



## **Comparative Study of Oxygen Consumption and Estimation of Protein in Freshwater Crab *Barytelphusa cunicularis***

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### **ABSTRACT**

The present study was undertaken to find out the protein content and oxygen consumption in the body muscle of fresh water crabs. *Barytelphusa cunicularis* of fresh water crab is packed with protein, which is important for building and maintaining muscle. The crab was divided into three hours such as 1hr, 3hr and 5hr. Crab were injected with a 10ul  $\beta$  1-3 glucan in crab body allowed to the muscle in the muscular system of the crab. Muscle was collected from crab after regular time interval as after 1h, 3h, and 5h of injection. The effect of induce immunity on protein was investigated. Estimation of protein were increased in crab after injection of  $\beta$  1-3 glucan. The protein was linearly increased up to 3hr and 5hr. In  $\beta$  1-3 glucan showing the highest activity in 5hr. Immunity stimulated by injected  $\beta$  1-3 glucan to crab. Estimation of protein from *Barytelphusa cunicularis* crab muscle showed highest in  $\beta$  1-3 glucan as compare to control (without injected). The estimation of oxygen consumption rate was increased up to 5hr as compare to control (without injected). Our work indicated the metabolic rate of oxygen consumption in fresh water crab and its proteins are plays an important role in human beings.

**Key words:** Oxygen consumption, Protein estimation, *Barytelphusa cunicularis*.

Received 28.04.2023

Revised 20.05.2023

Accepted 11.06. 2023

### **INTRODUCTION**

Freshwater crabs are found throughout the tropical and subtropical regions of the world. Crabs have a great economic importance to humans. Mostly crabs have a both terrestrial and aquatic habitat. Therefore they have both gills and enlarged and vascularised branchiostegites, which are used for respiration in ambient habitat. Crabs can be intake dissolved oxygen in water through well vascularised gills. [1] The received oxygen was utilised in cellular respiration to release energy on which their life process depends. Generally, growth and production of the crabs in aquaculture depends on amount of oxygen taken by them. Most living things needs oxygen to survive itself. Oxygen helps organisms grow, reproduce, and turn food into energy. The oxygen consumption rate was positively interconnected with the time per hour. According [2] study on daily rhythms of oxygen consumption in freshwater crab *Barytelphusa jaquemontii*. For the aquaculture, measurement of rate of respiration of aquatic animals is most essential factor. Freshwater crab *Barytelphusa cunicularis* has always been a nutritional food commodity, rich in proteins, carbohydrate, vitamins, having great medicinal properties as well. Proteins are large, complex molecules essential for the sustenance of life in all animals. They are required for the structure, function and regulation of the body's tissues and organs [3] Protein is essential for sustenance of life and accordingly exists in the largest quantity of all nutrients as a component of human body [4]. The acceptability and easy digestibility of animal protein make is very valuable in combating protein energy malnutrition, especially in children. The protein content in the crabs has a highest biological value for its growth promoting capacity [5]. When injecting the  $\beta$  1-3glucan substance in crab's body it also increased the value of nutritive protein in that crab.  $\beta$  1-3glucan plays important role in the activation of both innate and acquired immune functions. Innate immune responses stimulated by  $\beta$ 1-3 glucan not only act on invading microorganisms also complement to the activation and action of acquired immunity [6].It means that yeast have also nutritive value for human body.

### **MATERIAL AND METHODS**

#### **Collection of Specimen**

The live specimen of freshwater crab *Barytelphusa cunicularis* were collected from the local river of Pathare (Nashik) in rainy season during September and October with the help of local fishermen. The

collected specimen was acclimatized in the laboratory condition for a 4 days. After 4 day the healthy crabs were cleaned and the body muscle were dissected for extraction thereby following the estimation.

#### Measurement of Oxygen Consumption

The water samples were carefully collected and kept in undisturbed at room temperature for 1hour. Then after a 1hour these water samples are inserted in BOD bottles of capacity 300ml. The amount of dissolved oxygen consumed was determined by the standard Wrinkler's method, as given by [7]. The rate of oxygen consumption of freshwater crab was determined by taking difference between initial hour oxygen content and final hour oxygen content obtained after the one hour. By this process, oxygen consumption in initial (1hr) and final (3hr) water sample was determined and the difference between the three readings was the amount of oxygen consumption by crab during 1hr.

#### Estimation of Protein

Experimental setup consisted of covered glass tank each with fifteen fiddler crab and equal volume of fresh water. From the collected freshwater species of crab were taken for the estimation of the protein concentration. The amount of protein present in muscle was measured by a spectrometer according to the method of Lowry et al., [8] using a Bovine Serum Albumin (BSA) as standard. In a series of test tubes different aliquots of standard protein solution were pipetted out. All the test tubes were made up to 1ml with distilled water. In all the test tubes 3ml of reagent C was added and mixed well. The test tubes were allowed to stand for 15minutes then 0.5ml of Folin Ciocalteu reagent was added. The tubes were mixed immediately after each addition and kept at 35° C for 30 minutes. The colour developed was read at spectrometer in 660nm.

## RESULTS

### The Total Rate of Oxygen Consumption

The freshwater crab, *Barytelphusa cunicularis* showed variations in total rate of oxygen consumption when injected to  $\beta$ ,1-3 glucan. In the present study, it showed that the rate of oxygen consumption were increased up to 5hr as compare to control (without injected). Our work indicated the metabolic rate of oxygen consumption in fresh water crab. The results were presented in Fig.1.

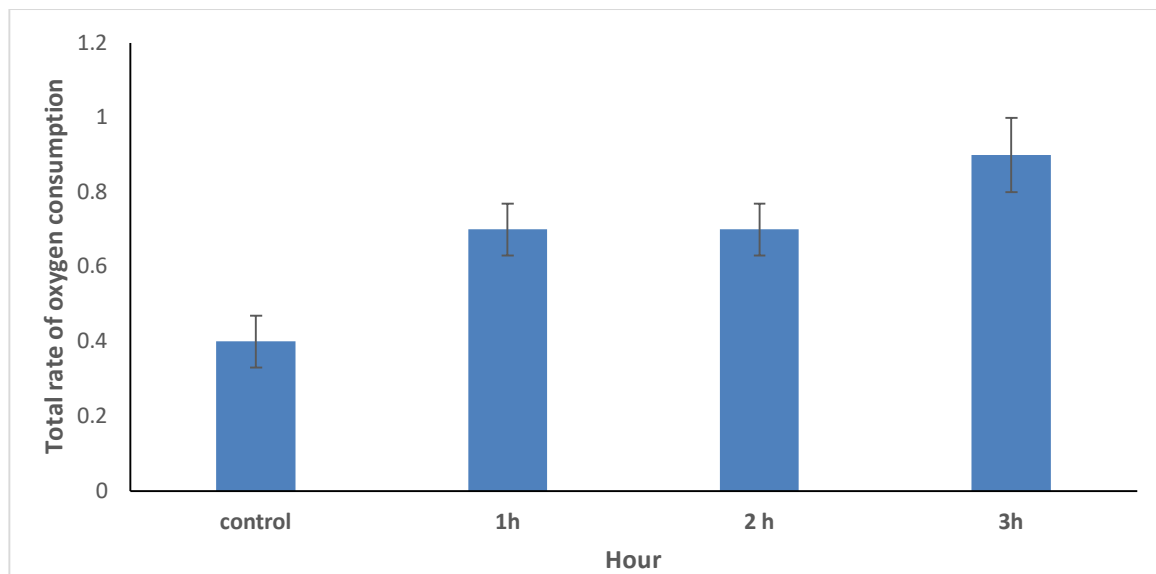
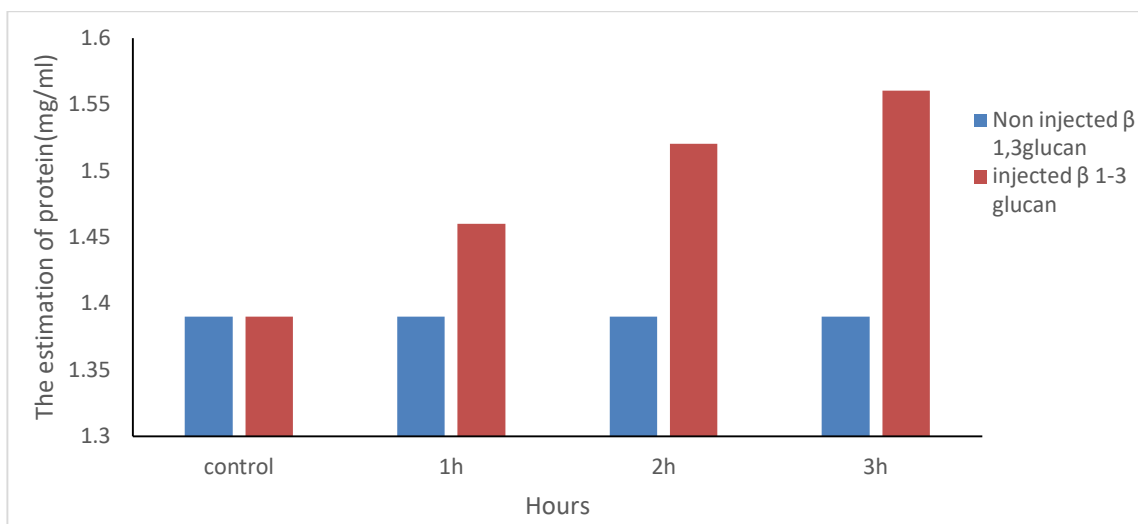


Fig.1. Measure the rate of Oxygen Consumption from Fresh Water Crab

#### Estimation of Protein

In the present study crab were divided into three hours such as 1hr, 3hr and 5hr. Crab were injected with a 10ul  $\beta$  1-3 glucan in crab body allowed to the muscle in the musculatory system of the crab. Muscle was collected from crab after regular time interval as after 1h, 3h, and 5h of injection. The effect of induce immunity on protein was investigated. Estimation of protein were increased in crab after injection of  $\beta$  1-3 glucan. The protein were linearly increased up to 3hr and 5hr. In  $\beta$  1-3 glucan showing the highest activity in 5hr. Immunity stimulated by injected  $\beta$  1-3 glucan to crab. Estimation of protein from *Barytelphusa cunicularis* crab muscle showed highest in  $\beta$  1-3 glucan as compare to control (without injected). The results were presented in Fig.2.



**Fig 2. Showing the Comparison of Estimation of Protein (mean  $\pm$  SD) at Different Hours in Fresh Water Crab**

## DISCUSSION

The main feature of the present results are, that there was an increase in the rate of oxygen consumption with increasing body mass of *Barytelphusa cunicularis*. It is in accordance to the result of Diawol et al. [9]. He stated that oxygen uptake of fresh water decapode varied according to the animals weight. The rate of oxygen consumption is generally increased with increasing body mass of the crab [10] is also similar to this study. The oxygen uptake depends upon various abiotic and biotic factors [11]. Of these factors, body weight is one which play important role. These variation are due to several factors. The rate of oxygen consumption in several animal is connected to the vastness of the energy of the requirement of the animal and its depend on animal body weight and environmental factor [12]. Oxygen consumption represent the physiological state of metabolic activity and it may be an indicator of metabolic stress [1] to evaluate the amount of energy oxygen consumption rates can be used and organism is using to maintain a stable concentration of the internal chemical fluids.[13]. Some environmental factors may affect the induced stress to destroy animals [14; 15; 16].

In the present study it was observed that the protein content increase was moderate in the muscle of challenged crabs during 2hrs but reached maximum during 3hrs. It is detected that the protein content in the body muscle of the fresh water crab, *Barytelphusa cunicularis* has higher protein content and their values are injected  $\beta$  1-3 glucan 1.56mg/g and without injected 1.39mg/g at 3hrs respectively. Protein is essential for normal function, growth and maintenance of body tissues. Proteins do play both structural and functional role of cellular level. Being an integral part of the cell-membrane, intracellular and extracellular passages are linked through it. Any sort of cellular metabolism occurring in body involves one or many proteins [17]. The proteins are extremely versatile in their function and interaction during metabolism of proteins, amino acids, enzymes and co-enzymes.

## CONCLUSION

In the present study, the increase the amount of oxygen consumption in *Barytelphusa cunicularis* at 3hrs. In the present study we are conclude that the protein content in the body muscle of the fresh water crab, *Barytelphusa cunicularis* is higher protein with injected  $\beta$  1-3 glucan as compare to without injected at 3hrs respectively.

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#### CITATION OF THIS ARTICLE

P. B.Chine and Y.R.Channe. Comparative Study of Oxygen Consumption and Estimation of Protein in Freshwater Crab *Barytelphusa acunicularis*. *Bull. Env. Pharmacol. Life Sci.*, Spl Issue [2]: 2023: 019-022.