

Identification of Ectoparasites in Sharks at The Paotere Makassar Fish Landing Base

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Abstract

Sharks are predators in aquatic ecosystems that play a crucial role in maintaining the balance of the ecosystem. The existence of sharks has become a topic of discussion in fisheries institutions due to the increase in shark hunting activities, especially for consumption. Disease problems in sharks, especially those caused by parasites, can lead to a decline in shark quality and have a negative impact on human health. This study aims to identify ectoparasites found on sharks at the Paotere Makassar Fish Landing Base. The method of this study involves collecting 11 shark samples, including mucus on the surface of the shark skin and organ mucus from the gills, randomly from 5 species of sharks. Parasite examination was carried out in the laboratory by adding a physiological NaCl solution to the sample, which was then placed on a glass slide before identification under a microscope. The results of this study showed the presence of parasites, including *Trichodina* sp., *Chilodonella* sp., and *Anisakis* sp.

Keywords

Chilodonella, Ectoparasites, Protozoa, Sharks, Trichodina

Introduction

Fish is one source of animal protein derived from fishery products. The bioavailability of protein from fish ranges from 5-15% higher than that of vegetable protein sources (Andhikawati *et al.*, 2021). Shark is a type of fish that belongs to the *Elasmobranchii* subclass, which is a cartilaginous fish (Widiarto *et al.*, 2020). Sharks can be found in almost all Indonesian waters, including territorial waters, oceanic waters, and the Indonesian Exclusive Economic Zone (Kudadiri *et al.*, 2022). Sharks are apex predators in the food chain. If they are infected with many parasites, it could be an indicator of an imbalance in the marine ecosystem, including pollution or changes in ocean temperature. Although sharks are banned from consumption, they are still often caught as bycatch (Rachmawati *et al.*, 2021).

Indonesia is known for its rapid shark fishery, a group of cartilaginous fish that is experiencing relatively high exploitation in all waters of the world, including some in Southeast Asia (Pramesti *et al.*, 2023). Shark fish has a very high economic value. Almost all parts of the shark's body can be utilized as products with high selling value, such as meat, cartilage, skin, teeth, jaws, viscera (entrails), liver, and fins (Arisandi *et al.*, 2020).

Damaged body parts generally cause parasitic infections in fish, so other diseases, such as bacterial, fungal, and viral infections, will more easily attack and exacerbate infections in fish that have been infected with parasites. Additionally, consuming fish contaminated with zoonotic parasites can impact human health and lead to serious illnesses (Alimuuddin *et al.*, 2022). Parts of the fish body that are commonly found to harbor parasites include the gills, skin, and muscle

tissue, which can cause irritation and decrease fish quality (Daud *et al.*, 2024).

Parasites are animals or plants that reside in the body, gills, or mucus of their host and benefit from the host. In other words, parasites live at the expense of their host. Parasites can include crayfish, protozoa, worms, bacteria, viruses, and fungi. The benefits that parasites take are mainly food substances from their host. Parasites specifically affecting sharks are still limited, especially in the context of Indonesian waters; however, some studies have been conducted on certain marine fish species (Tatipata, 2023).

Based on their location of attachment, parasites can be divided into two categories: endoparasites and ectoparasites. Endoparasites are parasites that live in the cells of the host. Meso Parasites are parasites that live between ectoparasites and endoparasites. Meso Parasites can be found in the intestinal colon or other body cavities. Ectoparasites are parasites that live in the skin, gills, and outer surface of the body. Ectoparasite infestation is the result of a mismatched interaction between environmental factors, fish conditions, and parasitic organisms. This mismatched interaction causes stress to the fish, weakening its self-defense mechanisms and making it vulnerable to parasitic organisms, ultimately leading to a decrease in fish quality (Tatipata, 2023).

The cause of death of fish populations in ponds or other waters can be environmental stress or poisoning, microbial infections (viruses, bacteria, protozoa, and metazoan infections (*cestodes*, *nematodes*, *acanthocephala*, *crustaceans*, and *trematodes*)) (Bakri *et al.*, 2020). Fish infected with parasites exhibit physical changes, including weak swimming, decreased appetite, excessive mucus secretion,

and wounds on the gills resulting from parasite attachment (Harjuni *et al.*, 2023).

Therefore, through this paper, researchers aim to provide information related to the dangers posed by microorganisms, such as parasites, in sharks. Currently, the spread of disease can be attributed to various factors, and attacking the animal itself is a significant challenge to overcome. It is hoped that in the future, we can be more vigilant in consuming shark fish and prevent zoonoses. Additionally, research on the identification of parasites in shark fish at PPI Paotere Makassar has not been conducted. Therefore, this is the basis for researchers to identify endoparasites and ectoparasites in sharks found at PPI Paotere Makassar.

Materials and Methods

This study was conducted from March to April 2024. The research was conducted at the Laboratory of Medical Parasitology, Veterinary Medicine Study Program, Faculty of Medicine, Hasanuddin University.

Sampling was conducted twice, with the first sampling in March and the second in April, to enhance the accuracy of identification. Sampling of 11 samples was carried out due to the limited number of shark fishing, which was not in large numbers, as it is not an easy species to catch, and the short research time. Samples were taken through mucus on the surface of the shark's skin and on organ mucus in the form of gills randomly from 5 species of sharks that had died and were found at PPI Paotere Makassar. Sampling was performed by scraping with a knife or anatomical tweezers, and also involved cutting the gills of the fish using scissors. Samples are put into sample pots or plastic clips.

Samples taken from each section are placed on an object glass, dripped with physiological NaCl, covered with a cover glass, and then examined for parasites under a microscope.

Results and Discussion

There were 5 shark species found and landed at PPI Paotere Makassar (Table 1).

Table 1. Conservation status of shark species found at PPI Paotere Makassar

No.	Scientific Name	International Name	Conservation Status (IUCN Red List)
1	<i>Carcharhinus melanopterus</i>	Blacktip	Vulnerable
2	<i>Carcharhinus longimanus</i>	Whitetip	Critically endangered
3	<i>Rhizoprionodon acutus</i>	Milk Shark	Vulnerable
4	<i>Hemiscylliidae</i>	Bambo Shark	Vulnerable
5	<i>Carcharhinus amblyrhyncholos</i>	Greyreef Shark	Endangered

Table 2. Types and Number of Parasites in Sharks

No.	Type of Parasites	Prevalance		
		Skin Mucus	Gill Mucus	Gills
1	<i>Trichodina</i> sp.	1	-	-
2	<i>Chilodonella</i> sp.	1	1	-
3	<i>Anisakis</i> sp.	-	1	-
Total		2	2	-

From the results of the discovery of shark species and random sampling of sharks at PPI Paotere Makassar, not all results were found to have parasites. Of the 11 samples of skin and gill mucus taken randomly from 5 species of sharks, 3 species of parasites were identified, including worms and protozoa. The parasite species found were *Trichodina* sp., *Chilodonella*

sp., and *Anisakis* sp. The parasite *Trichodina* sp. was found in one shark in the mucus layer of the shark's skin. This *Chilodonella* sp., species was found in 2 sharks in the skin mucus and gill mucus of sharks. Meanwhile, *Anisakis* sp. was found in 1 shark in the mucus of the gill organ (Table 2).

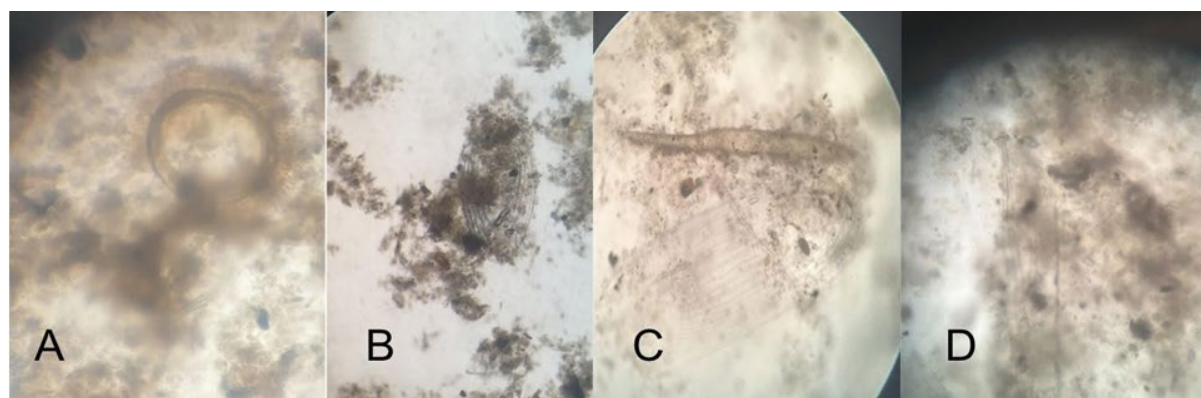


Figure 1. Identification of shark samples under a microscope (A) *Trichodina* sp.; (B,C) *Chilodonella* sp.; (D) *Anisakis* sp.

This study has limitations due to the use of fresh shark samples obtained at PPI Paotere Makassar, where sampling was conducted on sharks that had died and were placed on dirty floors, potentially allowing for contamination. This can affect the discovery of parasites in sharks that look less than perfect under a microscope. From the results of the microscope examination, parasitic species in the form of worms and protozoa were identified, belonging to the ectoparasite group, including *Trichodina* sp., *Chilodonella* sp., and *Anisakis* sp. ***Trichodina* sp.**

Trichodina sp. is a protozoan that belongs to the family *Trichodinidae*, order *Mobilina*, genus *Caliperia*, subclass *Peritrichia*, class *Oligohymenophorea*, a phylum *Ciliophora* (Nurcahyo, 2018). This pathogenic ectoparasite, belonging to the ciliate group,

generally attacks freshwater and marine fish. This ectoparasite is approximately 50 nm in size, round in shape, with bell-shaped lateral sides, and features a ring of denticles for attachment. It also has cilia surrounding its body (Rokhmani *et al.*, 2021). In general, *Trichodina* sp. prefer to infect body surfaces, such as the skin, fins, and gills, of fish. *Trichodina* sp. can cause a disease called *Trichodiniasis* (Koniyo *et al.*, 2020). Fish attacked by *Trichodina* sp. are characterized by the presence of grayish-white spots and increased mucus production. The high intensity of *Trichodina* sp. attacks is due to this parasite reproducing quickly. *Trichodina* sp. attacks with high intensity can cause hyperplasia and damage to the gill structure, making it easier for secondary diseases to occur that attack the skin and gills, which in

turn can cause the fish to have difficulty breathing and ultimately lead to death. *Trichodina* sp. infects by attaching to the epithelial layer of the fish with the help of a hook, which is a sharp membrane tip. This hook rotates so that it can damage the cells around the place where it attaches. Then, *Trichodina* sp. feeds on damaged epithelial cells, causing severe irritation (Supu *et al.*, 2020). *Trichodina* sp. acts not as a primary (main) parasite, but as a secondary parasite. *Trichodina* sp. infection is not zoonotic in humans, as it is limited to infecting its host, namely fish (Farlizah *et al.*, 2023).

***Chilodonella* sp.**

Chilodonella sp. is a protozoan parasite characterized by a size of 80 µm, a dorsoventrally oval and flat shape, a dorsal convex surface, cilia, and a unicellular or eukaryotic colony lifestyle. Cilia do not cover the convex side of the body except on the ventral surface (Koniyo *et al.*, 2020; Alemneh *et al.*, 2024). This parasite generally attacks commodities that live in free waters and forms a cosmopolitan distribution. *Chilodonella* is an opportunistic parasite that invades the skin and gill surfaces as an ectoparasite (Rebhung *et al.*, 2023). Many cases of infestation are found in various aquatic/marine locations (Hardi, 2015). This ectoparasite moves freely using cilia on its body surface. This parasite does not have a specific host and causes lesions in infected hosts; therefore, *Chilodonella* sp. is not zoonotic in humans, but only infects its natural host, fish. In fish infected with chilodonelliasis, it causes damage to the skin and secretes excess mucus. The most obvious clinical sign is skin abrasion (Sari *et al.*, 2024).

***Anisakis* sp.**

Anisakis sp. is a common type of parasitic worm found in marine fish, including sharks.

Many have been reported to be infected by the larvae of these worms. *Anisakis* sp., often inhabits the marine environment and can be transmitted through teleost fish and cephalopods, making it possible for sharks to carry this parasite as well (Siagian and Maryanti, 2020; Preti *et al.*, 2020). Larvae of *Anisakis* sp. in fish can reduce fish quality and pose a health hazard to consumers. *Anisakis* is characterized by its cylindrical shape, slender body, and lack of segments. The body is covered by a thick and transparent cuticle (Ayun *et al.*, 2021; Labhu *et al.*, 2022). Research conducted on *Anisakis* sp., found in fish gills, is in accordance with a study by Yusni and Handayani (2022), which found *Anisakis* sp. in fish gills with a prevalence of 3.33%. *Anisakis* sp. is a zoonotic parasite that affects humans. Unripe or undercooked fish infected with *Anisakis*, when consumed by humans, can cause allergic reactions, digestive tract disorders (including diarrhea), abdominal pain, and vomiting (Febrina *et al.*, 2020).

Conclusion

Ectoparasite species found on sharks obtained randomly at PPI Paotere include *Trichodina* sp., *Chilodonella* sp., and *Anisakis* sp., which belong to the class of ectoparasites that infect shark skin and gill organ mucus. There is a possibility of pathogenic microorganisms in the bodies of sharks, one of which is a parasite that requires attention because it can be detrimental to the animal itself and is zoonotic to humans, such as *Anisakis* sp. Research can be further developed with more systematic and accurate data collection.

Approval of Ethical Commission

This study did not require the use of a code of ethics because the fishermen caught the

fish used, and they were already dead when obtained. The slime sampling process was conducted directly at the fishing site by the researcher, as the fish were intended to be sold, not bought or taken home for research purposes. Therefore, there was no direct impact on the survival of the fish used in this study.

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Author's Contribution

WWT, MASM, and AS: Responsible for collecting samples, analyzing them in the laboratory, and compiling the research writing. MAN: Responsible for analyzing the research sample results.

Conflict of Interest

Samples used from sharks that fishermen have caught, the results of microscope examinations that look dirty, making it difficult to identify parasites.

Data Availability Statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request. The dataset can be accessed by contacting the author via repository email.

References

- Alemneh, T., Alehegn, A., Maru, G., Alemayehu, H., Fente, M., Agegnehu, M., and Maru, M., 2024. Major Ectoparasitic Protozoa of Fish and Other Aquatic Animals: With Particular Emphasis on Morphology, Biology, Epidemiology, Pathology, Diagnosis, Prevention and Control. *Journal of Veterinary Medicine and Research*, 11(1), pp.1-8. DOI: <https://doi.org/10.47739/2378-931X.veterinarymedicine.1262>
- Alimuddin, Yusuf, A., Nursidi, and Mulyati, 2022. Identifikasi Ektoparasit Pada Ikan Nila (*Oreochromis niloticus*) di Kolam Pembesaran Ikan Air Tawar Politani Pangkep. *Prosiding Semnas Politani Pangkep*, 3(1), pp. 130-137.
- Andhikawati, A., Junianto, Permana, R., and Oktavia, Y., 2021. Review: Komposisi Gizi Ikan Terhadap Kesehatan Tubuh Manusia. *Marinade*, 4(2), pp.76-84. DOI: <https://doi.org/10.31629/marinade.v4i02.3871>
- Arisandi., I.N., A., and N.L.G., S., 2020. Komposisi Ukuran dan Jenis Kelamin Ikan Hiu Karang Sirip Hitam (*Carcharhinus melanopterus*) Komoditas Ekspor Bali. *Widya Biologi*, 11(1), pp.52-59. DOI: <https://doi.org/10.32795/widyabiologi.v11i01.570>
- Ayun, N.S., Septiana Dewi, L., Murwantoko, and Setyobudi, E., 2021. The occurrence of Anisakis larvae on hairtail, *Trichiurus lepturus* caught from the Pangandaran Waters, West Java, Indonesia. *Biodiversitas Journal of Biological Diversity*, 22(3), pp.1-6. DOI: <https://doi.org/10.13057/biodiv/d220339>
- Bakri, M., Muharrir Asy'ari, I., Eliawardani, Hambal, M., Winaruddin, Darmawi, Azhari, and Novita, A., 2020. Identification

- of Parasites on the Shark Fish (*Selachimorpha*) in Peunayong Fish Market Banda Aceh City. *Jurnal Medika Veterinaria*, 14(2), pp.147-150. DOI: <https://doi.org/10.21157/j.med.vet.v14i2.4480>
- Daud, D.F.S., Juliana, and Mulis, 2024. Identifikasi dan Prevalensi Ektoparasit pada Benih Ikan Nila (*Oreochromis Niloticus*). *Jurnal Ilmiah Perikanan dan Kelautan*, 12(3), pp.117-126.
- Farlizah, T., Putriningtias, A., and Komariyah, S., 2023. Identifikasi dan Prevalensi Ektoparasit Pada Ikan Bandeng (*Chanos chanos*) serta Kaitannya Terhadap Lingkungan di Tambak Gamping Bayuen, Aceh Timur. *Journal Agroqua: Media Informasi Agronomi Dan Budidaya Perairan*, 21(2), pp.436-446. DOI: <https://doi.org/10.32663/ja.v21i2.4022>
- Febrina, M., Faizal Ulkhaq, M., Widyadi, H., Setia Budi, D., and Suciyo, 2020. Karakterisasi parasit pada komoditas perikanan di Balai Karantina Ikan, Pengendalian Mutu, dan Keamanan Hasil Perikanan Semarang, Jawa Tengah. *Depik*, 9(3), pp.510-515. DOI: <https://doi.org/10.13170/depik.9.3.17693>
- Hardi, E.H. 2015. *Parasit Biota Akuatik*. Mulawarman University Press. Samarinda
- Harjuni, F., Wulanda, Y., Sarumaha, H., Ramdhani, F., Hermala Yunita, L., and Latiful Khobir, M., 2023. Identifikasi Parasit yang Menginfeksi Benih Ikan Kerapu Macan (*Epinephelus fuscoguttatus*) di Keramba Jaring Apung (KJA). *Journal of Indonesian Tropical Fisheries (JOINT-FISH): Jurnal Akuakultur, Teknologi Dan Manajemen Perikanan Tangkap Dan Ilmu Kelautan*, 6(1), pp.35-43. DOI: <https://doi.org/10.33096/joint-fish.v6i1.150>
- Koniyo, Y., Juliana, Pasingi, N., and Kalalu, D., 2020. The Level of Parasitic Infection and Growth of Red Tilapia (*Oreochromis* sp.) Fed With Vegetable Fern (*Diplazium esculentum*) Flour. *AACL Bioflux*, 13(5), pp.2421-2430.
- Kudadiri, R., Najmi, N., and Fajri, I., 2022. Pendataan Pendaratan Ikan Hiu di Pangkalan Pendaratan Ikan (PPI) Rigaih Kabupaten Aceh Jaya. *Journal of Aceh Aquatic Sciences*, 6(1), pp.11-21. DOI: <https://doi.org/10.35308/jaas.v6i1.5418>
- Labhu, V.J., Agustiani Wuri, D., and Winarso, A., 2022. Prevalensi dan Derajat Infeksi Parasit *Anisakis* sp. pada ikan tongkol lisong (*Auxis rochei*) di Perairan Kota Ende. *Jurnal Veteriner Nusantara*, 35(5), pp.1-5. DOI: <https://doi.org/10.35508/jvn.v5i1.6796>
- Nurchayyo, W. 2018. *Parasit Pada Ikan*. Gadjah Mada University Press. Yogyakarta.
- Pramesti, D.N., Khan, A.M.A., Paradhita Dewanti, L., and Rudyansyah Ismail, M., 2023. Aspek Biologi Ikan Hiu yang Didaratkan di Pangkalan Pendaratan Ikan (PPI) Karangsong, Kabupaten Indramayu, Jawa Barat. *Acta Aquatica: Aquatic Sciences Journal*, 10(2), pp.102-110. DOI: <https://doi.org/10.29103/aa.v10i2.10353>
- Preti, A., MacKenie, K., Spivey, K.A., Noble, L.R., Jones, C.S., Appy, R.G., and Pierce, G.J., 2020. Spiral Valve Parasites of Blue and Common Thresher Sharks as Indicators of Shark Feeding Behaviour and Ecology. *Journal of Fish Biology*, 97(2), pp.354-361. DOI: <https://doi.org/10.1111/jfb.14363>
- Rebhung, F., Dahoklory, N., Djonu, A., and Pasaribu, W., 2023. Prevalence of Parasite in Crustacean at Panmuti Beach, Kupang Regency. *Saintek Perikanan: Indonesian*

- Journal of Fisheries Science and Technology*, 19(3), pp.159-163.
- Rokhmani, R., Joko Wahyono, D., and Mulyani, L., 2021. Detection Moleculer of Putative 18S rRNA Gen Protozoa *Trichodina* sp. Infected Larvae Gurami (*Osphronemus gouramy* L) in Balai Benih Ikan Kutasari Purbalingga Central Java. *BioEksakta: Jurnal Ilmiah Biologi Unsoed*, 3(1), pp.26-32. DOI: <https://doi.org/10.20884/1.bioe.2020.2.3.3924>
- Sari, A.P., Koesdarto, S., Damayanti Lestari, T., Hastutiek, P., Yunus, M., Bimo Aksono Herupradoto, E., Rafif Khairullah, A., Rani Ayuti, S., Hasib, A., Aryaloka, S., and Benjamin Moses, I., 2024. Prevalence of Ectoparasites in Tilapia (*Oreochromis niloticus*) in Sidoarjo, Indonesia. *Jurnal Medik Veteriner*, 7(2), pp.370-381. DOI: <https://doi.org/10.20473/jmv.vol7.iss2.2024.370-381>
- Siagian, F.E., and Maryanti, E., 2020. Anisakiasis Pada Ikan Laut Di Indonesia: Prevalensi, Sebaran dan Potensi Patogenitasnya Pada Manusia. *Jurnal Ilmu Kedokteran (Journal of Medical Science)*, 14(1), pp:11 DOI: <https://doi.org/10.26891/JIK.v14i1.2020.11-23>
- Supu, Z.Y., Juliana, and Mulis, 2020. Effect of Different Doses of Mangrove Leaf Juice on the Survival of Tilapia Seeds Infected with Parasite *Trichodina* sp. *Jurnal Ilmiah Perikanan Dan Kelautan*, 8(4), pp.74-78.
- Tatipata, K.P.B., 2023. Identifikasi Ektoparasit Pada Ikan Patin (*Pagasius* sp.) Di Unit Pembenihan Rakyat (UPR) Yosua Distrik Sentani Kabupaten Jayapura. *Jurnal Pertanian Terpadu Santo Thomas Aquinas*, 2(2), pp.1-5.
- Widiarto, S.B., Wahyudin, I., Sombo, H., Muttaqin, A.S., Prehadi, Tabalessy, R.R, and Masengi, M., 2020. Populasi Hiu Berjalan, Kalabia (*Hemiscyllium freycineti*) di Perairan Misool, Kabupaten Raja Ampat. *Aquatic Science and Management*, 8(1), pp.15-20. DOI: <https://doi.org/10.35800/jasm.8.1.2020.30597>
- Yusni, E., and Syafrida Handayani, L., 2022. Detection parasites of Indian Mackerel (*Rastrelliger kanagurta*) in North Sumatera, Indonesia. *Depik*, 11(3), pp.1-3. DOI: <https://doi.org/10.13170/depik.11.3.26814>