

EFFECT OF THYROID FEEDING ON PANCREATIC SECRETION IN DOGS

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Summary: The pancreatic juice collected from the pancreatic duct fistula in healthy mongrel dogs, was analysed for changes in volume, pH bicarbonate content and amylase activity. Oral administration of thyroxine significantly increased the pancreatic secretory activity without affecting its pH whereas thyroxine free thyroid extract decreased it significantly. Feeding of whole thyroid did not affect the pancreatic secretory activity.

Key words: pancreatic juice

thyroid extract feeding

thyroxine

INTRODUCTION

Greengard¹ *et al.* (3) reported a constant and prolonged increase in pancreatic secretion after the administration of secretion. Similar increase occurs after pancreozymin and glucagon administration (8,9). Histamin (4) and vagus stimulation (7) increase the secretion of canine pancreatic juice. Increase in jejunal secretion (2) and an increase in tone and motility of intestine and colon has been reported after thyroid feeding to animals (1). Little is known about the effect of thyroid on pancreatic secretion. In this paper we report the effect to thyroid feeding (thyroxine, thyroid extract and whole thyroid) on the pancreatic secretion.

MATERIALS AND METHODS

In healthy stray dogs pancreatic fistula was made by isolating the duodenum through a midline abdominal incision under chloralose anaesthesia (90 mg/kg). The pancreatic duct openings in the duodenum were visualized with the help of a magnifying glass. A thin stainless steel canula was put into the most prominent duct and held in position by purse string sutures. The duodenum was closed and the canula was exteriorized in the abdominal wall. In a second technique, the duodenum with attached pancreas was cut from the main gut and the continuity of the main gut was maintained by end to end anastomosis. The duodenum was opened and a fine polythene tube (1 to 1.5 mm bore) was passed in the pancreatic duct and fixed up with thin silk. The polythene tube was kept in a thin metal canula. This preparation of duodenum with attached pancreas was transplanted underneath the peritoneum and the canula was exteriorized. These dogs were harnessed under a special metal framework. Juice was collected for a period of one hour in a polythene bottle attached to the canula. Lean sheep meat, sodium chloride and water *ad lib* were provided for the induction of juice. The volume and pH of the juice were measured and biochemical analysis was done according to King (6).

Experiments were divided in three groups. First group was fed oral thyroxine (1.0 and 1.5 mg/daily for one week). The second group was given thyroxine free thyroid extract (1.8 and 2.0 gms daily for one week) and a third group was fed the whole thyroid (B.D.H. 20 gm daily for one week).

In each case control readings were taken for a period of one week before introduction of any variants or surgical intervention. The observations were run for a period of two to three weeks to judge the after effects if any.

RESULTS

Oral administration of thyroxine, significantly increased pancreatic secretory volume, bicarbonate content and amylase activity without affecting the pH (Table I). Feeding of thyroxine free thyroid extract significantly reduced secretory volume, bicarbonate content and amylase activity without affecting the pH (Table II). Administration of the whole thyroid (B.D.H.) did not affect the pancreatic secretory activity (Table III). There was no appreciable difference between the follow up and one weeks control readings in the experimental dogs.

TABLE I: Showing mean values of pancreatic analysis on feeding of thyroxine over a 4 weeks period and the significance of difference from control

<i>Dosage of thyroxine</i>	<i>Period in weeks</i>	<i>pH</i>	<i>Volume (ml)</i>	<i>Bicarbonates (meq/l)</i>	<i>Amylase activity (units/ml)</i>
a. 1.0 mg/day orally (3 dogs)	Control	7.21	21.46	95.6	532.3
	2nd week†	7.33	*27.3	*160.33	502.77
	3rd week††	7.38	*36.33	*153.54	567.85
	4th week††	7.98	*35.22	*151.07	502.34
	Control	7.51	25.29	117.91	383.0
	2nd week†	7.52	30.67	117.01	443.5
	3rd week††	7.45	*32.13	*173.93	395.8
	4th week††	7.85	*34.02	*173.99	463.65

† = Administration of drug

†† = Blank period

* = Highly significant change from control, $p < .01$

TABLE II : Showing mean values of pancreatic analysis over a period of four weeks on feeding the thyroxin free thyroid extract and the significance of difference from control.

Dosage of thyroid extract	Period in weeks	pH	Volume in ml	Bicarbonate (meq/l)	Amylase activity (unit/ml)
a. 1.8 gm/day orally for one week=3 dogs	Control	7.66	22.83	107.0	443.53
	2nd week†	7.91	18.0	89.8	408.95
	3rd week††	7.5	23.41	129.0	359.85
	4th week††	7.58	24.66	*132.0	440.15
b. 2 gm/day orally for one week=3 dogs	Control	7.66	25.82	171.25	661.15
	2nd week‡	7.91	**17.97	161.31	457.87
	3rd week††	7.80	**15.84	**138.27	449.17
	4th week††	7.84	*15.16	**133.53	445.42

† = Administration of thyroid extract

†† = Blank period

* = Significant change from control $p < .05$

** = Highly significant change from control $p < .01$

TABLE III : Showing mean values of the pancreatic analysis over a four weeks period after administration of the whole thyroid extract and the significance of difference from control.

Dosage	No. of dogs	Period in weeks	pH values	Volume in ml	Bicarbonate (meq./l)	Amylase activity (unit/ml)
(10 tabs x 2 mgs each orally daily for a week)	Three	Control	7.30	21.12	160.62	573.0
		2nd week†	7.77	21.08	175.19	593.40
		3rd week††	7.74	22.09	174.03	556.3
		4th week††	7.74	21.59	155.48	574.7

† = Administration of drug.

†† = Blank period.

DISCUSSION

Oral administration of thyroxine causes a significant increase in pancreatic secretory volume bicarbonate content and amylase activity but does not affect pH value. This increase persists for some time even after stoppage of thyroxine (Table I). Several factors may be involved in thyroid pancreatic relationship. An increase in blood flow (5) may have a direct effect on

the secretory cells of the pancreas leading to increased secretion. An alteration in the general metabolism may seemingly affect the activity of secretory cells of pancreas. The increase in jejunal secretion after oral thyroxine in dogs (2) could be due to its similar action on the jejunal secretory cells. This however does not appear to be true for gastric secretory activity which is not affected by the administration of thyroxine. Lastly it could as well be a consequence of release of other hormone like secretion which is in line with Timmer's (11) suggestion that thyroid functions in conjunction with other glands.

A decrease in pancreatic secretory activity due to thyroxine free thyroid extract is suggestive of there being two substances in the thyroid, having opposite action. One is the thyroxine itself and the other is some component of thyroxine free thyroid extract. Similar observations on gastric secretion were reported by us earlier (10). Thus it is likely that the oral administration of the whole extract may not produce any action due to the antagonistic effects of the two components as revealed in this study.

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