



## THE PREVALENCE OF HELICOBACTER PYLORI IN PATIENTS UNDERGOING ESOPHAGOGASTRODUODENOSCOPY: DIAGNOSTIC METHODS AND ASSOCIATED DISEASES

### Medicine

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### ABSTRACT

**Introduction and Objective** Helicobacter pylori infection is, one of the most common chronic bacterial infections in the world. Several invasive and non-invasive diagnostic methods are made use of to diagnose Helicobacter pylori (Hp). Using serological and histopathologic methods, this study investigated the frequency of Hp infections in patients undergoing esophagogastroduodenoscopy (=EGD), its associations with the age and occupational groups, and with the gastroduodenal diseases. In addition, the sensitivity, specificity, and the positive (PPV) and negative predictive values (NPV) of these methods were studied as well.

**Material and Method** Hp positivity, the diagnostic methods, and associated diseases were studied in 302 cases, who applied to the endoscopy department of Necmettin Erbakan University, Internal Medicine and General Surgery due to various indications and who underwent EGD. Biopsy specimens were collected from the antral mucosa of the stomach from all patients. These samples were stained with hematoxylin-eosin (HE) stain and were examined histopathologically. Hyperemia, edema, atrophy, erosion, ulcer, and other pathologic findings identified during the EDG were recorded. Then, the type of the lesion, positivity for the bacteria, and association of the bacteria with the epithelial tissue were examined. Among the tissue samples collected by biopsy, a separate tissue sample per patient was used to perform the urease test. Hp specific IgG and IgA antibodies were investigated by the ELISA method.

**Results** The mean age of the patients was  $47.3 \pm 16.1$ . 42% of the patients were males and 58% were females. The distribution of the cases according to their EGD results was as follows: Gastritis 38.4%, adenocarcinoma of the stomach 5%, duodenal ulcer 5.6%, stomach ulcer 2.3%, the patient group with unclassified diagnoses 44.7%, and the patients with normal findings 4%. IgA was positive in 53% of the cases. Among all diagnosis groups according to their EGD results, the highest rate of positivity of IgA was found in 66.7% of the adenocarcinoma cases. Hp was identified in 67.5% of the cases either with the urease test or with the histologic methods. The concordance of histopathology and urease test was 74%. Both were positive in 42% of the cases and both were negative in 42% of the cases. The diagnostic concordance of endoscopic and pathologic examinations was 76.8%.

**Conclusion** Identification Hp is quite important as it is considered to be an effective pathogen for the development of stomach cancer or preceding lesions. Our study demonstrated a high rate of positive correlation between the endoscopic view and pathologic diagnosis. Therefore, referring the patients with upper GIS findings for endoscopic imaging methods is important both for the early diagnosis and in determining the treatment strategies. Endoscopic examination is an irreplaceable cornerstone for the diagnosis of Hp.

### KEYWORDS

Helicobacter pylori, esophagogastroduodenoscopy, histopathologic evaluation, urease test

### INTRODUCTION AND OBJECTIVE:

Helicobacter pylori (Hp) is a gram-negative, microaerophilic, and spiral-shaped microorganism, which was first identified in the stomach of a dog by Bizzozera in 1893. It has received attention since 1983 when Marshall and Warren isolated it from the human stomach (1). Several epidemiologic, experimental, and clinical studies on this microorganism have established that it is involved in the pathogenesis of acute and chronic gastritis, intestinal metaplasia, peptic ulcer, and stomach cancer (2,3).

Helicobacter pylori infection is, one of the most common chronic bacterial infections in the world (4). The prevalence of Hp is variable in the normal population depending on age and origins of the population. The infection is typically acquired during childhood (5). The most common symptoms are the upper abdominal complaints (such as dyspepsia or indigestion). Studies in general population defined the prevalence of these symptoms at a rate of 13-27%. The recently discovered association between Hp and the gastrointestinal system diseases caused an intensified concentration on this microorganism (6). In 1990, Tygat et al demonstrated that there is a certain association between Hp and chronic antral gastritis. The association between Hp and peptic ulcer is well-established. Furthermore, it is suggested that it may be involved in the genesis of stomach carcinoma and MALT lymphoma, too (7). It is suggested that Helicobacter pylori is the cause of dyspeptic complaints, however, it requires caution as the Hp infection is seen at increased rates with increased age also in asymptomatic individuals.

Early diagnosis and effective treatment of the infections caused by this microorganism is very important since the diseases caused by this agent is quite common today, representing a public health concern due to the costs of diagnosis and treatment as well as due to the eventual work power loss. Several invasive and non-invasive diagnostic methods are made use of to diagnose Helicobacter pylori (H. pylori).

Cultivation, histologic examinations, gram staining, urea breath test, urease test, serologic tests, and antigen detection by immunofluorescence tests, electron microscopy, polymerase chain reaction, and examinations of the stool samples are the diagnostic methods to detect Hp (8).

Using serologic tests, urease, and histopathologic methods, this study investigated the frequency of Hp infections and its associations with the gastroduodenal diseases in patients who applied to the endoscopy department of the Necmettin Erbakan University, Meram Medical Faculty, Internal Medicine and General Surgery due to various indications, but especially for the gastrointestinal system complaints and who underwent esophagogastroduodenoscopy (EGD). In addition, the sensitivity, specificity, and the positive (PPV) and negative predictive values (NPV) of these methods were studied as well. Furthermore, the association of Hp infection with the age and occupational groups was studied.

### MATERIAL and METHOD

Helicobacter pylori positivity, the diagnostic methods, and associated diseases were studied in 302 cases, who applied to the endoscopy department of the Necmettin Erbakan University, Internal Medicine and General Surgery due to various indications and who underwent EGD. No inclusion or exclusion criteria were set as regards to age and gender. The cases presented with upper GIS complaints such as pyrosis, epigastric pain, and bloating. The patients fasted overnight on the day of the EGD procedure. In the morning, the fasting patients were applied oropharyngeal local anesthesia with lidocaine (Xylocaine) oral spray. The device used in the EGD procedure was Pentax LH-150 P II. The endoscope and the biopsy forceps were disinfected for each individual case before the endoscopic examination. At least three biopsy specimens were collected from the antral mucosa of the stomach from all patients on receiving the consents from the patients. Of these samples, 1 or 2 of them were submitted to the pathology

laboratory in a 10% formol solution. These samples were stained with Giemsa and hematoxylin-eosin (HE) stains and were examined histopathologically. Then, the type of the lesion, positivity for the bacteria, and association of the bacteria with the epithelial tissue were examined (9).

The following endoscopic definitions were used: Mucosal edema, erosion, hyperemia, and submucosal hemorrhagia were definitive for gastritis. Mucosal edema, hyperemia, and erosion were definitive for duodenitis. Finally, for the diagnosis of duodenal ulcers, the presence of ulcerations with a diameter wider than 5 mm, significant deformities of the pylorus and duodenal bulb, and the presence of deformation pili were definitive for the endoscopic diagnosis (35). Hyperemia, edema, atrophy, erosion, ulcer, and other pathologic findings identified during the EDG were recorded.

The tissue sections used in the histologic identification were prepared for HE staining. First, the sections were left in the drying oven for 1 hour at 180°C. Following this step, they were soaked in xylene and left for 1 hour. Then, they were left in 96%, 80%, and 70% concentrations of alcohol respectively. After being washed out with tap water, the sections were kept in hematoxylin for 1-2 minutes. Then, they were washed out with tap water. Following this step, they were dipped in acid alcohol for a few times, washed with tap water again, and then dipped in ammonium for a few times. After being washed out with the tap water, they were washed with eosin for 1-2 minutes. Then, they were soaked in 70%, 80%, and 96% alcohol respectively, before being dried up. Then, the slides were covered.

The samples submitted for the histologic examination were sliced into sections from the paraffin blocks. The sections were dipped into xylene and then alcohol. After being washed out with water, they were kept in the May Granwald solution for 2 minutes, in the Puffer solution for 1 minute, in the Giemsa solution for 5.5 minutes, and for the second time, in the Puffer solution for 1 minute respectively. Drying up and mounting processes were performed using Canada balsam. The tissue samples were examined under the light microscope. Then, the type of the lesion, positivity for the bacteria, and association of the bacteria with the epithelial tissue were examined.

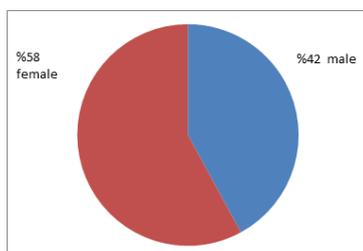
Among the tissue samples collected by biopsy, a separate tissue sample per patient was used to perform the urease test. To perform this test, a liquid urease medium (Broth-Rustigion-Stuart) prepared at our faculty's microbiology department was used. The Broth-Rustigion-Stuart medium at an amount of 0.5 ml was distributed into sterile laboratory tubes and the tubes were mounted over by sterilized cotton. The tissue samples collected by endoscopic biopsies were added into the tubes. The change in the color was observed in the first 15 minutes then in the 1st, 3rd, and 24th hours in the drying oven at 37 °C. The color change from yellow into red was accepted positive (10).

5 ml of venous blood is drawn from each patient into dry laboratory tubes for the serologic examinations. Hp specific IgG and IgA antibodies were investigated by the Zeus Scientific Inc. Helicobacter pylori ELISA method (11).

All the data were recorded in the SPSS 20.0 for Windows software. Chi-square test was used to compare the categorical data. Consistency between both test results was assessed with the Mc Nemar test. The difference between the mean values of two groups was evaluated by the t-test. The significance level was accepted to be 0.05.

**RESULTS**

302 cases who underwent EGD and antral biopsies were included in the study. Venous blood samples were collected from all patients to detect Hp with the ELISA method. The mean age of the patients was 47.3±16.1. The ratio of males was 42% (n = 127) and the ratio of females was 58% (n = 175) (Figure 1).



**Figure 1 The male-to-female ratio in the study population**

The age range of the male patients was 20-76 years with a mean age of 49.3±16.3. The age range of the female patients was 16-77 years with a mean age of 45.8±15.8.

The distribution of the cases according to their EGD results were as follows: Gastritis 38.4% (n=116), adenocarcinoma of the stomach 5% (n=15), duodenal ulcer 5.6% (n=17), stomach ulcer 2.3% (n=7), the patient group with unclassified diagnoses 44.7% (n=135), and the patients with normal findings 4% (n=12). (Table 1)

**Table 1: Endoscopic diagnosis of the cases**

Endoscopic Diagnosis	Number (n)	Percentage (%)
Normal	12	(%4)
Gastritis	116	(%38.4)
Stomach ulcer	7	(2.3%)
Duodenal ulcer	17	(5.6%)
Stomach Adenocarcinoma	15	(5%)
Others	135	(44%)

The female proportion in the endoscopically diagnosed cases of gastritis was 63.8%. It was 73.3% for the stomach cancers and 52.9% for the duodenal ulcers. As regards to the symptoms of the patients, the most common ones were hunger pain, epigastric pain, indigestion, melena, pyrosis, and weight loss. Hunger pain was the most common complaint with a rate of 88.2% (n = 15) in duodenal ulcer cases. The most common complaint in patients with gastritis was the epigastric pain in 70.7% (n = 82) of the patients. The rates of the common complaints of the stomach cancer were epigastric pain 86.7% (n = 13), indigestion 80% (n = 12), and melena 100% (n = 15) (Table 2).

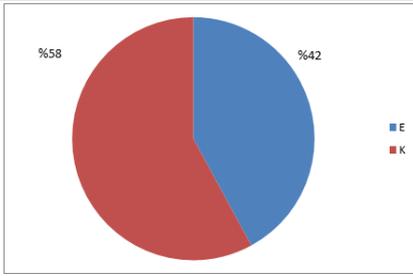
**Table 2: Frequency of symptoms according to the endoscopic diagnoses**

Symptom	Gastritis Percentage ((%) n)	Stomach cancer Percentage ((%) n)	Duodenal ulcer Percentage ((%) n)	Normal Percentage ((%) n)	Others Percentage ((%) n)
Hunger pains	38% 45	33% n=5	38.2 15	415	89 56
Epigastric pain	70% 82	36.7% 13	76.5% 13	66.7% 8	76.5% 13
indigestion	63.8% 74	30% 12	58.8% 10	60% 6	64.8% 92
Melena	11.2% 13	100% 15	17.6% 8	-	9.2% 8
Weight loss	4.3% 5	100% 15	-	8.3% 1	14.8% 21
Pyrosis	44% 52	40% 6	70% 12	25% 8	52% 75

HP IgG was found positive in 74.5% of all cases (n = 225) using the ELISA test method. For different age groups, the highest rate of IgG was found in the age group of 41-50 years and it was 80.4% while the lowest rate was 47.1% and it was found in the age group of 16-20 years. The mean age of the cases with IgG positivity for Hp was 48.3±15.7, whereas the mean age of the IgG negative cases was 44.3±17. As regards to the age groups and gender, in males, the highest frequency of Hp positivity was observed as 89% in the age group of 61-77 years and the lowest rate was 50% in the age group of 17-20 years. In females, the highest rate was 77.4% in the age group of 51-60 years and the lowest rate was 45.5% in the age group of 16-20 years. In the study patients, Hp positivity was 78.7% in males and 71.4% in females.

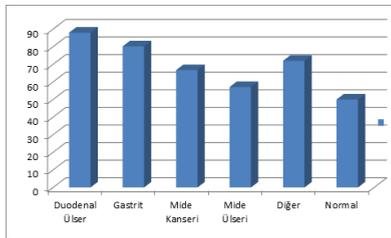
Hp IgA was positive in 53% (n = 160) of all cases. Among the endoscopic diagnoses groups, the highest Hp IgA positivity was present in the adenocarcinoma patients with a rate of 66.7%. As regards to the age, the highest Hp IgA rate was 62.2% in the age group 61-77.

Hp was detected in 67.5% of all cases (n = 204) with the urease test and/or histological examination (Figure 2).



**Figure 2: Hp positivity according to the results of the urease test and/or histologic diagnoses**

Among all endoscopic diagnoses groups, the highest Hp positivity was in the duodenal ulcer group at a rate of 82.4% as detected with urease test and/or with histologic examination. According to the ELISA test results and endoscopic diagnoses, Hp IgG antibodies were detected most commonly in the patient group with duodenal ulcers at a rate of 88% (n=15). The rates of Hp IgG positivity was detected by the ELISA method as follows in the endoscopic diagnoses groups: 80.2% (n = 93) in gastritis cases, 66.7% (n = 10) in the cases with adenocarcinoma of stomach, 57.1% (n = 4) in the gastric ulcer group, 72% (n = 97) in the group of patients with other diagnoses, and 50% (n = 6) in the group with normal findings (Figure 3).



**Figure 3 : Hp positivity according to the results of urease test and/or histological diagnosis, distributed into endoscopic diagnoses**

Pathological examination of the biopsy specimens resulted in the following distribution of diagnoses in the study population: Chronic non-specific gastritis 84.1% (n = 254), stomach adenocarcinoma 2.6% (n = 8), normal findings 9.3% (n = 28), intestinal metaplasia 3% (n = 9), and other diagnoses 1% (n = 3).

As regards to the Hp IgG positivity in the occupation groups of the study patients, the Hp IgG positivity was seen most commonly in the retired government employees and retired blue-collar workers at a rate of 88.7% (n = 55). The lowest rate was found in the students as 56% (n = 14).

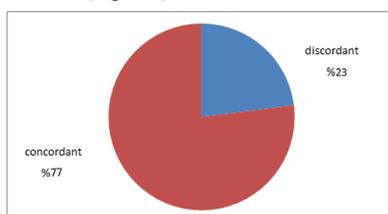
The specificity, sensitivity, positive predictive values (PPV), negative predictive value (NPV), and the total consistency (TC) results of the study tests are presented in Table 3.

**Table 3 Comparison of the tests used in the diagnosis of Helicobacter pylori**

	Sensitivity	Specificity	PPD	NPD	TT
Urease	78.2%	70%	75%	74%	74.2%
IgA	65.2%	59%	64%	61%	63.2%
IgG	83.2%	36%	60%	65%	74.2%

The concordance of the histopathology results with those of the urease test was 74%. These two tests were both positive in 42% patients and they were both negative in 42% of the cases.

The observed concordance between the endoscopic and pathologic diagnoses was 76.8% (Figure 4).



**Figure 4** The concordance between the endoscopic diagnoses and pathologic diagnoses

**DISCUSSION**

Helicobacter pylori is one of the most common infections in the world and is acquired in the early years of life in developing countries, remaining persistent throughout the lifespan. On the other hand, it is acquired at later ages in the developed countries (1). A study by LucioTrevesani et al. demonstrated Hp positivity in 81 (52%) patients out of 154, who presented with upper gastrointestinal system complaints (12). A study of Fontham et al. reported that Hp positivity did not increase with the increased age (13).

According to the data approved by Turkish Society of Gastroenterology in 1995, the Hp positivity rates according to the age groups in Turkey are 20.3% between the ages of 0-6 years, 72.7% between the ages of 7-11 years, 84.4% between the ages of 12-17 years, 76.8% between the ages of 18-24 years, and 84.2% between the ages of 25-35 years (14). Cetin et al. from Turkey reported that Hp positivity did not increase with the increased age (15). No statistically significant differences were found among the age groups in our study, too, demonstrating that the high prevalence of Hp in our patients was not affected by the age factor. When the patient data were analyzed according to the age groups, no significant differences in Hp positivity rates were observed among the age groups. The highest rate of Hp positivity is 73% in our study in the age group of 31-40 years. The lowest rate is 53% in the age group of 16-20 years. Including no patients younger than 16 years old in our study may be the other reason why no differences are observed among the different age groups. These results show that Turkish population is exposed to Hp in the earlier ages, unlike the developed countries.

Chong et al. conducted a study examining a total of 134 individuals who were gastroenterologists and endoscopy nurses as the study group. It was demonstrated that the Hp rates were significantly higher in the study group compared to the control group. In the control group, the Hp positivity rate was 10% in individuals younger than 45 years old, however, in the group composed of gastroenterologists and endoscopy nurses, this rate was 40%. The Hp positivity was 25% in the control group with individuals older than 45 years old compared to the 65% rate in the study group (16). No remarkable differences were detected in the Hp positivity among the different occupation groups. This finding is explained by the fact that our study was not designed to include the previously reported high-risk occupation groups in the literature. The highest rate of Hp positivity is 78.7% and observed in the government employees in our study. This finding demonstrates that the high rates of Hp positivity in the middle age group is different from the data of the developed countries. In addition, the association of our socioeconomic level in Turkey with the Hp positivity is a different finding, too, when compared to those data of the developed countries.

Invasive or non-invasive methods are available for use in the diagnosis of Hp. Invasive tests requiring endoscopic interventions include the serologic tests, urea breath test, and the immunohistochemical study of the enzymes in the stool. In addition, the polymerase chain reaction method, especially used in the recent studies, allows the precise diagnosis of Hp (8).

Local and systemic antibodies are generated in the host against Hp. These antibodies are remarkably beneficial for making the diagnosis by identifying the microorganism during the serologic tests. Serologic tests are especially useful in the studies evaluating the prevalence and in the surveillance of patients under treatment. The sensitivity and the specificity of the serologic tests vary according to the antigen preparations used. ELISA test is usually used as a serologic test. The sensitivity and the specificity of the ELISA method are reported to be 85-95% and 75-100% respectively (8).

In 1999, Cohen et al. compared the tests used to identify Hp. They have recognized that cultivating the microorganism and/or histological staining are the "golden standards" in identifying Hp. Their study noted the sensitivity and specificity of the ELISA test method as 92% and 63%, respectively (17).

In our study, we have identified Hp seropositivity in 74.5% of a total of 302 cases. The mean age of the male patients with positive Hp IgG antibodies was 51.7±15.9, whereas, the mean age was 40.4±14.8 in patients with negative results. As regards to all cases in the study, the mean age of the Hp IgG positive cases was 45.5±15, whereas, the mean

age of the Hp IgG negative cases was  $46.5 \pm 17.8$ . The frequency of Hp was found to be 78.7% (n=100) in the males and 71% in the females. In our study, the sensitivity and the specificity of the ELISA test used to identify Hp was found to be 83.2% and 36% respectively and the total consistency was 74.2%. Comparison of these results to the data reported in the literature, it is observed that our results are in parallel to the Hp IgG antibody rates in the developing countries. Considering the data in the literature along with our results, it is suggested that Hp IgG antibody rates are between 70-75% in adults in our country. The reasons for this finding include the following explanations: First, Hp IgG antibody positivity does not increase with the increasing age. Secondly, no patients younger than 10 years old were included in the study. Third, the atrophic changes increase by age and lead to the decreasing rates of Hp. And, fourth, the patients with dyspeptic complaints widely use the Hp eradicating medications and antibiotics, mainly the proton pump inhibitors, in our country.

A study by Aydin et al. investigated Hp in 140 dyspeptic patients with antral gastritis using histopathologic methods. With the method used in their study, Hp was positive in 91.8% of the gastritis cases (18).

In our study, we used HE stain to examine the mucosa and the Giemsa stain to investigate Hp. We identified Hp in 53.3% (n=161) of the cases using the Giemsa stain. In our study, Hp was found to be positive at the following rates in the following endoscopic diagnoses: 51.7% (n=60) of the gastritis cases, 76.5% (n=13) of the duodenal ulcer cases, 46.7% (n=7) of the stomach cancers, 33.3% (n=4) of the cases with normal findings, and 54.7% (n=77) of the cases classified under the heading "others". In our study, the specificity, sensitivity, PPV, and the NPV of the histopathologic method was 78%, 70%, 74%, and 75% respectively. The total consistency was 74%. Our results were parallel to the information in the literature.

Brown KE et al. developed a modified medium rapidly changing color and 100% concordant with the cultivation. Then this medium was put into the holes of the microdilution plaques. Finally, the individual biopsy materials were placed separately in these holes. Conducting this study, Brown KE aimed to evaluate the appearance of the tissue and Hp together, however, the results were unsuccessful (19). Murphy et al. conducted a study reporting the sensitivity and the specificity of the rapid urease test 85-93% and 96-98% respectively (20). Schrader et al. compared the cultivation, urease test and histopathologic methods used in the identification of Hp. They found the sensitivity and the specificity of the urease test as 57.9% and 86.5%, respectively (20). Trevisani et al. conducted a study on 238 patients and reported the sensitivity and the specificity of the rapid urease test 86.8% and 96.4% respectively (12). In our study, we used the Broth-Rustigion-Stuart medium, which is a liquid urease medium. Using this method, we obtained Hp positivity in 55% (n=166) cases. We identified urease positivity in 59% (n=68) of the gastritis cases, in 53.3% (n=8) of the stomach adenocarcinomas, in 70.6% (n=12) of duodenal ulcers, in 54.2% (n=72) of the cases in the group named "other", and in 33.3% of the cases with normal findings. The specificity, sensitivity, and the total consistency of the urease test we used were 70%, 78.2%, and 74.2%, respectively. Our results were compatible with the information in the literature.

In our study, it was noted that 78.4% of the patients, who were diagnosed with gastritis using endoscopy, were positive for the Hp IgG antibodies. Hp positivity was significantly higher when compared to the patients with normal endoscopic findings ( $p=0.005$ ). The Hp positivity was 69% in the same patients when investigated with the urease test and/or with histologic methods. Although this value did not show a statistical significance ( $p>0.05$ ), it was still higher compared to that of the cases with normal findings. Our results were parallel to the information in the literature.

Thurmer et al. conducted a study including 276 peptic ulcer patients. They found Hp positivity in 176 patients (22). Hp positivity was detected in duodenal ulcer patients at variable rates in the literature. Rauws et al. reported 81%, Hp positivity in duodenal ulcer patients (23).

Cullen et al. retrospectively studied 407 cases in a 25-year period. They reported a 15% frequency of duodenal ulcers in Hp positive individuals and a 3% frequency of duodenal ulcers in the Hp negative cases (24). Dang ve Graham conducted a study including 105 patients with duodenal ulcers and reported a 98% Hp positivity (25). In our

study, based on the endoscopic diagnoses, 88.2% (n=15) of the duodenal ulcer patients revealed positive results for the Hp IgG antibodies. When this result was compared to the group with normal endoscopic findings, the difference between the two groups was found to be statistically significant ( $p=0.004$ ). The Hp positivity was 82.4% (n=14) in the same patients when investigated with the urease test and/or with histologic methods. Similarly, comparison of this result to that of the group with normal endoscopic findings, the difference between the two groups was statistically significant ( $p=0.001$ ). These results of our study were found to be in line with the results of similar national and international studies.

In a study conducted in Japan, the prevalence of Hp in young stomach cancer patients was found to be 88.4%. In the symptomatic individuals at the same age group, Hp prevalence was 26.9% (26). A study conducted by Kokkolo et al. investigated the presence of Hp in the stomach cancer patients in the younger age group (with a mean of 45 years) with a serologic method, with Giemsa staining histopathologically, and with immunostaining. Hp positivity was 58% (n=29) in the stomach cancer patients with Giemsa staining. However, this rate was found to be 70% with the immunostaining (27). Menegotti et al. conducted a study to clarify the association of Hp with the gastric and non-gastric cancers. With Giemsa staining, they found Hp in 50% of the gastric cancer patients younger than 60 years old. In the same patient group, Hp was found 86% with the serologic IgG antibody method. In patients older than 60 years old, the same study found the Hp rates 34% with Giemsa staining and 81% with the IgG antibodies (28).

A metaanalysis performed by Forman reported Hp rates in gastric cancers as 58% in China, 82% in Sweden, 84% in America, and 89% in Finland (29). Sipponen et al. from Finland reported that in 38 (70%) gastric cancer cases out of 54, Hp antibodies (IgG) were positive in the serum. However, in 35 cases in the control group, this rate was found to be 49% (5).

In our study, we noted the Hp IgG antibody positivity 66.7% with the serologic methods in the 15 patients diagnosed with stomach cancers with endoscopy. These values were statistically significant compared to the Hp IgG positivity in cases with normal findings ( $p=0.043$ ). The Hp positivity was 53.3% (n=8) in the same patients when investigated with the urease test and/or with histologic methods. Although this value did not show a statistical significance ( $p>0.05$ ), it was still higher compared to that of the cases with normal findings. Considering the information in the literature and the results obtained in our study, there is a nonignorable association between the stomach adenocarcinoma and Hp positivity.

The number of studies investigating the concordance between the endoscopic and pathologic diagnosis methods is limited in dyspeptic patients. A study by Mihara et al. conducted in 2000 in Japan reported the diagnosis of endoscopic gastritis in 391 (60.9%) of 642 patients. Of the 391 patients with endoscopic gastritis, 318 (82.6%) had histologic gastritis and 310 (79.3%) had Hp infection. Of the 251 patients with normal stomach findings, histologic gastritis and Hp infection were identified in 43 (17.1%) and 32 (12.7%) patients, respectively. In cases with hyper rugosity and/or hyporugosity in the gastric plicae, a significantly higher prevalence of Hp was found. The rate of Hp infections was significantly higher in the endoscopic gastritis patients compared to the rate observed in the patient group with normal endoscopic findings (79.3% vs 12.7%). The prevalence of Hp infection and the histologic gastritis was high in the patients with endoscopic gastritis findings. The sensitivity, specificity, the concordance rate of the Hp infection rates were 79.3%, 87.3%, and 82.4%, respectively. The sensitivity, specificity, and the concordance rate for histologic gastritis was 82.6%, 82.9%, and 82.7% respectively (30). We found the observed rate of concordance 76.8% in our study. We are of the opinion that more precise results can be provided with the increasing number of further studies.

In conclusion, identification of Hp is quite important as it is considered as an effective pathogen for the development of stomach cancer or preceding lesions. Our study demonstrated a high rate of positive correlation between the endoscopic view and pathologic diagnosis. Therefore, referring the patients with upper GIS findings for endoscopic imaging methods is important both for the early diagnosis and in determining the treatment strategies. Endoscopic examination is an irreplaceable cornerstone for the diagnosis of Hp.

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