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EFFECT OF pH ON THE RESPIRATION OF THE FRESHWATER BIVALE MOLLUSCS, *INDONAIA CAERULEUS* (PRASHAD, 1918) FROM BHIMA RIVER AT PANDHARPUR (DIST. SOLAPUR), MAHARASHTRA.

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Abstract:

The present study report the effect of pH on a freshwater lamellibranch molluscs, Indonaia caeruleus from Bhima river, near Pandharpur. The freshwater molluscs are considered as the most important component in the aquatic ecosystem. It is also involved in as a link in the food chain. Bivalve molluscs abundantly distributed in various in land waters and are considered as a bio-indicators of the ecosystem. Any change in surrounding environment affects, there internal physiology of bivalve mollusk. Pandharpur being one of the famous pilgrimage centers attracts millions of devotees for various yatras. Human intervenes affects the water quality of the Bhima river. In the present study the attempt has been main to understand the effect of change of on the respiration of the bivalve molluscs, Indonaia caeruleus. The experiments were conducted for 15 day and an interval of 5, 15 day the rate of respiration were analysis from control as experimental groups. The changes in rate of oxygen consumption were comparing to control and indicated the disturbed physiological adjustment. The results are discussed in the rate of physiological changes due to the change of pH concentration.

KEYWORDS:

pH, Respiration, Indonaia caeruleus, Bhima river.

INTRODUCTION:

Many biotic and abiotic factors affect the rate of respiration of bivalve molluscs (Bayne, 1976). Domestic and industrial effluents can change the physiochemical parameters of various aquatic bodies. On the parameters is pH and it's important as it is concern with industrial discharges into the marine environment has been studied by (Perking, 1976). Vedhathak. et al., (2011) studied the rate of oxygen consumption, ammonia excretion and O:N ration of freshwater bivalve Indonaia caeruleus from Godavari river at Paithan. Very little work has been reported on the effect of pH in accordance with change in rate of respiration from Indian rivers, especially from the Bhima river which is heavily polluted from western Maharashtra. Therefore, the present investigation has undertaken keeping in view the importance and abundance of the freshwater molluscs, Indonaia caeruleus from Bhima river and the effect of change in pH on the respiration was studied.

MATERIAL AND METHODS:

Freshwater bivalve molluscs, Indonaia caeruleus were collected from the bank of Bhima river at

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Gopalpur site (latitude 17° 66'N 75° 36'E longitude), during November-December 2012. The animals having the size 58 to 64mm were selected for the experimentation soon after the collection. The animals were brought to the laboratory and clean for removing of algal biomass and mud. Before the experimentation the animals were acclimatized in laboratory condition for one week. And were grouped into three batches containing 30 animals in each hatch. Batch I was considered as a control having pH 7.4 and the Batch II of bivalve contain 30 animals were exposed to pH 6.0 (acidic). The Batch III containing 30 animals exposed to the pH 8.0 (basic). Batch I is considered as control and Batch II and III were considered as experimental. The effect of pH on bivalve molluscs were carried out for the duration of 15 days (chronic effect). The rate of respiration was determined at intervals of 5th and 15th day from control and experimental group during experimentation to water was change in duration of 12-130 hrs. For obtain acidic pH, 20% 1N of Hydrochloric acid was used and for the obtaining basic pH, 40% 1N of NaOH was used. The pH of the water holding the animals during the experimental duration was confirmed by digital pH meter (ELECO Hyderabad). The rate of O₂ consumption of individual animals from control as well as experimental was determined according to the modified Wrinklers method, specifically use for freshwater (Golterman. et al., 1978). For determination O₂ consumption, total 5 individual animals were used from each group (control, pH 6, pH 8) and O₂ consumption was determined from individual animals of respective groups and mean and the standard deviation values were determined, to know the oxygen consumption from each group. For the confirmation and for the statistical analysis the triplicates readings were taken at the time of oxygen estimation. For the determination of Oxygen consumption standard one liter respiratory jar containing inlet and outlet siphon was used. To determine the O₂ consumption of individual bivalve molluscs, *Indonaia caeruleus*, the O₂ content was determined at the beginning of the experiment and after one hour exposing the animal in one liter, containing in the respirator jar with air tight of experimental set up.

The mean value of five individual bivalve from each group were used for the statistical analysis to know the significant value. The rate of respiration was represented for individual bivalve as mg of O₂/lit/gm/hr.

RESULTS AND DISCUSSION:

The results of the experiments on changes in the rate of O₂ consumption were shown in the following graph no. 1 and table no. 1

The physico-chemical parameters of the water used for the experimentation were temperature 18.22°C, pH 7.2-7.8, O₂ content 5.8-6.2 mg/lit, Total Hardness 105-110 ppm. The rate oxygen consumption after 5th day, in the control group was 0.0700±0.0046 O₂/lit/gm/hr. and in the experimental groups it was decreased up to 70.14% in the pH 6.0 (acidic) and in pH 8.0 (basic) experimental group it was decreased by 46.14%. On the other hand, after 15th day of experiment in control group the rate of oxygen consumption was 0.0471±0.0019 O₂ mg/gm/lit/hr. In the experimental group after 15th day in pH 6.0 (acidic) it was decreased by 30.57% and in pH 8.0 (basic) the O₂ content was decrease by 29.51% when compare with respective control groups. From our results overall it can be stated that after 5th day of the experiment the bivalve molluscs in both acidic and basic group showed marked significant decrease in the rate of oxygen consumption. The rate of respiration was more pronouncedly decreased in acidic group compare with basic group. However, the decreasing pattern was maintained even after 15th days of change in pH (acidic and basic) noticed in the bivalve molluscs. This clearly indicates that alteration in any one physico-chemical parameter (pH) definitely affects the physiological status of the bivalve molluscs from Bhima river at Pandharpur. The change of pH could have altered the metabolic rate of the animals because of the stress of acidic as well as basic group imbalance. The respiratory metabolism might have altered due to the overall weakening of the animals. Magnus and Polites (1980) studied the oxygen uptake and transport in the prosobranch molluscs, *Busycon conalicultum* with respect to gases exchange and response to the hypoxia. Thurberg et al., (1974) stated that any alternations in metabolic rate could be a pathway indicating that the biochemical components might be involved in the compensatory mechanism under various stress conditions. O₂ consumption is considered as an indicator of both metabolic rates as well as it indicates the status of the organism under the stress condition (Cantelema, 1977). In present study it can be stated that the decrease in oxygen consumption could be due to the stress condition because of change in pH which might be due to the effect basically on the target organ like gills, may be responsible in decrease of O₂ consumption. Siddaki (2010) observed in decline in the oxygen consumption from fish, *Clarius batrachus* after exposing them to the metal stress (copper sulphate), Shelke and Wani (2005) observed reduction in oxygen consumption from fresh water fish *Amblypharyngodon mola* after exposing them to various metal stresses and stated that gill damage due to the metal impact could have reduced the efficiency of organism in oxygen uptake. This could be the same for present investigation where in, the bivalve *Indonaia caeruleus* after change in the pH (acidic and basic) might have induced the stress over the

gill and in turn alter the metabolic rate could have reduced the oxygen consumption. However, further investigations are required in the enzyme analysis concern with respiratory metabolism with special reference to the freshwater bivalve molluscs, *Indonaia caeruleus* after inducing the changes in acid and base balance for drawing final conclusions.

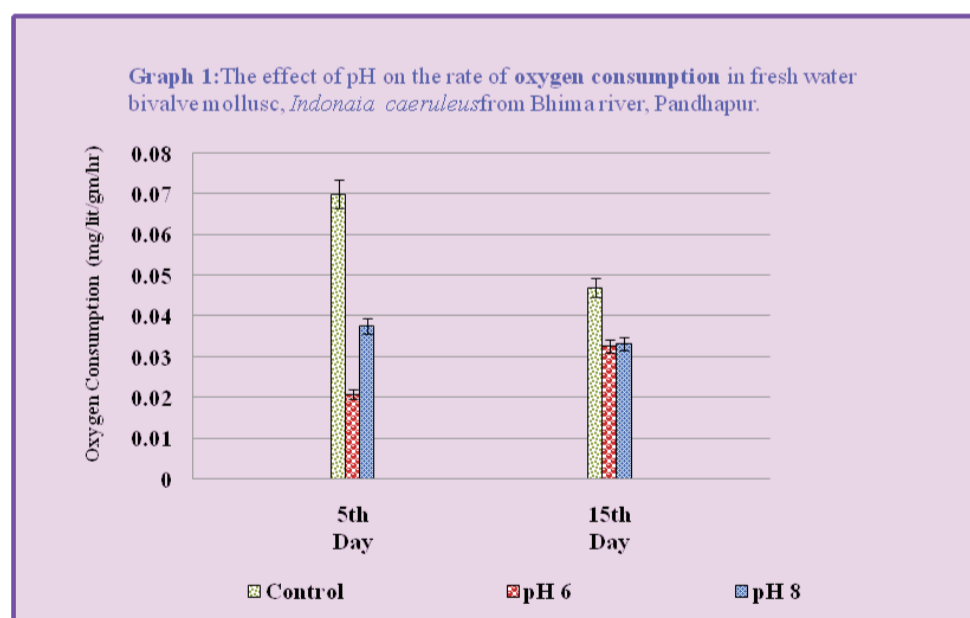
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Table 1: Effect of change in pH on respiration of fresh water bivalve molluscs, *Indonaia caeruleus*, (bracket value represent the percentage differences compare to control).

* indicates significant at P<0.05

DAY	CONTROL	CHANGE IN pH	
		pH 6	pH 8
5 th	0.0700±0.0046	0.0209 ± 0.0054* (70.14)	0.0377 ±? 0.0117* (46.14)
15 th	0.0471±0.0019	0.0327 ±?0.0050* (30.57)	0.0332 ±0.004592* (29.51)



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