

EFFECT OF ADRENOCORTICAL HORMONES ON OXYGEN UPTAKE IN AN AIR BREATHING FISH, CHANNA GACHUA (HAM.)

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ABSTRACT

In the present work an attempt has been made to study the effect of adrenocortical hormones and drugs on oxygen uptake in an air breathing fish, Channa Gachua (Ham). Treatment of adrenaline brought significant decrease in oxygen uptake as compared to control while the injection of both phentolamine and hydrocortisone brought statistically significant increase in oxygen consumption in experimental animals. Treatment of ACTH failed to alter the oxygen consumption of the fish to any significant level.

Key Words: Fish, Oxygen Uptake, adreno cortical hormones.

INTRODUCTION

Hormones play an important role in the physiology of fishes (Raza et al., 2000). Numerous workers have tried to demonstrate the fundamental calorogenic action of adrenocortical hormones (Marinesque, 1991; pandey et al., 1985) in fishes which is obvious in higher vertebrate. A perusal of literature indicates that our information regarding the role of adrenocortical hormones on the homeostasis of oxidative metabolism or oxygen consumption in Indian teleostean fishes are very scanty as such the present work has been taken into account in an air breathing fish, Channa Gachua (Ham) to fill up the gap of our knowledge in this regard.

MATERIAL AND METHODS

Live specimens of Channa Gachua (Ham) were produced from local fish dealers at Patna (Bihar) and kept in big glass aquarium (60 l) in the laboratory for seven days for proper acclimatization. In the laboratory the fishes were fed daily with pieces of goat liver. The details of the method employed in the determination of bimodal oxygen uptake of the experimal animals (body wt. $45.0 \pm 1.5g$) at $29.0 \pm 1.0^{\circ}c$ where those of Munshi and Dube (1973) who attached the glass respirometer to a differential manometer (for measurement of O₂ uptake from the aerial route through accessory respiratory organs). The concentration of dissolved O₂ in water was determined by winkler's volumetric method (Welch, 1948). Before any experiment, the effective dosage of different hormones (recorded in Table 1) were determined. The fishes of control group got the treatment of normal saline. The fishes were injected intraperitoneally on the ventral side just infront of pelvic fin. The differences

of significance, if any, between the control and experimental animals, was calculated by the student's 't'-test at the level of 5%.

RESULTS

The data showing the effect of different adreno-cortical hormones or drugs on oxygen uptake in experimental animals *Channa gachua* (Ham) are presented in Table.

Treatment of Hydrocortisone, adrenaline, progesterone and Thiouracil bring about significant decrease in oxygen uptake and equivalent energy utilization where as treatment of testosterone and L-Thyroxine bring about significant increase in oxygen uptake and equivalent energy utilization as compared to control.

Table 1

Effect of hormones and Pharmacological drugs on oxygen uptake and equivalent energy utilization (E.E.U.) in *Channa Gachua* (Ham) at $29.0 \pm 1.0^{\circ}\text{C}$: *= significant ($P < 0.05$); Body Weight $45 \pm 1.0\text{g}$

S.No.	Condition	Injection in no. of days	Total dose (mg.)	Oxygen uptake (ml/h)	E.E.U. (K. Cal/h)	E.E.U. (K. Cal/day)	E.E.U. (K. Cal/month)
1.	Control	-	-	4.512±0.21	0.0216	0.5197	15.5394
2.	Hydrocortisone	2-	1.0	2.139	0.0102	0.2464	7.3923
3.	Adrenaline	2-	0.000006	1.462	0.0070	0.1684	5.0526
4.	Testosterone	2+	1.0	5.813	0.0279	0.6696	20.0897
5.	Progesterone	3-	1.5	3.215	0.0154	0.3703	11.110
6.	L-Thyroxine	2+	1.5	5.714	0.0274	0.6582	19.7473
7.	Thiouracil	6-	1.5	2.345	0.0112	0.2701	8.1043

DISCUSSION

So far, the effect of adrenocortical hormones on the homeostasis of oxidative metabolism in fishes is concerned, we have very little information regarding this Chanchal et al. (1991) in *Puntius sophore*, Marinesque (1971) in *Gobius melanostomus*. Pallar and Pandey et al. (1985) in *Macrogathus aculeatum* found that the treatment of adrenaline causes a sharp and substantial decrease in oxygen uptake in these animals (recording was performed from 3 to 10 hrs) The exact reason of decrease in oxygen consumption after the treatment of adrenaline is not understood but Krantz. Jr and Carr (1958) have stated that it results from carotid sinus response to the increase in blood pressure. It is also possible that it results from the prompt relaxation of the respiratory muscle and slow heart rate evoked by epinephrine. Similar explanation may be followed here. Contrary to adrenaline, the treatment of hydrocortisone in *Channa Gachua* in the present study brought significant increase in oxygen uptake, a view consistent with the findings of Pandey et al., (1985) and Chatterjee (1973). In the present study the treatment of phentolamine (an antiadrenalrgic drug) led to increase in oxygen uptake in *C.gachua*; the reason for such increase in not known and it requires further investigation.

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