PROTOZOAN INFECTIONS IN *LABEO ROHITA* (HAMILTON, 1822), *PIARACTUS BRACHYPOMUS* (CUVIER, 1817) AND *PANGASIUS HYPOPTHALMUS* (SAUVAGE, 1878)

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Abstract

Labeo rohita, *Piaractus brachypomus* and *Pangasius hypopthalmus* are the most important fish species for Myanmar aquaculture and intensive investigation for protozoan parasites in these fishes are essential to develop methods for disease control. This study was conducted to examine the prevalence and infection intensity of protozoan parasites in cultured *Labeo rohita*, *Piaractus brachypomus* and *Pangasius hypopthalmus* collected from Lay Daung Kan fish farm. Thirty individuals from each species were collected monthly from January 2017 to December 2017. Gills, skin and internal organs were examined for protozoan infection. In total ten protozoan species were recorded including one species of *Thelohanellus*, two species of *Myxobolus*, one species of *Zschokkella* and one species of *Trichodina* in *Labeo rohita*. Two species of *Myxobolus* and one species of *Trichodina* were found in *Piaractus brachypomus*. In *Pangasius hypopthalmus*, one species of *Myxobolus* and one species of *Trichodina* were recorded. Among the recorded parasite species, the highest prevalence of infestation was found in *Trichodina* spp.

Keywords: Protozoan, *Labeo rohita*, *Piaractus brachypomus*, *Pangasius hypopthalmus*, Prevalence

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Introduction

Aquaculture is the fastest-growing food production system globally, with a 9% increase in production of animal crops per year since 1985 (FAO 2007). In Myanmar, fish culture started in 1953 with imported *Tilapia mossambica*. Fish were realized to be a stable diet for its people and potential industry for the national economy. Freshwater fish culture is a major source of aquaculture production in Myanmar. The most cultivated freshwater fish in Myanmar are *Labeo rohita* (nga-myit-chin), *Pangasius hypopthalmus*(Nga-dan), *Piaractus brachypomus* (Pacu), *Puntius sophore* (Nga-kone-ma), *Catla catla* (Nga-gaung-pwa), *Hypophthalmichthys molitrix* (Ngwe-yaung-nga-gyin) and *Oreochromis niloticus* (Ti-la-pia). Among these rohu, *Labeo rohita* is the most produced species in fish hatcheries throughout Myanmar followed by *Pangasius hypopthalmus* and *Piaractus brachypomus* (FAO, 2006). They are widely cultured by extensive or semi intensive system in Southeast Asia. Freshwater pond fish culture is a major contributor to aquaculture production. They are widely cultured by extensive or semi intensive system in the Southeast Asia. Forty seven percent of the total fish produced in Myanmar were produced by freshwater fisheries (The State of World Fisheries and Aquaculture, 2016).

Fish naturally carry a variety of pathogenic viruses, bacteria, fungi and parasites. Parasitic infections are one of the most important factors for economic losses in aquaculture. Due to the intensification of culture systems, diseases related to e.g. nutritional deficiency, parasitic infection or thereby causes secondary infection increased and are responsible for significant economic losses (Snieszko, 1974, Martins *et al*, 2002).

The production from culture system is hampered by the infection of various fish parasite. Parasites and diseases are the most serious limiting factors in culture farm (FAO, 2004). Fish are usually cultured in high density in a restricted water bodies, where pathogens can easily be transmitted between individuals (Woo *et al*., 2011). Besides direct losses caused by mortality, parasites may have considerable impact on growth, behavior of fish and their resistance to other stressing factors (Floyd, 1997). The number of fish parasitologists in fishery and aquaculture sectors of the country is small. Examination of parasitic infection in freshwater as well as in marine fishes in Myanmar is still required to improve Myanmar aquaculture system.

The present study was undertaken to investigate protozoan infection in three cultivated freshwater fish species. Prevalence and intensity of infections of protozoa in culture fish farm were also reported.

Materials and Methods

Sample collection and preparation of aquaria

The study period ran from January to September 2017 in Lay Daung Kan fish farm, Yangon Township (Fig-1). Fish were produced were induced breeding method and they were culture separately in 1436.67 m^2 pond very extensively (without feeding and water exchange). A total of 30 fish from each species (*Labeo rohita*, 5.1cm±1.4cm, *Piaractus brachypomus,* 5.6cm± 0.7cm and *Pangasius hypopthalmus*, 5.4cm±1.2cm with initial body weight) was collected monthly from a pond to examine protozoan infections. Selected fish were taken to the laboratory in plastic bags filled with oxygen.

On arrival, they were kept in small glass aquaria (51cm ×45cm × 39cm) and aeration was given. One day prior to arrival of the fish, aquaria were thoroughly cleaned, filled with water and aerated. Some fish were immediately dissected to examine parasite load and incidence, and the remainder were kept in aquaria for about five days for later studies. Diagnostic symptoms were carefully recorded from individual fish.

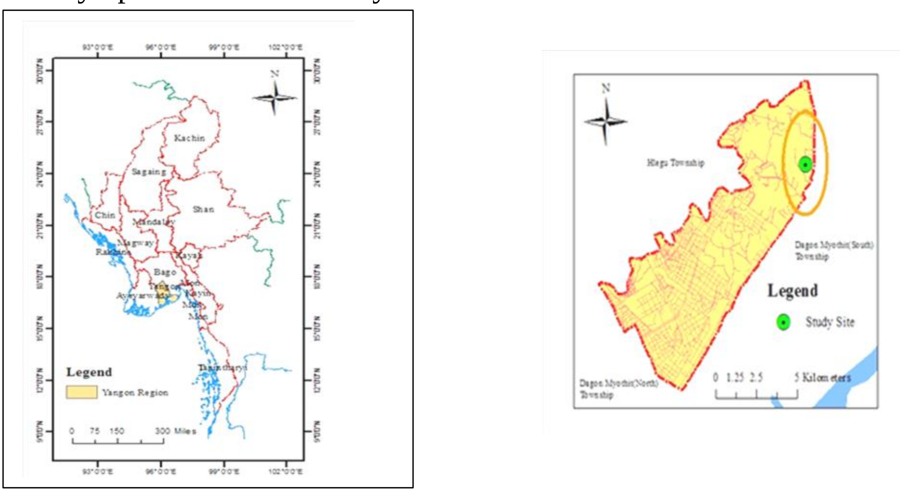


Figure 1. Lay Daung Kan fish farm located at Dagon Myothit(east)

Examination and identification of protozoan parasites

Mucous scrapped from fins, skin and gills removed from the branchial cavity were placed in a Petridish for microscopic examination. The body of the host was then opened and internal organs, viz., eye, brain, gills, heart, swim-bladder, liver, gall-bladder, muscles, fins, mucus, intestine and kidney were removed and transferred into Petridishes. Tissues were placed on a glass slide, physiological saline solution (0.9% NaCl solution) was added, and a cover slip was placed over the specimen prior to subsequent examination by light microscope. In order to prepare permanent slides, tissues were stamped on the slide and left for a few minutes to dry. Air-dried smears were stained with Giemsa after fixing in absolute methanol, they were then cleaned with distilled water, dipped in xylene and mounted permanently with D.P.X mounted. Identification of protozoan parasites was done following the description and figure of Lom and Dykova (2006).

Data analysis for parasite loads

Prevalence and mean intensity were calculated for each parasite species in accordance with the following method by Margolis *et al*. (1982).

$$\text{Prevalence (\%)} = \frac{\text{Number of infected host}}{\text{Total number of host examined}} \times 100$$

The intensity of infection were categorized into five stage according to Bachere *et al*., (1982)and Culloty *et al.,* (1999).

Stage 1: 1 – 20 parasites observed within 3-min of screening under 40× magnification.

Stage2: 21– 40 parasites observed within 3-min of screening under 40× magnification.

Stage3: 41– 60 parasites observed within 3-min of screening under 40× magnification.

Stage 4: 1 – 10 parasites observed in all fields of vision.

Results

1.1 Protozoans infection in three cultivated species of freshwater fish

During the study period, five species of parasite from two phyla were detected in the gills, skin and gallbladder of *Labeo rohita*, whereas four species of parasite belonging to two phyla were detected in the gills and skin of *Piaractus brachypomus* and in gills, skin and gallbladder of *Pangasius hypopthalmus*. Recorded species were *Thelohanellus* sp., *Myxobolus* sp. 1, *Myxobolus* sp. 2, *Zschokkella* sp., and *Trichodina* nigra in *Labeo rohita*. *Zschokkella* sp. was recorded only in the gallbladder of *Labeo rohita*.

In *Piaractus brachypomus*, *Myxobolus* sp. 3, *Myxobolus* sp. 4, and *Trichodina* sp. were observed, whilst *Myxobolus* sp. 5 and *Trichodina reticulata* were recorded from *Pangasius hypopthalmus* . Recorded parasites and their site of infection were described in Table (1).

1.2 Protozoan parasite recorded in *Labeo rohita*

***Thelohanellus* sp. (Plate 1a)**

Host - *Labeo rohita*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were mainly found in gills, brain and kidneys.

Characteristics of spores

The spores were pumpkin seed-like in front view. A single pyriform polar capsule reached the posterior half of the spore. Measurements of the spore were expressed as below;

Length of spore = 12µm ± 1.5µm (n = 10)

Width of spore = 11µm ± 0.5µm (n = 10)

Length of polar capsule = 7.6µm ± 2.3µm (n = 10)

Width of polar capsule = 1.5µm ± 0.4µm (n = 10)

Polar filaments = 8

***Zschokkella* sp. (Plate 1b)**

Host - *Labeo rohita*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gallbladder

Characteristics of spores

The spores were ellipsoidal in sutural view and slightly bent or semicircular in valvular view, with rounded or bluntly pointed ends. Shell valves were either smooth or had ridges. The suture is straight, curved or sinuous. Polar capsules almost spherical, open slightly subterminally and both to one side; the sporoplasm is binucleate. The measurements of the spores were as follows;

Length of spore = 17.5µm ± 0.3µm (n=10)

Width of spore = 12.2µm ± 0.5µm (n=10)

Length of right polar capsule = 14.2µm ± 1.2µm (n=10)

Width of right polar capsule = 9.25µm ± 0.6µm (n=10)

***Myxobolus* sp. 1 (Plate 1c)**

Host - *Labeo rohita*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gills and cysts in fibrous layer of scales and fins.

Characteristics of spore

The spores were pear shape in front view, having two equal polar capsules at the anterior end. Polar capsules were pumpkin seed-like or pyriform shaped. The measurement of the spores was as follows;

Length of spore = 10µm (n = 10)
Width of spore = 7.5µm (n = 10)
Length of polar capsules = 7.5µm ± 0.3µm (n = 10)
Width of polar capsules = 5µm (n = 10)

***Myxobolus* sp. 2 (Plate 1d)**

Host - *Labeo rohita*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gills.

Characteristics of spore

The spores were pear shape in front view, having two unequal polar capsules at the anterior end. The larger polar capsule was tear-shaped and the smaller one was ovoid or spherical in shape. Measurements of the spores were as below;

Length of spore = 7.5µm ± 0.5µm (n = 10)

Width of spore = 3.4µm ± 0.2µm (n = 10)

Length of polar capsule = 5.2µm ± 1.5µm (n = 10)

Width of polar capsule = 2.5µm ± 0.1µm (n = 10)

***Trichodina nigra* (Plate 1e)**

Host - *Labeo rohita*

Locality - Lay Daung Kan fish farm

Site of infection - Parasites were found in gills

Characteristics of parasite

Trichodina nigra is medium-sized and disc-shaped. The denticles are reduced and angular with truncated distal margins. The anterior surface of the denticle is slightly curved. The posterior margin of the denticle forms a narrow semilunar curve with the deepest point. The measurements of the parasites were as follows;

Diameter of adhesive disc (da) = 50µm ± 4.2µm (n=10)

Diameter of denticulate ring (dd) = 20.5µm ± 2.5µm (n=10)

Diameter of clear area (dc) = 15.2µm ± 1.4µm (n=10)

Number of denticles = 21 ± 1.5 (n=10)

1.3 Protozoan parasite recorded in *Piaractus brachypomus*

***Myobolus* sp. 3 (Plate 2a)**

Host - *Piaractus brachypomus*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gills.

Characteristics of spore

The spores were pear shape in front view, characterized by two polar capsules at the anterior end. Polar capsules were pumpkin seed-like or pyriform spores with bilateral symmetry. The measurement of the spores was as follows;

Length of spore = 7.5µm ± 0.3µm (n=10)

Width of spore = 5µm ± 0.5µm (n=10)

Length of polar capsule = 5µm (n=10)

Width of polar capsule = 2.5µm ± 0.8µm (n=10)

***Myobolus* sp. 4 (Plate 2b)**

Host - *Piaractus brachypomus*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gills.

Characteristics of spore

The spores were circle-shaped in front view, and had two unequal polar capsules at the anterior end. The large polar capsules were pumpkin seed-like in shape and the smaller one was tear-shaped. The measurements of the spores were as follows;

Length of spore = 51µm ± 3.2µm (n=10)

Width of spore = 38µm ± 4.2µm (n=10)

Length of right polar capsule = 34µm ± 5.2µm (n=10)

Width of right polar capsule = 24µm ± 5.1µm (n=10)

Length of left polar capsule = 24µm ± 5.2µm (n=10)

Width of left polar capsule = 14µm ± 5.2µm (n=10)

***Trichodina* sp. (Plate 2c)**

Host - *Piaractus brachypomus*

Locality - Lay Daung Kan fish farm

Site of infection - Parasites were found on skin and gills

Characteristics of parasite

Trichodina sp. is medium-sized and disc-shaped. The denticles are reduced and angular with truncated distal margins. The anterior surface of the denticle is slightly curved. The posterior margin of the denticle forms a narrow semilunar curve with the deepest point. The measurements of the parasites were as follows;

Diameter of adhesive disc (da) = 45µm ± 4.2µm (n=10)

Diameter of denticulate ring (dd) = 15.2µm ± 2.5µm (n=10)

Diameter of clear area (dc) = 12.5µm ± 1.4µm (n=10)

Number of denticles = 20 ± 1.5 (n=10)

1.4 Protozoan parasite recorded in *Pangasius hypopthalmus*

***Myobolus* sp. 5 (Plate 3a)**

Host - *Pangasius hypopthalmus*

Locality - Lay Daung Kan fish farm

Site of infection - Spores were found in gills, skin and gallbladder.

Characteristics of spore

The spores were spherical in front view, having two equal polar capsules at the anterior end. The polar capsules was tear-shaped. The measurements of the spores were as follows;

Length of spore = 17.5µm ± 0.3µm (n=10)

Width of spore = 12.2µm ± 0.5µm (n=10)

Length of right polar capsule = 14.2µm ± 1.2µm (n=10)

Width of right polar capsule = 9.25µm ± 0.6µm (n=10)

***Trichodina reticulata* (Plate 3b)**

Host - *Pangasius hypopthalmus*

Locality - Lay Daung Kan fish farm

Site of infection - Parasites were found in skin and gills

Characteristics of parasite

Trichodina reticulata is adhesive disc circular shaped. Denticles have needle-shaped well-developed thorns and blades. Rods are very conspicuous and parallel radial pins are inserted in the center of the disc. The measurements of the parasites were as follows;

Diameter of adhesive disc (da) = 50µm ± 4.2µm (n=10)

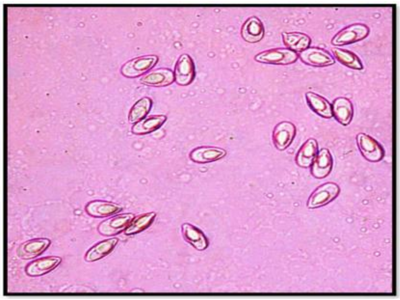
Diameter of denticulate ring (dd) = 20.5µm ± 2.5µm (n=10)

Diameter of clear area (dc) = 15.2µm ± 1.4µm (n=10)

Number of denticles = 21 ± 1.5 (n=10)

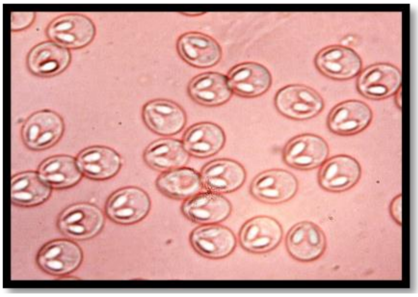
Table 1. List of parasites recovered and their site of infection

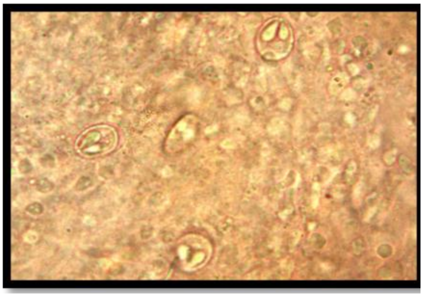
Parasite		Host	Site of infection
Cnidaria	*Thelohanellus* sp.	*Labeo rohita*	Gills
	Zschokkella sp.		Gills, skin (cyst) and fin
	Myxobolus sp. 1		Gills
	Myxobolus sp. 2		Gallbladder
Cilophora	*Trichodina nigra*		Gills, skin
Cnidaria	*Myxobolus* sp. 3	*Piaractus brachypomus*	Gills
	Myxobolus sp. 4		Gills
Cilophora	*Trichodina* sp.		Skin
Cnidaria	*Myxobolus* sp. 5	*Pangasius hypopthalmus*	Gills
Cilophora	*Trichodina reticulate*		Gills, skin



(a)

(b)



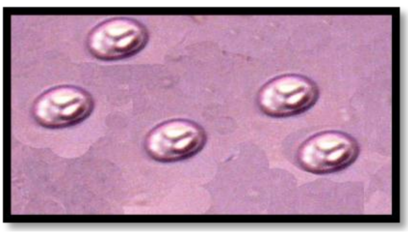


(c) (d)

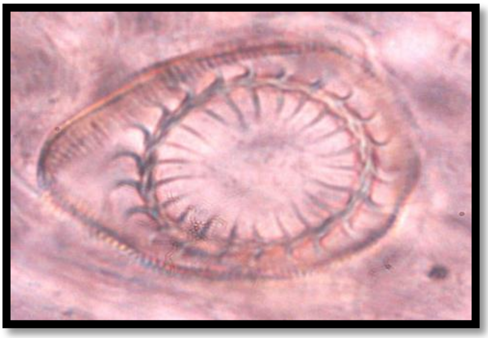
(e)

Plate. 1 Recorded protozoan parasite from *Labeo rohita* during study period.

(a) *Theohanellus* sp infected in *Labeo rohita* (b) *Zschokkella* sp. infected in *Labeo rohita* (c) *Myxobolus* sp. 1 infected in *Labeo rohita* (d) *Myxobolus* sp. 2 infected in *Labeo rohita* (e) *Trichodina nigra* infected in *Labeo rohita*



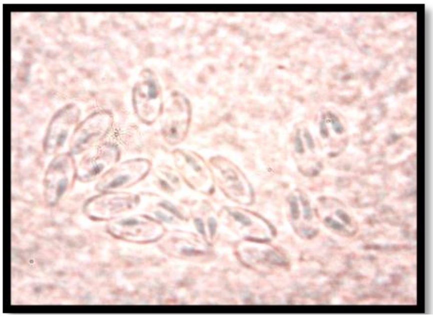
(a) (b)

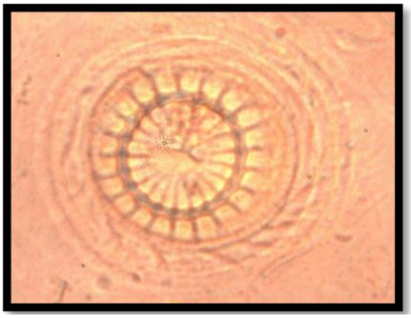


(c)

Plate. 2 Recorded protozoan parasite from *Piaractus brachypomus* during study period.

(a) *Myxobolus* sp. 3 infection in *Piaractus brachypomus* (b) *Myxobolus* sp. 4 infection in *Piaractus brachypomus* (c) *Trichodina* sp. infection in *Labeo rohita*





(a) (b)

Plate. 3 Recorded protozoan parasite from *Pangasius hypopthalmus* during study period.

(a) *Myxobolus* sp. 5 infection in *Pangasius hypopthalmus* (b) *Trichodina reticulata* infection in *Pangasius hypopthalmus*

1.4 Prevalence and mean intensity of parasite in *Labeo rohita*

Figure. 2 shows prevalence and intensity of parasite in *Labeo rohita*. Prevalence of infestation of *Thelohanellus* sp. from gills of *Labeo rohita* during study period. The highest prevalence found in the month of April (40%) and lowest in July and September (10%). No infection was recorded in January, May and June. Monthly intensity of infestation was described in Figure. 3. High mean intensity of 2 was recorded in July and while it was decreased around about 1.7 to 1.5 in August and September.

Zschokkella sp. was found only in the gallbladder of *Labeo rohita*. Prevalence of infecting did not change very much during study period (one month to one month). High prevalence was recorded in April (Figure. 2). Monthly intensity of *Zschokkella* sp. infestation was described in (Figure. 3). Mean intensity ranged from 1-1.5. In August, mean intensity was slightly decreased to 1.2.

Myxobolus sp. 1 was found highest in April and lowest prevalence was found in July and August, 2017. No infection of *Myxobolus* sp. 2 was recorded in first month of sample period. Mean intensity of *Myxobolus* sp. 1 and *Myxobolus* sp. 2 infestation was described in Figure. 3. Mean intensity of *Myxobolus* spp. ranged from 1.1 to 2.1.

Among the recorded parasite species, the highest prevalence of infestation was recorded in *Trichodina nigra*. Prevalence of infestation fluctuated monthly ranging from 60% to 75%. The highest prevalence was recorded in September and the lowest prevalence was recorded in July (Figure. 2). Monthly intensity of *Trichodina nigra* infestation was described in (Figure. 3). Intensity was fluctuated from January to September, 2007. High mean intensity 1.5 and 2.1 was recorded in May and September, 2007.

1.5 Prevalence and mean intensity of parasite in *Piaractus brachypomus*

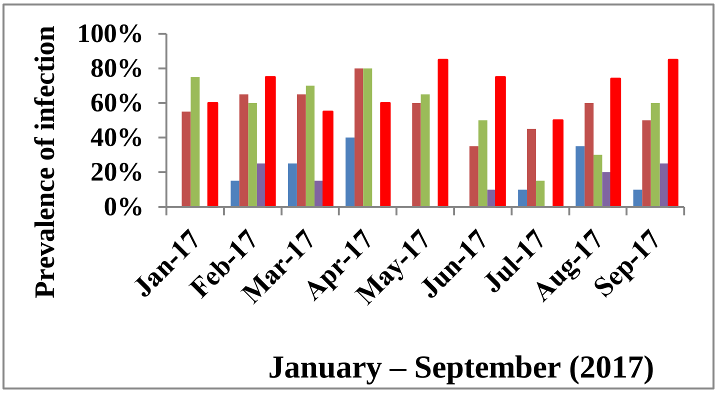
Prevalence and intensity of infection of parasites in Piaractus brachypomus were showed in Figure (4). *Myxobolus* sp. 3 was found highest in March and lowest prevalence was found in June and August. Prevalence of infection range from 15% to 50%. No infection of *Myxobolus* sp. 4 was recorded in the first four months. *Myxobolus* sp. 4 was recorded with the prevalence of 25% in May. And then, it was gradually decreased to 10% in June and 5% in July. But, it was disappeared in August. Mean intensity of *Myxobolus* sp. 3 and *Myxobolus* sp. 4 infestation was described in Figure 5. Mean intensity of *Myxobolus* sp. 3 ranged from 1.3 to 2. However, mean intensity of *Myxobolus* sp. 4 range from 1 to 1.3.

The highest prevalence of infestation was recorded in *Trichodina* sp. Prevalence of infestation fluctuated monthly ranging from 50% to 80%. The highest prevalence was recorded in April and the lowest prevalence was recorded in June (Figure 4). Monthly intensity of *Trichodina* sp. infestation was described in (Figure 5). Intensity was fluctuated from January to September, 2007. High mean intensity 2.5 was recorded in April 2007. Mostly, mean intensity of *Trichodina* sp. range was 1.2 during study period.

1.6 Prevalence and mean intensity of parasite in *Pangasius hypopthalmus*

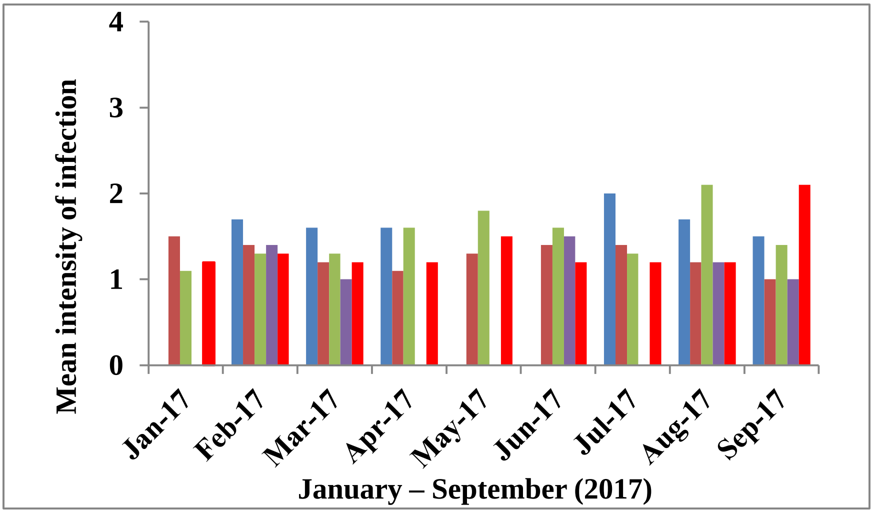
Figure 6 shows prevalence of infestation of *Myxobolus* sp. 5 from gills and gallbldder of *Piaractus brachypomus* during the study period. Prevalence of infection range from 15% to 60%. No infection of *Myxobolus* sp. 5 was recorded in June and July. Mean intensity of *Myxobolus* sp. 5 infestation was described in Fig. 7. Mean intensity of *Myxobolus* sp. 5 ranged from 1.2 to 2. High mean intensity of 2 was recorded in August.

Among the parasite species, the highest prevalence of infestation was recorded in *Trichodina reticulata*. Prevalence of infestation fluctuated monthly ranging from 45% to 65%. The lowest prevalence was recorded in July (Fig. 6). Monthly intensity of *Trichodina reticulate* infestation was described in (Fig. 7). Mean intensity of infection ranged from 1 to 1.5.



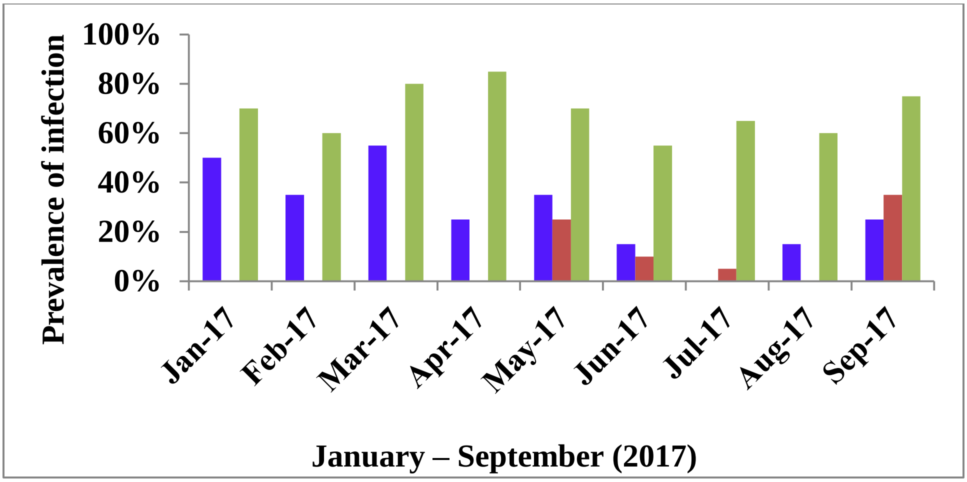
Thelohanellus sp. *Zschokkella sp.* *Myxobolus* sp. 1 *Myxobolus* sp. 2 *Trichodina nigra*

Figure. 2. Prevalence of protozoan infection in *Labeo rohita*



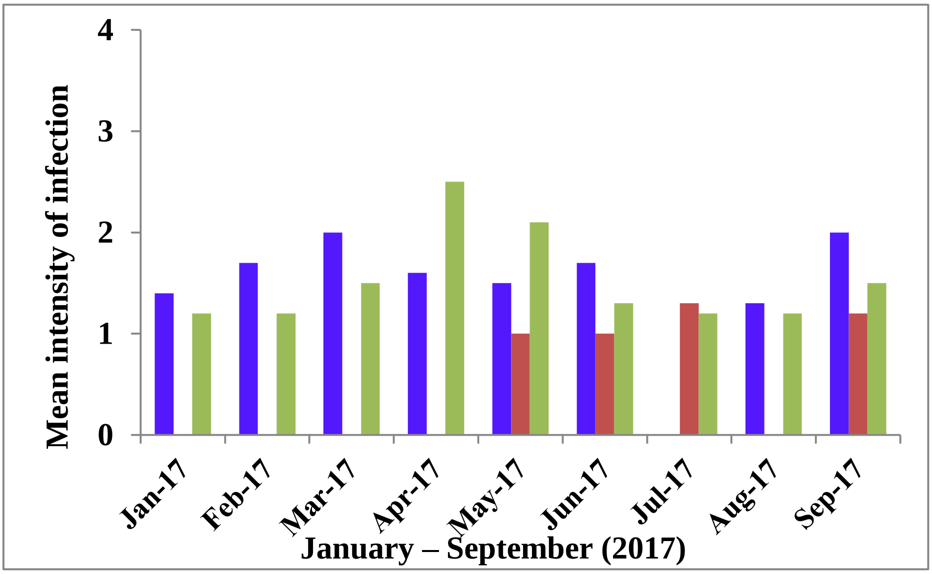
Thelohanellus sp. *Zschokkella sp.* *Myxobolus* sp. 1 *Myxobolus* sp. 2 *Trichodina nigra*

Figure. 3. Mean intensity of protozoan infection in *Labeo rohita*



Myxobolus sp. 3 *Myxobolus* sp. 4 *Trichodina* sp.

Figure. 4. Prevalence of protozoan infection in *Piaractus brachypomus*



Myxobolus sp. 3 *Myxobolus* sp. 4 *Trichodina* sp.

Figure. 5. Mean intensity of protozoan infection in *Piaractus brachypomus*

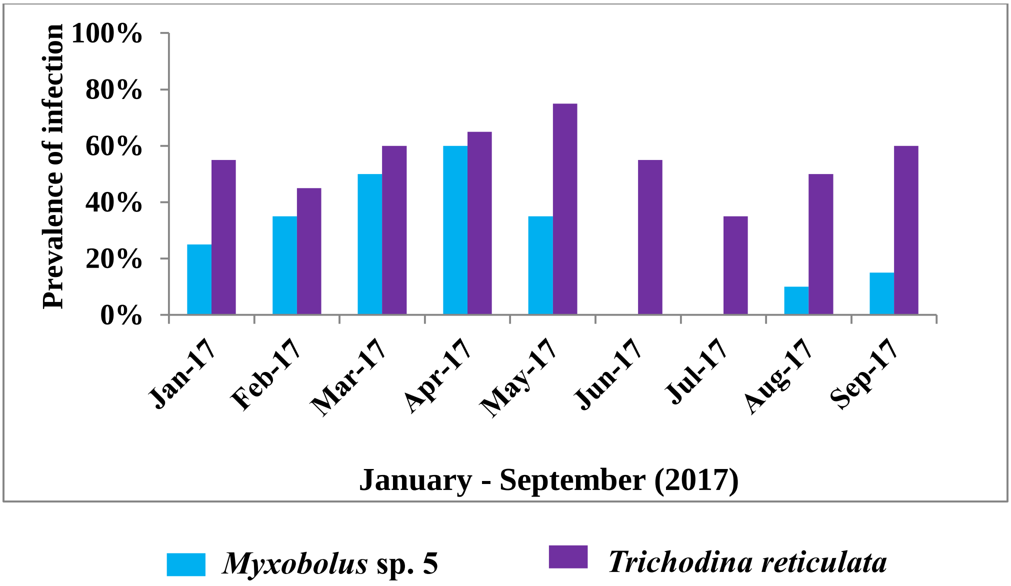


Figure. 6. Prevalence of protozoan infection in *Pangasius hypopthalmus*

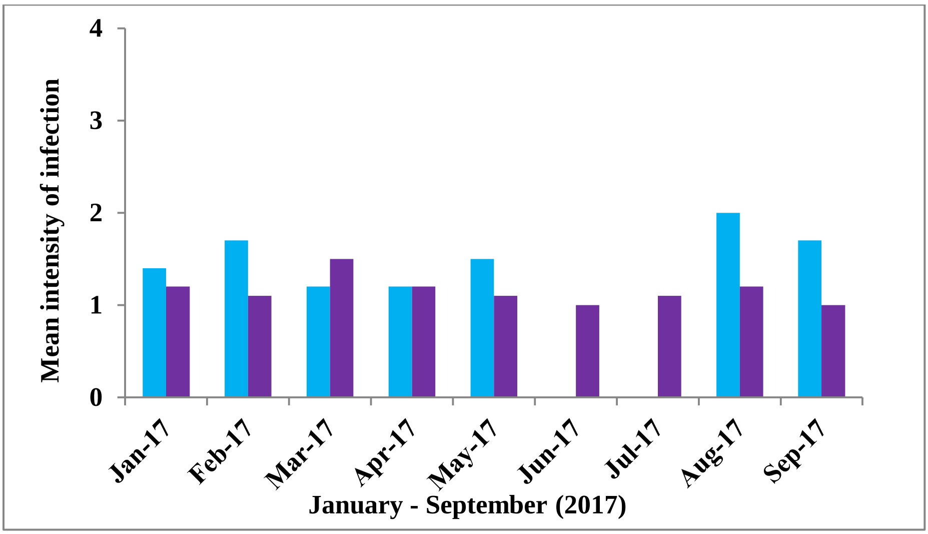


Figure. 7. Mean intensity of protozoan infection in *Pangasius hypopthalmus*

Discussion

In the present study, five parasites in *Labeo rohita*, three parasites in *Piaractus brachypomus* and two parasites in *Pangasius hypopthalmus* were recorded. One *Trichodina* species was found in each examined fish species in present study. In Myanmar, *Trichodina* spp were recorded in *Labeo rohita*, *Carassius auratus*, *Cyprinus carpio* and *Pangasius hypopthalmus* (Pa Pa Win, 2008; Thi Thi Thaw 2007; Khin May That, 2009 and Su Su Mon, 2014).

The genus *Trichodina* is the largest within the family Trichodinidae (Raabe, 1959). *Trichodina* spp. are the most famous and best known as ectoparasites of skin, fin and gill of the fish (Hoffman, 1998). They are typically found in aquaculture farms and sometime in natural water resources (Lom and Dykova, 1992). Although three *Trichodina* species were recorded in the present study, the intensity of infection was very low (range 1 -2). The impact of *Trichodina* species in the culture fish species will be low. However, since poor water quality enhance the production of *Trichodina* species, trichodinids become a problem in aquaculture if farmers do not maintain the water quality. Keeping the high water quality, feed residues and cleaning of the pool is very important in the control of *Trichodina* spp. (Ogut *et al*, 2005).

The shape and dimension of the *Myxobolus* spp. recorded in the present study was compared to those of other *Myxobolus* spp. Reported by Eiras *et al*., (2005). Moe Kyi Han (2007) recorded three species *Myxobolus* sp. in Rohu collected from That Yat Kone, Mandalay environ. Su Su Mon (2014) recorded two *Myxobolus* species in *Labeo rohtia* Yangon environ. In the present study, two *Myxobolus* sp was recorded in *Labeo rohita* and one species was found in *Piaractus brachypomus* and *Pangasius hypopthalmus.* Two *Myxobolus* species recorded in present are very similar shape and dimension of *Myxobolus* sp.1 and *Myxobolus* sp.2 reported by Moe Kyi Han (2007) and Su Su Mon (2014).

In the present study, one *Thelohanellus* sp. was recorded in *Labeo rohita.* The shape and dimension of *Thelohanellus* sp. found in this study were compared to those of some other species of genus *Thelohanellus* sp. reported by several authors (Lom and Dykova, 1992; Basu and Haldar, 2004; Moe Kyi Han, 2007; Su Su Mon, 2014). The shape and size of *Thelohanellus* sp. was similar to *Thelohanellus* sp. reported by Moe Kyi Han (2006).

Zschokkella sp. was found in *Labeo rohita* during study period. These myxozoans are primarily fish parasites usually infecting the gall-bladder of the hosts. *Zschokkella* sp. is very similar to *Zschokkella* sp. in *Labeo rohita* reported by Hnin Hnin Htay, 2014. Identification of myxosporeans so far described has been based on morphological variation in spore. Molnar *et al* (2002) stated that molecular biological methods such as DNA techniques including PCR might serve as an excellent tools for differentiation of morphologically similar species. DNA sequencing of recorded parasites should be conducted to identified the species as a future study.

In Myxozoa, high prevalence of infections were found for the first four months but it decreased after five months of culture period. Myxozoa is a spore formation parasite and they produce spore in the infected tissue and then the tissue will be burst out and fish will be recover from infection (Yokoyama *et al.*, 2007, Yanagida *et al.*, 2004). Therefore, infection was high in the beginning of sample period and it decreased after five months of culture period. Due to their low intensity of infection, impact of parasite in culture fish is assumed as low. However, secondary infection such as bacteria and fungus from infected skin/ gills should be considered.

Five species of parasite were found in *Labeo rohita* but only three species in *Piaractus brachypomus* and two species in *Pangasius hypopthalmus* were recorded. Two reasons are considered; 1. Lay Daung Kan fish farm has been cultured for *Labeo rohita* more than 18 years and parasite and host has high relationship in that area than the other fish species and 2. *Piaractus brachypomus* and *Pangasius hypopthalmus* may have more disease resistance than *Labeo rohita*.

In conclusion, the data obtained from the present study are useful for fish culture. Protozoans cause disease outbreaks occur in cultured fish more than any other infection in intensive aquaculture systems can thus serious morbidity and mortality (Yokoyama, 2003). Studies on protozoan parasites in fish culture farms in Myanmar important to further develop aquaculture production.

Conclusion

Five parasites in *Labeo rohita*, three parasites in *Piaractus brachypomus* and two parasites in *Pangasius hypopthalmus* were recorded. Highest prevalence of infection was found in *Labeo rohita* while the lowest one is found in *Pangasius hypopthalmus.* Intensity of infections of in all parasite species were low. Impact of parasitic infection in study area is assumed as low, however, secondary infection from the damage of infected skin and gills should be considered.

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