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Infection of *Anisakis* sp. larvae in some marine fishes from the southern coast of Kulon Progo, Yogyakarta

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ABSTRACT

Setyobudi E, Soeparno, Helmiati S (2011) Infection of Anisakis *sp. larvae in some marine fishes from the southern coast of Kulon Progo, Yogyakarta. Biodiversitas 12: 34-37.* The prevalence, intensity and distribution of *Anisakis* sp. larvae which infected some fishes at the southern coast of Kulon Progo District were investigated. Totally 95 fish specimens were collected during December 2007. Results of the present study indicated that the *Anisakis* sp. larvae infected various fish species i.e: *Trichiurus lepturus*, *Parupeneus* sp., *Lutjanus malabaricus*, *Terapon jarbua* and *Caesio* sp. Prevalence and mean intensity of infection showed the differences between fish species. The highest mean intensity of infection was found in *L. malabaricus* (7.71 larvae/infected host) and *T. Lepturus* (3.18 larvae/infected host), while the lowest intensity of infection was found in *Parupeneus* sp., *T. jarbua* and *Caesio* sp. (1 larvae/infected host). Infected host organs were body cavities (peritoneum), digestive tract, gonads, and liver. Presence of this parasite may be harmful for consumer; however it can be used for several ecological studies as biological tags.

Key words: *Anisakis* sp., infection, southern coast of Kulon Progo District.

INTRODUCTION

Anisakis sp. (Nematode: Anisakidae) is a common parasite of marine organisms world-wide. Their life cycles involve crustaceans, fishes, cephalopods and marine mammals. These organisms act as intermediate, paratenic or transport host and definitive host. Numerous species of fish (Hutomo et al. 1978; Chao 1985; Strømnes and Andersen 1998; Wharton et al. 1999; Manfredi et al. 2000; Margarena 2002; Shih 2004; Nuchjangreed 2006; Jacob and Palm 2006; Setyobudi et al. 2007; Suadi et al. 2007; Palm et al. 2008) and cephalopods especially belonging to the family of Sepiidae and Ommastrephidae (Abollo et al. 2001) have been reported to be infected by *Anisakis* sp. larvae. Occurrence of *Anisakis* sp. larvae in the fish may be reducing the quality and be harmful for consumer. These nematode cause human health implication and reduce the commercial value of fish. Human can act as incidental host by ingestion of raw or undercooked infected fish. Several symptoms in humans caused by *Anisakis* infection are: stomach pain, nausea, vomiting (Smith and Wooten 1978), allergic reaction (Ancillo et al. 1997; Audicana et al. 2002) and gingivostomatitis (Eguia et al. 2003). However, its occurrence can be used as biological tags for many purposes of ecological studies and applied fishery science e.g. fish stock discrimination, migration and feeding habits. Marcogliese et al. (2003) has been used parasite to identify marine fish stock and its movement pattern. Using *Anisakis* sp. larvae as biological tags have been conducted for some fish species, for example Chilean hake (*Merluccius gayi gayi*) (Oliva and Ballon 2002), swordfish (*Xiphias gladius*) (Pampillon et al. 2002), herring (*Clupea* sp.) (Horbowy and Podolska 2001; Podolska and Horbowy 2003; Tolonen and Karlsbakk 2003; Podolska et al. 2006), and also walleye pollock (*Theragra chalcogramma*) (Konisi and Sakurai 2002).

There were limited studies related to *Anisakis* sp. larvae infection in Indonesian water especially in the southern coast of Java Island. The aims of this research were to know the prevalence and mean intensity of *Anisakis* sp. larvae which infected some fishes at the southern coast of Kulon Progo District. This data provide some information of the infection levels on each fish species which can guide for fish handling and processing, as well as possibility for biological indicator. The fishes with high prevalence of *Anisakis* sp. larvae infection should be avoid to be consumed as raw or undercooked. However, understanding of the parasites distribution and specific site of infection may be used as biological indicator for several ecological studies.

MATERIALS AND METHODS

Sample collection

Samples were collected from fish landing-places in (i) Glagah (Temon Subdistrict), (ii) Bugel (Panjatan Subdistrict), and (iii) Trisik (Banaran Village, Galur Subdistrict), Kulon Progo District (7°54’-7°58’ S, 110°03’-110°11’E), Yogyakarta, Indonesia (Figure 1). A total of 95 individuals fish were randomly collected as samples during December 2007. The number of sample for each species was taken proportionally to the total fish caught by fisherman. The fish was transported to the laboratory and immediately frozen until the parasites examination or identification.

Samples examination

Each fish sample was thawed, measured the total length (nearest 0.1 cm) and body weight (nearest 0.1 g) and examined for the parasites. External examination was conducted on body surface and gill, internal examination were conducted on body cavity, digestive tract, liver, gonad, and muscle. Parasites collected were preserved in 70% ethanol for morphological analysis under microscope *Anisakis* sp. identification was based on morphological feature. Population descriptor are prevalence (a number of host infected with parasites divided by the number of host examined, expressed as percentage) and mean intensity (average of infection of parasite among the infected fish, expressed as larvae/infected host) (Bush et al. 1997).

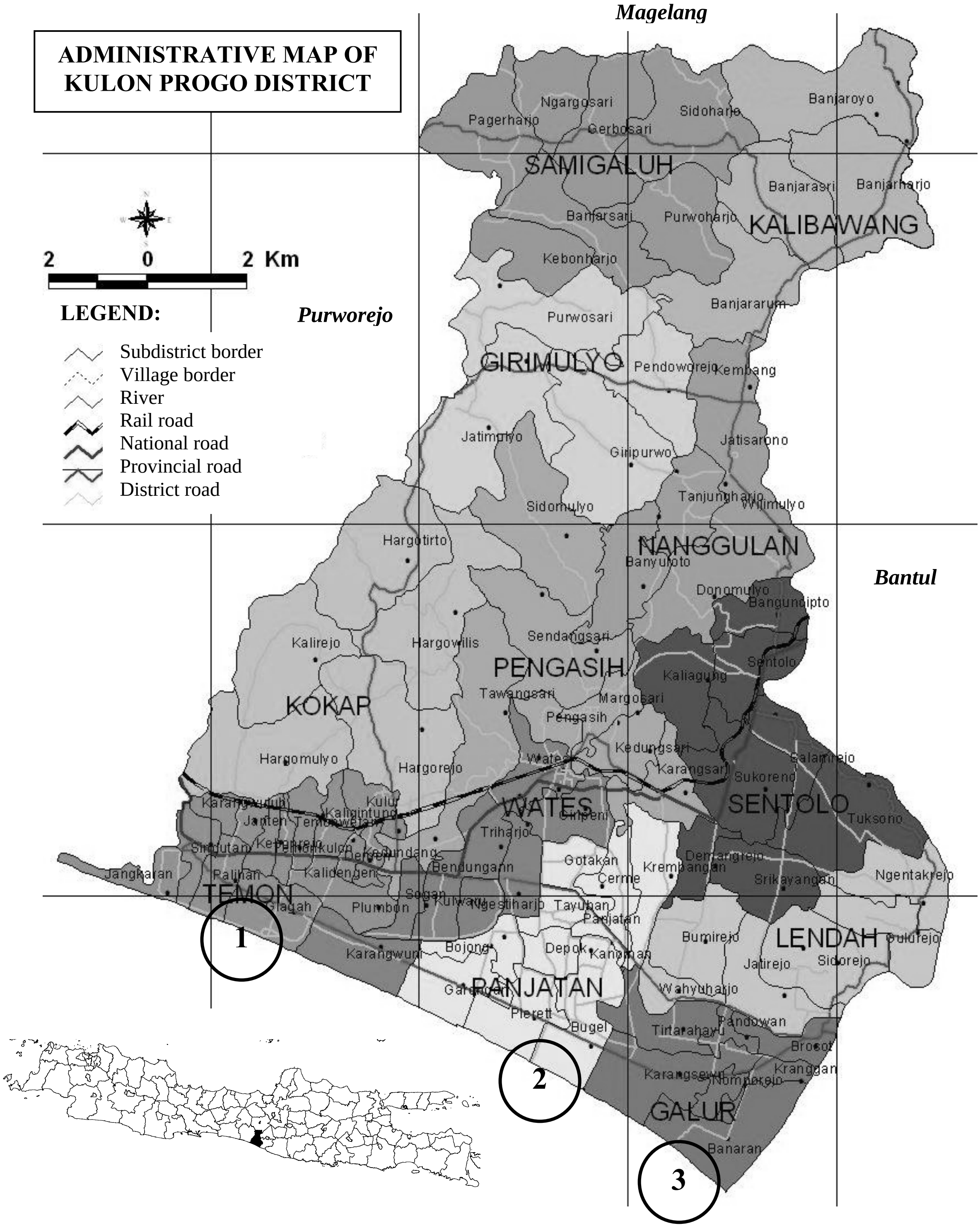

Figure 1. Fish sampling site of southern coast of Kulon Progo District, Yogyakarta. Note: 1. Glagah, 2. Bugel, and 3. Trisik beaches.

RESULTS AND DISCUSSION

Many commercially important fish species were captured at Indian Ocean, southern coast of Kulon Progo District. This dominantly by economic important fish e.g. *Pampus argenteus*, *Trichiurus lepturus*, *Lutjanus malabaricus*, *Terapon jarbua*, *Caesio* sp. and *Arius maculatus*. *Anisakis* sp. larvae infection showed the difference of prevalence and mean intensity between fish species. Species, total number of individuals and size of fish samples and the infection of *Anisakis* sp. larvae were given in Table 1. There were only 5 of 11 observed fish species infected by *Anisakis* sp. larvae. The presence of *Anisakis* sp. larvae in marine organisms have been investigated in several previous studies and a great number of fish species and cephalopods have been found and reported to be receptive to anisakid infection (Smith and Wooten 1978; Abollo et al. 2001).

This study showed the highest mean intensity observed on *L. malabaricus* (7.71 larvae/infected host), following *T. lepturus* (3.18 larvae/infected host), whereas in *Parupeneus* sp., *T. jarbua* and *Caesio* sp. just a few (around 1 larvae/infected host) were obtained. Reports on the distribution of *Anisakis* sp. larvae on some fish species from different area shown a great variation of prevalence, intensity and distribution. Margarena (2002) reported the differences of prevalence and intensity of *Anisakis* sp. infection in *Trichiurus lepturus* from different regions in southern coast of Bantul District. The higher prevalence (49.23%) were observed in Pandansimo fish landing place than Depok fish landing place (42.90%), conversely, the higher intensity were obtained in Depok fish landing place (7.46 larvae/infected host) compared to Pandansimo (5.35 larvae/infected host). Similar prevalence, ranged 31.26-53.33% was obtained in *Trichiurus* spp. landed in Cilacap (Suadi et al. 2007). In contrast, the higher prevalence were showed *Anisakis* sp. infecting *Trichiurus* sp. in southern coast of Purworejo District, that is 62.68% but only has lower intensity (3.30 larvae/infected host) (Setyobudi et al. 2007).

Chao (1985) reported the *Anisakis* sp. larvae infection in some marine fish, with mean prevalence reached 37.7% and mean intensity 14.2 larvae/infected host. The high mean intensity was achieved in *Evynnis cardinalis* and *Nemipterus virgatus*, 80.3 and 76.2 larvae/infected host, respectively. Several studies of *Anisakis* sp. larvae infection in some marine fishes from Indonesian waters have been conducted, and showed different prevalence and mean intensity for each fish species. Fishes belonging Gempylidae family (*Gempylus serpens*, *Thyrsitoides marleyi)* exhibited high prevalence and mean intensity of *Anisakis* sp. infection (Tabel 4). Many studies shown the infection was more often found in feeding area than nursery area. Prevalence in the feeding area reached 83-100% with mean intensity 6.0±4.7-9.9±15 larvae/infected host, whereas in nursery area the prevalence reached 7-54% with mean intensity 1-3.7±2.9 larvae/infected host (Tolonen and Karlsbakk 2003).

The distribution and locality of infections by *Anisakis* sp. showed that the majority of nematodes were found in digestive tract, peritoneum and gonad (Table 2). Mostly *Anisakis* sp. larvae was found in peritoneum than other organs, for example in *Trichiurus lepturus* (Margarena 2002), some commercial flatfish (Alvarez et al. 2002) and *Merluccius gayi gayi* (Oliva and Ballon 2002). Wharton et al. (1999) found that the majority of larvae were associated with the visceral organs, mesenteries, and peritoneum. Due to the infection and distribution of *Anisakis* sp. occur through food web by predator-prey relationship, factors like the feeding habits of the host or time period of larvae the within the host have been used to explain the preferences of larvae to muscles or visceral organs. Strømnes and Andersen (1998) revealed the distribution patterns of *A. simplex* L3 between muscle and viscera were not significantly affected by host size but might be governed by the conditions encountered within host tissues, and are possibly related to the availability of nutrients. These parasites seem to be capable of living for several years. The larvae will penetrate the digestive tract and entered to the abdomen. In contrast, Valero et al. (2006) reported the clearly higher prevalence of larvae in viscera than in the muscle tissue of *Merluccius merluccius* and an increase in parasitization with increasing host length.

Presence of *Anisakis* sp. larvae in the mouth cavity of the host as shown in *T. lepturus* in this study was rarely case and unusual. The possibly the larvae was move toward of digestive tract, from stomach to the mouth after previous host has been ingested.

Occurrence of *Anisakis* sp. in some marine fishes has been investigated for health and ecological reason. Indonesia has thousands fish species but only little amount have been studied for *Anisakis* sp. (Anisakidae) infestation. In the future, a long term survey and more detailed studies about its eco-biology in large-scale area are necessary for providing useful information of anisakids infection in Indonesian waters.

Table 1. Species, total numbers, size of fish sampled and the infection of *Anisakis* sp. larvae

Species (local and scientific name, family)	No. of individuals	Total Length (cm)	Infection (prevalence (%), mean intensity)
Layur (*Trichiurus lepturus*; Trichiuridae)	24	48.0-85.0	45.83 % (3.18)
Kuniran (*Parupeneus* sp.; Mullidae)	36	15.4-20.6	33.33% (1.08)
Tombol (*Lutjanus malabaricus*; Lutjanidae)	13	16.3-26.1	53.85% (7.71)
Manyung (*Arius maculatus*; Ariidae)	4	21.0-25.1	0 (0)
Kerong-kerong (*Terapon jarbua*; Terapontidae)	3	17.9-21.4	66.67% (1.00)
Bawal (*Pampus argenteus*; Stromateidae)	2	19.6-20.6	0 (0)
Ikan kelelawar (*Platax orbicularis*; Ephippidae)	1	36.1	0 (0)
Kakap *(Gymnocranius microdon*; Lethrinidae)	3	17.9-22.0	0 (0)
Ketang-ketang (*Drepane punctata*; Drepaneidae)	5	14.5-35.3	0 (0)
Ekor kuning (*Caesio* sp.; Caesionidae)	2	18.0-20.3	50.00% (1.00)
Peperek (*Leiognathus fasciatus*; Leiognathidae)	2	20.0-21.0	0 (0)

Table 2. Distribution of *Anisakis* sp. larvae on each organ in some marine species from southern coast of Kulon Progo District

Fish species	Locality				
	Mouth	Peritoneum	Digestive tract	Liver	Gonad
T. lepturus	2.9%	14.3%	57.1%	14.3%	11.4%
Parupeneus sp.	-	53.8%	30.8%	-	15.4%
L. malabaricus	-	59.3%	25.7%	-	15.0%
*T. jarbua**	-	100.%	-	-	-
Caesio sp.*	-	-	-	-	100.%

* = 1 fish sample

Table 3. Related studies of *Anisakis* sp. larvae infection in some marine fishes from Indonesian waters

Fish species	Prevalence (%)	Intensity	References
Decapterus russelli	15-83.94	1-15.06	Hutomo et al. 1978
	2.9-28.6	1-1.9	Palm et al. 2008
Rastrelliger kanagurta	4-87.72	1.5-13	Hutomo et al. 1978
Sardinella sirm	16.98-78	1.22-3.77	Hutomo et al.1978
Auxis rochei rochei	20-74.3	2.9-4.6	Palm et al. 2008
Trichiurus lepturus	62.68	3.30	Setyobudi et al. 2007
	97.1	1-70	Jacob and Palm 2006
	46.07	6.41	Margarena 2002
Brama dussumieri	10.5	1-2	Jacob and Palm 2006
Gempylus serpens	97.1	1-32	Jacob and Palm 2006
Thyrsitoides marleyi	100	9-25	Jacob and Palm 2006

CONCLUSION

Anisakis sp. larvae infecting various fish species i.e.: *T. lepturus*, *Parupeneus* sp., *L. malabaricus*, *T. jarbua* and *Caesio* sp. Prevalence and intensity of infection showed the differences between fish species. The high intensity of infection was found in *L. malabaricus* and *T. lepturus.* These larvae mostly found in body cavities (peritoneum) and digestive tract. Presence of this parasite may be harmful for consumer; however it can used for several ecological studies as biological tags.

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