

Seroepidemiological prevalence of *Helicobacter pylori* in the south of Tehran, Iran

Reza Torabi¹, Hamid Tebyanian², Mohamad Heiat³, Ali Choopani^{4*}

¹ Molecular Biology Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran

² Research Center for Prevention of Oral and Dental Diseases, Baqiyatallah University of Medical Sciences, Tehran, Iran

³ Research Center for Gastroenterology and Liver Diseases, Baqiyatallah University of Medical Sciences, Tehran, Iran

⁴ Amiran Oghyanoos Biotechnology Company, Tehran, Iran

* **Corresponding author:** Ali Choopani, Amiran Oghyanoos Biotechnology Company, Tehran, Iran **Email:** Choopani.ali3266@gmail.com

Received: 16 November 2021 **Revised:** 18 November 2023 **Accepted:** 25 December 2021 **e-Published:** 1 January 2022

Abstract

Background: *Helicobacter pylori* (HP) is one of the most prevalent infections globally, particularly in developing countries like Iran. The assessment of the disease in Tehran, the capital of Iran, is essential due to its high population density, inadequate sanitation infrastructure, and economic challenges.

Objectives: This study aimed to evaluate the prevalence of anti-HP antibodies in patients referred to a clinical laboratory in Tehran, Iran, in 2019.

Methods: We evaluated anti-HP IgA and IgG antibodies using the ELISA method. Positive and negative results were analyzed. During this study, we examined a total of 593 patients who were referred to clinical laboratories due to symptoms of the disease. We collected serum samples from these patients and used them for diagnosis via an ELISA kit.

Results: Out of 593 patients, 451 tested positive for both antibodies. Additionally, 87% of patients tested positive for IgG, and 47.8% tested positive for IgA. The findings also demonstrated that among different age groups, patients above 70 years old had the highest percentage of positive results for IgG (90%), while the age group of 50–60 years old had the highest percentage of positive results for IgA (82%). There were no statistically significant differences between the genders.

Conclusion: It seems that the number of patients suffering from this disease is increasing in Tehran, and even younger age groups are now being affected. For a reliable diagnosis, the evaluation of both antibodies is recommended.

Keywords: Antibody, ELISA, Epidemiology, *Helicobacter pylori*.

Introduction

Helicobacter pylori (HP) is one of the most widespread infections in the world, especially in developing countries.^{1,2} The prevalence of this infection is relatively low in older populations in developed countries, but it is more common in poorer societies, where people are often infected from childhood.^{3,4} Besides age, other factors, including environmental conditions, poverty issues, and genetics, play a key role in HP infection.^{5,6}

The bacterium is capable of causing chronic gastritis and other diseases associated with chronic gastritis, such as duodenal ulcers, stomach lymphomas, and gastric cancers.⁷ HP was categorized as one of the most important carcinogenic agents by the WHO in 1994. Despite recent

advances in understanding the pathophysiological mechanisms of HP infection, some epidemiological issues have not been well studied yet. Conducting research in developing countries reveals a significant difference in the prevalence of infection among different populations. It has been demonstrated that the prevalence of HP infection varies between developed and developing countries, with developing countries having a higher incidence of HP infection than their developed counterparts.^{8,9}

HP infection can be diagnosed using several methods. Serological tests have been widely used in epidemiological studies to assess the prevalence of infection in various populations. Since HP strains vary across different regions, diagnostic kits (detection kits) must use native antigens

(domestic antigens); therefore, each country should collect its own epidemiologically relevant data. It is believed that humans are the only definitive source of this infection, and the routes of transmission are still unknown, although infections can be transmitted in two main ways: oral-oral and oral-fecal routes. Some surveys have also indicated that treatment for HP infection can reduce the risk of peptic ulcers and lymphoma.¹⁰

Anti-HP IgG, IgM, and IgA antibodies are commonly investigated in clinical laboratories. IgG titers are positive in 95% of patients within two months after the bacteria enters the body, and this titer remains measurable for a year or more, even after complete treatment.¹¹ IgA titers become positive two months after the initial entry of bacteria and establishment of infection, and this antibody is removed from the blood one month after treatment. Serologic testing can determine whether a person is infected or in the recovery phase. However, sometimes a cross-reaction with another antigen may lead to pseudo-positive results.¹²

Iran, a developing country, is said to have high rates of bacterial infections. Tehran, the capital of Iran, with a population of over 15 million, serves as a suitable case for studying HP epidemiology. Due to the poor economic and social conditions in the southern part of Tehran, the rate of HP infection is high and more prevalent in this region. Clinical laboratories are the primary-recommended way (the first-line strategy) to diagnose HP. In Tehran, when physicians discover the symptoms of the disease, patients are referred to the laboratory for further experiments.

Objectives

The objective of this study is to investigate IgG and IgA titers in patients with symptoms in the southern part of Tehran, Iran, during 2019.

Methods

This cross-sectional study was conducted in 2019, involving a total of 593 patients referred to clinical laboratories in the southern part of Tehran, Iran. Serum samples from these patients were sent for serological testing, and IgG and IgA antibodies were measured using an ELISA kit (Monobind, USA) with a specified level of specificity and sensitivity (i.e., 95%). All procedures were

performed according to the protocol and company instructions. Optical density was measured using an ELISA reader (Stat Fox 303, USA).

Demographic data was obtained from the lab's patient reception software.

Statistical analysis

All statistical analyses were performed with SPSS (version 16.0, SPSS Inc, Chicago, IL, USA). A "P-value" less than 0.05 was considered significant. Kendall's tau-b test was used for analyzing the relation between age groups and antibodies titer.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki, and Institutional Review Board approval was obtained. The present study did not interfere with the process of diagnosing and treating patients. All participants were able to withdraw from or leave the study at any point without feeling an obligation to continue.

Results

From 593 patients, 87% of them were positive for IgG titer and 47.8% were positive for IgA titer. In terms of gender, 203 (34.3%) males and 261 (44.2%) women had positive IgG titers, and these amounts also refer to IgA because the women number was greater than men. There was no significant difference between genders for both tests. A significant relationship was found between the percentage of IgG and IgA positive titers and age groups ($P < 0.05$). Out of all patients, 211 cases (35.5%) were positive for both antibodies' titers, while 143 cases (24.0%) and 3 cases (0.005%) had positive titers only for IgG and IgA, respectively.

Discussion

HP infection is widely spread in Asia, and its prevalence is higher in certain countries such as Korea, Vietnam, Iran, Saudi Arabia, and Pakistan.^{13,14} The infection rate has risen in urban areas across Asia. As a country situated in the midst of disease outbreaks in the Middle East, Iran holds great significance, particularly in regards to its capital city, Tehran, which is home to the largest population in the country.¹⁵ Furthermore, the rate of this infection is increasing in the Iranian population every year.¹⁶

Table-1. The relation between age groups and percentage of IgG /IgA titer

| | | IgA titer | | | IgG titer | | |
|---------------------------------|----------|-----------|----------|-------|-----------|----------|-------|
| | | Under 20 | Above 20 | Total | Under 20 | Above 20 | Total |
| Age group (years old) | 1(1-10) | 19 | 2 | 21 | 27 | 9 | 36 |
| | 2(10-20) | 39 | 11 | 50 | 21 | 41 | 62 |
| | 3(20-30) | 55 | 56 | 111 | 28 | 122 | 150 |
| | 4(30-40) | 59 | 41 | 100 | 21 | 107 | 128 |
| | 5(40-50) | 45 | 65 | 110 | 22 | 113 | 135 |
| | 6(50-60) | 5 | 24 | 29 | 5 | 38 | 43 |
| | 7(60-70) | 9 | 12 | 21 | 2 | 25 | 27 |
| | 8(70-80) | 4 | 5 | 9 | 1 | 9 | 10 |
| Total | | 235 | 216 | 451 | 127 | 464 | 591 |
| P value | | | 0.001 | | | 0.001 | |

In 2011, the seroprevalence of HP infection was reported to be about 58% in the Bahamas, USA.¹⁷ Similarly, in Texas, USA, in 2012, the age group 41–60 years had the highest rates of infection.¹⁸ Several studies have reported similar results. For example, a seroepidemiology study of *Helicobacter pylori* conducted in 2008 and 2009 in Lithuania involved 3564 patients.¹⁹ The positive rate in these patients was reported to be greater than 79.2%, which is comparable to the findings of the current study. Furthermore, a high prevalence of *H. pylori* infection (75–83%) was reported in six Latin American countries, including Chile, Colombia, Costa Rica, Honduras, Mexico, and Nicaragua, according to Porras et al. in 2008.²⁰

The positive titer among symptomatic individuals is higher than moderate, and it has been reported to be up to 99%. Since this study was conducted among symptomatic individuals, it is common to see a high percentage of positive titers. Patterson et al.,¹⁸ reported the lowest percentage of positive titers in recent years. They reported that the incidence rates of positive titers measured in 283 individuals by a serological method were only 17% in Texas. (18)

The positive titer among symptomatic individuals is higher than moderate, and it has been reported to increase with aging from 0.5 to 2% annually. As a result, the majority of elderly adults have a positive titer, as demonstrated by our study. (11) Because IgA is eliminated from the body before IgG, the simultaneous presence of IgG and IgA indicates that the disease is active. In this study, 60% of the population had an active disease, while 18.5% of those had only IgG positivity. They are either

under or after treatment, as the antigen is removed from their bodies. The incomplete treatment is another reason for the IgG-positive titer. The high proportion of individuals suffering from active disease (60%) could be attributable to the deliberate selection of the target group from individuals suffering from clinical signs and who have been referred to a laboratory by medical professionals. More research is required for the epidemiological investigation of HP in a normal population. Since infection with HP is one of the most important factors for gastrointestinal disorders, particularly gastric cancer, the high incidence in the study population must be carefully considered.

Conclusions

Based on the analysis of the results, it appears that the percentage of people with this disease is rising in Tehran, and even the lower age groups are involved in this disease. The evaluation of both antibodies for accurate diagnosis of patients showed better results, and antibody titers are higher in older age groups. Moreover, ELISA is a more reasonable technique due to the duration of exposure to bacteria and physiological changes.

Acknowledgment

The authors take this opportunity to thank the Medical Laboratory staff for their technical support.

Abbreviations

Helicobacter pylori: HP; World Health Organization: WHO; Enzyme-linked immunosorbent assay: ELISA.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

HA, and AC were responsible for study concept and design. HT, MG, RT, and MH led data collection. HA, HT, and AC were responsible for the analysis and interpretation of data. All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

Funding

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

References

- Benajah DA, Lahbabi M, Alaoui S, El Rhazi K, El Abkari M, Nejari C, et al. Prevalence of *Helicobacter pylori* and its recurrence after successful eradication in a developing nation (Morocco). *Clinics Res Hepatol Gastroenterol.* 2013; 37(5):519-26. doi:10.1016/j.clinre.2013.02.003 PMID:23567104
- Valliani A, Khan F, Chagani B, Khuwaja AK, Majid S, Hashmi S, et al. Factors associated with *Helicobacter pylori* infection, results from a developing country - Pakistan. *Asian Pac J Cancer Prev.* 2013; 14(1): 53-6. doi:10.7314/APJCP.2013.14.1.53 PMID:23534789
- Ozcaf F, Kocak N, Temizel IN, Demir H, Ozen H, Yuca A, et al. *Helicobacter pylori* infection in Turkish children: comparison of diagnostic tests, evaluation of eradication rate, and changes in symptoms after eradication. *Helicobacter.* 2004; 9(3):242-8. doi:10.1111/j.1083-4389.2004.00230.x PMID:15165260
- Jafar S, Jalil A, Soheila N, Sirous S. Prevalence of *Helicobacter pylori* infection in children, a population-based cross-sectional study in west Iran. *Iran J pediatrics.* 2013;23(1):13-8.
- Khalifa MM, Sharaf RR, Aziz RK. *Helicobacter pylori*: a poor man's gut pathogen? *Gut Pathog.* 2010;2(1):2. doi:10.1186/1757-4749-2-2 PMID:20356368 PMCid:PMC2861632
- Santos IS, Boccio J, Santos AS, Valle NC, Halal CS, Bachilli MC, et al. Prevalence of *Helicobacter pylori* infection and associated factors among adults in Southern Brazil: a population-based cross-sectional study. *BMC Public Health.* 2005;5:118. doi:10.1186/1471-2458-5-118 PMID:16283940 PMCid:PMC1308822
- Inoue I, Kato J, Tamai H, Iguchi M, Maekita T, Yoshimura N, et al. Related chronic gastritis as a risk factor for colonic neoplasms. *World J Gastroenterol.* 2014; 20(6):1485-92. doi:10.3748/wjg.v20.i6.1485 PMID:24587623 PMCid:PMC3925856
- Peleteiro B, Bastos A, Ferro A, Lunet N. Prevalence of *Helicobacter pylori* Infection Worldwide: A Systematic Review of Studies with National Coverage. *Dig Dis Sci.* 2014. doi:10.1007/s10620-014-3063-0 PMID:24563236
- Calvet X, Ramirez Lazaro MJ, Lehours P, Megraud F. Diagnosis and epidemiology of *Helicobacter pylori* infection. *Helicobacter.* 2013;18 Suppl 1:5-11. doi:10.1111/hel.12071 PMID:24011238
- Kutlubay Z, Zara T, Engin B, Serdaroglu S, Tüzün Y, Yilmaz E, et al. *Helicobacter pylori* infection and skin disorders. *Hong Kong Med J.* 2014; 20(4):317-24. doi:10.12809/hkmj134174 PMID:25045884
- Versalovic J. *Helicobacter pylori*. Pathology and diagnostic strategies. *Am J Clin Pathol.* 2003;119(3):403-12. doi:10.1309/5DTF5HT7NPLNA6J5
- Veenendaal RA, Pena AS, Meijer JL, Endtz HP, van der Est MM, van Duijn W, et al. Long term serological surveillance after treatment of *Helicobacter pylori* infection. *Gut.* 1991; 32(11):1291-4. doi:10.1136/gut.32.11.1291 PMID:1752457 PMCid:PMC1379154
- Baik SJ, Yi SY, Park HS, Park BH. Seroprevalence of *Helicobacter pylori* in female Vietnamese immigrants to Korea. *World J Gastroenterol.* 2012; 18(6):517-21. doi:10.3748/wjg.v18.i6.517 PMID:22363117 PMCid:PMC3280396
- Muhammad JS, Zaidi SF, Sugiyama T. Epidemiological ins and outs of *Helicobacter pylori*: a review. *J Pak Med Assoc.* 2012;62(9): 955-9.
- Habib N, Freegard T, Gock G, Newman P, Moate R. Late surface opacification of Hydroview® intraocular lenses. *Eye.* 2002; 16(1):69-74. doi:10.1038/sj.eye.6700069 PMID:11913892
- Graham DY, Malaty HM, Evans DG, Evans DJ, Klein PD, Adam E. Epidemiology of *Helicobacter pylori* in an asymptomatic population in the United States. Effect of age, race, and socioeconomic status. *Gastroenterology.* 1991; 100(6): 1495-501. doi:10.1016/0016-5085(91)90644-Z
- Carter FP, Frankson T, Pintard J, Edgecombe B. Seroprevalence of *Helicobacter pylori* infection in adults in the Bahamas. *West Indian Med J.* 2011;60(6):662-5.
- Patterson T, Straten E, Jimenez S. The prevalence of *Helicobacter pylori* antibody in different age groups in Central Texas. *Clin Lab Sci: J Am Soc Med Technol.* 2012;25(2):102-6. doi:10.29074/ascls.25.2.102 PMID:22693779
- Kupcinskas J, Leja M. Management of *Helicobacter pylori* -Related Diseases in the Baltic States. *Dig Dis (Basel, Switzerland).* 2014;32(3):295-301. doi:10.1159/000357862 PMID:24732196
- Porrás C, Nodora J, Sexton R, Ferreccio C, Jimenez S, Dominguez RL, et al. Epidemiology of *Helicobacter pylori* infection in six Latin American countries (SWOG Trial S0701). *Cancer Causes Control.* 2013; 24(2):209-15. doi:10.1007/s10552-012-0117-5 PMID:23263777 PMCid:PMC3645498

Cite this article as:

Torabi R, Tebyanian H, Heiat M, Choopani A. Seroepidemiological prevalence of *Helicobacter pylori* in the south of Tehran, Iran. *Novel Clin Med.* 2022; 1(1):55-58. doi:10.22034/NCM.2022.140810