New record of six species of Myxozoan parasites *Myxobolus* in *Carasobarbus luteus* from Tigris River at Baghdad city, Iraq

Nahla Taleb Mansoor 1, Fatima Shihab Al-Nasiri 2, Inam Badr Falih 3

1Animal and Fish Research Center, Agriculture Research Director, Ministry of Science and Technology, Baghdad, Iraq.
2Department of Biology, College of Science, University of Tikrit, Tikrit, Iraq
3College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq

DOI: http://dx.doi.org/10.25130/tjps.25.2020.008

**ABSTRACT**

During the period from March till the end of October 2018, a total of 60 specimens of *Carasobarbus luteus* (Cyprinidae) were collected from Tigris River passing through Baghdad city and examined for seeking and identify the *Myxobolus* infection. The results of examination revealed that these fishes were infected with six species of genus *Myxobolus* including *M. feisti* (1.66%) from tissue of gills, *M. gigi* (1.66%) from spleen, *M. impressus* (3.33%) from kidney, *M. musajevi* (1.66%) from kidney, *M. phylloides* (1.66%) from kidney and *M. suturalis* (1.66%) from kidney. These six species were recorded in the present study for the first time in Iraq. The description and measurements of these papasites are presented.

The cyprinid fish *Carasobarbus luteus*, which is called himri in Iraq, is endemic and widely distributed in Tigris river and Euphrates and adjacent drainage basins [8]. *C. luteus* is considered as one of the important fish for fisheries and consumer in Iraq. The importance of fish parasites is connected to the importance of fishes themselves. So, more study on fish parasites are needed to identify more species and increasing the data on the parasitic fauna of freshwater fishes as *C. luteus* which are scattered of Iraq. Therefore, present study have done to seeking the myxosporeans species which infect Cyprinidae fish *C. luteus* from Tigris River at Baghdad city.

**Materials and Methods**

During the present study, a total of 60 fish samples of *C. luteus* were collected from Tigris River at Baghdad city, during the period from March to the end of October 2018. The fishes were identified according to Froese [8] and their scientific names were determined using Froese and Pauly [9]. Fishes were examined as soon as possible after killing them by pithing method. Fish samples were dissected and examined externally and interinally with magnifying lens or with dissecting microscope to seeking for plasmodia of *Myxobolus* species. Scrapping the skin was done by spatula and the...
smears of skin materials were examined under compound microscope. Gills were removed from branchial cavity and placed in Petri dishes with normal saline (0.9%) and examined by dissecting microscope. Pieces from kidney, spleen, liver, gonads and contents of gall bladder were examined microscopically after compressed it between two slides. The intestine is examined under a dissecting microscope as a whole view, and pieces of it was cut, opened longitudinally and compressed between two glass plates.

The spores of Myxobolus (which were presence in isolated and opened cysts) studied in a wet mount, and some of the spores were mounted with glycerine-jelly onto a slide under a cover slip. The specimens of Myxobolus species are diagnosed using the morphometric features of spores [10; 11]. All measurements are given in microns (µm) as Mean (range; no. of specimens). The parasites were photographed by compound microscope with digital camera. The prevalence of infection (%) of infected fish with Myxobolus species was calculated as demonstrated by Margolis et al. [12].

Results and Discussion

A total of 60 samples of C. luteus were collected from Tigris River at different regions at Baghdad city. The results of examination the fishes demonstrated that seven species (out of 60 examined fishes) were infected with Myxobolus spp. and six species of Myxobolus (M. feisti, M. gigi, M. impressus, M. musajevi, M. phylloides and M. suturalis) were identified in/on infected fish sample. The Muxobolus spp. was varies in their site and prevalence of infection (Table 1).

The following is a brief description of the Myxobolus species which recorded in present study from C. luteus species. The description is according to morphological features of spores.

Genus Myxobolus Bütschli, 1882

Spore spherical, ovoid, ellipsoid or pyriform in the front view, two polar capsules in anterior part. They have a polar filament coiled in spiral shape into each polar capsule. Sporoplasm contains the iodinophile vacuole.

Myxobolus feisti Molnár, Gech, Székely, 2008

This parasite was detected from gill filaments of C. luteus with prevalence of infection 1.66% (Table 1). This parasite was not previously reported from Iraqi fish. Spore ellipsoidal shape, with two equal polar capsules that are pearl shape, they occupy in first half of spore length, intercapsular process clear and triangle shape (Figure 1). Length of spore was 11.2 (10.8-11.8; 4), width 7.2 (6.8-7.8; 4), length of polar capsules 5.5 (5.0-6.0; 4), and their width 2.3 (1.8-2.8). This parasite was recorded in the present study from gills of C. luteus which represents as new host for M. feisti in Iraq. The description was agreement with those reported in Molnár et al. [13] whereas the measurements of the present specimens were smaller than those recorded by Molnár et al. [13]. These differences may be due the small no. of specimens which measured in present study or may be reflect differences in environmental conditions and host.

Myxobolus gigi (Fujita, 1927)

This spore was isolated from spleen of C. luteus with a prevalence of infection 1.66% (Table 1). M. gigi was not previously reported from Iraqi fish, the following is a brief description and measurement of this parasite. Spores lamonian shape with tapering anterior pole. Polar capsules pyriform occupy first half of spore length (Figure 2). Spore length 10.3 (9.0-11.7; 5), width 7.3 (6.5-8.6; 5), length of polar capsules 4.6m (3.9-5.2; 5) and their width 1.8 (1.4 - 2.0; 5). In the present study, this parasite represents the first record of M. gigi from Iraqi fish. C. luteus consider as first host for M. gigi in Iraq. The description and measurements of the present specimens were similar to those reported by Shu’man [11].

Myxobolus impressus Miroshnichenko, 1980

This parasite was recorded from kidneys of C. luteus with a prevalence of infection 3.33% (Table 1). Spore is spherical in shape (Figure 3), the morphological characteristics of this spores widening at level of the polar capsules, length of spores 11.6 (11.5-11.8; 7), width 9.5 (9.4-9.6; 7), length of polar capsules 4.2 (4.0 -4.6; 7), and their width 2.4 (2.2- 2.8; 7). The present record represents the first record for M. impressus in Iraq. The description and measurements of the present specimens were at the agreement with those reported by Miroshnichenko [14].

Myxobolus musajevi Kandilov, 1963

Spore was isolated from kidney of C. luteus with a prevalence of infection 1.66% (Table 1). The following is a brief description and measurement of this parasite. Spores ovate, narrow anterior pole. Polar capsules pyriform, occupy half spore length (Figure 4). Length of spores was13.4 (11.9-15.6; 6), width 8.5 (7.8-9.7; 6), length of polar capsules 6.5 (6.4-6.8; 6) and their width 2.9 (2.6-3.2; 6). In the present study, M. musajevi represents a parasite recorded for the first in Iraqi fish and C. luteus consider as new host for it in Iraq. The descriptions of the spore were similar to those previously reported in Shu’man [11] with slight differences on the measurements between each specimens.

Myxobolus phylloides Shu’man, 1962

Spore was isolated from kidney of C. luteus with a prevalence of infection 1.66% (Table 1). Previously, there are no report for M. phylloides in Iraqi fish, therefore it consider as new item added to the parasitic fauna of Iraqi fish, and C. luteus consider as first host for M. phylloides in Iraq. Spores pyriform, narrow-tapered anterior end. Pyriform polar capsules equal in size, occupy more than half spore body (Figure 5). Length of spore was 8.4 (7.3 -9.8; 4), width 7.4 (7.2 -7.5; 4), length of polar capsules 4.1 (3.4-4.6; 4) and their width 2.2 (1.8-2.5; 4). The description were agreement with those reported by Shu’man [11] whereas the measurements of the
present specimens were slightly smaller than the measurements of spore described in Shul’man [11].

**Myxobolus suturalis** Shul’man, 1962

The spore of *M. suturalis* was reported from kidneys of *C. luteus* with a prevalence of infection 1.66% (Table 1). This parasite was not previously reported from Iraqi fish, it was reported herein as new organism for the parasitic fauna of Iraqi fishes. Spores ellipsoid elongated with rounded toward anterior and posterior end; pyriform polar capsules reside in first half of spore body (Figure 6). Length of spore 14.6 (14.2-14.9; 4) width 12.6 (12.4-12.8; 4), length of polar capsules 7.6 (7.5-7.8; 4) and their width 5.3 (5.0-5.8; 4). The description of the present specimens was agreement with those reported by Shul’man [11] whereas the spores isolated in present study were larger compared with the measurements of the spores which recorded by Shul’man [11].

Table (1): *Myxobolus* species recorded during the present study from 60 specimens of *C. luteus*, their site and prevalence of infection.

| *Myxobolus* species | Site of infection | No. of infected fish | Prevalence of Infection (%) |
|---------------------|-------------------|----------------------|----------------------------|
| *Myxobolus feisti*  | Gills             | 1                     | 1.66                       |
| *Myxobolus gigi*    | Spleen            | 1                     | 1.66                       |
| *Myxobolus impressus* | Kidney          | 2                     | 3.33                       |
| *Myxobolus musajevi* | Kidney            | 1                     | 1.66                       |
| *Myxobolus phylloides* | Kidney           | 1                     | 1.66                       |
| *Myxobolus suturalis* | Kidney           | 1                     | 1.66                       |

Fig. 1: Spore of *M. feisti* from gills of *C. luteus* (1000 X).

Fig. 2: Spore of *M. gigi* from spleen of *C. luteus* (1000 X).

Fig. 3: Spore of *M. impressus* from kidney of *C. luteus* (1000 X).

Fig. 4: Spores of *M. musajevi* from kidney of *C. luteus* (1000X).
Fig. 5: Spore of *M. phylloides* from kidney of the *C. luteus* (1000X).

Figure (6): Spore of *M. suturalis* from the kidney of *C. luteus* (1000 X).

References

[1] Tilami, S. K. and Sampels, S. (2017). Nutritional value of fish: lipids, proteins, vitamins, and minerals. *Reviews in Fisheries Science*, 26 (2): 1-11.

[2] Obiero, K.; Meulenbroek, P.; Drexler, S.; Dagne, A., Akoll, P.; Odong, R.; Kaunda-Arara, B. and Waidbacher, H. (2019). The contribution of fish to food and nutrition security in eastern Africa: emerging trends and future outlooks. *Sustainability*, 11 (1636): 1-15.

[3] Iyaji, F. O. and Eyo, J. E. (2008). Parasites and their freshwater fish host. *Bio-Research*, 6 (1): 328-338.

[4] Gupta, A. and Kaur, H. (2017). A new pathogen, *Myxobolus holzerae* (Myxosporia: Myxozoa) causing severe gill disease in an Indian major carp *Labeo rohita* in a cold water wetland, Punjab (India). *Microbial Pathogenesis*, 111: 244-251.

[5] Kaur, H. (2014). Myxozoan infestation in freshwater fishes in wetlands and aquaculture in Punjab (India). *Journal of Advanced Veterinary and Animal Research*, 2 (9): 488-502.

[6] Kudo, R. (1920). Studies on Myxosporidia, A synopsis of genera and species of Myxosporidia, Ill. Biol. Monogr., 5: 1-265.

[7] Lom, J. and Dykova, I. (1992). Myxosporidia (Phylum Myxozoa). In: Lom, J. and Dykova, I. (eds.). Protozoan parasites of fishes, developments in aquaculture and fisheries. Elsevier Publ., Amsterdam: 159-235.

[8] Coad, B.W. (2010). Freshwater fishes of Iraq. Pensoft Publ., Moscow, 274pp + 16Plts.

[9] Froese, R. and Pauly, E. (eds.) (2018). Fish Base. World Wide Web electronic publications, www.fishbase.org (version Feb. 2018).

[10] Bykhovskaya-Pavlovskaya, I.E.; Gusev, A.V.; Dubinina, M.N.; Izyumova, N.A.; Smirnova, T.S.; Sokolovskaya, I.L.; Shtein, G.A.; Shul’man, S.S. and Epshtein, V.M. (1962). Key to parasites of freshwater fish of the U.S.S.R. Akad. Nauk, S.S.S.R., Moscow: 727pp (In Russian).

[11] Shul’man, S.S. (1988). Myxosporidia of the U.S.S.R. Nauka, Moscow (English Translation). Amerind Publ., New Delhi: 632 pp.

[12] Margolis, L.; Esch, G.W.; Holmes, J.C.; A. M. Kuris, A.M. and Schad, G.A. (1982). The use of ecological terms in parasitology (Report of an adhoc committee of the American Society of Parasitologists). *Journal of Parasitology*, 68 (1): 131-133.

[13] Molnár, K.; Cech, G. and Székely, C. (2008). *Myxobolus* species infecting the cartilaginous rays of the gill filaments in cyprinid fishes. *Acta Parasitologica*, 53 (4): 330–338.

[14] Miroshnichenko, A.I. (1980). *Myxobolus impressus* n sp., a new myxosporidian (Cnidosporidia, Myxosporidia) from freshwater fish in the Crimea. *Biologicheskie Nauki*, 9: 38-39.
تسجيل جديد لستة انواع من البوغيات الحيوانية Myxobolus المتطفلة في اسماء الكحري من نهر

 глجلة عند مدينة بغداد، العراق

نهلة طالب منصور1، فاطمة شهاب الناصري2، انعام بدر فالح3

1 مركز بحوث الثروة الحيوانية والسمكية، دائرة البحوث الزراعية، وزارة العلوم والتكنولوجيا، بغداد، العراق
2 قسم علوم الحياة، كلية العلوم، جامعة تكريت، تكريت، العراق
3 كلية الطب البيطري، جامعة بغداد، بغداد، العراق

الملخص

تم خلال الدراسة الحالية الملمسة من شهر آذار إلى نهاية شهر تشرين الأول 2112، تشخيص البوغيات الحيوانية العائدة إلى الجنس Myxobolus المستلمة على سمكة الحمري (العائمة الشبوطية). حيث جمعت 60 سمكة حمري من نهر دجلة عند مدينة بغداد، وفحصت الأسماك بحثا عن الإصابة بطفيليات الجنس. Myxobolus وبييت نتائج الفحص أصابتهم هذه الأسماك بستة أنواع من الطفيلييات العائدة إلى الجنس

M. impressus (0.66) (M. gigi, M. feisti) المتطفل في نسيج الغلاصم (1.66) (M. musajevi) المتطفل في نسيج الحمراء (1.66) (M. phylloides) المتطفل في نسيج الكلي (1.66) (M. suturalis) المتطفل في نسيج الكلية.