The Asian Journal of Animal Science (June, 2011), Vol. 6 Issue 1 : 81-84 | RESEARCH ARTICLE

Effect of starvation on the oxygen consumption of freshwater male crab, *Barytelphusa guerini*

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Received : April, 2011; Accepted : May, 2011

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ABSTRACT

The availability of oxygen plays a key role in the distribution and survival of animals. Oxygen consumption of freshwater male crab, *Barytelphusa guerini* was determined at normal and during starvation conditions on 1st, 5th, 10th, 15th and 20th days. Due to starvation stress, respiratory metabolisms of animals were shown to be changed in the present investigation. Total oxygen consumption of normal crabs, showed the mean value in the range of (2.999 – 2.398 CC of oxygen/hr.) and it was found to be decreasing significantly (p-value < 0.05) and had maximum per cent depletion (-33.72 %) on 1st day and minimum per cent depletion (-7.13 CC %) on 5th day of starvation over normal conditions than remaining other days. Rate of oxygen consumption showed the mean value in the range of 0.0753 – 0.0579 CC of oxygen/g wet weight of animal/hr. at normal condition. It was also recorded to be decreasing insignificantly (p-value > 0.05). Highest depletion rate on 1st day (-39.59 %) and lowest on 15th day (1.72 %) during starvation periods over normal conditions was observed.

Key words : *Barytelphusa*, Starvation, Oxygen consumption

The failure of nearly all living structures to maintain any actual store of available oxygen is an established fact. Continuous respiration is, therefore, necessary to maintain oxidative metabolism, and this is necessary for life. The consumption rate of oxygen by an organism is limited by the gradient of concentration between the organism and the layer of the medium that immediately surrounds it. Oxygen consumption by organism is used as an index of the metabolic activities (O'Hara, 1971). Starvation is generally known to influence the oxygen consumption of animals.

The animals exhibit differential responses in oxygen consumption towards the starvation have been studied earlier by (Rajabai, 1961; Kotaiah, 1969; Stickle and Duerr, 1970; Cuzon and Ceccaldi, 1973; Marsden *et al*., 1973; Kotaiah and Rajabai, 1974; Heeg, 1977; Cuzon *et al*., 1980; Satya Reddy and Balaparameswara Rao, 1985; Anger, 1986; Dall and Smith, 1986; Anilkumar and Sinha, 1990; Comoglio *et al*., 2004 and Comoglio and Amin, 2005). The fact that continued starvation results in metabolic depression of the animal is well known for long. In comparison to vast information on the oxygen consumption in relation to starvation on other animals, the information on crab is scanty and less extensive and hence it was worthwhile to undertake the effect of starvation on the oxygen consumption of freshwater male crab.

Oinam, R.S., Khagokpam, M.S. and Mali, R.P. (2011). Effect of starvation on the oxygen consumption of freshwater male crab, *Barytelphusa guerini*. *Asian J. Animal Sci.*, **6**(1): 81-84.

MATERIALS AND METHODS

The collected fresh water male crabs, *Barytelphusa guerini* from rice fields of Nanded district (Maharashtra) and Nizamabad district of Andhra Pradesh were brought and maintained in the laboratory condition for 5 days. The animals were kept in glass troughs with enough water in the range (pH 6.2 – 7.52, temperature 24 – 27^{0}C and D.O. 4.3 – 5.2 mg/L) and animals were fed sufficiently every day. Water was changed daily and injured animals were discarded immediately. Only healthy and active male crabs (40 – 55 g) were selected for the present investigation in order to avoid variation in oxygen consumption due to sex, size and weight. The animals were divided into two groups and acclimated for 20 days. The animals subjected to normal condition were given sufficient food daily and the animals subjected to starvation were not fed. The experiment for the present investigation on fresh water male crabs, *Barytelphusa guerini* was performed on 1st, 5th, 10th, 15th, and 20th days at normal and starvation conditions.

The oxygen consumption was measured by using the method reported by (Saroja, 1959). The amount of dissolved oxygen consumed was determined by the standard Winkler's method, as given by (Walsh and Smith,