

# A Major Parasites of Freshwater Fishes in India, Their Control and Management Strategies.

DIKSHA UDHAV GALTE<sup>1</sup>, DR. ASHOK. D. LAKHE<sup>2</sup>

<sup>1,2</sup> *Department of Zoology Arts, Commerce and Science College, Kille-Dharur, Dist- Beed -431 124 (M.S), India.*

**Abstract-** *Parasitic infections pose a significant challenge to freshwater fishes in India and the world wide, impacting their health, growth, and survival. In India, freshwater fishes are affected by various types of parasites, such as Protozoa, Helminths (Worms), Crustaceans and Myxozoa which causes severe type of damage which ultimately leads to decreased health and quality of the fishes. Parasitic infection can have significant impacts on both the aquaculture industry and local communities that rely on fish for nutrition and income. The prevalence of these parasites varies with environmental conditions, fish species, and regional factors. This study is crucial for maintaining the health of aquatic ecosystems, sustainability of both natural fish populations and aquaculture operations, the viability of the aquaculture industry, and the nutritional security of communities that rely on fish as a food source.*

**Index Terms-** *Parasites, aquaculture, sustainability, IPM.*

## I. INTRODUCTION

The fishes (Phylum: Chordata) are the most diversified group of aquatic organisms known as cold-blooded vertebrates. Fish is considered as an important part of human food and playing a significant role in the economy of various states worldwide. There are around 28,900 species of fish present in the world (Leveque *et al.*, 2008). Indian water provides habitats for nearly 2500 species from which 930 are freshwater fishes. They are the major and cheapest source of animal protein and are a good source of essential

amino acids (Tober, 1990) as well as other dietary supplements. According to nutritionists fish is an excellent substitute for red meat as protein source. Fish flesh contains all the essential amino acids and minerals such as iodine, phosphorus, potassium, iron, copper and vitamin A and D in desirable concentration. Because of its low carbohydrate and unsaturated fat content, it forms a healthy diet. Omega-3 fatty acids in the fish oil fights inflammations in blood vessels. Fish oil helps to stabilize fatty deposits or plaques to build up on artery walls, thereby preventing heart attack. Omega-3 fatty acids in fish prevent inflammation, keep joints supple and alleviate arthritis. So the inclusion of fish in the diet can make a valuable contribution to any diet which mainly contains cereals, starchy roots and sugar (Sandhu, 2005). Fishing and Fisheries contribute to more than any other animal production activity in most of the countries of the world. Freshwater fishes in India are affected by majorly four types of parasites which are Protozoa, Helminths (Worms), Crustaceans and Myxozoa which causes severe type of damages. several species of protozoa causes various types of damage such as *Ichthyophthirius multifiliis*, can cause the gill damage, respiratory distress, and ultimately, death if untreated, *Trichodina spp.* reduce oxygen uptake, stunted growth, and increased susceptibility to secondary infections, And *Cryptocaryon irritans* Can induce high mortality rates due to severe respiratory distress and systemic infections. Helminths family

includes, Platyhelminthes (Flatworms) which is having major class such as Trematoda (Flukes), Cestoda (Tapeworms) and Nematoda (Roundworms) which also consist of different sub-classes which consist of major parasitic species of fresh water fishes. Crustaceans are a diverse group of arthropods that include various families across several orders, and have adverse effect on the fishes. Myxozoa is a class of parasitic cnidarians can cause various diseases such as Myxobolosis, Which shows the Symptoms like swelling, skin lesions, and internal cysts which ultimately results in severe organ damage, including liver and kidney dysfunction, leading to high mortality rates and reduced fish health. Dogiel's reviews laid the foundation for the study of the ecology of fish parasites. After that many investigators like Bauer and Stolyarov (1961) and Pugachev (1983) continued to concentrate on parasitocoenosis whereas, some workers have shifted their work on population dynamics (Chubb, 1964a; b; Anderson, 1974; 1978; Kennedy, 1977; 1985) and biology of fish parasites (Mackiewicz, 1981; Belghyti et al., 1994), Approximately, 50% of fish diseases particularly of freshwater fishes are caused by different parasites (Rogers, 1978).

## II. SUMMARY OF OVERALL IMPACTS OF PARASITES ON FRESHWATER FISHES

- Health Deterioration: Parasites interfere with the immune system and general health of fish, making them more susceptible to other diseases.
- Growth and Development: Nutrient absorption and growth are impaired, leading to stunted growth and development as well as it reduces the reproductive success.

- Increased Mortality: Severe infestations can lead to high mortality rates, affecting both wild populations and aquaculture stocks.
- Economic Losses: Parasite infestations lead to increased costs for treatment and management of Fisheries, it reduces the market value of fishes, which ultimately results in financial losses.
- Food Security and Ecosystem Stability: Declines in fish populations due to parasitic infections can impact food security and disrupt aquatic ecosystems.

As a result of parasitic infection or attack the overall health and quality to the fishes has been affected. Thus we can say parasitic infection have significant impacts on both the aquaculture industry as well as the local communities that rely on fish for nutrition and income. Hence a detailed study on such issue is crucial for maintaining the health of aquatic ecosystems, the viability of the aquaculture industry, and the nutritional security of communities. Effective management and treatment strategies are crucial to mitigate these impacts.

## III. PREVALENCE AND CONTROL OF PARASITIC INFECTIONS IN FRESHWATER FISHES

Prevalence: The prevalence of these parasites varies with environmental conditions, fish species, and geographic location etc. Protozoan and monogenean infections are commonly observed in aquaculture systems due to higher fish densities. Some species are more susceptible to specific helminths due to their habitat preferences and biological characteristics. Prevalence rates may range from 10% to over 60% in heavily infected populations.

#### Prevalence Rates:

- **Geographic Variation:** Prevalence varies by region, species of fish, and environmental conditions. In some areas, up to 60% of fishes may be affected.
- **Seasonal Variation:** Parasite prevalence can fluctuate with seasons, often increasing in warmer months due to higher parasite activity and stress on fishes.

#### Risk Factors:

- **Environmental Conditions:** Poor water quality, high stocking densities, and temperature changes can increase susceptibility to parasitic infections.
- **Species-Specific Susceptibility:** Some fish species are more prone to certain parasites based on their biological and ecological characteristics.

### IV. CONTROL AND MANAGEMENT

#### Preventive Measures:

- **Water Quality Management:** Regular monitoring and maintenance of water quality parameters such as pH, temperature, and oxygen levels to prevent conditions that favor parasite proliferation.
- **Quarantine Practices:** New fishes should be quarantined and examined for parasites before introducing them to established populations.
- **Hygiene:** Regular cleaning and disinfection of aquaculture systems and equipment to reduce the risk of parasitic transmission.

#### CHEMICAL AND BIOLOGICAL CONTROL:

- **Ant-parasitic Treatments:** Use of medications such as formalin, copper sulfate, praziquantel, and

ivermectin to treat infections. These should be used as directed to avoid resistance and environmental harm.

- **Biological Control:** Utilizing natural predators or biological agents that target parasites such as introducing certain species of fish that feed on parasites can help control their populations.

#### INTEGRATED PEST MANAGEMENT (IPM):

- **Combination of Methods:** An IPM approach integrates multiple control methods, including preventive measures, chemical treatments, and biological controls, tailored to the specific parasitic threat.
- **Monitoring and Surveillance:** Regular health checks, parasitological surveys, and early detection systems to identify and manage infections before they become widespread.

#### ENVIRONMENTAL AND MANAGEMENT PRACTICES

- **Stocking Density Management:** Avoiding overcrowding to reduce stress and the spread of parasites.
- **Habitat Enrichment:** Providing a suitable environment for fishes that reduces stress and supports their immune system.

#### EDUCATION AND TRAINING:

- **Farmer Training:** Educating fish farmers and aquaculture practitioners on parasite management, signs of infection, and best practices for prevention and control.

- Research and Development: Investing in research to develop new control methods, treatments, and resistant fish strains.

### CONCLUSION

Parasitic infections in freshwater fishes can be managed more effectively by applying multiple strategies such as regular monitoring, good management practices, and timely intervention are key to maintaining the health of freshwater fishes.

### REFERENCES

- [1] Anderson, R.M. (1974). Population dynamics of the Cestode *Caryophyllaeus laticeps* (Pallas, 1781) in the bream, *Abramis brama* L. *J. Anim. Ecol.* 43: 305-321.
- [2] Anderson, R.M. (1978). The regulation of host population growth by parasitic species. *Parasitology* 76: 119-157.
- [3] Bauer, O.N. and Stolyarov, V.P. (1961). Formation of the parasite fauna and parasitic diseases of fish in hydro-electric reservoirs. In: *Parasitology of Fishes* (Eds. Dogiel, V.A., Petrushevski, G.K. and Polyanski, Yu.I.) pp. 246-254, Oliver and Byod, London.
- [4] Belghyti, D., Berrada-Rkhami, O., Boy, V., Aguesse, P. and Gabrion, C. (1994). Population biology of two helminth parasites of flatfishes from the Atlantic coast of Morocco. *J. Fish Biol.* 44: 1005-1021.
- [5] Chubb, J.C. (1964a). Observations on the occurrence of the plerocercoids of *Triaenophorus nodulosus* (Pallas, 1781) (Cestoda: Pseudophyllidea) in the perch *Perca fluviatilis* L. of Llyn Tegid. (Bala Lake), Merionethshire. *Parasitology* 54: 481-491.
- [6] Chubb, J.C. (1964b). Occurrence of *Echinorhynchus clavula* (Dujardin, 1845) nee Hamann, 1892 (Acanthocephala) in the fish of Llyn Tegid. (Bala Lake), Merionethshire. *J. Parasitol.* 50: 52-59.
- [7] Chubb, J.C. (1980). Seasonal occurrence of helminths in freshwater fishes Part III. Larval Cestoda and Nematoda. *Adv. Parasitol.* 18: 1-120.
- [8] Chubb, J.C. (1982). Seasonal occurrence of helminths in freshwater fishes Part IV. Adult Cestoda, Nematoda & Acanthocephala. *Adv. Parasitol.* 20: 1-292.
- [9] Dogiel, V.A. (1958). Ecology of the parasites of freshwater fishes. In: *Parasitology of Fishes* (Eds. Dogiel, V.A., Petrushevski, G.K. and Polyanski, Yu.I.) pp. 1-47. Oliver and Byod, London.
- [10] Dogiel, V.A. (1961). Ecology of the parasites of freshwater fishes. In: *Parasitology of Fishes* (Eds. Dogiel, V.A., Petrushevski, G.K. and Polyanski, Yu.I.) pp. 1-47. Oliver and Byod, London.
- [11] Kennedy, C.R. (1977). The regulation of fish parasite populations. In: *Regulation of Parasite Populations*. (Ed. Esch, G.W.) pp. 63-109. Academic Press, New York.
- [12] Kennedy, C.R. (1985). Interactions of fish and parasite populations: to perpetuate or pioneer? In: *Ecology and Genetics of Host-Parasite Interactions* (Eds. Rollinson, D. and Anderson, R.M.) pp. 1-20. Linnean Society Symposium Series 11, Academic Press London.
- [13] Mackiewicz, J.S. (1981). Caryophyllidea (Cestoidea): evolution and classification. *Adv. Parasitol.* 19: 139-206.
- [14] Pugachev, O.N. (1983). Helminths of freshwater fishes of Northeast Asia. *Tr. Zool. Inst. Akad. Nauk. CSSR Leningrad.* 181: 90-113.
- [15] Rogers W. A. (1978). Parasitic diseases of freshwater fishes. *Marine Fisheries Review*, 40 (3): 56-57.
- [16] Sandhu GS (2005) A Text book of Fish and Fisheries. Dominant Publishers and Distributors, New Delhi, pp.39 - 40.
- [17] Tober JG (1990) the fishing industry in Nigeria status and potential for self-sufficiency in fish production. NIOMR Technical paper no. 54.