

# HISTAMINE AND MAST CELL STUDY IN THE GASTRIC TISSUE OF SOUTH INDIAN PATIENTS SUFFERING FROM DUODENAL ULCER WITH PYLORIC STENOSIS

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**Summary :** Patients undergoing surgery for pyloric stenosis secondary to duodenal ulcer were the subjects for the study. Two pieces of full thickness gastric wall (all coats) were obtained at laparotomy. The pieces were immediately split into two halves. One of these was used for histamine assay where as the othe was used to study the mast cell population. Histamine content and mast cell population was found to be less in gastric mucosa of our patients as compared to values from normal human gastric mucosa. There was lack of correlation between mast cell population and histamine content which suggests that there could be some other storage sites for histamine.

**Key words :**

histamine

mast cells

## INTRODUCTION

The demonstration of two types of histamine receptors and studies with specific  $H_1$  and  $H_2$  receptor antagonists have confirmed that histamine plays a central role in gastric acid secretion and pathophysiology of ulcer formation (1). Mast cells which are important sources of tissue histamine (7) are abundant in human gastric tissue (5) but quantitative data on histamine content and mast cell population in ulcer patients is not adequate. In this communication an attempt has been made to report on the histamine

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content and mast cell population of gastric mucosa of patients suffering from duodenal ulcer with pyloric stenosis.

### MATERIAL AND METHODS

Thirteen male and two female patients between ages of 22 and 45 years suffering from pyloric stenosis secondary to duodenal ulcer were the subjects of this study. The patients were suffering from severe gastric outlet obstruction and operative procedures like gastrojejunostomy and vagotomy were required to be done for the definite treatment of the disease. While the patients were undergoing surgery, two pieces of full thickness of gastric wall (all coats), of the size  $1.5\text{ cm} \times 0.5\text{ cm}$  from the two ends of stomal edges at points 'A' and 'B' (Fig. 1) were removed. Since the patients were undergoing surgery for the definite treatment of the disease, removal of the pieces from the edge of stoma before completion of anastomosis did not impose any extra risk for the patient. The edge 'A' was located in the antrum while the edge 'B' was located in the body of the stomach. Procedure of biopsy was identical in all instances.

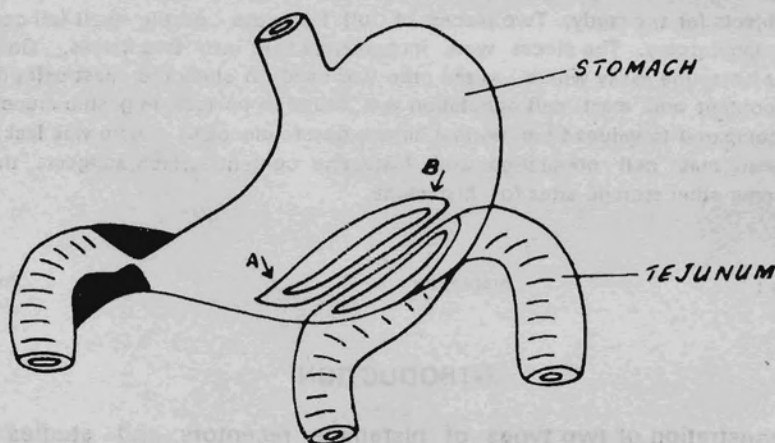


Fig. 1 : A and B indicate the points at which full thickness of gastric wall  $1.5\text{ cm} \times 0.5\text{ cm}$  was removed in cases of duodenal ulcer with pyloric stenosis.

The pieces were immediately split into two halves. One half was transferred to normal saline for histamine assay and the other half was kept in 4% aqueous solution of basic lead acetate for 48 hrs after a wash in normal saline to study the mast cell population. Routine histological procedures were followed and  $10\ \mu$  thick sections were made and stained in 1% aqueous solution of toluidine blue for 1 min. The mast cells were

counted under high power objective and expressed for 1 mm<sup>2</sup> area of the gastric tissue as described by other workers (8).

For histamine assay the tissue was weighed and extracts prepared as per method of Feldberg *et al.* (2) for the mucosal and seromuscular layers separately. The amount of histamine was determined by bio-assay on the isolated terminal ileum of the guinea pig. The histamine content in each layer was expressed as micrograms of histamine base/gm wet weight of tissue.

## RESULTS

The results are summarised in Table I. Histamine content in our patients was higher in the mucosa than in the seromuscular layer of the body as well as the antrum of the stomach. The increase was found to be statistically significant ( $P < 0.02$ ) in the antrum while it was insignificant in the body ( $P > 0.2$ ).

TABLE I: Histamine content ( $\mu\text{g/g}$ ) and mast cell population (number/mm<sup>2</sup>) of gastric tissue obtained from patients suffering from duodenal ulcer with pyloric stenosis.

Values are mean  $\pm$  SE

	<i>Seromuscular</i>		<i>Mucosal layer</i>	
	Histamine	Mast cells	Histamine	Mast cells
Body	21.64 $\pm$ 5.19 (n=15)	71.54 $\pm$ 8.99 (n=13)	34.23 $\pm$ 6.56 (n=15)	68.35 $\pm$ 12.20 (n=14)
Antrum	15.96 $\pm$ 3.27 (n=14)	69.80 $\pm$ 9.54 (n=13)	32.93 $\pm$ 5.73 (n=15)	87.50 $\pm$ 13.50 (n=15)

n = Number of patients

With regard to mast cell population there was little difference between seromuscular and mucosal layers of the body of the stomach. In the antrum the mast cells were more in number in the mucosa than in the seromuscular layer but the difference was statistically insignificant ( $P > 0.05$ ).

The correlation coefficient (r) between mast cell population and histamine content was found to be + 0.2037 and + 0.1788 in the body and antral mucosa respectively.

## DISCUSSION

As indicated by the results, histamine content in our patients was significantly

higher in the mucosa than in the seromuscular layer of the antrum of the stomach and was insignificantly higher in the mucosa than the seromuscular layer of the body of the stomach. Our results are similar to those of Liavag *et al.* (4) who reported higher histamine content in the mucosa of the antrum than in the muscular coat of the gastric wall in duodenal ulcer, gastric ulcer and gastric cancer patients. The control values of histamine content of human gastric body mucosa as mentioned by Trodil *et al.* (9) are  $42.6 \mu\text{g/g}$  of tissue. In our patients the histamine content of gastric body mucosa was  $34.23 \pm 6.56 \mu\text{g/g}$  (Table I). Comparing our results with the above control values there is definite decrease in mucosal histamine content of the body of the stomach in our patients. Further Ganguly and Gopinath (3) have reported reduction in gastric tissue histamine following pylorus ligation in rats. Since our patients were suffering from pyloric stenosis secondary to duodenal ulcer, our results are comparable with these findings. Riley and West (7) reported decrease in tissue histamine content following increased histamine liberation by these tissues as a result of administration of histamine liberators like stilbamidine and D-tubocurarine. Keeping in view the findings of Riley and West (7) and the decrease in histamine content of the body of stomach in our patients, it is concluded that increased histamine release from the gastric mucosa occurs in patients of duodenal ulcer with pyloric stenosis.

With regard to mast cell population there was little difference between seromuscular and mucosal layers of the stomach. The number of mast cells in seromuscular layer of the body of the stomach was  $71.54 \pm 8.99$  and in the mucosal layer was  $68.35 \pm 12.20$ . Whereas in the antrum of the stomach the mast cells were  $69.80 \pm 9.54$  in seromuscular layer and  $87.50 \pm 13.50$  in the mucosa. The difference was statistically insignificant ( $P > 0.05$ ). Very little work has been done on the mast cell population of human gastric mucosa. However, Rasanen (6) has found  $135 \pm 36$  mast cells/ $\text{mm}^2$  area of normal human gastric mucosa. When compared with these values, the mucosal mast cell population of the body as well as the antrum are significantly less in our patients suffering from duodenal ulcer with pyloric stenosis. This reduction in mast cell population may be due to loss of metachromasia of mast cells and may be considered as an evidence of enhanced histamine release by gastric mucosal mast cells in duodenal ulcer patients.

The correlation co-efficient ( $r$ ) between mast cell population and histamine content was found to be  $\pm 0.2037$  and  $0.1788$  in the body and antral mucosa respectively. The lack of correlation between mast cell population and histamine content in the mucosa of the corpus and antrum of the stomach found in this study suggests that apart from mast cells, there could be some other important storage sites for histamine in human gastric mucosa.



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