Study of Helminthes in Glyptothorax kurdistanicus (Actinopterygii: Sisoridae) in Greater Zab and Lesser Zab Rivers, Kurdistan Region, Iraq

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ABSTRACT:

During April 2017 to the end of September 2017, a total of 34 Glyptothorax kurdistanicus were captured from Greater Zab River near Ask-Kalak Town, south east of Erbil City and some watersheds of Sharbazher area northeast of Sulaimani City, Kurdistan Region, Iraq. The study revealed the existence of five species of helminthes including two species of metacercaria of trematodes (Clinostomum complanatum, Diplostomum spathaceum), one species of cestode (Ligula intestinalis), one species of nematode (Procamallanus viviparous), and one species of acanthocephalan (Pomphorynchus spindletrucatus). Glyptothorax kurdistanicus in the present study is considered as a new host for all recorded parasitic helminthes in Iraq. Full description, prevalence and mean intensity of infection of these parasites were demonstrated in the present study.

KEY WORDS: Helminthes, G. kurdistanicus, Fish, Greater Zab, Lesser Zab.

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INTRODUCTION:

Parasitic infections in fishes are common, especially in wild populations where ecological requirements for intermediate hosts and parasite transmission are met (Feist and Longshaw, 2008). Fishes are host to many adult parasitic helminthes and larval forms (Dhole et al., 2010). Helminthes live in all vertebrates inhabiting the digestive tract, accessory tubes and cavities and have been reported from different species of fish (Roberts & Janovy, 1996). Helminthes damage health of fish by inducing variable intensity of infection depending upon the quality of environmental conditions (Read, 1992). Glyptothorax kurdistanicus is a freshwater sucker catfish belongs to family Sisoridae, it found in mountain streams, this species is poorly known in Iraq (Coad, 2010). In total, two species of digenea, one species of each cestoda, nematode, and acanthocephala have been recorded from Glyptothorax kurdistanicus in Greater Zab and Lesser Zab Rivers.

The objectives of this paper were to specifically identify and classify the parasitic internal helminthes collected from the sucker catfish (Glyptothorax kurdistanicus) based on their morphological features, and to note their prevalence and mean intensity in some water bodies in Kurdistan region of Iraq.
2. Material Methods

The fish samples were caught by local fishermen at cross river basin using locally available gill nets and electro shock, 34 specimens of *Glyptothorax kurdistanicus* were collected in Greater Zab River in Aski-kalak South east of Erbil City and and some watersheds of Sharbazher area northeast of Sulaimani City in April 2017 to the end of September 2017. The fish samples were identified according to Froese and Pauly (2016).

Fish samples were examined for parasitic helminthes, a total of five different species of helminthes were recorded. Metacercaria of trematodes were removed from their cysts and from eye lenses of the infected fish with very fine needle, washed in 0.6% saline solution and fixed in 5% hot formalin (60°C), stained with acetocarmine, then cleared in xylene and mounted in Canada balsam (Scholz, 1989). The digestive tract and body cavity of each fish was searched, plerocercoids of *Ligula intestinalis* were killed in warm water (60°C), fixed in 10% formalin for 24h and transferred to 70% ethyl alcohol for permanent preservation (Barson1 and Marshall, 2003). The nematodes washed in physiological saline and then fixed in cold 4% formaldehyde solution, cleared with glycerin (Moravec and Yooyen, 2011). The acanthocephalans were removed from the intestinal wall, washed with saline solution, refrigerated in cold water for 12 hr, fixed in alcohol-formalin-acetic acid, stained with acid carmine, cleared with 4% HCl in 70% ethanol, dehydrated with ascending concentrations of ethanol, cleared in increasing concentrations of toluene in 100% ethanol to 100% toluene, placed in 50% toluene and 50% Canada balsam, and finally mounted in Canada balsam (Olmos and Habit, 2007). Microphotographs were taken with Sony camera. The figures were drawn by using a Camera Lucida (Drawing tube). Measurements of parasite were made with an Olympus ocular micrometer. The epidemiological terms (prevalence and mean intensity of infection) were used here based on Margolis et al. (1982).

3. Results and Discussion

During investigation for parasitic helminthes in *G. kurdistanicus*, the present study showed the existence of five species of parasitic helminthes including two species of trematodes, one species of each cestode, nematode, and acanthocephalan. The distribution of these parasites, their location in the fish hosts body and the prevalence and mean intensity of infection are summarized in Table (1). The following is an account on the description and measurements of these parasites.
Table 1. Number of fishes examined, infected, prevalence, mean intensity and site of infection in *G. kurdistanicus*.

| Parasite species              | Infected fish Number | Prevalence (%) | Mean intensity | Site of infection     |
|------------------------------|----------------------|----------------|----------------|-----------------------|
| *Clinostomum complanatum*    | 1                    | 2.94           | 2              | Branchial cavity      |
| *Diplostomum spathaceum*     | 3                    | 8.82           | 5              | Eye                   |
| *Ligula intestinalis*        | 2                    | 5.88           | 26             | Anterior part of intestine |
| *Procamallanus viviparous*   | 4                    | 11.76          | 3.5            | Intestine             |
| *Pomphoryhnchus spindletruncatus* | 2            | 5.88           | 6              | Anterior part of intestine |

*Clinostomum complanatum* (Rud., 1819)

Two encysted metacercaria of this parasite were found in the branchial cavity, with prevalence of 2.94% and mean intensity 2 (Table 1).

This larva is ligulae shape, ventral sucker is larger than the oral sucker and lies in the first third of the body, esophagus is short, and the two intestinal caecae are thick wrinkled and unbranched with blind ends (Fig. 1). Body length 4.0-6.0 mm, width 1.0-1.5 mm. The diameter of oral sucker is 0.25-0.35 mm and ventral sucker 0.75-0.85 mm, the dimensions of the intestinal caeca are 3.1-4.0 x 0.18-0.22 mm.

This metacercaria was recorded for the first time in Iraq from both *B. luteus* and *A. vorax* in Mehaijeran creek in Basrah (Khamees, 1983). After that, it was reported from 22 different fish hosts excluding *G. kurdistanicus* (Mhaisen, 2016). So, this fish represents new host for this parasite in Iraq. *C. complanatum* was reported from *B. esocinus*, *B. luteus*, *C. macrostomum*, *L. lepidus*, and *V. umbla* from different regions (Ali, 1989; Abdullah, 1990; 2002).

*Diplostomum spathaceum* Rud., 1819

This metacercaria not encysted, it was founded from the eye lens with prevalence of 8.82% and mean intensity 5 (Table 1).

Body broad, leaf shaped, white color and feebly mobile. The anterior end of the body is bluntly rounded with angular lappet like protrusions. Lateral suckers (Pseudosuckers) distinct, brandes’s organ is round or somewhat extending transversally (Fig. 2). Body length 0.40-0.60 mm, width 0.18-0.25 mm, length of lateral sucker 0.010 mm the diameter of the ventral sucker 0.020-0.025 mm, oral sucker 0.005-0.01 mm and intestinal caeca not branched 0.30-0.33 x 0.09-0.12 mm.

The first record of *D. spathaceum* in Iraq was done by Abdullah (1990) from eye lens of *B. luteus*, *C. macrostomum* and *C. carpio* from Dokan Lake. After that, it was recorded in 34 fish host species excluding *G. kurdistanicus* (Mhaisen, 2016). So, this fish represents new host for this parasite in Iraq.

*Ligula intestinalis* (Linnaeus, 1758)

A large numbers of plerocercoids were obtained inside intestine with prevalence of 5.88% and mean intensity 26 (Table 1).

This larval worm is white in color, threat like (Fig. 3). Body length 3-6 mm, width 0.2-0.5 mm.

Previously, this parasite has been recorded from 13 different Iraqi freshwater fish species excluding *G. kurdistanicus* (Mhaisen, 2016). So, this fish represents new host for this parasite in Iraq.

*Procamallanus viviparous* (Ali, 1956)

Adult female was isolated from the intestine with prevalence of 11.76% and mean intensity 3.5 (Table 1).

This worm is orange to yellowish in color, carrying four cervical papillae anteriorly. The tail bears three small processes at its tip. The female is viviparous, inside female uterus numerous small sized larvae is noticed (Fig. 4). Length of worm 10-18 mm, the buccal capsul measures 0.1 x 0.13 mm. The tail bears three small processes at its tip.

This species was recorded for the first time in Iraq by Ali et al. (1987b) in the stomach of *Mystus halpensis* from Tigris River, Baghdad City. After that, it was recorded in six fish host species.
excluding *G. kurdistanicus* (Mhaisen, 2016). So, this fish represents new host for this parasite in Iraq. In Kurdistan Region it was recorded in the stomach and intestine of *M. mastacembelus* and *S. triostegus* from Greater Zab river (Bashě and Abdullah, 2010; Shwani and Abdullah, 2010 respectively).

**Pomphoryhnchus spindletruncatus** Amin, Abdullah et Mhaisen, 2003

Many adult male and female were obtained from intestine of this fish with prevalence of 5.88% and mean intensity 6 (Table 1).

This worm is spindle-shaped, speckled trunk three times as long as wide. Terminations of secondary branches of lacunar vessels create speckled appearance in processed specimens. Neck is moderate length, somewhat tapered, broader at base, with prominent distal bulb. Proboscis cylindrical to ovoid, it bears 15-18 longitudinal rows of 7-9 hooks (Fig. 5).

Male: Total length of trunk 6.0-9.30 mm, width 2.0-3.25 mm. Length of neck 2.0-3.30 mm, width 0.20-0.42 mm below the bulb and 0.55-0.75 mm wide close to trunk. Bulb spherical with 0.75-1.50 x 0.75-1.55 mm in size. Proboscis 0.38-0.63 x 0.25-0.38 mm wide in middle. Proboscis receptacle 1.75-3.4 x 0.10-0.33 mm wide at posterior end. Longer lemniscus 1.12-2.5 x 0.12-0.45 mm wide posteriorly. Shorter lemniscus 1.0-2.5 x 0.12-0.45 mm wide posteriorly. Total length of reproductive system 2.0-5.50 mm. Egg fusiform elongate with polar prolongation of fertilization membrane, outer shell 0.075-0.090 x 0.012-0.017mm.

*P. spindletruncatus* was recorded by Amin et al. (2003) for the first time in Iraq as a new species from *A. vorax* and *B. xanthopterus* from Greater Zab and Lesser Zab rivers respectively. After that, it was recorded in 4 fish host species excluding *G. kurdistanicus* (Mhaisen, 2016). So, this fish represents new host for this parasite in Iraq.

**Conclusion**

During the enternal examination for parasitic helminthes in *G kurdistanicus*, five species of parasitic helminthes were recorded including two species of trematodes, one species of each cestode, nematode, and acanthocephalan. This fish represents new host for these parasites in Iraq. The highest degree of percentage of infection was 11.76% for *Procamallanus viviparous* while the lowest degree of percentage of infection was 2.94% for *Clinostomum complanatum*.
**Figure 2.** Metacercaria of *Diplostomum spatheceum*

A- Photomicrograph of Metacercaria of *Diplostomum spatheceum* (100x)
B- Camera lucida drawing of Metacercaria of *Diplostomum spatheceum*

*br* = brandes’ organ; *i* = intestine; *os* = oral sucker; *p* = pharynx; *vs* = ventral sucker

**Figure 3.** Plerocercoid of *Ligula intestinalis*

A- Photomicrograph of Plerocercoid of *Ligula intestinalis* (20x)
B- Camera lucida drawing of Plerocercoid of *Ligula intestinalis*
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