THE EFFECT OF HYPERCHOLESTEROLEMIA ON GASTRIC SECRETION
Preliminary Report

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INTRODUCTION

Review of the literature shows that there is not study reported indicating a relationship between acid secretion in the stomach and membrane fluidity of the oxyntic cell. Hypercholesterolemia however is known to reduce membrane fluidity (1,2,3,4). The effect of reduced membrane fluidity on the physiological function of the parietal cell, however has not been studied. We therefore investigated gastric acid secretion in hypercholesterolemicrats.

MATERIALS AND METHODS

41 animals were fed with a diet containing 1% cholesterol, and 47 animals were used as control group and were given normal laboratory rat chow for 12 weeks. At the end of the feeding period 8 rats from each group were used to measure in vivo basal acid output according to the method described previously (5). The remaining animals were used to isolate gastric mucosae according to the method of Rutten and Ito (6). The resting and stimulated acid output of isolated gastric mucosae with 10^{-5}M of acetylcholine (Sigma No. A-6625) and 10^{-4}M of Histamine (Sigma No. H-7250) in subgroups where their specific blockers were used.

The acid outputs were determined by the titration with 0.01 N NaOH.

RESULTS AND DISCUSSION

12 weeks feeding with 1% cholesterol caused a significant elevation in plasma cholesterol levels. The mean cholesterol value increased to 96.41±16.00 from 63.29 ± 8.19 mg/dl ($p<0.01$). However basal acid output showed a significant depression with a decline to 13.3±3.6 mEq/h from the control value of 30.07±8.4 mEq/h ($p<0.001$).

The reason of this hypoacidity appears to be due to the unresponsiveness of receptors on the partietal cell membrane since the response of isolated gastric mucosae from hypercholesterolemic rats to Histamine (10^{-4}M) and Acetylcholine (10^{-5}M) was significantly lower than those of control rats.

Stimulation with acetylcholine caused an abvious increase in the acid output. The mean acid output of control mucosae was 6.66±1.64 mEq/cm^2/h while the response to the same dose of acetylcholine was significantly depressed in hypercholesterolemic rats (5.01±1.28 mEq/h/cm^2, $p<0.01$).

Similar low responses were obtained to Histamine stimulation. Isolated mucosae from control rats gave an increased acid otuput (from 4.51±1.1 mEq/h/cm^2 to 7.82± 1.88 mEq/h/cm^2) while hypercholesterolemic mucosae secreted, 6.01±0.74 mEq/cm^2 acid which is obviously lower than that of control rats.

The acetylcholine stimulated response was not abolished with concomittant application of 10^{-5}M Atropin sulphate to the serosal side while the response to Histamine was partially inhibited with the application of H_2 receptor blocker, Ranitidine.

These results suggest that parietal cells of hypercholesterolemic rats do not recognize properly their agonists and antagonists. The reduced responsiveness of parietal cells must have clinical importance in view of gastric problems. These observations deserve to be considered the treatment of peptic ulcerations with receptor blocking agents, especially of hypercholesterolemic cases.

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