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HISTOPATHOLOGICAL OVERVIEW ASIAN REDTAIL CATFISH (*Hemibagrus nemurus*) SKIN AND GILLS INFECTED WITH ECTOPARASITES

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ABSTRACT

Frequent problems faced in fish farming are possible parasites that cause a declining level of fish production. The study's objective is to know the damage to the skin and gills of Asian redtail catfish in a manner that infects histopathology ectoparasites. The sample used three fish in each pool: Freshwater Fish Hatchery and Cultivation (PBIAT) Ngrajek and Regional Technical Implementation Unit (UPTD) Freshwater Fish Hatchery Sawangan in July 2022. Results data analysis inspection histopathology skin found necrosis and infiltration cell inflammation, for gill found exists infection parasite *Dactylogyrus* sp and *Ichthyophthirius multifiliis* as well as secondary lamellae adhesions, congestion, and cartilage hyperplasia hyaline.

Keywords: Histopathology, Ectoparasites, Asian Redtail Catfish, Gills, Skin

1. INTRODUCTION

Asian Redtail Catfish (*Hemibagrus nemurus)* is one freshwater fish commodity catfish grunt living in Indonesia's waters river. This fish the public favours lots because the meat is thick and rich in protein has a few thorns and has a delicious taste[1]. The distribution of Asian redtail catfish in Indonesia includes West Sumatra, Jambi, South Sumatra, Kalimantan, and Java. One area that provides Asian redtail catfish is the District Magelang[2]. According to TKPI[3], every 100 g of Asian redtail catfish has a content of 74.9 g of water nutrition, 15.1 g of protein, 5.5 g of fat, carbohydrates of 3.3 g, calcium of 5 mg, potassium of 349 mg, and phosphorus of 146 mg.

The parasite is one frequent problem faced in possible fish farming, causing a decline in fish production. Fish get attacked by parasites caused by organisms, and another accumulation of remaining fish and food conditions in the environment is lacking. A condition with a low pool will cause fish to experience stress, so the defence mechanism becomes weak and, finally, quickly attacks parasites. Attack parasites lose the fish lust, eat, and die[4]. Damage caused by parasites, among others, can cause organ damage, i.e., skin and gills, slow growth, and declined mark selling[5].

Inspection histopathology is an inspection technique for learning abnormal cell changes or networks to determine fish edification diagnosis disease[6]. Inspection in a manner histopathology as supporting data for diagnosis of parasites found. Inspection histopathology also advanced from the inspection of infection parasites on fish. Sudaryatma & Eriawati[7] mentioned that clinical observation in infested fish parasites is complicated because parasites live externally on fish bodies and follow fish movement-free. This is because changes in environmental waters often cause the symptoms of clinical and lesion pathological anatomy of the gills. With the inspection of histopathology, the histopathological picture of the infection parasite is evident and consistent. With so, necessarily done

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inspection histopathological carry on to determine description change infected cells and tissues of the skin and gills ectoparasites.

2. RESEARCH METHOD

Time and Place

This study was held in the month of July 2022. Asian redtail catfish sample obtained from pool cultivation Freshwater Fish Hatchery and Cultivation (PBIAT) Ngrajek and Regional Technical Implementation Unit (UPTD) Freshwater Fish Hatchery Sawangan. Observation of ectoparasites in Asian redtail catfish samples in the Laboratory Faculty Tidar University Agriculture. Inspection histopathology was conducted in the Faculty of Animal Medical Gadjah Mada University laboratory.

Procedures

Inspection Parasite

Fish samples were weighed and measured in length. After that preparation, the physique outside the fish body covers mucus done with scraping, fins done with fish fins, and gills done with the technique of second split. Then, each preparation is placed on top of object glass, dripped with 0.62% NaCl, and closed with cover glass. Observation of ectoparasites done using a microscope with 100× magnification.

Identification of Ectoparasites

Identify ectoparasites found in the samples using book identification ectoparasites "Common Freshwater Fish Parasites Pictorial Guide". The identification of ectoparasites was done by observing form morphology and cell size.

Inspection histopathology

Fish samples were dissected, skin and gills were cut, then 2-5 mm thick fixed with 10% formalin. Organs that have cut entered the tool processing tissue. Then, the cutting process is carried out. A network microtome 5-6 µm thick is laid on object glass. Furthermore, the coloring network used hemotoxylin and eosin (H&E), and the preparation was closed using covered glass.

3. RESULT AND DISCUSSION

Histopathological Overview Skin

Skin is the outermost organ in fish that directly impacts the environment. Skin, including in integumentary systems, has some function among others, namely as protection of other organs against glitches and for adapting self to factors that bully others, as tool excretion and osmoregulation, as well as tool breathing on certain types of fish. Generally, un-scaly fish produce slimmer and thicker than scaly fish[8]. In line with the study's results, the Asian redtail catfish is a fish that does not have a scale, so mucus is used to protect fish from parasites that will infect it. A histopathological of skin on Asian redtail catfish can be seen in Figure 1.

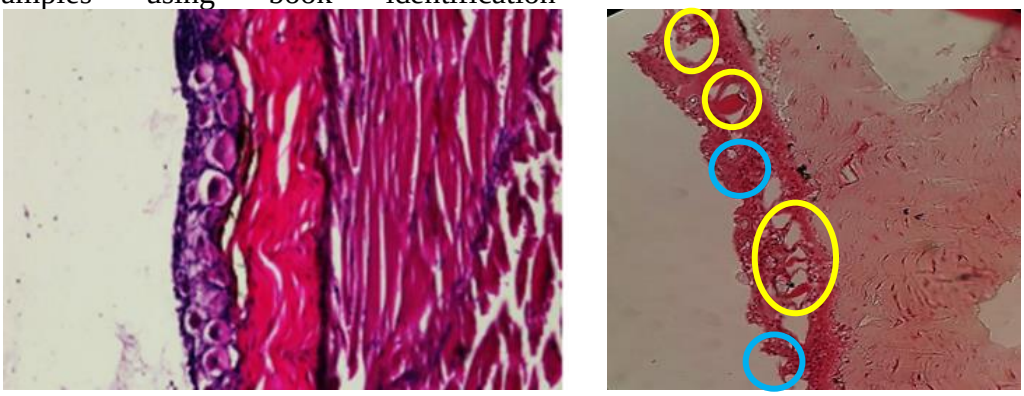


Figure 1. Histopathology Asian redtail catfish skin
Description: (A) Normal skin ; (B) Necrosis (Circle yellow), Infiltration cell inflammation (Circle blue); Source : (A) Sari[9]

Figure 1 (A) represents a description of histopathology; the skin of the Asian redtail catfish is normal. The skin of the Asian redtail catfish shows a normal cell network and neat skin, and nothing is broken. Figure 1 (B) describes the histopathology of Asian redtail catfish skin that experienced necrosis and cell inflammation. Necrosis affects cells' damage, and finally, the death of the cell network causes loss of function in the affected area of necrosis[10]. Figure 1 (B), with a yellow circle, shows that affected skin necrosis exists in network perforated and damaged skin so that tissue on the skin is not intact again. The cells that are not intact can cause cell skin to die, and no can operate function again.

In Figure 1 (B), with a blue circle, infiltration cell inflammation exists. This suspect originates from reaction ectoparasites attached to the skin, such as *I. multiphilis* and *Trichodina* sp, found in research. This follows research by Sari[9], who found that damage networks can relate to behaviour-inclined parasites that attach to the host and move in a manner accessible on the fish's body. The inflammatory process in the wound can increase pressure hydrostatic and annoying balance in blood vessels. Circumstances cause more fluid to go out, leaving blood vessels to enter the network. Inflammation is the reaction of injured tissue being repaired and replaced with a new network reaction. It causes dangerous agents to network bodies or prevents order agents from spreading broadly.

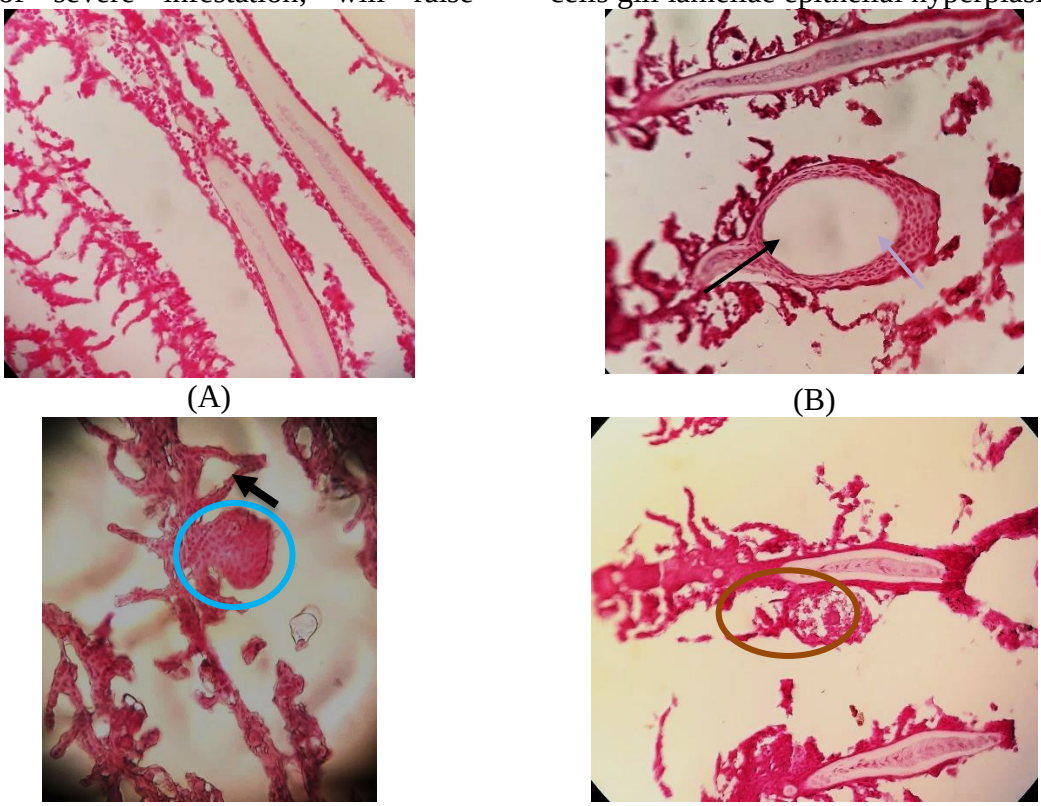
Infiltrating cells are wound. Among them are lymphocytes, neutrophils, and macrophages[11]. Inflammation connects tightly with the damage network because cell inflammation is the cell defence body's first to replace damaged cells or die. Figure 1 (B) describes histopathology on the skin of Asian redtail catfish cultivated in the Regional Technical Implementation Unit (UPTD) of Freshwater Fish Hatchery Sawangan. The ammonia levels that exceed the optimum limit in the pond Asian redtail catfish cultivation at the Regional Technical Implementation Unit (UPTD) of Freshwater Fish Hatchery Sawangan can cause inflammation of the skin of the Asian redtail catfish following a statement by Lestari[12], which states that high ammonia levels can cause happening inflammation.

Histopathological Overview Gill

Gill is a vital organ that is important in fish's respiration process. There are so many blood capillaries on the gills, where blood is a rich source of nutrients that are very nutritious and perfect for breeding microorganisms like parasites, bacteria, viruses, and fungi[13]. Some ectoparasites infect Asian redtail catfish, which can cause gill damage because pathogens enter the fish's body. Damage to the gills can seen with histopathological tests.

Figure 2 (A) shows the histopathology of normal Asian redtail catfish gills, in fig. This indicates that the primary and secondary lamella Still look normal and clear. Figure 2 (B), with the sign arrow black, describes the histopathology of the gills samples of fish reared in ponds Asian redtail catfish farming Freshwater Fish Breeding Regional Technical Implementation Unit (UPTD). Infected Sawangan ectoparasites *Dactylogyrus* sp primary lamellae are visible existing room blank-like hole matter. This signifies exists of the bite parasite *Dactylogyrus* sp matter. This is because, at the moment, the coloring Hematoxylin-Eosin (HE) cannot absorb color, so the circle is big and white or not colored. Next, Figure 2 (B), with the sign yellow, shows cartilage hyperplasia hyaline, which means the numbered cell around room blank used bite *Dactylogyrus* sp increase Lots in a manner abnormal. This is caused by the parasite *Dactylogyrus* sp that infects gills. This aligns with research by Mora et al.[14] that describes the histopathology-infected fish gills parasite *Dactylogyrus* sp as spaced empty on the primary lamella. The damage process starts from hyperplasia and then continues to form fusion, telangiectasias (enlargement of the vessels' blood), and vacuoles (empty spaces).

Infected gills parasite *Dactylogyrus* sp will experience hyperplasia cells and, on the level of severe infestation, will raise vacuole-sized small nor big post-sticking parasites, in general, will be seen in section cells gill lamellae epithelial hyperplasia



(A) (B)

(C) (D)

Figure 2. Histopathology Asian redtail catfish gills

Description: (A) Normal gills ; (B) Bite *Dactylogyrus* sp (Arrows black), Cartilage hyperplasia hyaline (Arrows yellow); (C) Congestion (Circle blue), secondary lamella adhesions (Arrows black); (D) *I. multifiliis* found on gills (Circle green)

Figure 2 (C), with a circle of blue, describes the histopathology of gill samples of Asian redtail catfish cultivated in ponds cultivation Freshwater Fish Hatchery and Cultivation (PBIAT) Ngrajek, which experienced damage congestion. Congestion is when blood vessels widen or pile up in the vascular area, blood specific and things. This is caused by infecting ectoparasite fish bodies. The gills that experience congestion are suspected to be caused by the height of infecting ectoparasite gills in the observed fish samples from pool cultivation. Breeding and Cultivating Freshwater Fish (PBIAT) Ngrajek. This is in line with Sari[9], which states that damage congestion is caused by many parasites that increasingly infest fish. Lots of parasites will more clearly see the level of damage.

Next, Figure 2 (C), with the black sign arrow, shows that secondary lamellae adhere to gills when the secondary lamellae stick to each other. This is suspected because infecting ectoparasite sample fish gills can cause secondary lamellae not to function perfectly because lacuna-containing cell blood are red closed and have each other attached, which can cause fish death. Secondary lamellae attachment is caused by existence level infection and possible parasites, causing secondary lamellae not to function normally because lacuna containing red cell blood is covered by secondary lamella epithelial cells. Closed lacunae by cells' secondary lamellae epithelia can increase the pressure in the lacunae and result from damaged functioning pillar cells guarding secondary lamella stability[7].

Figure 2 (D), with a green circle, shows the histopathology of the gills samples of Asian redtail catfish cultivated in ponds cultivation Breeding and Cultivating Freshwater Fish (PBIAT) Ngrajek. Infected parasite *I. multifiliis.* It seems like it exists from a circle of no order, with the cell nucleus in the middle. Histopathological test this as supporting data in line with results study microscopy showing infection parasite *I. multifiliis* on the gills of Asian redtail catfish cultivated in ponds cultivation Breeding and Cultivating Freshwater Fish (PBIAT) Ngrajek.

Based on inspection of histopathology of the gills, attachment *anchors* parasites on the gills can result in bleeding into the lamellae and resulting in hyperplasia cells gill lamellae epithelium is very fast then enhancement secretion mucus by cells mucus. Cell-increased mucus signifies protection on the body from infected fish parasites, producing lots of mucus on the surface gill, but this can cause necrosis cells in the lamellae epithelium. Necrosis caused by hypersecretion of mucus can cause oxygen and nutrients that cannot reach cells' gill lamellae epithelium. If conditions continue, it will cause a death network. Death gill tissue will significantly interfere with oxygen osmosis because many are covering mucus part gills. If this happens in a manner that keeps going continuously, it can cause fish death.

4. CONCLUSION

Based on the results, the research that has held can take conclusion that is analysis of outcome data inspection histopathology skin found exists necrosis and infiltration cell inflammation, for gill found exists infection parasite *Dactylogyrus* sp. and *I. multifiliis* as well as secondary lamellae adhesions, congestion, and cartilage hyperplasia hyaline.

REFERENCES

1. [KKP] Kementerian Kelautan dan Perikanan (KKP). Komoditas Ikan Lokal Berpotensi Tingkatkan Kesejahteraan dan Gizi Masyarakat. *https://kkp.go.id/artikel/31639-kkp-komoditas-ikan-lokal-berpotensi-tingkatkan-kesejahteraan-dan-gizi-masyarakat*. 2021. Access 6 Maret 2022.
2. Gaffar, A.K. 1983. Percobaan Pembesaran Ikan Baung (*Macrones nemurus* C.V.) di dalam Sangkar dengan Perlakuan Formula Pakan. *Buletin Penelitian Perikanan Darat*, 1983; 3(2): 5-12.
3. [TKPI] Tabel Komposisi Pangan Indonesia. Kementerian Kesehatan (Kemenkes). Manfaat, Khasiat, dan Kandungan Gizi per 100gram Ikan Baung Segar. *https://m.andrafarm.com/_andra.php?_i=daftar-tkpi&kmakan=GR008#:~:text=Sistem%20Otot-,Berdasarkan%20data%20Kemenkes%20RI%20(TKPI)%2C%20setiap%20100%20gram%20%22,termasuk%20tinggi%20dan%20cukup%20tinggi*. 2019; Access 6 Maret 2022
4. Pujiastuti, N., Setiati, N. Identifikasi dan Prevalensi Ektoparasit pada Ikan Konsumsi di Balai Benih Ikan Siwarak. *Life Science*, 2015; 4(1).
5. Bhakti, B. *Pembenihan dan Pembesaran Nila Gift*. Penebar Swadaya: Jakarta, 2011.
6. Mohammadi, F., Mousavi, S.M., Rezaie, A. Histopathological Study of Parasitic Infestation of Skin and Gill on Oscar (*Astronotus ocellatus*) and Discus (*Symphysodon discus*). *AACL Bioflux*, 2012; 5: 88- 93.
7. Sudaryatma, P.E., Eriawati, N.N. Histopatologis Insang Ikan Hias Air Laut yang Terinfestasi *Dactylogyrus* sp. *Jurnal Sains Veteriner (JSV)*, 2012; 30(1): 68-75
8. Efendi, Y. *Serial Biologi Perikanan: Sistem Organ Ikan*. Universitas Bung Hatta. Sumatera Barat, 2016.
9. Sari, R.E.R. *Perubahan Histopatologi Jaringan Kulit Ikan Komet (Carrasius auratus auratus) Akibat Infestasi Argulus japonicus.* Universitas Airlangga. Surabaya, 2014.

10. Wardhani, A.K. *Gambaran Histopatologi Kulit dan Insang Benih Ikan Lele (Clarias sp.) yang Terinfeksi Saprolegnia sp dan yang Telah Diobati dengan Ekstrak Daun Sirih (Piper Betle L.*). Universitas Airlangga. Surabaya, 2014.
11. Prasetyo, B.F. *Aktivitas dan Uji Stabilitas Sediaan Gel Ekstrak Batang Pisang Ambon (Musa paradisiaca var sapientum) dalam Proses Persembuhan Luka pada Mencit (Mus musculus albinus)*. Institut Pertanian Bogor. Bogor, 2008.
12. Lestari, P.I. *Pengaruh Paparan Asap Rokok terhadap Kadar Malondialdehid dan Kelainan Histopatologi Glandula Lakrimal Tikus Percobaan*. Universitas Andalas. Padang, 2022.
13. Priosoeryanto, B.P., Ersa, I.M., Handayani, S.U. Gambaran Histopatologi Insang, Usus dan Otot Ikan Mujair (*Oreochromis mossambicus*) yang Berasal dari Daerah Ciampea, Bogor. *Indonesia Journal of Veterinary Science & Medicine*, 2010; 11(1): 1-8.
14. Mora, L., Muttaqien, M., Zainuddin, Z., Salim, M.N., Winaruddin, W., Jalaluddin, M., Etriwati, E. Gambaran histopatologi insang ikan nila (*Oreochromis niloticus*) yang terpapar parasit *Dactylogyrus sp. Jurnal Ilmiah Mahasiswa Veteriner (JIMVET)*, 2022; 6 (3): 74-82