Potency of Turmeric in Reducing Motile Aeromonas Septicaemia (Mas) in *Pangasius hypophthalmus*

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**Abstract** A study on the histological structure of kidney of *Pangasius hypophthalmus* that were fed with turmeric supplementation and were infected with *Aeromonas hydrophila* has been conducted in the Laboratory of Parasites and Fish Disease, the Fishery and Marine Science Faculty, Riau University from February to July 2019. There were 3 treatments applied. The first group (P1) was given diet supplemented by 0.5g of turmeric powder. The second group (P2) was given diet supplemented by 0.7g of turmeric powder. The third group (P3) was given diet supplemented of 0.9g of turmeric powder. After 14 days, the fishes were infected with *Aeromonas hydrophila* (0.1 ml of 10^9 of *A. hydrophila* culture). The negative control were fishes that were not receive any treatment, while the positive control were fishes that were infected with *A. hydrophila*, and were not given diet any supplementation of turmeric powder. Fishes were reared for 14 days and than kidney organ were obtained for histological study. Tissue sample were processed by standard histological method (formalin fixed, alcohol series, HE stained and 6 sliced). The result indicated that there were differences in the tissue of treated fishes and that of the control. Kidney tissue of the positive control shown badly damage, there were many necrotic spots, congestion, hyperplasia, hypertropy and haemorrhage. Kidney tissue of the treated fishes of P2 (0.7g of turmeric extract) shown less abnormalities such as necrotic spots and haemorrhage. It can be concluded that the turmeric supplementation in Fish feeding is able to cure *A. hydrophila* infection on fish.

**Keywords**: Congestion, turmeric, liver, *Pangasius hypophthalmus*, diet

1. **Introduction**

*Pangasius hypophthalmus* is a freshwater fish that has high economical value in Riau Province. Many traditional dishes are made from *P. hypophthalmus*, fresh or smoked. To fulfill the need of *P. hypophthalmus*, the culture of this fish is commonly conducted, especially in the Kampar Regency, Riau. Problems that commonly encountered in the *Pangasius* culture is fish disease, especially Motile Septicaemia Disease (MAS). This disease is an acute infection due to infection with motile aeromonads bacteria in freshwater fish. This disease causes approximately 80% mortality in fish farming especially when the fish are stressed [1] and is characterized by rapid fatal septicemia with few gross signs, exophthalmia, ascitis and ulcer formation [2]. The poor fish performance result in low market price or even cannot be sold [3].
To prevent diseases caused by pathogens, the fish health must be improved through the use of probiotics, immunostimulants and feed supplements. One of the supplements that provides good result in preventing and curing the A. hydrophila attack is turmeric. [4] stated that the use of turmeric extract is effective to prevent the MAS diseases. [5] also proved that dipping the diseased fish in the turmeric solution (0.5 gr/ L) was effective to cure the fish. While [6] stated that fish that was fed with feed pellets enriched with turmeric powder (0.7 g/Kg fodder) is effective to improve the immunity of P. hypophthalmus toward A. hydrophila attack. The dipping method can be conducted in small-scale aquaculture, however it may not be effective to use in large scale commercial aquaculture operations. Therefore, it is necessary to find out a method that can be used to provide turmeric extract to high number of fish. As turmeric is commonly used as medicine to cure bacterial infections in humans, the addition of turmeric extract into fish feed pellet may be a viable approach in delivering turmeric to fish in large-scale aquaculture operation. So far, there is no information on the effectiveness of incorporating turmeric in fish feed pellet as means of combatting A. hydrophila infections. Hence, this study was conducted to address this research gap.

2. Material And Methods

This research was conducted from February-May 2019 in the Parasite and Fish Diseases Laboratory of Fishery and Marine Science Faculty, Universitas Riau, Indonesia. The fish used in this study was fingerling of Pangasius hypophthalmus (8-12 cm TL and 5 -15g BW). The fish were reared in aquarium (30x30x40cm), 50 L volume, 10 fishes/aquarium. Prior to the experiment, the fish was acclimated for a period of one week. The fish was fed with commercial fish feed pellets (Charoen Phokphand) that was enriched with turmeric powder, 0.7 gram/ Kg feed. The feed was given at 10% of total body weight, 3 times per day. After being fed with enriched diet for 2 weeks, the fish was then infected with A. hydrophila (0.1ml, 107, intramuscular injection). Clinical symptoms of the Aeromonas Septicaemia Disease were monitored for 5 days. Seven days after bacterial infection, the clinical signs of the MAS diseases were noted. There were 5 treatments, namely:

- Ko: No turmeric addition
- Kp: No turmeric addition + Aeromonas hydrophila infection
- T1: 0.5g of turmeric and A. hydrophila infection
- T2: 0.7g of turmeric and A. hydrophila infection
- T3: 0.9g of turmeric and A. hydrophila infection

Aeromonas strain was obtained from the Pekanbaru Fish Quarantine. Turmeric powder was made from local turmeric that was rinsed, sliced, dried and grind. The clinical symptoms of the fish were then described.

3. Result And Discussion

Seven days after injection, the clinical symptoms of MAS occurred. However, the clinical symptoms in the treated group occurred at different days post-infection.

On the other hand, the control positive that was not fed with turmeric and was injected with Aeromonas hydrophila showed strong clinical symptom of MAS. There were ulcers with exposed muscle, several haemorrhagic spots, swollen abdomen and exophthalmia. The fish was swimming frantically and showed no response when given pelleted feeds. The fish fed with turmeric (T1 and T3) showed light symptoms of MAS. There were small ulcers, eroded fins and few haemorrhagic spots in the body. Fish fed with turmeric (T2) showed no symptoms of MAS. The skin was normal with no ulcers or haemorrhagic spots, normal fin and no exophthalmia. The fish were able to swim normally and responded actively when given feed pellets. (Figure 1). [7] reported that the clinical signs of the MAS in catfish included increased respiration, lethargy,
presence of skin lesions such as white discoloration, shallow hemorrhagic ulcers or deep ulcers with exposed underlying muscle.

As there was slight or no symptoms of MAS was observed in the turmeric-fed fish, it indicates that turmeric improved the immunity of fish. The fish had the capability to counteract the pathogenic effects of Aeromonas hydrophila. Curcumin, the active ingredient in turmeric, is believed to have a wide range of biological effects including anti-inflammatory, anti-oxidant, anti-tumour, anti-bacterial, and anti-viral activities, thus, it has a good potential in clinical medicine [8]. In the fish that were fed with turmeric, the curcumin may be distributed in the fish tissue and it hampered the growth of the bacteria. As Aeromonas could not develop in fish tissue, the health status of the fish is not affected and as a result, there is no clinical symptoms of MAS. [9] stated that fish behavior reflects the biochemical and physiological changes induced by stress and disease conditions. [10] stated that Aeromonas hydrophila causes diverse pathologic condition such as dermal ulceration, rotting of the tail, fin haemorrhage, septicaemia, red sores, exophthalmia, erythrodermatitis and scale protrusion especially in common carp (Cyprinus carpio). [11] also stated that chronic infection could lead to ulceration, inflammation and dermal lesions with focal haemorrhages. The symptoms of MAS in each treated fish are presented in Table 1.

Table 1. MAS symptoms in fish.

| Symptoms                    | Treatments          |
|-----------------------------|---------------------|
|                             | Ko   | Kp       | T1  | T2   | T3   |
| Haemorrhage                 | -    | Many spots | Few spots | Few spots | Few spots |
| Skin condition              | -    | Ulcers, exposed muscle | Few ulcer | - | Few ulcer |
| Fin condition               | -    | Rotten | Rotten | - | Rotten |
| Abdomen                     | Normal | Swollen | Normal | Normal | Normal |
| Feed response               | Good | Fair | Good | Good | Good |
| Swimming                    | Normal | Frantic | Normal | Normal | Normal |
| Eyes condition              | Normal | Exophthalmia | Normal | Normal | Normal |

A. Normal fish
B. MAS symptoms (a. exophthalmia, b. rotten fin, c. haemorrhage, d. rotten tail)

Figure 1. Pangasius hypophthalmus

CONCLUSION

Based on the data obtained, it can be concluded that the addition of turmeric powder in fish feed pellets is able to reduce the risk of MAS in P. hypophthalmus. The
best result was obtained in T2 (addition of 0.7g/Kg fish feed) as the fish that was infected with *A. hydrophyla* did not manifest the clinical symptoms of the disease.

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