

GASTRIC ACID CONTROL, AMYLASE ACTIVITY AND PROTON PUMP INHIBITORS

Charlene Galea, Lilian M. Azzopardi, Anthony Serracino-Inglott, Godfrey Laferla*
 Department of Pharmacy, Department of Surgery*, Faculty of Medicine and Surgery, University of Malta, Msida, Malta
 E-mail: cgal0018@um.edu.mt



INTRODUCTION

Proton pump inhibitors increase gastric pH to ensure healing of duodenal and gastric ulcers. However, this increased pH is also the optimal pH for salivary (S-AM) and pancreatic amylase (P-AM) activity in gastric juice^{1,2}. Could a high amylase level in gastric juice explain dyspepsia in patients who fail to respond to standard PPI treatment?

AIMS

- To quantify total (AMYL) and pancreatic active amylase present in gastric juice samples
- To correlate any relevant patient and drug history with the gastric amylase activity

SETTING

Endoscopy Unit at Mater Dei Hospital, Malta

METHOD

Patients

2 groups of patients were included in the study: patients taking PPIs and those not on PPIs (control patients). Gastric juice samples were collected from patients undergoing a gastroscopy.

Patient Information

- Patient identity
- Past medical history
- Presenting complaint
- Diagnosis
- PPI used
- Still symptomatic
- Compliance to dosing
- Correct dose timing

Reflotron

The Reflotron^{1,2} was used to measure gastric amylase activity in U/L.

Sample		
Beaker A	Beaker B	Beaker C
Nothing else added	30ml buffered gastric juice with pancreatic α-amylase + 10ml of buffered gastric juice	40ml buffered gastric juice 18ml:22ml
Average pH	Average pancreatic α-amylase	
	Average total α-amylase	

Table 1— Summary of method of analysis for gastric α-amylase

Quantitative Analysis

A calibration curve was prepared to confirm the maximum α-amylase activity that the Reflotron could measure in artificial gastric juice, without dilutions. Concentrated samples were diluted with buffered gastric juice to obtain a reading.

RESULTS

Study Population

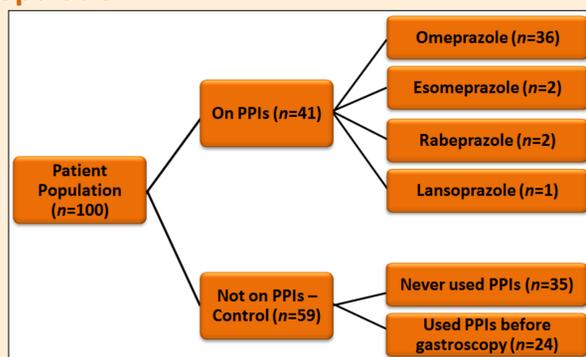


Figure 2: Summary of study population's PPI-use

PPI patients

P-AM and AMYL show significantly higher activity in PPI patients when compared to control patients (p-values <0.05). Amylase activity showed increased results when the patients' pH was above 6.

Control patients

A significant number of patients treated with PPIs, irrespective of the treatment duration, show Rebound Acid Hyper Secretion (RAHS)^{3,4,5} on therapy withdrawal. The increased acid output could be a possible reason for the acid-related symptoms and the decreased amylase activity in the sub-group that previously made use of PPIs.

Diagnosis

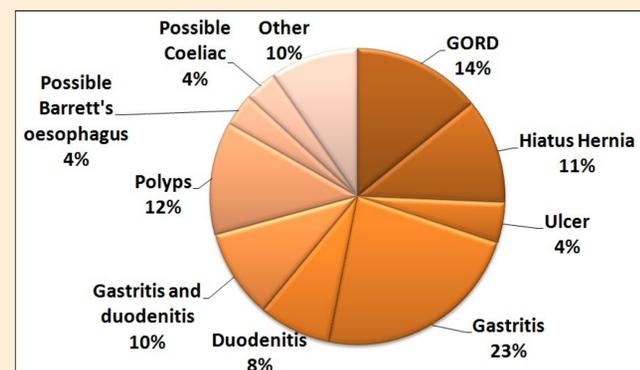


Figure 3: Pie Chart showing the diagnosis of study population (n=100)

Patients diagnosed with GORD or hiatus hernia had the highest activity of S-AM. With the "oesophago-salivary reflex"⁶, a greater volume of saliva is produced, to neutralize or decrease the corrosive effect of the gastric acid on the oesophageal mucosa. Thus, an increase in salivary volume results in a parallel increase in S-AM.

Patients diagnosed with gastritis and duodenitis had the highest activity of P-AM. Duodenogastric reflux (DGR)⁷ contents include bile, pancreatic and intestinal secretions—thus the increased injury might not be a direct result of P-AM on the gastric and duodenal mucosa. Measuring the amount of gastric P-AM of patients taking PPIs, can provide an indirect measurement of the extent of DGR.

CONCLUSION

Patients who remain symptomatic despite treatment should be questioned⁸ regarding compliance, and checked to exclude sub-optimal dosing and inappropriate dose timing. When these are ruled out, alternative therapies^{9,10}, such as tricyclic anti-depressants, baclofen and acupuncture, should be considered.

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