GASTRIC FUNCTION IN NORMALS AND IN MALNUTRITION

G. L. PUROHIT AND J. C. SACHDEV.*

Department of Physiolgy, M. G. M. Medical College, Indore.

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INTRODUCTION

These days the tubeless technique of gastric analysis by ion exchange resins and the study of gastric functions by uropepsin and pepsin estimations in blood is becoming very popular but the classical method of gastric analysis still holds an important position in giving information about the gastric secretory response to a test meal.

Several workers, Bennet and Ryle (1922), Rufkin and Dick (1922), Vanzant(1932), and Bockus(19 43)have reported the fractional analysis values in normal persons in response to a test meal. On analysing these reports we find that gastric acidity shows wide variations with height, age, diet, body built and the environmental conditions. With so many variable factors affecting the gastric secretion, it is not possible to utilise European figures and standards for Indians. The values have been reported by Napier and Dasgupta (1933), Napier and Dharmendra (1936) and Napier and Choudhry (1938), for Indian population in Assam and Bengal but no figures are available for this part of the country.

Malnutrition is very common in India and has been the subject of study of its different aspects by various workers. Its relation to gastric secretion and cytology has not been definitely established.

METHODS AND MATERIALS

Seventy five normal, healthy young medical students were selected for the normal series. All these subjects were previously examined to exclude any disease.

The cases under the malnutrition series (25 cases) were selected from the medical wards of M. Y. Hospital Indore, and those having malnutrition associated with other diseases were not included in this series.

Fractional test meal studies were undertaken by the technique outlined by Napier and Dasgupta using 50 c.c. of seven percent alcohol as test meal.

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*Present address: Principal, Medical College, Jabalpur.

All the samples were analysed for free and total acidity, chlorides, blood, bile and the gastric sediments. Free and total acidity was estimated by titrating with N/10 NaOH using Topfer's reagent (for free acidity) and phenolphthalein (for total acidity) as indicators. The chloride content of the samples was estimated by the "Whitehorns" method using ferric alum as the indicator. The gastric sediments were precipitated by alcohol ether mixture and the smear staining was done by Papanicolaou's technique (1942). In case of malnutrition the total blood count and the plasma protein estimations were also done.

RESULTS

The results of investigation are represented in the following table :—

	Normal Series.		Malnutrition Series.	
	Average.	Range.	Average.	Range.
1. *Fasting Juice* :				
(i) Quantity	35.53 c.c.	7-120 cc.	15 c.c.	2-34 cc.
(ii) Free acidity units	22-46	0-67	8	0-28
(iii) Total ,, ,,	31.25	2-72	15.5	2-34
(iv) Chloride in gms. per cent	0.75	0.2-1.2	1.7	0-1-0.9
2. *Fractinoal Analysis* :				
A. Maximum Values :				
(i) Free acidity units	38.24	14-96	15	0-36
(ii) Total acidity ,,	46.74	18-102	20	2-46
(iii) Chloride in gms. per cent	0.75	0.5-1.2	0.7	0.3-1.1
B. *Minimum Values* :				
(i) Free acidity units	14	0-46	8	0-24
(ii) Total acidity ,,	18	2-46	11	2-30
(iii) Chloride in gms. per cent	0-4	0.1-0.9	0.25	0.1-0.4
C. Time for maximum acidity level.	1 hr. 13 min.	½ hr.-2 hr.	1 hr. 20 min.	1-2 hrs.
D. Minimum acid level after the acid peak.	2 hr. 15 min.	1½-2 hrs.	2 hrs. 15 min.	1½-2½ hrs.
3. *Residual Juice* :	14.46 c.c.	1-30 c.c.	5.5 c.c.	1-20 c.c.
4. *Cytological Examination of the gastric sediments* :				
Bacteria	80%		84%	
Epithelia	88%		68%	
Leucocytes	89%		80%	
Mucous	100%		100%	

It would be observed that the values for the quantity of fasting juice, its free and total acidity and chloride content and the minimum free and the total acidity were diminished in malnutrition cases as compared to the values observed in normal subjects.

An analysis of the results showed that in 65 per cent of the normal subjects the quantity of fasting juice was less than 40 c c. and in 35 per cent of the cases it exceeded this limit; while in malnutrition series, this was less than 20 c.c. in 92 percent of the cases.

The free acidity in the fasting juice was found to be less than 30 units in 75 per cent of the normal subjects and out of this 12 per cent of the subjects had no free acidity in their fasting juice samples, on the other hand 76 per cent of the patients suffering from malnutrition the values were less than 20 units and in 28 per cent of these no free acid was detected in the fasting juice.

The maximum free acidity after the test meal was found to be less than 60 units in majority of the normal subjects and in only 10.6 percent of the cases higher figures were obtained. Eight percent of the cases showed complete achlorhydria and there was no response to the test meal. In patients suffering from malnutrition the maximum free acidity in 92 percent did not exceed 30 units.

It took about 1-1½ hours for the free acidity to reach its maximum in both groups of the cases.

The quantity of the residual juice was less then 20 c.c. in 76 percent of the normal subjects as against the value of less than 10 c.c. in 48 percent of the cases.

DISCUSSION

The values for the normal series are not markedly different from those reported by other workers. The range for these values is, however, wide in our series which may be attributed to variations in the dietetic habits. There was no evidence of the delayed emptying in these cases.

The values in cases of malnutrition patients are much below our normal averages and may be due to decreased secretory response in these cases.

It was found that the reduced acidity was associated with low R. B. C. count and anaemia. When average R. B. C. count was 2.5 million per c. mm. and haemoglobin 8 gms. percent, the average free acidity was 7.5 units; with R. B. C. count three million per c. mm. and haemoglobin 9.2 gms. per cent, it was 9.5 units; when R. B. C. count was 3.5 million per c. mm. and haemoglobin 9.8 gms. percent the free acidity was 16 units; with R. B. C. count 4 millions per c. mm. and haemoglobin 11 gms. percent

average value for free acidity was 18 units and in cases having values higher than this, the average free acidity was found to be 12 units. It had no relation to the plasma proteins as in cases when the proteins were diminished, and the R. B. C. count was normal there was no reduction in acidity.

The maximum acid level time in the malnutrition series was similar to that of the normals. The residual juice was also diminished in malnutrition series and may be explained on the same basis. Smear examination does not seem to be valuable in these cases.

SUMMARY

Fractional gastric analysis and cytological examination of the gastric sediment by Papanicolaou's technique was done in 75 normals and 25 malnutrition cases.

The value for the quantity of fasting juice, its free acidity, total acidity and chloride content, maximum free and total acidity and chloride content of juice after the test meal was diminished in malnutrition cases when compared to the values observed in normal subjects.

No conclusive results could be obtained from the cytological studies of gastric sediment.

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