Degree of nematode endoparasite infection in asian swamp eel (\textit{Monopterus albus}) from Banyuwangi regency

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Abstract. Banyuwangi district has widely rice field with big potential in agriculture and fisheries such as Asian swamp eel (\textit{Monopterus albus}). Endoparasites infection in Asian swamp eel happened by consumption of natural feed that infected with endoparasites larvae. This research aims to identify and determine the prevalence and intensity of nematode endoparasites that infected to Asian swamp eel (\textit{M. albus}). Three hundred asian swamp eel (30-110 cm length and 29.8-60 g weight) were collected from five traditional market in Banyuwangi district (Banyuwangi City, Srono, Cluring, Rogojampi and Genteng). The result showed that Asian swamp eel from Banyuwangi district was infected by \textit{Eustrongylides ignotus} with the highest prevalence and intensity, 16.33\% and 1.92 respectively than another endoparasite (\textit{Procamallanus} and \textit{Pingus sinensis}). This result expected to base for further study to determine the prevalence and intensity of endoparasite in a different season for mapping the spread of endoparasite in Asian swamp eel at Banyuwangi district.

1. Introduction

Banyuwangi regency was located in the eastern of East Java Province which has widely rice field up to 65,500 hectares and holds big potential for agriculture and fisheries. One of the fisheries commodity that have produced was asian swamp eel (\textit{Monopterus albus}) which reached 15.2 tons in 2018. The asian swamp eel have distributed at not only traditional markets in Banyuwangi, Jember, Bondowoso, and Situbondo regions but also until Bali island [1].

Endoparasit infection in asian swamp eel caused by many factor, mainly the existence of endoparasit larvae at the first intermediet host which migrated to the asian swamp eel as secondary intermediet host through natural feed, such as crustacean, mollusk or oligochaeta. In the body of asian swamp eel, the larvae will develop to the infective stage that can infected the definitive host, such as mammals, sea bird or human [2]. Endoparasite spesies that previously infect in asian swamp eel originated from class of Digenean Trematode, Cestode, Nematode and Acanthocephalans [3].

Main effect from endoparasite infection in fish was lesion in digestive track which caused stress and decreased the appetite of fish. Finally the growth will inhibited, disturbed the reproduction process and caused the mortality in fish [4]; [5]. [6] reported several spesies of nematode endoparasites causes fish borne zoonosis such as from genus \textit{Eustrongylides}, \textit{Gnathostoma}, \textit{Anisakis}, \textit{Pseudoterranova}, \textit{Contracaecum}, \textit{Hysterothylocium}, dan \textit{Diactophyme}. The symptoms of fish borne zoonosis to human was fever, nausea, vomiting, diarrhea, inflammation in the intestine accompanied by allergic reaction in skin and mucus membranes. In acute condition, endoparasite larvae and adult will spread to the all organ of human body, such as liver, lungs, gonads and caused death. [7].
Previous study was reported some endoparasites nematode that infects in asian swamp eel such as *Eustrongylides* larvae that infects to intestine wall and *Anisakis simplex* that infects to intestine cavity [8]; *Anguillicoloides crassus* that infects to swim bladder [9]; and *Cucullanus* that infects to digestive track [10]. [11] and [12] found *Gnathostoma spinigerum* infected to asian swamp eel from natural caught and cultured. In Indonesia, [13] reported that endoparasites found in digestive track of asian swamp eel were *Procamallanus* sp dan *Acanthocephala* sp. Furthermore [14] found that endoparasites *Eustrongylides ignotus* dan *Pingus sinensis* infects to digestive track of asian swamp eel that marketed in Surabaya City. That has no report about endoparasite nematode that infected asian swamp eel from Banyuwangi District, so this study aimed to identify and to count the prevalence and intensity of endoparasite nematode that infects to asian swamp eel. This result can used as basic data to prevent the fish borne zoonosis from endoparasite nematode infection to human.

2. Material and method

2.1 Material

Material that used in this study i.e three hundreds asian swamp eel (30-110 cm length and 29,8-60 gram weight), Physiological saline (Otsuka), alcohol glycerin 5% (solution of alcohol 70% and glycerin), alcohol 70% (Onemed), alcohol 85%, alcohol 96% (Onemed), acetic acid 45% (Merck), Carmine (Merck), HCl (Merck), NaCO3 (Merck), and entellan (Merck). Instrument that used in this study i.e coolbox 16 liters (Lion star, Indonesia), sectio set, digital scale, (Ohaus, USA), trinocular microscope (Nikon E200-LED, Japan), beaker glass, petri dish, microtube 1,5 mL.

2.2 Research Procedures

Three hundred asian swamp eel samples (*M. albus*) that collected from five central traditional market in Banyuwangi District i.e Genteng, Rogojampi, Srono, Cluring and Banyuwangi City. The total number of sampel that taken from each location were 30 tail [15] with two replication sampling. Samples were packing in the coolbox and carried to Biology and Anatomy Laboratory Universitas Airlangga campus Banyuwangi to examined.

2.3 Sample Examination

Samples of asian swamp eel was taken one by one from coolbox, measures the length and weight, and sectioned to examine the endoparasite nematode from internal organ, such as liver, intestine and gonads. Endoparasite that found was entered to the microtube that contains alcohol glycerin 5% solution and staining with Semichen Aceto-carmine method [16]. Endoparasite identification based from [17]; [18]; and [19]. Prevalence and intensity was counted from description of [20] and categorized by [21].

2.4 Data Analysis

Data (prevalence and intensity) from each endoparasite nematode that has categorized will be analized by descriptive method with table and figure.

3. Result and discussion

Based to endoparasite identification found that three species of nematode endoparasites i.e *Eustrongylides ignotus* (Nematoda; Dioctomidae), *Pingus sinensis* (Nematoda; Quimperiidae), and *Procamallamus* (Nematoda; Camallanidae) was infect asian swamp eel from this study. Similarly study from [22] identified *Eustrongylides* spp from *M. albus* in China. Furthermore, [17] found that local duck (*Anas platyrhynchos domestica*) infected by *Eustrongylides ignotus* because consumed *M. albus* from natural caught. *Pingus sinensis* have previously reported infect the Japanese eel (*Anguilla japonica*) [23] and *M. albus* in Liangzi Lake, China [18]. Whereas, *Procamallamus* reported infects the Pasifik eel (*Anguilla spp.*) [24] and *Anguilla bicolor* in Thailand [25].
Table 1. Infection degree of endoparasite nematode from asian swamp eel (M. albus)

| Year | 2018 |
|------|------|
| Total sample | 300 |
| Length average (SD) cm | 68,19 (13,4) |
| Length range cm | 30-110 |
| Weight average (SD) gram | 39,48 (4,2) |
| Weight range gram | 29,8-60 |

| Type of endoparasite | Loc | Pos | Abud | Prev (%) | Category | Inty | Category |
|----------------------|-----|-----|------|----------|----------|------|----------|
| Eustrongylides ignotus | int, liv, gc, go | 49 | 94 | 16,33 | Often | 1,92 | Light |
| Pingus sinensis | gc, liv, musc, int, go | 27 | 9 | 9 | Occasionally | 0,33 | Very light |
| Procamallanus | liv | 11 | 12 | 3,67 | Occasionally | 1,1 | Light |
| TOTAL | | 87 | 115 | 29 | Often | 1,32 | Light |

Pos: total sample that positively infected; loc: site infection; abud : abundance; prev: prevalence; inty: intensity; int: intestine; liv: liver; gc: gastrointestinal cavity; go: gonad; musc: muscle

Prevalence of endoparasite showed the percentage of samples that infected by endoparasite from all samples that examined [26]. Result of this study showed that the highest prevalence of endoparasite nematode in swamp eel (table 1) were Eustrongylides ignotus (16.33%) including the category “often” [21]. This highly prevalence caused by asian swamp eel as a second intermediate host of endoparasite E. ignotus. [17] stated that life cycle of E. ignotus needed the first intermediate host i.e Oligochaeta and second intermediate host i.e, fish, frog and eel. Furthermore, [27] reported that some species from Oligochaeta, such as Dero digitata, Limnodrillus hoffmeisteri, Aulodrilus pigueti and Pristina synclites contained E.ignotus larvae which overall were natural feed from asian swamp eel [28]. Oligochaeta can live and grow on the highly organic matter environment like on the rice field which habitat for asian swamp eel [29]. The lowest prevalence were Procamallanus (3.67%) that include to category “Occasionally” [21]. This lowest prevalence caused that Procamallanus as an incidental parasite on asian swamp eel. [24] stated that Procamallanus mainly found in eel from genus Anguilla such as, Anguilla obscura, Anguilla reinhardtii and Anguilla bicolor [25].

Intensity showed that the average of endoparasite that infects one host. Result of this study showed that the highest intensity (table 1) were E.ignotus (1,92) that means one sample infected by average two endoparasite E.ignotus. According to [21], the intensity of E.ignotus including the category ‘light’. This intensity caused by asian swamp eel were suitable for live and grow of E.ignotus. [2] stated that suitability of parasite in the host depend on easily to take the site for infection and feed for grow of parasite. Furthermore, [30] added that eutrophication and water quality from habitat of asian swamp eel were primarily external factor for the live of parasite. Result study from [27] reported that fish which live in muddy waters like in the rice field almost all infected by larvae and egg of E.ignotus. The lowest intensity were P.sinensis (0,33) that include to category “very light” [21]. This lowest value caused by P.sinensis as an incidental parasite on asian swamp eel. [31] stated that P.sinensis was found infects fish from family of Quimperiidae such as Channa maculata, Acanthorhodeus fortunensis, Leptobarbus hoevenii dan Oxyleotris marmorata. This parasite migrated to the host because the parasite live at the same habitat and same first intermediate host [32].

Endoparasite nematode infection in asian swamp eel, especially E.ignotus caused ulceration and inflammation in the gastrointestinal, kidney, liver and gonad. Larvae of E.ignotus will migrated to the inner muscle and skin that caused foci necrosis [33]. In human, E.ignotus as the one of fish borne zoonosis pathogen that cause diarrhea, nausea, vomiting, and fever [34] that caused by consumed the raw fish or undercook fish that contains the larva of E.ignotus [6].
4. Conclusion
The highest prevalence and intensity of endoparasite nematode that infects to asian swamp eel from Banyuwangi district was *E. ignotus* i.e 16.33% and 1.92. Whereas the lowest prevalence was *Procamallanus* (3.67%) and intensity was *P. sinensis* (0.33). Further study needed to determine the prevalence and intensity of endoparasite at wet and dry season as a basic data to mapping the endoparasite at the asian swamp eel.

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6. **Acknowledgement**

I would like to thank Professor Sri Subekti for her expert advice and encouragement throughout this difficult project and her brilliance in the lab.