



International Journal of Fisheries and Aquatic Studies

E-ISSN: 2347-5129

P-ISSN: 2394-0506

(ICV-Poland) Impact Value: 5.62

(GIF) Impact Factor: 0.549

IJFAS 2018; 6(2): 551-555

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www.fisheriesjournal.com

Received: 15-01-2018

Accepted: 16-02-2018

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Occurrence of isopod parasite on *Alepes kleinii* (Bloch, 1793) from Mumbai and Goa coast of India

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Abstract

Parasitological examination, on *Alepes kleinii* (Bloch 1793) (family: Carangidae) from Mumbai Coast and Goa Coast, India was carried out on 182 specimens (117 from Mumbai Coast and 65 from Goa Coast), collected between August 2015 to May 2016. During examination 20 specimens were found to be infested with isopod *Norileca indica* (Isopod: Cymothoidae) from Mumbai Coast and 15 specimens from Goa Coast; mostly attached to gills. Others were located in the mouth cavity where the tongue itself was replaced by the parasite in most cases. The size of parasite was varied from 14 to 20.1 mm long and 5.8 to 8 mm wide at Mumbai Coast and 14.6 to 17.6 mm long and 6.1 to 6.95 mm wide at Goa Coast, whereas the size of fish varied from 84.92-174.36 mm TL at Mumbai Coast and 85.12-148.12 mm TL at Goa Coast. Prevalence of infection was observed to 23.08% at Mumbai Coast while, 16.81% at Goa Coast. The lowest percentage of infection in *A. kleinii* at Mumbai Coast was 10% and at Goa Coast it was 9.09%. The overall prevalence, mean intensity and abundance of infestation with isopod were found to be 16.81%, 1.183, 0.271 at Mumbai Coast and 23.08%, 1.33, 0.308 on Goa Coast. The highest prevalence of parasite infection was observed in the month of October in Mumbai Coast and in March on the Goa Coast.

Keywords: *Alepes kleinii*, isopod parasite, *Norelica Indica*, cymothoidae, carangidae

Introduction

The parasitic diseases affect fish host and cause high mortalities^[1]. These fish parasites can cause numerous negative effects to their specific hosts like pathological, mechanical, chemical and physiological changes^[2]. More than 3000 parasitic crustaceans are recorded on fishes^[3]. Parasites represent an important considerable source of economic losses^[4]. In India, about 56 species of cymothoid isopods have been reported, most of which are abundant on East Coast and very few occurred on West Coast^[5]. However, parasites populations are useful indicators of environmental stress, food web structure and biodiversity; they are the natural part of all ecosystems^[6]. According to Brusca^[7] parasites of family Cymothoidae are taxonomically least understood within the sub-order Flabellifera. Trilles^[5] distinguishes ecological and neogenic specificity of family Cymothoidae in the Mediterranean Sea, and significantly showed that species of this family are specific in their choice of host. Morton^[8] reported Cymothoid - host interaction as a genus specific aspect of study. Brusca^[7] redescribed and redefined the externally attaching and gill attaching cymothoids from Australian waters. Panikkar and Aiyar^[9] recorded Cymothoids on *Etroplus maculatus*, *E. suratensis* and *Glossogobius giuris* from Adyar estuary. There are very few records available on isopod infestation in Carangidae family, especially from India hence the present study was undertaken to investigate the prevalence, mean intensity and abundance of the isopod parasite, *Norileca indica* infestation on Carangid fish, *Alepes kleinii* (Bloch, 1793) in relation to months, host sex and host size, along Mumbai and Goa coasts of India.

Materials and Methods

A total no of 182 specimens of *A. kleinii* were collected on monthly basis during August 2015 to May 2016 (except June and July due to fishing ban). The collected samples were brought to the laboratory in an ice box. Total length and weight were measured using a scale up to 1mm and electronic balance up to 1gm accuracy, respectively. Sex was determined by dissecting them. Each specimen was examined carefully under a magnoscope for parasites (mouth and er

branchial cavity). The site of infection, number of isopods infested to the host were recorded. Images of host fish and parasites were recorded using Kodak digital camera (M555 12 MP). The isopods were carefully removed using forceps and then body size measurements like body length, body width were taken using Vernier caliper. The collected parasites were preserved in 70% alcohol. The parasites were identified using key given by Bruce (1990) [10].

Data analysis

The ecological terminologies like prevalence, mean intensity, and abundance were referred from Margolis *et al.* (1982) [11], Esch *et al.* (1975) [12] and Bush *et al.* (1997) [13]. Prevalence is the number of individuals of a host species infected with a particular parasite species divided by number of host examined. Mean intensity is the mean of individuals of a particular parasite species per infected host in a sample. Abundance or relative density is the total number of individuals of a particular parasite species in a sample divided by total number of the host species. The effect of month, host sex and host size on the prevalence, mean intensity and abundance of *N. indica* was estimated by a general statistical analysis using Chi-square test. The graphs were obtained using Microsoft Excel spread sheet Version- 2010.

Results

A total of 117 fish specimens from Mumbai Coast and 65 specimens from Goa Coast were examined for study of parasitic infestation. Among those, which 33 fishes and 15 fishes were found to be infested by Cymothoid isopod parasite, *N. indica*, from Mumbai and Goa, respectively. The infestation was observed in their branchial and mouth cavities. The mean size of parasites measured was 17.15mm total length (mean) and 6.78mm width, at Mumbai Coast while at Goa Coast, it was 17.60mm long in TL and 6.95mm in width. Of the 117 host fishes examined at Mumbai Coast, 68 specimens were females and 45 were males. (Indeterminates were excluded from sex wise analysis). Isopod infestation was recorded in 20 fishes corresponding to overall prevalence, mean intensity and abundance of 16.811, 1.183, and 0.271, respectively (Table-1). In females the values were 21.98%, 1.23, 0.36 and in males 14%, 0.55, 0.19 respectively. Among 65 fish studied from Goa Coast, 35 were females and 29 were males. Isopod infestation was recorded in 10 specimens where, overall prevalence, mean intensity and abundance was 23.08%, 1.33, 0.308, respectively (Table-1); in female fishes it was 46.23%, 1.212, 0.581 and 16.5%, 0.3, 0.165 in males, respectively. The effect of month, host sex and host size on prevalence was analyzed by applying Chi-square test. Monthly variation in prevalence was significant showing highest infestation in the month of October (54.5%) in Mumbai samples and Goa samples in March (100%) followed by October (72.73%). There was no infestation in January and February in specimens of Mumbai Coast and in December and January at Goa Coast. Mean intensity was high in November at Mumbai Coast, and in September, November, December, March and April at Goa coast. Abundance was high in October (0.727) followed by March (0.667) at Mumbai Coast and it was high in October (1.00) followed by March (0.909) at Goa Coast. In relation to size of the host fish, the highest prevalence (31.58%) was observed in 141-150mm length range at Mumbai Coast and

131-140mm length range at Goa Coast (33.33%). Minimum prevalence and abundance were observed in younger specimens (<121mm) while maximum prevalence and abundance were observed in maturing stages (121-150mm) and there was no infestation in adult specimens (>150mm) at both the coasts.



Fig 1: A. Attached to branchial cavity of host (*A. kleinii*)



Fig 1B: Ovigerous female



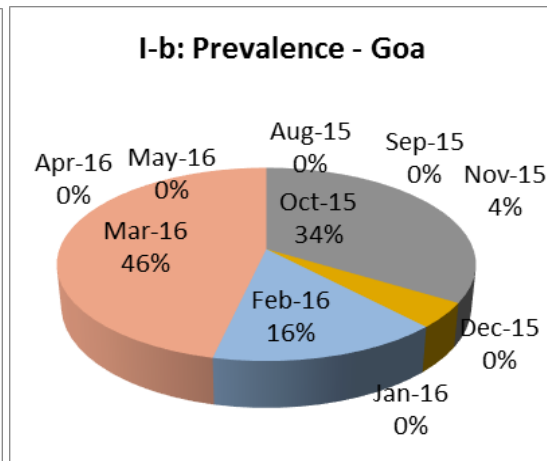
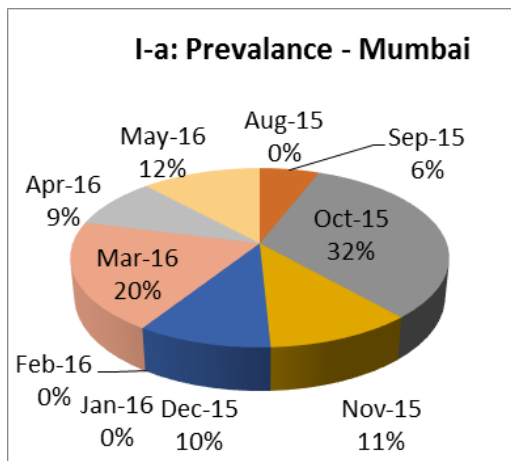
Fig 1C: Multiple isopods in one host (*A. kleinii*)

Table 1: The occurrence of *N. indica* on *A. kleinii* in relation to Month, host sex, and size.

	Prevalence (%)		Mean Intensity		Abundance	
Overall Mumbai	16.811		1.183		0.271	
Overall Goa	23.08		1.33		0.308	
Month wise	Mumbai	Goa	Mumbai	Goa	Mumbai	Goa
Aug-15	0.000	0.000	0.000	0.000	0.000	0.000
Sep-15	10.000	0.000	2.000	0.000	0.200	0.000
Oct-15	54.545	72.730	1.300	1.250	0.727	0.909
Nov-15	18.182	9.090	1.500	3.000	0.273	0.273
Dec-15	16.667	0.000	2.000	0.000	0.333	0.000
Jan-16	0.000	0.000	0.000	0.000	0.000	0.000
Feb-16	0.000	33.333	0.000	1.330	0.000	0.444
Mar-16	33.333	100.00	2.000	1.000	0.667	1.000
Apr-16	15.385	0.000	2.000	0.000	0.308	0.000
May-16	20.000	0.000	1.000	0.000	0.200	0.000
Host sex						
Mumbai- Female	21.98		1.23		0.36	
Male	14		0.55		0.193	
Goa- Female	46.23		1.212		0.581	
Male	16.5		0.3		0.165	
Length class	Mumbai	Goa	Mumbai	Goa	Mumbai	Goa
81-90	0.000	0.000	0.000	0.000	0.000	0.000
91-100	14.286	16.667	0.300	1.667	0.286	0.278
101-110	0.000	0.000	0.000	0.000	0.000	0.000
111-120	0.000	0.000	0.000	0.000	0.000	0.000
121-130	25.000	19.048	0.750	1.250	0.417	0.238
131-140	10.000	33.333	0.150	1.000	0.150	0.333
141-150	31.579	30.000	0.450	1.333	0.474	0.400
151-160	0.000	0.000	0.000	0.000	0.000	0.000
161-170	0.000	0.000	0.000	0.000	0.000	0.000
171-180	0.000	0.000	0.000	0.000	0.000	0.000

Table 2: Month wise prevalence, mean intensity and abundance in relation to host sex.

	Prevalence (%)				Mean Intensity				Abundance			
	Mumbai		Goa		Mumbai		Goa		Mumbai		Goa	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Aug-15	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sep-15	20.000	0.000	0.00	0.00	2.000	0.000	0.000	0.000	0.400	0.000	0.000	0.000
Oct-15	80.000	40.000	100.00	40.00	1.250	1.500	1.167	1.000	1.000	0.600	1.167	0.400
Nov-15	14.286	33.333	14.29	0.00	2.000	1.000	3.000	0.000	0.286	0.333	0.429	0.000
Dec-15	33.333	0.000	0.00	0.00	2.000	0.000	0.000	0.000	0.667	0.000	0.000	0.000
Jan-16	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb-16	0.000	0.000	40.00	25.00	0.000	0.000	1.500	1.000	0.000	0.000	0.600	0.250
Mar-16	33.333	33.333	100.00	100.00	2.000	2.000	1.000	1.000	0.667	0.667	1.000	1.000
Apr-16	22.222	0.000	0.00	0.00	2.000	0.000	0.000	0.000	0.444	0.000	0.000	0.000
May-16	16.667	33.333	0.00	0.00	1.000	1.000	0.000	0.000	0.167	0.333	0.000	0.000



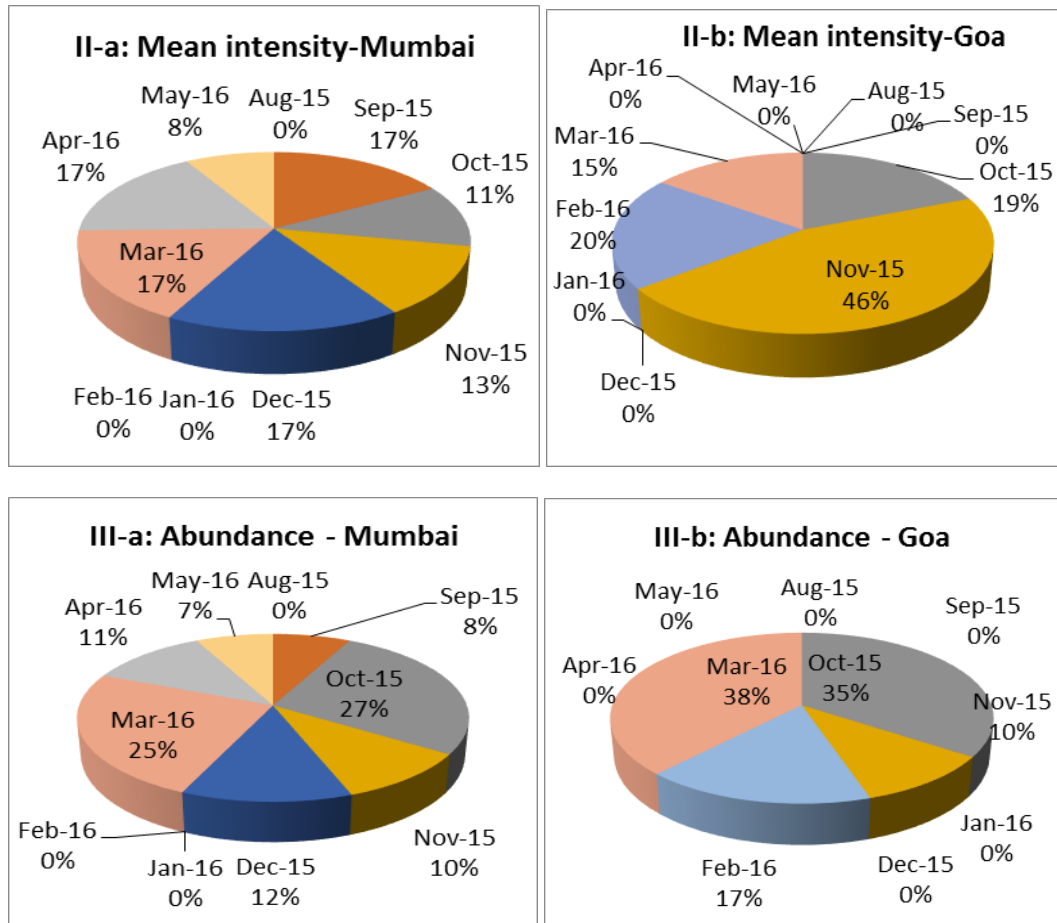


Fig 2: Prevalence, mean intensity and abundance of parasites in Mumbai (I-a, II-a, III-a) and Goa (I-b, II-b, III-b) samples

Discussion

Norelica indica (Milne Edwards, 1840) is a hermaphroditic cymothoid isopod; mainly infesting the gill chamber of the pelagic scads [14]. Crustacean parasites absorb their nourishment directly from host. They are usually large, fierce and cause considerable damage to the host species [15]. These isopods are specialized to attach pelagic, fast swimming hosts. The adult females of parasite carry the developing embryos in the marsupium which protect the young ones and keep the embryos aerated with its oostegites (Fig-1B), the eggs hatch in the marsupium and after undergoing several moults attain manca stage which is free swimming. Manca seek an appropriate host and form a pre-adult stage [16]. Nagasava and Petchsupa [17] (2009) reported very high rate of prevalence (85%) of *N. indica* on the host species from Pattani Bay of Southern Thailand. In the present study, significantly higher prevalence was observed during post monsoon months, October at Mumbai coast and March at Goa coast while no infection occurred in January. High temperature of water during October and March might be one of the reasons of parasitic infestation. Mean intensity and abundance values are quite higher in female hosts at both the coasts. Parasite host interaction, in between isopod and marine fishes, has shown high parasite prevalence in relation with a high value of abundance [18]. Nair [19] (2000) reported higher prevalence and intensity of parasite infestation in female hosts than that in male hosts. Similar observations (Table-2) were recorded in the present study. According to Thomas [20] (1964) higher rate of infestation in females is also the lowering of estrogen levels in female fishes during breeding season which makes them more susceptible to parasitic infections. The findings of the present study also support the above statement.

Acknowledgement

Authors are thankful to Head of the Department, Zoology, K. J. Somaiya College of Science and Commerce, Vidyavihar, Mumbai-400077, and Director ICAR-CIFE, Panch Marg, Yari Road, Mumbai-400061 and for providing laboratory and library facility for the present research work.

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