Histopathological effects on two carangid fishes in northwest of the Arab Gulf, Iraq infected with trypanorhynch cestodes

Khalidah S. Al-Niaeem*, Suzan A. Al-Azizz, Fatimah H. Al-Ataby***, Saleh K. Majeed******

*****Department of Fisheries and Marine Resources, College of Agriculture, University of Basrah, Basrah, Iraq, kalidah_salim@yahoo.com
**Department of Microbiology, College of Veterinary Medicine, University of Basrah, Basrah, Iraq, suzanalazizz@yahoo.com
***Department of Microbiology, College of Veterinary Medicine, University of Basrah, Basrah, Iraq, fatimah.iraq@yahoo.com
********Department of Pathology and Poultry Diseases, College of Veterinary Medicine, University of Basrah, Iraq

Abstract:

Histopathological effects in gills, heart, liver, spleen, intestine and genital organs of carangid fishes *Carangiodes malabaricus* and *Megalaspis cordyla* infection with trypanorhynch cestodes [*Callitetrarhynchus gracilis, Callitetrarhynchus* sp., *Floriceps minacanthus, Progrillotia* sp. and *Pseudogrillotia spratti*] were studied. A total of 86 fishes samples were collected during the period between September 2011 till March 2012. Fish samples were obtained from northwest Arab Gulf, Iraq [latitudes 47° 30′ to 48° 15′; longitude 30° 50′ to 30° 00′]. It was found the macroscopic lesions represented hemorrhagic congestion, patches and redness around the heart, spleen, liver and intestines. The microscopically showed that thickening in the lamella and the presence of foreign bodies may be from parasites, collected acidophilic materials, erosion, hyperplasia of lamina propria of the intestine and infiltration and expansion of blood vessels around the heart area.

Keywords: Histopathological effects, Trypanorhynch, Carangid fishes, Arab Gulf.

I. Introduction:

Trypanorhynch belong to the most abundant marine fish parasites especially in tropical waters [1]. Beside their negative effects on fish health, these parasites can infect the fishes musculature and are of economic significance [2]. Trypanorhyncha have been reported from various oceans [3] a thirty fish species from the Visayan Sea in the central Philippines were investigated for the central Philippines for the occurrence of parasites in their flesh [4].

Trypanorhynch larvae on free-living host fish species was difficult to demonstrate, although Hoffman [5] gave an opinion that such influences may diverse and include growth disturbances and lowering of the condition factor. Direct

pathogenic effects have been established in only a few cases [6, 7]. Adjei *et al.* [8] attributed an increase mortality of *Saurida tumbil.* The pressure of the ventral aorta exerted by the blastocyst of *Callitetrarhynchus gracilis,* while Bussieras and Aldrin [9] showed an increasing mortality of young *Thyrsites atun* due to heavy infestation of the ventral aorta with plerocercoid of *Dasyrhynchus talismani*. Larval cestodes [plerocercoid], also known as metacestodes [10] was of the most damaging parasites to viscera of fish and decreases carcass value if presents in muscle and scolex of cestodes caused only local erosion of the mucosa and proliferation of fibrous tissue at the site of attachment, scolex of cestodes destruction of hepatocytes and thickening of capillary walls caused by these parasites [11].

Relatively few studies have investigated the effects of trypanorhynch on their hosts [12, 13] as a consequence, one is left to speculate about the severity and frequency of occurrence of cestode-induced disease and mortality during infections in wild sharks which described the histopathogenicity of two adult trypanorhynch from the mucosa of the nurse shark. Never the less quite of few reports on the pathogenicity of cestode on fishes are available, furthermore, Campbell and Callahan [14] studied the pathological effect of the larval stage of *Hepatoxylon trichiuri* in the liver of the shark and observed hyperplasia and infiltration of White Blood Cell. The aim of the study including the histopathological effects of trypano- rhynch cestodes in gills, heart, liver, spleen, intestine and genital organs of carangid fishes *C. malabaricus* and *M. cordyla* wer.

II. Materials and Methods:

A total of 490 fishes [256 *C. malabaricus* and 234 *M. cordyla*] samples were collected from northwest Arab Gulf, Iraq during the period between September 2011 till March 2012. They transport to the laboratory. Each fish specimen weighed and measured the total length and opened longitudinally and internal organs were fully examined e. g. gut, spleen, cecum, liver by using dissecting microscope according to the method by [15] and [16]. 25 specimens of two above species was selected for histopathology study, and infected organs were fixed in 10% formalin. Preserved, embeding in parafin, cutting by use rotary microtome, and stained with heamatoxylin and eosin according to [17] .

III Results:

In table [I] noticed the type of trypanorhynch cestodes which was isolated from each species of carangid fishes [*C. malabaricus*, total length 17-26 cm and *M. cordyla*, 22-30 cm] of the present study. The parasites recorded as a first time in Iraq [put in Natural History Museum, London] and some fish recorded as a new host in Iraq.

Table. I. Parasite- host list of the present study**.**

Cestoda	**Fish host**
Callitetrarhynchus gracilis	*Carangoides malabaricus*** *Megalaspis cordyla***
Callitetrarhynchus sp.*	*Carangiodes malabaricus* *M. cordyla*
*Floriceps minacanthus**	*C. malabaricus*
Progrillotia sp.*	*Megalaspis cordyla*
*Pseudogrillotia spratti**	*M. cordyla* *C. malabaricus*

*First record in Iraq
**New host record in Iraq

A. Gross examination

During the present study, a macroscopic lesions were seen in the internal organs of fishes [*C. malabaricus* and *M. cordyla*] by trypanorhynch cestodes. These lesions including congestion, edema and hemorrhagic focus were observed in liver, kidney and intestine wall. In some cases a thick layer of mucus was shown, hemorrhage from superficial capillaries of cardiac region, also congestion in the ovary and spleen [Fig. 1]. Many cysts present in the body cavity of fishes [Figs. 2, 3].

B. Microscopic examination

Liver:

In the liver of infected fishes [*M. cordyla* with trypanorhynch] it can be found a vacuolated of hepatocytes in the center structure appear vein which enclosed by fibrous tissue like, with aggregation of inflammatory cells [Fig. 4] as compared with control [Fig. 5].

Stomach:

The main lesions that present in infected stomach including vacculation of mucus glands and congestion of smooth muscles in the out of serosa [Fig. 6] as compared with normal [Fig. 7].

Kidney:

The kidney of infected fish [*M. cordyla***]** were notice dystrophic calcification and bleeding in cortical tubules and Glomeruli as compared with normal [Figs. 8, 9].

Heart:

It is noticed the myocardial of infected fish with areas hemolysis [Fig. 10]. The outer and inner part of the heart with an empty spaces between muscular layer [Fig. 11], and suppurated muscular with congestion areas of dilated blood vessels [Fig. 12], fatty infiltration and area of inter still edema [Fig. 13], while [Fig. 14, 15] the control group.

Ovary:

Ovary of infected fish [*Carangiodes malabaricus*] with stages of egg development characterized by numerous fat droplets, three stages of egg development. The first is pale basophilic structure lined by cell membrane and dark cytoplasm. The second stage is egg full with fat droplets enclosed by double cell membrane but the third stage is quite large, no differentiation of fat droplets can be identified. It is noticed the first stage in the center of the second stage, primary and secondary tertiary follicles and presence of fibrous capsule like [Fig. 16, 17, 18, 19].

Testes:

The testes of infected fish [*C. malabaricus*] look like normal lesion with somniferous tubules with reduce spermatogenesis [Fig. 20].

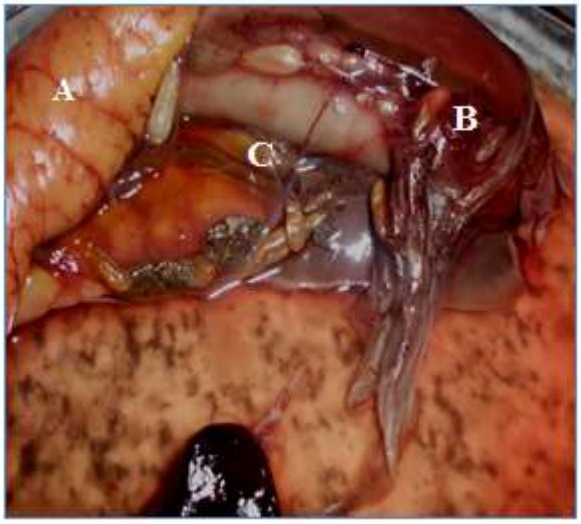

Fig. 1. Grossly investigation of *C. malabaricus* infection with trypanorhynch cestodes, [A] ovary, [B] spleen, [C] cyst, with hemorrhage foci, sever congestion.

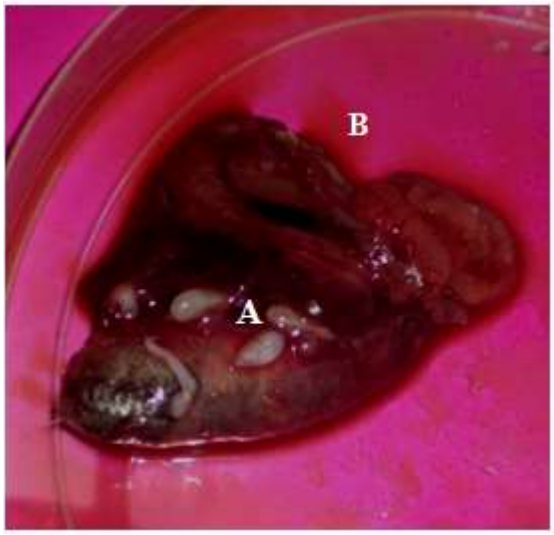

Fig. 2. Grossly investigation of *C. malabaricus* infection with trypanorhynch cestodes, [A] liver with cyst [B] spleen with hemorrhage and congestion.

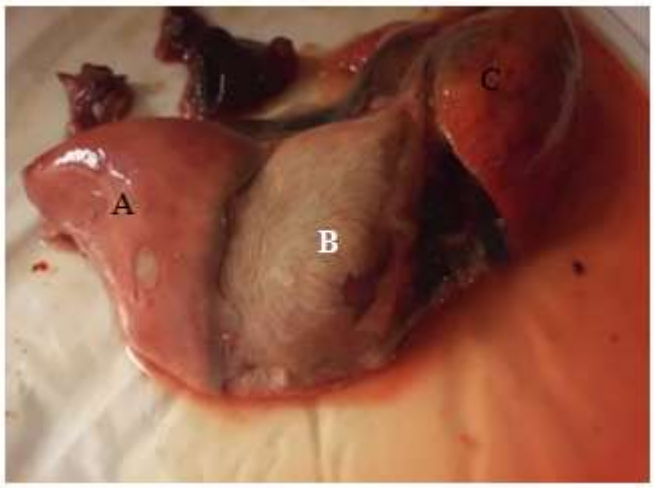

Fig. 3. Grossly investigation of *C. malabaricus* infected with trypanorhynch cestodes, [A] heart with congestion, cyst [B] Cecum, [C] ovary.

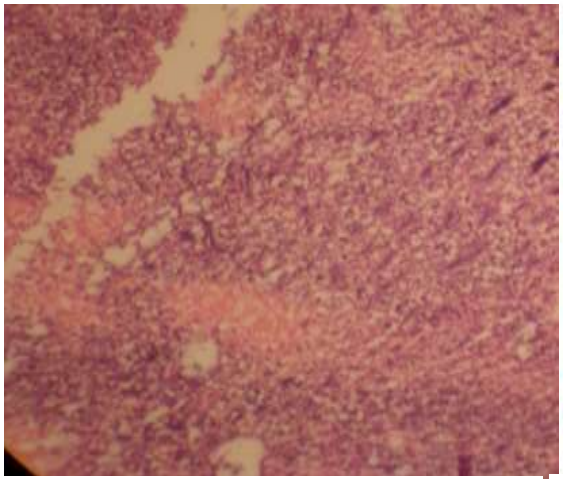

Fig. 4. Photomicrograph of control liver [E & H, 500X].

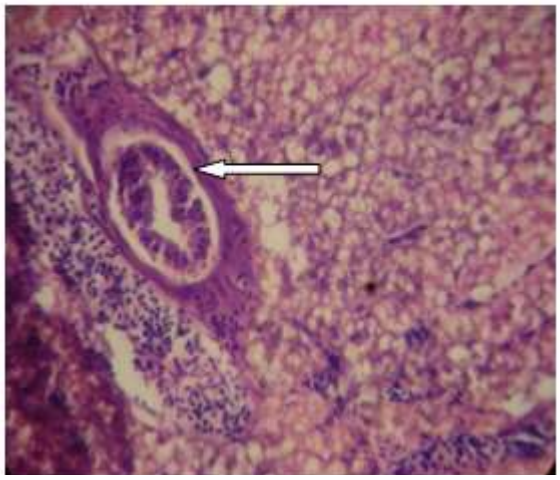

Fig. 5. Photomicrograph of infected liver in *M. cordyla* with trypanorhynch cestodes, vacculation of hepatocytes in the center vein enclosed by fibrous tissue. [E & H, 500X].

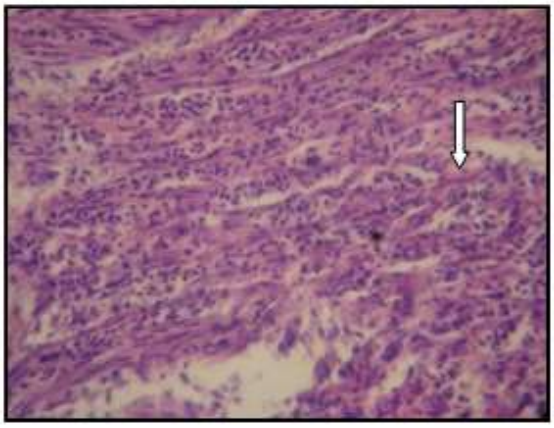

Fig. 6.. Photomicrograph of infected stomach in *C. malabaricus* infection with trypanorhynch cestodes, congestion in the smooth muscles [H & E, 500X].

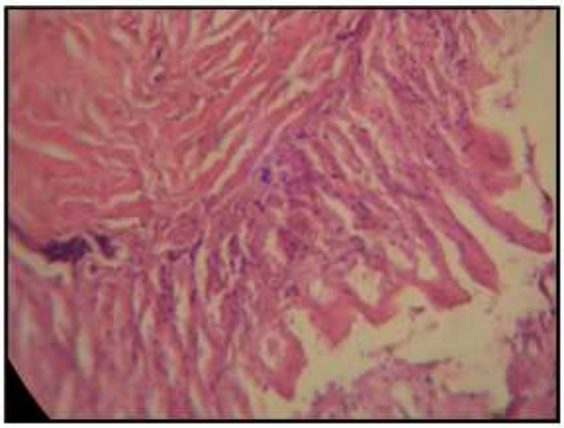

Fig. 7. Photomicrograph of control stomach [H & E, 500X].

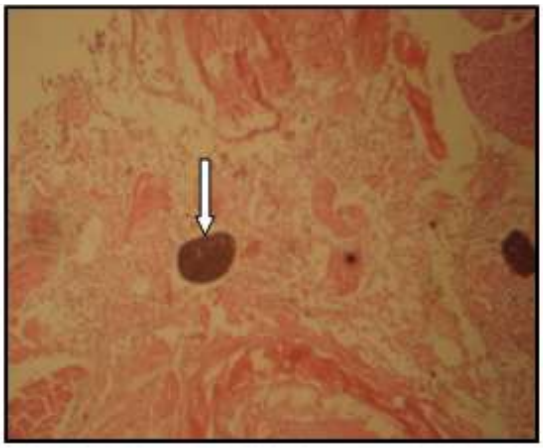

Fig. 8. Photomicrograph of infected kidney in *M. cordyla* infection with trypanorhynch cestodes, dystrophic calcification and bleeding in cortical tubules and Glomeruli [E & H, 125X].

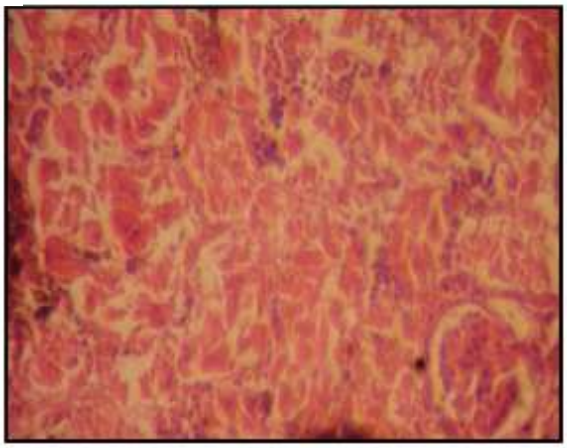

Fig. 9. Photomicrograph of control kidney [E & H, 500X].

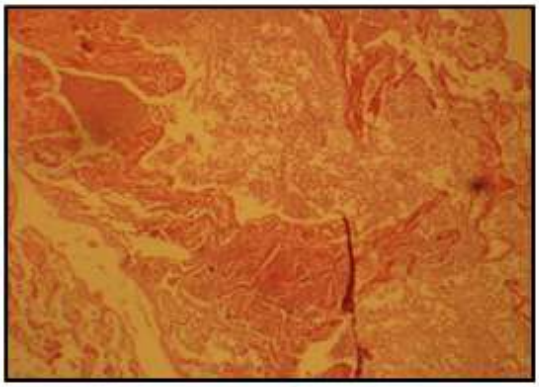

Fig. 10. Photomicrograph of infected heart in *M. cordyla* infection with trypanorhynch cestodes, with myocardial muscles cells and areas of hemolysis [H & E, 125X].

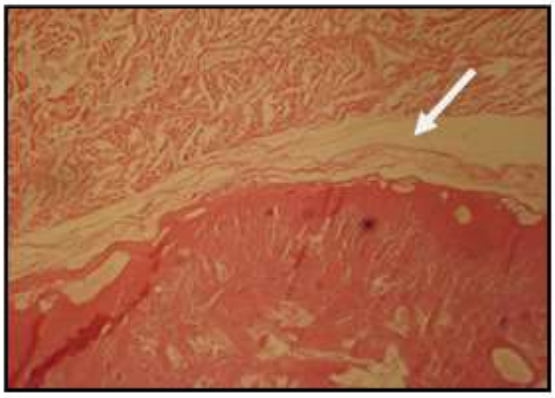

Fig. 11. Photomicrograph of infected heart in *M. cordyla* infection with trypanorhynch cestodes, empty spaces between muscular layer in the inner and outer part [H & E, 125 X].

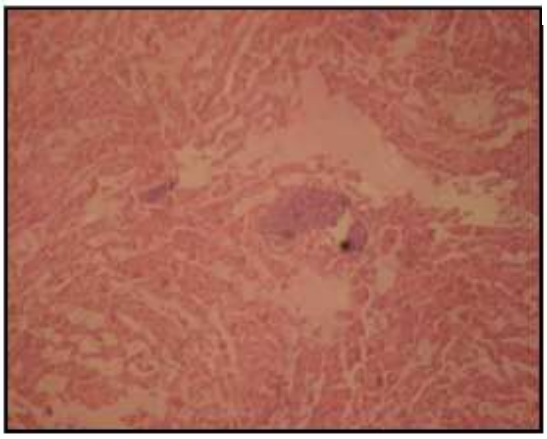

Fig. 12. Photomicrograph of infected heart in *M. cordyla* infection with trypanorhynch cestodes, with areas of congestion and dilated blood vessels [H & E, 125X].

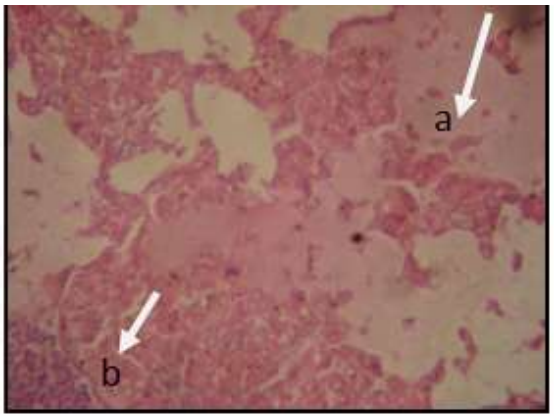

Fig. 13. Photomicrograph of infected heart in *M. cordyla* infection with trypanorhynch cestodes, with areas of inter still [a] edema and [b] fatty infiltration [H & E, 125X]

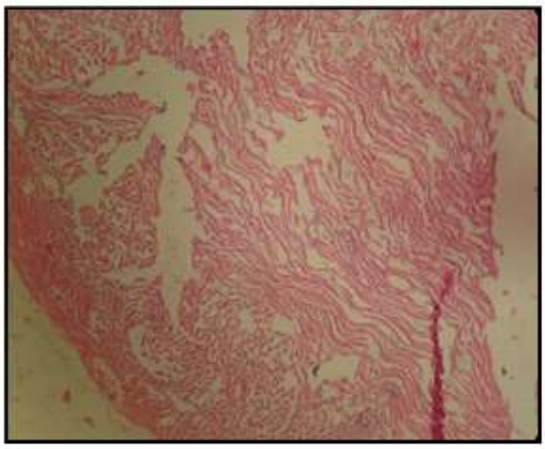

Fig. 14. Photomicrograph of control heart, the ventricle. [H & E, 125X].

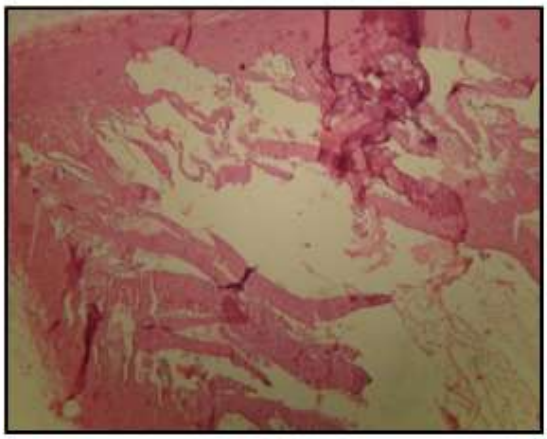

Fig. 15. Photomicrograph of control heart, the atrium [H & E, 125X].

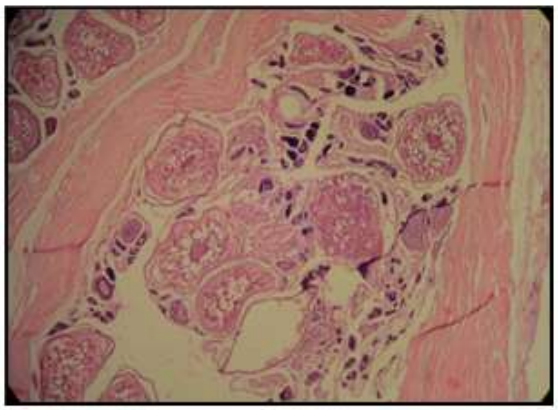

Fig. 16. Photomicrograph of infected ovary in *C. malabaricus* infection with trypanorhynch cestodes with fibrous capsule like [E & H, 500 X].

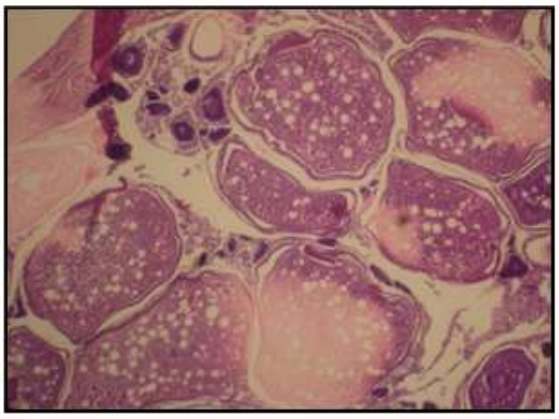

Fig. 17. Photomicrograph of control ovary [E & H, 500 X].

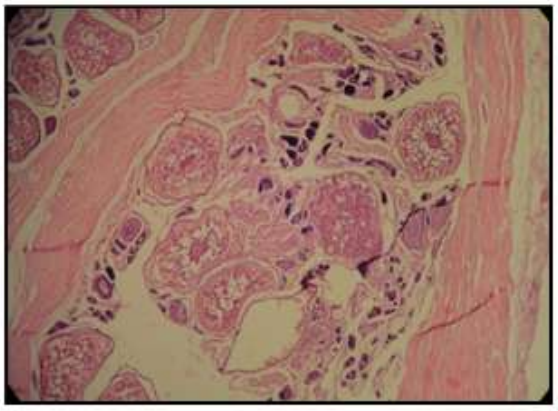

Fig. 18. Photomicrograph of infected ovary in *C. malabaricus* infection with trypanorhynch cestodes with fibrous capsule like [E & H, 500 X].

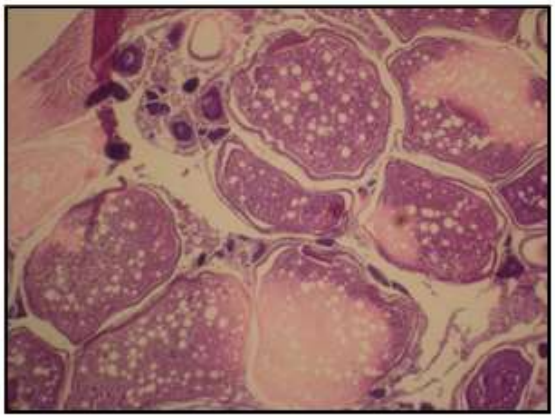

Fig. 19. Photomicrograph of control ovary [E& H, 500 X].

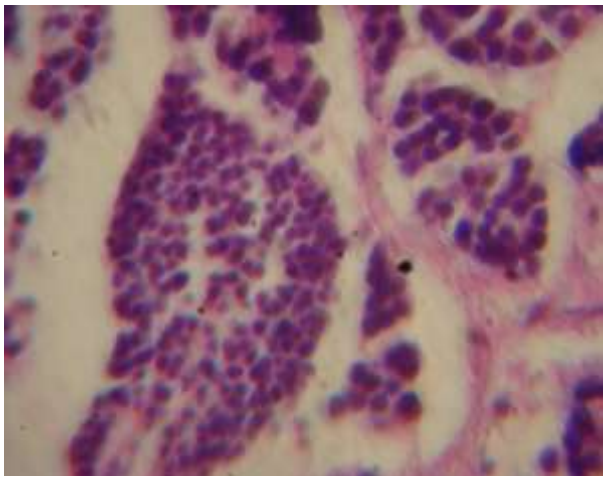

Fig. 20. Photomicrograph of testes in *C. malabaricus* infection with trypanorhynch cestodes, somniferous tubules with reduce spermatogenesis [E & H, 500X].

VI. Discussion:

Microscopically, this study shows erosion in *C. Malabaricus* fishes which infected with Trypanorhynchid cestodes present of larvae inside cyst of intestine this due to adhesion of this larva in the epithelial layer. This result is similar to the result of [18] who observed edema and sever inflammation reaction around the plerocercoid. Abbas [19] showed adhesion of *Bothriocephalus acheilognathi* in the epithelial layer of intestine, also Al-Niaeem [20] noticed adhesion of *B. acheilognathi* in the epithelial layer of intestine.

In genital organs; ovary with stages of egg development characterized by numerous fat droplets, three stages of egg development, primary, secondary and tertiary follicles and presence of fibrous capsule either the lesion that presents in testes somniferous tubules with spermatogenesis, which may be due to the attachment of cestodes in this organs and make a host immune defense to release this pathological changes [21].

Rahemo and Al-Nouri [21] recorded a pathological effect of the *Ligule intestinalis* larvae in the ovary and testes of *Acanthobrama marmid* with in fibrous capsule in ovary and infiltration while in the testes abnormalities in shape of sperm.

Liver with vacculation hepatocytes in the center structure appeared bile duct enclosed by fibrous tissue like, vacuolated hepatocytes near the central vein with cyst full with acidophilic materials, all the causes of these changes may be due to the mechanical damages by parasites and the host immune defense [11, 22]. Campbell and Callahan [14] studied the pathological effect of *Hepatoxylon trichiuri* in liver of shark and observed infiltration and hyperplasia, while Camargo and Martinez [22] noticed vacculation and damaged of hepatocytes of *Prochilodus lineatus*.

In kidney nest of myelin in med of macrophages, some congestion and cortical tubules were found which may related to the parasite secret many toxic materials which may be effect on kidney as a renal toxicity and make this changes in *M. cordyla* with trypanorhynch [22, 23].

Camargo and Martinez [22] showed alterations and degeneration in the Kidney and the most important change found in the glomerulus of *P. lineatus*.

In myocardial muscles cells with areas of hemolysid erythrocytes outer part of the heart there were empty spaces between muscular structures while the inner part of the heart muscular structure also some space spate [6, 18]. Outer part with space suppurated the muscular and congestion areas of dilated blood vessels, fatty infiltration and area of inter still edema [18].

Bamidele [23] showed focal lymphocytic infiltrations of the myocardium which were observed in the heart of *Chrysichthys igrodigitatus* from *Lekki Lagon* fish.

While the main lesions that present in stomach including vacculation of mucus glands and congestion of smooth muscles in the out of serosa. Spleen with nest of melanin pigment and congestion in the central arteriole [24]. Rrbok [24] showed the melanin macrophage centers adjacent to the blood vessels and congestion of stomach.

Acknowledgments

I would like to thank Prof. Dr. Harry W. Palm, Department of Fisheries Biology, Institute Zoo Morphology, Germany for confirmation the cestodes.

References

[1] Palm, H.W. The *Trypanorhyncha* Diesing, 1863. PKSPL-IPB Press, Bogor, 710 pp. (2004).

[2] Hassan, M.A.; Palm, H.W.; Mahmoud, M. A. and Jama, F.A. Trypanorhyncha cestodes from the musculature of commercial fishes from the Arabian Gulf. Arab Gulf J. Sci. Res., 20(2): 74-86. (2002).

[3] Overstreet, R.M. *Poecilancistrium caryophyllum* and other trypanorhynch cestode plerocercoid from the musculature of *Cynoscion nebulosus* and other sciaenid fishes in the Gulf of Mexico. J. Parasitol. 63: 780-789. (1977).

[4] Petersen, F.; Palm, H; Moller, H. and Cuzi, M. Flesh parasites of fish from central Philippine waters. Dis Aqua. Org., 15: 81-86. (1993).

[5] Hoffman, G.L. Lesions due to internal helminthes in freshwater fishes. In: The Pathology of Fishes, pp. 151-188. The University of Wisconsin Press, Madison, WI, USA. (1975).

[6] Richard, K.S. and Arme, C. The effect of the plerocercoid larva of the pseudophyllidean cestode *Ligula intestinalis* on the musculature of the bream (*Abramis brama*). Z. Parstenk., 65: 207-215. (1981).

[7] Rosen, R. and Dick, A. Growth and migration of plerocercoids of *Triarnophorus Crassus* Foreland pathology in experimentally infected white fish *Coregonus clupeaformis* (MitchiIl). Can. J. Zool., 62: 203-21 1. [1984].

[8] Adjei, E.L.; Barnes, A. and Lester, R.J.G. A method for estimation possible parasite-related host mortality, illustrated using data from *Callitetrarhynchus gracilis* [Cestoda: Trypanorhyncha] in lizard fish [*Saurida* spp.]. Parasitology, 29: 243-277. [1986].

[9] Bussieras, J. and Aldrin, J.F. Une tetrarhynche osevasculaire des thons golf de Guinee due aux larvaes plerocerci de *Dasyrhynchus talismai* (R.Ph. Dollfus, 1935). Re. Ele. Med. Vet. Pays. Trop. 182: 137-143. (1965).

[10] Freeman, R.S. Ontogeny of cestodes and its bearing on their phylogeny and systematic. Adv. Parasite., 11: 481-557. (1973).

[11] Pronina, S.V. The encapsulation of *Triaaenophorus rodubus* plerocercoid in the liver of parca fluviatilis (histomorpjology and pathogenesis). J. Trudy Bunyat. Inst. Est. Nauk. (Faunisticheskie, ekologicheskie. issledovaniya Zabaikale) No.15.2001., 46.511. (1977). (English summary).

[12] Borucinska, J.D. and Caira, J.N. A comparison of mode of attachment and histopathogenicity of four tapeworm species representing two orders infecting the spiral intestine of the nurse shark, *Ginglymostoma cirratum*. J. Parasitol., 79: 238–246. (1993).

[13] Borucinska, J.D. and Dunham, A. Lesions associated with attachment of the parasitic cestode *Tentacularia* sp. to the duodena-spiral junction in blue sharks, *Prionace glauca* (L.). J. Parasitol. Fish Dis., 23: 353-359. (2000).

[14] Campblle, R. and Callahan, C. Histopathological reaction of the blue shark, Prionace glavca to post larva of *Hepatoxylon trichiuri* (Cestodea), in relation to scolex morphology. Folia Parasitol., 45: 47-52. (1998).

[15] Amlacher, E. Textbook of fish diseases [English Translator]. T.F. H. Publ., Jersey City: 302 pp. (1970).

[16] Lucky, Z. Methods for the diagnosis of the diseases. Amerind Publ. Co. Pvt. Ltd. N.Y., 140 pp. (1977).

[17] Annpreece, H. T. Manual for histological Technicians. 3 th. Edit. Brown and company Boton. Lajolia, California. USA., 428 pp. (1972).

[18] Hassan, M.A.; Palm, H.W.; Mahmoud, M. A. and Jama, F.A. Trypanorhyncha cestodes from the musculature of commercial fishes from the Arabian Gulf. Arab Gulf J. Sci. Res., 20(2): 74-86. (2002).

[19] Abbas, A.A. K. Histopathological studies of some parasites of the Asian catfish, *Silurus triostegus* (Heckel, 1843) and potassium permanganate on the black molly, *Poecilia sphenops* (Valenciennes, 1846). Ph. D. Thesis, Coll. Educ., Univ. Basrah, 144 pp. (2007). (In Arabic).

[20] Al-Niaeem, K.S.K. Histopatho- logical and biochemical effects of some helminthes parasitic in three Iraqi freshwater fishes. M. Sc. Thesis, Coll. Agric., Univ. Basrah: 73pp. (1999). (In Arabic).

[21] Rahemo, Z.1.F. and Al-Nouri, A.A. Effect of Ligula intestinal is on gonad histology of *Acanthobrama marmid* Heckel,1843. Rvi. Di Parasitol., XVI: 235-239. (1999).

[22] Camargo, M. P. and Martinez, B. R. Histopathology of gills, kidney and liver of a *Neotropical* fish caged in an urban stream. Neotropic Ichthyol., 5(3): 327-336. (2007).

[23] Bamidele, A. Histopathological study on the parasitized visceral organs of some fishes of Lekki Lagon, Lagos, Nigeria. Life Sci. J., 4(3): 70-76. (2007).

[24] Rrbok, K.; Jordanova, M. and Vaslleva, I. Spleen histology in the female *Ohrid trout, Salmo letica* (Kar) (Telleostei: Salimonidae) during the reproductive cycle. Arch. Biol. Sci., Belgrade, 63 (4): 1023-1030. (2011).