The prevalence of parasites in ornamental fish from fish market in Medan

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Abstract. Parasites still become the major problem in ornamental fish as the fast grown of its trading in Indonesia. Parasites causes diseases in ornamental fish hence followed by death and reducing its appearance. In this study, the prevalence of parasites in 100 apparently healthy ornamental fishes namely Guppy (Poecilia reticulate) and Goldfish (Carrasius auratus) were determined. The method of this research used was survey in local fish market in Medan from March to May 2017 The aim of this study was to determine the parasite that infects aquarium fishes and find out its prevalence. For this purpose, ornamental fishes were examined for parasites from their skin, fin, gill and intestine using wet mount method under a light microscope. The survey result showed that parasites that infect Guppy and Goldfish were Monogenea (Dactylogyrus sp and Gyrodactylus sp) in their skin and gill, Protozoa (piscinodinium sp) in their gill and Nematoda (Capillaria sp) in abdominal cavity. Prevalence rate of parasites that attack Guppy in Medan is Dactylogyrus sp (8%), Gyrodactylus sp (14%), Piscinodinium sp (6%) and Capillaria sp (8%). Then, prevalence rate of Capillaria sp that attack Goldfish is 4%. The conclusion of this work revealed that the prevalence rate of ectoparasite and endoparasites in ornamental fishes in Medan had the low rate as well as there was no pathological findings is observed. However, these parasites could be a harmful parasitic diseases in case there is the changes in aquarium environment and improper fish handling.Key word : Parasites, prevalence, ornamental fish

1. Introduction
Gold fish and Guppy is the main ornamental fish because its appearance and many hobbyist choose them as a pet. Despite of their appearance, an economic value of ornamental fish are the main reason for the remarkable grown in its trading both in Indonesia market and worldwide. The global wholesale value for aquarium fish trading estimated at US$ 900 million in 2000[1]. Asia provided more than 50 % of the worldwide total ornamental fish supply. Furthermore, Indonesia has been one of the main country in Asia which is import both marine and fresh water ornamental fish to Europe in 2009[1].

Parasitic diseases in ornamental fish is one of the main problem both for farmer and aquarist. Parasites make a great loss because it could reduce fish performance such as scale loss, colour change and many pathological aspects as well as mortality. Obviously, parasites possibly have the capability to directly lessen the appearance of their hosts, in terms of growth and reproduction, through their direct impact on fish health[2]. High mortality rate by parasites due to the progress infection by parasites such as mechanical damages in gill [3], alterations in reproduction organ [4] and secondary infection by bacterial diseases[5].
The occurrence of parasites in ornamental fishes has been reported worldwide as well as Indonesia. Parasites in ornamental fishes that determined from Chumuci River in Mexico were from 3 taxa, namely Monogenean, Nematoda and Acantocephala[6]. In Korea, 7 imported fishes from Southeast Asia were examined for parasite infection and they found that there were 3 ciliates, 2 monogeneans, 1 nematode, and 1 copepod from 7 host species [7].Aquarium fishes that collected from pet shop in Sweden mostly infected by Monogenea parasites[8]. Parasites infection in imported fish also found in Pakistan [9]. In Iran, there were reported that parasites infection in fresh water ornamental fish farm also happened during 2011 -2012 [10]. Parasites infection in ornamental fishes also reported from Indonesia such as Jakarta [11] and Surabaya [12]. However, the occurrence parasites of ornamental fishes in Medan still unknown for these years.

The distribution of parasites infection could by trading (imported fish), fish farm infection from natural resources or in fish market. The present study is aimed to investigate parasitic infection and to know the prevalence of parasites infection in guppy and goldfish species ornamental fishes that selling in fish market in Medan city.

2. Materials And Methods
One hundred ornamental fishes were collected from five pet shops in Medan city from March 2017 to May 2017 and were examined for the parasites infection. The fish samples were brought live in polyethylene bag and kept in aquarium aerated water in Management Water Resources laboratory, Faculty of Agriculture, Sumatera Utara University. The experiment methods was survey method.

The experimental fishes were measured and examined by standard parasitology examination [13].The external examination was observed to identified the pathological damage caused by parasites. The body, skin, fins, gill were thoroughly examined as well as intestine for external parasites and endoparasites infestations. The wet mount preparation or biopsy procedures were applied to observe the parasites from experimental fishes [13]. The surface of body and fins were scrapped and intestine were cut to observe the parasites infestation. The parasites examination and identification were done by using the microscope examination [13][14]. Parasites, habitats, prevalence and intensity of parasites were analyzed by descriptive analysis.

3. Results and Discussions
The study of parasitic infection in ornamental fish both Guppy and goldfish from Medan were done then it found there were three group of parasites : monogenean (Gyrodactylus sp, Dactylogyrus sp), protozoa (Piscinodinium sp), and nematode (Capillaria sp) were observed. A total of 100 fishes both guppy and gold fish were examined for parasitic infection. The total length of the fish ranged 2.3 - 4.9 cm for guppy and 4.72 – 7.62 cm for gold fish. Out of the total 100 fishes, the number of infected fishes varied for each type of parasites (Table 1). There were four species infected Guppy and one species infected goldfish. These were : Piscinodinium sp, Gyrodactylus sp, Dactylogyrus sp, and Capillaria sp. The parasites prevalence and intensity both Guppy and Goldfish are given in Table 1

| Table 1. Prevalence and Intensity of Parasites that Infected Ornamental Fishes in Fish Market Medan |
|-------------------------------------------------|
| Fish Guppy          | Parasites | Prevalence (%) | Intensity |
|---------------------|------------|----------------|-----------|
|                     | Piscinodinium sp | 6              | 10.67     |
|                     | Monogeneans   | 14             | 1.43      |
|                     | Gyrodactylus sp | 8              | 1.25      |
|                     | Dactylogyrus sp | 8              | 1.25      |
|                     | Nematoda      | 2              | 1         |
| Gold Fish           | Capillaria sp  | 2              | 1         |
|                     | Nematoda      |                |           |
The prevalence of Monogenean both Gyrodactylus sp and Dactylogyrus sp that infect the Guppy is the highest among all the parasites which is about 14% and 8%, respectively. Then, the endoparasites; Capillaria sp about 8%. The lower prevalence of parasites in Guppy is Piscinodinium sp about 6%. On the contrary, Goldfish have the fewest parasites which is shown by the lowest prevalence was about 2%. Then, the parasites that infects goldfish was endoparasites namely nematodes (capillaria sp.). The intensity of parasites Piscinodinium sp is the highest among all the parasites infected the Guppy which is about 10.67. The intensity of monogenean, both Gyrodactylus sp and Dactylogyrus sp were 1.43 and 1.25. Hence, the intensity of Capillaria sp was 1.25. In goldfish, the intensity of nematode parasites was about 1.

Different parasite species were reported from various ornamental fish species around the world. Parasites infection in a variety of goldfish was reported from Pakistan. These parasites were; monogenean (Dactylogyrus extensus. Gyrodactylus sp.), protozoan (Trichodina sp. Ichthyophthirius multifilis) and crustacean parasite (Argulus foliaceus)[9]. Ambiphyra spp. was reported from the skin of guppy [15]. The ectoparasites also observed from goldfish (Carassius auratus) in Iran. six were monogeneans (Dactylogyrus vastator. D. baueri. D. formosus. Dactylogyrus sp.. Gyrodactylus chinensis and Gyrodactylus. sp.) and three were protistans (Ichthyophthirius multifilis. Trichodina sp. and Cryptobia sp)[16].

This study is the first report about parasitic infection in ornamental fish from market fish in Medan, North Sumatera. However, there were many reports of parasite fauna from ornamental fishes in Indonesia market. Parasites that infected guppy fish were Trichodinid (Ciliophora). Gyrodactylus sp. (Platyhelminthes) dan Lerneae sp. (Crustacea)[3]. Types of ectoparasites that found in Koi fish (Cyprinus carpio) in East Java were Trichodina sp.. Chilodonella sp.. Myxobolus sp.. Ichthyophthirius multifilis. Dactylogyrus sp. Gyrodactylus sp.. and Argulus japonicus[12].

In this study, there were three group of parasites: monogenean (Gyrodactylus sp. Dactylogyrus sp). protozoa (Piscinodinium sp). and nematode (Capillaria sp) were observed. In guppy fish. The highest prevalence of parasite infection were monogeneans: gyrodactylus sp.(14%) and dactylogyrus sp (8%). Monogeneans are platyhelminths parasitic that common in fish and known to lead disease in all kind of fish culture [14]. Their existance in fish culture and aquarium probably they have the high rate of reproduction under poor sanitation and deteriorating water quality such as over crowding, high ammonia or nitrate. organic pollution or low dissolve oxygen[13]. While this study found that the prevalence and intensity of monogeneans in Guppy was low. however it still became threatened for diseases outbreak because the epidemic study on monogenea infection in guppy result showed that in social hosts like guppies. the frequency of social contact largely rules disease epidemics independent of host density [17].

Protozoan parasites that infect gill of Guppy fish in this experiment was Piscinodinium sp. with prevalence rate was about 6% and intensity was 10.67. Piscinodinium sp. infection in ornamental fish also reported in Srilanka [18]. This parasites was one of genera in Dinoflagellates which are protozoa that are commonly found in aquatic ecosystems [14]. Hence, it is a a problem in tropical freshwater fishes and mostly were reported in aquarium fishes [18][19]. Piscinodinium sp infest the gill and skin [14]. Furthermore, in this study. we found it infected the gill with pathological sign such as slightly deteriorated in lamella.

Endoparasites findings in this study was nematodes infection in intestine both Guppy and Goldfish. The prevalence of this infection was 8% in Guppy and only 2% in goldfish. Capillaria sp infestation also reported in Guppy from Srilanka [18] and Iran [10]. Fish are either intermediate or final hosts for nematodes and neither adult or larval nematodes are usually a problem in most cultured fish[13]. Capillaria sp. could lead the high mortality in aquarium fish because it can cause chronic wasting if present in high number [13].

The site of infection varied for each species of parasites. The Protozoan infected gill and Monogenean infected skin and gill. Endoparasites also found in the intestine which is identified as nematode. The location of each parasites were given in Table 2.
Table 2. Location of Parasites in ornamental fish bodies

| Parasites     | Host Species | Location     |
|---------------|--------------|--------------|
| Piscinodinium sp | Guppy        | Gill         |
| Gyrodactylus sp   | Guppy        | Skin         |
| Dactylogyrus sp   | Guppy        | Gill         |
| Capillaria sp     | Gold fish, Guppy | Intestine |

The location of parasites depend on their specificity and their feeding. Ectoparasites infect host in their external bodies such as skin, fin and gill. Piscinodiiniums infest the skin and gill and feed from epithelial cells [13]. Nematodes are endoparasites that had infestation in intestine mucus of fish. The fish length also measured in this study. The existance of parasites and their relationship with length of fish were showed in figure 1. The chart represents that the prevalence of parasite infection decrease as long as the the increase of the fish size. The highest prevalence with the length between 2.0 – 2.9 cm then followed by fish size with 3.0 – 3.9 cm length both value were 50% and 35%, respectively. The fish with length between 4.0 – 4.9 cm have the prevalence about 25%

![Figure 1. Parasites Prevalence and length of The Guppy](image1)

The diagram in figure 2 describes that the prevalence of parasitic infection gradually rise along with the increase of the length of the fish. The highest prevalence value is about 10% with the range of length between 7.0 – 7.9 cm then followed by the fish with length 6.0 – 6.9 cm with the prevalence 7.6%.

![Figure 2. Parasites Prevalence and length of The Goldfish](image2)
The relation between host length and the existence of parasite in this study showed that there were difference pattern between guppy and goldfish prevalence related to the size of their body. The pattern in gold fish showed that large fish was more susceptible to parasites infection than the small fish and this work has similarities with the work of [20]. Hence, the given data showed that the smallest fishes were relatively less infected than the other length groups and the percentage of infection increases with enhancement of fish length. On the contrary, Guppy fish showed that the smallest fish have the higher prevalence of parasite infection. Some parasitic diseases namely piscinodinium infestation most pathogenic in young fish [15].

The incidence of parasite infection in ornamental fish could be the main problem in ornamental fish industry in Indonesia particularly in Medan. The identified parasites in this study have not been reported as a parasitic problem in Medan. Though, the rate of infection in these aquarium fishes was low. the transmission of contamination among aquarium fishes and customer satisfaction taken into consideration. The prevention from severe infection should be done such as reducing stress condition through improved water quality a. reduction of organic matter. avoiding excessive density of fish and unnecessary manipulation and using appropriate disinfectants in farms can be benefit to avoid economic losses caused by parasitic disease in ornamental fishes.

4. Conclusion
The parasites that infected ornamental both Guppy and Goldfish which was sold in fish market were four species infected Guppy and one species infected goldfish. These were: Piscinodinium sp, Gyrodactylus sp, Dactylogyrus sp. and Capillaria sp. The prevalence of Monogenean both Gyrodactylus sp and Dactylogyrus sp that infect the Guppy is the highest among all the parasites which is about 14% and 8%. Goldfish have the fewest parasites which is shown by the lowest Capillaria sp infection prevalence in was about 2%. The relation between host length and the existence of parasite in this study showed that there were difference pattern between guppy and goldfish prevalence related to the size of their body.

The information about advance research in parasitic infection of ornamental fishes is needed along with the economic value and the burden that caused by it. The routine monitoring in parasitic prevalence could prevent the huge economic loses caused by parasitic diseases.

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