

THE RESULTS OF BASAL AND POST PENTAGASTRIN GASTRIC SECRETORY STUDIES IN APPARENTLY HEALTHY SUBJECTS, A PRELIMINARY COMMUNICATION

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Abstract

Pentagastrin stimulated gastric secretory studies were carried out in 26 apparently healthy subjects. Each specimen of gastric juice was analysed for volume, pH, total acidity and major electrolytes. The data was analysed and compared with other published reports.

Introduction

'Acidity' is a common feature in patients who present themselves with various abdominal problems. No studies are available on gastric secretions of the local population. An attempt was therefore made to study and record the normal gastric secretory patterns in apparently healthy subjects in Karachi.

Material and Method

The subjects were selected at random from the hospital population who were admitted for minor medical or surgical problems such as anxiety neurosis, anal fistula, haemorrhoids and hydrocele. Care was particularly taken that none of them had any abdominal symptoms.

Pentagastrin stimulated gastric secretory studies were carried out in 26 subjects. Twenty two of the 26 subjects (82%) were males with an average weight and height of 51.8 Kg and 161.5 Cms respectively and four females (18%) with an average weight of 48 Kgm. The average age of the subjects studied was 35.8 years.

Collecting Technique:

Each patient was fasted over night (10-12 hours) and all medications stopped 24 hours prior to the testing. Psychic influences stimulating or inhibitory were avoided by performing gastric analysis in a quiet room devoid of odour, light or conversation about food. The patient was seated comfortably and radiopaque nasogastric tube introduced after explaining the procedure to the patient in order to obtain full cooperation. Fluoroscopic tube placement was done in the first few patients to ensure that the tip of the tube rested in mid antral portion of the stomach. The patency of the tube was checked from time to time by injecting air.

The stomach was aspirated and the aspirate was discarded. Basal secretions were collected every 15 minutes interval for an hour and then pentagastrin 0.6 microgram per Kg body weight was injected subcutaneously. Pentagastrin stimulated gastric secretions were collected at 15 minutes interval for 90 minutes.

Each specimen was analysed for volume, pH, major electrolytes, total acidity and physical characters on the same day.

Results

The average volume of gastric juice under basal condition was 23.8 ml; 24.6 ml in males and 19.3 ml in females (as shown in the accompanying table). The average pH recorded was 2.99, 2.90 in men and 3.48 in women and the average total acidity was 6.89 meq/hour; 7.56 meq/hour in males and 3.20 meq/hour in females. Following stimulation of gastric secretion by pentagastrin, the average volume rose to 36.89 ml, the pH values changed to 1.74 and the total acidity increased to 23.22 meq/hour (Fig. 1). The basal and post pentagastrin gastric secretory volume is shown in Fig. 2. Figure 3 shows the change in pH values during maximal gastric secretion. The comparison between total acidity during basal conditions and after maximal stimulation is shown in Fig. 4. Sodium and Potassium changes during basal and after maximal stimulation are projected in Fig. 5.

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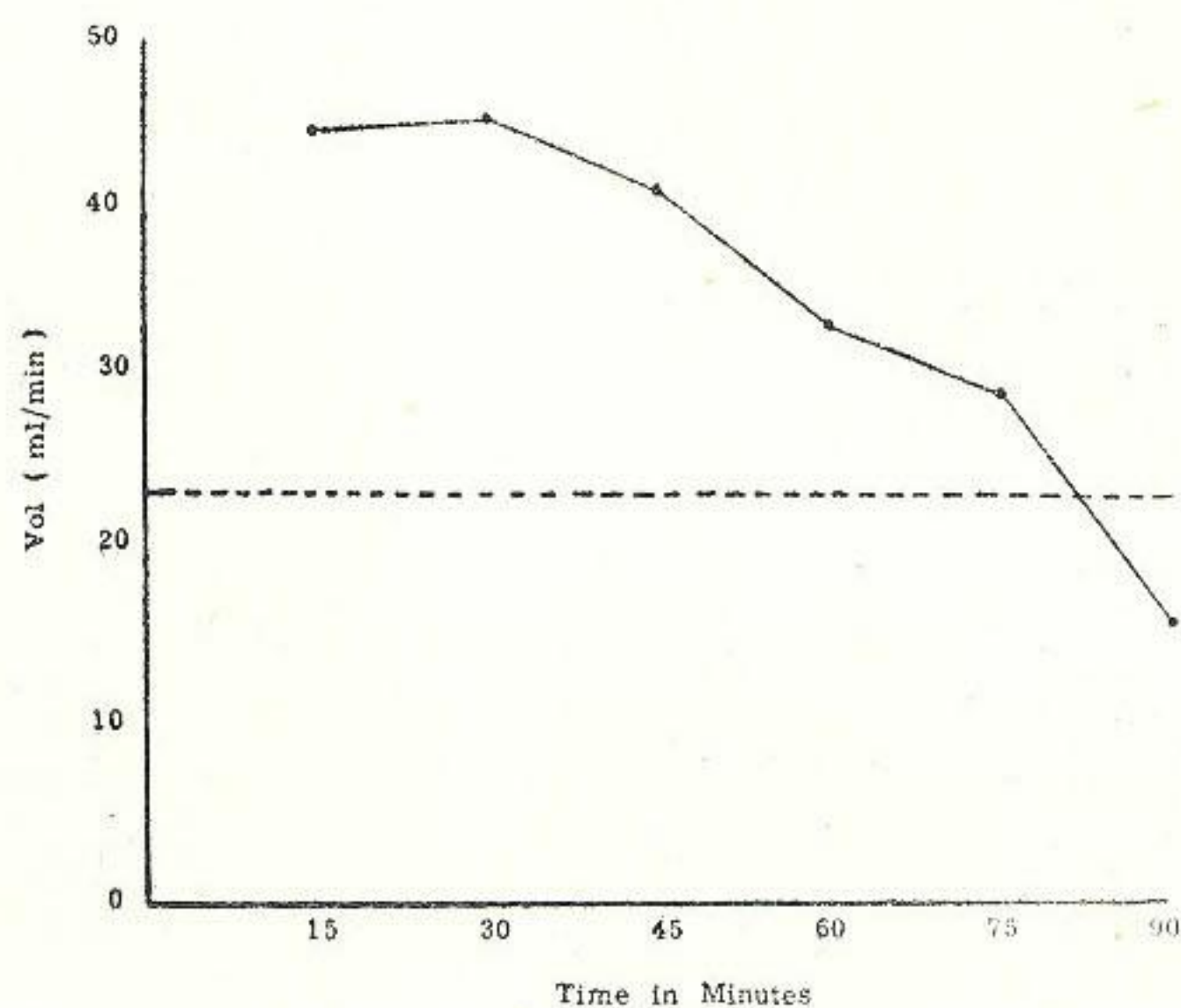


Fig. 1: Basal and Post Pentagastrin Gastric Secretory Volume.

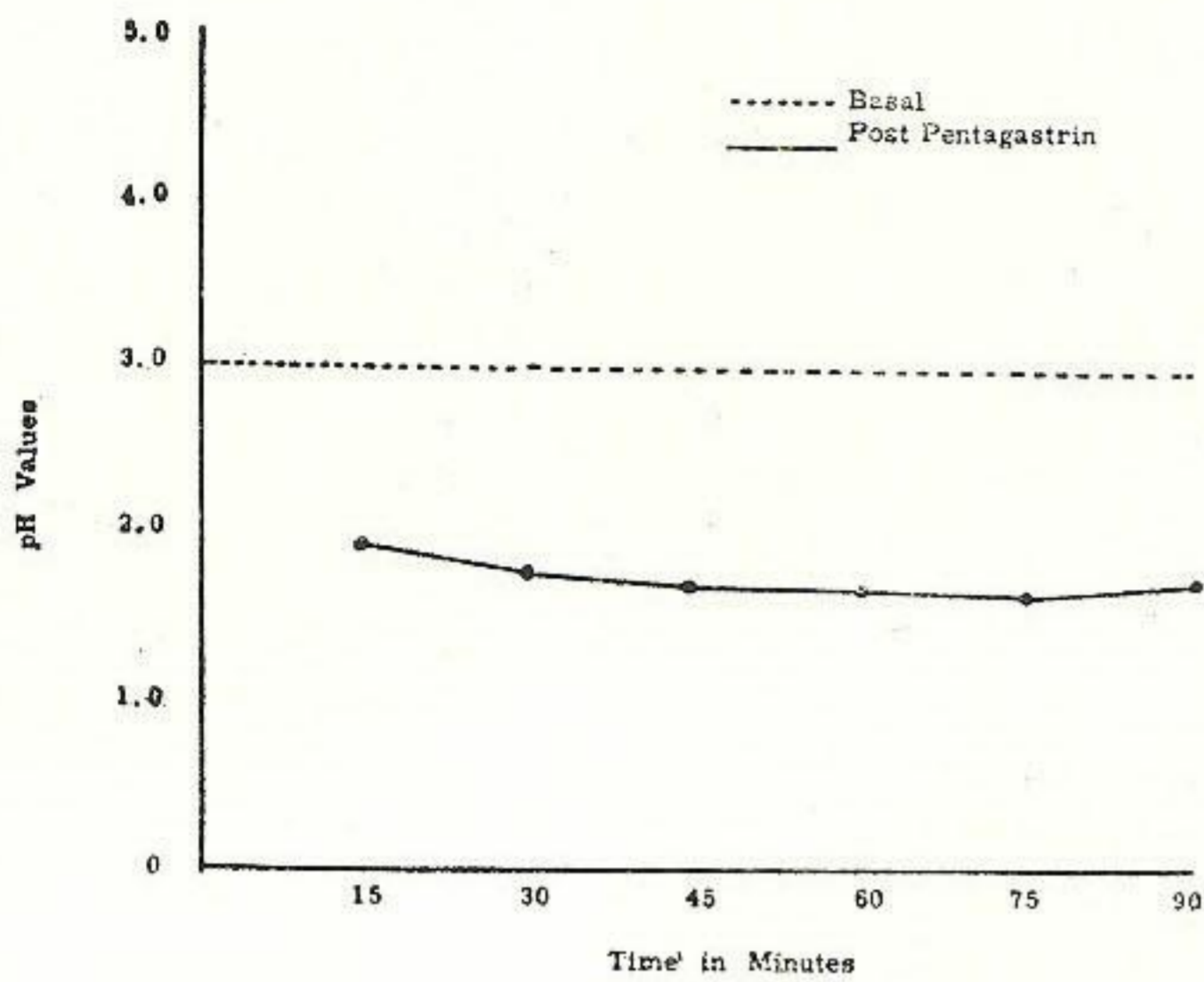


Fig. 2: pH Values in Basal and Post Pentagastrin Gastric Secretion.

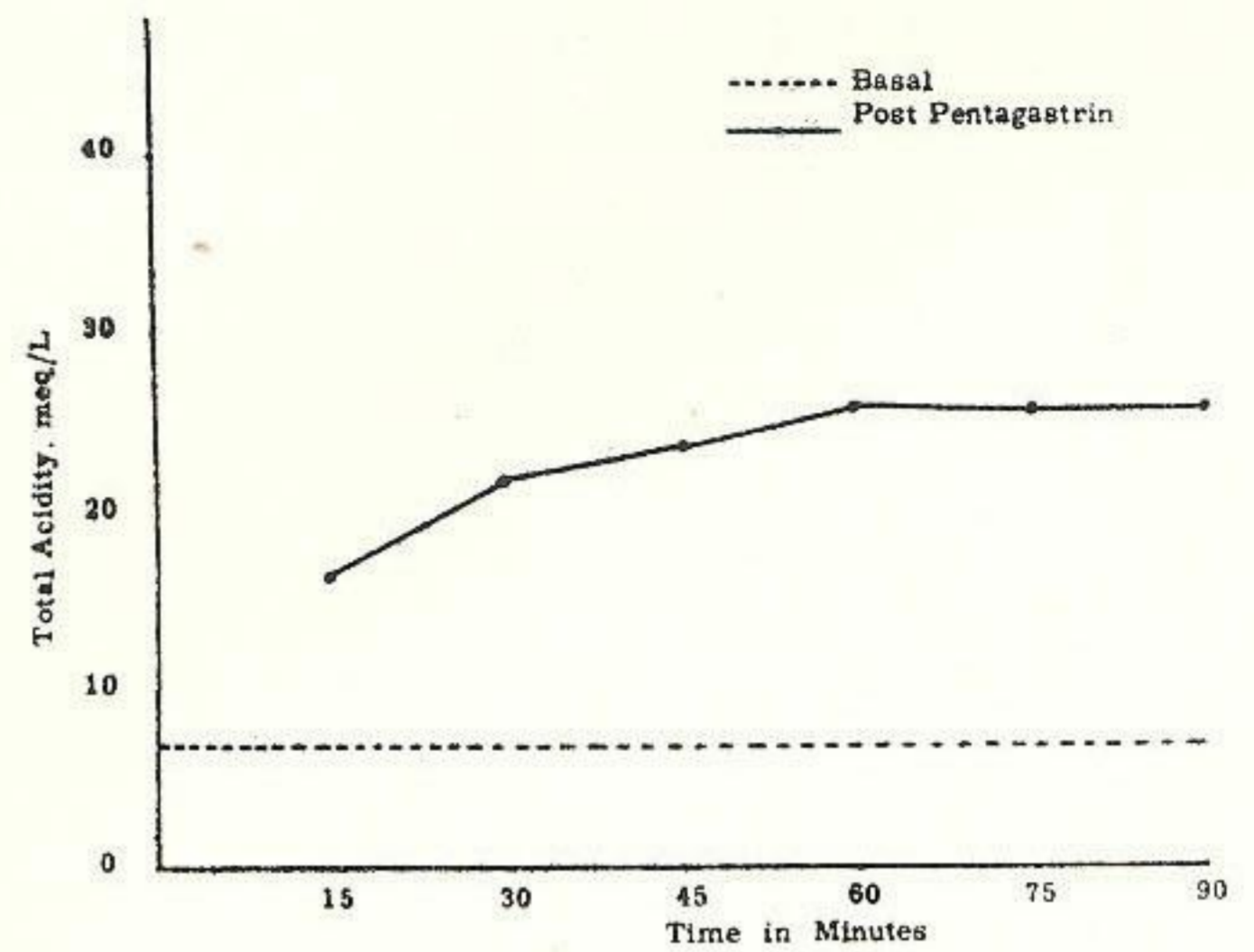


Fig. 3: Mean±S.E. of Volume, pH, Total Acidity, Na and K of Gastric Secretion in Basal and after Pentagastrin Injection.

Table: Mean±S.E. of Volume, pH, Total Acidity, Na and K of Gastric Secretion in Basal and after Pentagastrin Injection.

Parameters	BASAL			AFTER PENTAGASTRIN		
	Male	Female	Total Normal Subjects	Male	Female	Total Normal Subjects
Volume	24.62±1.47 (22)	19.38±8.14 (4)	23.81±1.41 (26)	38.44±2.51 (22)	28.42±3.72 (4)	36.89±2.29 (26)
pH Values	2.90±0.23 (22)	3.48±0.62 (4)	2.99±0.21 (26)	1.73±0.09 (22)	1.81±0.05 (4)	1.74±0.08 (26)
Total Acidity meq/L	7.56±1.59 (22)	3.20±1.08 (4)	6.89±1.39 (26)	23.75±1.38 (22)	20.30±2.51 (4)	23.22±1.24 (26)
+ Na meq/L	71.64±1.67 (22)	70.0 ±6.18 (4)	71.38±1.65 (26)	43.09±1.94 (22)	49.50±5.72 (4)	44.08±1.87 (26)
+ K meq/L	13.92±0.35 (22)	14.58±0.65 (4)	14.02±0.31 (26)	15.19±0.33 (22)	15.75±0.34 (4)	15.27±0.29 (26)

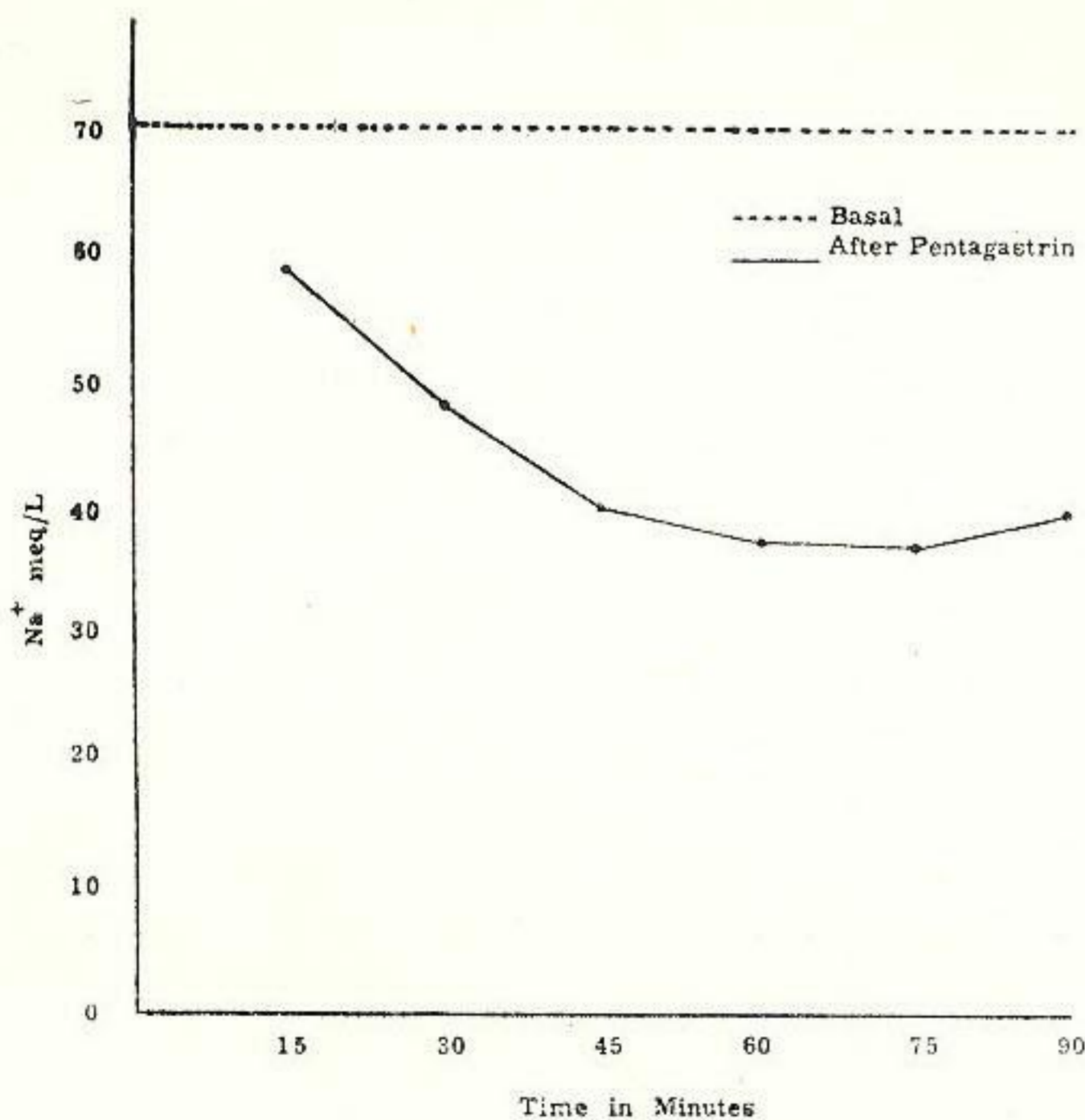


Fig. 4: Total Acidity in Basal and Post Pentagastrin Gastric Secretion.

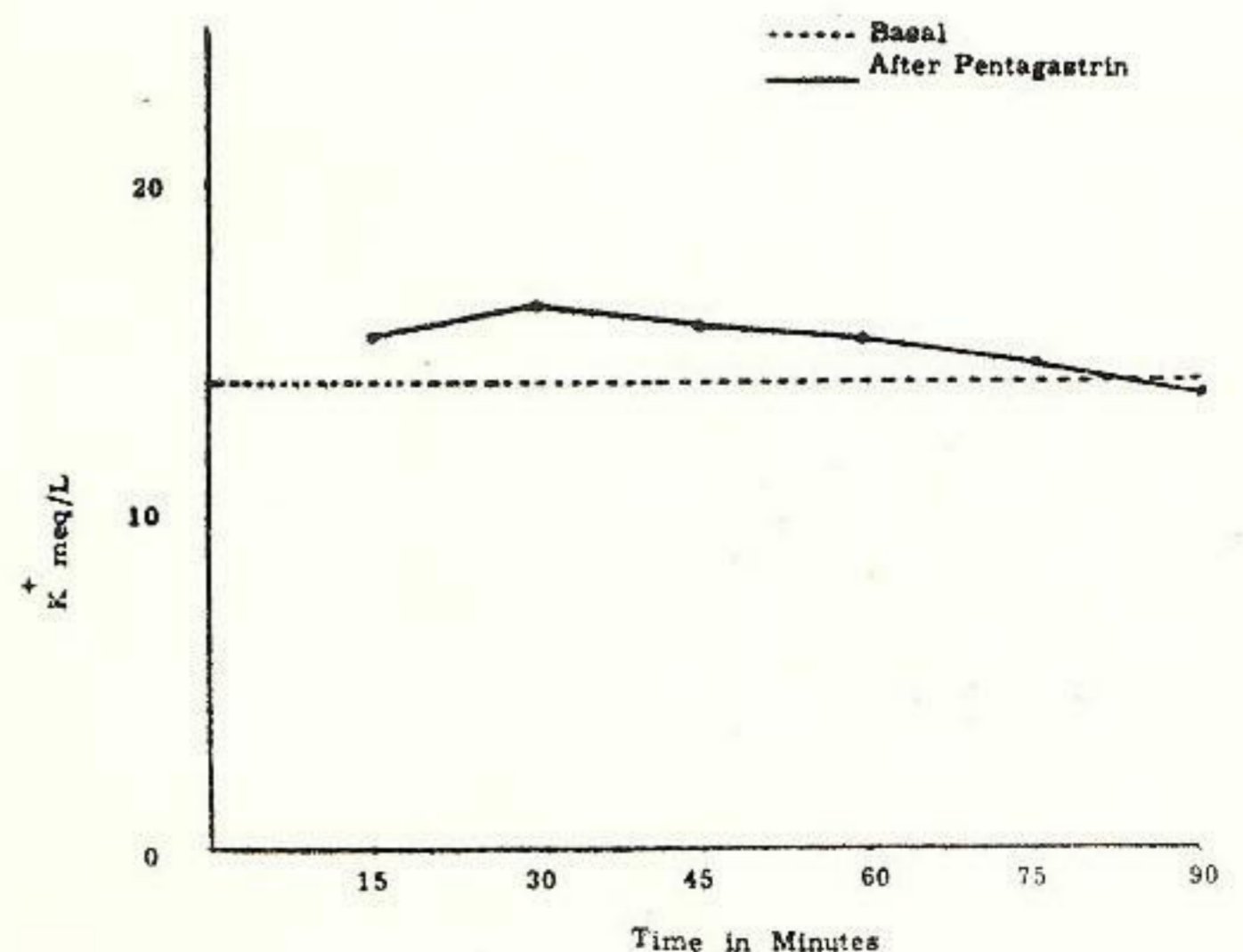


Fig. 5: Sodium Content of Gastric Juice in Basal and after Pentagastrin Injection.

Discussion

The basal gastric secretory study is a quantitative test and provides information on the output of acid under basal conditions. Excessive gastric secretion under basal conditions might indicate the presence of Zollinger Ellison Syndrome. The effect of various drugs on the acid production could also be determined by studying the basal gastric secretion. The mean concentration and out put of acid under basal conditions is higher in patients with duodenal ulcer although there is a considerable overlap between the normal and duodenal ulcer patients.

Since the introduction by Kay (1953) of augmented histamine test a number of agents other than histamine have been employed to stimulate maximal secretion from gastric cells. Pentagastrin a synthetic derivative of gastrin is a potent stimulant of gastric secretion (Abernethy et al., 1967; Makhlof et al., 1966) and probably acts directly on parietal cells. The maximal acid out put produced by pentagastrin is comparable to histamine or histalog and is yet devoid of serious side effects. The results of a single injection in a dose of 6 microgram per Kilogram are reproducible and response appears much earlier than with either histamine or histalog. The gastric secretory data in apparently healthy subjects is variable in different studies on account of selection of subjects. The gastric acid secretory capacity is decreased with advancing age with consequent reduction of acid.

The average volume of gastric secretion over a period of 60 minutes under basal conditions was 23.8 ml in the present study while a higher figure of 56 to 79 ml (± 33) have been reported by Western workers. There is considerable increase in the volume of gastric secretion following maximal stimulation with pentagastrin and the results are comparable as far as the percentage of increase is concerned.

The basal acid out put in healthy subjects has been reported as 1.2 to 2.4 mEq/hour and the upper limit of normal was 4.1 to 6.6 mEq/hour (Baron 1970). The basal acid out put recorded in the present study was 6.8 mEq/hour which is higher than that reported by others.

The normal maximal acid out put (MAO) after augmented histamine test is approximately 20 mEq/hour, 25 mEq/hour after pentagastrin injection which compares favourably with the present figure of 23.2 mEq/hour (Baron 1970).

Sodium is an important constituent of gastric juice and consistently declines in concentration after stimulation of gastric secretion (Hirschowitz 1961). Similar decrease in sodium concentration was observed in the present study after maximal stimulation with pentagastrin

injection. The mean basal concentration of sodium was 71.3 mEq/L while the values dropped to 44.08 mEq/L after maximal stimulation. The concentration of potassium in gastric juice is 3-4 times that of the plasma and the concentration increases with maximal stimulation of gastric secretion (Hirschowitz 1961). The mean basal concentration of potassium was found to be 14.02 mEq/L which increased to 15.27 mEq/L following pentagastrin injection.

Acknowledgement

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