# Detection of Parasitic Helminth in Wild Gabus Fish (*Channa Striata*) at Baduk Fish Market Nganjuk Regency

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## Abstract

This study aimed to detect the existence and identify, also to determine the prevalence and degree of infection from parasitic helminth in wild gabus fish (*Channa striata*) at Baduk Fish Market, Nganjuk Regency. In 50 samples of gabus fish, parasitic helminths were examined on the body surface, gills, abdominal cavity, muscles, and digestive tract then identified. Parasitic helminths from digestive tract stained with Semichen Acetic Carmine method. Parasitic helminths that have been identified then calculate the prevalence and degree of infection. The result showed that the parasitic helminths found in gabus fish consist of the genera *Pallisentis, Spinitectus, Dactylogyrus, and Gyrodactylus*. *Pallisentis sp*. infect the intestines with 74% prevalence and degree of infection 5,62 parasite each fish. *Spinitectus sp*. infect the stomach and intestines with 48% prevalence and degree of infection 8 parasite each fish. *Dactylogyrus sp*. infect the gills with 80% prevalence and degree of infection 1,95 parasite each fish. *Gyrodactylus sp*. infect the body surface with 42% prevalence and infection degree 1,33 parasite each fish.

**Keywords:** Parasite, helminths, gabus fish, prevalence, infection degree.

## Introduction

Baduk Fish Market, Nganjuk Regency is a special market sell wild freshwater fish, one of them is gabus fish. Gabus fish (*Channa striata*) has a high albumin content which good for healing postoperative wounds and burns (Fitriyani and Deviarni, 2013). Based on the research of Chasanah et al. (2015), albumin levels of gabus fish living in nature can reach 107.28 ± 3.20 mg/g of meat, while cultured gabus fish has albumin levels of 66.74 ± 3.76 mg/g of meat. Gabus fish that live in nature have a greater chance of contracting disease caused by parasites. Parasites are organisms that live inside other organisms and at the expense of the host organism (Subekti et al., 2010). Parasitic diseases can decrease fish quality and health problems in humans (Lianda et al., 2015). Research by Umara et al. (2014) showed that gabus fish easily infected by *Pallisentis nagpurensi* with 96% prevalence. Ghassani et al. (2016) showed that gabus fish from nature infected with endoparasites, namely *Pallisentis sp.* with 65% prevalence and 34.3 infection degree per fish, and *Camallanus sp*. with 35% prevalence and 6,1 infection degree per fish. Research conducted by Fitriani et al. (2019), showed that gabus fish infected with *Dactylogyrus sp.* with a prevalence of 94% and an infection degree of 6.64 individuals per fish, and *Gyrodactylus sp.* with 89% prevalence and 2 infection degree individuals per fish.

Based on the data above, gabus fish is never free from the threat of parasitic worms. *Camallanus sp.* included in the Nematoda Phylum generally attacks the intestinal organs of freshwater fish and sucks blood, causing anemia and erosion of the mucosa (Adji, 2008). *Pallisentis sp*. belongs to the Phylum Acanthocephala (Thorny-headed-worm) which generally infects wild animals and several species of domestic animals (CDC, 2019). *Dactylogyrus sp*. and *Gyrodactylus sp*. is parasitic worm from the Monogenea Class which commonly infects fish. *Dactylogyrus sp.* generally infects the gills and can cause mild or severe irritation to the gills of fish. *Gyrodactylus sp*. usually infect the skin and fins of fish and cause discoloration on the

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surface of the body (Roberts and Janovy, 2008). This study aims to detect the presence and identify, as well as determine the prevalence and degree of parasitic worm infection in gabus fish (*Channa striata*) caught in the wild at the Baduk Fish Market, Nganjuk Regency.

## Methods

### Time and Place of Research

The research conducted in September-December 2021. Samples of wild gabus fish (*Channa striata*) taken from the Baduk Fish Market, Nganjuk Regency. Parasitology identification held at the Parasitology Laboratory, Faculty of Veterinary Medicine and Wet Laboratory, Faculty of Fisheries and Maritime Affairs, Airlangga University.

### Materials and Research Tools

The research materials were 50 gabus fish (*Channa striata*), physiological NaCl, distilled water, 5% glycerin alcohol, carmine, acidic alcohol (70% alcohol + HCl), alkaline alcohol (70% alcohol + $NaHCO_3$), graded alcohol (85%, 70 %, 95%), Hung's I and Hung's II solutions. The research tools included gloves, surgical tool sets, object glass, cover glass, pipettes, petri dishes, magnifying glasses, light microscopes, cameras, and microscopes equipped with a camera lucida.

### Examination and Identification

Examination of the body surface by scraping mucus all over the body surface of the gabus fish using a scalpel, the results of the scraping placed on an object glass then add physiological NaCl, observed using a microscope with a magnification of 100x and 400x. Examination of the gills of the gabus fish by taking all the gills and separating the filaments from the sieve bones. The filaments placed on an object glass then add physiological NaCl, observed using a microscope with a magnification of 100x and 400x. Examination of the abdominal cavity, muscles, and digestive tract by dissecting the thoracic and abdominal cavities of the gabus fish transversely using a scalpel or surgical scissors, observing the presence of parasites in the abdominal cavity and muscles. Examination of the digestive tract by open and remove its contents.

The parasitic worms found in the examination then placed in a petri dish containing physiological NaCl, observed using a 40x and 100x magnification microscope. Parasitic worms found in the digestive tract then stained using the Semichen-Acetic Carmine method. The identification keys used were Moravec et al., (2006), Yooyen et al., (2006), Bhattacharya (2007), Roberts and Janovy (2005), and Arai and Smith (2016).

### Semichen Acetic Carmine staining

The staining method of Semichen Acetic Carmine refers to Kuhlmann (2006), the worms stored in 5% glycerin alcohol for 24 hours, then put in 70% alcohol for five minutes, then transfer the worms in a carmine solution diluted with 70% alcohol (1: 2) and left for eight hours. The worms were transferred in an acidic alcohol solution for two minutes, a basic alcohol solution for 20 minutes, then dehydrated in stages (70%, 85%, 95% alcohol) for five minutes each, and put in Hung's I solution for 20 minutes. . Finally, the worm placed on the object glass, dripped with sufficient Hung's II solution and covered with a cover glass.

### Data analysis

The results of the study analyzed descriptively and calculated the prevalence and degree of infection in parasitic worms found to infect gabus fish with the following formula:

$$\text{Prevalence} = \frac{\text{Number of positive infected samples}}{\text{Number of samples examined}} \times 100\%$$

$$\text{Infection Degree} = \frac{\text{Number of parasite}}{\text{Number of samples infected by parasite}}$$

## Results and Discussion

The results of the parasitic worm detection study on 50 samples of wild gabus fish caught from the Baduk Fish Market, Nganjuk Regency, infected by parasites from the genera *Pallisentis*, *Spinitectus*, *Dactylogyrus*, and *Gyrodactylus*.

### *Pallisentis sp.*

Pallisentis sp. found in the intestine of gabus fish with a cylindrical body shape extending 3-23 mm and white to orange in color. On examination of Pallisentis sp. (Figure 1A) shows the proboscis, neck, trunk, proboscis sac and lemnisci.

 

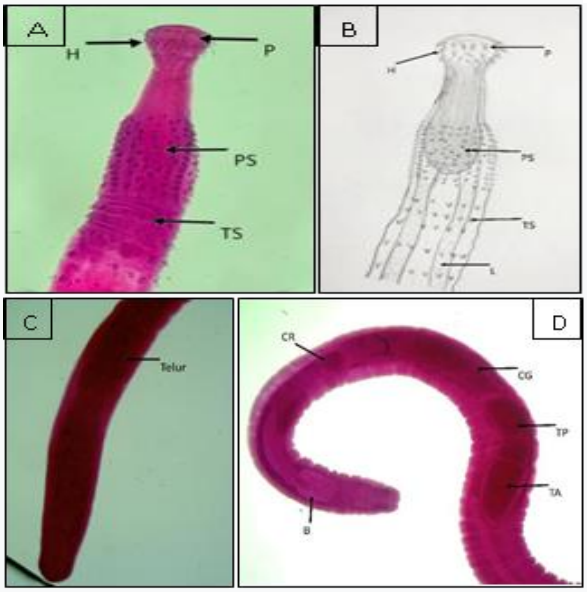


**Figure 1.** Examination results of Pallisentis sp. 100x magnification and stained with the Semichen Acetic Carmine method. Description: (A) Anterior. (B) Anterior imaged with the camera lucida microscope. (C) Female posterior. (D) Posterior male. TA: Anterior Testis, TP: Posterior Testis, CG: Cement Gland, CR: Cement Reservoir, B: Bursa. P: Proboscis, H: Hook, PS: Proboscis Sac, TS: Trunk Spine, and L: Lemnisci

*Pallisentis sp*. included in the Phylum Acanthocephala, Class Eoacanthocephala, Order Gyracanthocephala, Family Quadrigiridae, Subfamily Pallisentinae, and Genus Pallisentis (Amin, 2013). Phylum Acanthocephala commonly known as Thorny-headed-worm because its proboscis is equipped with hooks. The number of lines and hooks in the proboscis is very important as the taxonomic basis of Acanthocephala (Bhattacharya, 2007). *Pallisentis sp*. has a short rounded to cylindrical proboscis with four rows of loops, each circle consisting of 6-12 hooks (Kundu and Gürelli, 2020). The neck is not barbed or hooked and separates the proboscis from the trunk. The trunk divided into collar spines and trunk spines. According to Bhattacharya (2007), collar spines consist of 6-14 circles with each circle consisting of 20-40 spines. Trunk spines arranged in 17-20 whorls with each whorl consisting of 5-19 spines (Kundu and Gürelli, 2020).

The female *pallisentis* has characteristics at the medial to the posterior end of which there are oval-shaped eggs, and the posterior end is blunt with a long and circular uterus. Male *pallisentis* has characteristics in its reproductive organs, namely two testicles that are oval to cylindrical in shape and are located closely, there is a cement gland that contains a number of nuclei, and an oval-shaped muscular bursa (Bhattacharya, 2007).

***Spinitectus* sp.**

*Spinitectus sp*. infect the stomach and intestines of gabus fish with a small elongated body shape of 3-13 mm and white in color. On examination of *Spinitectus sp*. (Figure 2), seen anteriorly there is a mouth with an elongated shape dorsoventrally, then to the caudal direction there are many transverse circles equipped with a row of cuticle spines, muscular esophagus, nerve ring, and glandular esophagus.

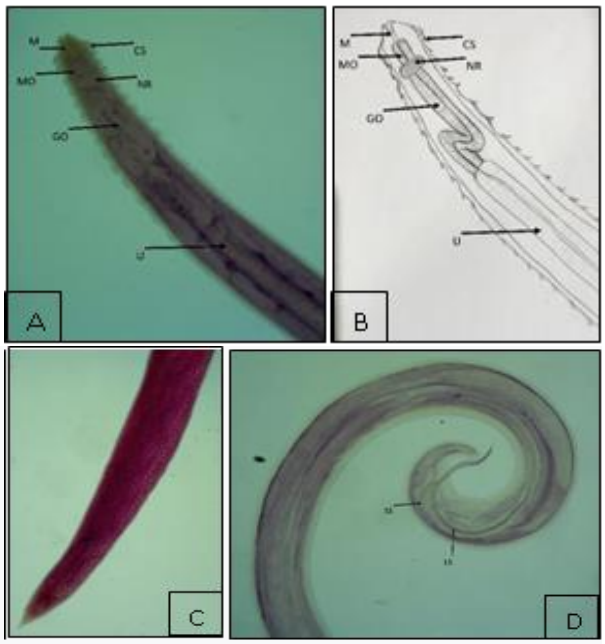


**Figure 2.** Examination results of Spinitectus sp. 100x magnification and stained with the Semichen Acetic Carmine method. Description: (A) Anterior. (B) Anterior imaged with the camera lucida microscope. (C) Female posterior. (D) Posterior Male. M: Mouth, MO: Muscular Oesophagus, GO: Glandular Oesophagus , U: Intestine, CS: Cuticular Spines, and NR: Nerve Ring. SS: Short Spicule, and LS: Long Spicule.

*Spinitectus sp*. included in the Nematoda Phylum, Class Chromadorea, Order Rhabditida, Suborder Spirurina, Superfamily Habtonematoidea, Family Cystidicolidae, Genus Spinitectus (Arai and Smith (2016).The main identification key to the genus Spinitectus is the cuticle with many transverse circles equipped with cuticular spines (cuticle spines). The female's body is full of spines to the posterior end, while the male's posterior body has no spines (Aria and Smith, 2016).

The male spinitectus is characterized by a spirally coiled posterior end equipped with a narrow vesicular subventral alae that almost reaches the tip of the tail and short and long spicules. The female spinitectus has the shape of a tapered posterior end with vaginal muscles which located directly anterior to the vulva, and there are eggs on her body (Sethar et al., 2020).

***Dactylogyrus sp.***

*Dactylogyrus sp*. found in the gills of gabus fish. *Dactylogyrus sp*. (Figure 3A) has a fusiform body shape with a length of 0.88 mm and a width of 0.09 mm, there are two pairs of eyes spots on the anterior part of the body and on the posterior of the body there is an opisthaptor which is equipped with a penetrating organ such as a large anchor (hamuli).

*Dactylogyrus sp*. included in the Phylum Platyhelminthes, Class Monogenea, Order Dactylogyridae, Suborder Dactylogyrinea, Family Dactylogyridae, and Genus Dactylogyrus (Roberts and Janovy, 2008). According to Roberts and Janovy (2008), Class Monogenea is a hermaphrodite worm, dorsoventrally flat, elongated or oval with a hook organ (opisthaptor) in the posterior body which functions to attach to its host. The order Dactylogyridea is characteristic of two pairs of ventral anchors, and the suborder Dactylogyrinea is characterized by 12 edge hooks and 2 central hooks in the larval stage (oncomiracidium); 8 edge hooks, 2 center hooks, and 4 dorsal hooks in the adult species.

***Gyrodactylus sp.***

*Gyrodactylus sp*. found on the body surface of the gabus fish. *Gyrodactylus sp*. (Figure 3B) has a flat, elongated body shape with a length of 0.12 mm and a width of 0.04 mm, has no eyes, and has an opisthaptor equipped with a pair of penetrating organs such as anchors (hamuli). This is in accordance with Fitriani et al. (2019) which stated that *Gyrodactylus sp*. it has a fusiform body, a pair of anchor rods with two supports and 16 side hooks, and has no eye spots. *Dactylogyrus sp*. included in the Phylum Platyhelmintes, Class Monogenea, Order Gyrodactylidae, Family Gyrodactylidae, and Genus Gyrodactylus. The order Gyrodactylidea is characterized by two ventral bars and 16 edge hooks in oncomiracidium (larval stage); 16 edge hooks in the adult stage (Roberts and Janovy, 2008).

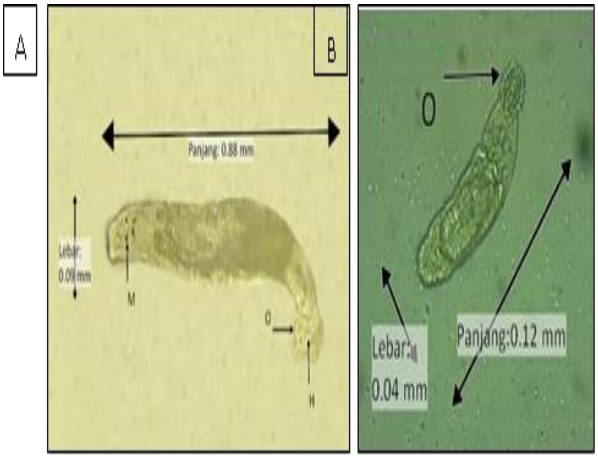


**Figure 3.** Examination results (A) *Dactylogyrus sp*. and (B) *Gyrodactylus sp*. Description: 400x magnification, M: eye, O: opisthaptor, and H: hamuli.

**Gabus Fish Parasitic Worms Prevalence**

Based on calculations, it is known that the prevalence value of parasitic worms that infect gabus fish, namely Pallisentis sp. by 74%, Spinitectus sp. by 48%, Dactylogyrus sp. by 80%, and Gyrodactylus sp. by 42% (Table 1).

**Table 1.** Parasitic worms prevalence

| No. | Worms | Fish samples | | |
|---|---|---|---|---|
| | | Checked | Infected | Prevalence |
| 1 | *Pallisentis* sp. | 50 | 37 | 74% |
| 2 | *Spinitectus* sp. | 50 | 24 | 48% |
| 3 | *Dactylogyrus* sp. | 50 | 40 | 80% |
| 4 | *Gyrodactylus* sp | 50 | 21 | 42% |

*Pallisentis sp*. infection in gabus fish reported several times in Indonesia, while infection with *Spinitectus sp*. never been reported, but has been reported to infect several freshwater fish in India, Japan and Thailand. *Spinitectus sp.* infection estimated to have the same factors as infection with *Pallisentis sp*. because their life cycles have similarities, namely involving aquatic arthropods (crustaceans or insects) as intermediate hosts. According to Umara et al. (2014), the high

prevalence value of the parasite in gabus fish occurred due to the samples taken relatively located in the same area, the environmental conditions of the waters where the fish live and there are many intermediate hosts of this parasite in the fish's living habitat. According to Ghassani et al. (2016), the high prevalence of endoparasites in gabus fish that live in nature caused by pollution, imbalance between hosts and pathogens, and the survival of parasite eggs.

Infection with *Dactylogyrus sp*. and *Gyrodactylus sp*. in gabus fish has reported several times. According to Fitriani et al. (2019) infection with *Dactylogyrus sp*. and *Gyrodactylus sp*., caused by disturbed fish living environment due to increased fish population in one habitat and lack of nutrients and low water quality causes fish conditions become weak and susceptible to disease. High population densities cause stress for fish and fish will rub against one another resulting in rapid transmission of ectoparasites (Rustikawati et al., 2004).

**Infection Degree of Gabus Fish Parasitic Worm**

Based on the calculation results, found that the infection degree of parasitic worm that infects gabus fish, namely *Pallisentis sp*. was 5.62 individual parasites per fish, *Spinitectus sp*. was 8.00 individual parasites per fish, *Dactylogyrus sp*. was 1.95 individual parasites per fish, and *Gyrodactylus sp*. was 1.33 individual parasites per fish (Table 2).

**Table 2.** Infection Degree of parasitic worms

| No | Worms | Number of Parasites | Infected Samples | Infection Degree |
|---|---|---|---|---|
| 1 | *Pallisentis* sp. | 208 | 37 | 5.62 |
| 2 | *Spinitectus* sp. | 192 | 24 | 8 |
| 3 | *Dactylogyrus* sp. | 78 | 40 | 1.95 |
| 4 | *Gyrodactylus* sp. | 28 | 21 | 1.33 |

*Spinitectus sp.* has higher degree of infection than *Pallisentis sp.* According to Ghassani et al. (2016), the degree of endoparasite infection in wild gabus fish caused by several factors, such as water quality and the distribution of intermediate hosts infected with eggs or larvae of parasitic worms.

*Dactylogyrus sp.* and *Gyrodactylus sp.* has a relatively small or mild degree of infection, this thought to be related to the length of the gabus fish sample in this study 15-30 cm. According to Rustikawati et al. (2004), ectoparasitic attacks on fish will decrease in line with increasing age and size of fish, the larger the size of the fish, the better the fish's immune system.

Gabus fish samples came from natural catches obtained from fish seekers using a traditional tool called a wuwu or using a low-voltage stun device which causes the fish to faint, and it is not known what habitat conditions or where each fish sample was caught. The presence of parasitic worms might related to the habitat, behavior of the gabus fish, and the existence of an intermediate host and the compatibility of the parasite with the intermediate host and definitive host for the survival of the parasite.

## Conclusion

Parasitic worms found in wild gabus fish (*Channa striata*) at the Baduk Fish Market, Nganjuk Regency were *Pallisentis sp.* (74% prevalence and infection degree 5.62 parasites per fish). *Spinitectus sp.* (48% prevalence and infection degree 8 parasites per fish), *Dactylogyrus sp.* (80% prevalence and infection degree 1.95 parasites per fish), and *Gyrodactylus sp.* (42% prevalence and infection degree 1.33 parasites per fish)

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