Original Article

Correlation of anemia and Helicobacter pylori infection among dyspeptic patients in Kutahya region

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Abstract

Background: *The presence of Helicobacter pylori* is commonly linked with anemia among dyspeptic patients. In the present study, we aimed to investigate the etiologic link between anemia and *Helicobacter pylori* among the general population of Kutahya. **Materials and Methods***: We enrolled* 1408 dyspeptic patients presenting at our institution between November 2011 and February 2015 and evaluated their complete medical records in this retrospective investigation. *Helicobacter pylori* colonization was identified by upper gastrointestinal endoscopic biopsy. Whole blood samples were collected at the time of endoscopy evaluated using standard blood cell counts and biochemical tests. Statistical analysis included logistic regression. Differences in proportions between experimental groups were identified using the chi-square calculation. The Student's t-test was applied to evaluate differences in continuous variables. **Results:** *All together,* 64.4% of the patients evaluated were diagnosed with active *Helicobacter pylori* infection. Among infected individuals, 91.8% were anemic while only 8.2% of uninfected patients showed signs of anemia ($P < 0.001$). Serum hemoglobin was significantly reduced among individuals infected with *Helicobacter pylori* relative to uninfected patients. **Conclusions:** The total rate of *Helicobacter pylori* colonization was high among patients with dyspepsia. The incidence of anemia was substantially greater among *Helicobacter pylori* infected individuals relative to uninfected patients.

Key Words: *anemia, Helicobacter pylori,* correlation, dyspepsia, Kutahya region.

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Introduction

Helicobacter pylori (H. pylori) is an exceptionally widespread infection and occurs throughout the world (1). Sanitation, genetic factors, ethnicity, gender, age, and education are known risk factors (2). Although the precise etiology of *H. pylori* infection remains undetermined, oral transmission is likely. The rate of *H. pylori* diagnosis is greater in developing regions; poor housing conditions (3) and low income are associated with increased rates of infection. *H. pylori* is a contributing factor in many alimentary tract disorders, including gastroduodenal ulcer, intestinal metaplasia, atrophic gastritis and adenocarcinoma of the stomach (4). Anemia is a common clinical symptom with various etiologies, including chronic illness, gastrointestinal bleeding, vitamin B12

deficiency, iron-deficiency, and folic acid deficiency. Consequently, chronic *H. pylori* infection frequently results in atrophic gastritis, which leads to hypochlorhydria or achlorhydria, which is the underlying cause for decreased iron absorption and increased iron uptake and utilization by the bacteria, is likely to result in anemia (5,6). We conducted a retrospective study that included a large cohort of dyspeptic patients in which *H. pylori* infection was suspected and who underwent endoscopy and biopsy with histological assessment. These individuals also underwent routine blood testing to determine hemoglobin levels and identify anemia.

Materials and Methods

Study Design

This retrospective study was conducted at Kutahya, Turkey. Initially, 1408 patients (395 male and 1013 female) were enrolled from General Surgery Clinics of Dumlupinar University Faculty of Medicine, from November 2011 to February 2015. The average age of the study subjects was 47 years, ranging from 17 to 76 years of age. All patients underwent esophagogastroduodenoscopy (EGD) examination. An endoscopic biopsy was collected from the gastric mucosa for confirmation of *H. pylori* infection. Exclusion criteria for anemia diagnosis included past history of anemia with known etiology other than *H. pylori*, known hematologic disorder causing anemia, evident gastrointestinal bleeding within one month, and evident blood loss within one month. After application of the exclusion criteria, we enrolled 1408 cases for further analysis. We defined anemia as serum hemoglobin (Hb) levels less than 12 g/dL among women and less than14 g/dL among men.

Sample Collection and Measurement of Hematological Parameters

The blood samples were collected in 2 ml K_2 EDTA vacuum tubes (BD Vacuteiner® BD-Plymouth, UK). We performed complete blood cell counts using the Coulter Gen-S automated counter (Beckman Coulter LH 780 Gen-S System; Miami, FL, USA) according to the manufacturer's instructions.

Histopathological Examinations

The presence of active *H. pylori* was identified using histopathological examination of gastric biopsy samples. Formalin-fixed gastric biopsy samples were paraffin embedded and sectioned (4 μm), mounted and stained with Giemsa hematoxylin-eosin (H&E). A light microscope (Olympus BX51, Tokyo, Japan) was used evaluate *H. pylori* status in stomach biopsy specimens. An experienced pathologist conducted all histopathology experiments.

Statistical Analysis

We applied the Student's *t*-test to determine the statistical significance of differences in demographic characteristics and mean serum hemoglobin levels. The proportion of anemic patients was compared between *H. pylori* $^-$ and *H. pylori* $^+$ individuals using the Chi-square test.

Results

All together, 1408 patients were enrolled into the investigation. The average age of patients with no detectable *H. pylori* infection was 34.0 ± 11.3; the mean age of patients with active *H. pylori* infection 55.5 ± 12.9 years old. The study subjects ranged in age from 17 to 76 years old (Table 1). Both gender distribution and mean age differed significantly between the *H. pylori* $^-$ and *H. pylori* $^+$ groups. The significant difference was demonstrated between negative and positive *H. pylori* infection groups.

Table 1. Demographic data pertaining to the *H. pylori* positive and *H. pylori* negative patient groups.

	H. pylori (-) (n=502)	*H. pylori* (+) (n=906)	*P* value
Age (years)	34.0 ± 11.3	55.5 ± 12.9	(P < 0.05)
Gender			(P < 0.05)
Male	104 (26.3%)	291 (73.7%)	
Female	398 (39.2%)	615 (60.8%)	

* *H. pylori* (-) as negative *H. pylori* infection and *H. pylori* (+) as positive *H. pylori* infection

H. pylori Infection and Anemia

The average serum Hb concentration was 13.65 g/dL in the negative group and 11.10 g/dL in the positive group. The number of anemic patients was significantly increased among the *H. pylori* (+) patients relative to the patients that had no detectable *H. pylori* (P < 0.001) (Table 2).

Table 2. Hb and anemia in *H. pylori* $^{+}$ and *H. pylori* $^{-}$ patients.

	H. pylori (-) (n=502)	*H. pylori* (+) (n=906)	*P* value
Mean Hb g/dL	13.65	11.10	(P < 0.001)
Anemia (-)	441 (67.1%)	217 (32.9%)	(P < 0.001)
Anemia (+)	61 (8.2%)	689 (91.8%)	

Anemia: male: Hb < 14 g/dL, female: Hb < 12 g/dL.

Discussion

The number of individuals infected with *H. pylori* is substantially greater in the developing world compared to regions with more advanced healthcare systems. In some countries, as much as 80% of the general population may be infected by the age of 20 (7). We report the rate of *H. pylori* detection as 64.4% in a population of dyspeptic patients from Kutahya. In the developing world, rates of *H. pylori* diagnosis are 67% -86.8% (8-11). Our observations also suggested an increased rate of *H. pylori* diagnosis in men (73.7%) relative to women (60.8%), although this result was not statistically significant. This observation is in direct contrast to prior publications in which the rate of *H. pylori* diagnosis was reported to be

higher in women (12,13,14). Interestingly, *H. pylori* positive diagnosis was associated with elderly patients. A previous study of a population in Addis Ababa, Ethiopia reported similar findings (15). *H. pylori* infection may be acquired in early life and persist for many years before resulting in symptomatic infection in elderly individuals. Anemia has been linked to *H. pylori* colonization by previous reports. Among the individuals evaluated in the current study, the number of anemic patients was markedly higher among *H. pylori* positive individuals (91.8%) relative to *H. pylori* negative patients (8.2%; $P < 0.001$) (16). Chronic *H. pylori* infection is likely to cause anemia, given the long term persistence of infection in adults and the associated predisposition to gastrointestinal mucosal lesions, both of which contribute to anemia. Our data support the findings of previous reports demonstrating a connection between anemia and chronic *H. pylori* infection (17-20).

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