World Journal of Fish and Marine Sciences 8 (1): 47-53, 2016
ISSN 2078-4589

DOI: 10.5829/idosi.wjfms.2016.8.1.10245

Studies on Crustacean Parasites from Commercial Marine Fish Along the Andaman Coast in Comparison with Malabar Coast of Kerala of Indian EEZ

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Abstract: The present paper is a comparative study on parasitic infection of commercially important marine fishes from Andaman and Malabar Coast. The host, mode of attachment on the host and location specificity of external parasites also discussed. Parasites are the organisms that adversely affect the growth and normal physiology of the exploited major fishery resources and lead to economic loss by reducing the marketability of the same. In this regard two landing centres viz. Junglighat, Andaman Coast and Chombala, Malabar Coast were surveyed to conduct study on crustacean parasites of commercial marine fishes. A total of 89 marine fish species were collected from both landing centres and a total of 53 parasites belonging to 13 species were identified. A total of 44 parasites from 60 fishes were recorded from Junglighat while only 9 parasites from 29 fishes could be recorded from Chombala fish landing centre. The number of infected specimens and number of parasites recovered more in *Rastrelliger kanagurta* and *Atule mate* in Chombala and Junglighat respectively. Most of the Copepod parasites belong to Caligidae and Isopods in Cymothoidae families. Most of infected fishes belongs to family Scombridae at Chombala and Carangidae at Junglighat. *Norileca indica* (56%) from *R. kanagurta* in Chombala and *Caligus robustus* (46%) from *Atule mate,* Junglighat were more frequent. *Caligus kanagurta* was the only common parasite infected *R. kanagurta* from both Malabar and Andaman coast. Prevalence of parasites was more in gill filament (40%) in infected fish species. The sites of attachment of parasites not observed from the body surface and inside the fins during the present study period. The attachment was achieved using their hook and needle like appendages on the surface of the host.

Key words: Isopods · Copepods · Junglighat · Chombala · Appendages

INTRODUCTION

Parasite is an organism lives in or on another organism (its host) and benefits by deriving nutrients at the others expense. In case of fish both ecto and endo parasites are reported regularly. Endo parasites are present inside the body and ectoparasites are seen as attached outside the body. Among marine fish parasites, 25% are Crustaceans [1]. They are found on nasal cavity, gills, inner surface of operculum, fins, outer body surface, buccal cavity [2]. The gill-inhabiting parasites are comparatively small and their colour matches that of the gill filaments and all have slender cylindrical body demarcated into cephalothorax and an unsegmented trunk. Parasites infect most of the fish families. Parasites affect the growth and normal function of fishes and lead to economic loss and the marketability of the same will reduced drastically. Studies on the marine fish parasites from Indian waters are very scanty except some of the limited studies from Kerala and Tamilnadu coasts [3-13].

Parasitic infections affect commercially important marine fishes that lead to economical loss to the nation in form of domestic market as well as foreign exchange. Proper conservational measures are required to keep healthy and disease free from parasitic infestation.

Different types of parasites are already reported from various invertebrate groups including Protozoans, Flagellates, Nematodes, Trematodes, Cestodes, Crustaceans etc. [14, 15]. The three major order of parasitic crustaceans are Copepoda, Isopoda and

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Branchiura. Copepods parasites are surface living or in shallow water fishes and are comparatively few in mid water and very rare in deep sea fishes. Their body consists of head, thorax and abdomen, head forms cephalothorax by often fusing with one or more thoracic segment [16]. The size of the host appears to dictate the size of parasite that is found on it. Parasitic infestation is a cosmopolitan phenomenon in almost all the habitats, especially among aquatic biota [4]. A recent studies from Parangipettai coast showed 6 isopod species from three genera found in four species of fishes [12] also similar study from same area resulted 6 isopod species found from five different food fish species [13] and 13 species of parasites are reported from deep sea shark from Andaman continental shelf in the Exclusive Economic Zone (EEZ) within Thailand's territorial waters [17].

MATERIALS AND METHODS

The present study was undertaken in Chombala and Junglighat fish landings centre along the Indian EEZ. Freshly landed fish collected from the fish landings centre and brought to the laboratory. Various parts of the fish like body surface under the fin, inner wall of the operculum, the branchial cavity, buccal cavity and gill filaments examined for the parasites. The attachment of the parasites on the fish body observed using a hand lens to find out the mode of attachment. Parasites were removed using forceps giving utmost care not to break any of the appendages while removing. Collected parasites transferred to 70% ethanol for identification and further studies. The photographs were taken using SLR (Nikon D3100) and Digital camera (Sony 14.3 X MP zoom). The images for parasite taken using inverted microscope (ZEISS 10X PLAIN). The identification of the parasite by using dissecting microscope [16, 18]. The host fish species identified using standard identification sheets [19, 20].

RESULTS

Percentage Composition of Parasites from Malabar and Andaman Coast: A total of 53 crustacean parasites belongs to 39 Copepods and 14 Isopods of 13 different species recorded during present study. A maximum of 36 copepods, 8 Isopod from Junglighat and 3 Copepods 6 Isopods observed from Chombala. 14 isopods parasites from four genera namely *Norileca, Joryma, Cymothoa, Catoessa* and remaining copepods parasitic from three genera *Caligus, Bomolochus, Lernanthropos* respectively were identified (Figure 1).

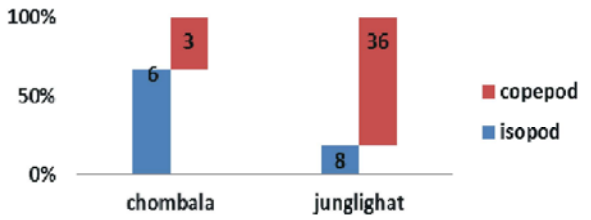

Fig. 1: Percentage composition of parasites in two stations

Infected and Recovered Ratio of Fishes: The common edible fishes belongs to the families Scombridae, Leiognathidae, Carangidae, Clupeidae and Nemipteridae observed for parasitic infection but no parasite could be observed from Leiognathidae and Nemipteridae at Chombala fish landing centre. A maximum of infected fishes examined from the family Scombridae *Rastrelliger kanagurta* (25%). Similarly, the highest percentage of parasites also recovered from *R. kanagurta* (30%), but prevalence and percentage of parasite infected maximum in *Alepes bjeddaba* (50%) and (20%) in *Illisha melanostoma* and *R. kanagurta* respectively infected with two different species of parasite.

The common edible fishes belongs to the families include Carangidae, Scombridae, Mullidae, Leiognathidae and Hemiramphidae infected except Nemipteridae and Clupeidae. Two species of Carangids and Scombrids observed as infected with parasite. Maximum observed infected species was *Atule mate* (33.3%) and parasite recovered (93.3%). *Caranx ignobdilis* has (40%) prevalence and (100%) parasites recovered. Prevalence and infected percentage of different species are presented *R. kanagurta* (16.67%) and *Upeneus vittatus* (50%) both (16.67%), *Leiognathus eqqulus* (28.57%) and (57.14%), *Hyporamphus phar* both 66.67%, *Tunnus albicares* both 33.33% respectively (Figures 2 and 3).

Composition of Parasites from Chombala and Junglighat Fish Landing Centres: A maximum of (56%) *Norileca indica* Isopod Family Cymothoidae abundant followed by the other parasites (11%) of equal dominance from Chombala (Figure 4). *N. indica* can be easily distinguished by the larger size, twisted body shape and straight sided pleon.

Mostly family Carangidae infected and more number of parasites recovered from *A. mate* of same family. 22 Copepods and 6 Isopods from 2 different species, each were recovered from these fish. It could be observed from Junglighat a maximum of *Caligus robustus* (46%) was found to be the major followed by other species *Caligus sp*. 16%. An isopod *Cymothoa sp.* and copepod *Caligus hamruri* was the second most species infected (Figure 5).

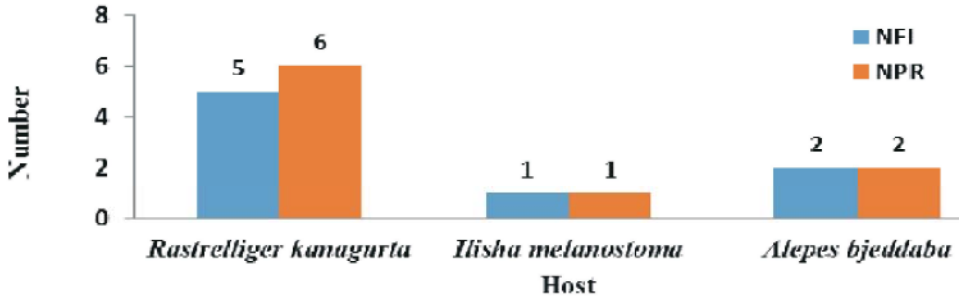

Fig. 2: Infected and recovered ratio of fishes in Chombala

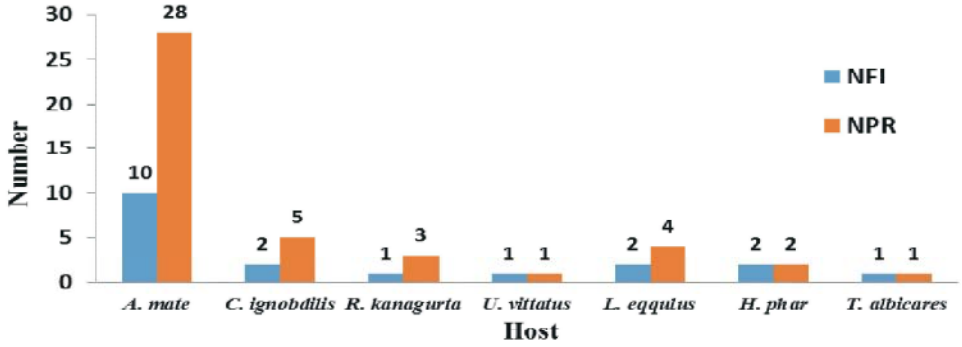

Fig. 3: Infected and recovered ratio of fishes in Junglighat

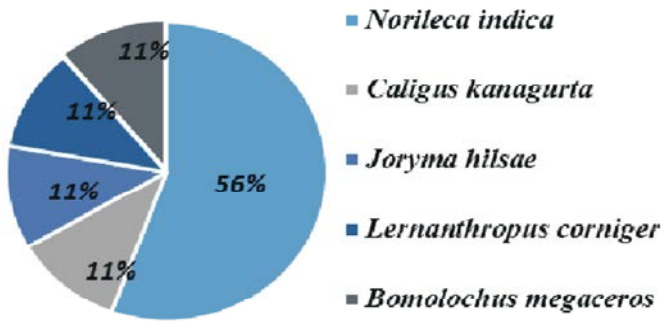

Fig. 4: Percentage composition of parasites from Chombala

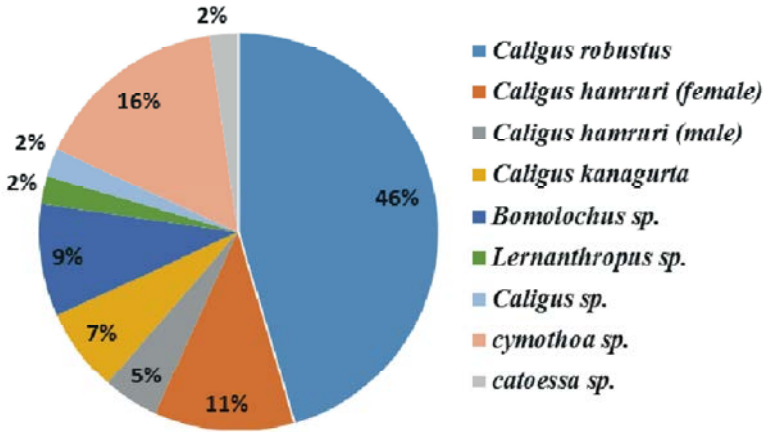

Fig. 5: Percentage composition of parasites from Junglighat

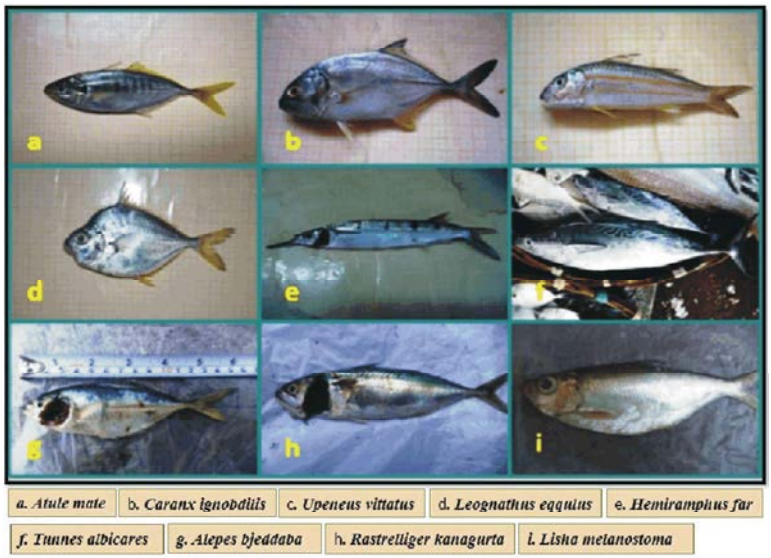

Fig. 6: Infested parasite in fish species

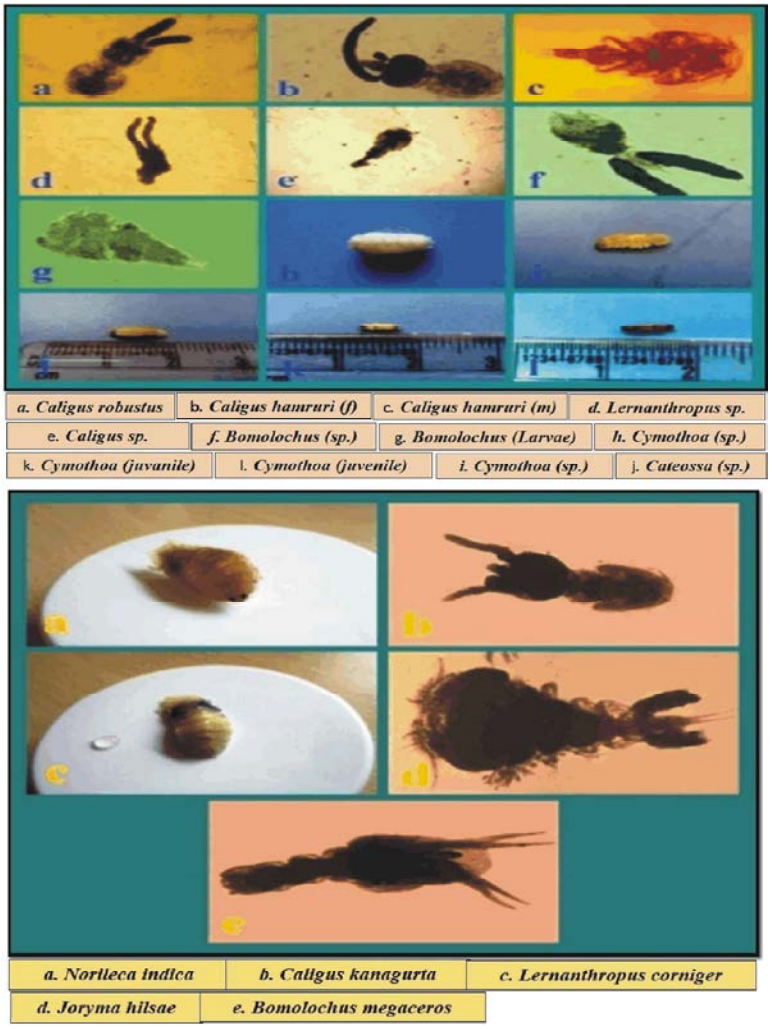

Fig. 7: Parasites removed from infested fish

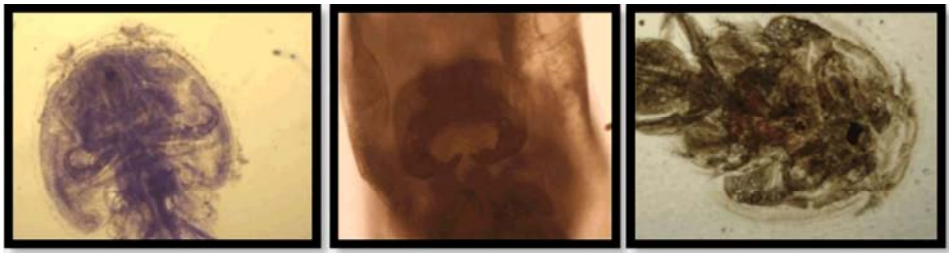

Fig. 8: The translucent image of head part of 3 different copepod parasites showing hook and needle like appendages for attachment and support.

Table 1: Site of attachment Parasites on Fish Body

Host family	Parasite species	Site of attachment
Carangidae	*Caligus robustus*	Inside the gill filaments
	Caligus hamruri(female)	Inside the gill filaments
	*Caligus hamruri (*male)	Inner side of operculum
	Lernanthropus corniger	Inside the gill filament
	Bomolochus megaceros	Inner side of operculum
	Cymothoa sp.	Buccal cavity
	Cateossa sp.	Gill cavity
Scombridae	*Caligus kanagurta*	Inside the gill filament
	Norilecaindica	Buccal cavity
	Caligus sp.	Inside the gill filaments
Mullidae	*Cymothoa* sp.	Buccal cavity
Leiognathidae	*Bomolochus* sp.	Inner side of operculum
Hemiramphidae	*Cymothoa* sp.	Gill cavity
	Lernanthropus sp.	Inside the gill filaments
Clupeidae	*Jorymahilsae*	Gill cavity

Site and Mode of Attachment of Parasite: Generally most of the parasites species observed inside gills, the copepod parasites were found to inhabitant inside or on the gill filament and some on the inner wall of the operculum (Figure 6). Infected copepod and isopod parasites which removed from different fish species shown (Figure 7).

In the case of isopod parasites some of them are inside buccal cavity and others inside the gill cavity (Table 1). Each parasite has a specific site and mode of attachment on the host fishes. In the case of isopods they occur on fish host on the outer body or fins, in the mouth, gill chambers or occasionally in self-made pockets in the flesh of their host [2].

The Copepod and isopod parasites observed in the inside the buccal or gill cavity, their mode of attachment using hook and needle like appendages (Figure 8), the head and trunk part of these parasites have pointed structures it supports these organisms to attach on the fish gills or inner wall of the operculum. In the case of isopod parasites it present in high struggled environment (forced water movement) so, they have hook like pereopods which help them to attach inside gill and buccal cavity.

DISCUSSION

The parasites collected from Chombala landing centre mostly infected fishes belongs to the families Scombridae, Clupeidae and Carangidae. In case of Junglighat landing centre Carangidae, Leiognathidae, Scombridae, Mullidae and Hemiramphidae were found to be infected fish families. The present study showed that the parasites mainly from Caligidae family in the case of Copepods and from Cymothoidae family in the case of Isopods. The prevalence of parasite species, *C. robustus* and *N. indica* observed from Chombala and Junglighat respectively. The parasite *N. indica* dominated at Chombala fish Landing Centre. A previous study from Parangipettai Kerala Coast showed that *N. indica* in the buccal cavity of *Rastrelliger kanagurta* frequently observed [10].

Where as in Andaman Coast Carangidae was infected by the parasite *C. robustus* and other *Caligus sp.* also. *R. kanagurta* were infected with parasite *Caligus kanagurta* from both study areas. This species being highly host specific parasite and observed in two environmental conditions. An earlier fish parasitic studies showed that branchial cavity of *R. kanagurta* infected with Female parasite *C. kanagurta* from West Coast of India [16]. Generally parasites have shown no host specificity except for a few. Host specificity is the tendency of a parasite occur on one or a few host species and is a product of co-existence between both parasite and host lineages [21]. Based on the studies from Indian waters [10] *Sardinella gibbosa* Infected from *N. phaeopleura* is highly host specific towards the host from Tamil Nadu Coastal [13], also *Liza parsia* infected with *N. phaeopleura* from Parangipettai Coastal water.

Most of the parasites were found inside the gills, only three observed inside buccal cavity. These species

show more preference to gill cavity may be due to the fact that the operculum will act as a protection. The development of specificity in all that ectoparasite has been promoted by the combination of two factors the uniformity of diet (blood or epithelium) and morphological adaptation to the particular kind of epithelium or scales. Parasite *Joryma hilsae* observed inside the gills covered with mucous. The position in the gills will help these parasites who feed basically on blood and mucous. A report from Parangipettai coast *J. hilsae* observed in the gill cavity of the fish [10]. But no parasites observed outside body surface or inside the fins and may be due to post harvest cleaning on board as well as in the landing centre.

The mode of attachment was found to be almost same in the observed parasites. They were found to use their hook and needle like appendages on the surface of the host for attachment. Copepods usually attached using clawed antennae, but some also displayed modifications of the ventral body surface and limbs that allow them to generate suction onto the surface of the host. Isopods have claw like pereopod legs which they used to attach on the host. *Nerocila phaeopleura* all the appendages are highly modified to hold the body surface and tearing the body muscles of host fish strongly [10].

ACKNOWLEDGEMENT

Authors are grateful to the authority of Pondicherry University for the facilities and support. We also thank the fishermen of Andaman and Malabar Coast, India for providing the materials to carry out the work.

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