FISH WORM CAUSE ALLERGY

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Introduction

Indonesia is rich in various marine resources which are very abundant including fish. Fishery activities play a big role in meeting the needs of the Indonesian people. Fish is a food that contains high levels of protein which plays an important role in meeting human nutritional needs. Based on KKP data, the national life fish consumption rate in 34 provinces, which reached 55.95 kg / capita / year in 2019, will continue to increase in the future (KKP, 2019).

Fish are members of the class of vertebrates that inhabit all the waters of the world, be it fresh, brackish or salty waters. Fish life is also affected by parasites and creates a symbiosis of parasitism, in which the host will suffer losses, and the parasite will benefit from the host. Parasites can be divided into two groups based on their way of life, namely ectoparasites and endoparasites. Ectoparasites, for example from members of the arthropod class, for example mites and endoparasites, for example from members of the Platyhelminthes class, for example worms (Sains and Hartini, 1999). Parasitic infestations have a detrimental effect on the host. At a milder level, parasites disrupt the availability and dynamics of host resources, causing damage to the host's body and even death of the host. Parasites are one of the factors controlling the growth of the host population (Newey et al. 2005).

Fish and other marine products such as crab, shrimp, lobster, shellfish and oysters, mussels, octopus and squid as main food ingredients can trigger allergic reactions in the human body if not properly managed or consumed raw (Candra et al, 2011). An allergic reaction occurs when the immune system overreacts to seafood proteins, allergens or antigens.

Discussion

1. Fish as Food Material

Fish are members of the poikilothermic (cold-blooded) that live in water and breathe with gills. Fish are the most diverse group of vertebrates with more than 27 000 species worldwide. Taxonomically, fish are classified as a paraphyletic group whose relationship is still debated, usually fish are divided into jawless fish (Agnatha class, 75 species including lampreys and hag fish), and cartilaginous fish (Chondrichthyes class, 800 species including sharks and rays), and the rest are classified as hard-bony fish (Osteichthyes class). Fish can be found in almost all freshwater, brackish water and salt water at various depths, from near the surface to several thousand meters below the surface (Campbell et al. 2000).

Fish is a food source of protein which is very important for body growth. Fish contains 18% protein consisting of essential amino acids which are not damaged at the time of cooking. Fat content 1-20% fat that is easily digested and can be directly used by body tissues. The fat content is mostly unsaturated fatty acids which are needed for growth and can lower blood cholesterol. Fish is often referred to as food for intelligence. Fish meat has protein fibers shorter than beef or chicken protein fibers. Vitamins in fish, namely vitamins A, D, Thiamin, Riboflavin, and Niacin. Fish also contains minerals such as calcium, phosphorus. There are two groups of vitamins in fish: water soluble and oil soluble. The ones that dissolve in oil are vitamins A and D, which are fish oil which is good for brain development (Efendi and Yusra, 2010).

2. Parasites in Fish and Tissue Damage

A fish species will be influenced by members of other species in a certain habitat and create a symbiosis. One form of symbiosis between fish and members of other species is symbiosis of parasitism. Parasites are organisms that use other organisms of different types for shelter and for food. According to Irianto (2005), parasite attack is the result of mismatched interactions between environmental factors, fish conditions, and parasitic organisms. This mismatched interaction causes stress to the fish so that their defense mechanisms become weak and they die easily. Johnny and Roza (2006), stated that the parasites that attack fish consist of ectoparasites and endoparasites. Parasites that attack fish can damage the fish's body tissues.

Several cases of parasites that attack fish have been reported by Argulus sp attacking goldfish (Cyprinus caprio) causing hemorrhagic and melanomacrophages in the skin and fins (Rukmini, 2017), catfish infected by Aeromonas hydrophila causes damage to the kidneys in the form of inflammation of inflammatory cells , degeneration, and necrosis and in the liver in the form of degeneration, vacuolization and necrosis (Safratilofa, 2017), gill tissue infested with monogeneous trematode parasites is characterized by hyalin cartilage hyperplasia, mucus cell proliferation, secondary lamella hyperplasia, and secondary lamella fusion (Utami et al. 2017).

3. Parasite Prevalence and Intensity

Each type of parasite found in the host body can be calculated the prevalence value and the intensity of the infestation. Prevalence represents

percentage of parasite species infesting the host. Intensity is the degree of worm species infesting the host. Analysis of the prevalence and intensity of the infestation based on Setyobudi, (2011), namely;

Prevalensi jenis parasit = $\frac{Pi}{p} x100\%$

Intensitas parasit $I = \frac{p}{n}$ (parasit/inang)

Information:

I = Intensity of parasite infestation
n = Number of hosts infested
P = The number of parasites that infest
Pi = Number of parasites i infest

Table 1.Prevalence Value Categories (Williams and Williams, 1996)

Prevalence Value	Category
100-99 %	Always
98-90 %	Almost always
87-70 %	The usual
69-50 %	Moderate
49-30 %	Generally
29-10 %	Often
9-1 %	Sometimes
1-0,1 %	Rarely
0,1-0,01 %	Sangat jarang
< 0,01 %	Almost never

Table 2. Category Intensity Value (Williams and Williams, 1996)

Prevalence Value		Category
< 1	Parasitic / fish individuals	Inventaris very mild parasites
1-5	Parasitic / fish individuals	Light parasite inventory
6-50	Parasitic / fish individuals	Medium parasite inventory
51-100	Parasitic / fish individuals	Heavy parasite inventory
100+	Parasitic / fish individuals	The parasite inventory is very heavy
1000+	Parasitic / fish individuals	Super parasitic infection

4. Worms and Allergies Parasites

Fish as an important food product can trigger an allergic reaction. This allergic reaction can be triggered by an allergen or antigen. Allergy is a disorder of overreaction (hypersensitivity) of the body's immune system to specific substances (allergens) that cause tissue damage. Anaphylactic reactions occur when mast cells and basophils release histamine due to stimulation of worm allergens that are bound to immunoglobulin E (Ig E) and eosinophil cells. This high histamine will trigger anaphylactic reactions in skipjack tuna (Katsuwonus pelamis) consumers, so they can handle skipjack fish properly and consume it for consumers (Diba and Basir, 2020)

5. Endoparasitic worm infection in Skipjack tuna (Katsuwonus pelamis), tissue damage and mast cell distribution

Based on the results of research conducted by the author that one of the marine fish, namely skipjack tuna (Katsuwonus pelamis) can be infested by endoparasite worms with their prevalence and intensity values in the table (Diba and Rahman, 2018)

Table 3.Calculation Results of Prevalence of Skipjack tuna (Katsuwonus pelamis) endoparasitic worms

Number of samples	Number of infested fish (tail)		Prevalence (%)
30	12	18	50%

Table 3 shows that the prevalence of endoparasitic worms in skipjack tuna is 50% and in its general category. Endoparasitic worms that infest skipjack tuna are classified as low. This is due to the adaptability of parasites in the host's body, the suitability of the host for parasite survival and the quality of the environment. According to Velasque (1985), marine fish are relatively resistant to disease, this is because skipjack tuna are pelagic and active fish and are resistant to environmental changes.

Table 4.Calculation Results of Intensity of Skipjack tuna (Katsuwonus pelamis) endoparasitic worms

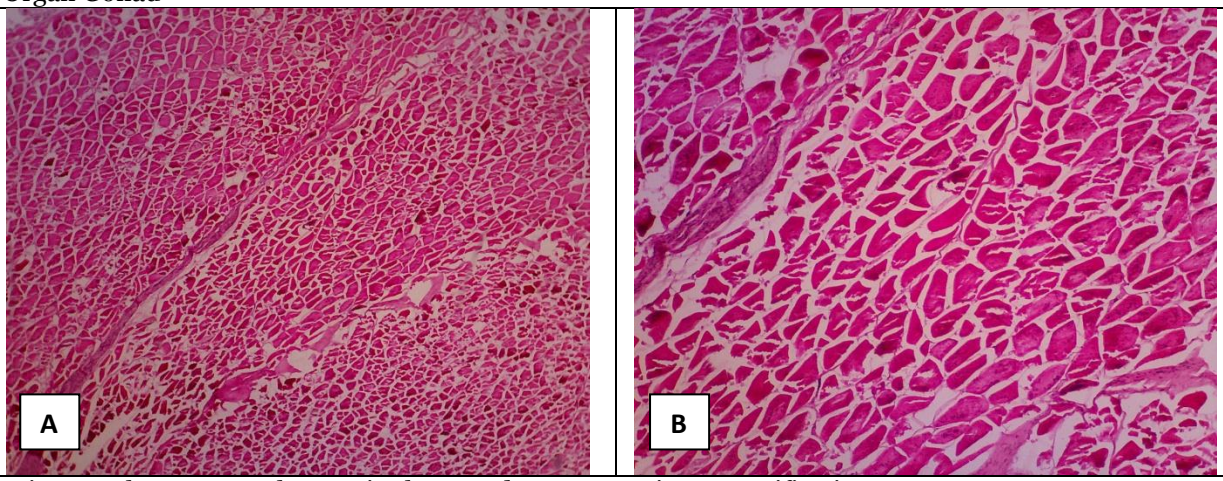
Types of Worms	Number of Worms	Intensity
Anisakis sp	98	8,2
Larva Anisakis	46	3,8
Inidentification species	18	1,5
amount		13,5

Table 4 shows the intensity of endoparasite worms in skipjack tuna of 13.5 and is included in the moderate inventory category. The level of parasite attack that is not able to kill the host (Tompo et al, 2009).

Endoparasitic worm infestation on the inside of the skipjack tuna can cause tissue damage. Tissue damage caused by worms in the form of inflammation, hemorrhage, and congestion in the liver, stomach and intestines of skipjack tuna (Diba and Rahman, 2018). Infestation of worms in the body of skipjack tuna can bully the active mast cells. Mast cells are distributed in gonads, gills, and fish hearts (Diba and Basir, 2020).

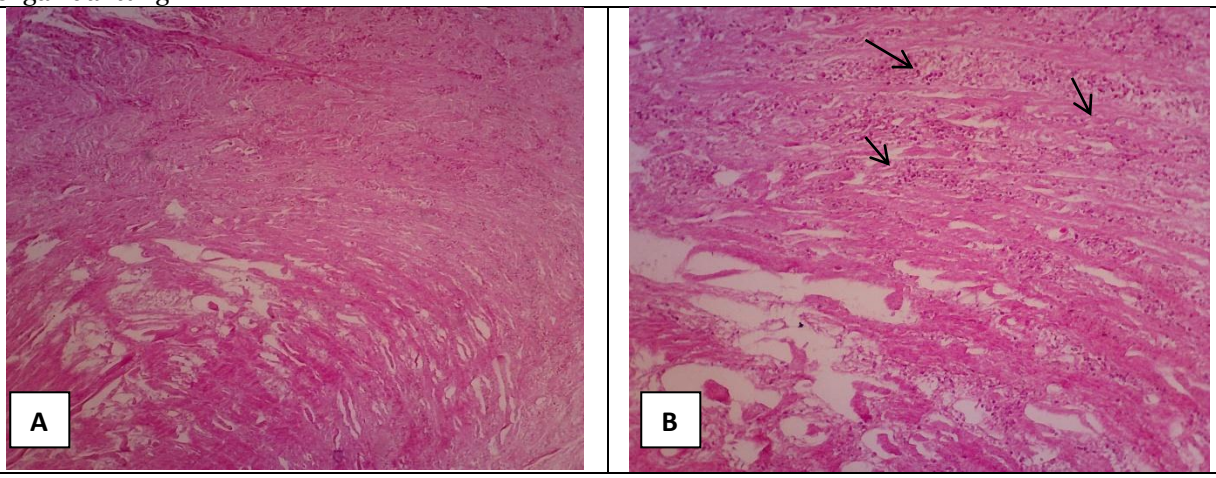
Tissue damage and distribution of mast cells can be seen in the following figure:

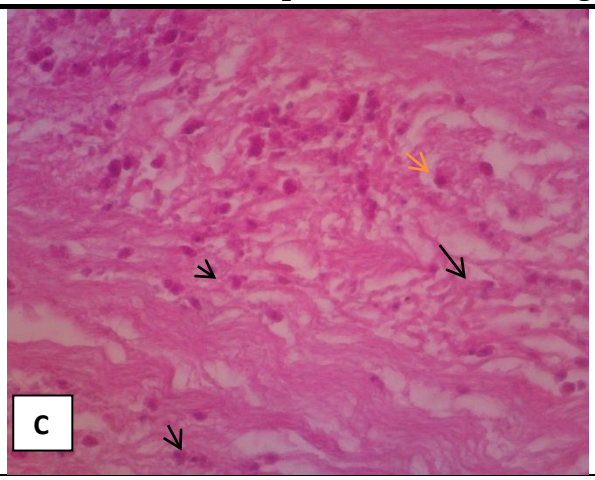
Organ Gonad



Picture. There are no changes in the gonads. Cross section. Magnification A: 40x, B: 100x, C: 400x. HE staining

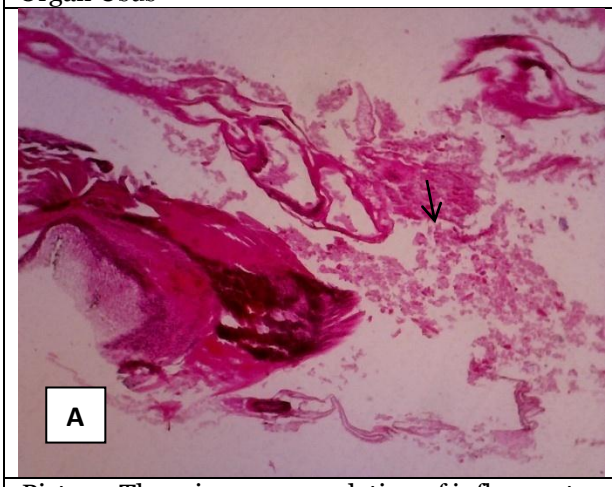
Organ Jantung

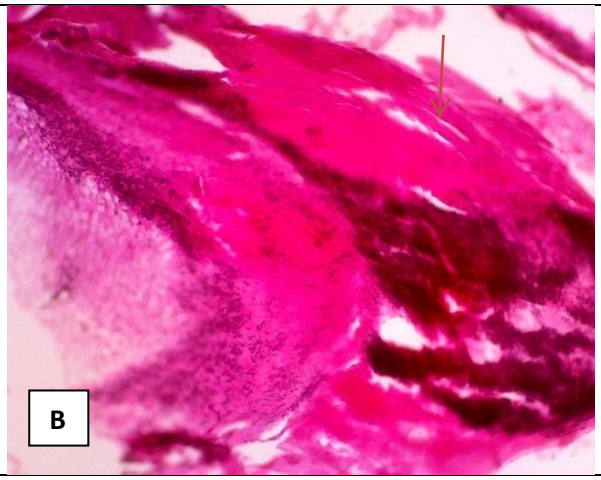




Picture. There is an accumulation of inflammatory cells around the tissue (black arrow), including Mast cells (orange arrow). In addition, mild hemorrhage is seen around the tissue, which is indicated by the presence of red blood cells (red arrows). Magnification A: 40x, B: 100x, C: 400x. HE staining

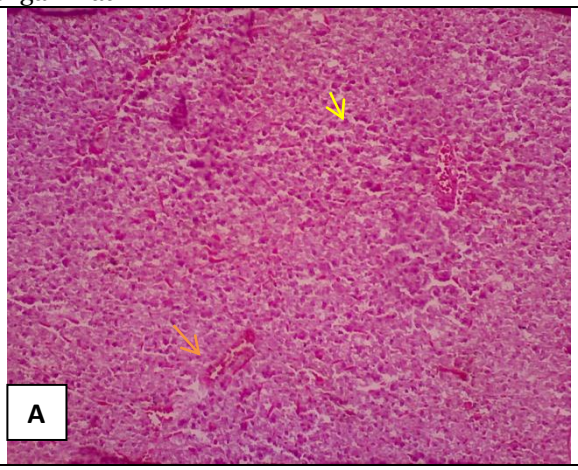
Organ Usus

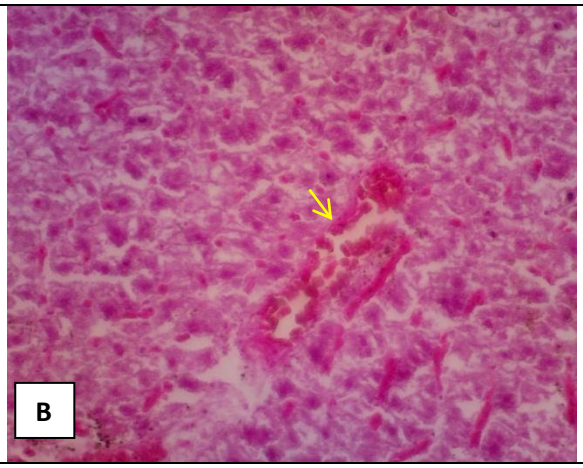




Picture. There is an accumulation of inflammatory cells (black arrows) and necrose (red arrows) around the intestines. Magnification A: 100x, B: 400x. HE staining

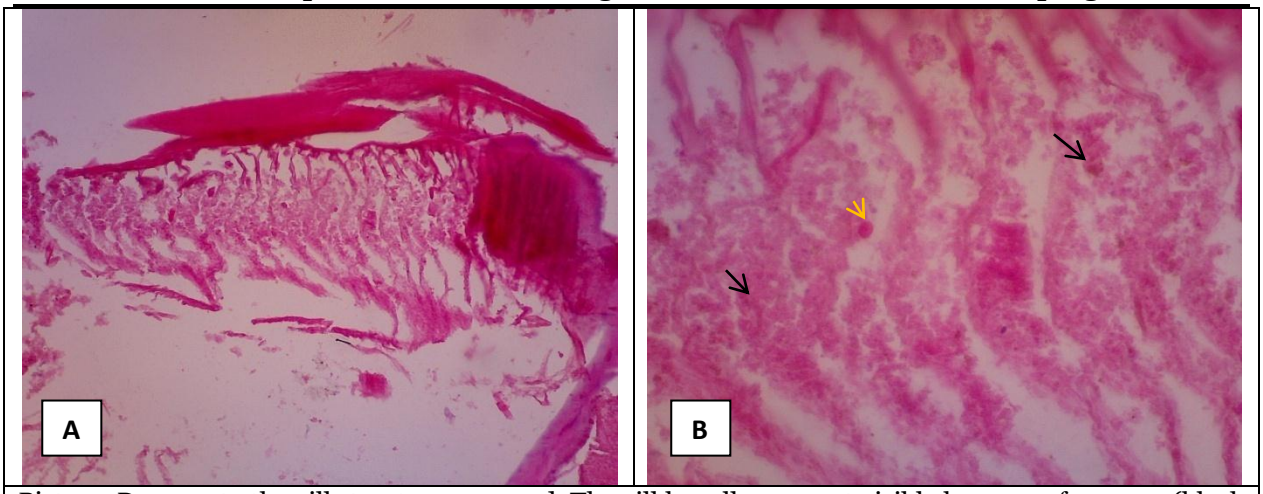
Organ Hati





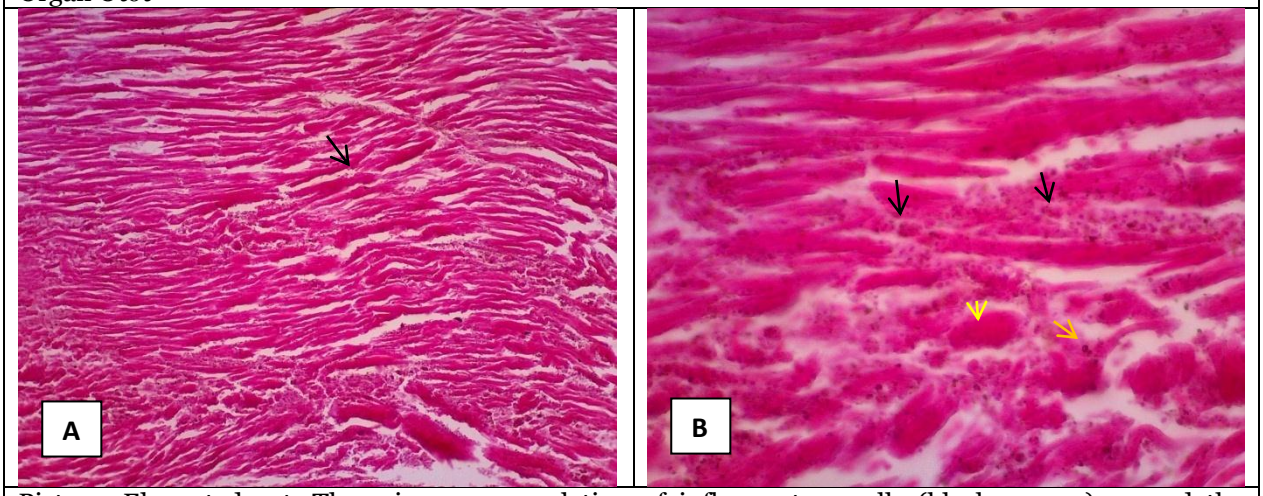
Picture. Inflammatory cell infiltration (blue arrow), congestion (yellow arrow) and hemorrhage (blue arrow) were seen. Magnification A: 100x, B: 400x, HE Staining

Organ Insang



Picture. Damage to the gill structure occurred. The gill lamellae are not visible because of necrose (black arrow). There was an accumulation of inflammatory cells including Mast cells (orange arrow) / A: 100x, B: 400x enlargement, HE staining.

Organ Otot



Picture. Elongated cut. There is an accumulation of inflammatory cells (black arrows) around the muscles and accumulation of hemosiderin (yellow arrow) due to hemorrhage. Also visible is the Mast cell (orange arrow). Magnification A: 100 x and B: 400x. HE staining

Source: Diba and Rahman, 2018, Diba and Basir, 2020

Conclusion

The life of fish as one of the main foodstuffs can be affected by parasites. Parasitic worms that infest the fish's body can cause tissue damage to the fish's organs. Parasitic worms can also act as allergens that trigger allergic reactions experienced by consumers after eating fish that is not properly managed or cooked.

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GLOSSARY

1. Allergy is a hypersensitivity response due to allergens or antigens
2. Basophils are granulocytes with a population of about 0.01-0.3% of the circulating white blood cells. Basophils play a role in allergic reactions
3. Worms are animals that usually have long tube-like bodies, have no limbs, are members of several invertebrate phyla, including Platyhelminthes (flatworms), Annelida (segmented worms), Nemertea (tapeworms), Nematodes (roundworms, pinworms) , Sipuncula (earthworms), Echiura (spoonworms), Acanthocephala (spiny-head worms), Pogonophora (beardworms), and Chaetognatha (arrowworms).
4. Ectoparasites are parasites that inhabit the outer body surfaces of the host
5. Endoparasites are parasites that inhabit the outer body surface of the host
6. Hypersensitivity is a pathological immune reaction, which occurs as a result of an excessive immune response that causes tissue damage
7. Histamine is a chemical that is produced by cells in the body when they experience an allergic reaction or infection
8. Histopathology is damage to body tissues
9. Fish are members of poikilothermic (cold-blooded) that live in water and breathe with their gills.
10. Parasites are organisms that live on other organisms and benefit from the organisms they feed on
11. Mast cells or mastocytes are cells that contain granules that are rich in histamine and heparin

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BIOGRAFI

Dewi Farah Diba, S.Si., M.Si was born in Ujungpandang, South Sulawesi Province, Indonesia on October 8, 1982. The first of 2 children from Drs. Daeng Idris, M.S and Ernina Dewi, S.Pd. Formal education is taken from SD. Inpres Campus Unhas I Makassar graduated in 1994, SMP Negeri 12 Makassar graduated in 1997, SMA Negeri 6 Makassar graduated in 2000. Undergraduate education (S1) was taken in the Biology Department, Faculty of Mathematics and Natural Sciences, Hasanuddin University graduated in 2005, and continued to the Masters level (S2) at The Department of Biology, Bogor Agricultural University graduated in 2009.

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