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# Study on Population Dynamics of *Circumoncobothrium* Sp. and *Senga* Sp. Parasitizing Freshwater Fish *Mastacembelus* *armatus* (Lacepede)

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**Abstract:** The present work deals with the study of population dynamics of *Circumoncobothrium* Sp. Shinde, 1968 and *Senga* Sp. Dollfus 1938, from *Mastacembelus armatus* from different places and fish market at Aurangabad and Beed region for the period of one annual cycle (July 2021 to June 2022). The percentage of incidence, intensity, density and index of infection is recorded along with the influence of seasons on these values during study period.

**Keyword:** *Circumoncobothrium*, *Senga*, *Mastacembelus armatus*, Population dynamics.

## I. INTRODUCTION

Teleost fish plays a central role in ecosystems as consumers in food chains, and because they offer a large surface area for encounter and colonization. They are frequently utilized as hosts by range of parasites that are taxonomically diverse and that exhibit a wide variety of life cycle strategies. The invasion of parasitic infection affects nutrition, metabolism, and the secretory function of the alimentary canal (Markov, 1961). It also harms the neurological system. Stress is a result of unfavorable environmental factors, which also erode immunity and make a person more susceptible to diseases (Eissa, 2002). The research of helminth parasite variety and distribution began in India in the middle of the 19th century, and multiple works have been completed in various regions of the country by Bhalerao, 1937; Gupta, 1984; Soota, 1981; Sood, 1989; Tondon *et al.*, 2005; Pandey and Agrawal, 2008; and Deshmukh, 2015. The distribution of helminths is not only affected by seasons but also by host age, size, diet, abundance of fishes and an independent number of parasites within the fish. Change in climatic conditions is predicted to affect the prevalence of parasites in freshwater and marine ecosystems. A study of Chubb (1977) showed the seasonal occurrence of helminthes of freshwater fishes from different climatic zones. Parasitic disease have posed a complex problem and has become a great challenge to the parasitologists in the world today, coupled with the rapid changing world; the changes in the human ecology and the effect of climatic changes on parasitic system have further increased the threat to human as well as animals life.

The studies on Population dynamic of fish parasites with respect to the fluctuation of the entire parasites fauna of any host species are still meager. The majority of these investigations have been carried out in seasonal cycles. Seasonal environmental changes of water affect occurrence of parasites of aquatic host (Dogieal *et al.*, 1970).

The population dynamics, incidence of infection and seasonal variation of helminth parasites to the host particularly fish, the following literature is available: Hiware (2007), Chubb (1977), Forbs *et al.*, (1989), Anderson (1976), Dobson (1985), Dogiel (1958), Esch (1977), Lawrence (1970), Thomas (1964), Satpute and Agarwal (1974), Firdaus (1988) and carried out work on different aspect of parasites. According to Kennedy (1976), the study can be used as the biological of method to regulate population of parasites.

## II. MATERIAL AND METHOD

The hosts *Mastacembelus armatus* were collected from the local markets of Aurangabad and Beed district of Marathwada region with more or less regular periodicity, brought to laboratory, autopsied and examined for cestode infection for a period of one annual cycle July 2021 to June 2022. The parasites were collected washed with saline solution and preserved in 4% formalin, some were processed for taxonomic study: stained with Harris Haematoxylin stain, dehydrated, cleared in xylene, mounted in DPX and identified. The data obtained throughout the year was processed scrutinized and analyzed to derive the various biostatistical parameters such as incidence, intensity, density and index of infection by using following formulae.

$$\text{The \% incidence of infection} = \frac{\text{Infected host} \times 100}{\text{Total host examined}}$$

$$\text{Intensity of infection} = \frac{\text{No of host infected}}{\text{No of host infected}}$$

$$\text{Density of infection} = \frac{\text{No of host infected}}{\text{No of host infected}}$$

$$\text{Index of infection} = \frac{\text{No of host infected} \times \text{No of parasites collected}}{\text{No of host (infected + uninfected) examined}}$$

### III. RESULT AND DISCUSSION

Table no 1: The value of incidence, intensity, density and index of infection for *Circumoncobothrium* Sp. in *Mastacembelus armatus* from Aurangabad dist. during the period of July 2021 to June 2022.

| Year & month | No. of host examined | No of host infected | No. of parasites collected | % of incident of infection | Intensity of infection | Density of infection | Index on infection |
|--------------|----------------------|---------------------|----------------------------|----------------------------|------------------------|----------------------|--------------------|
| July 2021    | 14                   | 08                  | 10                         | 57.14                      | 1.25                   | 0.71                 | 0.40               |
| Aug 2021     | 14                   | 08                  | 11                         | 64.28                      | 1.22                   | 0.78                 | 0.50               |
| Sep 2021     | 16                   | 11                  | 14                         | 68.75                      | 1.27                   | 0.87                 | 0.60               |
| Oct 2021     | 17                   | 12                  | 16                         | 70.58                      | 1.33                   | 0.94                 | 0.66               |
| Nov 2021     | 09                   | 02                  | 02                         | 22.22                      | 1.00                   | 0.22                 | 0.04               |
| Dec 2021     | -                    | -                   | -                          | -                          | -                      | -                    | -                  |
| Jan 2022     | 09                   | 02                  | 02                         | 22.22                      | 1.00                   | 0.22                 | 0.04               |
| Feb 2022     | 11                   | 03                  | 04                         | 27.27                      | 1.33                   | 0.36                 | 0.09               |
| Mar 2022     | 11                   | 04                  | 05                         | 36.36                      | 1.25                   | 0.45                 | 0.16               |
| Apr 2022     | 13                   | 06                  | 08                         | 46.15                      | 1.33                   | 0.61                 | 0.28               |
| May2022      | 14                   | 06                  | 08                         | 42.85                      | 1.33                   | 0.57                 | 0.24               |
| Jun 2022     | 14                   | 07                  | 10                         | 50.00                      | 1.42                   | 0.71                 | 0.35               |

Table no 2: The value of incidence, intensity, density and index of infection for *Senga* Sp. in *Mastacembelus armatus* from Aurangabad dist. during the period of July 2021 to June 2022.

| Year & month | No. of host examined | No of host infected | No. of parasites collected | % of incident of infection | Intensity of infection | Density of infection | Index on infection |
|--------------|----------------------|---------------------|----------------------------|----------------------------|------------------------|----------------------|--------------------|
| July 2021    | 16                   | 9                   | 11                         | 56.25                      | 1.25                   | 0.71                 | 0.4                |
| Aug 2021     | 16                   | 9                   | 12                         | 56.25                      | 1.22                   | 0.78                 | 0.5                |
| Sep 2021     | 18                   | 13                  | 15                         | 72.22                      | 1.27                   | 0.87                 | 0.6                |
| Oct 2021     | 19                   | 13                  | 17                         | 68.42                      | 1.33                   | 0.94                 | 0.66               |
| Nov 2021     | 11                   | 3                   | 3                          | 27.27                      | 1                      | 0.22                 | 0.04               |
| Dec 2021     | -                    | -                   | -                          | -                          | -                      | -                    | -                  |
| Jan 2022     | 8                    | 3                   | 3                          | 37.5                       | 1                      | 0.22                 | 0.04               |
| Feb 2022     | 11                   | 4                   | 5                          | 36.30                      | 1.33                   | 0.36                 | 0.09               |
| Mar 2022     | 13                   | 5                   | 5                          | 38.46                      | 1.25                   | 0.45                 | 0.16               |
| Apr 2022     | 15                   | 7                   | 9                          | 46.66                      | 1.33                   | 0.61                 | 0.28               |
| May2022      | 14                   | 7                   | 9                          | 50                         | 1.33                   | 0.57                 | 0.24               |
| Jun 2022     | 17                   | 8                   | 11                         | 47.05                      | 1.42                   | 0.71                 | 0.35               |

Table no 3: The value of incidence, intensity, density and index of infection for *Circumoncobothrium* Sp. in *Mastacembelus armatus* from Beed dist. during the period of July 2021 to June 2022.

| Year & month | No. of host examined | No of host infected | No. of parasites collected | % of incident of infection | Intensity of infection | Density of infection | Index on infection |
|--------------|----------------------|---------------------|----------------------------|----------------------------|------------------------|----------------------|--------------------|
| July 2021    | 15                   | 08                  | 11                         | 53.33                      | 1.37                   | 0.73                 | 0.39               |
| Aug 2021     | 16                   | 09                  | 11                         | 56.25                      | 1.22                   | 0.68                 | 0.38               |
| Sep 2021     | 17                   | 10                  | 12                         | 58.82                      | 1.20                   | 0.70                 | 0.41               |
| Oct 2021     | 19                   | 14                  | 19                         | 73.68                      | 1.35                   | 1.00                 | 0.73               |
| Nov 2021     | 08                   | 02                  | 02                         | 25.00                      | 1.00                   | 0.25                 | 0.06               |
| Dec 2021     | -                    | -                   | -                          | -                          | -                      | -                    | -                  |
| Jan 2022     | 09                   | 03                  | 04                         | 33.33                      | 1.33                   | 0.44                 | 0.14               |
| Feb 2022     | 10                   | 03                  | 04                         | 30.00                      | 1.33                   | 0.40                 | 0.12               |
| Mar 2022     | 12                   | 05                  | 07                         | 41.66                      | 1.40                   | 0.58                 | 0.24               |
| Apr 2022     | 13                   | 05                  | 08                         | 38.46                      | 1.60                   | 0.61                 | 0.23               |
| May2022      | 13                   | 06                  | 08                         | 46.15                      | 1.33                   | 0.61                 | 0.28               |
| Jun 2022     | 15                   | 07                  | 09                         | 46.66                      | 1.28                   | 0.60                 | 0.28               |

Table no 4: The value of incidence, intensity, density and index of infection for *Senga* Sp. in *Mastacembelus armatus* from Beed dist during the period of July 2021 to June 2022.

| Year & month | No. of host examined | No of host infected | No. of parasites collected | % of incident of infection | Intensity of infection | Density of infection | Index on infection |
|--------------|----------------------|---------------------|----------------------------|----------------------------|------------------------|----------------------|--------------------|
| July 2021    | 16                   | 9                   | 12                         | 56.25                      | 1.37                   | 0.73                 | 0.39               |
| Aug 2021     | 18                   | 10                  | 12                         | 55.5                       | 1.22                   | 0.68                 | 0.38               |
| Sep 2021     | 20                   | 11                  | 13                         | 55.5                       | 1.2                    | 0.7                  | 0.41               |
| Oct 2021     | 21                   | 15                  | 20                         | 71.42                      | 1.35                   | 1                    | 0.73               |
| Nov 2021     | 7                    | 3                   | 3                          | 42.85                      | 1                      | 0.25                 | 0.06               |
| Dec 2021     | -                    | -                   | -                          | -                          | -                      | -                    | -                  |
| Jan 2022     | 10                   | 4                   | 5                          | 40                         | 1.33                   | 0.44                 | 0.14               |
| Feb 2022     | 11                   | 4                   | 5                          | 36.36                      | 1.33                   | 0.4                  | 0.12               |
| Mar 2022     | 14                   | 6                   | 8                          | 42.85                      | 1.4                    | 0.58                 | 0.24               |
| Apr 2022     | 16                   | 6                   | 9                          | 37.5                       | 1.6                    | 0.61                 | 0.23               |
| May2022      | 18                   | 6                   | 9                          | 33.33                      | 1.33                   | 0.61                 | 0.28               |
| Jun 2022     | 14                   | 8                   | 10                         | 57.14                      | 1.28                   | 0.6                  | 0.28               |

The collected parasites after closer taxonomic observation turned out to be the genus *Circumoncobothrium* and *Senga*

The values for the percentage of incidence, intensity, density and index of infection for *Circumoncobothrium* Sp. Shinde, 1968 in Aurangabad and Beed district is shown in Table 1 2, and *Senga* in Table no 3, 4.

Table no 1 shows the values for the percentage of incidence, intensity, density and index for *Circumoncobothrium* Sp infecting *Mastacembelus armatus* in Aurangabad dist, were it revealed that the incident of infection was highest (62.50%) in the month of October 2021, whereas the value was lowest (11.11%) in the month of January 2022, during the remaining month it was ranging from 20.00% (March 2022), 25.00% (September 2022) and 37.50% (October 2022). The incident of infection in the month of December was totally absent. The value for intensity density and index of infection was very high during the month July 2022, but intensity of infection it was low than the month of September 2022, whereas lowest during July 2021.

Hiwara and Pawar (2007) observed the incidence of infection highest in rainy season and moderate in winter season, incidence of infection was lowest in summer season in *Gangesia* Sp. and *Protocephalus* Sp.



According to Fartade and Chati (2016) high incidences, intensity, density and index of infection of all the helminth parasites occurred in summer season followed by winter season where as lower infections in monsoon season. The intensity varies greatly with respect to helminth parasites and host species, host size and feeding habitats, season and locality.

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#### REFERENCES

- [1] Anderson (1976): Seasonal variation in the population dynamics of *Caryophyllaeus laticeps* Parasitology, 72: 281-395.
- [2] Bhalerao, G.D. (1937): Studies on the Helminths of Indian Trematoda, IV. J. Helminthol., 15 (2): 97 – 124.
- [3] Chubb J.C. (1977): Seasonal occurrence of helminths in freshwater fishes. Part I. Monogenea. Adv Parasitol.15:133-99.
- [4] Deshmukh V. S. (2015): Biosystematics studies on some Helminth Parasites of freshwater fishes. PhD thesis, India, Nanded: S.R.T.M. University.
- [5] Dogiel, V.A. (1958): Parasitology of fishes. Leningrad University Press, Oliver and Boyed, Edinburgh and London. 1-348.
- [6] Dollfus RP. (1934): Sur un cestode Pseudophyllidae parasite de Poisson d' Ornement. Bull Soc Zool Fr. 59:476-490.
- [7] Eissa, I.A.M. (2002): Parasitic fish infections in Egypt. In: Dar EL-Nahdda 1st (Ed) El-Arabia Publishing pp. 52 – 53.
- [8] Esch G.W. (1977): Regulation of Parasite population. Academic press, INC, New York, 253.
- [9] Fartade and Chati (2016): Population dynamics of helminth parasite in fishes from solapur and osmanabad dist (M.S) india. Int. J. Adv. Res. 4(8), 427-430
- [10] Firdaus S. (1988): Seasonal incidence of helminth infection in relation to sex of host, *Channa punctatus* (Bloch). Rivista di Parasit. 3(47): 288-295.
- [11] Gupta, P.D. (1984): Helminthology in India in 18th – 19th centuries with some remarks on its recent progress. Ind. J. Hist. Sci., 19: 109 – 117.
- [12] Hiware C.J (1999): Population dynamics of the Caryophyllidean cestode parasitizing freshwater air breathing predatory fish *Clarias batrachus* Linnaeus Riv.Di.Parasitol.19 (1).
- [13] Hiware C.J and Pawar R.T. (2007): Population dynamics of the proteocephalids cestode parasitizing freshwater catfish *Mystus cavasius*. Flora and Fauna 13(2) 384-388. 9.
- [14] Kennedy C.R (1976): Ecological aspect of Parasitology. North Holland Publishing Company, Amsterdam/Oxford, 1-474.
- [15] Lawrence (1970): Effect of season, host age on endo helminths of *Catostomus commersoni*, J.Parasitol. 56(3): 567-571.
- [16] Markov, G.S. (1961): Physiology of fish parasites. In: Dogiel, v.a., petrushevsky, g.k. polyansky, yu. I. (Eds) Parasitology of Fishes. London, Edinburg, pp. 117 – 139.
- [17] Pandey, K.C., and Agrawal, N. (2008): An encyclopedia of Indian Monogenoidea. New Delhi, Vitasta Publishing Pvt Ltd, pp. 552.
- [18] Satpute and Agarwal (1974): Seasonal infection of *Clarias batrachus* (Bloch) by *Lytocestus indicus* Moghe and parasitic effects on its Haematology and histopathology. Ind. Jour. Exp. Biol. 12 (6): 584-586.
- [19] Shinde, G. B. (1968): On *Circumcobotrium ophiocephali* n.gen. n.sp. from freshwater fish, *Ophiocephalus leucopunctatus* in India, Rivista Di Parasitol. 19 (20): 111-114.
- [20] Sood, M.L. (1989): Fish nematodes from South Asia. India, Kalyani Publisher, 389 pp. Tondon, V., Kar, P. K., Das B., Sharma, B., Dorjee, J. (2005): Preliminary survey of gastrointestinal helminth infection in herbivorous livestock of mountainous regions of Bhutan and Arunachal Pradesh. Zoo. Print. J., 20: 1867 – 1868.
- [21] Soota, T.D. (1981): On some nematodes from the unnamed collection of the zoological survey of India, along with the description of a new species. Rec. Zool. Surv. Ind., 79: 55 – 71.
- [22] Thomas (1964): Studies on population of helminth parasites in trout (*Salmo trutta* L.). J. Animal Ecology, 33: 83-85.



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