ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 12, Issue, 04, pp. 55687-55691, April, 2022
https://doi.org/10.37118/ijdr.24392.04.2022

RESEARCH ARTICLE OPEN ACCESS

PARASITES OCCURRENCE IN FISHES COLLECTED FROM DAIM MAYO LAGOON AT THE SUDANESE RED SEA COAST

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ARTICLE INFO

Article History:
Received 26th January, 2022
Received in revised form
20th February, 2022
Accepted 19th March, 2022
Published online 30th April, 2022

Key Words:

Fish parasites, Red Sea,
Sudanese coast.

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ABSTRACT

Total prevalence of parasites infection among all fish species investigated was 64.62%. Mugil cephalus recorded highest prevalence of infection with 40.85%. Four external parasites were found in gills of most fish species collected from the study area, these were Ganthia sp., Aella sp., Lepeophtheirus sp., Lernanthropus sp. and Lepeophtheirum sp.. Two helminthes parasites Sclerocolum sp. and Procamallnus sp. were reported inside the intestinal tract of some examined fishes. The parasites Ganthia sp. and Lernanthropus sp. were infested the gills of the following fish species: Plectorhynchus schotaf, Upeneus vittatus, Epinephlus summana, Hipposcarus harid, Mulloidichthys vanicolensis, Rhinecanthus assia, Scombroides lysine, Crenidens crenidens, and Caranx bajed. The examination of the infected intestine of M. cephalus, Chanos chanos and Siganus rivulatus revealed presence of heavy infection with Sclerocolum sp. and Procamallnus sp. parasites. Also Cymothoa sp. were recorded in mouth roof and gills of M. cephalus. The examination of infected intestine of M. cephalus revealed the presence of heavy infection with the Sclerocolum sp. and Procamallnus sp. parasites with prevalence of 17.5% and 22.5 %, respectively. The ectoparasites Ganthia sp., Aella sp., Lernanthropus sp. and Cymothoa sp. were recorded for the first time in fishes from the Sudanese Red Sea coast.

Citation: ***Hala Khidir Hassan Osman, Salah Eldeen Yagoub Mohamed, Mohamed Elamin Hamza.*** "Parasites Occurrence in Fishes Collected from Daim Mayo lagoon at the Sudanese Red Sea Coast*", International Journal of Development Research*, 12, (04), 55687-55691.

INTRODUCTION

Sudan has a total coast line of 853 km, and a continental shelf area of 22 300 km2, its territorial rights on the Red Sea extend to an Exclusive Economic Zone (EEZ) of 91 600 km2. These waters are rich in fisheries resources and also possess abundant coral populations. They have the following fundamental characteristics: The biological resources of the Sudan's offshore waters between the shelf area and the 200 nautical mile EEZ have been considerably tapped, though not to their full capacity. Expansion in fishery exploitation is, however, bound to remain on the increase as more pressure is exerted on the fishery by market forces. Indicative of this trend is the observation that over the years an increasing number of fishing vessels, of greater deadweight tonnage, have been registered to operate on the Red Sea territory of the Sudan (FAO, 2020). The Sudanese marine fishery is largely coastal in nature and employs mainly traditional gear, traditional craft such as papyrus rafts and dugout canoes, and traditional harvesting techniques, whereas the marine commercial fishers use purse seiners and small- and medium-size trawlers to exploit the resources within and beyond the continental shelf area. In 2017, 2 330 small boats were reported, against 605 engine powered vessels, for fishing communities a total of 6 300 marine coastal fishers were active in 2016 (FAO, 2020). Sudan Red Sea coast is Classified as pollution free, rich in minerals, high tourism potential such as the Sanganeb atoll, and other promising fishing and diving sports sites .There are about 309 species of fishes in Sudan Red Sea 64 species of these are commercial fishes .Many studies were conducted in the Sudanese Red Sea coast, which recorded all dominant commercial fishes (Farah, 2008). Acanthocephalans were reported in siganid and scombrid fishes in Sharm El- Sheikh Coast, South Sinai (Hassanine, 2006). Ultrastructure and genetic diversity of two Sclercollum infected siganid and lutianid fishes in Red Sea, Egypt were studied by Abdou and Mahfouz (2006). *Sclerocollum sp*. were reported for the first time from Suakin at the Sudanese Red Sea coast by Salah Eldeen *et al*. (2014). Many studies in fish parasites in the Sudanese Red Sea coast were conducted; Salah Eldeen *et al*. (2012) studied the effect of helminthes parasites on *S. rivulatus* collected from two sites (Dongnab and Suakin), Mohammed *et al*. (2017) found nematode parasite in *E. microdon* fish that collected from the Sudanese Red Sea coast. Parasitic crustaceans present diversity estimated as around 5,400 species (Poulin and Morand, 2004; Luque *et al*., 2013). Copepods were a common component of the ectoparasite assemblages of fishes, and some copepods like caligids, lernaeopodids, hatschekids, and lernanthropids were dominant among

parasitic copepods of fishes (Ho *et al*, 2011). Gnathiid isopods are ubiquitous marine and estuarine ectoparasites of teleosts and elasmobranchs (Smit and Davies, 2004). All known Gnathiid life cycles consist of three parasitic juvenile stages that moult into non-parasitic, sexually dimorphic adults becoming pranizae (Smit and Davies, 2004). The family Cymothoidae contains about 500 species that parasitize fish; Cymothoid isopods are obligate fish parasites, occurring in all oceans with the exception of polar waters. The family is primarily marine, with limited occurrence in African and Asian freshwaters, but with moderate diversity in tropical South American river systems, notably the Amazon and its tributaries. (Ravichandran *et al*., 2009; Rajkumar, 2004; Ravichandran, 2007; Rameshkumar and Ravichandran, 2010, Rameshkumar *et al*., 2011). The objective of this work is to investigate the occurrence of fish parasites in fishes collected from Daim Mayo lagoon, Red Sea coast, Sudan.

MATERIALS AND METHODS

The study site: The Study was conducted in Daim Mayo lagoon located at the end of Port Sudan harbor which is a natural inlet extending from the sea to inland about 5 km long with 1 km width , ending into a shallow lagoon with depth ranging between 3-5meters.

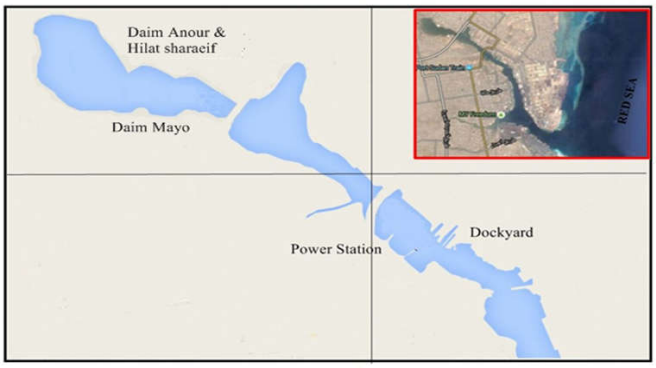

Fig. 1. The study area. Modified from www.flashearth.com, (2015)

Fish sampling: 164 fishes were collected randomly via gill net with 6 cm mesh size and of 4 to 5 m length twice a month, collection was carried during early morning, fishes were identified according to Randall (1983) and Froese and Pauly (2010).

Fish external examination: Small amount of mucus was gently scraped from the skin behind the pectoral fins and the base of the tail and from any lesions. Smear of the mucus was added onto a clean microscope slide with a drop of water and a coverslip; the slides were examined under the microscope (Model: LEICA DM 750 with camera). Smear samples were also taken from any areas of discoloration or where scales are raised or sloughed. This method can also be used to collect samples from the nose openings and the oral cavity (Piasecki *et al*., 2004).

Fish internal examination: The body surface was disinfected with 70 percent alcohol then an incision was made above the pectoral fin and cut along the swim bladder to the vent using either sterile scissors or a scalpel flamed in alcohol. The body wall may be held back or completely removed. Cutting was done carefully so not to damage or rupture any internal organs. In small fish the entire intestine was examined using the dissecting microscope. In large fish a scraping of the intestinal contents was made (Bartholome, 2003).

Calculation of infection rate: The infection rate was estimated according to formula mentioned by Akinsanya *et al*, (2008):

$$\textbf{Infection rate} = \frac{\text{Number of infected fish}}{\text{The total number of fish}}$$

Identification of fish parasites: External parasites *Ganthia sp., Aella sp*. and *Lernanthropus sp*. were identified following Smit *et al*., 2006, Johnson, 2004 and Sabri and Shaharom, 2008, respectively. *Cymothoa sp*. parasites were identified following: Brandt and Poore, 2003 keys. Helminth nematode and Acanthocephalus parasites were identified using the key of Fuscoo and Overstreet (1979) and Schmidt and Paperna (1978), respectively.

RESULTS AND DISCUSSION

Four external parasites were detected in gills of most fish species collected from the study area, these were *Ganthia sp., Aella sp*., *Lepeophtheirum sp*. and *Lernanthropus sp*., *Lepeophtheirum sp*. and two helminth parasites *Sclerocolum sp*. and *Procamallnus sp*. were reported inside the intestinal tract of some examined fishes.

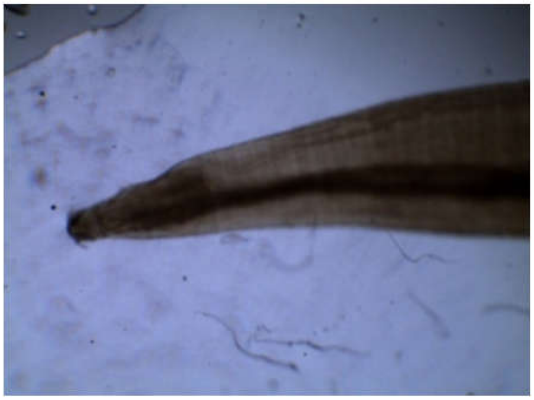

Plate 1. Anterior part of the body of adult nematode *Procamallussp*. Parasite

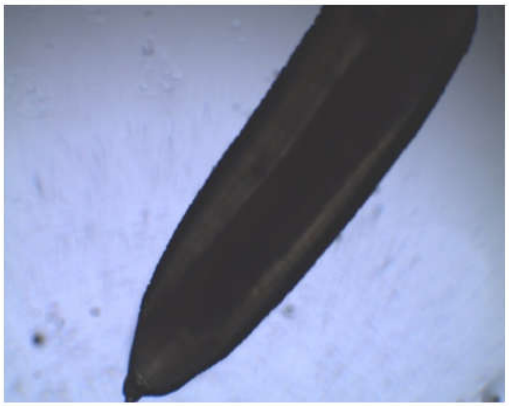

Plate 2. Posterior part of the body of adult nematode *Procamallussp.* Parasite

Plate 3. Anterior part of the body of Adult acanthocephalan *Sclerocolumsp*. parasite

Infection rate among fish species: Total number of fishes examined in this study was 164 fishes. Total prevalence of parasites infection among all fish was 64.02 %, However *M. cephalus* fish recorded highest prevalence of infection with 40.85 % , *S. rivulatus* recorded

3.70%,*C. ignobilis* 3.5%, *R. kanagurta* and *P. gaterinus* 2.44%. *M. vanicolensis, L. harak, C. fulvoguttus, C. crenidens* 1.22%. While *C. trilobatus, H. harid, S. lysine, C. bajed, U. vittatus, P. schotaf* recorded 0.6%.

Plate 4. Posterior end of the body of acanthocephalan *Sclerocolum sp*. parasite

Total prevalence of parasites infection: The examination of infected intestine of *M. cephalus* revealed presence of heavy infection with the *Sclerocolum sp*. and *Procamallnus sp*. parasites with prevalence of 17.5% and 22.5 %, respectively, also infection with *Cymothoa sp.* was recorded in mouth roof and gills of *M. cephalus* with prevalence of infection about 83.75%. On the other hand *Ganthia sp*. and *Aella sp*. parasites were found in gills with prevalence of infection 7.5% and 0.6% respectively, plate(5), (6) and plate(12).

Plate 5. Anterior part of the body of *Gnathiasp*. parasite

Plate 6. Posterior part of the body of *Gnithiasp*. parasite

Plate 7. Ventral view of the *Cymothoa sp* parasite.

Investigation of infected intestine of *C. chanos* showed presence of *Sclerocolum sp*. with prevalence of 100%. Fish species *C. crenidens* was infected with *Gnathia sp*. and *Lernanthropus sp*. in the gills, however, *Procamallanus sp*. were also recorded in the intestine of the fish. *Gnathia sp*. and *Lernanthropus sp*. were detected in the gills of *P. gaterinus* fish, Plate (11) and (12).

Plate 8. Dorsal view of the *Cymothoa sp*. parasite

Plate 9. Anterior part of the body of Lepeophtheirum sp

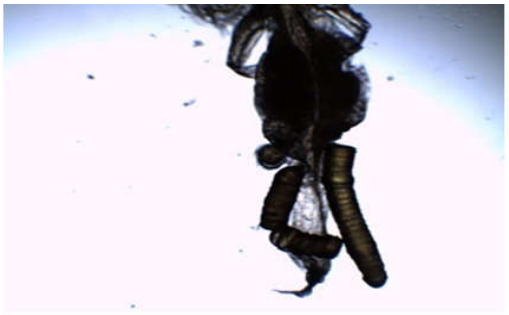

Plate 10. Posterior part of the body of Lepeophtheirum sp

Gnathiid isopods are ubiquitous marine and estuarine ecto-parasites of teleosts and elasmobranchs (Smit and Davies, 2004). The parasites *Ganthia sp*. and *Aella sp*. were detected in gills of the following fish species: *P. schotaf*, *U. vittatus*, *E. summana*, *H. harid*, *M. vanicolensis*, *R. assia*, *S. lysine* and *C. crenidens, C. bajed* similar findings were reported by (Ho and Nagasawa, 2001). *Cymothoa sp*. was also recorded in mouth roof and gills of *M. cepahlus*. Cymothoidae were also reported from Algeria, however, the majority being widely distributed in the Mediterranean (Ramdane *et al*, 2007). The ecto- parasites *Ganthia sp*., *Aella sp., Lernanthropus sp*. and *Cymothoa sp*. were recorded for the first time in fishes from the Sudanese Red Sea coast. In the present research, fish were caught by barrier net and examined in the field at the least possible time after capture in order to avoid significant changes. Williams *et al*. (1991) showed that certain methods of capture (traps or nets) result in significant stress to fish. Such stress causes regurgitation and contributes towards the expelling of some intestinal helminthes. According to Mackenzie and Gibson (1970), the migration of parasitic helminthes along the gastrointestinal tract of fish, during periods of starvation or after death, may also affect their normal distribution. Two helminthes parasites were seen in the intestine of *M. cephlus*: these were Acanthocephalan *Sclerocollum sp* and *Procamallanus sp*. Salah Eldeen *et al*. (2012) reported presence of *Procamalanus sp*. inside the intestine of *S. rivulatus*. Fusco and Overstreet, (1979); Ben-Tuvia *et al*., (1973); Dzikowski*et al*, (2003)

and Hassanine and Al-Jahdali, (2007) reported significant increase prevalence of gut helminthes nematodes *Procamallanus elatensis* and *Cucullanus sigani* in the wild rabbit fish in the Gulf of Aqaba, Red Sea. Schmidt and Paperna, (1978); Diamant (1989); Hassanine *et al* (2007) and Abdou and Mahfouz, (2006) reported significant increase prevalence of gut helminthes *Sclerocollum sp* infected wild rabbit fish in the Gulf of Aqaba, Red Sea. Salah Eldeen *et al*. (2016) examined samples of *S. rivulatus*, the Acanthocephalan Sclerocollum *sp*. were recorded in the interior and posterior intestine of the fish.

Plate 11. *Aellasp*. parasite

Plate 12. Posterior part of the bodyof Lernanthropussp. parasite

Although the fishes examined showed high intensities of parasites infection, never the less no pronounced symptoms of disease were observed. Abdou and Mahfouz (2006) stated that *Sclerocollum sp*. predominated in posterior region of intestine appeared swollen with anterior ends of some worms projecting into the peritoneal cavity and enclosed in a connective tissue capsule at site of proboscis attachment, the surface of intestine appeared thickened and with high mucus.

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