

## Brief communication

# The occurrence of heterophyid metacercariae in freshwater fish from reservoirs

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**Background:** Fish-borne trematode infection is a parasitic zoonosis with a great variety of clinical manifestations. According to current information, the metacercaria of heterophyid trematode can be found in freshwater fish, especially the cyprinoid group.

**Objective:** To investigate the prevalence of Heterophyidae metacercariae in freshwater fish.

**Material and methods:** A parasitological investigation was done using 129 fish from 17 species: *Labiobarbus siamensis*, *Puntius proctozysron*, *Barbodes gonionotus*, *Barbodes altus*, *Henicorhynchus siamensis*, *Hampala macrolepidota*, *Mystacoleucus marginatus*, *Notopterus notopterus*, *Pristolepis fasciatus*, *Anabas testudineus*, *Puntius brevis*, *Poropuntius deauratus*, *Cyclocheilichthys armatus*, *Osteochilus hasselti*, *Labiobarbus spilopleura*, *Lobocheilus davisi* and *Rasbora torneri*. The fish were caught during the rainy season (June-September 2007) in the Chiang Mai water reservoirs (Mae Ngad and Mae Kuang) and the Chiang Rai water reservoirs (Nong Luang and Mae Tak).

**Results:** The prevalence of heterophyid metacercariae infection at Mae Ngad, Mae Kuang, Nong Luang and Mae Tak were 37.83 %, 51.35 %, 12.00 % and 63.33 %, respectively.

**Conclusions:** There is a high prevalence of *Haplorchis* metacercarial infection in cyprinoid fish. The highest intensity of heterophyid metacercariae infection in *Barbodes gonionotus* was in Mae Kuang at 104.

**Keywords:** Freshwater fish, *Haplorchis taichui*, *Haplorchoides* sp, metacercariae.

Trematode in the genus *Haplorchis* of the family Heterophyidae were found in the small intestines of various definitive hosts such as birds, cats, dogs and rats. Human or other definitive hosts were infected by eating raw freshwater fish containing encysted metacercariae. This study was done to investigate the prevalence of Heterophyidae metacercariae in freshwater fish.

Trematodes, or flukes, are parasites of animals; they are dorsoventrally flattened, hermaphroditic, and require one or more intermediate hosts. To complete their life cycle, specific species of intermediate hosts must be available for trematode development. Infections are food borne, and the problem of infections is emerging as a major public health problem, with more than 50 million people worldwide being infected [1]. A series of developmental stages occur within snails (sporocyst, redia), eventually producing cercaria, which are

released. These cercariae then encyst in the tissue of fresh water fish (cyprinoid fish), and become metacercaria. The metacercariae can infect human hosts whenever they eat raw fresh water fish. In Southeast Asia, especially Thailand, eating raw fish is a tradition. Fluke diseases, caused by fish-borne trematodes, are therefore common to this region. Several species of metacercariae of medically important flukes have been reported [2-4]. In Northern Thailand, fluke diseases remain a common public health problem. This project was to determine the prevalence of metacercariae in cyprinoid fish from reservoirs (Mae Ngad and Mae Kuang in Chiang Mai Province and Nong Luang, Mae Tak in Chiang Rai Province). The epidemiological information collected will help to develop a prevention strategy for public health service.

## Materials and methods

A survey of metacercaria from freshwater fish was carried out at 4 reservoirs, the Mae Ngad (UTM 47Q E 503200, 47Q N 2119300) and Mae Kuang (UTM 47Q E 513000, 47Q N 2092600) reservoirs of

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Chiang Mai Province and the Nong Luang (UTM 47Q E 598707, UTM 47Q N 2194922) and Mae Tak (UTM 47Q E 606096, 47Q N 2189091) reservoirs of Chiang Rai Province.

#### Metacercarial collection

The fin muscles of fish were removed for metacercaria collection using 1 % pepsin digestive solution technique in normal saline (1 ml conc. hydrochloric acid, 1 g pepsin, 99 ml 0.85 % sodium chloride solution for 1.30 hours at 37 °C). The digested material was rinsed with 0.85 % sodium chloride solution and examined for metacercariae

#### Data analysis

The percentage of prevalence and the percentage intensity were calculated as follows:

$$\% \text{ prevalence} = \frac{(\text{Number of infected fish})}{(\text{Total number of fish examined})} \quad (\times 100), \quad (1)$$

$$\% \text{ Intensity} = \frac{(\text{Total number of helminthes})}{(\text{Total number of host examined})} \quad (\times 100). \quad (2)$$

#### Results

**Figure 1(A, B)** show microscopic images of *Haplochis taichui* metacercariae and *Haplochoides* sp. Metacercariae, respectively.

**Table 1** shows the prevalence of heterophyid metacercariae in fresh water fish from each reservoir.

Studies at Mae Ngad reservoir show that 3 out of the 9 species tested had a 100 % prevalence of heterophyid metacercaria. The highest intensity of

heterophyid metacercariae infection in *Barbodes gonionotus* was 47.75. In Mae Kuang, 2 out of the 9 species tested had a 100 % prevalence of heterophyid metacercaria. The highest intensity of heterophyid metacercariae infection in *Barbodes gonionotus* was 104. In Nong Luang, 3 out of the 6 species tested had a smaller prevalence of heterophyid metacercaria. The highest intensity of heterophyid metacercariae infection in *Mystacoleucus marginatus* was 0.33. Studies at Mae Tak reservoir show that 2 out of the 7 species tested had a 100 % prevalence of heterophyid metacercaria. The highest intensity of heterophyid metacercariae infection in *Mystacoleucus marginatus* was 274.

#### Discussion

Previous trematode metacercariae epidemiological studies carried out on freshwater fish, in Khonkaen province showed that *H. taichui* was dominant and found in all kinds of fish, especially *Hampala dispa*. [5] The metacercariae of *H. taichui* were found in fish collected from Chom Thong and Mae Taeng Districts [6,7], in *Mystacoleucus marginatus* of Mae Sa stream, Chiang Mai [8], in *Thynnichthys*



**A**



**B**

**Fig. 1** Light microscopic images of *Haplochis taichui* metacercariae (A) and *Haplochoides* sp. Metacercariae (B).

**Table 1.** The prevalence of heterophyid metacercariae in fresh water fish from reservoirs at Mae Ngad (A), Mae Kuang (B), Nong Luang (C) and Mae Tak (D). HT=*Haplorchis taichui*, HP=*Haplorchoides* sp.

(A) Mae Ngad						
	Number	HT	HP	Total	Intensity (%)	Prevalence (%)
<i>Labiobarbus siamensis</i>	2	2	2	5	2.5	100
<i>Puntioplites proctozysron</i>	5	4	3	7	1.4	60
<i>Barbodes gonionotus</i>	4	170	21	191	47.75	100
<i>Barbodes altus</i>	1	0	0	0	0	0
<i>Henicorhynchus siamensis</i>	5	112	27	139	27.8	100
<i>Hampala macrolepidota</i>	5	0	0	0	0	0
<i>Mystacoleucus marginatus</i>	5	0	0	0	0	0
<i>Notopterus notopterus</i>	5	0	0	0	0	0
<i>Pristolepis fasciatus</i>	5	0	0	0	0	0
<b>Total</b>	<b>37</b>	<b>288</b>	<b>53</b>	<b>342</b>	<b>9.24</b>	<b>37.83</b>

  

(B) Mae Kuang						
	Number	HT	HP	Total	Intensity (%)	Prevalence (%)
<i>Anabas testudineus</i>	5	0	0	0	0	0
<i>Mystacoleucus marginatus</i>	5	146	8	154	30.8	80
<i>Barbodes gonionotus</i>	2	181	27	208	104	100
<i>Henicorhynchus siamensis</i>	1	0	0	0	0	0
<i>Puntius brevis</i>	6	14	22	36	6	83.33
<i>Poropuntius deauratus</i>	5	51	4	55	11	100
<i>Cyclocheilichthys armatus</i>	2	0	0	0	0	0
<i>Labiobarbus siamensis</i>	6	7	2	9	1.5	50
<i>Osteochilus hasselti</i>	5	0	0	0	0	0
<b>Total</b>	<b>37</b>	<b>399</b>	<b>63</b>	<b>462</b>	<b>12.49</b>	<b>51.35</b>

  

(C) Nung Luang						
	Number	HT	HP	Total	Intensity (%)	Prevalence (%)
<i>Puntius brevis</i>	5	0	0	0	0	0
<i>Henicorhynchus siamensis</i>	5	0	0	0	0	0
<i>Labiobarbus spilopleura</i>	5	2	3	5	1	20
<i>Mystacoleucus marginatus</i>	6	2	0	2	0.33	33.33
<i>Lobocheilus davisi</i>	4	0	0	0	0	0
<b>Total</b>	<b>25</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>0.28</b>	<b>12</b>

  

(D) Mae Tak						
	Number	HT	HP	Total	Intensity (%)	Prevalence (%)
<i>Anabas testudineus</i>	5	2	1	3	0.6	40
<i>Rasbora tornieri</i>	5	0	0	0	0	0
<i>Henicorhynchus siamensis</i>	7	435	28	463	66.14	100
<i>Mystacoleucus marginatus</i>	1	259	15	274	274	100
<i>Lobocheilus davisi</i>	1	0	0	0	0	0
<i>Labiobarbus siamensis</i>	1	0	0	0	0	0
<i>Barbodes altus</i>	10	798	137	935	93.5	90
<b>Total</b>	<b>30</b>	<b>1494</b>	<b>181</b>	<b>1675</b>	<b>55.83</b>	<b>63.33</b>

*thynnoides* in Chiang Mai Province [9], in *Puntioplites proctozysron* (90 %), *Hampala dispar* (87.88 %) and *Henicorhynchus siamensis* (82.47 %) [10], and a high prevalence of *H. taichui* was found in *Henicorhynchus siamensis* and *Mystacoleucus marginatus* [7]. In Chiang Mai Province, metacercariae of *S. falcatus* were found in *Dermogenus pusillus* [11-14], and in *Xenentodon cancala* of Mae Sa Stream, Chiang Mai [8]. This study included a survey of the metacercariae trematodes *H. taichui* and *S. falcatus* in freshwater fish from reservoirs in Chiang Mai and Chiang Rai Provinces.

The results show there is a high prevalence of *Haplorchis* metacercarial infection in cyprinoid fishes. Only five species of freshwater fish (*Hampala macrolepidota*, *Notopterus notopterus*, *Pristolepis fasciatus*, *Rasbora tornieri* and *Lobocheilus davisi*) were not infected with heterophyid metacercariae. Previous and present studies found that most cyprinoid fish are infected with *Haplorchis* metacercariae, implying that the degree of infection of the definitive host would be high in this area.

A further study will include geographic information for use in developing public health prevention and control strategies.

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