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Research Article

Analysis of Gastric Diseases and Their Symptoms Based on Indexes of Pepsinogen I (PGI) and Pepsinogen II (PGII): Take 1106 Patients as Samples

Kuanpeng Guo, Zhengqiu Li, Bibo Qiu, Bin Hu, and Suwu Yi

Clinical Laboratory Center, Hunan Children's Hospital, Changsha 410006, China

Correspondence should be addressed to Zhengqiu Li; zhengqiu.li@ibmcenters.org

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In this study, preoperative analysis of 1106 gastropathy patients with abdominal pain, vomiting, dyspepsia, and other symptoms was conducted. Independent sample *t*-test and correlation analysis and other ways were used for data cleansing and analysis. Findings were as follows: (1) Samples of different genders showed significance in PGI and PGII. The PGI and PGII values of women were significantly lower than those of men. (2) Age showed a significant positive correlation with PGI and PGII, which indicates that as the age increases, the PGI and PGII values become higher. (3) There was a significant negative correlation between age and abdominal pain. This signified that the younger the patient is, the more likely they will suffer abdominal pain. (4) PGI displayed a positive correlation with abdominal pain in the digestive tract (dyspepsia, gastrointestinal ulcers, gastrointestinal bleeding, etc.). It indicated that the higher the PGI value is, the more likely the patients will suffer abdominal pain and gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.). (5) PGII displayed a significant positive correlation with gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.) and a negative correlation with gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.). It indicated that the higher the value of PGII is, the more likely the patients will suffer symptoms of gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), while less likely the patients will suffer gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.).

1. Introduction

Two indexes of pepsinogen 1 (PGI) and pepsinogen 2 (PGII) are crucial for the judgment of gastric surgery. They are the main components of serum pepsinogen (PGs) (Kazumasa [1]). PGI is mainly secreted by the main cells of the stomach body and the neck cells, while PGII is secreted in the heart, pylorus, and Brunner gland cells near the duodenum. The concentration of PGI and PGII can reflect the mass/renewal of these cells in the mucosa [2, 3]. The concentrations of PGI and PGII are the important factor in the diagnosis of atrophic gastritis and changes of gastric secretion ([4]; K. [5, 6]). The concentration of PGI and PGII undergo dynamic change under pathological condition [7, 8]. Therefore, relevant examinations must be performed before the operation. Generally, the concentrations of PGI and PGII will increase in the state of gastric inflammation [9]. As the disease becomes more serious, PGI concentration begins to decrease, while PGII concentration increases [10]. Higher level of PGII is also associated with the presence of precancerous lesions [11, 12].

SPSS has been widely used for data analysis in the analysis of PGI and PGII gastric surgery, and pathological analysis is gradually used more frequently [13–15]. Some studies have been conducted on the detection methods of PGI and PGII in order to develop a method that can reduce the detection cost, simplify the surgical detection procedure, and make the test results accurate, sensitive, and rapid [16–18]. Other studies have explored the effect of PGI and PGII concentrations on early surgical screening for gastric cancer. It

Table 1: The t-test analysis of sex and PGI and PGII.

	Gender (mean and standard deviation)		t	p
	Female ($n = 470$)	Male ($n = 636$)		
PGI	58.64 ± 37.80	70.79 ± 48.78	-4.665	≤0.001**
PGII	11.01 ± 8.70	12.47 ± 9.75	-2.633	0.009**

*$p < 0.05$; **$p < 0.01$.

has been found that the detection of PGI and PGII concentrations provides a high detection rate for early gastric cancer, and surgery is of great clinical significance [19–21]. In addition, some studies have also found that changes of the concentrations of PGI and PGII may cause a variety of diseases and even lead to the occurrence of malignant tumors such as gastric cancer [22–25].

In summary, PGI and PGII are very significant in clinical surgery. However, there is little analysis on the preoperative test results of PGI and PGII for average patients especially those with abdominal pain, vomiting, dyspepsia, and other symptoms of gastric surgery. This study, therefore, analyzed 1106 patients (636 males and 470 females) with abdominal pain, vomiting, dyspepsia, and other symptoms. Independent sample t-test and correlation analysis were used for data cleansing and analysis. This study will help to enrich the research status of patients with abdominal pain, vomiting, dyspepsia, and other symptoms and supplement the data of PGI and PGII indexes and provide the basis for making the treatment plan in the future.

2. Methods

2.1. General Description. 1106 patients (636 males and 470 females) were selected as study subjects. These patients were admitted to the Gastrointestinal Nutrition Department of our hospital from April 7, 2020, to April 7, 2022. The patients were asked to use pepsinogen I and II determination kits (latex nephelometry). The collection kits were measured using detection instruments and a large biochemical analyzer (Beckman Au5800). The test results were judged by serum and plasma PGI and PGI/II ratio and the progression of gastric mucosal atrophy. Results are reviewed by a professional and are generally considered normal within the reference intervals. If it is not within the reference interval, the condition will be further determined.

2.2. Inclusion and Exclusion Criteria. Inclusion criteria are as follows:

(1) Age: 0–20 years old

(2) Voluntarily: one can communicate and agree to data collection

Exclusion criteria are as follows:

(1) Unconscious: unable to communicate effectively

Table 2: Pearson correlation analysis of age and PGI and PGII.

		Age
PGI	Correlation coefficient	0.245**
	p value	≤0.001
PGII	Correlation coefficient	0.128**
	p value	≤0.001

*$p < 0.05$; **$p < 0.01$.

(2) The patient's condition is not stable. Patients with multiple diseases are transferred to other departments

3. Results

As shown in Table 1, t-test (independent sample t-test) was used to analyze the differences between genders for PGI and PGII. As shown in Table 1, samples of different sexes showed significance for PGI and PGII. The PGI and PGII values of women were significantly lower than those of men.

As shown in Table 2, correlation analysis was used to study the correlation between age and PGI and PGII, respectively, and Pearson correlation coefficient was used to show the strength of the correlation. From the correlation coefficient and p value in Table 2, it can be seen that age displayed a significant positive correlation with PGI and PGII. It indicated that as the age increases, the PGI and PGII values would be higher.

As shown in Table 3, correlation analysis was used to study the correlation between age and abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, digestive tract ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.). And Pearson correlation coefficient was used to show the strength of the correlation. From the correlation coefficient and p value in Table 3, it can be seen that age showed a significant negative correlation with abdominal pain, while age displayed no correlation with gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.). It indicated that the younger the patient is, the more likely the patient will suffer abdominal pain. However, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), digestive tract (dyspepsia, peptic ulcer, gastrointestinal hemorrhage,

Table 3: Pearson correlation analysis between age and abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.).

		Age
Abdominalgia	Correlation coefficient	-0.083*
	p value	0.030
Gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.)	Correlation coefficient	0.076
	p value	0.471
Abnormal stool (hematochezia, constipation, etc.)	Correlation coefficient	-0.234
	p value	0.147
Gastrointestinal diseases (dyspepsia, digestive tract ulcer, gastrointestinal hemorrhage, etc.)	Correlation coefficient	-0.038
	p value	0.705
Vomiting (retching, hematemesis, etc.)	Correlation coefficient	0.009
	p value	0.901

*$p < 0.05$; **$p < 0.01$.

Table 4: Pearson correlation analysis of 4PGI and abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), stool abnormalities (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.).

		PGI
Abdominalgia	Correlation coefficient	0.086*
	p value	0.024
Gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.)	Correlation coefficient	-0.100
	p value	0.341
Abnormal stool (hematochezia, constipation, etc.)	Correlation coefficient	-0.093
	p value	0.568
Gastrointestinal diseases (dyspepsia, digestive tract ulcer, gastrointestinal hemorrhage, etc.)	Correlation coefficient	0.273**
	p value	0.005
Vomiting (retching, hematemesis, etc.)	Correlation coefficient	-0.095
	p value	0.209

*$p < 0.05$; **$p < 0.01$.

etc.), and vomiting (retching, hematemesis, etc.) had no relationship with age.

As shown in Table 4, correlation analysis was used to study the correlation between PGI and abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, digestive tract ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.). And Pearson correlation coefficient was used to show the strength of the correlation. From the correlation coefficient and p value in Table 4, it can be seen that PGI showed a positive correlation with abdominal pain in the digestive tract (dyspepsia, peptic ulcer, gastrointestinal hemorrhage, etc.), while there is no correlation between PGI and gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.). These results indicated that the higher the PGI value is, the more likely the patient will suffer abdominal pain and gastrointestinal symptoms (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), while PGI value has no correlation with gastric diseases (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.).

As shown in Table 5, correlation analysis was used to study the correlation between PGII and symptoms, such as abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.). And Pearson correlation coefficient was used to show the strength of the correlation. As shown in Table 5, PGII displayed a significant positive correlation with digestive tract (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.) and a negative correlation with gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), while PGII had no correlation with abdominal pain, abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.). These results indicated that the higher the value of PGII is, the more likely the

Table 5: Pearson correlation analysis of 5PGII with abdominal pain, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), stool abnormalities (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.).

		PGII
Abdominalgia	Correlation coefficient	0.032
	p value	0.402
Gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.)	Correlation coefficient	-0.242*
	p value	0.018
Abnormal stool (hematochezia, constipation, etc.)	Correlation coefficient	0.001
	p value	0.994
Gastrointestinal diseases (dyspepsia, digestive tract ulcer, gastrointestinal hemorrhage, etc.)	Correlation coefficient	0.283**
	p value	0.004
Vomiting (retching, hematemesis, etc.)	Correlation coefficient	0.094
	p value	0.216

*$p < 0.05$; **$p < 0.01$.

patient will suffer symptoms of gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.) and less likely the patient will suffer gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.). And PGII has no relationship with abdominal pain, abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.).

4. Conclusion

The study analyzed 1106 patients (636 males and 470 females) with symptoms of abdominal pain, vomiting, and dyspepsia. This study will help to enrich the research status of patients with abdominal pain, vomiting, dyspepsia, and other symptoms; supplement the data of PGI and PGII indicators; and provide the basis for the development of treatment options in the future.

This sample shows the following:

(1) Samples of different sexes showed significance for PGI and PGII. The PGI and PGII values of women were significantly lower than those of men

(2) Age displayed a significant positive correlation with PGI and PGII. It indicated that as the age increases, the PGI and PGII values would be higher

(3) Age showed a significant negative correlation with abdominal pain, while age displayed no correlation with gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.). It indicated that the younger the patient is, the more likely the patient will suffer abdominal pain. However, gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), digestive tract (dyspepsia, peptic ulcer, gastrointestinal hemorrhage, etc.), and vomiting (retching, hematemesis, etc.) had no relationship with age

(4) PGI showed a positive correlation with abdominal pain in the digestive tract (dyspepsia, peptic ulcer, gastrointestinal hemorrhage, etc.), while there is no correlation between PGI and gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.). These indicated that the higher the PGI value is, the more likely the patient will suffer abdominal pain and gastrointestinal symptoms (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), while PGI value has no correlation with gastric diseases (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.)

(5) PGII displayed a significant positive correlation with digestive tract (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.) and a negative correlation with gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.), while PGII had no correlation with abdominal pain, abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.). These indicated that the higher the value of PGII is, the more likely the patient will suffer symptoms of gastrointestinal diseases (dyspepsia, gastrointestinal ulcer, gastrointestinal hemorrhage, etc.), and less likely the patient will suffer gastropathy (acute gastritis, chronic superficial gastritis, gastric ulcer, etc.). And PGII has no relationship with abdominal pain, abnormal stool (hematochezia, constipation, etc.), and vomiting (retching, hematemesis, etc.)

Data Availability

All data supporting this work is included within the paper.

Ethical Approval

Ethical approval for this work was obtained from the Ethical Review Committee of Hunan Children's Hospital, China.

Conflicts of Interest

The authors declare no conflict of interest.

Authors' Contributions

KG contributed to the conception and design of the study and wrote the first draft of the manuscript. ZL contributed to the manuscript revision, read, and project management. BQ, BH, and SY contributed to the data collection and analysis. All authors approved the submitted version.

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Supplementary Materials

Raw data for the analysis. *(Supplementary Materials)*

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