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Original Research Paper

Study of External Parasites Infesting *Carcharhinus Melanopterus* Fish From The Red Sea In Jeddah, Saudi Arabia

Science

KEYWORDS : *Carcharhinus Melanopterus*, Monogenea, copepod, Saudi Arabia (Jeddah).

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ABSTRACT

Parasitic diseases are harmful and limiting factors in breeding and rearing ornamental fish industry, such as the Monogenea (Dactylogyrus sp and Erpocotyle tiburonis) and copepod (Pandarus sinuatus and Anchistrotos tangi). The copepod and the monogenean are gill parasites found on the shark; Carcharhinus Melanopterus. The primary purpose of this study was to determine the parasitic infections of sharks in red sea in Jeddah. For this purpose, 19 female C. Melanopterus and 14 male C. Melanopterus were first examined for ectoparasites using wet mount under a light microscope. All male sharks had Monogenea and/or copepod in their gill and only 3 females haven't infections. Then, we aimed to find a combination of copepod and monogenea infection in C. Melanopterus gills. 50% of male and 42% of female were infected by copepod and monogenea. Our findings revealed that the protozoan infections are very common among sharks. Although, no gross pathology was observed among infected shark, but it is likely that in case of any changes in the environment, then parasitic infections could be harmful.

Introduction

Supervision and research on diseases in wildlife populations present many challenges but are significant tools to identify changes in ecosystem health and emerging menaces to human and animal health (**Ryser-Degiorgis M, 2013**).

Attachment is an essential feature of all parasitic organisms for their survival, and monogeneans and copepods, which are mainly ectoparasites, are no exception.

Monogenea is one of the largest classes within the phylum Platyhelminthes and they usually possess anterior and posterior attachment apparatus that are used for settlement, feeding, locomotion and transfer from host to host (**Bychowsky, 1957**; **Yamaguti, 1963**; **Kearn, 1998**). In red sea, infections are intensified, and monogeneans may become problematic on requiem sharks (Carcharhinidea), leading to disease and death (**Rand et al. 1986**; **Cheung et al. 1988**).

Coexistence of gill monogeneans is the most commonly studied **(Lo and Morand 2000**; **Simkova et al. 2001**; **Matejusova et al. 2003**). However, although the spatial distribution of copepods has been well documented (**Benz and Dupre 1987**), the coexistence of copepod species has been studied much less (**Bashirullah 2000**). Further, investigations considering the co-occurrence of monogeneans and copepods are uncommon, and the majority of them have addressed motile copepods (**Ramasamy et al. 1985; Yao 2003**). Additionally, some reports have focused solely on the abiotic factors allowing parasite maintenance on hosts (**Barker and Cone 2000**) or on the pathological consequences of such co-infections for their hosts (**Ojha and Hughes 2001**).

The aim of this study was to determine the spatial distribution of these two parasitic species in mono- and bispecific infections, in order to understand the nature of their interactions and how such interactions affect the populations of these parasites

Materials and Methods

Within the plankton sampling framework of a study of the parasitic infection, *Carcharhinus Melanopterus* were collected from Jeddah, western coast of Saudi Arabian Red Sea between 5 January and 29 February. 14 male sharks and 19 female sharks between 41 cm and 61 cm were acquired. Visual inspection of the abdominal cavities and digestive tracts were examined for presence of parasitic spices. Also an external examination of the cavity of the mouth and gills was realized.

Results

Of all examined sharks, 30 sharks (91%) were infected by at least one parasite. Two monogeneans (*Erpocotyle tiburonis* and *Dactylogyrus* sp.) and two copepods (*Pandarus sinuatus, Anchistrotos tangi*) were identified (figure 1). Only 3 female sharks (9%) do show any infection. The hemorrhagic areas on gills were observed in infected sharks. The prevalence was 6.5% of sharks were infected by two specimens; one specimen of Monogeneans or/and one specimen of copepod. 6% of sharks were infected by two specimens of Monogenea or Copepod and 6% infected by three different specimens; two specimens of Monogenea and one specimen of Copepod (Table 1).



Figure 1: Monogenea and Copepod isoled from gills of *Carcharhinus Melanopterus.* **Tow specimens of copepod (a)** *Pandarus sinuatus*, **(b)** *Anchistrotos tangi* **and tow specimens of monogenea; (c)** *Erpocotyle tiburonis*, **(d)** *Dactylogyrus sp*.

Table1. Distribution of parasites in gills of male and female *Carcharhinus Melanopterus*

Parasites	Male of *Carcharhinus Melanopterus*	Female of *Carcharhinus Melanopterus*	Infected sharks (%)
Erpocotyle tiburonis	4	0	12.2
Anchistrotos tangi	0	3	9.1
E.tiburonis and *D. sp*	1	1	6

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D.sp and P.sinuatus	1	1	6
Erpocotyle tiburonis and *Anchistrotos tangi*	7	8	45.5
P.sinuatus and *A.tangi*	0	1	3
E.tiburonis, D.sp and A.tangi	1	2	9.1

Discussion

Parasitic diseases affect physiologic and biologic characteristics caused mechanical damage and economic losses in ornamental fish industries (**Jalali B. 1997**). The present specimens of Monogenea and Copepod collected and examined from the Red Sea. Different parasite species were reported from various ornamental fish species around the world.

The monogeneans are usually found in the gills, but they can inhabit the nasal cavities and, in rare cases, other body parts of hosts (**Zanolo and Yamamura, 2006**). The species found in this study were described only in the gills of their host (**Suriano, 1981**). *Gyrodactylus sp* was collected from gills (**Koyun M. 2000**). In the other hand, intense infection by E. tiburonis in aquarium-held bonnet- head sharks was associated with proliferative gill lesions that probably altered the flow of respiratory water over lamellae, thereby reducing the exchange of gases and ions across the lamellar epithelium (**Stephen A. et al, 2001**).

Site specificity studies treating parasitic copepods have primarily focused on parasites that infect the body surfaces and gill of teleosts (**Van den Broek, 1979**; **Jaworski and Holm, 1992**; **Tirard et al., 1996**). Regarding elasmobranchs (Elasmobranchii), such studies have primarily focused on copepods that infect the gill (**Benz and Dupre, 1987**; **Benz and Adamson, 1990**; **Dippenaar et al., 2008**). The genus *Pandarus* comprises ectoparasites of the body surface and gill archs of sharks (**Benz and Adamson, 1990).** The parasitic copepod Anchistrotos tangi was also detected in the gill of different fish (**Venmathi Maran et al., 2014**).

In the present study, all of the parasites presented an aggregated distribution pattern, which is characteristic of parasite systems. Our results showed that at least, gills of sharks are infected by one parasite. Parasite population aggregation in a small host population increases the relationship stability, due to regulatory mechanisms such as host mortality, which depends on the parasite density and the decrease in survival and fecundity of parasites caused by intraspecific competition between parasites or immunological reactions of hosts (Dobson, 1990).

Although there are evidences of monogeneans and copepods with a broad host species spectrum, most of them show high host specificity, occurring on a single species or on closely related fishes. The species found in this study were described only in the gills of their host.

References

1. Bashirullah AK. 2000. Non-interactive coexistence of two parasitic copepods of Caranx hippos (Carangidae) in eastern Venezuela. Crustac Issues 12:791–796.
2. Benz GW, Dupre KS (1987) Spatial distribution of the parasite Kroyeria carchariaeglauci Hesse, 1879 (Copepoda: Siphonostomatoida: Kroyeriidae) on gill of the blue shark (Prionace glauca) (L., 1758). Can J Zool 65(5):1275–1281.
3. Benz GW and S.A.M. Adamson. 1990. Disease caused by Nemesis robusta (van Beneden, 1851) (Eudactylinidae: Siphonostomatoida: Copepoda) infections on gill filaments of thresher sharks (Alopias vulpinus (Bonnaterre, 1758)), with notes on parasite ecology and life history. Canadian Journal of Zoology 68: 1180–1187.
4. Barker DE, Cone DK. 2000. Occurrence of Ergasilus celestas (Copepoda) and Pseudodactylogyrus anguillae wild eels (Anguilla rostrata) in relation to stream flow, pH and temperature, and recommendations for controlling their transmission among captive eels. Aquaculture 187(3–4):261–274.
5. Bychowsky, B. E. 1957. *Monogenetic Trematodes, Their Systematics and Phylogeny*. Moscow/Leningrad: Academy of Sciences of the U.S.S.R. [in Russian]. (English translation by W. J. Hargis and P. C. Oustinoff, 1961). Washington DC: American Institute of Biological Sciences.
6. cheung PJ, Nigrelli RF, Ruggieri GD, Crow GL. 1988. A new microbothriid (monogenean) causing skin lesions on the Pacific blacktip reef shark, *Carcharinus melanopterus* (Quoy and Gaimard). J Aquaric Aquat Sci 5:21-25
7. Dippenaar, S.M., R.C. van Tonder, S.P. Wintner, and P. Zungu. 2008. Spatial distribution of Nemesis lamna Risso 1826 (Copepoda: Siphonostomatoida: Eudactylinidae) on the gills of white sharks Carcharodon carcharias off KwaZulu-Natal, South Africa. African Journal of Marine Science 30: 143–148.
8. Dobson AP. Models of multi-species parasites-host communities. 1990. In: Esch G, Kennedy CR, Aho J, editors. *Parasite communities*: patterns and process p. 261-287
9. Jalali B. 1997. Parasites and parasitic diseases of fresh water fishes of Iran. Iranian fisheries research organization. Tehran, Iran; 105-112.
10. Jaworski, A., and J.C. Holm. 1992. Distribution and structure of the population of sea lice, Lepeophtheirus salmonis Krøyer, on Atlantic salmon, Salmo salar L., under typical rearing conditions. Aquaculture and Fisheries Management 23: 577–589.
11. Kearn, G. C**.** 1998. *Parasitism and the Platyhelminths*. New York, NY: Chapman and Hall
12. Koyun M. The helminthes fauna of some fishes in Enne Dam Lake. 2000. Phd Thesis, Uludag University Science Institution. Bursa, Turkey.
13. Lo CM, Morand S. 2000. Spatial distribution and coexistence of monogenean gill parasites inhabiting two damselfishes from Moorea Island in French Polynesia. J Helminthol 74:329–336
14. Matejusova I, Simkova A, Sasal P, Gelnar M. 2003. Microhabitat distribution of Pseudodactylogyrus anguillae and Pseudodactylogyrus bini among and within gill arches of the European eel (Anguilla anguilla L.). Parasitol Res 89:290–296
15. Ojha J, Hughes GM .2001. Effect of branchial parasites on the efficiency of the gills of a freshwater catfish, Wallago attu. J Zool Lond 255:125–129
16. Ramasamy P, Ramalinga MK, Hanna REB, Halton DW .1985. Microhabitats of gill parasites (Monogenea and Copepoda) of teleosts (Scomberoides spp.). Int J Parasitol 15:385–397.
17. Rand, T. G., Wiles, M. and Odense, P**.** 1986. Attachment of *Dermophthirius carcharhini* (Monogenea: Microbothriidae) to the Galapagos shark *Carcharhinus galapagensis*. *Trans. Am. Microsc. Soc.* **105**, 158-169.
18. Ryser-Degiorgis M .2013. Wildlife health investigations: Needs, challenges and recommendations. BMC Vet Res 9: 223–240.
19. Simkova A, Gelnar M, Sasal P .2001. Aggregation of congeneric parasites (Monogenea: Dactylogyrus) among gill microhabitats within one host species (Rutilus rutilus L.). Parasitology 123(6):599–607
20. Stephen A. Bullard, Salvatore Frasca, Jr. and George W. Benz. 2001. Gill Lesions Associated with Erpocotyle tiburonis (Monogenea: Hexabothriidae) on Wild and Aquarium-Held Bonnethead Sharks (Sphyrna tiburo). The Journal of Parasitology, Vol. 87, No. 5, pp. 972-977
21. Suriano, DM., 1981. *Androspira* gen. no. (Monogenea Ancyrocephalinae) parasito branquial de *Pseudocurimata gilberti* (Quoy and Gaimard, 1824) Fernandez-Yepes, 1948 (Pisces Tetragonopteridae) de La Laguna de Chascomus, Republica Argentina. *Neotropica*, vol. 27, p. 67-78.
22. Tirard, C., F. Thomas, A. Raibaut, and F. Renaud. 1996. The distribution and abundance of Lernaeocera lusci (Copepoda) on hake (Merluccius merluccius) and bib (Trisopterus luscus) (Teleostei). International Journal for Parasitology 26: 1387–1392.
23. Van den Broek, W.L.F. 1979. Copepod ectoparasites of Merlangius merlangus and Platichthys flesus. Journal of Fish Biology 14: 371–380.
24. Venmathi Maran1 , Seong Yong Moon2 and Thamir Katea Adday. 2014. A new species of Anchistrotos (Copepoda: Taeniacanthidae) from hilsa shad, Tenualosa ilisha (Actinopterygii: Clupeidae), off Iraq. Folia parasitologica 61 [5]: 479–484

25. Yamaguti, S. 1963. *Systema Helminthum. IV. Monogenea and Aspidocotylea*. New York, NY: John Wiley and Sons.
26. Yao W-J .2003. Spatial distribution of monogeneans and copepod on gills of bullhead catfish Pelteobagrus fulvidraco. Acta Hydrobiol Sin 27(6):635–638.
27. Zanolo, R. and Yamamura, MH., 2006. Parasitas em tilápias-do-nilo criadas em sistemas de tanques-rede. *Semina: Ciências Agrárias*, vol. 27, no. 2, p. 281-288.