Sustainability and Biodiversity Conservation

Helminth fauna of migratory waterfowl ducks and geese in Hokersar wetland of Kashmir, India

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Abstract

The present study was carried out to determine the prevalence of gastrointestinal helminths in migratory waterfowl- ducks and geese in the Hokersar wetland of Kashmir. For this purpose 18 dead migratory waterfowl (Mallards, Gadwall, Common Teal, Northern Pintail, Northern Shoveler and Graylag Geese) were collected from various sites in Hokersar wetland for necroscopic examination. The overall prevalence of helminthiasis was 55.55%. The gastrointestinal helminths isolated were *Notocotylus attenutus* (16.66%), *Paryphostomum radiatum* (5.55%), *Capillaria anatis* (16.66%) and *Epomidostomum anattinum* (5.55%) and *Hymenolepis abortive* (11.11%). Incidence with respect to host and gender was also recorded during the present study.
Keywords: Helminth fauna, Waterfowl, Prevalence, Hokersar

Introduction

A survey was carried out on the incidence of gastrointestinal helminthiasis in migratory waterfowl ducks and Geese from the Hokersar wetland of Kashmir. Migratory birds face many threats to their survival in the wild. The migratory birds are parasitized by viruses, bacteria, ticks, mites, lice and helminths. Among them, the helminth parasites (trematodes, cestodes, nematodes) and ectoparasites are the most common, most diverse and most important affecting these birds in different ways. Parasitism is common in wild waterfowl (Atkinson *et al*., 2008). Waterfowl are considered one of the vertebrate groups with the greatest diversity of parasites (Barrera-Guzm´an

and Guill´en-Hern´andez, 2008; Leung and Koprivnikar, 2016). This diversity may be explained due to the natural history of their bird hosts, the great diversity of feeding habits (Graves and Fedynich, 2013), migratory (Garvon *et al*., 2011) and seasonal patterns (Wallace and Pence, 1986), as well as the complexity of the digestive tract of waterfowl species (Poulin, 1995). Although studies regarding infection of migratory waterfowl ducks and geese have been carried out in different parts of the world (Zedar, 1800; Lundahl, 1848; Railliet and Henry, 1909; Seurat, 1918; Skrjabin, 1915; Broderson *et. al*., 1977; Shah *et. al*., 1980; Mohammad *et al*., 2011; Sokol *et. al*., 2016; Aguilar *et. al*, 2020), studies regarding infection in this region are limited (Fotedar *et al*, 1965 and Kharoo, 2011. The present investigation records the incidence of different kinds of helminth parasites in migratory waterfowl ducks and Geese from Hokersar wetland.

Material and methods

Study area

Hokersar is a main and well-protected reserve for ducks and geese managed by J&K Wildlife Protection Department. The wetland is located about 10 km to the west of Srinagar on the Srinagar-Baramulla National Highway (Fig. 1). The wetland is more or less semicircular in outline, extending in an East-west direction with an area of about 5 sq. km. Doodhganga and Sukhnag streams are the major water sources for the wetland. The wetland is surrounded by a group of villages on its north, south, southwest and eastern sides. The wetland provides an excellent habitat to a variety of resident and nonresident birds and is very famous for the winter visiting waterfowl-ducks and geese.

Sample collection

The different parts of the study area were surveyed for the collection of dead waterfowl birds for parasitological investigation. During the study gastrointestinal tract of 18 dead migratory ducks and Geese were collected from various sites of the Hokersar wetland. The gastrointestinal tracts were separated anatomically, then each organ was opened separately and its contents and mucosa were washed in water to remove all parasites. The helminths collected were processed and preserved (70% alcohol) and were identified as per Yamaguti (1959) and Solusby (1982).

Figure 1. Study area, Hokersar wetland

Results and discussion

In the present study, a total of 18 dead winter migratory waterfowl ducks and geese were examined and collected from various sites in Hokersar wetland, out of which 10 were found positive for helminths. The overall prevalence of helminths was recorded as 55.55 per cent. The gastrointestinal helminths isolated were *Notocotylus attenutus* (16.66%), *Paryphostomum radiatum* (5.55%), *Capillaria anatis* (16.66%) and *Epomidostomum anattinum* (5.55%) and *Hymenolepis abortive* (11.11%) as shown in Table 1 and Fig. 2.

Table 1. Species-wise prevalence of gastrointestinal helminths in waterfowl-ducks and geese.

No.	Species	No. of Migratory Birds Examined	Total Positive	Prevalence
1	*Notocotylus attenutus*	18	3	16.66%
2	*Paryphostomum radiatum*	18	1	5.55%
3	*Capillaria anatis*	18	3	16.66%
4	*Epomidostomum anattinum*	18	1	5.55%
5	*Hymenolepis abortive*	18	2	11.11%
	Total	**18**	**10**	**55.55%**

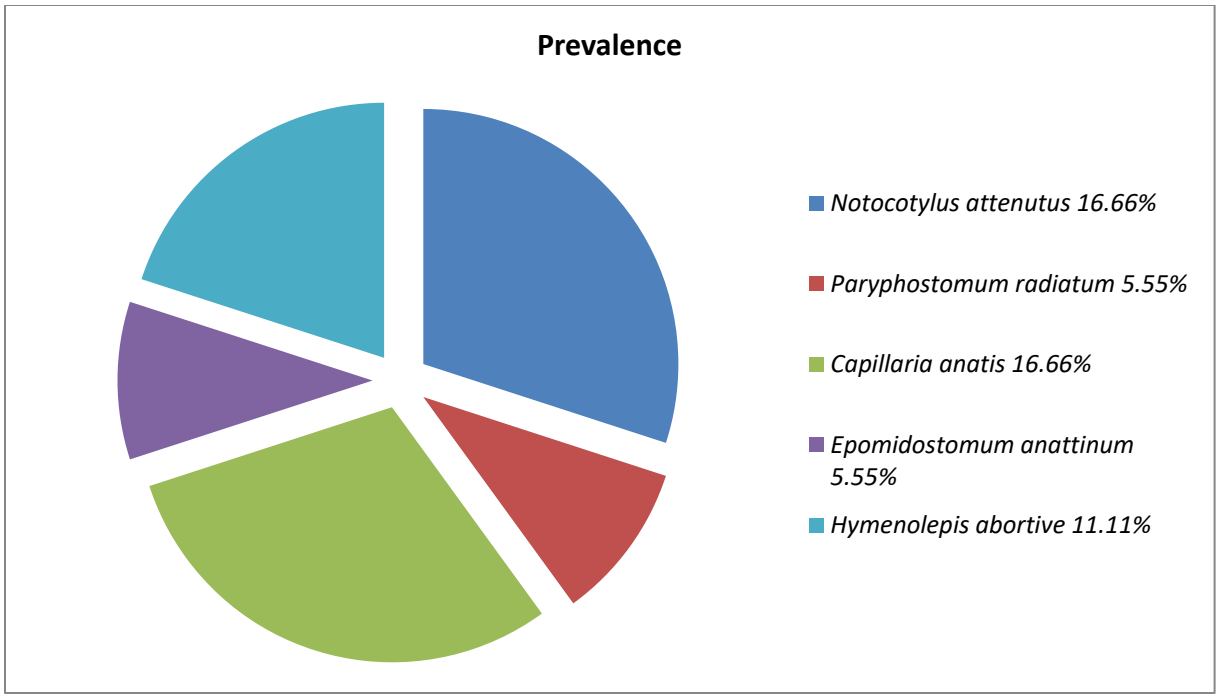

Figure 2 . Species-wise prevalence of gastrointestinal helminths in waterfowl ducks and geese

Out of 18 winter migratory waterfowl examined, 11 were males and 7 were females. It was found females have more parasite infections than males during the study as shown in Table 2. During the study host, the wise prevalence was also observed.

Table 2. Host-wise and sex-wise prevalence of Helminth parasites in migratory waterfowl-ducks and geese

S. No.	Wetland	No. of waterfowl examined	No. of Males	No. of Females	No. Positive/Prevalence percentage	Prevalence in Males	Prevalence in Females
1	Mallard Duck	7	4	3	4 (57.14%)	2 (50%)	2 (66.66%)
2	Gadwall	1	0	1	1 (100%)	0 (0%)	1(100%)
3	Common Teal	4	3	1	2 (50%)	1(33.33%)	1 (100%)
4	Northern Pintail	2	1	1	1 (50%)	1 (100%)	0 (0%)
5	Northern Shovelar	3	2	1	2 (66.66%)	1 (50%)	1 (100%)
6	Graylag Goose	1	1	0	0 (0%)	0 (0%)	0 (0%)
	Total	**18**	**11**	**7**	**10 (55.55%)**	**5 (45.45%)**	**5 (71.42%)**

Waterfowl can act as a main source of various types of parasites; they can pick up infections from their habitat, transmit and spread them in the surrounding environment, including drinking water supplies and domestic animals (Gunnarsson *et al*. 2012). Research carried out in the past has

suggested a very positive relationship between migration and parasite richness could stem from a weakening of the immune system during migration (Bibi *et al*. 2013), a greater aggregation of hosts (Krauss et al. 2010), or exposure to a wider range of habitats and parasite types.

The helminths isolated in the present study are in agreement with the previous findings of Fotedar *et al*. (1965), Tanveer and Chishti (2001) and Kharoo (2011). The present findings are also in concurrence with the helminthic infection reported in other parts of the world (Avery,1969; Crichton and Welch. 1972; Broderson *et. al*., 1977; Shah and Kocan 1980); Canaris *et al*., 1981; Dronen *et al*., 1994; Gicik and Arslan 2003; Garvon *et al*., 2011; Mahammad and Al-Moussawi 2011; Malgorzata Nowak *et al*., 2012; Graves and Fedynich, 2013; Youssefi *et. al*., 2014; R. Sokol *et. al*., 2016; Oo Ean *et al*., 2018; Thebo *et al*., 2019; Farook *et al*., 2020; Aguilar *et. al*, 2020).

The study further revealed that the sex of the waterfowl showed an association with the prevalence of the parasite. It was found that females were more infected than males. The influence of sex on the susceptibility of birds to infection could be attributed to genetic predisposition and the differential susceptibility owing to hormonal control (Blood and Radostitis, 2000). The difference in susceptibility to infection between sexes has been observed by various workers (Matur *et al* (2010); Youssefi *et al* (2014); Atsanda *et al* (2015). Youssefi *et al* (2014) reported a maximum percentage of helminth prevalence in females 71.79 in Green-winged Teal (*Anas crecca*) in North Iran.

The reports from other studies that there are significant differences in susceptibilities between various host birds, this study also found prominent differences in parasitic load between these winter migratory birds with high in gadwall followed by northern shoveler, mallard duck, common teal, northern pintail and graylag goose. Out of total waterfowl- ducks and geese 18 were examined 10 were positive for one or another type of infection. Our results are in accordance with a report by Shah and Kocan, (1980). Our studies have shown a higher prevalence than reported by Aguilar *et al*., (2020). Thus it seems that there is no clear-cut difference in gastrointestinal helminthiasis shared between various winter migratory waterfowl ducks and geese and it is the environmental factors and local climatic conditions which might be responsible for the difference in prevalence in these water birds.

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