



The Seroprevalence Trend of *Helicobacter pylori* Infection in a Turkish Tertiary Hospital: A 4-year Retrospective Study

Türkiye’de Bir Üniversite Hastanesinde *Helicobacter pylori* Enfeksiyonu Prevalans Eğilimi: 4 Yıllık Retrospektif Bir Çalışma

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ABSTRACT

Objective: *Helicobacter pylori* (*H. pylori*) is a Gram-negative microaerophilic bacterium that is associated with diseases such as peptic ulcer, chronic gastritis, gastric MALT lymphoma, and gastric cancer. *H. pylori* infection is more common in developing countries. The high socioeconomic conditions and elimination of bacterial carriage by antimicrobial treatment reduce the prevalence of *H. pylori* in developed countries. The fecal *H. pylori* antigen test has been widely used recently. This test with high sensitivity and specificity constitutes a significant diagnostic method alternative due to its cost-effectiveness and rapid results. In this study, we retrospectively analyzed the presence of *H. pylori* antigen in the stool samples of patients with gastroduodenal complaints from laboratory records.

Methods: Test results of patients who underwent *H. pylori* antigen rapid cassette test from fresh fecal samples between January 2018 and May 2022 in the Medical Microbiology Laboratory were included in the study. Fresh fecal samples from patients were analyzed using *H. pylori* Antigen Rapid Test Cassette (Acro Biotech Inc, USA) kits. The statistical analysis of the research was made with IBM-SPSS 25.0 (IBM Co., USA). The chi-square test was used to evaluate the research data. $P < 0.05$ value was considered statistically significant.

Results: A total of 5,718 patients, 3,285 (57.5%) women with gastroduodenal complaints, were included in the study. Fecal *H. pylori* antigen test positivity was determined in 1,429 (25%) of these patients. The antigen positivity rate was found to be higher in women (26.6%) compared to men (22.9%) ($p < 0.05$). In addition, this rate was higher in adult patients (27.4%) than in pediatric patients (10.1%). In addition, this rate was higher in adult patients (27.4%) compared with pediatric patients (10.1%) ($p < 0.01$).

Conclusion: The regional prevalence data are informative about the development levels of countries in socioeconomic issues such as urbanization, infrastructure services, and access to clean water. In addition, these data may provide insight into the future prevalence of *H. pylori*-related diseases. We think that this study, in which the data of our region is shared, contributes to the literature.

Keywords: Antigen, *Helicobacter pylori*, seroprevalence, stool

ÖZ

Amaç: *Helicobacter pylori* (*H. pylori*), peptik ülser, kronik gastrit, mide MALT lenfoması ve mide kanseri ile ilişkilendirilen Gram-negatif mikroaerofilik bir bakteridir. *H. pylori* enfeksiyonu gelişmekte olan ülkelerde daha yaygın olup, gelişmiş ülkelerde iyi sosyoekonomik koşullar ve antimikrobiyal tedavi yoluyla taşıyıcılığın ortadan kaldırılması *H. pylori* prevalansını azaltmaktadır. Dışkıda *H. pylori* antijeni testi son dönemde yaygın olarak kullanılmaktadır. Yüksek duyarlılığa ve özgüllüğe sahip bu test, uygun maliyetli olması ve hızlı sonuç vermesi nedeniyle önemli bir tanı alternatifi oluşturmaktadır. Bu çalışmada, gastroduodenal şikayetleri bulunan hastaların dışkı örneklerinde *H. pylori* antijen varlığını laboratuvar kayıtlarından retrospektif olarak analiz edilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya Ocak 2018-Mayıs 2022 tarihlerinde Tıbbi Mikrobiyoloji Laboratuvarı'nda taze dışkı örneğinden *H. pylori* antijen hızlı kaset testi çalışılan hastalara ait test sonuçları dahil edilmiştir. Hastalardan alınan taze dışkı örnekleri *H. pylori* Antigen Rapid Test Cassette (Acro Biotech Inc, ABD) kitleri kullanılarak incelenmiştir. Araştırmanın istatistiksel analizi IBM-SPSS 25.0 (IBM Co., ABD) programı ile yapılmıştır. Verilerin değerlendirilmesinde ki-kare testi kullanılmış ve $p < 0,05$ istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular: Çalışmaya gastroduodenal şikayetleri bulunan 3.285 (%57,5) kadın olmak üzere toplam 5.718 hasta dahil edilmiştir. Bu hastaların 1.429'unda (%25) dışkıda *H. pylori* antijen testi pozitifliği belirlenmiştir. Antijen pozitiflik oranı kadınlarda (%26,6) erkeklere (%22,9) göre daha

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yüksek tespit edilmiştir ($p<0,05$). Ayrıca, bu oran yetişkin hasta grubunda (%27,4) çocuklara (%10,1) kıyasla daha yüksek bulunmuştur ($p<0,01$).
Sonuç: Bölgesel prevalans verileri ülkelerin kentleşme, alt yapı hizmetleri ve temiz su erişimi gibi sosyoekonomik konulardaki gelişmişlikleri hakkında bilgi verici özelliindedir. Ayrıca, bu veriler *H. pylori* ile ilişkili hastalıkların gelecekteki prevalansı üzerine öngörü sağlayıcı olabilir. Bölgemize ait verilerin paylaşıldığı çalışmamızın literatüre katkı verici özellikte olduğunu düşünmekteyiz.

Anahtar Kelimeler: Antijen, *Helicobacter pylori*, seroprevalans, gayta

INTRODUCTION

Helicobacter pylori (*H. pylori*) is a Gram-negative, spiral-shaped, microaerophilic bacterium that is widely distributed all over the world (1). This bacterium is an important pathogen associated with diseases such as peptic ulcers, chronic gastritis, gastric MALT lymphoma, and gastric cancer. For treating diseases caused by *H. pylori*, long-term and intensive use of antibiotics is necessary. Colonization formed by the bacteria is mostly asymptomatic, but these people are in the risk group regarding gastric diseases (2). Approximately 1% of people infected with *H. pylori* develop gastric cancer (3). Although it remains unclear how the infection is transmitted, it is thought that it can be transmitted in different ways such as fecal-oral, oral-oral, or gastro-oral (4).

Age, race, rural life, population density, socioeconomic status, poor health conditions, low education level, malnutrition, and insufficient water resources are important risk factors for the transmission of *H. pylori* (4,5). In consideration of all these factors, it can be stated that the disease is more common in developing countries. In developed countries, adequate socioeconomic conditions, effective hygiene and sanitation, and elimination of disease carriers with antimicrobial therapy reduce the prevalence of *H. pylori* (4,5).

Invasive and non-invasive techniques can be used for the diagnosis of *H. pylori* infection. Invasive methods such as immunohistochemistry tests, rapid urease tests, culture methods, and polymerase chain reaction require endoscopy, and these tests are known as biopsy method-based tests. Non-invasive methods include the gaita-antigen test, urea breath test, and ELISA *H. pylori*-IgG antibody tests. The sensitivity, specificity, and the cost of the test and clinical conditions are among the main factors affecting test selection (4,6,7).

H. pylori antigen search tests in feces have been widely used recently. It is stated that these tests using monoclonal anti-*H. pylori* antibodies have high sensitivity and specificity. It has been reported that these tests are useful for planning appropriate treatment methods because they are an alternative to invasive methods, cost-effective, and give rapid results (8).

This study retrospectively analyzed the presence of *H. pylori* antigen in the fecal samples of patients who applied to Sivas Cumhuriyet University Medical Faculty Practice and Research Hospital between January 2018-May 2022 with gastroduodenal complaints.

METHODS

This study, carried out at Sivas Cumhuriyet University Medical Faculty Hospital, was planned retrospectively to cover January 2018-May 2022 dates. The laboratory test results of patients who had gastroduodenal complaints and whose *H. pylori*-antigen rapid test cassette kit were studied from fresh feces samples in the medical microbiology laboratory within the specified time were included in the study.

Fresh feces samples from patients were analyzed using *H. pylori*-Antigen Rapid Test Cassette (Acro Biotech Inc, USA) kits, a qualitative chromatographic immunoassay test. According to the producer company bulletin, the sensitivity of the test kits using monoclonal anti-*H. pylori* antibodies is 99.9% and the specificity is 98.4%.

All tests were studied based on the guides of the producer company. The fecal samples were transferred to sample collection tubes containing the extraction buffer and homogenized. Two drops of this mixture were taken and dropped into the sample well in the test cassette. After waiting for 10 minutes, the formed bands were evaluated according to company guide. The formation of a colored line in the control (C) region of the test strips indicates that the test was performed following the guideline and the test result is valid. Only the formation of a colored line in the C region is interpreted as a negative result. A colored line in both the C region and the test (T) region is interpreted as a positive result.

Statistical Analysis

The statistical analysis of the research was made with IBM-SPSS 25.0 (IBM Co., USA). The numerical variables are given as frequencies (percentages). Chi-square test was used to evaluate the data. A value of $p<0.05$ was considered significant statistically.

This study was conducted with the approval of the Sivas Cumhuriyet University Faculty of Medicine Non-Invasive Clinical Research Ethics Committee (decision no: 2022-06/14, date: 22.06.2022).

RESULTS

The 5,718 patients [3,285 patients were females (57.5%) and 2,433 were males (42.5%)] with gastroduodenal complaints were included in the study. The ages of the patients ranged from 0 to 96. The 791 patients (13.8%) were in the child age group and 4,927 patients (86.2%) were in the adult age group. When the ranges of laboratory tests by years were examined, it was determined that the maximum number of laboratory tests was made in 2021 (33.4%). The ranges of the patients according to age, gender and laboratory test dates are given in Table 1.

H. pylori antigen positivity was determined in fecal samples of 1,429 patients (25%) included in the study. The antigen positivity rate was determined as 26.6% in women and 22.9% in men. This difference between men and women was considered statistically significant ($p < 0.05$) (Table 1).

Antigen positivity in feces was detected in 80 persons (10.1%) of the pediatric patients (0-18 age) included in the study. Antigen positivity in feces was detected in 1,349 persons (27.4%) of the adult patients (≥ 19) included in the study (Figure 1).

Table 1. Demographic data of the patients

	Positive samples (%)	Number of tests (%)
Gender		
Woman	873 (26.6)	3285 (57.5)
Man	556 (22.9)	2433 (42.5)
Age (range)		
0-9	28 (6.1)	459 (8)
10-18	52 (15.7)	332 (5.8)
19-29	275 (25)	1099 (19.2)
30-39	290 (31.1)	931 (16.3)
40-49	269 (28.3)	952 (16.7)
50-59	263 (29.2)	901 (15.8)
60-69	172 (26.1)	659 (11.5)
>70	80 (20.8)	385 (6.7)
Test order date		
2018	216 (18.6)	1163 (20.3)
2019	393 (29.8)	1320 (23.1)
2020	257 (25.2)	1020 (17.8)
2021	488 (25.6)	1907 (33.4)
2022	75 (24.4)	308 (5.4)
Total	1429 (25)	5718 (100)

The *H. pylori* antigen positivity rate was found to be statistically significantly higher compared to the adult age group and the pediatric age group ($p < 0.01$).

In this study, the range of *H. pylori* antigen positivity rates in age groups was also examined. It was determined that the fecal *H. pylori* antigen test was mostly performed in patients aged 19-29 years and 40-49 years old (Table 1). It has been determined that patients in the 30-39 age group have a higher *H. pylori* antigen positivity rate compared to patients in other age groups (Figure 2).

DISCUSSION

H. pylori continues to be a significant public health problem because it causes diseases such as peptic ulcers, chronic gastritis, and gastric cancer (9,10). It is thought that more than 50% of people worldwide are infected with *H. pylori*. However, the prevalence of *H. pylori* varies due to regional differences worldwide. While the prevalence of *H. pylori* is 25-40% in industrialized and developed countries, it is reported to be 60-85% in developing countries (9,10).

There are data in the literature indicating that the prevalence of *H. pylori* tends to decrease in different regions of the

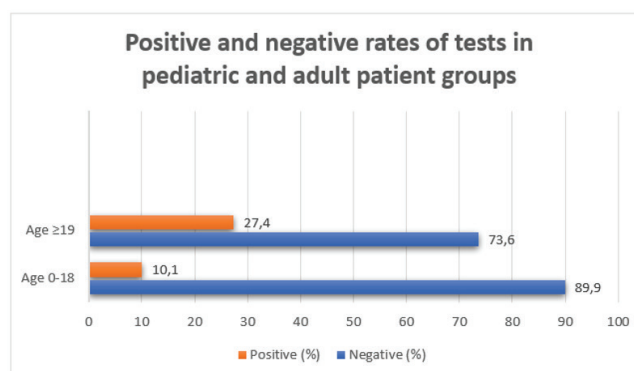


Figure 1. Positive and negative rates of tests in pediatric and adult patient groups

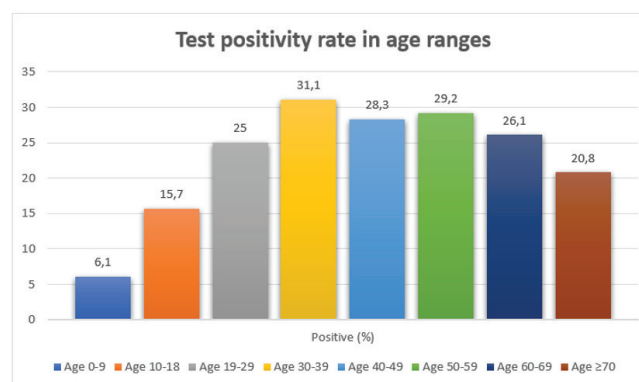


Figure 2. Test positivity rates by age range

world compared to the past (9-11). It has been stated that the prevalence of *H. pylori* is low, especially in children and young people in developed countries (10,12). However, it is argued that for developing countries, a similar assessment is not yet possible. In addition, the uncontrolled population growth and immigrant problem caused by socioeconomic reasons may negatively affect regional prevalence data (9,12).

Regional prevalence data can be informative about the development levels of countries in socioeconomic issues such as urbanization, infrastructure services, and access to clean water compared to the past. In addition, these data may offer implications for the future prevalence of *H. pylori*-related diseases, such as peptic ulcers, especially gastric cancer, and chronic gastritis (9).

A meta-analysis was recently published, presenting data from 412 studies in China (13). In this study, the prevalence of Chinese *H. pylori* was determined to be 44.2%. However, the authors noted that the prevalence of *H. pylori* in China, which has wide geography, shows regional variations. In this study, it was reported that a higher prevalence of *H. pylori* was observed in adults (46.1%) compared with children (28%). In addition, the prevalence level in women (42%) was lower than in men (44.9%). In this study, in which the data of the last 40 years of the country were examined, it was determined that there was a significant decrease in the prevalence of *H. pylori*, especially in the last 10 years. The researchers stated that this is related to their country's socioeconomic developments such as infrastructure services, health services, and an increase in quality of life.

Alsulaimany et al. (14) published a review aiming to determine the prevalence of *H. pylori* in the Middle East and North African countries in 2020. In this study, high prevalence rates of 7-50% in children and 40-90% in adults were reported in countries such as Egypt, Iran, Israel, Lebanon, Libya, Saudi Arabia and Tunisia. The researchers reported that they did not detect a significant difference in terms of the gender variant in the prevalence of *H. pylori*, except a few studies (14). Lower prevalence rates have been reported in regions with advanced infrastructure and high socioeconomic status, such as Oceania (24%), Western Europe (34%), and North America (37%) (9).

In recent studies in Türkiye, the prevalence of *H. pylori* was found to be between 11 and 65% (15-21). It was determined that the prevalence range in these studies varied in terms of the age group variable. Lower prevalence rates have been reported in children and individuals over the age of 65. It has also been reported that there has been a recent decrease in *H. pylori* prevalence rates compared with previous years

in Türkiye. In our study, similar to other studies conducted in Türkiye, *H. pylori* antigen test positivity in feces was found to be 25%. This rate was determined as 10.1% for children and 27.4% for adults ($p < 0.01$).

In many studies conducted in our country, it has been determined that the prevalence of *H. pylori* does not make a significant difference in terms of gender (16-21). However, Maçın et al. (15) found a higher rate of antigen positivity in women compared to men in their study. Similarly, Alim et al. (22) reported a higher prevalence rate in women in their study in our province. In our study, similar to the results of this study, a higher *H. pylori* antigen positivity was found in female patients (26.6%) than in male patients (22.9%) ($p < 0.05$).

A prevalence study was conducted in our province in 2004 involving 620 adult patients aged 28-69 years. In this study, the presence of *H. pylori* IgG-antibody in serum samples of patients was investigated by the ELISA method. The antibody test was positive in 70.1% of the patients (22). When these results are compared with the results of our study in which we present the data of our region, we can be stated that the prevalence of *H. pylori* has decreased compared with previous years. This situation can be evaluated as an indicator of socioeconomic developments such as the improvement of infrastructure services in our province, access to clean water, access to qualified health services, increase in education level, and increase in quality of life. Another reason for determination of positivity rates at different amounts can be said to be the difference in the methods used. A rapid cassette test based on the chromatographic immunoassay method was used in this study. Antigen search tests in feces, which have become more common recently, are among the non-invasive techniques that can be used in the diagnosis of *H. pylori* infection. These tests, which are an alternative to invasive methods, are advantageous because of their cost-effectiveness and rapid results. On the other hand, the feces antigen test and ¹³C-urea breath tests have higher sensitivity and specificity compared to the *H. pylori* IgG antibody test (23,24). It is also reported in the literature that the feces-antigen tests are useful for epidemiological studies and screening, are affordable in terms of cost and equipment, and give reliable results, which were used methodologically in this study too (24). In addition, there is currently no technique accepted as the gold standard for the diagnosis of *H. pylori*.

CONCLUSION

Regional prevalence data provide information on socioeconomic issues such as the city's infrastructure

services, access to clean water, health services, education level of people, and quality of life. Regular testing and presentation of the prevalence of *H. pylori* in Türkiye will contribute to the development of screening and diagnostic approaches for *H. pylori*. We think that this study, in which the data of our region is shared, is significant at this point.

ETHICS

Ethics Committee Approval: This study was conducted with the approval of the Sivas Cumhuriyet University Faculty of Medicine Non-Invasive Clinical Research Ethics Committee (decision no: 2022-06/14, date: 22.06.2022).

Informed Consent: Retrospective study.

Authorship Contributions

Concept: F.Ç., M.H., Design: F.Ç., A.H.T.K., M.H., C.Ç., Data Collection or Processing: F.Ç., A.H.T.K., M.H., C.Ç., Analysis or Interpretation: F.Ç., A.H.T.K., Literature Search: F.Ç., A.H.T.K., R.A., Writing: F.Ç., A.H.T.K., R.A.

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