

# Helicobacter Pylori Infection in Iran: Demographic, Endoscopic and Pathological Factors

**Seyedeh Amineh Hojati**

Guilan University of Medical Sciences

**Sara Kokabpeyk**

Guilan University of Medical Sciences

**Salma Yaghoubi**

Guilan University of Medical Sciences

**Farahnaz Joukar**

Guilan University of Medical Sciences

**Mehrnaz Asgharnejhad**

Guilan University of Medical Sciences

**Fariborz Mansour-Ghanaei** (✉ [fmansourghanaei@gmail.com](mailto:fmansourghanaei@gmail.com))

Guilan University of Medical Sciences

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## Research Article

**Keywords:** H. pylori infection, clinical manifestation, endoscopic findings, histopathology findings

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# Abstract

**Background:** *Helicobacter pylori* infection is the most important risk factor for Gastritis and Peptic Ulcer. But other factors except *H. pylori* play roles in its pathogenesis. In current study we compare the clinical manifestation and endoscopic and histopathology findings in patients with and without *H. pylori* infection.

**Methods:** In this cross-sectional study, 233 of patients with dyspepsia who referred for endoscopy were studied about presence of *H. pylori* infection. During endoscopy 5 biopsies were taken from each individual. The criteria for presence of *H. pylori* infection was the presence and recognition of bacteria in pathologic specimen which was done for all patient. These two groups of patient were compared with their demographic, background, endoscopic and pathologic findings.

**Results:** From 233 cases, 154 (66.1%) cases were non-smoker, 201 (86.3%) cases were not alcohol user, 153 (65.7%) cases used tap water and the most common symptom was reported in 157 individual (67.4%) was epigastria pain. There was a significant relation between the number of family member, marital status and presence of *H. pylori* infection. Also there is a significant relation between endoscopic findings and pathologic findings in patients with *H. pylori*.

**Conclusions:** the results of current study demonstrated that *H. pylori* infection was not associated with sex, alcohol and NSAID drugs. According to the role of *H. pylori* in pathophysiology of peptic ulcer was clarified, also in this study there were a significant difference in endoscopic and pathological findings *H. pylori*.

## Introduction

*Helicobacter pylori* (*H.pylori*) are a Gram-negative bacillus and one of the most prevalent global gastrointestinal pathogens [1]. *H. pylori* cause chronic gastritis, peptic ulcer, gastric marginal zone/mucosa-associated lymphoid tissue (MALT) lymphoma and gastric carcinoma [2]. Recent investigations revealed that *H. pylori* infections are significantly associated to the extra intestinal diseases, comprising refractory iron deficiency anemia [3], immune thrombocytopenic purpura [4] and vitamin B12 deficiency [5].

*H.Pylori* infections are occurs worldwide and the exact incidence rate is still remains undistinguishable and the prevalence of infections is geographically different [1]. Many previous studies indicated that the rate and risk of infection is significantly high in developing countries and low socioeconomic status [6]. Ghotaslou et al., (2015) in a systematic review revealed that about 4.4 billion people were infected by *H. pylori* infection in worldwide. Northern America (37.1%) and Australia (24.4%) showed the lowest and Africa (79.1%), Latin America (63.4%), and Asia (54.7%) showed the highest incidence rate of infection [7]. Contaminated food and faecal-oral paths are the main routes of transmission so, developments in hygiene is imperative factors in declining the rate of infection. Cats, cockroaches, rhesus and pigtailed monkeys and sheep are the main reservoirs hosts for *H. pylori* [8].

Patients with *H. pylori* infection are prone to gastric ulcer, gastric atrophy, intestinal metaplasia, and gastric carcinoma [9]. In 1994, this bacterium was recognized as the main carcinogen for gastric cancer [10]. The role of *H. pylori* in non-ulceric dyspepsia is unclear but, the rate of infection in these patients is high. The genetic predisposition of the host is very important in causing *H. pylori* infection [11]. Previous studies have also shown that more than 90% of duodenal ulcers and 60% of gastric ulcers are associated with *H. pylori* infection [12]. But today this association is not entirely clear. Some studies suggest that the prevalence of *H. pylori* is much higher than peptic ulcer, and the question arises as to why not all patients with *H. pylori* have peptic ulcer disease? On the other hand, many patients with peptic ulcer are negative for *H. pylori* infection. For instance, Chu et al. studied patients with peptic ulcer from 1996 to 2002, and the results showed that 30% of patients were negative for *H. pylori*, and in a study conducted by Wei et al., 2014, 62.3% of people were negative [13].

Harmful health standards, cultural background, diet, oral hygiene, crowded families, drinking unhealthy water, contaminated vegetables, swimming in rivers are the main risk factors for *H. pylori* infection [14]. There are several diagnostic methods for rapid and accurate diagnosis of *H. pylori* infection that can be divided into two categories: endoscopic and non-endoscopic. Non-endoscopic procedures include histology, rapid urease testing, culture, Serology, urea breath test and molecular techniques [15]. Due to the important role of *H. pylori* in peptic ulcer or other gastrointestinal disorders and the existence of other possible factors, it is necessary to compare the patients with positive and negative results for *H. pylori*. Also, no research has been done on the relationship between demographic, endoscopic and pathological factors in patients with and without *H. pylori* infection in Guilan province, northern Iran. Therefore, this study is aimed to assess above factors in Patients with and without *H. pylori* infection.

## Materials And Methods

### *Patients*

Initially, in coordination with the endoscopy department of the Caspian Gastroenterology and Liver Clinic, patients with dyspepsia who referred for endoscopy were examined for *H. pylori* infection. During endoscopy, 5 samples were taken from each patient. Diagnosing for *H. pylori* infection was performed on all patients using pathology method. Patients were then divided into two groups (*H. pylori* positive and negative). The two groups of patients were compared in terms of demographic information and the results of endoscopic and pathological findings. Inclusion criteria in this study included all patients referred to the endoscopy department of the Caspian Gastroenterology and Liver Clinic and patients more than 12 years old. Exclusion criteria included pregnant women and patients who had used an acid inhibitor and anti-*H. pylori* drugs user.

### *Methods*

This study was conducted as a questionnaire. After obtaining moral consent from all patients, a questionnaire containing name, surname, age, sex, BMI, level of education, number of family members, smoking, alcohol consumption, occupation, marital status, source of drinking water, *H. pylori* infection,

family history of cancer, Gastrointestinal symptoms, endoscopic findings and pathology findings were delivered to all patients and supplemented by the patient or patient companion.

### **Data analysis**

Data in current study were analyzed using Chi-square statistical test and descriptive tests and SPSS version 21 (SPSS Inc., Chicago, IL, USA) statistical software. Graphs were drawn using Prism7 software and P values less than 0.05 were considered significant.

## **Results**

In this study 233 people were studied which 125 (53.6%) were men and 108 (46.35%) were women. 134 (57.5%) people are over 45 years old and 99 (42.4%) people are under 45 years old. 145 (62.2%) people have a BMI between 25- 29.9. 154 (66.1%) people do not smoke, 32 people drink alcohol. 186 (79.8%) people were married and 47 (20.1%) people were single. 153 (65.7%) patients used tap water and others used unhealthy water. 189 (81.1%) patients have no history of cancer in family members. The most reported gastrointestinal symptoms were epigastric pain which was reported in 157 (67.4%) patients (Table 1).

The results of pathology test indicated that 109 (46.8%) and 124 (53.2%) patients were positive and negative for *H. pylori*, respectively. The frequency of pathologic findings in the patients referring to the Caspian Gastroenterology and Liver Clinic for endoscopy is shown in Figure2.

There was a statistically significant difference between the two groups in terms of number of family members, marital status and some gastrointestinal symptoms ( $P < 0.001$ ) (Table 2).

The results showed that there was a significant difference between the two groups in terms of mucosal erosions in the stomach and duodenum and in terms of normal endoscopic findings ( $P = 0.001$ ) (Table 3). The frequency of endoscopic findings in the patients referring to the Caspian Gastroenterology and Liver Clinic for endoscopy is shown in Figure1.

The results showed that there was a difference between the two groups in terms of normal gastric gland and intestinal metaplasia ( $P = 0.001$ ) (Table 4).

Comparison of drug use and gastrointestinal symptoms in the subjects is shown in Table 5.

## **Discussion**

In this study, 233 patients with gastrointestinal diseases were first examined for *H. pylori* infection and then patients were divided into positive and negative groups for *H. pylori* infection. Demographic data showed that *H. pylori* infection is significantly higher in married people, with more than 3 family members, and people with a history of cancer. Also, the incidence of gastrointestinal symptoms including epigastric pain, weight loss and loss of appetite in *H. pylori* positive patients were significantly higher

than *H. pylori* negative patients. Various studies have suggested that factors such as age, congestion, increasing number of family members and low level of health, especially in childhood, are the main causes of infection with this organism [16-18].

Age is one of the most important factors in the development of *H. pylori* infection and many recent studies showed a significant association between this factor and the incidence of *H. pylori* infection [19]. In a study conducted by Rowland et al., (2006) revealed that young children before the age of 3 years are at risk for *H. pylori* whereas the risk of infection is very low after 5 years of age. In the present study, most people (59.5%) with *H. pylori* were in the 35-45 age group [17]. Similar to our results, Toyoshima et al., (2017) reported that patients at age ranges between 40 to 59 significantly have higher serum antibody titer for *H. pylori* than other age groups [20].

In this study, the incidence rate of *H. pylori* infection in different sexes was not statistically significant. Of course, the results of many studies in consistent with our study, showed that *H. pylori* infection is not sex dependent. In current study, BMI, Number of family member, Smoking, Alcohol drink and Education were not significant risk factors in patients with *H. pylori* infection. While smoking and alcohol consumption factors are the confirmed important factors in the incidence of *H. pylori* infection, but no difference has been observed in the present study. Education is one of the factors that are inversely related to the incidence of *H. pylori* infection, and people with higher education are less likely to suffer from this type of disease [21]. However, in the present study, no significant relationship was observed between education and the incidence of *H. pylori* infection. The number of family members was one of the items evaluated in this study and had no significant relationship with the incidence of *H. pylori* infection. In many studies, the opposite results have been reported to our study. It is hypothesized that with the increase in the number of family members, the amount of contact with the outside environment increases, the contact of indoor people with each other increases and can increase the incidence of disease [22].

The highest endoscopic finding in this study was gastric mucosal erosion, which was observed in 98 (42.1%) patients. Based on the endoscopic results of gastric mucosal erosions, there was a significant difference between gastric and duodenal mucosal erosions, and duodenal mucosal erosions were more common in *H. pylori* positive patients. In 72.4 and 80.9% of patients infected by *H. pylori* infection, gastric mucosal erosion and duodenum mucosal erosion was observed, respectively. Past studies showed that more than 90% of duodenal ulcers and 60% of gastric ulcers are associated with *H. pylori* infection [23]. In this study, gastrointestinal ulcer endoscopy was significantly higher in patients with *H. pylori* than in the normal group. In logistic multivariate analysis, *H. pylori* infection was independently associated with endoscopic wound. On the other hand, peptic ulcer and gastritis are increasing in patients who are negative for *H. pylori* and cover at least 30% of these patients [24, 25]. The results of other studies differ from ours. In the study conducted by Chu et al., (2005) *H. pylori* negative patients had more gastrointestinal bleeding [24].

Comparison of pathological findings in patients with and without *H. pylori* infection showed that the neutrophil infiltration was the highest finding which was observed in 124 (53.2%) patients [26]. The

results of this study showed that the incidence and severity of neutrophil infiltration findings in the mucosal layer and propriolar muscularity, normal gastric glands, complete intestinal metaplasia and incomplete intestinal metaplasia were significantly more reported in *H. pylori* positive patients.

In current work 75.8% of patients with *H. pylori* showed neutrophil infiltration in the mucosal layer and propria muscularity signs were reported. Also, incomplete intestinal metaplasia and complete intestinal metaplasia were reported in 100% and 96.4% of cases. Intestinal metaplasia is characterized by the loss of mucus-secreting capillaries and their replacement by the epithelium containing goblet cells which manifests in three forms and the third type is called as incomplete intestinal metaplasia.

In a similar work, Fontham et al., (1995) indicated that 87% of patients with gastric cancer were associated with intestinal metaplasia and had significant differences with normal controls [27]. Silva concluded in a study that the highest prevalence of *H. pylori* occurs in the area where there is incomplete intestinal metaplasia and this type of metaplasia indicates long-term damage to the mucosa and leads to cancer [28]. There are different statistics on the prevalence of *H. pylori* in chronic gastritis and intestinal metaplasia. Therefore, many studies have been trying to find a way to link the direct or indirect effects of *H. pylori* to histological findings, especially dysplasia and gastric cancer. The results showed that users of non-steroidal anti-inflammatory drugs showed gastrointestinal symptoms such as heartburn, reflux, weight loss, loss of appetite and also the use of drugs such as diabetes and heart drugs also mentioned the symptoms of heartburn, reflux, weight loss, loss of appetite, premature satiety, the presence of blood in the stool and iron deficiency anemia.

## Conclusion

In general, the results of this study indicated that the prevalence of *H. pylori* is related to the number of family members and marital status. The results also indicated that *H. pylori* infection was not sex-related and that alcohol, smoking, and non-steroidal anti-inflammatory drugs did not increase the incidence of *H. pylori* infections. Since the role of *H. pylori* in the physiopathology of gastric ulcer is well understood, in this study, patients with *H. pylori* had obvious differences in endoscopic and pathological findings, especially in gastric and duodenal erosions and the presence of complete and incomplete intestinal metaplasia. Considering the important role of *H. pylori* in gastric ulcer and the possible presence of other factors in its development, it is recommended to make a comparison between clinical features and endoscopic findings and pathology of patients with gastric ulcer with positive and negative *H. pylori* infection. Because in the present study, the relationship between the drugs used and gastric ulcer was not investigated, so in the future study, it is recommended to compare different drugs with gastric ulcer.

## Abbreviations

H. pylori: Helicobacter pylori; MALT: Marginal zone/mucosa-associated lymphoid tissue.

## Declarations

## **Ethics approval and consent to participate under Declarations**

This study was **approved** in the Research Department of Guilan University of Medical Sciences with the ethics code of IR.GUMS.REC.1398.145 and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Written Informed consent was obtained from all individual adult participants included in this study. The consent form for illiterate people was read by their first degree relatives and in the absence of the first family, the form was read by one of their trusted people. This manuscript has not been published in whole or in part. All authors have read the manuscript and have agreed that the work is ready for submission and accept responsibility for its contents.

## **Consent for publication**

Not applicable

## **Availability of data and materials**

The datasets obtained during this study will be available upon request to the corresponding author.

## **Competing interests**

The authors declare that they have no conflict of interest.

## **Funding**

None

## **Authors' contributions**

S AH and FM-G and FJ were involved in the study design and data analysis. SK and SY data collection and contributed to data interpretation. MA literature searched. SAH, F M-G and FJ wrote the initial draft of the manuscript, SAH and FJ and MA and FM-G contributed toward its final version. FJ generated of figures. All authors were involved in writing the paper and had final approval of the submitted and published versions.

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## **Authors' information**

**1** Gastrointestinal and Liver Diseases Research Center, **2** GI Cancer Screening and Prevention Research center, **3** Caspian Digestive Diseases Research Center.

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## Tables

Table 1. The results of demographic information of patients

Frequency (%)	Demographic data	
125 (53.6)	Men	Sex
108(46.4)	Women	
57 (24.5)	<35	Age
42 (18.0)	35-45	
134 (57.5)	>45	
3 (1.3)	<18.5	BMI
35 (15.0)	18.5- 24.9	
145 (62.2)	25- 29.9	
50 (21.5)	>30	
93 (39.9)	<3	number of family members
140 (60.1)	>3	
79 (33.9)	Yes	Smoking
154 (66.1)	No	
32 (13.7)	Yes	Drink alcohol
201 (86.3)	No	
10 (4.3)	Un-educated	Educatin
47 (20.2)	Under diploma	
83 (35.6)	Diploma	
93 (39.9)	Upper graduated	
44 (18.9)	Single	Marital status
186 (79.8)	Married	
3 (1.3)	Divorces	
56 (24.0)	Workless	occupation
71 (30.5)	Housekeeping	
39 (16.7)	Employee	
67 (28.8)	Free work	
1 (0.4)	River	Source of dirinking water
153 (65.7)	Tap	

48 (20.6)	Mineral	
31 (13.3)	Tap & Mineral	
44 (18.9)	Yes	family history of cancer
189 (81.9)	No	
157 (67.4)	Epigastric pain	Gastrointestinal symptoms
107 (45.9)	Heartburn	
76 (32.6)	Reflux	
55 (23.6)	Weight Loss	
64 (27.5)	Decreased appetite	
17 (7.3)	Early satiety	
9 (3.9)	The presence of blood in the stool	
27 (11.6)	Iron deficiency anemia	

Table 2. Comparison of demographic and contextual factors in terms of patients with *H. pylori* positive and negative in the subjects.

<b>P-Value</b>	<b>Negative (%)</b>	<b>Positive (%)</b>	<b>Demographic data</b>	
0.4	70 (56.0)	55 (44.0)	Men	Sex
	54 (50.0)	54 (50.0)	Women	
0.08	36 (63.2)	21 (36.8)	<35	Age
	17 (40.5)	25 (59.5)	35- 45	
	71 (53.0)	63 (47.0)	>45	
0.2	3 (100.0)	0 (0.0)	<18.5	BMI
	18 (51.4)	17 (48.6)	18.5- 24.9	
	76 (52.4)	69 (47.6)	25- 29.9	
	27 (54.0)	23 (46.0)	>30	
0.05	56 (60.2)	37 (39.8)	<3	Number of family member
	68 (48.6)	72 (51.4)	>3	
0.1	46 (58.2)	33 (41.8)	Yes	Smoking
	78 (50.6)	76 (49.4)	No	
0.4	16 (50.0)	16 (50.0)	Yes	Alcohol drink
	108 (53.7)	93 (46.3)	No	
0.6	7 (70.0)	3 (30.0)	Un-educated	Education
	23 (48.9)	24 (51.1)	Under diploma	
	46 (55.4)	37 (44.6)	Diploma	
	48 (51.6)	45 (48.4)	Upper graduated	
0.01	32 (72.7)	12 (27.3)	Single	Marital status
	91 (48.9)	95 (51.1)	Married	
	1 (33.3)	2 (66.7)	Divorces	
0.1	24 (42.9)	32 (57.1)	Workless	occupation
	39 (54.9)	32 (45.1)	Housekeeping	
	19 (48.7)	20 (51.3)	Employee	
	42 (62.7)	25 (37.3)	Free work	
0.5	0 (0.0)	1 (100.0)	River	Drinking water source

	85 (55.6)	68 (44.4)	Tap	
	23 (47.9)	25 (52.1)	Mineral	
	16 (51.6)	15 (48.4)	Tap & Mineral	
0.001	14 (31.8)	30 (68.2)	Yes	Family history of cancer in
	110 (58.2)	79 (41.8)	No	
0.001	72 (45.9)	85 (54.1)	Epigastric pain	Gastrointestinal symptoms
0.4	52 (68.4)	24 (31.6)	Heartburn	
0.3	42 (55.3)	34 (44.7)	Reflux	
0.008	21 (38.2)	34 (61.8)	Weight Loss	
0.09	29 (45.3)	35 (54.7)	Decreased appetite	
0.5	9 (52.9)	8 (47.1)	Early satiety	
0.1	7 (77.8)	2 (22.2)	The presence of blood in the stool	
0.2	12 (44.4)	15 (55.6)	Iron deficiency anemia	

Table 3. Comparison of endoscopic findings by patients with positive and negative *H. pylori* in the subjects

P-Value	Negative (%)	Positive (%)	Gastrointestinal symptoms
0.5	10 (55.6)	8 (44.4)	Ulcers
0.1	5 (83.3)	1 (16.7)	Duodenal ulcer
0.001	27 (27.6)	71 (42.4)	Mucosal erosions in the stomach
0.001	13 (19.1)	55 (80.9)	Mucosal erosions in the duodenum
0.06	10 (76.9)	3 (23.1)	Antral nodularity
0.07	7 (35.0)	13 (65.0)	Antral nodularity
0.7	1 (50.0)	1 (50.0)	duodenal nodularity
0.001	69 (73.4)	25 (26.6)	Normal

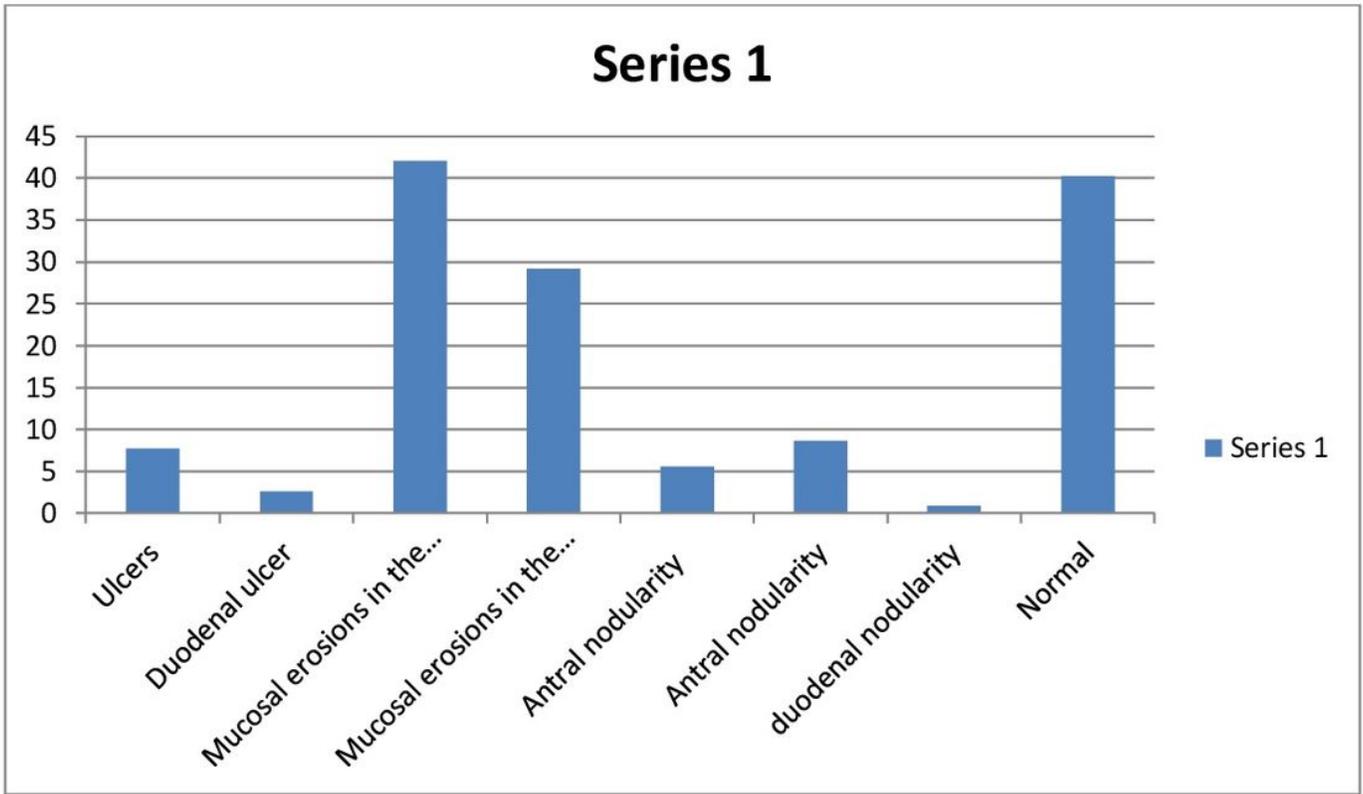
Table 4. Comparison of pathological findings by patients with *H. pylori* positive and negative in the subjects

P-Value	Negative (%)	Positive (%)	Gastrointestinal symptoms
0.001	30 (24.2)	94 (75.8)	Neutrophil infiltration
0.4	0 (0.0)	1 (100.0)	Abscess+mucin decrease
0.001	78 (98.5)	2 (2.5)	Normal gastric glands
0.001	0 (0.0)	12 (100.0)	Complete intestinal metaplasia
0.001	1 (3.6)	27 (96.4)	Incomplete intestinal metaplasia
0.1	40 (47.6)	44 (52.4)	Atrophy
0.4	0 (0.0)	1 (100.0)	High grade dysplasia

Table 5. Comparison of drug use and gastrointestinal symptoms in the subjects

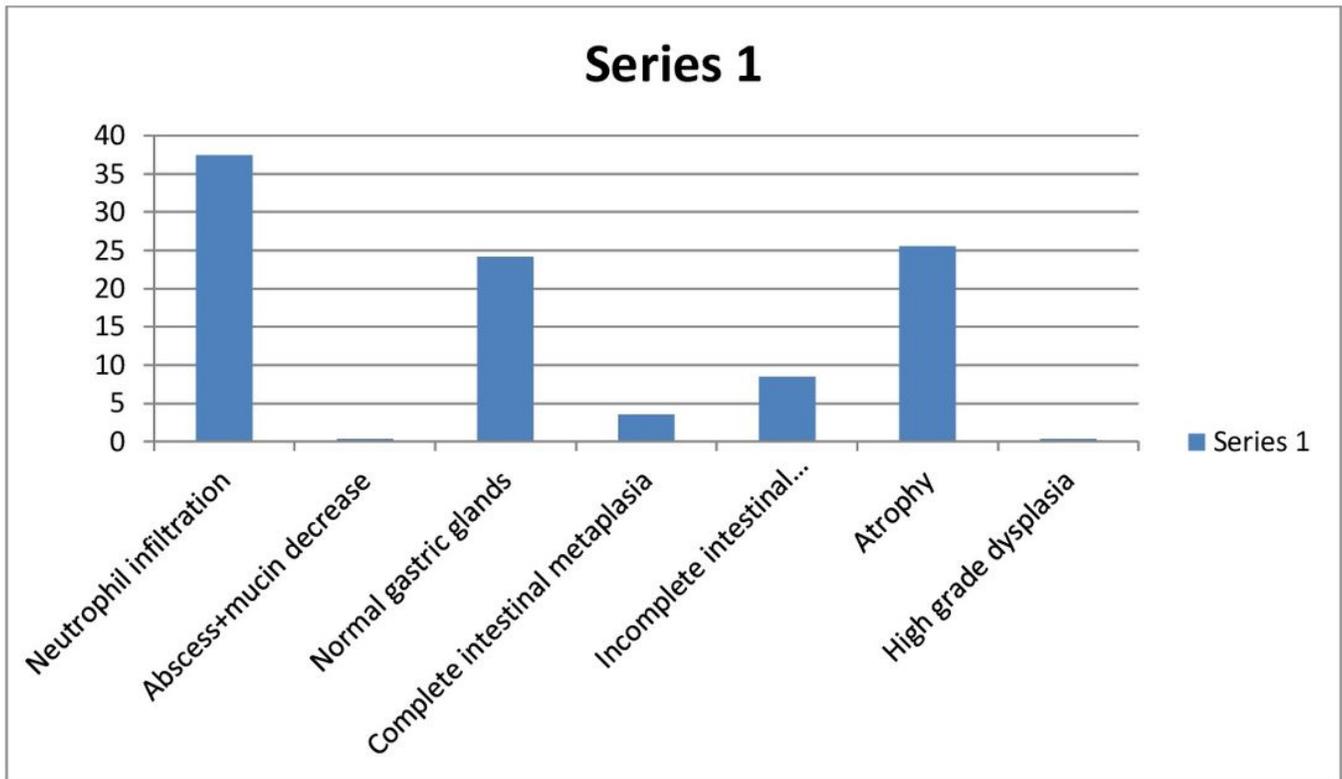
Gastrointestinal symptoms	Drugs	Diabetes	NSAID	Heart diseases	Others
Epigastric pain	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
Heartburn	4 (8.0)	17 (34.0)	7 (14.0)	14 (28.0)	8 (16.0)
Reflux	2 (6.3)	13 (40.5)	3 (9.4)	7 (21.9)	7 (2.9)
Weight Loss	6 (21.5)	10 (35.7)	2 (7.1)	8 (28.6)	2 (7.1)
Decreased appetite	7 (20.0)	8 (22.8)	2 (5.7)	8 (22.8)	10 (28.7)
Early satiety	2 (33.3)	0 (0.0)	0 (0.0)	2 (33.3)	2 (33.3)
The presence of blood in the stool	2 (40.0)	2 (40.0)	0 (0.0)	1 (20.0)	0 (0.0)
Iron deficiency anemia	1 (14.3)	3 (42.7)	0 (0.0)	2 (28.7)	1 (14.3)

## Figures



**Figure 1**

The frequency of endoscopic findings in the patients referring to the Caspian Gastroenterology and Liver Clinic for endoscopy, Guilan, northern Iran



**Figure 2**

The frequency of pathologic findings in the patients referring to the Caspian Gastroenterology and Liver Clinic for endoscopy, Guilan, northern Iran.

## Supplementary Files

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- [questionnaier.docx](#)