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Coprological study of endoparasite infections in Indian crested porcupine (*Hystrix indica)*

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ABSTRACT

Aim: The main purpose of the study is to determine prevalence and associated risk factors with gastrointestinal parasitic infections in porcupine from Kerala state Zoo, India.
Method and materials: Porcupines were screened using classical parasitological techniques, sedimentation and floatation methods. The faecal samples collected from the Zoo were analyzed for the presence of endoparasites.
Results: Out of the total six faecal samples screened, all (100%) samples were positive for gastrointestinal parasitic infections. The parasites identified were Ascarid, Strongyle sp. (nematode or round worm), Strongyloids sp. (nematode) and Trichuris. The percentage of the parasitic attack off eggs/ oocytes of these three different types of parasites observed in the study were ascarid (66.6%), Strongyle sp. (16.66 %), Strongyloids (50 %) and Trichuris sp. (50 %).
Conclusion: It was concluded that the endoparasites Ascarid, Strongyloids sp. (nematode or round worm), Strongyloids sp. (nematode) and Trichuris occurred in captive porcupines.

Keywords: Coprological study, Endoparasites, *Hystrix indica*, Porcupine, Zoo.

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Introduction

The Indian crested porcupine (*Hystrix indica)* is a rodent species native to Asia and Middle East. These are herbivores, primarily feed on upon fruits, grains, roots, supplementing their diet by chewing bones and faeces may lead different parasites. The life cycle of parasites involves hosts: Dogs, cats, foxes and other carnivores are the definitive hosts of the parasite. Transmission to intermediate hosts occurs through contamination of nasal secretions and fecal matter of dogs contains eggs of this parasite. Intermediate hosts include human beings and herbivores animals such as cattle, goats, sheep and other ruminants that have ingested grass plants contaminated with eggs. Parasites of the upper respiratory system, inhabits the nasal cavities, turbinate and frontal sinuses of carnivorous animals as definitive hosts (Oryan *et al*. 1993; Rahman *et al*. 2009). The eggs are expelled from the respiratory passage of the final host therefore contaminate pastures and water resources.

When the infected eggs are swallowed by suitable herbivorous animals, the larvae reach the mesenteric lymph nodes, liver, lungs, spleen, rarely the eyes and other organs (Youssef and Hadizadeh-Moalem, 2015).

Humans may be infested with these parasites either by ingestion of nymphs resulting in a condition called nasopharyngeal linguatulosis or Halzoun syndrome or by ingestion of infective eggs which develop in internal organs resulting in visceral involvement. Halzoun syndrome may arise via consumption of raw or undercooked liver and lymph nodes (Yao *et al*., 2008; Tappe *et al*., 2009). Human linguatulosis is reported from various parts of the world such as Egypt (Morsy *et al*., 1999) and Sudan (Yagi *et al*., 1996).

The occurrence of the parasites in domestic and wild animals used as a food source to humans including cattle, buffaloes, sheep, goats, pigs has been well documented (Khalil, 1976; Saiyari et al., 1996; Tavassoli *et al*., 2007). Canine acquire the parasites by ingestion of raw or undercooked viscera of infected animals with nymph stage (Rajabloo *et al*., 2015). The study was

aimed to analyze and describe the endoparasites profile among porcupine kept in Thrissur Zoo for implementation of effective management strategies against these parasites.

Materials and Methods

A total number of six samples were collected from selected captive porcupine for the examination on random days within the time period and were screened using classical parasitological techniques including sedimentation and floatation methods. The samples collected were analysed in university veterinary hospital Kokkalai, Thrissur. Faecal samples were examined qualitatively for the detection of parasite infection by direct smear examination or by concentration techniques.

Results and Discussion

The faecal samples collected from the Zoo were used to analyze the presence of parasites. Out of six samples examined all the samples found positive for endoparasites – two samples with strongyles and three samples with strongyloides, trichuris and ascarid ova. The overall percentage of infection was 4.4% in the total porcupine population; 3.5% of captive porcupines were found affected with infection. However protozoan parasites were not recorded in this study. Poly parasitosis was also observed in the study. In a faecal sample of single Porcupine species more than one kind of parasite could be seen at a time. Such conditions are huge threats to their health. The endoparasitic infection was consistent during the rainy season. The most found endoparasite was *Ascarid* and the least found was *Trichuris*. The most affected species was of the sample 2 and least affected was sample 5. *Strongyle* was negative for both the samples.

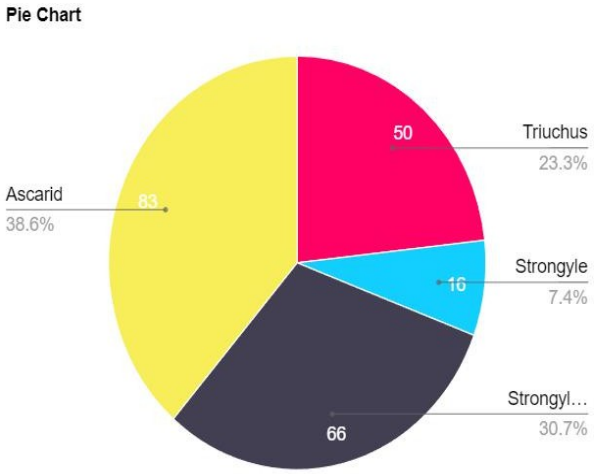

Fig.1. Species distribution of endoparasites in porcupine

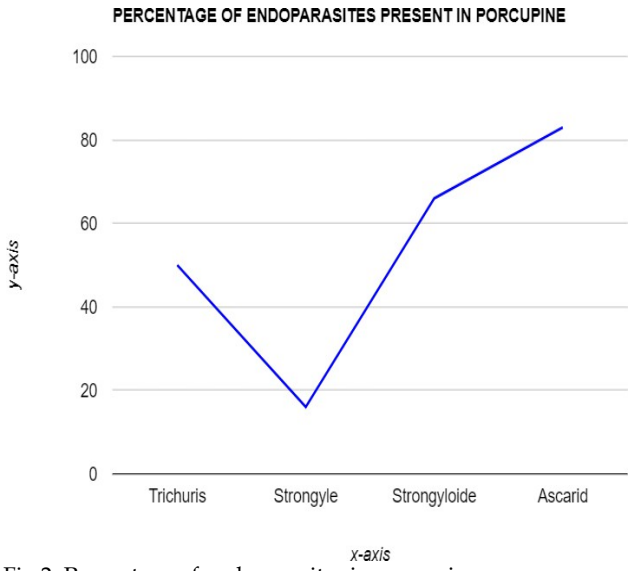

Fig 2. Percentage of endoparasites in porcupine

The species identified are *Ascarid, Strongyle sp.* (nematode or round worm), *Strongyloids sp.* (nematode) and *Trichuris* (Fig. 1 & 3). The percentage of the parasitic attack off eggs/ oocytes of these three different types of parasites observed in the study are *ascarid* (66.6%), *Strongyle sp.* (16.66 %) Strongyloids (50 %) and *Trichuris sp.* (50 %) (Fig. 2).

An investigation in to the prevalence of helminthic infections among the wild mammals in captivity in the Thrissur zoo and also the variations thereof on account of season, age and sex were carriedout by regular faecal examination, using the concentration method of centrifugation-cum-sedimentation technique for two months. Certain nonspecific clinical symptoms such as general weakness, debility, occasional diarrhoea, dehydration and respiratory distress with cough were observed during the study period in a variety of the animals which were having helminthic infections.

The present investigation revealed that wild mammals in the zoo did not show in general, considerable specific clinical symptoms due to parasitic infections. However, the present study also showed clinical symptoms like general weakness, debility, occasional diarrhoea, dehydration and alopecia due to parasitic infections in a variety of wild mammals. This was in agreement with the observations of Maske *et al.*, (1990).

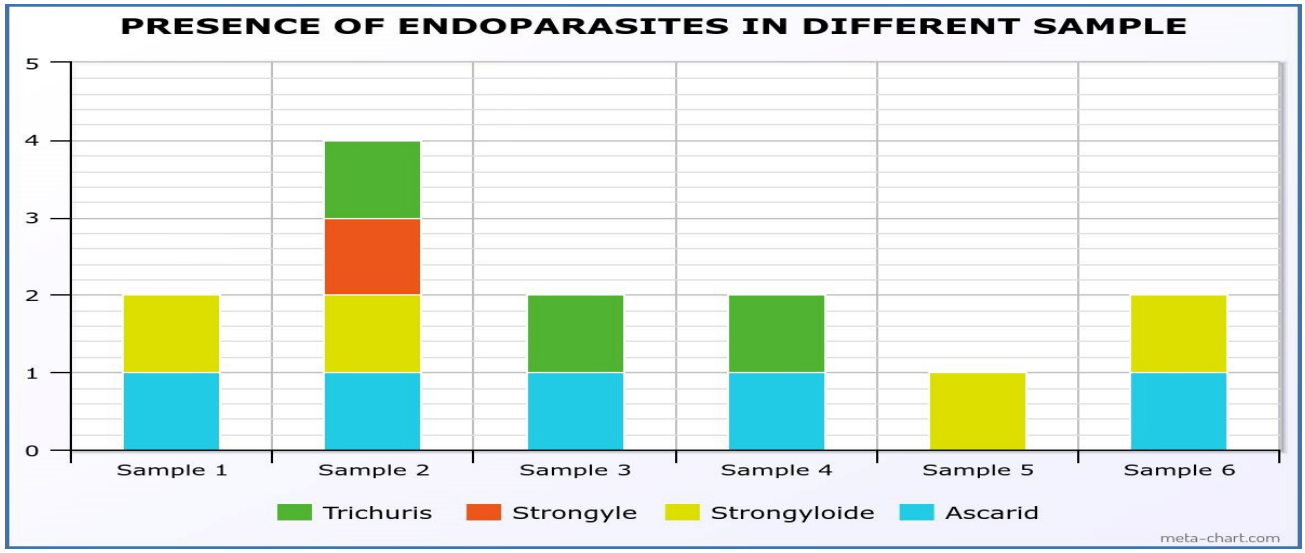

Fig. 3. Presence of endoparasites in faecal samples.

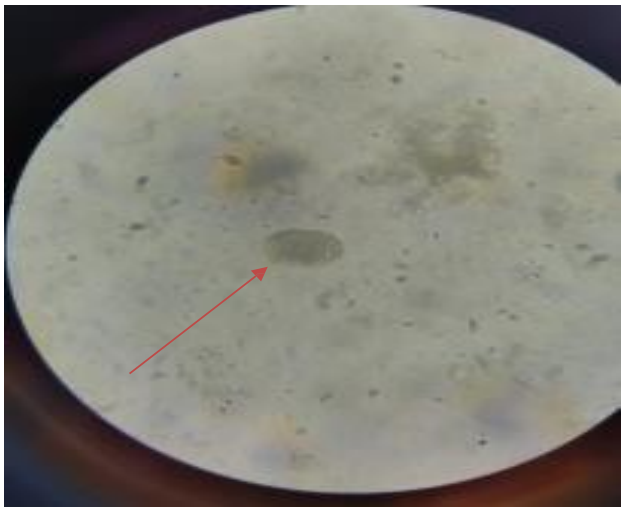

Fig 4. Ascarid

Fig 6. Strongyloide stercoralis

Fig. 5. Strongyle

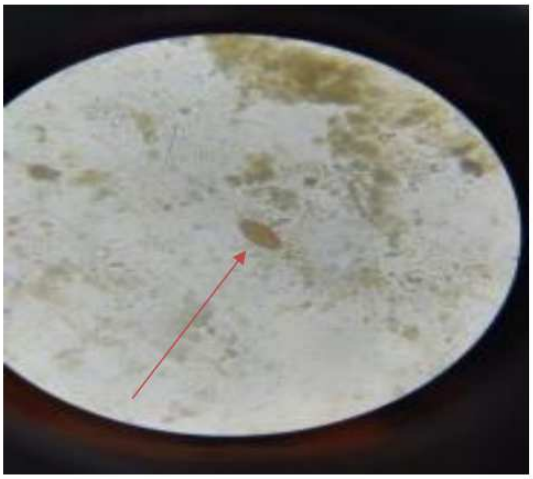

Fig 7. Trichuris trichiura

The prevalence of gastrointestinal endoparasites in captive wild animals at Aurangabad Municipal Corporation Zoo, Maharashtra revealed anoverall gastrointestinal endoparasite prevalence of 48.4 % and statistically significant variation in the prevalence between different seasons (Lingayat *et al.,* 2022).

Most of the parasitic infections recorded from carnivorous animals are of zoonotic importance and those handling them should be aware to follow all hygienic cares to prevent infection to them (Muraleedharan, 2016). On the basis of information provided in the 2011-2012 Annual Report of Mysore Zoo, 1032 faecal materials were examined and Toxocara, strongyle oocysts were detected in carnivores. During 2012-13, 1109 samples were subjected for screening of which 208 (18.76%) were positive for various ova.

The influence of season on the prevalence of helminthic infections among wild mammals in the Thrissur Zoo infection was comparatively higher during both the rainy seasons viz the South-West monsoon and the North-East monsoon (Varadharajan *et al.,* 2001, 2003). Ramadevi *et al.,* (2020) reported prevalence as 37.24 %, 13.88 %, 23.59 % respectively. Relatively higher prevalence in omnivores could be contributed to small sample size in this study. Varadharajan *et al.,* (2001, 2003) reported similar prevalence of 65.35 % and 65.9 %in omnivores respectively.eddy *et. al.,* (1992), Chakraborty *et. al.,* (1996), Modi *et. al.,* (1997) and Thawait *et. al.,* (2014) reported GI endoparasite prevalence of 42.4%, 40.4%, 48.1% and 46.2% respectively in captivated animals. The study on prevalence of GI parasites has been conducted in various zoos and national parks throughout the world by different researchers like Mir *et. al.,* (2016); Maske *et al.,* (1990); Opara *et al.,* (2010); Parsani *et al.,* (2001); Thawait *et al.,* (2014) and Rahman *et al.,* (2012,2014). The prevalence of GI endoparasites observed in our study was comparatively lower than the previous findings of researchers Cordon *et al.,* (2008); Thawait *et al.,* (2014); Opara *et al.,* (2010); Rahman *et al.,* (2012) and Varadharajan *et al.,* (2001) reported GI endoparasite prevalence of 72.5, 68.05, 76.6%, 76.9% and 68.36 respectively.

Similar findings were also observed by some researchers like Vardharajan *et al.,* (2003) who reported higher prevalence of helminthic infection in herbivores (71.62 %) than the omnivores (65.9 %) and Rahman *et al.,* (2012) reported prevalence of 76.9% in herbivores. Usually overcrowding in herd animals, competition for feed and water results in stress and decreased immunity, leading to more vulnerability to parasitic infections. Contrary to our findings lower prevalence in herbivores was observed by others like Thawait *et al.,* (2014). Varadharajan *et al.,* (2001); Singh *et al.,* (2009); Thawait *et al.,* (2014); Moudgil *et al.,* (2020) and Mir *et al.,* (2016) who reported prevalence of 45.6%,67.47%,25.71%,45.68% and 68 % respectively. Lower prevalence in carnivores in comparison to herbivores and omnivores could be contributed to their individual confinement and good management practices. Singh, *et. al.,* (2009) reported 58.68 % prevalence in carnivores at Mahendra Choudhury Zoological Park, Chhatbir, Punjab and Mahali *et al.,* (2010) reported 60.52% prevalence in carnivores of Nandankanan Zoo, Bhubaneswar, Odisha. Some researchers observed lower prevalence in carnivores than our study like Thawait *et al.,* (2014) and Nasiri *et al.* (2019).

Singh *et al.* (2009) and Moudgil *et al.* (2020) reported a lower GI parasitic prevalence of 29.02 % and 6.85 % respectively in omnivores while as Arunachalam *et al,* (2015) reported higher GI parasitic prevalence of 43% in Rhesus Macaque. Incontrast to our finding of 47.61% prevalence of helminthic parasites in birds Parasani *et al.* (2001). Moudgil *et al.* (2020) also studied the prevalence of GIT parasitic infections in zoo-housed birds of various zoological/deer parks and an aviary of Punjab, India screening 1273 samples from the birds of the MC Zoological Park, Bir Moti Bagh Deer Park Patiala, Patiala aviary, Bir Talab Deer Park Bathinda and Tiger safari Ludhiana showing an overall GIT parasitic burden of 37.52%, 25.54 %, 37.50%, 45.39%, and 67.64% respectively. The protozoan infection mainly involved coccidian infection of Eimeria spp. a finding also reported by Morrondo *et al.* (2008) and Moudgil *et al.* (2020).

Some researchers also studied the seasonal prevalence in wild animals and reported different findings than our study like Moudgil *et al.* (2020) who reported monsoon season prevalence of 37.73% and 53.12% in animals and birds of MC Zoological Park, Chhatbir, Punjab and in the animals and birds of Bir Moti bagh Deer Park, Patiala respectively. Mahali *et al.* (2010) also studied the prevalence in the carnivores of Nandankanan Zoo during three seasons (Rainy, winter and summer) and reported higher incidence during rainy season (63.51 %), as compared to summer (62.96 %) and winter seasons (54.29 %). High

prevalence of GI endoparasites in winter observed in this study could be due to lack of deworming after monsoon season. Lower prevalence in summer as compared to winter season was also observed by other researchers like Modi *et al.* (1997) and Kumar *et al.* (2003).

Conclusion

It was concluded that *Ascarid, Strongyloids sp.* (nematode or round worm), *Strongyloids sp.* (nematode) and *Trichuris* are identified from captive porcupines. The percentage of the parasitic attack off eggs/ oocytes of these three different types of parasites observed in the study are *ascarid* (66.6%), *Strongyle sp.* (16.66%) Strongyloids (50%) and *Trichuris sp.* (50%). Ascarid was most common species while strongyle was rare..

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