SHORT COMMUNICATION

HYPERGLYCEMIA AND LIVER GLYCOGENOLYSIS IN HISTAMINE ADMINISTERED FROGS

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Summary: Intramuscular histamine administration in frogs produced hyperglycemia, a decrease in the liver glycogen content, and an increase in the rate of glucose absorption in isolated intestinal segments.

Key words: histamine administration hyperglycemia liver glycogenolysis glucose transport

INTRODUCTION

Histamine is known to influence many physiological processes. It dilates the blood capillaries, increases the capilary blood flow, alters the capillary resistance, alters the permeability of cell membranes, increases the gastric juice production, causes allergic manifestations, and increases ACTH production (1). It has strong pharmacological properties with an activating effect on the Central Nervous System (2). In the present study the effect of intramuscular histamine administration on the blood glucose level and liver glycogen level in frogs with reference to *in vitro* intestinal transport of glucose has been discussed.

MATERIALS AND METHODS

Frogs, *Rana cyanophilictis* weighing 30-35 *g* each, were selected for the study. Blood glucose was estimated using the method of Scott and Melvin (3). The liver glycogen was islolated and estimated by the method of Hassid and Abraham (4). Histamine acid phosphate (Ward Blenkinsop and Co., England) at the dose of 0.01 *mg* in 1 *ml* of Frog Ringer was injected intramuscularly into the thigh muscle of frog. 45 min after the injection the animals were sacrificed.

To study the *in vitro* glucose transport a known length of the intestine of frog were excised, inverted and cleaned in Ringer. One end of it was ligated with a thread and after introducing a known amount of glucose solution (1 *mg/ml* of Ringer) into the lumen, the other end was also ligated. The set-up was maintained in glucose Ringer (1 *mg/ml*). An indentical set-up was maintained in a solution of glucose Ringer containing histamine (0.01 *mg/ml*). After one hr

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the intestine piece was removed and the amount of glucose in the fluid in its lumen was estimated. The difference between the initial and the final amount of glucose in the lumen gave the amount of glucose transported in one hr. This was presented per unit length of intestine per unit time.

RESULTS

The results obtained from the study are presented in Table I.

TABLE I: Effect of histamine on the levels of blood glucose and liver glycogen, and *in vitro* glucose transport through the intestine of frog. (Values are Mean±S.D.)

	No. of observations	*Control*	*Effect of histamine*	*Incidence of change*
Blood glucose (*mg/ml*)	5	0.67+0.2002	1.20+0.2302	Increase t=3.88, p=>0.01
Liver glycogen (*mg/g* wet weight)	4	8.5+0.2298	7.60+0.2786	Decsease t=4.98, p=>0.01
In vitro glucose transport (*mg* glucose transported/cm/hr)	3	0.0516+0.018	0.13+0.045	Increase t=3.65, p=>0.05

DISCUSSION

These results obviously illustrate that histamine increases the glucose absorption and glycogenolysis in liver. It is secn from the results of Table I that 45 minutes after the intramuscular histamine administration, the frogs developed significant hyper-glycemia. The causes for this are not well accounted. However, they must be sought in the increased liver glycogenolysis (Table I); and increased transport of glucose at the intestinal level (Table I). It could be possible that the liver glycogenolysis and increased transport of glucose at the intestinal level due to histamine may add glucose to the blood, thereby resulting in hyperglycemia. Furthermore, these results corroborate the findings of Troshin (5) and Wiseman (6) which demonstrate the histamine altering tissue permeability.

How histamine affects the glycogenolysis and tissue permeability is not clear; but the above results only show that besides acting as a local hormone (7), histamine affects the carbohydrate metabolism.

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