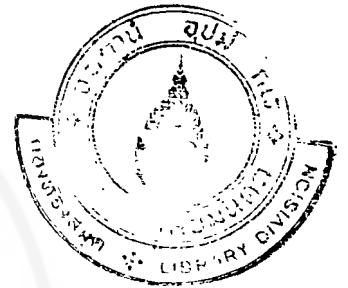


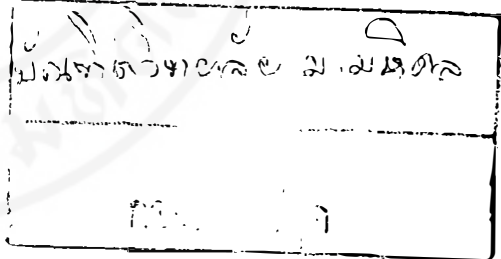
ACUTE EFFECT OF ETHANOL ON GASTROINTESTINAL HANDLING OF
CALCIUM AND WATER

BY

PORNPIMON BOONPIMON



A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENT FOR THE DEGREE OF
MASTER OF SCIENCE
(PHYSIOLOGY)



IN THE

FACULTY OF GRADUATE STUDIES

OF

MAHIDOL UNIVERSITY

Copyright by Mahidol University
1985

ACUTE EFFECT OF ETHANOL ON GASTROINTESTINAL HANDING OF CALCIUM AND WATER

Pornpimon Boonpimon

Department of Physiology, Faculty of Science, Mahidol University

Rama VI Rd., Bangkok 10400, Thailand.

ABSTRACT

The acute effect of 3 g/kg BW 20% ethanol administered intragastrically on the gastrointestinal fluid and calcium absorption was investigated in female Fisher rats. The animals were fasted for 18-20 hr before study with access to water.

From the in vivo studies, ethanol administration one hour before removal of the gastrointestinal tract resulted in a decrease in net absorption of fluid and calcium in both the stomach and small intestine which was partly due to ethanol induced gastric retention of test solution. Moreover, when 2 μCi ^{45}Ca given intravenously at 0 min was used to indicate calcium secretion, ethanol was found to significantly enhance the transport of calcium from blood to lumen both in the stomach and the small intestine.

To quantitate the calcium fluxes across the small intestine in control and ethanol-treated animals, the in situ intestinal loop experiment was performed 60 min after intragastric administration of ethanol. The mucosal calcium accumulation was first determined. It was found that mucosa ^{40}Ca content was higher in ileum than in duodenum. However the mucosa ^{45}Ca accumulation during the 30 min incubation period was the same in both segments, indicating that the disappearance of ^{45}Ca from lumen in the present experimental condition could be used to represent the movement of calcium from lumen to plasma (Ca_{L-p}).

The results of in situ experiment demonstrated that under control condition, the net absorption in duodenum (1.68 ± 0.13) was greater than that in the ileum (0.84 ± 0.11) because of a higher rate of Ca_{L-p} flux. Ethanol administration inhibited the net calcium absorption in the duodenum from 1.68 ± 0.13 to 0.12 ± 0.29 $ug/cm^{-1} \cdot 30 \text{ min}^{-1}$ ($P < 0.001$) by decreasing the Ca_{L-p} flux from 3.10 ± 0.28 to 2.21 ± 0.12 $ug/cm^{-1} \cdot 30 \text{ min}^{-1}$ ($P < 0.01$), while having no effect on the Ca_{p-L} flux. On the other hand, ethanol administration completely inhibited the net absorption on calcium and induced net calcium secretion in the ileum. The Ca_{p-L} was increased from 1.20 ± 0.19 to 2.49 ± 0.43 $ug/cm^{-1} \cdot 30 \text{ min}^{-1}$ ($P < 0.01$) while the flux in opposite direction was not changed.

Thus it could be concluded that acute ethanol administration induced gastric retention of test solution and stimulate gastric calcium secretion. In the small intestine, the reduction in net absorption of calcium after ethanol administration was due to a suppression of Ca_{L-p} flux in the duodenum and an increase in Ca_{p-L} flux in the ileum.