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Survey of Internal Protozoa Parasites of Marine Fish *Siganus Rivulatus* at The Red Sea State, Sudan

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مسح للطفيليات الداخلية في سمك *Siganus Rivulatus* في ولاية البحر الأحمر، السودان.

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Abstract

A total of 50 specimens of marine fish *Siganus rivulatus* were investigated for internal protozoa. The fish samples were collected from two positions: EL-Sigalaa and Dungunab Bay. The samples were taken from blood (from tail area) and also from the liver, kidney and gonad. The study revealed *Haemogregarina sp.* from blood, Myxobolus *sp.* and *Henneguya sp.* recovered from the Liver, kidney, and gonad. Also, the study revealed *Cryptobia sp.* from Liver of *Siganus rivulatus*. The parasite prevalence in EL-Sigalaa is 56% while that for Dungunab Bay is 38%. Also, the density of the parasite is higher in EL-Sigalaa than that in Dungunab Bay. The Gonads had higher density (78%) in both locations and most of the parasite identified is *Myxobolus sp.*.

Keywords: *Internal protozoa, Siganus rivulatus, Red Sea, Sudan.*

الملخص

الهدف من هذه الدراسة هو مسح للطفيليات الداخلية الاولية في نوع واحد من الأسماك البحرية بولاية البحر الاحمر السودانية. جمعت 50 عينة من سمك السيجان من موقعين من ولاية البحر الأحمر وهما سوق السقالة بمدينة بورتسودان ومنطقة خليج دونقناب قرب حلايب. تم أخذ العينات من الدم والكبد والكلى والمناسل وقد أظهر الفحص الميكروسكوبي ان نسبة انتشار الطفيليات الاولية الداخلية أكثر في منطقة السقالة وكذلك الهيموقرارينا في الدم، الميكزوبولس والهينجيا في الكبد والكلى والمناسل أما الكريبتوبيا وُجدت في الكبد فقط. وايضا اظهرت الدراسة ان كثافة الطفيليات أكثر في منطقة السقالة وأن الميكزوبولس هي أكثر الطفيليات تواجدا والمناسل أكثر الأعضاء إصابة.

الكلمات الدلالية: *الطفيليات الأولية الداخلية، سمك السيجان، البحر الأحمر، السودان.*

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1. Introduction

Sudanese Red Sea of immense importance because of numbers of unique marine habitats in it including sea grass beds, salts pans, mangrove, salts marshes and there are no major ocean currents and the continental shelf is very narrow and the coast is blessed by rich coral reef beds (Mishrigi *et al.*, 1993).

The Sudanese Red Sea divided into seven fishing zones, the inlets along the coast, are astonishingly uniform, a deep narrow entrance with a shallow fringing coral reef drops almost vertically to depths of 10 to 12 fathoms, boat channel, fringing reef which consist of a continuous mass of a luxuriant growth of stony corals where many commercial fishes are found here, the deep channel, barrier reef and pelagic zone beyond the barrier lies the open Sea which is of no importance (Reed, 1964). Vine and Vine (1980) reported 204 fish species from Sudanese waters as coral reefs fishes (including 65 commercial fish species) from which 192 species occur south of Port Sudan (Suakin area); on the other hand, Mishrigi *et al.* (1993) reported 65 fish species in Sudanese Red Sea waters belonging to 29 families, in addition to unidentified number of species that belong to seven families of fin and shell fish. Also, Smith (1965) reported that there are five *Siganus spp.* in the Red Sea. *Siganus rivulatus* is considered as favorable food-fish in many parts of the world. *Siganus rivulatus* is herbivores, feeding on Sea grass (*Halophylla sp.*) and epiphytic algae and grows to a length of 35-40 *cm*. For this reason, they have recently been suggested as possible subjects for marine culture (Popper and Gundermann, 1975).

Protozoa are single-celled organisms, many of which are free living in the aquatic environment. Typically, no intermediate host is required for the parasite to reproduce (direct life cycle). Consequently, they can build up to very high numbers when fish are crowded causing weight loss, debilitation, and mortality (Dickerson and Dawe, 1995). Chandra (2006) reported that the most commonly occurring protozoan parasitic disease are myxoboliasis. Accordingly present study attempts to conduct a general survey of internal protozoan parasites in blood, liver, kidney and gonads in Sigan fish (*Siganus rivulatu*) at Red Sea state, Sudan.

2. Materials and Methods

Fish were collected from two different sites (as shown in Figure.1). Port Sudan the main fisher's area (EL-Sigalaa); Port Sudan town it's the major sea port of the country located at the western coast of Red Sea, it's the main center for fishing consumption in Sudan as it is the most density populated (30%), and the total production of it about 139.785 tons (20% of total product) (Hariri *et al.*, 2000), and Mohamed Gool/Dungunab bay; Mohamed Gool area laying north to Dungunab bay and Halaib, it has a wide entrance which is almost blocked by reefs with few navigable passages for small vessels only. On the eastern side the coral reef gives way to a sloping sandy beach. On the western side there are flat, rocky grounds covered with silt or sea weeds (Farah, 2007). The total fish production at these areas about (206.527 *tons*)

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that is to say 35% from total product (Hariri *et al.*, 2000). Fish is being sold fresh, iced and dried, the iced product is transporting to port Sudan.

Figure 1. The Sudanese Red Sea coast area

2.1. Samples Collection

A total of 50 fish samples (*Siganus rivulatus*) were investigated for internal protozoa parasites. All fish were sampled in April to May, 2010. As shown in Table (1), 29 samples from Port Sudan and 21 samples from Dungunab area. The fish were caught by gill nets by local fishermen.

Table 1. Number of samples collected

Organ	*EL-Sigalaa*	*Dungunab bay*
Blood	29	21
Liver	29	21
Kidney	29	21
Ovary	29	21

2.2. Blood Smears

Firstly, the fishes were brought out of water and the tails was cut by sharp scissor to obtain blood from caudal vein or artery with pressure. Then a drop of blood was placed on the edge of microscope slide and touched with another slide (spreader) at 45 angle and moved quickly forward, then the smear was left to dry.

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2.3. Liver, Kidney, and Ovary Smears

The routine dissection method was adopted, as a ventral incision was made from the anus to the pectoral region and another vertical from the anus to the lateral line. The side flap was lifted and the internal organ exposed. The operculum was removed to expose the gill (Bucke, 1972). Then the tissue smears from liver, kidney and gonads were prepared by putting them in the filter paper to absorb the fluids and blood.

2.4. Fixation

The methanol was added to fix the dried smear and left for 10 *min*.

2.5. Staining

One ml of Giemsa stain mixed with 9 *ml* of distilled water were added carefully, and then the smears were stained by Giemsa stain and left for 10 *min.* and washed by slow runny water then left to dry.

2.6. Microscopic Examination

The smears were examined under light microscope and the slide was first viewed with x10, x40 objective lenses and then with oil immersion lens for identification of the protozoan parasites.

2.7. Photography

Microscope (leitz daimx 20) fitted with camera was used to photograph the parasites. The photography was carried at The Electron Microscopy Unit, Department of Zoology, Faculty of Science, University of Khartoum.

3. Results

The parasite prevalence in EL-Sigalaa was 56% while that for Dungunab bay was 38%. Also the density of parasite is higher in EL-Sigalaa than that of Dungunab bay. The Gonads had higher density (78%) in both location and the most of prevalent parasite was *Myxobolus sp.* (as shown in Table .2).

Table 2. Prevalence of endo protozoan parasites in *Siganus revulatus* in different organs in tow sites

	EL-Sigalaa			***Dungunab bay***		
Organ	***No. exmined***	***No. infected***	***%***	***No. exmined***	***No. infected***	***%***
Blood	29	9	0.31	21	0	0
Liver	29	10	0.34	21	11	0.52
Kidney	29	9	0.31	21	5	0.23
Gonads	29	25	0.86	21	14	0.66

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Table 3. Intensity of endo protozoan parasites in *Siganus revulatus* in different organs in tow sites

	EL-Sigalaa			Dungunab bay		
Organ	***No. infected***	***No. of parasite***	***%***	***No. infected***	***No. of parasite***	***%***
Blood	9	13	1.4	0	0	0
Liver	10	10	1.0	11	13	1.1
Kidney	9	9	1.0	5	5	1
Gonads	25	36	1.4	14	23	1.6

The result obtained in this study revealed the presence of *Haemogregarina sp.* in blood; *Cryptobia sp., Myxobolus sp.* and *Henneguya sp.* in liver, kidney and gonads of *Siganus rivulatus* from EL-Sigalaa and Dungunab bay.

4. Discussion

The results obtained in this study revealed that the density of parasite is higher in EL-Sigalaa than that of Dungunab bay (Table 2). The same result obtained by Ahmed *et al.* (2012) for the external parasites. Some biotic factors such as water temperature current and depth affect the distribution of parasites (Lyaji and Amana, 2015). Also the result viewed *Haemogregarina*, *Cryptobia*, *Myxobolus* and *Henneguya* recovered in different positions in *Siganus rivulatus.*

Haemogregarina sp. were found in blood of *Siganus rivulatus* and the same result obtained by (Laird and Bullock, 1969) who said that *Haemogregarines* have been most often recorded in fish erythrocytes. Also *Cryptobia sp.* found in *Siganus rivulatus* in liver and this result in partial agreement with (Lom and Dykova, 2006) who said that infection with vascular Cryptobia occurred in salmonids and carp. But (Woo, 2003) recorded that Cryptobia are not exclusively vascular parasites and (even sometimes the same species) also occur as ectoparasites on the fish body surface and in the digestive tract. Also reported Cryptobia in all species of Pacific *Onchohyncus spp*. in the west coast of North America.

The result also recovered *Myxobolus sp*. in liver, kidney and gonad and this result agree with (Paperna, 1973) who reported that infections are best known from cichlids, but also occur in fish from other families. Also Grant *et al.* (2013) reported that the microsporidia are diverse parasite infecting host group from all taxa in all environment transmitting horizontally or vertically. The same result obtained by Abdel-Baki *et al.* (2015) who observed clusters of developmental stages in the lumen of the renal tubules of *Siganus revulatus* from the Red Sea, Saudia Arabia coast. *Myxobolus sp*. has been reported in other organs as well as in gonads or others which are systemic and gonads are just another site (Diamant *et al.*, 2005; and Sirin and Toksen , 2014).

Henneguya sp. were found in liver, kidney and this result agree with (Eiras, 2002) who said that *Henneguya species* infect mainly freshwater fishes and parasitic stages of this parasite are

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mostly found in the gills, skin, kidneys, musculoskeletal system, or gastrointestinal tract. Kent *et al.* (2001) reported that *Henneguya* and *Myxobolus* form a polyphyletic clade comprised of both marine and freshwater species, and there are a few studies have examined geographic variation of infection with marine *Henneguya species*.

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