INFLUENCE OF POLLUTION ON THE GILL HISTOPATOLOGY AND HEMATOLOGY OF TAWES (PUNTIUS JAVANICUS) REARED IN CAGES AT ALOE RIVER SIDOARJO, INDONESIA

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Abstract- Based on the results of many studies aloe river much polluted of heavy metal that are able to cause disease and damage to the fish body. The aimed of this research was to know the effect of pollution to P. javanicus (local name; Tawes) on the Fish gills histopathology and hematology maintained in the cages. P. javanicus were coolected from along the Aloe River using 2 x 1 x 1 m^3 cages on 3 stations, fish density was 10 fish/m^3, and it was maintained for about 3 weeks without giving any artificial feed. The parameters were gills histopathology, blood cell, and fish deformities morphological. The result of fish histopathology are lamella oedema, necrosis. Observe of white blood cell were increased (Leukosit and differential Leukosit) and decrease of red blood cell effect of pollution. The morphological damaged on the . P javanicus, it also showed that the condition of the fish were on the 90% deformities of fin, 80% chipped of scales, 80 % brown on the liver, and 80% mucus and pale of gills.

Keywords- Cages, Gills, Histopathology, Pollution

I. INTRODUCTION

The Aloe River in Sidoarjo Indonesia was one of the rivers which had many settlement, agriculture, and aquaculture along the stream. The estuarine became a fishing place. It's a branch river of Brantas which flew through Madura strait. Aloe River got a water runoff from Lapindo mud which came from Gempolsari River. So, it decreased the water quality of Aloe River. According to, Lapindo mud contained of toxic metals above threshold which caused pollution to the Aloe River. Heavy metal content exceeds water quality standart with the highest range to Cd Value of 0.05 to 10.45 mg/L, Cr 0,05 to 105.44 mg/L.

The effect of chemical pollution are measurable on biological in aquatic environment are significant. Documented effect includes alteration in hematology, homeostasis physiology and histology. Contaminants can enter the organism body through the food chain, gills and diffusion through the skin).

Most toxins enter through the membrane of the gill epithelium and then transferred into the blood. Therefore, this study was aimed to determine the effect of pollution on the river flow to fish gills and hematology of P. javanicus reared in cages at Aloe River.

II. METHODS

In order to study effect of pollution on the histopatology of gill and haematology, sample were collected from along Aloe River using gillnet (with 3 cm mesh). It was maintained on the density of 10 fish/m^3 , It used 2 x 1 x 1 m^3 cages on the 3 stations, was maintained for about 3 weeks without giving any artificial feed. Parameters were taken by measuring the water quality through Temperatur, oxygen dissolved, pH, and some metals.

The preparation of gills histology used methods and the observation of blood used the modification method by. Hematology data included erythrocytes count and differential leucocyte.

Monitoring of water quality daily observation were done for DO, temperature, pH. The histology and haematology of fish were observe at 0 and after 3 weeks.

III. RESULTS

A. Morphological deformities of P . javanicus
P. javanicus were collected from along Aloe River using gillnet (with 3 cm mesh). It was maintained on the density of 10 fish/m^3, size body length varies between 129 – 166 mm, and weigh range of 29,9 – 59 g. Effect pollution to damage of P. javanicus as Table 1.

Table 1. Morphological deformities of P japanicus

Item	Description	Persentage of prevalence
Weight(gr)	29,9 - 59	
Length(mm)	128 – 162	
Fin and body surface	Ripped fins, surface slimy	90
Scale	Chipped, necrosis	80
Liver	Brown	80
Gills	Pale and mucous	80

B. Haematology
The results of the effect pollution on P. javanicus haematology response, it reared in cages Aloe River of Sidoarjo before experiment and after 3 weeks are shown in Table 2.

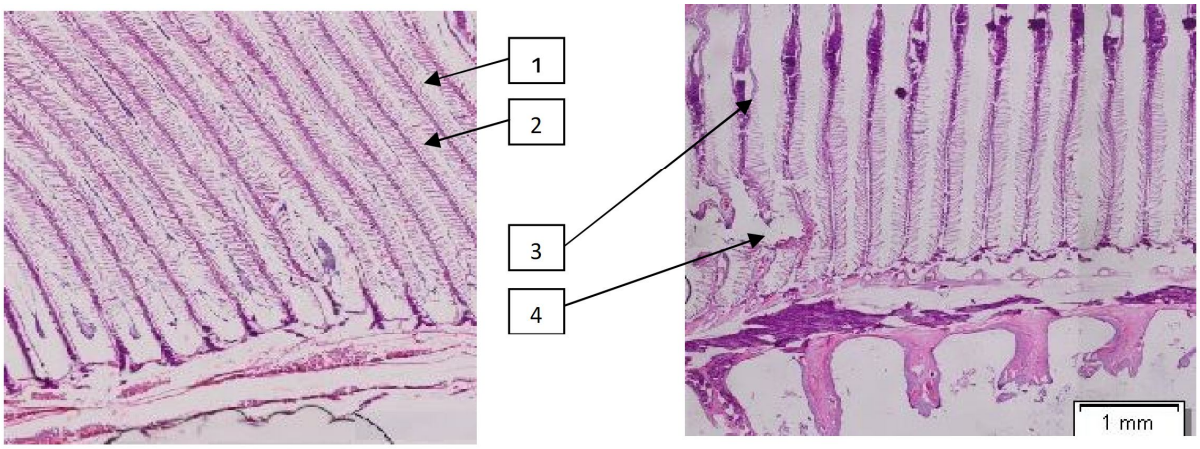
Table 2. Influence of pollution on haematology

Parameter	Normal	After maintained in the cages (3 weeks)		
		Stasiun 1	stasiun 2	stasiun 3
Eritrosit (10^5 sel/ml)	64.5	44.5	53.5	46.5
Leukocyte (10^3 cell/ml)	49.3	60.1	71.4	77.3
Neutrophil (%)	6.25	7.14	8.13	7.74
Monocyte (%)	10.21	15.13	18.75	24.15
Lymphocyte (%)	51.5	58.2	65.4	72.8

C. Histopathology of gills

Normal histological structure was observed in fish. It were collected from along Aloe River using gillnet (with 3 cm mesh) (a). The lamellar epithelium (number 1) was support by pilar cells (number 2). Mucous cells were present on the lamellae and in the filamental epithelium.

Eosinopholic chloride cells were prominent at the base of lamellae Pathological change in histological gills structure was evident in fish from maintained in the cages for 3 weeks (b), oedema of the lamellar (4) necrosis (5). (Figure1).



(a) (b)

Figure 1. Gill filament of fish in the normal lamellae (a) and fish histopatological (b) are pollutant in the cages (1) Lamella gills (2) Pillar cells (3) Oedema ot the Lamellar (4) Necrosis (H & E, magnification = 100x, bar 1mm).

IV. DISCUSSION

High percentage of fish organ damages was observed on fish sample. Morphological damage of P. Javanicus on Fins for about 90%, chipped scales on 80%, the brown liver on 80%, and the slimy pale gills for 80%. The pathology of fish organs were related to the quality of river water. It showed that the oxygen has less than a minimum threshold of below 6 mg / L. while other parameters, such as BOD, COD, TSS, Cd, and Cr were , in excess of the limit. it was polluted on the River Aloe.

Polluted Aloe River may cause physiological stress on fish, marked by the activation of Sympatic Nervous System (SNS) and the Hypothalamus Pituitary Adrenocortical (HPA) glandresulting in increased plasma concentrations of catecholamine and cortisol which causes disruption of homeostasis. The heavy metal contamination can cause immunotoxic metal that lower antibody titers resulting in a change on the number of lymphocytes. It observed on the haematological response of fish living in a Cadmium contaminated river have increase number of lymphocyte and suffering anemia as demonstrated by reduction total red blood cell number. Contaminated river caused damages to the gills as shown on the fish gill histopathology. The cells enlarged and there is a changed on the normal structure of lamella. According to, Oedema occurred as response to the toxic. With separation of epithelial cells extending the length of lamellae. Gills of fish showed focal necrosis, typical at the base of lamellae. Necrotic tissue was characterized by loss of cellular integrity, karyolysis of nuclei and infiltration by leucocytes, indicate of an inflammatory response. The damaged on the necrosis system which caused by the toxic effect, will make the immunity decreased. There is a relationship between the effects of the toxin to cell damage, due to the covalent bonding of the toxin with macromolecular network, an expected interaction that initiates cellular necrosis. Apart from the age of the fish, the immune systems was also influenced by the under developed lymphoid organs which is not able to cope with polluted waters.

It was concluded that histopathology occurred in fish gills reared in cage. Polluted water increased the leucocyte count and differential leucocyte and reduction total red blood cell number. The percentage of morphological damage on fin, scales, liver and gill were 90%, 80%, 80%, and 80%, respectively.

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