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Infestation of Copepod Parasites in the Food Fishes of Vellar Estuary, Southeast Coast of India

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ABSTRACT: The crustacean parasites are common on fish hosts in coastal, marine and brackish waters. These parasites are belongs to three major groups of crustacea contain fish parasites; such as Isopoda, Branchiura and Copepoda. During an observation, ten different copepod parasites were collected from five different food fishes. This is the first report on the identification of copepod parasites from the Vellar estuary, south eastcoast of India. Five different estuarine food fish species (*Mugil cephalus, Etroplus suratenesis, Scatophagus argus, Lates calcarifer, Epinephelus bleeker*) were examined for parasitic copepod infestation. The maximum copepoda parasite infestation was noticed in *M. cephalus* and *L. calcarifer* and minimum infestation rate was noticed in *E. suratenesis* and *E. bleekeri*. Considerable variation in the respiratory area was observed owing to the attachment of parasites in the infected fishes. The infested fish had extremely pale gills, indicating the gill rakers were seriously lost, apical damage and out off gill lamellae. It was concluded that in aquaculture, some parasites are able to reproduce rapidly and heavily infect a large proportion of farmed fish which may lead to diseases with significant economic consequences.

Key words: Infestation · Copepod parasites · Estuarine fishes · Pale gills · Anemia

INTRODUCTION

Copepods are common parasites of marine fishes which have been studied extensively in coastal and neritic waters, where as they have become pests of fish species of commercial importance. However, little is known of the ecology of parasitic copepods of fishes in oceanic waters [1]. The crustaceans parasites are common on fish hosts in coastal, marine and brackish waters. Three major groups of Crustacea contain fish parasites; Isopoda, Branchiura and Copepoda [2-6] are common in fishes of coastal, marine and brackish waters. The Caligidae of the genus *Caligus* contains the highest number of species known to parasitize fish [7]. Six species of copepods of the genus parasitic was reported on marine fishes from Taiwan ([8]. The parasitic copepods of *Sarcotretes* spp. were identified from food fish samples collected at Crozet Islands in the southern Indian Ocean [9-11]. Among the parasites, copepod family is commonly found on fishes cultured in brackish and marine waters. They cause disease problems in both Pacific and Atlantic fish culture [12-14] and with economic losses due to sea lice in salmon culture, estimated to be greater than 100 million US$/year [7]. Previously are not carried out in Vellar estuarine waters. The present study was carried out to report the occurrence of copepod parasites from the estuarine food fishes. This is the first record of copepod parasites from the Vellar estuary southeast coast of India.

MATERIAL AND METHODS

During a routine observation of the food fishes fishery in the Vellar estuary (11° 29' N; 79° 46' E) an interesting incidence of parasitisation in some several fishes were observed. Fishes were thoroughly checked for parasitic infection in the body surface, fins, head, gill filaments, oral cavities and other tissues also examined. Each fish was examined microscopically for the presence of parasitic crustaceans [15-17]. The collection and preservation of parasites was carriedout. Methodology for crustacean parasites followed [18]. The prevalence was calculated as the number of infested fish divided by the number of examined fish x 100%.

Respiratory Surface Area: The influence of infestation of respiratory surface area of the gill arch of infested and uninfected fish were carefully dissected out and blotted to remove the moisture. The imprint drawing of each gill

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Table1:Infestation and estimated damage by fishes gill raker in Copepoda parasites

	Gill arch (%)				
Name of Species	I-Gill	II-Gill	III-Gill	IV-Gill	Total
Mugil cephalus	40	35	45	30	150
Etroplus suratenesis	45	35	40	30	150
Scatophagus argus	45	30	40	35	150
Lates calcarifer	45	30	35	20	140
Epinephelus bleekeri	35	20	25	15	95

arch on millimeter graph used to calculate the surface area of the gill arch. The surface area of each tracing was determined by counting the number of small squares and the total area was obtained. The value was taken and doubled to consider the total functioning of the gill arch. The total surface area of the gill arch of both infected and uninfected fish was compared and the in area was considered as reduction of respiratory area due to infestation.

Gill Rack Count : The average gill rack count of the Ist, IInd and IIIrd gill arch of infested fish taken (Table 1). The data collected were tabulated and variation in the gill raker count as a function of infestation was recounted.

RESULTS

Infestation of Estuarine Fishes : A total of 160 fishes were collected and examined for parasitic infestation it includes five different species. Among the examined fishes 28 fishes were infected from that 655 total number of parasites were collected (Fig 1). The percentage of infection of copepod parasites was calculated (Table 2).

The occurrence of copepod infestation in all the infected fishes was 17.5%. The occurrence of *Caligus phihsoni* and *Lernanthropus kroyeri* was 20%, *Caligus laticaudus Shiino, Caligus absens* and *Lernaeopoda galei* was 15%, *Caligus rotundigenitalis* was 10%, *caligus pelagicus* and *Caligus epidemicus* was 5%. The maximum copepoda parasite infestation was noticed in *Mugil cephalus* and *Lates calcarifer* and minimum value was recorded in *Etroplus suratenesis* and *Epinephelus bleekeri* (Table 3).

Respiratory Surface : Variation in the respiratory surface area of fish owing to the infestion of copepoda parasites (*C. phihsoni, C. laticaudus shiino, C. rotundigenitalis, C. absens, C. pelagicus, C. epidemicus, Lernaeopoda galei, Lernanthropoda kroyeri)* was studied. Detailed study of respiratory surface area due to the infestation of copepods in *M. cephalus* was carried out. The maximum reduction in respiratory surface area was noticed in the first gill arch and minimum in the third gill arch. Thus,considerable variation in the respiratory area was observed owing to the attachment of parasites in the infected fishes.

Table 2: The percentage of infection of copepod parasites in food fishes

Host	Parasites	Site of attachment	Percentage of infection (%)
Mugil cephalus	*Caligus phihsoni*	Gill, body surface	20
	Caligus laticaudus Shiino	Gill, body surface	15
	Caligus rotundigenitalis	Gill, body surface	10
Etroplus suratenesis	*Caligus absens*	Gill	15
	Callgus pelagicus	Gill, body surface	5
Scatophagus argus	*Lernaeopoda galei*	Gill	15
Lates calcarifer	*Lernanthropus kroyeri*	Gill	20
Epinephelus bleekeri	*Caligus epidemicus*	Gill, body surface	5

Table 3: Occurrences and average number of Copepoda parasite in food fishes

Name of host	No. of examined fish	No. of infected fish	No. of parasites (%)
Mugil cephalus	40	8	20
Etroplus suratenesis	35	6	17
Scatophagus argus	30	5	16
Lates calcarifer	30	5	16
Epinephelus bleekeri	25	4	16
Total	160	28	17.5

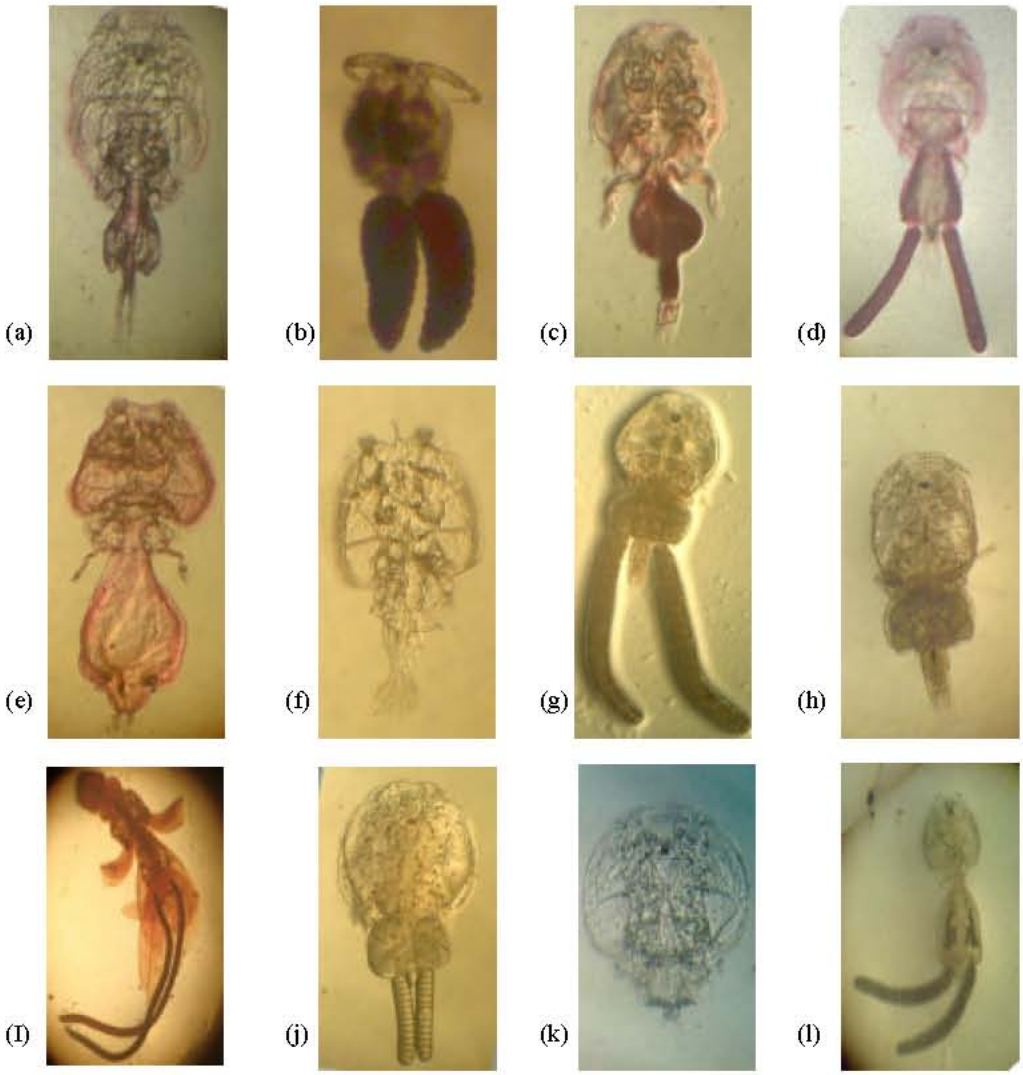

Fig. 1: Caligid copepod species obtained from Vellar Estuary.

a. *Caligus pelagicus* ?
b. *Lernaeopoda galei* (?)
c. *Caligus rotundigenitalis* ?
d. *Caligus phihsoni* (?)
e. *Caligus nengai Rangnekar* ?
f. *Caligus laticaudus Shiino* ?
g. *Caligus laticaudus Shiino* (?)
h. *Caligus elongatus Nordmann* ?
i. *Lernanthropus kroyeri* (?)
j. *Caligus epidemicus* (?)
k. *Caligus epidemicus* ?
l. *Caligus absens* (?)

The infested fish had extremely pale gills, indicating the gill rakers were seriously lost, apical damage and out off gill lamellae were deployed. Some secondary gill lamellae were fused or thickened. Gill lamellae of the first and second arches gill were found to be eroded due to parasites and the damage was found to be concentrated towards posterior position. Several damages would suggest that the host of fishes, Gill damage was major effect when a large section of filaments was destroyed and gill arch broken.

DISCUSSION

Although Copepod parasites has been recorded from various localities throughout the world [19-26]. The copepod families (Bomolochidae, Caligidae, ernanthropidae, Lernaeopodidae and Pennellidae) are mainly or exclusively known as marine fish parasites [24,27]. In the present study, *M. cephalus*, *E. suratenesis*, *S. argus*, *L. calcarifer* and E. *bleekeri* had a species-rich copepod fauna. Ten parasitic copepods were identified from five species of estuarine food fishes. Most of the

parasitic copepods are known to have high host specificity [27]. For example, *L. polynemi* and *P. hirsutus* occur exclusively on polynemid fish [28-30]. Others such as some *Caligus spp.* are known to have low hosts specificity [31]. For example, *C. elongatus*) has been recorded from more than 100 host species, both teleosts and even elasmobranchs, belonging to 47 families [32]. The findings of the present study also support the earlier works. In the present study, result also shows that *Caligus* sp. have the character of broad host specificity, it infect five different estuarine fish species but the host specificity of Lernaepoda and Larnanthropus was very narrow both the species are infest only the host fishes of *S. argus* and *L. calcarifer*. Host parasite relation is the outcome of the interaction of three factors: the host, the parasite and the environment [33,34].

The macro environment of the parasite or the environment of the host may profoundly influence the nature of parasitic infestation [35]. It was rightly pointed out by Rao *et al* [36]. In the present infestation level of any parasite depended not only on the change in the ecological stability of the host, but also on external factor such as temperature, rain fall, salinity etc. This is all the more true in the case of poikilothermic host, who maintain an intimate association with their external milieu. Several variables influence the kind and abundance of parasites in fishes. This includes 'host factors' such as the size, sex, maturation, food habit and the immune system.

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