-monsoon season (EPG=700). However, lowest EPG count was recorded in Spotted deer (EPG=100) during summer season. Singh et al. (2009)[10] have reported that overall mean EPG was maximum for Strongyles spp. (585.19) followed by Amphistome spp. (250) and Strongyloides spp. (127.78) reported in captive wild animals of Van Vihar National Park, Bhopal. Rahman et al. (2014)[9] have reported in intensity of infection in terms of EPG/CPG ranging from 100-500 in spotted deer of Dhaka National Zoological Garden, Bangladesh.

Conclusion

In conclusion, it can be said that the prevalence of gastrointestinal parasites in Nandanvan Zoo, Raipur was reported to be 27.50% during this study which indicates that zoo is not free from parasitic infection. A higher rate of prevalence of gastro-intestinal parasites was observed in pre-monsoon season in our study. The season wise prevalence of gastrointestinal parasitism was recorded to be 16.00% summer and 35.70% pre-monsoon. A higher rate of prevalence of gastro-intestinal parasites was observed in male animals in our study. A higher rate of prevalence of gastro-intestinal parasites was observed in young animals in our study. The age wise prevalence of gastrointestinal parasitism was recorded to be 26.38% in adult and 43.47% in young animals in our study. Highest prevalence (61.90%) of gastrointestinal parasites was observed in Blue bull population with Strongyle spp. as most predominant parasite. An overall prevalence of different gastrointestinal parasites was recorded to be 50.31% nematode and 37.10% trematodes in our study.

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