Helminth parasite communities in anuran amphibians of Kalesar Wildlife Sanctuary (Haryana), India

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Abstract Helminth parasite fauna in anuran amphibia were investigated during the general faunistic surveys of Kalesar Wildlife Sanctuary, situated in Haryana state. Three species of amphibian hosts were found to harbour 12 genera of helminth parasites. The prevalence, intensity and abundance were studied. *Euphlyctis cyanophlyctis* harboured maximum parasite species followed by *Fejervarya limnocharis* and *Duttaphrynus melanostictus*. In *E. cyanophlyctis*, among nematode parasites, the genus *Camallanus* was most prevalent followed by *Cosmocerca* and *Cosmocercoides*, whereas, *Rhabdias* and *Aplectana* were the least prevalent genera. Among trematode parasites, *Ganeo* was the most prevalent genus and least was *Diplodiscus*. *Acanthocephalus* was recovered only once and no cestode infection was found. In *F. limnocharis*, the most prevalent nematode genus was *Oxysomatium*, followed by *Cosmocerca* and the only trematode recorded was *Ganeo*, whereas, cestode *Proteocephalus* was also recovered once. In *D. melanostictus*, only two nematode genera were recovered of which *Oxysomatium* was dominant followed by *Cosmocerca*. The helminth parasite community in anuran amphibia of Kalesar WLS comprised 52.9% of nematodes, 46.2% of trematodes, 0.58% cestodes and 0.29% acanthocephala.

Keywords Amphibia · Helminth · Kalesar Wildlife Sanctuary · Haryana

Introduction

Kalesar Wildlife Sanctuary (WLS) is situated in district Yamuna Nagar of Haryana state between 30°16' to 30°28' North latitude and between 77°20' to 77°37' East longitude. It was notified as WLS on 13th December 1996 and is spread over an area of 24431.65 acres in the lower reaches of Shivalik range (website: Haryana Forest Department). Although the area is rich in biodiversity, only three species of anuran amphibia were collected during the general faunistic surveys. The only study on the helminth parasite from KWLS is that of Rizvi and Bhutia (2010) reporting two species of the genus *Camallanus*. Although few reports are available on the helminth communities of amphibians from other states of India (Devi and Rao 1990; Kumari and Madhavi 1996; Tandon et al. 2001; Gupta et al. 2004; Chandra and Gupta 2007), no data is yet available from Haryana state. Therefore, the present study was conducted to investigate the helminth communities in anuran amphibians of Kalesar WLS.

Materials and methods

Study area

Kalesar WLS comprises plains to hills up to 700 m. Narrow valleys between the hills are locally called khols and these valleys house seasonal rivulets locally called soats. The sanctuary has number of water bodies, both natural and man-made, which provide wetland habitats. The amphibia were mainly found in the soats of khols. Four khols, one water body called Barasot and newly constructed water bodies in Kalesar National Park (KNP) were surveyed for the hosts (Table 1).

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Table 1 Host species examined for Helminth parasites in Kalesar WLS

Host species	Locality surveyed (no of host examined)					
	Kalesar National Park	Barasot	Nagal Patti khol	Kansli khol	Ambwala khol	Darpur khol
1. <i>Euphlyctis cyanophlyctis</i>	12	24	8	30	20	40
2. <i>Fejervarya limnocharis</i>	4	–	1	1	1	–
3. <i>Duttaphrynus melanostictus</i>	1	2	–	1	5	–

Table 2 Helminth parasites and amphibian hosts in Kalesar WLS

Parasite (genera)	<i>Euphlyctis cyanophlyctis</i>	<i>Fejervarya limnocharis</i>	<i>Duttaphrynus melanostictus</i>
Trematodes			
<i>Diplodiscus</i>	+	–	–
<i>Ganeo</i>	+	+	–
<i>Pluerogenoides</i>	+	–	–
Cestodes			
<i>Proteocephalus</i>	–	+	–
Nematodes			
<i>Aplectana</i>	+	–	–
<i>Camallanus</i>	+	–	–
<i>Cosmocerca</i>	+	+	+
<i>Cosmocercoides</i>	+	–	–
<i>Oswaldocruzia</i>	+	–	–
<i>Oxysomatium</i>	+	+	+
<i>Rhabdias</i>	+	–	–
Acanthocephala			
<i>Acanthocephalus</i>	+	–	–

Hosts collected/surveyed

Caution was taken to collect minimum of host samples keeping in view their low population. Total 150 amphibian hosts were collected from August 2007 to 2009. Only three species of anuran amphibian were found, namely, *Euphlyctis cyanophlyctis* (Schneider, 1799), *Fejervarya limnocharis* (Gravenhorst, 1829), and *Duttaphrynus melanostictus* (Schneider, 1799) (Table 2).

Collection of parasites and data analysis

Live frogs were brought to the laboratory, autopsied, and various organs examined for helminth parasites. Most of the parasites were collected from the gastrointestinal tract. The parasites collected were processed by standard methods of fixation and preservation. The data analysis was done following Tandon et al. (2001). Prevalence is the percentage of host individuals infected in a sample of host species examined. Intensity is the number of individuals of a particular species in each infected host and abundance is the mean number of individuals of a particular species per

host examined. All the amphibian hosts have been deposited in the National Zoological Collections of Zoological Survey of India, Dehradun.

Results

The anuran amphibian population in Kalesar WLS was found to be low and also the diversity was low with only three species of amphibian in the entire area. Altogether 150 anuran hosts belonging to two families, representing three genera with one species each were examined for helminth infection over a period of two years. Six localities were surveyed and hosts were collected keeping in view their population at a particular locality (Table 1). Out of 150 amphibian hosts, 17 were collected from KNP, comprising of all the three host species, and 133 were collected from different khols of KWLS. Among khols, amphibian population was highest at Darpur khol but comprised of only *E. cyanophlyctis*, whereas, maximum diversity with all three species of amphibian hosts were present at Ambwala khol and Kansli khol. However, Nagal Patti khol had low population of amphibia.

Euphlyctis cyanophlyctis was found in all the localities surveyed with a stable population at Kansli, Darpur and Barasot, and fluctuating population at Ambwala khol. Its population was found to be building up in KNP. As *E. cyanophlyctis* was found throughout the year, they were found to harbour maximum helminth infection comprising 11 out of 12 genera recorded (Table 2). No cestode infection was found in *E. cyanophlyctis*. Among nematode parasites, genus *Camallanus* was found to be most prevalent, followed by *Cosmocerca*, *Cosmocercoides* and *Oxysomatium*, whereas, *Oswaldocruzia*, *Aplectana* and *Rhabdias* were less prevalent. The most prevalent trematode was *Ganeo* followed by *Pleurogenoides* and least prevalent was *Diplodiscus*. Among Acanthocephala, only one genus *Acanthocephalus* was found encysted in the intestine (Table 3).

Fejervarya limnocharis was found only four times during two years survey and in a very low population, therefore only seven host specimens were collected for helminth investigations (Table 1). Helminth parasitism was found to be low comprising one genus of trematode, *Ganeo*, one of cestode, *Proteocephalus* and two genera of

Table 3 Prevalence, intensity and abundance of helminth parasites in amphibia of Kalesar WLS

Host (no examined)	Parasite (no. of hosts infected)	Prevalence %	Total no of parasites collected	Intensity	Abundance
<i>Euphlyctis cyanophlyctis</i> (134)	<i>Diplodiscus</i> (12)	8.9	16	1–2	0.11
	<i>Ganeo</i> (51)	38	176	4–10	1.31
	<i>Pleurogenoides</i> (24)	17.9	120	2–6	0.89
	<i>Aplectana</i> (6)	4.4	12	1–3	0.08
	<i>Camallanus</i> (48)	35.8	80	1–4	0.59
	<i>Cosmocerca</i> (30)	22.3	72	2–3	0.53
	<i>Cosmocercoides</i> (15)	11.1	40	1–3	0.29
	<i>Oswaldocruzia</i> (9)	6.7	24	1–4	0.17
	<i>Oxysomatium</i> (12)	8.9	80	1–3	0.59
	<i>Rhabdias</i> (6)	4.4	12	1–3	0.08
	<i>Acanthocephalus</i> (1)	0.74	2	2	0.01
<i>Fejervarya limnocharis</i> (7)	<i>Ganeo</i> (1)	14.2	6	6	0.85
	<i>Proteocephalus</i> (1)	14.2	4	4	0.57
	<i>Cosmocerca</i> (1)	14.2	4	4	0.57
	<i>Oxysomatium</i> (2)	28.5	10	2–8	1.42
<i>Duttaphrynus melanostictus</i> (9)	<i>Cosmocerca</i> (2)	22.2	8	2–6	0.88
	<i>Oxysomatium</i> (3)	33.3	22	2–10	2.44

nematodes, *Cosmocerca* and *Oxysomatium*. The most prevalent helminth was *Oxysomatium* (Table 3).

Duttaphrynus melanostictus was found in four localities and in low frequency, however, this may be because the surveys were conducted during daytime and these amphibians are nocturnal. Helminth parasitism was found to be low with only two genera of nematodes. *Oxysomatium* was more prevalent than *Cosmocerca* (Table 3).

As a whole, helminth parasite community in anuran amphibia of Kalesar WLS comprised 52.9% of nematodes, 46.2% of trematodes, 0.58% cestodes and 0.29% acanthocephala (Fig. 1).

Fig. 1 Helminth parasite community in amphibia of Kalesar WLS

Discussion

The only study on the helminth parasites in anuran amphibia from Kalesar WLS is that of Rizvi and Bhutia (2010) reporting two species of the genus *Camallanus*, therefore all the 11 genera reported in this study forms first report from Kalesar WLS. Only three species of amphibian hosts were found and among these, *E. cyanophlyctis* was most prevalent host with maximum population and harboured maximum helminth parasites. This may be because it is an aquatic species and has an opportunistic, unselective feeding behaviour, which favours more parasitic infection (Tandon et al. 2001). Further, the host collected were more females, as they are larger in size and males being smaller escaped during collection. Since females are larger, they feed more and acquire more parasites, which is in agreement with the findings of Muzzal (1991) on Newts. *Fejervarya limnocharis* hosts were recorded in low population and harboured low parasitic infection with only four genera, whereas, *Duttaphrynus melanostictus* being ground dwelling and nocturnal were found to harbour only two nematode genera.

Though the present study gives an account on the distribution of amphibian and its helminth parasites, such studies outside the sanctuary would provide more information on the host-parasite relationships.

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