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Seasonal Helminth Infection in Fishes Correlate with Temperature and Dissolved Oxygen in Narmada River, Dindori (M.P.), India

Dr. Bilquees J Khan [1] EPCO Scientist, MP

Anupriya Karode [2], Research scholar, SAM Global University, Bhopal

Abstract

Helminth parasites are found in freshwater environments across the globe, including rivers, lakes, ponds and wetlands. The distribution of helminths is influenced by factors such as climate, water quality, host availability, and the presence of intermediate hosts or vectors. Climate plays a significant role in determining the distribution and prevalence of helminth infections. Prevalence of helminth infection in fishes shows strong, very strong and very weak correlation with temperature and dissolved oxygen according to seasons.

Key Words- Helminth, Dindori, Prevalence, Narmada river

Introduction

Freshwater ecosystem are home to a diverse array of fish species, many of which are threatened or endangered. Helminths parasites can impact the health and survival of endangered or vulnerable fish species. By studying helminth infection in freshwater fishes, researchers can contribute to the conservation and management efforts aimed at protecting these vulnerable species and maintaining overall ecosystem health. Studying helminths parasites in freshwater fishes is essential for assessing fish health, managing fisheries, understanding ecological interaction, safeguarding public health and promoting conservation efforts. Helminth parasites are found in freshwater environments across the globe, including rivers, lakes, ponds and wetlands. The distribution of helminths is influenced by factors such as climate, water quality, host availability, and the presence of intermediate hosts or vectors. Different regions may have unique helminth fauna due to variations in environmental conditions and host species composition. Understanding the diversity and distribution of helminth parasites in freshwater fishes is crucial for assessing ecosystem health, managing fisheries, and developing effective control strategies.

Water conditions such as pH, oxygen levels, and pollution levels can also impact the presence and abundance of helminth parasites in freshwater environments. The prevalence of helminth infections in freshwater fish can exhibit seasonal and annual variations. Factors such as temperature fluctuations, water

flow, and breeding patterns of intermediate hosts can influence the timing and intensity of infection. Certain parasite species may have peak prevalence during specific seasons or years.

Methodology

Water samples and fishes collected during analysis for physicochemical parameters like water temperature and dissolved oxygen from Narmada River Dindori of MP., for seasonal studied rainy, winter and summer. The collected samples will be analyzed according to APHA (2012). The sample site selected was Dindori city (M.P.) from four selected locations, i.e., S1 (Sati ghat dharamshala), S2 (Dam ghat near stop dam), S3 (Jogi tikariya ghat) and S4 (Shiv ghat near model college) for a period of one year, i.e., Dec 2021 to Jan 2023. The investigation period was divided into three seasons winter, summer and rainy,

The fishes were collected by hand net and cast net with the help of local fisherman. The fishes were delivered to the laboratory in bucket that contained water from the same waterbody. In general, between 1-2 specimens of various species were investigated on a daily basis during all seasons. 200 adult fishes were collected in each season. After external examination body cavity of the fishes was cut open and examined body cavity and other internal organs were carefully removed to separate clean petri dishes, containing normal saline solution. The organs were slit open carefully and examined under binocular microscope. Adult helminths parasites (not larval stages) were collected, processed and identified. Identification was done with the help of Yamaguti series (1961,1963) 'Systema Helminthum' Vol II Helminths of Vertebrates and other available literature.

The means of prevalence correlate with Temperature and Dissolved oxygen. Prevalence would calculate by following the formula given by **Margolis *et al*., (1982). Bush *et.al,* (1997).** The data collected will be statistically analyzed using Microsoft Excel and significant correlation implied by Pearson's correlation coefficient formula.

$$\text{Prevalence \%} = \frac{\text{Total no. of infected fishes}}{\text{Total no. of fish examined}} \times 100$$

Result and Discussion

This study shows seasonal variation for the different physicochemical parameters at various stations (S1, S2, S3 and S4) with their ranges which have tabulated and shown in Tables. To assess the quality of river water, Indian drinking water quality standard BIS 10500 (2012) has acquired. The data presented the seasonal variation of temperature and dissolve oxygen during the study period.

Table 1: Showing the Temperature in different season at Site 1 to 4 from Dec 2021 to Jan 2023 in Narmada river.

Temperature	**S_1**	**S_2**	**S_3**	**S_4**	**Mean+ SD value**
Winter	16.2	16.3	16.5	16.2	16.3±0.12
Summer	30	32	31	29.8	30.7±0.87
Rainy	20.1	20.3	20.6	22.3	20.82±0.86

Table 2: Showing the Dissolved Oxygen in different season at Site 1 to 4 from Dec 2021 to Jan 2023 in Narmada river.

Dissolved Oxygen (mg/l)	**S_1**	**S_2**	**S_3**	**S_4**	**Mean+ SD value**
Winter	6.9	7.3	7.2	6.8	7.05±0.20
Summer	6.2	6.1	6.8	6.4	6.3±0.26
Rainy	6.5	7.4	6.2	5.8	6.4±0.58

Table 3: Showing the Seasonal Prevalence of helminth infection in Fishes from Dec 2021 to Jan 2023 in Narmada river.

Parasite	Season	Prevalence
Cestode	Winter	5.5
	Summer	9
	Rainy	9
Trematode	Winter	3
	Summer	7.5
	Rainy	2.5
Nematode	Winter	1.5
	Summer	6.5
	Rainy	4.5

Statical Analysis

Prevalence correlate with Temperature and Dissolved Oxygen in different seasons (winter, summer and rainy). The correlation coefficient calculated by using the Pearson correlation formula.

Calculate the correlation coefficient (r):

$$r = \Sigma [(Xi - \text{Mean of } X) * (Yi - \text{Mean of } Y)] / \sqrt{(\Sigma [(Xi - \text{Mean of } X)^2] * \Sigma [(Yi - \text{Mean of } Y)^2])}$$

Table 4: Shows the Correlation between Prevalence with Temperature and Dissolve Oxygen in Winter, Summer and Rainy season, Dec 2021- Jan 2023

Season	Parameters	r value	Status of Correlation
Winter Season	Temperature	-0.8269	Strong Negative Correlation
	Dissolve Oxygen	-0.1811	Weak Negative Correlation
Summer Season	Temperature	2.8089	Strong Positive Correlation
	Dissolve Oxygen	0.0067	Very Weak Positive Correlation
Rainy Season	Temperature	-1.7085	Strong Negative Correlation
	Dissolve Oxygen	-0.2724	Weak Negative Correlation

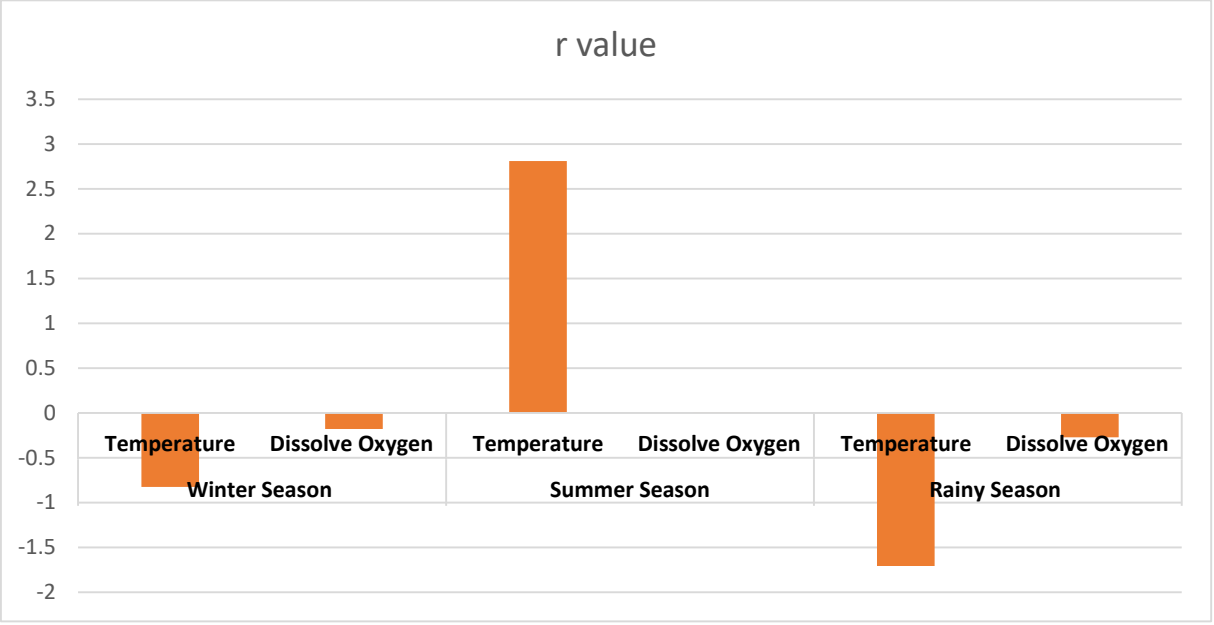

Fig 1: Correlation between Prevalence with Temperature and Dissolve Oxygen in Winter, Summer and Rainy season, Dec 2021- Jan 2023.

During the winter season, water body temperature typically decreases. This decrease in temperature can have a significant impact on the survival and reproduction of helminth parasites. Helminth parasites are ectothermic, meaning that their body temperature is regulated by the temperature of their environment (Karode and Khan 2022,2023) When water temperatures are cold, helminth parasites must expend more energy to maintain their body temperature. This can lead to slower development and reproduction, and in some cases, it can even lead to the death of the parasites. As a result of these factors, there is a strong negative correlation between helminth prevalence in fish and water body temperature during the winter season. This means that as water temperatures decrease, the prevalence of helminth infection in fish also decreases. There is a weak negative correlation between helminth prevalence in fish and dissolved oxygen levels during the winter season. This means that while higher dissolved oxygen levels can favor the survival and reproduction of helminth parasites, they can also stress fish, making them more susceptible to infection. The net effect of these factors is a slight decrease in helminth prevalence as dissolved oxygen levels increase. Overall, the relationship between helminth prevalence in fish and water body temperature and dissolved oxygen during the winter season is complex and multifaceted. While there is a strong negative correlation between helminth prevalence and temperature, the correlation between helminth prevalence and dissolved oxygen is weaker and more complex. These findings suggest that water body temperature and dissolved oxygen play important roles in influencing the prevalence of helminth infection in fish during the winter season. There is a very weak positive correlation between helminth prevalence in fish and dissolved oxygen levels during the summer season. This means that while lower dissolved oxygen levels can make it more difficult for fish to resist infection, they can also make parasites less able to survive and reproduce. The net effect of these factors is a slight increase in helminth prevalence as dissolved oxygen levels decrease. There is a weak negative correlation between helminth prevalence in fish and dissolved oxygen levels during the rainy season. This means that while lower dissolved oxygen levels can make it more difficult for fish to resist infection, they can also make parasites less able to survive and reproduce. The net effect of these factors is a slight decrease in helminth prevalence as dissolved oxygen levels decrease.

References

APHA (2012): Standard Methods for the Examination of water and waste waters, 22nd Edition, American Public Health Association, Washington, DC. 2012

Bush, A.O. et al (1997): Parasitology meets ecology on its own terms. *The Journal of Parasitology*. 83(4),575–583

Karode, A. and Khan, B. (2022): A study of Physicochemical Parameters of Narmada River in Dindori city, MP, India. *International Journal of chemical studies.* 10 (5),30-34

Karode, A. and Khan, B. (2023): Occurrence of Helminth Parasites in Fresh Water Fishes of Narmada River at Dindori, Dindori District, M.P., India. *IJCRT* 11(8),557-562.

Karode, A. and Khan, B. (2023): Seasonal Variation of Fish Diversity in Narmada River at Dindori District, Madhya Pradesh, India. International Journal for Multidisciplinary Research (IJFMR). 5(2), 1-5.

Margolis, L., et al. (1982): The use of ecological terms in Parasitology. *The Journal of parasitology*.68,131-133. Karode, A. and Khan, B. (2022): A study of Physicochemical Parameters of Narmada River in Dindori city, MP, India. *International Journal of chemical studies.* 10 (5),30-34.

Sharma, K. and Goswami, M.M. (2011). Organal distribution of Endo-helminth parasites in three snake headed fish species of Deeper beel, Assam, India. *Aquacult.* 12(2),159-166.

Shirdhonkar, S. (2022): Comparative Analysis of Physicochemical Variables of Water in River Narmada at Mandleshwar and Khedighat (M.P.), *India. Inter. Jou. of creative res. Thought* 10(1), 311-313.

Yamaguti, S. (1963): Systema Helminthum- IV: Monogenea and Aspidocotylea. *Inter science Publication,* NewYork.699. 1963

Yamaguti, S., (1961): Systema Helminthum. Volume III. The nematodes of vertebrates. New York: *Inter science Publishers*, 1261