

# Occurrence of parasitic and bacterial diseases in Thai freshwater fish

Chutharat Kanchan<sup>1\*</sup> • Puttachat Imjai<sup>1</sup> • Nukoon Kanchan<sup>2</sup> • Aonanong Chaiyara<sup>3</sup> • Kwanprasert Panchai<sup>4</sup>

<sup>1</sup>Program in Aquaculture Technology, Faculty of Agriculture Technology, Rajabhat Maha Sarakham University, 44000, Thailand.

<sup>2</sup>Animal Production Technology Program, Faculty of Agricultural Technology, Kalasin University, 46000, Thailand.

<sup>3</sup>Fisheries Program, Faculty of Agricultural Technology, Sakon Nakhon Rajabhat University, Sakon Nakhon, 47000, Thailand.

<sup>4</sup>Biology Program, Faculty of Science and Technology, Nakhon Ratchasima Rajabhat University, 30000, Thailand.

\*Corresponding author. E-mail: cmunchan@yahoo.com. Tel: +6643725439.

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**Abstract.** The present study was aimed to investigate the occurrence of parasitic and bacterial diseases in some freshwater fish in NongBo reservoir, Maha Sarakham Province. The sampling was randomly collect from three sites by gillnets, bag nets and cast nets from the local fisherman during October 2015 to September 2016. A total of eight freshwater fish species were identified namely *Oreochromis niloticus*, *Hampala dispar*, *Pristolepis fasciata*, *Trichopodus pectoralis*, *Anabas testudineus*, *Oxyeleotris marmorata*, *Channa striata* and *Clarias batrachus*. The parasitic diseases found on the sampled fish species were external parasites such as *Trichodina* sp., *Dactylogyrus* sp. and Digenea gen.sp. The bacterial diseases identified were *Aeromonas hydrophila*, *Acinetobacter baumannii*, *Plesiomonas shigelloides*, *Serratia odorifera* and *Staphylococcus epidermis*. The dominant species of bacterium was *Aeromonas hydrophila*. This study revealed that the natural fish stock could be risk from the fish pathogens both parasites and bacteria.

**Keywords:** Reservoir, external parasite, fish pathogens.

## INTRODUCTION

Fish have a one of the best source of protein. It has a high nutritional value and a healthier choice over red or white meat. People over the years are becoming more health conscious and are resorting to eating fish over meat. Food safety is a popular trend in nowadays, especially the foods that humans are consume namely fruits, vegetables and meats. Animals from aquaculture or natural aquatic environments are expected to be a clean food for the consumers. To obtain a good quality of fish meat is necessary for the present good health. Fish diseases are the main problems found in commercial fish. Diseases which caused by a various pathogens such as parasite, fungi, virus and bacteria could be found in the

water, soil, air, or fish (Rottmann *et al.*, 1992). The bacterial and parasitic infections are the most common problem that caused illness, mortality and reduce fish growth (Plumb and Hanson, 2010). The parasitic diseases are mainly caused by protozoan and metazoan parasites (Durborrow, 2003). There are a variety of protozoan which infest the gills and skin of fish causing irritation, weight loss, and finally death (Francis-Floyd, 1997). The genus *Dactylogyrus* is the largest helminth genus parasitizing many fish species (Neary *et al.*, 2012). Like parasites, bacterial infestation or infection plays an important role in fish health. The disease status of cultured fish and wild fish has importance both for the



**Figure 1.** The location for collecting the specimen.

well-being of these populations and with regard to the restore of wild fish populations (Anderson, 1995). Observation on the disease status of the natural fish population of this study in NongBo reservoir, Maha Sarakham Province, Thailand is aimed to investigate the suspected disease of natural fish which caused by parasitic and bacterial pathogens.

## MATERIALS AND METHODS

### Study area

The location for collecting the specimen was divided into 3 sampling sites as follows: site 1 was located between 1615098 N and 1037675 E, site 2 between 162666 N and 10373865 E and site 3 between 1605978 N and 10372301 E, respectively. Site 1 was near the areas of discarded snail shells, site 2 was near the bus station and site 3 was near the village as shown in Figure 1. The reservoir has an area of 1,883 rai which comprised 2 main rivers namely Chi and Saew Rivers.

### Collection of freshwater fish specimens

The fish samples were spatially collected from three sites around the reservoir by local fishermen landing using local fishing gears such as gillnets, bag nets and cast nets from the selected sites. Samples of fishes (N = 130) of which *Oreochromis niloticus* (Linnaeus, 1758) (30), *Trichopodus pectoralis* (Regan, 1910) (10), *Oxyeleotris marmorata* (Bleeker, 1852) (10), *Anabas testudineus* (Bloch, 1792) (20), *Hampala dispar* (Smith, 1934) (20), *Pristolepis fasciata* (Bleeker, 1851) (20), *Channa striata* (Bloch, 1793) (10) and *Clarias batrachus* (Linnaeus, 1758) (10) were collected in three different seasons from

October 2015 till September 2016. The sampled fish species were identified using the proposal of Nelson (1994).

### Parasites analysis

Live fish samples were transferred to the laboratory and physical examinations, such as the gross appearance, body color, hemorrhages and abnormal characteristics were carried done. Diagnostic examination for external parasites was conducted following the methods of Zafran *et al.* (1998). Briefly, gills and body surface were examined for parasites by using light microscope. Parasitic identification was carried out as described by Woo (2006). The prevalence of the parasites species were evaluated according Bush *et al.* (1997). Fish samples that exhibited signs and symptoms of parasites were separated from healthy fish.

### Isolation of bacteria

Kidneys, livers, spleen and some lesions on the body surface from diseased fish were aseptically streaked on Tryptic Soy agar (TSA, Difco, USA) plates and incubated at 30°C until pure cultures were obtained. Purified cultures were inoculated onto TSA plates and kept at 4°C for stock.

## RESULTS

### Gross appearance of the specimens

Abnormal finding of the fish were hemorrhage, fin rots and pale gills. Some fish such as *O. niloticus*, *T. pectoralis*

**Table 1.** Sampled fish from NongBo reservoir, Maha Sarakham Province, Thailand; their common name and parasites prevalence.

Species	Common name	PF/EF	P (%) <sup>a</sup>	P (%) <sup>b</sup>
<i>Oreochromis niloticus</i>	Nile tilapia	16/30	53.33	12.31
<i>Trichopodus pectoralis</i>	Snake skin gourami	6/10	60	4.62
<i>Oxyeleotris marmorata</i>	Sandy goby	4/10	40	3.08
<i>Anabas testudineus</i>	Climbing perch	10/20	50	7.69
<i>Hampala dispar</i>	Eye-spot barb	20/20	100	15.38
<i>Pristolepis fasciata</i>	Striped tiger leaf fish	0/20	0	0
<i>Channa striata</i>	Striped snake-head fish	0/10	0	0
<i>Clarias batrachus</i>	Batrachian walking catfish	0/10	0	0
Total	-	56/130	-	43.08

PF: parasitized fish; EF: examined fish; P<sup>a</sup>: parasites prevalence in relation to the total number of each examined fish; P<sup>b</sup>: parasites prevalence in relation to the total number of examined fish

**Table 2.** Prevalence of parasites in sampled fish from NongBo reservoir, Maha Sarakham, Thailand.

Fish	<i>Trichodina</i> sp.	<i>Dactylogyrus</i> sp.	Metacercaria
<i>Oreochromis niloticus</i>	16/30 (53.33%)	4/30 (13.33%)	-
<i>Trichopodus pectoralis</i>	4/10 (40%)	6/10 (60%)	-
<i>Oxyeleotris marmorata</i>	2/10 (20%)	4/10 (40%)	-
<i>Anabas testudineus</i>	-	10/20 (50 %)	6/20 (30 %)
<i>Hampala dispar</i>	10/20 (50 %)	20/20 (100 %)	-
<i>Pristolepis fasciata</i>	-	-	-
<i>Channa striata</i>	-	-	-
<i>Clarias batrachus</i>	-	-	-

and *H. dispar* showed ascites with extruded fluids in the body cavity.

### Occurrence of parasites in sampled fishes

A total of 40 fish out of 130 fish specimens examined during the study period (October 2015 – September 2016) were observed to exhibit parasitic infestation. The parasitic prevalence were found in different rates in each fish. The parasites were identified as *Dactylogyrus* sp., *Trichodina* sp. and *Digenea* gen. sp. (Table 1). *Dactylogyrus* sp. (13.33 to 100%) showed the highest prevalence, followed by *Trichodina* sp. (20 to 53.33%). The *Digenea* gen. sp. metacercaria was found only in *Anabas testudineus* (30%) (Table 2). This indicates *Dactylogyrus* spp. was highest prevalence of parasite during study period in NongBo reservoir. The parasites were found in *H. dispar*, *O. niloticus*, *T. pectoralis*, *A. testudineus* and *O. marmorata*. On the other hand, ectoparasites were not found in *P. fasciata*, *C. striata* and *C. batrachus*.

### Occurrence of bacteria in sampled fishes

A total of 52 fish out of the 130 fish specimens examined

fish during the study period were revealed with the bacterial infection. The identified bacterial agents were classified into 5 species and 53 strains namely *Aeromonas hydrophila* (Chester, 1901) Stanier, 1943 (36 strains), *Acinetobacter baumannii* (Bouvet and Grimont, 1986) (5 strains), *Plesiomonas shigelloides* (Bader 1954) Habs and Schubert, 1962 (4 strains), *Serratia odorifera* (Bizio, 1823) (3 strains) and *Staphylococcus epidermis* (Table 3).

The dominant species of bacterial infection was *A. hydrophila*. Prevalence of *A. hydrophila* infection in each fish species was 43.33% in *O. niloticus*, 50% *T. pectoralis*, 40% *O. marmorata*, 30% *A. testudineus*, 45% *H. dispar* were examined. Moreover, *A. baumannii*, *P. shigelloides*, *S. odorifera* were only recovered from *O. niloticus* as following 16.67, 13.33 and 10%, respectively. In addition, *S. epidermis* was only found in *A. testudineus* as 20%. The bacterial agents were mostly found in *O. niloticus*. On the other hand, *P. fasciata*, *C. striata* and *C. batrachus* were not contaminated by bacteria.

### DISCUSSION

The prevalence of parasites in sampled fish was 43.08% which was highest in Eye-spot barb (15.38%) and Nile

**Table 3.** Prevalence of bacterial species in sampled fish from NongBo reservoir, Maha Sarakham Province, Thailand.

Fish	<i>Aeromonas hydrophila</i>	<i>Acinetobacter baumannii</i>	<i>Plesiomonas shigelloides</i>	<i>Serratia odorifera</i>	<i>Staphylococcus epidermis</i>
<i>Oreochromis niloticus</i>	13/30 (43.33%)	5/30 (16.67%)	4/30 (13.33%)	3/10 (10%)	-
<i>Trichogaster pectoralis</i>	5/10 (50%)	-	-	-	-
<i>Oxyeleotris marmoratus</i>	4/10 (40%)	-	-	-	-
<i>Anabas testudineus</i>	6/20 (30%)	-	-	-	4/20 (20%)
<i>Hampala dispar</i>	9/20 (45%)	-	-	-	-
<i>Pristolepis fasciatus</i>	0/20 (0%)	-	-	-	-
<i>Channa striatus</i>	0/10 (0%)	-	-	-	-
<i>Clarius batrachus</i>	0/10 (0%)	-	-	-	-

Tilapia (12.31%). The dominant parasites observed during the study were *Dactylogyrus* sp. and *Trichodina* sp. These results were similar with Jalali and Barzegar (2006) who reported the fish parasite in Zarivar Lake and Ashade *et al.* (2013) who reported the parasitic infestation in Nile Tilapia captured by fishermen from a river in Nigeria and similar. Additionally, *Dactylogyrus* sp. was the principal parasite identified and was corroborated by finding of Suramanee and Sirikarn (2001) in Tha Chin River at Changwat Suphan Buri, Thailand. *Dactylogyrus* is a member of Dactylogyridae which are the most reported parasites in wild and cultured fish (Öztürk and Özer, 2014). The dominant bacterial species which was isolated from the five fish species was *A. hydrophila* (43.33%). *A. hydrophila* is a gram negative bacteria with short rod which can be found widespread in aquatic environments both soil and water (Ansari *et al.*, 2011). Furthermore, *A. hydrophila* was reported as bacterial pathogens in aquatic animals (Samal *et al.*, 2014), although this bacteria can be entered in the humans body via eating contaminated sea foods (Lee *et al.*, 2000). Further gram negative bacteria were *A. baumannii*, *P. shigelloides* and *S. odorifera*. These results were similar to several authors such as Sugita *et al.* (1996), Aldová *et al.* (1999), El-Sayyad *et al.* (2010), Ume-Kalsoom *et al.* (2013), Kozłowska *et al.* (2014) which isolated from fish either natural nor cultural features such as *Oncorhynchus mykiss* (Walbaum, 1792), *Cyprinus carpio* (Linnaeus, 1758), *Ictalurus punctatus* (Rafinesque, 1818), *O. niloticus* and *Clarias gariepinus* (Burchell, 1822). In addition, *S. epidermis* is a gram positive bacterium isolated from the sampled fish and this result was corroborated by reports of El-Sayyad *et al.* (2010) and Uddin and Al-Harbi (2012).

In conclusion, the protozoan, metazoan parasites and bacteria were important pathogens which can be disseminated in aquatic environment. Especially, *Dactylogyrus* sp. and *A. hydrophila* were found from the natural fish in NongBo reservoir. Diagnosis of fish diseases is useful to monitoring the fish health and to predict the affecting agents in the aquatic environments and likewise in the fish farm. The results of this study showed that the natural fish stocks tend to decrease over

time due to the fish pathogens. Next study should be focused to manage the fish stocks in a good practice such as the local government has a policy to keep clean of aquatic environments around the reservoir and examined the drug resistance of those bacteria for evaluate the resistant bacteria in fish and also the aquatic environments.

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