ANTRAL AND DUODENAL DISACCHARIDASES IN PATIENTS OF DUODENAL ULCER AND NON-ULCER DYSPEPSIA

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ABSTRACT

Duodenal ulcer is a common disease and is considered acid-peptic disease. Duodenal ulcer patients are known to have higher incidence of antral gastritis and duodenitis than general population. Thus one can expect some alteration in the enzyme products of mucosal cells of antrum and duodenum in this condition. The present study was planned in 30 patients of duodenal ulcer and 30 of non-ulcer dyspepsia. After overnight fast, upper gastrointestinal endoscopy was done using forward viewing fibreoptic endoscope. Two pairs of biopsies were taken from the antrum and two from the descending duodenum using standard biopsy forceps. One pair of biopsy from each site was taken in 10% formal saline for histopathological examination. One pair of biopsies from each site was collected in saline for the measurement of disaccharidases by Dahlquist method. Activities of lactase, sucrase and maltase were significantly higher in descending duodenum mucosa as compared to antral mucosa in both groups. Activities of these enzymes in antrum and duodenum of both groups did not differ significantly. No significant difference was found in disaccharidases in antrum and descending duodenum in patients with or without histological gastritis. This study suggests that the disaccharidases do not change in antrum and duodenum of ulcer patients as compared to the patients with non-ulcer dyspepsia.

KEYWORDS

Disaccharidases, antrum, duodenum, duodenal ulcer, non-ulcer dyspepsia.

INTRODUCTION

Duodenal ulcer patients are known to have higher incidence of antral gastritis and duodenitis than general population (1,2,3). Peptic ulcer is considered a symptom of underlying ulcer diathesis (1) and mucosal changes are more extensive than just ulcer formation in stomach and duodenum (3). Antritis associated with duodenal-ulcer is mild to moderate in intensity whereas with gastric ulcer antritis tends to be more severe and occasionally associated with antral gland disruption or atrophy or intestinal cell metaplasia (2). As duodenal ulcer is associated with gastric metaplasia of antral epithelium and intestinal cell metaplasia of duodenal epithelium, alteration in enzyme activities at these sites can occur. Increased levels of brush border enzymes in antrum were documented earlier in duodenal ulcer patients (1). Jonson & Bodemar (4) reported that disaccharidase activities in duodenal bulb were inversely proportional to severity of inflammation. But there is not a single report

available in the literature from North India showing the effect of duodenal ulcer on disaccharidases of antrum and duodenum biopsies. Therefore, the present study was undertaken to estimate antral and duodenal disaccharidases in North Indian patients of duodenal ulcer and non-ulcer dyspepsia.

MATERIALS AND METHODS

Thirty patients of duodenal ulcer (study group) participated in this study. These were documented by flexible fibreoptic endoscopy that was done at the department of Gastroenterology of PGIMER, Chandigarh. Another set of 30 patients of non-ulcer dyspepsia was enrolled comprising the control group. Non-ulcer dyspepsia was defined as dyspepsia of at least 3 months duration where clinical evaluation revealed no organic disease that could be responsible for dyspepsia and upper gastrointestinal endoscopy showed no evidence of acute or chronic peptic ulceration, malignancy, esophagitis, erosive or non-erosive gastroduodenitis (5). All patients were enrolled from medical out patients of Department of Gastroenterology at PGIMER, Chandigarh. They underwent stool examination on three consecutive days to rule out giardiasis or any other intestinal parasites. Patients who had taken H₂-blockers, proton pump inhibitors or antacids on regular basis in two weeks preceding the date of upper gastrointestinal

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endoscopy, suffering from malignancy, giardiasis, idiopathic ulcerative colitis, celiac disease, tropical sprue or any other disease known to affect the activities of enzymes were excluded from the study.

Sampling Procedure:

The patients were kept fasting overnight and endoscopy examinations were performed after taking an informed consent from all patients. Upper gastrointestinal endoscopy was done using a forward viewing fiberoptic endoscope. Esophagus, stomach and duodenum (upto descending duodenum) were examined carefully in every patient and findings were recorded. Two pairs of biopsies (from each portion) were taken from the antrum and descending duodenum using standard biopsy forceps. One pair of biopsies from each site was taken in 10% formal saline for histological examination. The other pair of biopsies was collected in saline for enzymatic analyses. Activities of disaccharidases were measured in antral and duodenal biopsies by the method of Dahlquist (6). Proteins were measured by the method of Lowry et al (7). Ethical approval was obtained from the Institute's ethical committee before starting the present study.

STATISTICAL ANALYSIS

Student's unpaired 't' test was applied to determine if the two groups were comparable with respect to age,

duration of symptoms and enzyme levels. To compare enzyme activities between antrum and duodenum of same group, student's paired 't' was used. The effect of age and total duration of symptoms was analyzed by applying Pearson's correction coefficient. The p-value less than 0.05 was taken as significant.

RESULTS

The mean age in the two groups (control vs study) was observed to be comparable ranging from 21-60 years (control group) and 20-71 years (study group). The sex ratio was also comparable in the two groups. The control group included 20 males (66.67%) and 10 females (33.33%), while study group had 24 males (80%) and 6 females (20%) patients. In the control group, all patients complained of abdominal pain and 6 (20%) had history of loose motions at some point during illness. Similarly 28 patients (93.33%) in study group presented with abdominal pain and 6 out of 30 (20%) had history of loose motions. The mean duration of symptoms in control group (34.33 ± 9.63 months) and in study group (37.2 ± 15.55 months) were comparable. The activities of lactase, sucrase and maltase were significantly higher in duodenal mucosa (10.03 ± 1.26 ; 52.88 ± 6.47 ; 97.19 ± 9.27 units/gm protein respectively) as compared to antral mucosa (7.04 ± 0.97 ; 13.20 ± 2.02 ; 39.18 ± 3.47 respectively) in the control group. Similarly, activities of lactase, sucrase and maltase were higher in duodenum as compared

Table I. Comparison of disaccharidases activity in antrum of study and control groups

	Study Group (n=30)	Control Group (n=30)	p-value
Lactase	7.95 ± 0.82	7.04 ± 0.97	>0.05
Sucrase	12.66 ± 1.18	13.20 ± 2.02	>0.05
Maltase	42.59 ± 4.59	39.18 ± 3.47	>0.05
Mean $\pm$ SEM in units/gm protein, No change in disaccharidases in antrum of study & control groups was observed.			

Table II. Disaccharidases activity in descending duodenum of study and control groups

	Study group (n=30)	Control group (n=30)	p-value
Lactase	11.12 ± 1.38	10.03 ± 1.26	>0.05
Sucrase	44.38 ± 4.99	52.88 ± 6.47	>0.05
Maltase	94.77 ± 9.43	97.19 ± 9.27	>0.05
Mean $\pm$ SEM in units/gm protein, No changes in disaccharidases in duodenum of study and control groups were observed.			

Table III. Disaccharidases activity in study group in relation to antral histology

	Normal antral histology (n=8)	Gastritis (n=22)	p-value
Antrum			
Lactase	7.18 ± 1.66	8.22 ± 0.98	>0.05
Sucrase	14.60 ± 1.34	11.96 ± 1.51	>0.05
Maltase	42.24 ± 8.71	42.72 ± 5.65	>0.05
D.Duodenum			
Lactase	13.72±1.70	10.18 ± 1.73	>0.05
Sucrase	48.80±12.59	42.78 ± 5.42	>0.05
Maltase	110.31±30.22	89.12 ± 7.64	>0.05
Mean ± SEM in units/gm protein, (D= descending) No change in disaccharidases in antrum & descending duodenum in relation to normal antral histology and gastritis was observed.			

Table IV. Disaccharidases activity in control group in relation to antral histology

	Normal antral histology (n=14)	Gastritis (n=16)	p-value
Antrum			
Lactase	5.82±0.63	8.11 ± 1.70	>0.05
Sucrase	10.40 ± 1.80	15.65 ± 3.32	>0.05
Maltase	35.75 ± 6.19	42.19 ± 3.69	>0.05
D.Duodenum			
Lactase	8.04 ± 1.13	11.77 ± 2.01	>0.05
Sucrase	41.49 ± 5.07	62.84 ± 10.36	>0.05
Maltase	84.27 ± 13.96	108.50 ± 11.71	>0.05
Mean ± SEM in units/gm protein, (D = descending) No change in disaccharidases in antrum & descending duodenum in relation to normal antral histology and gastritis was found.			

to antrum in the study group at the level of $p < 0.05$. The enzyme activities did not differ significantly in the two groups both in antrum as well as descending duodenum (Tables I & II). Sixteen patients out of 30 (53.3%) in the control group had evidence of gastritis on histopathological examination while 22 out of 30 (73.3%) patients in study group had gastritis. Duodenitis was in similar number of patients (n=2) in both the groups. When enzyme activities were compared in two groups in relation to histology, no significant difference was observed in enzyme levels between normal histology and gastritis in any of the disaccharidases (Tables III & IV). The activities of lactase, sucrase and maltase of antrum and duodenum had no significant correlation with age & duration of symptoms in both control as well as study groups. The enzyme activities were comparable in the males and females in both the groups.

DISCUSSION

Activities of lactase, sucrase and maltase in the antrum and the descending part of duodenum in 30 patients of duodenal ulcer and 30 patients of non-ulcer dyspepsia were studied. Values of enzymes in descending duodenal mucosa were significantly higher than antral mucosa. This was observed in both the study as well as control groups of patients. In human studies, similar results were reported earlier but only in different sets of patients from other countries (8,1,9). Levels of lactase, sucrase and maltase in the antrum did not differ significantly in the two groups in present study. In an earlier study, Vetvik et. al. (1) reported increased activities of brush border enzymes in antral mucosa of duodenal ulcer patients. Thus, the results in the present study are different with that of Vetvik et.al.(1).

No significant difference in the enzyme activities was seen in descending duodenum between the two groups of patients in the present study. This is also in contrast to the study reported earlier (9) where brush

border enzyme levels were decreased in duodenal ulcer patients as compared to controls. Patients in the earlier studies in control group had no duodenal inflammation on endoscopy and histological examination. In contrast, normal endoscopy was taken as inclusion criteria in the control group in our study but histologically inflammation was present in 53% patients in this group. There is close relationship between gastric metaplasia of duodenum and duodentitis. As gastric mucosal cells are known to have lower levels of brush border enzymes, duodentitis is expected to be associated with lower levels of these enzymes. So difference in the criteria for control group of patients from Vetvik's study and the present study might explain the difference of results between two studies.

This indicates that the activity of disaccharidases dose not change due to duodenal ulcers in North Indian population. There may be some other reasons for duodenal ulcer formation, such as entry of more acid from antrum to duodenum and some inflammation in duodenum. Underlying reasons responsible for no change in disaccharidase activity in duodenum may be that the duodenal ulcers in North Indian population are superficial and not affecting in deep to the duodenum epithelium. As the activity of disaccharidases dose not change in duodenum and antrum of duodenal ulcer patients, it cannot be beneficial for treatment of duodenal ulcers. But it shows that at least the activity of disaccharidases dose not change in antrum and duodenum of patients with duodenal ulcers and malabsorption of carbohydrates is not there.

Levels of enzymes were also analysed with respect to age, sex, duration of disease and presence or absence of gastritis on histology. No significant difference in antral or duodenal enzyme activities was observed between the patients having evidence of gastritis on histology and those without gastritis in either group. In earlier study, decrease in brush border enzyme activities with inflammation was found by Vetvik et. al. (1). In their study, they found decreased levels of brush border enzymes in patients with superficial gastritis as compared to atrophic gastritis. None of the patients in the present study had evidence of atrophic gastritis on histology.

There was no decrease or increase to a significant extent in any of the enzyme's activity with age. No significant difference in the levels of any of these enzymes at either site between males and females was observed neither in study group nor in control group of patients. Eariler studies (10,11) have shown similar results. So these findings are as expected from

established characteristics of disaccharidases.

In conclusion, enzyme activities in antrum and descending duodenum in study and control groups did not differ significantly in Indian population in the present study. The levels of the enzymes also did not show any correlation with age and duration of symptoms in either group.

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