ISSN: 0067-2904

Serrasentis Sp. Acanthocephalans Parasite of Some Iraqi Marine Water Fishes With Observation of the Pathology, Feeding Habits and Infection of *Upeneus Sulphureus* Fishes

Majid Abdul Aziz Bannai
Department of Marine Vertebrate, Marine Science Center, University of Basra, Basra, Iraq

Abstract

The genus *Serrasentis* is one of important acanthocephalan parasites, parasitizing fish, birds and other vertebrates. Twenty two out of 500 fish specimens (4.4%) were found to be naturally infected with adult and cyst of worms of *Serrasentis* sp. which were collected from the stomach and intestine of *Synaptura orientalis*; *Johnius belangrii*, *Otolithus ruber* and ***Upeneus sulphureus*** fish species', from locations of Khor Abdullah, Arabian Gulf, Iraqi marine waters (29°58,33, N48°28, 20E) during the year 2017.The light and SEM study revealed that the adult worm have elongated and cylindrical body, anterior extremity with hooks forming combs arranged on the ventral and lateral region, longitudinally curved U-shaped, the Proboscis are claviform in shape and the measurement are equal to 0.54 long to 0.28 width, with 22-26 rows of 14-18 hooks, hooks thicker in ventral than dorsal parts, decreasing in size from the apex to the base. Proboscis receptacle with a thick double wall. The cross examination of ***Upeneus sulphureus*** fish intestines and food items containing revealed that are consists of different species of amphipods, and crustaceans, The present finding species are compared morphologically with some of the previously recorded species isolated from different host species, which revealed that the present species should be classified as *Serrasentis* sp. with a new host record in *Upeneus sulphureus* fishes.

Keywords: *Serrasentis* sp.; Acanthocephala; pathology; fish feeding habits of infection; Iraqi marine water; Arabian Gulf.

الطفيلي ***Serrasentis*** **sp** طفيليات شوكية الراس في بعض أسماك المياه البحرية العراقية. مع ملاحظة علاقة الأمراضية وعادات والتغذية للأسماك مع الاصابة

ماجد عبد العزيز بناي
مركز علوم البحار، جامعة البصرة، البصرة، العراق

الخلاصة

يعد الجنس *Serrasentis* واحدا من اهم انواع الديدان الشوكية الراس التي تتطفل على الاسماك والطيور وبعض الفقريات الاخرى اثنان وعشرون سمكة سمكة من مجموع خمسمائة عينه من الاسماك المصطاده بنسبة اصابة بلغت 4.4% وجد على انها مصابة بشكل طبيعي بالاطوار اليرقية والديدان البالغة للنوع *Serrasentis* sp والتي جمعت من معد وامعاء الاسماك كل من النويبي والمزلك والطعطعوه واسماك الجنعد***Upeneus sulphureus*** *Synaptura orientalis*; *Johnius belangrii* ,*Otolithus ruber* خلال العام (29°58,33, N48°28, 20E) احداثيات ،المياة البحرية العراقية ،في منطقة خور عبد الله.

Email: Majidbannai65@gmail.com

2017 .اظهرت نتائج الدراسة العينية والدراسة بالمجهر الالكتروني ان الطفيليات البالغة تمتلك جسم متطاول اسطواني يحتوي الجزء الامامي منه على مجاميع او تشكيلات من الاشوالك على الجانب البطني والجانبي والتي تكون متطاوله ومنحنية بشكل الحرف U ،الخطم كمثري الشكل 0.28 x 0.54 ملم تكون الاشواك المترتبة علية التي تظهر بشكل سميكة من الجانب البطني عنها من الجانب الظهري يكون الخطم مستدق من الجهة الطرفية عنها بالقاعده و غمد الخطم يحتوي على جدار مزدوج .الفحص العرضي لمحتوى الامعاء لنوع الغذاء تضمن افراد صغيره من الرويبيان والقشريات والشوكيات .يعد النوع المشخص في الدراسه الحالية الذي قورن من حيث الشكل مع الانواع المسجلة سابقا والمعزوله من مظائف مختلفة من الاسماك ، صنف النوع المسجل بالدراسة الحالية على انه نوع غير مسجل ومختلف وتعد اسماك *Upeneus sulphureus* مضيف جديدا لها.

Introduction

The Acanthocephalans parasite is an obligate parasite that uses some of arthropods and other invertebrate as intermediate and vertebrates as final host, the infection usually occurs when the definitive host ingests an infected intermediate host and complete life cycle, many of Acanthocephalan species are using a variety of vertebrate species as a definitive host, but some of them are specific in infection [1-3]. Near, 2000 [4] suggested that the relationship between early life stage of species of acanthocephalan parasite and their intermediate hosts are differ physiologically than that final life stage.

Different species of Acanthocephala parasites are known in the Arabian Gulf fishes, one species of *Serrasentis sagittifer*, Van Cleave are reported by [1] (Amin *et al.*, 1984), and three species of *Serrasentis* sp. are reported by Bannai, 2002 [5]. The common species of the genus are described by Golvan [6] that are synonyms of the *S. socialis* (Leidy, 1851) Van Cleave, 1924 with *S. sagittifer* (Linton, 1889) Linton, 1932. After that Gupta and Jain (1977) [7] are reported the *S. socialis* in *Rndlicentron cnnadum* and *Elecate nigre.* Also, they suggested that the *S. socialis* is a junior synonym of *S. sngittifl*, synonymy of three juvenile and one adult species, with the former is no more valid. The earlier synonymy of Indian species made by Soota and Bhattacharya (1981) [8] with *S. sagittifer* remains valid. The goal of the present study is to recognize a recorded of the genus *Serrasentis* parasite species, geographical distribution, larval stage, host recorded and their pathology to understanding the pathogenesis of infection, as well as the relationship between fish length, food items and infection.

Materials and Methods

Fish collection and examination

Fishes samples were collected from local fish market in Al- Faw City from the locations of the study area of Khor Abdullah Southern Iraq, Arabian Gulf (29°58 0 33 00 N48°28 0 20 E) Figure-1. Fish samples were placed in a clean plastic bags, chilled, and sent to the Marine Science Center, Basrah University. Some of samples injected with formalin 10% to prevent food degradation. The intestine of 500 fish specimens (110 of *Synaptura orientalis*; 130 of *Johnius belangrii* and 90 *of Otolithus ruber* and 170 ***Upeneus sulphureus***) examined during January to October of the year 2017. The intestinal tract was examined under a dissecting scope. Worms were stored in 70% ethanol, gross lesions were recorded, and host tissue samples were fixed in 10% neutral buffered formalin for further studies. Selected samples had been fixed and stored in 70% ethanol and shipped to Scottsdale, Arizona facility for processing and further studies of SEM (Scanning Electron Microscopy). SEM with digital images was obtained with the Nano lab software system (FEI, Hillsboro, Oregon). Images were taken at various magnifications. Fishes were identified according to (Kuronuma and Abe, 1986) [9].

Figure 1-Photograph drawing shows the study area of Iraqi marine coastal water, Arabian Gulf. (29°58, 33, N48°28, 20E).

Result and Discussion

1- Morphology and Scanning electron microscopy on *Serrasentis* sp.

The light and SEM study revealed that the adult worm has elongated and cylindrical body, anterior extremity with hooks forming combs arranged on the ventral and lateral region, longitudinally curved U-shaped, Proboscis claviform, armed with 22-26 rows of 14-18 hooks each. Proboscis hooks thicker in ventral than dorsal parts, decreasing in size from the apex to the base. Proboscis receptacle with a thick double wall

Echinorhynchida Southwell & MacFie, 1925
Rhadinorhynchidae Travassos, 1923
Serrasentinae Petrochenko, 1956
Serrasentis Van Cleave, 1923

***Serrasentis* sp.**

Location*:* Intestine and mesentery; pyloric caeca.
Distribution: Khor Abdullah, Arabian Gulf coasts. (29°58, 33, N48°28, 20E).
Description

Based on 17 specimens collected from *Synaptura orientalis; Johnius belangrii, Otolithus rubber and Upeneus sulphureus*: body elongated and cylindrical. Anterior extremity with hooks forming combs arranged on the ventral and lateral region, longitudinally curved U-shaped. The Proboscis is claviform in shape and the measurement is equal to 0.54 long to 0.28 mm width, with 22-26 rows of 14-18 hooks. Neck short and conical. Proboscis hooks thicker in ventral than dorsal parts, decreasing in size from the apex to the base. Proboscis receptacle with a thick double wall. A pair of leminisci extremely long, which extend to 2/4 of the trunk. Trunk elongated, with 24-28 longitudinal rows of 8-9 spines on anterior extremity; followed by transversal rows of combs of spines, 18-20 in males and 18 - 22 females, on ventral surface, Male genital apparatus: two ovoid testes in tandem, four tubular cement glands, and receptacle of cement linked at a Saefftigen's pouch elongated, seminal vesicle perform, and cirrus spiny inside of a bursa copulatrix. Female genital apparatus: ovarian balls primordium, uterine bell, a uterus and a muscular vagina divided in the funnel, sphincter, and bulb. Figures -(1, 2, 3)

Figure 2-A,B,C,D,E, Photograph of A lateral view of *Serrasentis* sp with camera canon attached Olympous microscope which, were collected from the stomach and intestine of *Synaptura orientalis; Johnius belangrii* ,*Otolithus ruber* and *Upeneus sulphureus* fish species, from locations of Khor Abdullah ,Arabian Gulf, Iraqi marine waters (29°58,33, N48°28, 20E).

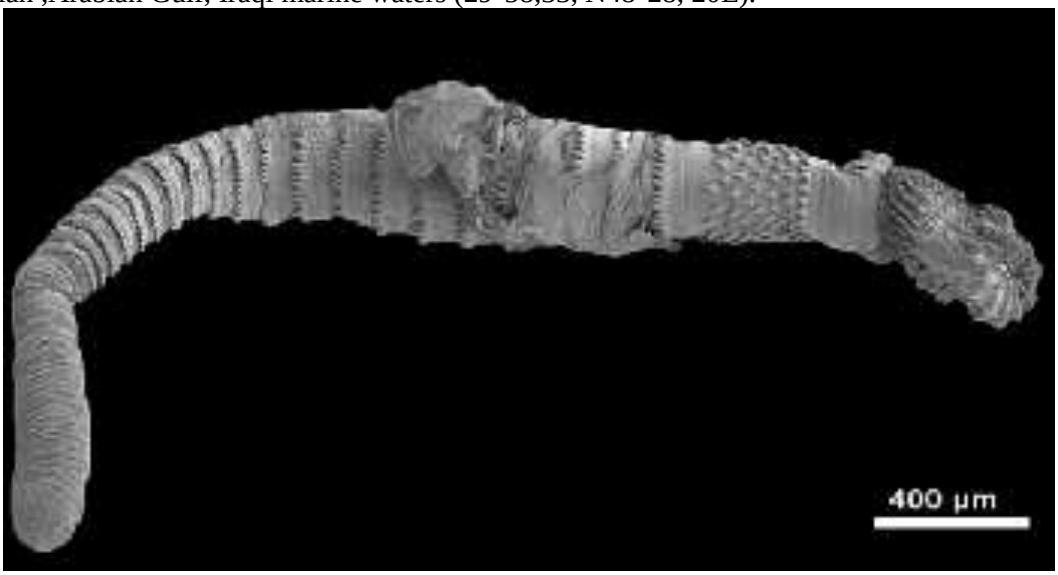

Figure 3-SEM of A lateral view specimens of *Serrasentis* sp. which were collected from the stomach and intestine of *Synaptura orientalis; Johnius belangrii, Otolithus ruber and* ***Upeneus sulphureus*** fish species, from locations of Khor Abdulah ,Arabian Gulf, Iraqi marine waters (29°58,33, N48°28, 20E).

Many species' of the genus *Serrasentis* are recorded around the world as *S. sagittifer* (Linton, 1889) Van Cleave 1923 (type species) syns.; *Echinorhynchus sagittifer* Linton, 1889; *Echinogaster sagittifer* (Linton, 1889) Porta, 1908; *Serrasentis socialis* (Leidy, 1851 nec 1858) Van Cleave, 1924; *S. chauhani* Datta, 1954; *S. longa* Tripathi, 1959; *S. longiformis* Bilqees, 1971*; S. giganticus* Bilqees, 1972; *S. scomberomori* Wang, 1981;*Serrasentis engraulisi* Gupta & Gupta, 1980; *Serrasentis fotedari* Gupta & Fatma, 1980 ; *Serrasentis golvani* Gupta & Kumar, 1987; *Serrasentis indicus* Singh, Agarwal & Lakshmi, 1998; *Serrasentis manazo* Bilqees & Khan, 2005 ; *Serrasentis mujibi* Bilqees, 1972; *Serrasentis nadakali* George & Nadakal, 1978 Species *Serrasentis psenesi* Gupta & Gupta, 1980 Species *Serrasentis sciaenus* Bilqees, 1972; *Serrasentis sidaroszakaio* Tadros, Iskandar & Wassef, 1979 ; *Serrasentis giganticus* Bilqees, 1973 accepted as *Serrasentis sagittifer* (Linton, 1889) (Synonym); *Serrasentis longiformis* Bilqees, 1974 accepted as *Serrasentis sagittifer* (Linton, 1889) (Synonym , *Serrasentis longus* Tripathi, 1956 accepted as *Serrasentis sagittifer* (Linton, 1889) (Synonym); *Serrasentis scomberomori* Wang, 1981 accepted as *Serrasentis sagittifer* (Linton, 1889) (Synonym) *; Serrasentis socialis* (Leidy, 1851) accepted as *Serrasentis sagittifer* (Linton, 1889) Original misidentification.

In the Arabian Gulf region including (Amin *et. al.,* 1984)[1] three types of these worms type Van Cleave, 1924 *S. Sagittifer* Kuwaiti coast, as well as run (Amin & Sey, 1996) [10]; Bannai, 2002 [5]. Another study in the same area found that the gut to gut six types of marine fish were infected by 18 of

the parasite *S. sagittifer* these fish have back new intermediate host to parasite. The SEM and morphological of previous record species are differing in the arrangement of hooks of the Proboscis, so we advise to more molecular study on this species of the parasites in the world.

2- The pathological observation.

The pathological observation affecting showed that some lived larvae encysted and adult forms are damaging to the tissues of their hosts and should produce significant injury. The lesions are hyperplasia around the parasite attachment and hyperplasia with infiltration. The inflammatory response in muscle tissues are included granulomatous lesions. Acanthocephalans are a group of endoparasitic helminthes commonly found in both marine and freshwater fishes worldwide, they have a complex life cycle involving arthropods as intermediate hosts and vertebrates as definitive hosts and are known to cause pathological conditions in many fin fishes Jithendran and Kannappan, 2010[11].

Acanthocephalan is one of most important pathogens parasite, which attaché to the digestive system, especially intestine. In recent years, some studies have been made on sea fish from the point of view of infection with different Acanthocephalans. Acanthocephalan infections depend on various factors such as species of parasite and host nature of the infected tissues and host-parasite interactions the nature and thickness of the various tissue layers, length of the neck and proboscis, presence or absence of a proboscis bulb. The nature of spination also affects the pathological outcome. The mechanical destruction to the host's intestinal tissue is usually followed by host immune responses like proliferation of fibroblasts and granular cell infiltration around the invader, resulting in the formation of a collagenic capsule around it, Schelhaas, 1980[12]. Usually in acanthocephalan infections, pathology appears to be negligible when parasites are attached to the epithelial mucosa only but deeply embedded forms like *Pomphorhynchus* spp. can cause serious pathological conditions resulting in extensive granuloma and subsequent fibrosis ,McDonough and Gleason, 1981[13]. Extensive inflammation, peritonitis due to perforation of the gut and systemic clinical changes will occur only in massive infections, most often in farmed fish, Bullock, 1963 [14]. Taraschewski (2000) [15] has observed that the pathogenicity of acanthocephalans is mainly caused by two factors, density of worms and depth of parasite penetration into the host tissues. Though the pathological effects are localized around individual worms, in the present case with unusually high parasite load, total destruction of the tissue architecture due to the collective pathological changes had occurred. However, the fish appeared healthy without any clinical manifestations and this observation is in agreement with the views of Hine and Kennedy, 1974 [16].

A similar finding has been reported by in case of other species of acanthocephalans.

3- Feeding habits and infection of *Upeneus sulphureus* fishes.

Seventy of ***Upeneus sulphureus*** Cuvier, 1829 sulphur goal fish were examined for feeding habits and infection relationship study. The total length of fishes examined and infected with cyst and adult of acanthocephalan were 20-25 cm long. The cross examination of fish intestines revealed food items containing amphipods and crustaceans ,so these food chine may play an important role as intermediate host for the parasite. The occurrence of various food items was distinctly different according to the fish size. The monthly occurrence of different food items in the stomach shows that a high percentage of occurrences of a miscellaneous group of food were recorded in some months of the year with the highest percentage in April and May. However crustaceans were the second ranking food items. According to Sivasubramaniam and Ibrahim, 1982 [17] fish habitat mostly is in the water column at a depth 20-60 m, and their diet consists of polychaetes, amphipods and small shrimps. The abundance of food diversity of these fish gives indications that there is a relationship between food habits and the infection.

The diversity of fish food and specialty contracting this type of parasites enhances the result that crustaceans are the most important sources of infection as they pose for the second occurrence of this type of food fish.

Acknowledgments: This project was supported by the Department of Marine Vertebrate, Marine science Center, University of Basrah. Iraq. Grateful to Dr. Omar M. Amin Institute of Parasitic of Diseases, Scottsdale, USA. Richard A. Heckmann Department of Biology, Brigham Young University, USA for taxonomic identification of the parasite studied in this paper and SEM image. Also grndful to Dr Abbas Jasiem, Marine Vertebrate Marine Science Center, University of Basra, Iraq for taxonomic identification of the fish host

Conclusion

More studies needed to recognize on the larval stage parasite infection and intermediate because of the relationship between them, and their clinic pathology to provide a basic of the general principles of the pathogenesis and pathology of parasite, and Their relationship between fish length, food items and infection

References

1. Amin, O. M., Nahhas, F. M., Al-Yamani, F. and Abu- Hakima, R. **1984.** On three Acanthocephalan species from some Arabian Gulf fishes off the coast of Kuwait. *J, Parasitol*., **70** (1): 168-170, http.r/www.j stor. orglpss/3 281951.
2. Nikishin, V.P. **2001.** The Structure and Formation of Embryonic Envelopes in Acanthocephalans. *Biol, Bull*., **28**(1): 40-53. http://www.springerlink.com/ contentlw67 6177 43 25v3 287 /fulltext. pdf.
3. Santos, R.S., Mtins M.L, Marengoni, N.G., Francisco, C. I., Piazza, RS., Takahashi, H.K. and Onaka, E.M. **2005.** *Neoechinorhynchus curemai* (Acanthocephala: Neoechinorhynchidae) in Prochilodus lineatus (Osteichthyes: Prochilodontidae) from the Parana' River, Brazil. *Vet. Parasitol*, **134**: 111-115. http://www.sciendirect.com/ science/journal/ 03044017.
4. Near, TJ. **2002**. Acanthocephalan Phylogeny and the Evolution of Parasitism. *Integrative and Comparative BioI*, **42**: 668-677. http://icb. Oxford journals. org/cgi/ reprintl42/3/668.pdf.
5. Bannai, M.A.A. **2002.** Parasite of some marine fishes of Khor-Abdullah, North West Arabian Gulf. M.Sc.Thesis College of Education, University of Basrah, 103p. (In Arabic).
6. Golvan, Y. J. **1969.** Systematique des Acanthocephales (Acanthocephala Rudolphi 1801), L'ordre de Palaeacanthocephala Meyer 1931, La superfamille de Echinorhynchidae (Cobbold 1876) Golvan et Houin 1963. Memoires du Museum Nationale d'Histoire Naturelle, **47**: 1-37.3
7. Gupta, N.K. and Jain, M. **1977.** On *Serrasentis socialis* (Leidy, 1851) Van Cleave, 1924 and discussion on synonymy of some related species with it. [ABS.]. All India Symposium Hel1ninthology, Srinagar: 3.
8. Soota, T. D. and Bhattacharya B.S. **1981** .On some acanthocephalans from indian marine fishes. *Bull.Zool.Survey india*, **3:** 227-233.
9. Kuronuma, K. and Abe,Y. **1986.** *Fishes of the Arabian Gulf*, Kuwait institute for scientific research, 356 pp.
10. Amin, O.M., SEY, O. **1996.** Acanthocephala from Arabian Gulf fishes of Kuwait, with descriptions of *Neoechinorhynchus dimorphospinus* sp. n. (Neoechinorhynchidae), *Tegorhynchus holospinosus* sp. n. (Illiosentidae), *Micracanthorhynchina kwaitensis sp*.n. (Radinorhynchidae), and *Slendrorhynchus breviclaviproboscis* gen. n., sp. n. (Diplosentidae); and key to species of the genus *Micracanthorhynchina*. *Journal of the Helminthological Society of Washington*, **63**: 201-210, 1996.
11. Jithendran, K.P. and Kannappan, S. **2010.** A short note on heavy infection of acanthocephalan worm (Neoechinorhynchus agilis) in grey mullet, Mugil cephalus. *Journal of Parasitic Diseases*. **34**(2): 99-101.
12. Schelhaas, D.P. **1980.** Comparative Histopathology of Acanthocephan Infections in Some Freshwater Fishes. M.Sc. Thesis, University of North Dakota.
13. Mcdonough, J.M., Gleason, L.N. **1981.** Histopathology in the rainbow darter, *Etheostoma caeruleum*, resulting from infections with the acanthocephalans, *Pomphorhynchus bulbocolli* and *Acanthocephalus dirus*. *The Journal of Parasitology*, **67**: 403-409.
14. Bullock, W. L. **1963.** Intestinal histology of some salmonid fishes with particular reference to the histopathology of acanthocephalan infections. *Journal of Morphology*. **112**: 23-44.
15. 15. Taraschewski, H. **2000.** Host-parasite interactions Acanthocephala:a morphological approach. *Adv. Parasitol*. **46**: 1-179.
16. Hine, P.M., Kennedy, C.R. **1974.** Observation on the distribution, specificity and pathogenicity of the acanthocephalan *Pomphorhynchus laevis*. *Journal of Fish Biology*, **6**: 521-533.
17. Sivasubramaniam, K. And Ibrahim, M.A. **1982.** Common fishes of Qatar. Scientific Atlas of Qatar, Doha. 176 p