Isolation And Diagnosis of The Tapeworms Parasitizing in Some Fish Species in Tigris River at Salah Al-Din Governorate, Iraq

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Abstract
During the period from February 2021 to the end of January 2022, a total of 580 fish specimens belonging to seven families and 16 species from Tigris River at Tikrit city. The results revealed infection with seven species of cestoda, belong to five different families, Amphcotylidea (Eubothrium salvelini); Bothriocephalidae (Schyzocotyle acheilognathi); Cyathocephalilide (Caryophllaeus brachyocllois, Caryophllaeus fimbriceps, Khawia armeniaca); Diphyllobothridae (Ligula intestinalis) and Proteocephalidae (Postgangesia inarmata).
Key words: Tapeworms, Cestoda, worms, fish parasite.

1. Introduction

The study of fish parasites in any aquatic systems is important because it directly binds to the importance of fishes, which are infected by these harmful organisms. Parasites are important, since they affect fish productivity via mortalities, reduce growth percentage, decrease the value of fish meat and rise fish susceptibility to more pathogenic agent. Since the world is about to get a lot more crowed, all food stuffs including fishes, become ever more worthy as they are considered a cheap source of animal protein (1). Increasing the probability of human 's infection of fish parasites more common than endoparasites, where it is possible to be some worms such as Trematoda, Cestoda and Nematoda to move human through eating uncooked fish on the opposite ectoparasites (2). But there will not be harmful if fish cook perfectly (3). Cestodas are also commonly called as tapeworms, it is a class of parasitic worms in the flatworm phylum (Platyhelminthes). All cestodes are generally flat, segmented and ribbon-like. The body consists of a scolex (head, a short neck and strobili (segemented body) formed of proglottids. The scolex is used by the worm to anchor itself on the host. The length of these worms might arrive 10 meters in some species. Since cestodes are endoparasites, they can cause severe damage for the infected fish, especially by large helminthes. These worms have no gut or mouth; therefore, they get their food by absorbing nutrients from the hosts alimentary tract via particular cuticle which can also protectthe parasite from digestive enzymes of the host (4).

Cestoda consists of two family: **Cestodaria** has two orders Gyrocotylidea and Amphilinidea. The second family is **Eucestoda** that medical importance (5). It involves 13 orders that are well over 5000 valid species of cestodes, adult of these worm inhabit the digestive tract, or occasionally its associated organs, in the vertebrate definitive host. Cestodes lack a digestive system, absorbing nutrients through a specialised outer layer of the body, the neodermis (6). Cestoda diagnostic depends on morphological and biometrical characters such as shape and structure scolex, number and shape suckers, hooks, spines, bothria, shape proglottids, sexual organs, structure in uterus and vitellaria gland. Also shape and size eggs (4).

2. Materials and Methods

A total of 580 fish specimen were collected during the period from February 2021 to January 2022, from different local shops in Tikrit city. Samples transferred to our parasite laboratory in College of Science. The fishes were examined as fresh material according to mentioned method to (7), Besides, these fishes were determined according to their scientific names (8). Cestoda was transported with a fish intestine tissue to put in water. The worms were conserved by using ethanol 70% and stained by acetocarmin (9). measurements and diagnosis parasites (10) and Scanning electron microscope of some Tapeworms

3. Result and Dissection

Through the current study is collected and examined 580 fish, involved sixteen species of fish. They have taken from Tigris River at Tikrit city. The results revealed that infection with seven species of cestoda involving Caryophllaeus brachyoclois, Caryophllaeus fimbriceps , Eubothrium salvelini, Khawia armeniaca, Ligula intestinalis, Postgangesia inarmata and Schyzocotyle acheilognathi (Table 1).

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Table (1): Distribution of Cestoda Parasites in different sites of infections and their prevalence on fish species of Tigris river at Tikrit city.

Parasite	Fish species	Fish no.		Prevalence %	Mean Intensity
		Total	Infection		
C. brachyocllois	Carasobarbus luteus*	65	2	3.07	6.00
C. fimbriceps	Silurus triostegus*	10	1	10.00	15.00
E. salvelini	Carasobarbus luteus	65	3	4.61	2.33
K. armeniaca	Alburnus sellal*	40	2	5.00	5.50
	Arabibarbus grypus	30	1	3.33	10.00
L. intestinalis	Leuciscus. Vorax	50	3	6.00	3.33
	Heteropneustes. fossilis*	10	1	10.00	5.00
P. inarmata	Mastacembelus mastacemblus*	12	1	8.33	2.00
S. acheilognathi	Chondrostoma regium	55	2	3.63	4.00
	Cyprinus carpio	60	7	11.66	4.28
	Luciobarbus. Xanthopterus	21	1	4.76	2.00
	Silurus triostegus	10	1	10.00	12.00
*New host in Iraq					

1- Caryophllaeus brachyocllois Janiszewsk, 1951

The tapworms were recorded with percentage of C. luteus infection 3.07% and mean intensity 6.00 (Table 1)

Description

Body slender, elongated, with maximum width at level of cirrus-sac, then narrowing towards posterior extremity. Scolex spatulate, with tapered anterior edge or flabellate with curved anterior margin slightly or markedly wider that neck (Figure 1). Testes oval to sub spherical, intermingled with vitelline follicles; anterior most testes close or at long distance from scolex; posteriorly testes reach anterior margin of cirrus-sac. Vas deferens surrounded by vitelline follicles. Cirrus-sac large, thick-walled, elongated to ovoid, containing long, muscular cirrus. Internal seminal vesicle absent. Ovary follicular. Vagina sinuous in its proximal part, almost straight distally. Seminal receptacle oval to sub spherical, antero dorsal to ovarian isthmus. Preovarian vitelline follicles lateral and median, surrounding testes and distal (posterior) part of vas deferens; postovarian vitelline follicles numerous (several dozens). Uterine region moderately long.

The first record of this worm in Iraq was from Barbus lacerta in Tigris River (11). Then it was recorded from L. xanthopterus only (12). Therefore, this fish was considered a new host in Iraq and represented third host in the currently study.

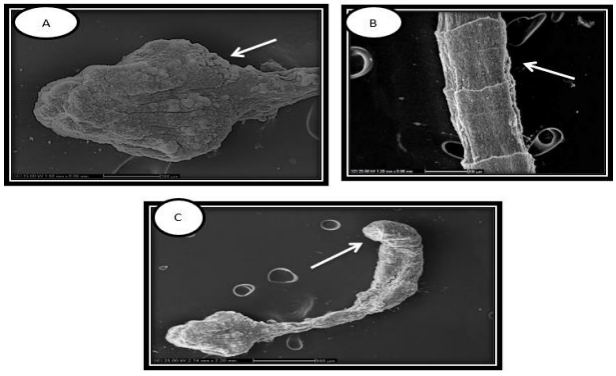

Figure (1): SEM micrograph of Caryophllaeus brachyocllois showing: A: Scolex B: reign after scolex C: posterior end

2. *Caryophllaeus fimbriceps* Annekova-khlopina, 1919

This cestoda was collected, from intestine of *S. triostegus* with percentage of infection 10.00% and mean intensity 15.00 (Table 1) .

Description

This parasite worme of moderate size, anterior margin of cephalic expansion deeply lobated in to festoons. Neck constriction is absent. vitellaria begin at short distance away from the cephalic extension ovary and extend back to anterior or margin of ovary. Post varial group of vietlaria small. Tastes numerous with anterior boundary extending somewhat behind of vitellaria. seminal receptacle small. Uterine loops few. Length of the worms 9-16mm, width 0.9-1.1mm.

The first record of this worm in Iraq was from *Luciobarbus barbulus* of intestine in Dokan, north of Iraq by (13). Later, this worm was recorded from *L. kersin*. There was not recorded from *S. triostegus* , considered a new host in Iraq, and third host. This was first record in Salah Al-Deen (12).

3. Eubothrium salvelini Schrank, 1790

These parasites were collected from intestine of C. luteus with percentage of infection4.61% and mean intensity 2.33 (Table 1).

Description: The maximum length of E. salvelini was 51 cm. Both possessed an elongate scolex with a prominent, slightly convex apical disc and two elongate shallow bothriae situated dorsoventrally. On the lateral, wider side of the scolex, two shallow depressions, resembling the bothriae,. The general morphology of the strobila was similar in both species. Proglottids were craspedote, always wider than long, with a very short cirrus sac, a bilobed ovary, and well-developed longitudinal musculature, forming isolated bundles of muscle fibres surrounding internal organs. Large intrauterine eggs were of similar appearance

Eubothrium salvelini was reported the first time from the body cavity of C. lutues (reported as B. luteus) by (14). Later, it has been recorded from one species of fish only (12). Therefore, this fish considered a new host in Iraq.

4. Khawia armeniaca (Cholodkovsky, 1915) Shulman, 1958

Khawia armeniaca was isolated from the intestion, of *A. sellal* with percentage of infection 5.00% and mean intensity 5.50 (Table 1).

Description

The body that showed consisted of one piece. The total length
of body of this parasite is 6-10 mm, and the maximum width reached (1.19- 1.53) mm. Scolex is bulbate, slightly than neck mm (Figure 2). Test spherical. Ovary bilobed, butterfly-shaped, with two lateral arms, like H litter near to the posterioraway. Vitelline follicles cortical, oval, variable in size, and spread about in all body specially in the sides, and cluster of Postovarian follicles located at the end of worms.

This worm was reported the first time in Iraq from Mesopotamichthys sharpeyi in Al-Hammar march (15). Then, it was recorded seven species from fish in Iraq and A. grypus was involved but A. sellal was not included. So, it was considered as a new host and represented eighth host (12).

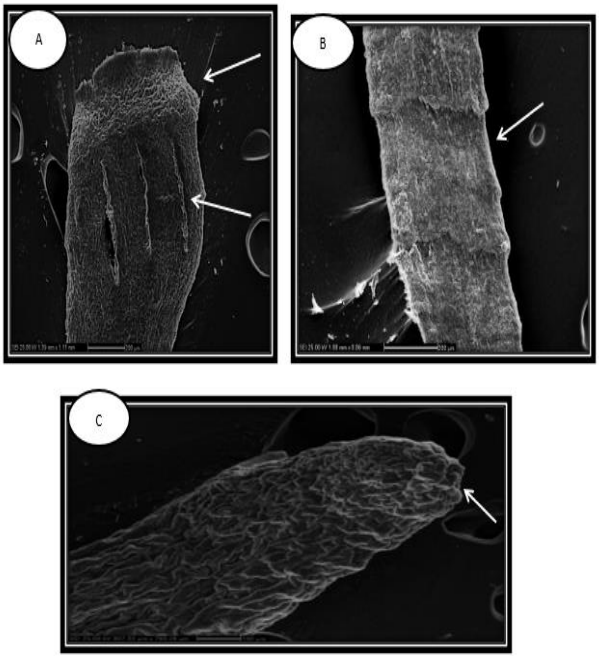

Figure (2): SEM micrograph of Khawia armeniaca showing: A: Scolex, gland duct B: Region after Scolex C: posterior end.

5. Ligula intestinalis Linnaeus,1756

This cestoda were collected from intestine of two species fish, *L. vorax* and *H. fossilis,* with percentage of infection 6.00% and 10.00, mean intensity 3.33 and 5.00 respectively (Table 1).

Description: Parasite length 20 - 100 cm, width 0.5 - 1.8 cm, without external separations, swimming at surface or on their sides/back, swollen belly, loss of appetite. The plerocercoid was of white colour, belt-shaped, with sharpened anterior and posterior body ends. The body segmentation was not obvious. The scolex presented two bothridae, less small than those of the adult cestoda. The plerocercoid has developed genital organs, which open at the body surface through a genital pore placed medially.

Ligula intestinalis The first report of this cestode in Iraq was from the body cavity of *L. vorax* (reported as *A. vorax*) from Shatt Al-Arab River by (16). Also, it was recorded fifteenth species of fish and *Heteropneustes fossilis* was not involved. It was considered new host and acted sixteenth (12).

6. Postgangesia inarmata (de Chambrier *et al.*, 2003)

The tapworm were recorded of *M. mastacemblus* with percentage of infection 8.33% and mean intensity 2.00 (Table 1).

Description: The scolex of *P. inarmata* is fairly invariable in shape, being symmetrically globular, almost square shaped in the apical view, and provided with four conspicuous, anteriorly directed suckers and a large, spherical, rostellum-like apical organ. The rostellum-like apical organ is armed with to six irregular circular rows of small hook lets with a wide, oval basal plate and a short, sharp, posteriorly curved blade. The size of the hooklets decreases from the anterior (apical) row posteriorly. The largest hook lets have an oval basal plate the scolex are present on the neck region and posterior margins and internal cavities of the suckers. It is assumed that tegumental spines reported in the scolices of other proteocephalideans . ovary is bilobed and massive, uterus with lateral diverticula, out growths begin anteriorly, vitellaria are lateral in cortex, testes ovary and uterus medullary with median genital pores .

These worms were discovered for the first time *S. triostegus* in east-south Diylla river (17), But it was the synonym name called *Silurotaenia siluri*. After that it was recorded three species of fish in Iraq (12). *M. mastacembelus* was not included so it was considered new host and represented fourth host.

7. Schyzocotyle acheilognathi (Yamaguti, 1934)

This parasites were collected, from intestine of four species fish, *C. regium C. carpio* , *L. xanthopterus* and *S. triostegus* with percentage of infection 3.63% , 11.66% , 4.76% and 10.00% respectively and mean intensity 4.00, 4.28, 2.00 and 12.00 respectively (Table 1) .

Description: body length about 55-65- mm long. Maximum width 0.83- 1.22 mm. A wide scolex arrow or heart-shaped (Figure 3) , deep dorsally and lateral bothrias short and very deep. Neck not clear and first proglottid imediatelly posterior to scolex; imature proglottids much narrower, mature and gravid proglottides

This parasite was recorded for the first time in Iraq by (18) from C. carpio in some fish farms in Baghdad but in the synonymy name was S. acheilognathi . Late, it was stated from 19 fish hosts in Iraq (12). It was involved from C. regium L. Xanthopterus and S. triostegus. This L. xanthopterus was recorded the first time in Salah Al-Deen in the currently study. While C. regium and S. triostegus were reported the second time in Salah Al-Deen.

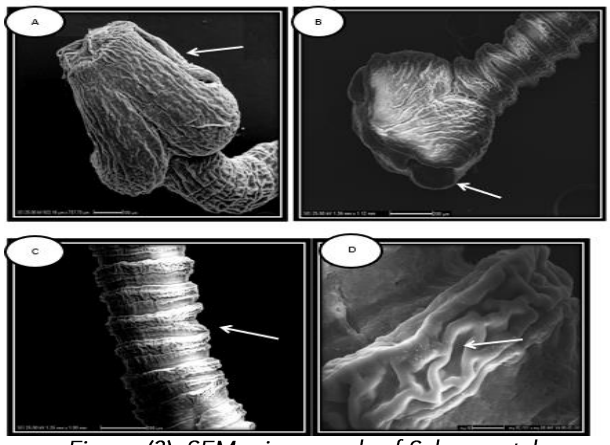

Figure (3): SEM micrograph of Schyzocotyle acheilognathi showing: A and B: Scolex (arraow) Bothria C: Proglottides D: mature proglottides

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