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MODIFICATIONS IN VALUES OF GASTRIN SERUM AND CARBONIC ANHYDRASE AFTER THERAPY TO ERADICATE THE HELICOBACTER PYLORI IN DUODENAL ULCER PATIENTS

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ABSTRACT. Many researchers have suggested that measuring the levels of gastrin and pepsinogen during the treatment to eradicate H. pylori infection may be useful to assess whether the treatment is effective or not. The gastrin which is a key- enzyme in modulating gastric acid secretion is also a direct activator of carbonic anhydrase (CA). In our work we have studied the effect of treatment to eradicate H. pylori infection on the levels of serum gastrin and carbonic anhydrase IV in the gastric mucosa, in the case of two groups of patients with UD and positive H. pylori diagnostics who were treated by means of triple therapy, and respectively quadruple therapy for 10 days. Endoscopy with biopsy sampling was performed in the case of all patients. The study results prove the implication of isoenzyme CA IV of the gastric mucosa and the gastrin in the action of therapy mechanisms to eradicate H. pylori infection. Following the treatment to eradicate the H. pylori infection one reveals a decrease of CA IV gastric activity by 64% in the Group no. 1 patients, and 78% in the Group no. 2 patients, while the levels of serum in gastrin decrease by 58% in Group no. 1 and by 69% in group no.2, respectively.

Keywords: Helicobacter pylori, Carbonic anhydrase, Duodenal (peptic) ulcer, Gastrin

INTRODUCTION

The Helicobacter pylori infection is one of the most common infections of the human species and is common all over the world and virtually all people are susceptible. It is believed that over half of the world population is infected with H. pylori, as there are areas where virtually the entire population is infected since childhood. This infection is more common in developing countries, where prevalence in adults reaches 80-90%, as compared to the developed countries where this infection does not exceed 60%. Untreated, and once appeared the infection persists for a lifetime. Therefore the prevalence of infection with H. pylori is the most useful parameter for studying the epidemiology of this bacterium.

The research methods the epidemiologists have at their disposal to determine the presence of H. pylori infection vary, each technique showing its string and weak points at the same time. The standard method of determining the situation of a person regarding his/her infection with H. pylori and that would enable correlations with possible injuries, is the endoscopic method accompanied by biopsy sampling from different parts of the stomach, particularly in the gastric (pyloric) antrum. Practical and ethical drawbacks make this method unacceptable to be applied for large population studies. However, studies on volunteers were performed using endoscopy as the reference technique, the aim of these studies being to asses other methods of establishing H. pylori infection (serology, breath tests). Initially, the first marker that suggests the presence of H. pylori infection was the presence of associated diseases such as gastritis, peptic ulcer or gastric adenocarcinoma (cancer). It was found later that there are significant changes in some laboratory parameters, modifications that may be associated with H. pylori infection. There is a large share of suggestive biochemical markers to highlight the active or passive presence of H. pylori infection. For example, one of these biochemical markers proving an active infection with H. pylori is the increased serum gastrin stimulated by food or high levels of pepsinogen which is known as a risk factor in the development of duodenal ulcer. Many researchers have suggested that measuring levels of gastrin and pepsinogen during the treatment to eradicate H. pylori infection may be useful to assess whether the treatment is effective or not. Regarding the gastrin, it is well known its role in the mechanism of gastric acid secretion, as the gastrin is one of the endogenous activators of acid secretion. The studies conducted by Prof. Puscas and his team proved once again that this hormone is also a direct activator of carbonic anhydrase (CA), and the enzyme with a key role in modulating gastric acid secretion.

SCOPE OF THE STUDY

Based on the data here above, this paper presents the results of the study we conducted on the effect of treatment to eradicate H. pylori infection on the levels of serum gastrin values and carbonic anhydrase IV in the gastric mucosa in patients with duodenal ulcer.

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MATERIAL AND METHOD

We selected a total number of 40 patients, volunteers, male, aged 28-65 years with duodenal ulcer and H. pylori positive. They were divided into 2 groups depending on the treatment they were applied for 10 days, respectively:

Patients Group no. 1 - Triple therapy, the following pairing respectively:
- Omeprazole 40 mg / day
- Amoxicillin 2 g / day
- Clarithromycin 1 g / day

Group no. 2 - Quadruple therapy, the following pairing respectively:
- Omeprazole 40mg / day
- Bismuth. subnitric. (De-Nol) 4x120 mg / day
- Tetracycline 2 g / day
- Metronidazole 1.5 g / day

Both before and after treatment, all patients were performed endoscopic examination with biopsy sampling.

Biopsies were used to determine H. pylori infection by means of Urease method. The test is read at 30, the positiveness speed being correlated with the number of bacteria present in the biopsy.

Moreover one separated the carbonic anhydrase IV from biopsy samples and then, by means of stopped-flow method, one determined the activity of this isoenzyme isolated from the parietal cells of gastric mucosa. Measuring the CA IV activity was performed by means of a rapid kinetic spectrophotometer HI-TECH SF-51MX manufactured in England.

The CA activity was calculated using the following formula:

$$A = \frac{T_0 - T}{T} \quad [UE/ml]$$

where T_0 is the uncatalyzed reaction time and T is the time of the catalyzed reaction by CA IV.

All patients were collected venous blood to dosing the serum gastrin by immunoenzymatic method with detection by chemiluminescence.

The study was conducted in accordance with the Declaration of Helsinki.

Statistical analysis of data was performed by computing using the software packages Microsoft Excel and EpiInfo 6.0.

The study results were expressed as mean ± standard deviation, calculated in the framework of Microsoft Excel software according to the following formulas:

$$m = \Sigma xi / n$$

Where:

m = arithmetic mean;
xi = the result of individual determinations;
n = number of individual determinations.

$$SD = \sqrt{[\Sigma xi^2 - (\Sigma xi)^2/n] / (n-1)}$$

Where:

SD = standard deviation, indicating scattering limits of n parameters (xi) individually determined as against the average;

xi = the result of individual determinations;

n = number of individual determinations.

For each parameter analyzed, only the values falling within the reference parameters range, defined as mean ± 2 × SD, were included in the final statistical calculation.

Comparison of the results was performed by using the t Student test or the variance analysis (ANOVA) test. The values $p < 0.05$ were considered statistically significant.

RESULTS

The results of the study are presented in Tables 1 and 2 and in the Graphs 1 and 2 hereunder.

Table 1: Changes in CA IV gastric activity at patients with duodenal ulcer after anti H. pylori therapy

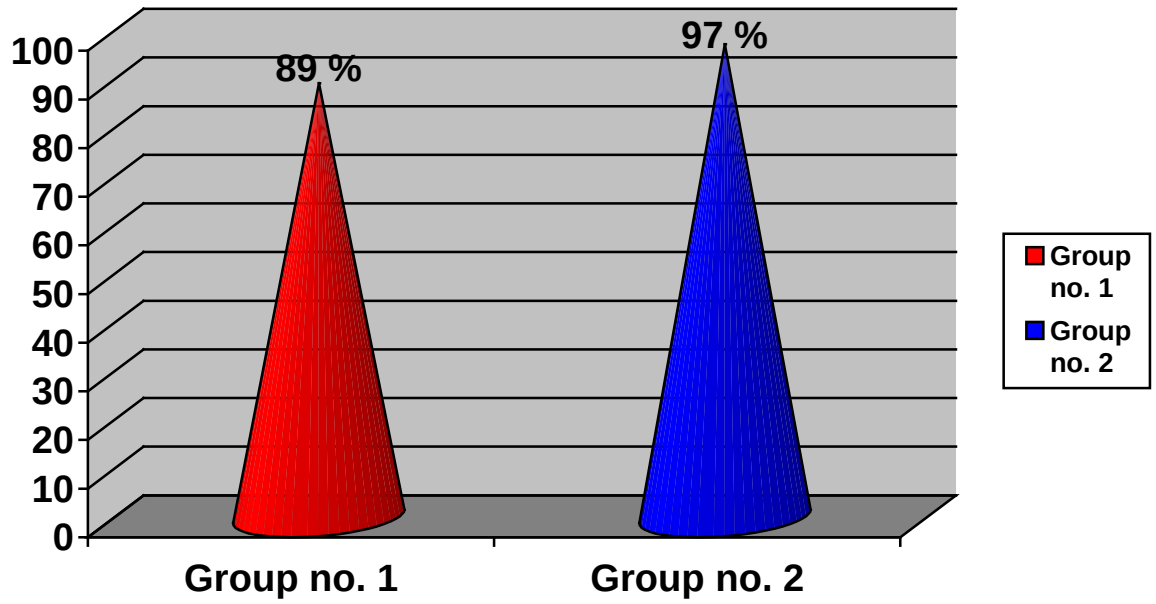
Group of patients	CA IV (UE/ml) Before treatment	CA IV (UE/ml) After treatment	Statistical value
1	1.746 ± 0.149 UE/mg	0.628 ± 0.086	p<0.05
2	1.837 ± 0.152	0.404 ± 0.055	p<0.05

Normal values of gastric CA IV: 1.00 to 1.30 EU/ml

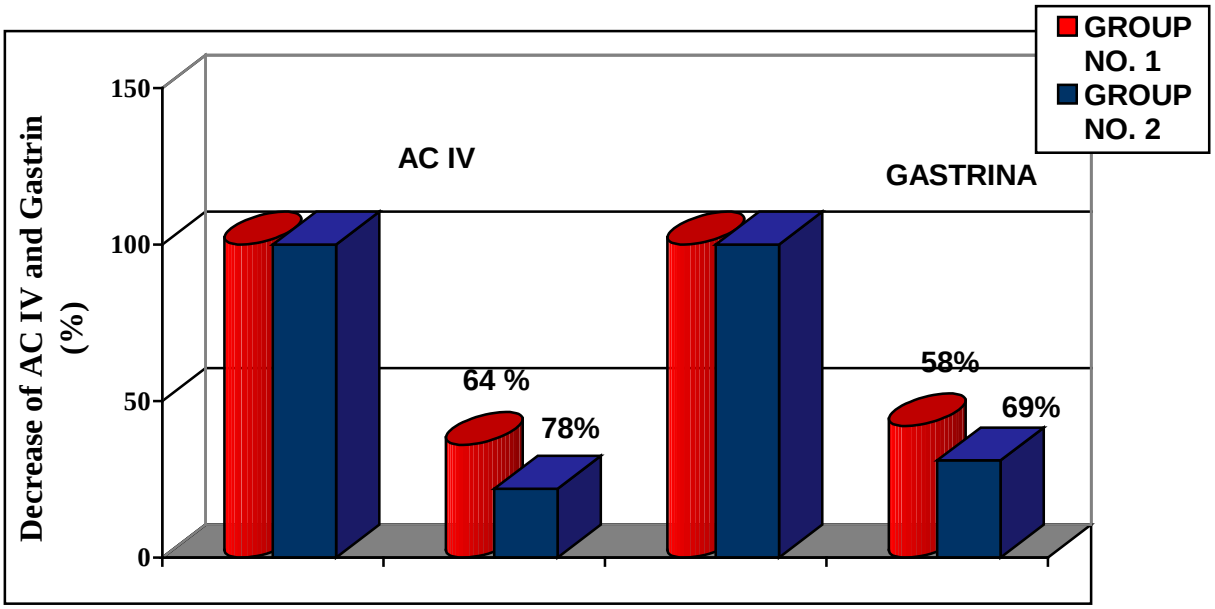
Table no. 2: Changes in serum gastrin values in patients with duodenal ulcer after anti H. pylori therapy

Group of patients	Gastrin (pg/ml) Before treatment	Gastrin (pg/ml) After treatment	Statistical value
1	273 ± 19	110 ± 14	p<0.05
2	348 ± 27	106 ± 11	p<0.05

Normal values of serum gastrin: 13 to 115 pg/ml



Graph no. 1 - Bacterial load, and the percentage of H. pylori infection in the 2 groups of patients studied



Graph no. 2 Parallel decrease of CA IV gastric activity and serum gastrin in the 2 groups of patients studied

FINDINGS

Urease test performed on biopsies sampled from patients with duodenal ulcers highlights that 89% of patients in the Group no. 1 and 97% in the Group no. 2 were infected with H. pylori.

The measurement of CA IV activity in the parietal cells of gastric mucosa highlights an increased activity of this isoenzyme in patients with duodenal ulcer, slightly higher in Group no. 2 where H. pylori infection was higher.

Serum gastrin values are elevated as compared to normal values in all patients with duodenal ulcers, and they are significantly higher in Group no. 2 patients.

Following the treatment to eradicate H. pylori infection one reveals a decrease of CA IV gastric activity by 64% in the Group no. 1 and by 78% in the

Group no 2, whereas serum gastrin values decrease at a rate of 58% in the Group no. 1 and 69% in the Group no. 2.

The results of the study show a parallelism between the inhibition of gastric CA IV and the decrease of serum gastrin values; this parallelism correlates with the treatment efficacy since the inhibition higher percentages are present in the Group no. 2 where the patients are applied a quadruple therapy.

The study results prove the implication of CA IV isoenzyme of the gastrin mucosa and gastrin in the action mechanism of the therapy conceived to eradicate H. pylori infection.

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