

FREQUENCY THE SERO POSITIVITY OF HELICIBACTERPYLORI AND ASSOCIATED RISKFACTORS WITH INFECTIONAMONG DYSPEPETIC PATIENTS

ABSTRACT

Background and Objectives:Prevalence of *Helicobacter pylori* infection is the most common worldwide, and the seroprevalence of *H. pylori* infection varies greatly among societies and geographical locations.This study aimed to determine the seroprevalence of *H. pylori* infection among dyspeptic patients in Mukalla city-Hadhramout/Yemen.

Methods:A cross-sectional study was conducted for 100 suspected patients complaining of dyspeptic disorders. Serum anti-*H. pylori* was detected using *H. pylori* antibody test cassette rapid immunochromatographic assay. A structured questionnaire developed to collect socio-demographic characteristics, personal hygienic status and some clinical signs.

Results: The seropositivity prevalence of *H. pylori* infection was 37% with statistically significant value (P -value = 0.000). High prevalence of *H. pylori* infection was detected among males than females. The age groups 19-32 years and 33-46 years showed the highest rate prevalence of *H. pylori* infection, while *H. pylori* infection decreased with advancing age of 47-60 year. There was no significant correlation of *H. pylori* infection with socio-demographic, behaviors and hygienic variables (P -value > 0.05). Clinical signs of heartburn and regurgitation were found to be significant risk factors associated with *H. pylori* infection (P -value = 0.014).

Conclusions:*H. pylori* seroprevalence infection found to have associated with dyspepsia. Heartburn and regurgitation as clinical symptoms were found to be significant risk factors associated with *H. pylori* infection. Non-invasive anti-*H. pylori* test card was rapid and easy method for detection of *H. pylori* infection.

Key words:Seropositivity, *Helicobacter pylori*, Risk factors, Infection, Dyspeptic patients

INTRODUCTION

Helicobacter pylori (*H. pylori*) is a Gram-negative microaerophilic spiral shaped flagellated bacillus bacterium¹, found deep in the gastric epithelial cells that secrete mucus in the human stomach where neutral pH is prevalent². It infects 30-50% of the general population worldwide³.

H. pylori has several virulence factors that cause the infection, some of these factors contribute to cause gastric inflammation⁴. Also, *H. pylori* recognized play a causative role in pathogenesis of various gastrointestinal diseases, chronic gastritis, peptic ulcer, gastroduodenal ulcer and it has been associated with the mucosa-associated lymphoid tissue (MALT) lymphoma and gastric carcinoma^{2,4,5}.

Some risk factors associated with *H. pylori* infection include residence in developing countries, health status, improper and handling of swages^{6,7}. *H. pylori* infection is more frequently and commonly found in gastroenterologists, endoscopy staff, intensive care nurses, groups of healthcare workers and those caring for development disabled individuals⁸.

Non-invasive diagnostic and screening tests for detection of antibody directed against *H. pylori* are now available. Because IgG or IgA antibodies remain elevated as long as the infection persists of *H. pylori*. These tests are valuable for both screening and evaluating therapy of *H. pylori* infection⁹.

In Yemen, some previous studies are known about the seroprevalence of *H. pylori* infection, but there have been no studies addressing environmental and dietary risk factors are known to have been conducted on the seroprevalence of *H. pylori* infection either among children or adults in Hadhramout Governorate-Yemen. Therefore, the current study was aimed to determine the

seroprevalence of *H. pylori* infection by detection of antibody among dyspeptic patients referred to some hospitals in Mukalla city-Hadhramout/Yemen, as well as to study the potential risk factors associated with *H. pylori* infection.

MATERIALS AND METHODS

Study design

This a cross-sectional study was conducted in Mukalla city-Hadhramout/Yemen. A total of 100 suspected patients complaining of dyspeptic disorders which referred to some main hospitals in Mukalla city-Hadhramout were included. Patients excluded when were they are without dyspeptic disorders.

Data collection tool

Prior to samples collection, socio-demographic characteristics, hygienic status and clinical symptoms information of the participants were obtained using a structured questionnaire.

Laboratory method

Serum anti-*H. pylori* was detected using a one-step *H. pylori* antibody test cassette supplied by InTec Products, INC, USA. The advanced quality rapid Anti-*H. pylori* test is a colloidal gold enhanced test detect antibodies in human. The test is based on immunochromatography and can give a result within 20 minutes with a high sensitivity 94.88% and specificity 95.21% as per manufacturer's specifications. The test used for the rapid visual qualitative detection of antibodies to *H. pylori* in human whole blood, serum or plasma. The procedures followed the manufacturer's instructions. In brief, 100µl of sample or control dispensed into the circular sample well on the card, then the test results interpreted at 15-20 minutes.

Evaluation of diagnostic test for *H. pylori* detection

Evaluation of anti-*H. pylori* diagnostic test was carried out by measurement of sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV).

Data analysis

Statistical Package for Social Sciences (SPSS) version 20 was used for data analysis. The association between different variables and outcome the seroprevalence of *H. pylori* infection was measured and compared using Pearson chi-square (χ^2) test. The level of statistical significance was set at $P\text{-value} > 0.05$.

Ethical consideration

We obtained written consent of all cases. Approval was obtained from the participants prior to collection of blood samples. The study proposal was evaluated and approved from faculty of sciences, Hadhramout university. The objectives, benefits and procedure for the study was made very clear to the participants and they were assured of the confidentiality associated with the study.

RESULTS

The overall estimated seropositivity prevalence of *H. pylori* infection among dyspeptic patients was 37(37%) with significant statistical analysis ($P\text{-value} = 0.000$) as shown in Table 1. For evaluation of non-invasive diagnostic methods for *H. pylori* infection detection, the sensitivity, specificity, PPV, and NPV of blood test for antibody detection were 34%, 71%, 84% and 24% respectively.

Among the participants, 47% of them were males and 53% were females, the range age was 5-60 years. 22% of them were illiterate, 35% had primary education, 26% had completed high school, whereas 16% had university level education and 1% had postgraduate education as given in Table 2. Seroprevalence of *H. pylori* infection was high in males than females. High rate of *H. pylori* infection was found among the age groups of 19-32 years and 33-46 years and decreased with the age group of 47-60 year, also high rate seroprevalence of *H. pylori* infection was found in primary education level. Statistically, there was no significant associated with *H. pylori* infection and socio-

demographic variables (P -value > 0.05). *H. pylori* seroprevalence infection showed no significantly association with personal habits like food patterns and water sources, as well as, antibiotics drug used (P -value > 0.05), whereas clinical symptoms status of the participants complaining heartburn and regurgitation were significantly associated with their *H. pylori* infection (P -value = 0.014), as it is shown by the results presented in Table 3.

DISCUSSION

This study showed the overall estimated seroprevalence of *H. pylori* infection among dyspeptic patients was 37%, similar results of seroprevalence *H. pylori* infection in patients with dyspepsia showed in studies carried out in Iran 34%¹⁰, India 35.6%¹¹, Vietnam 48.8%¹². Another study showed the anti-*H. pylori* IgG positive was 69.0%¹³.

However, the prevalence in our study was lower than that reported in other studies, Ethiopia 98%¹⁴, Kuwait 88.5%¹⁵, Afghanistan 75.6%¹⁶, Cameroon 51.5%⁸. Other studies showed *H. pylori* infection rate 78.1%, 64.39% and 73.9%^{17,18,19} respectively. On the other hand, some studies showed low positivity *H. pylori* serum antibody test 28.0%²⁰ and 24.3%²¹. This difference in the seroprevalence of *H. pylori* infection could be due to the differences in living conditions or low levels of exposure to the risk factors other than that included in our study.

Many clinical tests are used to confirm the presence of a disease or further the diagnostic process. In our validation of non-invasive anti-*H. pylori* diagnostic test, the sensitivity, specificity, PPV, and NPV of blood test for antibody detection were 34%, 71%, 84% and 24% respectively. Such tests correctly identify all patients with disease and similarly correctly identify all patients who are disease free. In other words, a perfect test is never positive in a patient who is disease free and is never negative in a patient who is in fact diseased²². Prevalence affects PPV and NPV differently, PPV is increasing, while NPV decreases with the increase of the prevalence of the disease in a population, whereas change in PPV is more substantial, NPV is somewhat weaker influenced by the disease prevalence²³. A test with a high sensitivity but low specificity results in many patients who are disease free being told of the possibility that they have the disease, these patients should be undergo to further investigation²². Therefore, several studies seroprevalence of *H. pylori* infection showed different results of tests evaluations. A test serology had high sensitivity but low specificity²⁴. Infection of *H. pylori* diagnosed by measuring IgG levels by ELISA method has a sensitivity 94% and specificity 98%²⁵. Also, an enzyme immunoassay test showed sensitivity and specificity of 90% and 89% respectively²⁶.

In this study, seroprevalence of *H. pylori* infection was high in males than females, while high rate *H. pylori* infection showed among the age groups of 19-32 years and 33-46 years and decreased with the age group of 74-60 year, as well as the high rate seroprevalence of *H. pylori* infection found among primary and high school education levels. Other more seroprevalent of *H. pylori* infection in India showed in males 78% and the majority of the *H. pylori* infected patients were in the age group of 31-60 years 61.6%⁵. On the other hand, 42.6% of female students tested by serum antibody found to be positive for *H. pylori* infection with statistically significant²⁰. Other studies showed overall 62% and 63.6% of women were infected with *H. pylori*^{8,18}. Also, the seroprevalence of *H. pylori* infection were higher in women than in men¹³.

The infection of *H. pylori* takes place early in childhood and adolescence and reaches its peak at adulthood at 35 to 44 years¹⁸. Other study showed *H. pylori* infection was more prevalent at the age of 30-39 years 90.8% with significant difference between sexes and women had a higher infection rate than men²⁷, while the predictor of seroprevalence of *H. pylori* was found to be the illiteracy¹⁶. The level of education was statistically related to *H. pylori* infection in the group with

high school level¹⁰. Other study showed that infection of *H. pylori* was higher among school going children with significant value²¹.

In this study, the relationship of the prevalence *H. pylori* infection with personal habits and hygienic behaviors variables were not associated with *H. pylori* infection. A study conducted in China showed that the prevalence of *H. pylori* infection was associated with some foods as eating kipper and fried food²⁷, other study revealed that *H. pylori* has a close association with acid peptic disease, it facilitates the fact that individuals who consumes junk food and beverages are predisposed towards both acid peptic disease and *H. pylori*²⁸. On contrast, similar results of the prevalence *H. pylori* infection were significantly higher among individuals with consumption of unboiling water showed in Thailand²⁹. A study conducted in Uganda revealed that infection rate of *H. pylori* was higher among unsafe source of drinking water with significant value²¹.

In our results, the relationship the prevalence of *H. pylori* infection with clinical symptoms of the participants complaining heartburn and regurgitation were significantly associated with *H. pylori* infection, while antibiotics drug used was associated with *H. pylori* infection. Moreover, the parasitic infections were not associated with *H. pylori* infection. Similar results showed the predictor of seroprevalence of *H. pylori* was found to be epigastric pain¹⁶. Other study showed all patients with upper abdominal pain and frequent burping were *H. pylori* seropositive¹⁸. Another study revealed that symptomatic participants complained mostly of heart burn, followed by loss of appetite, abdominal pain, nausea, dark foul- smelling stool and vomiting²⁰. Other disagree results showed that the antibiotics used was found to be significant risk factor for *H. pylori* seroprevalent infection¹².

CONCLUSIONS

The study revealed that seroprevalence of *H. pylori* infection was found to have associated with dyspepsia. Heartburn and regurgitation as clinical symptoms were found to be significant risk factors associated with *H. pylori* infection. Non-invasive anti-*H. pylori* test card was rapid, easy, inexpensive method for detection *H. pylori* infection.

ACKNOWLEDGMENTS

Special thanks to all the participants in the research work. Great thanks expressed to department of biology, faculty of science, Hadhramout university/Yemen for their efforts in developing scientific research.

CONFLICT OF INTEREST

No conflict of interest associated with this work.

AUTHORS CONTRIBUTION

The manuscript was carried out, written and approved in collaboration with all authors.

REFERENCES

1. Bolanle A, Jesse O, Temitope L, Abideen O, Georgina O, Clement O, Samuel O, Philip I, Adegboyega A, Aderemi K. Prevalence of Helicobacter pylori infection among dyspepsia patients in Ibadan, South west Nigeria. *Afr. J. Microbiol. Res.* 2012; 6(14): 3399-3402.
2. Nevoa JC, Rodrigues RL, Menezes GL, Lopes AR, Nascimento HF, Santiago SB, Morelli ML, Barbosa MS. Molecular technique for detection and identification of Helicobacter pylori in clinical specimens: a comparison with the classical diagnostic method. *Journal Brasileiro de Patologia e Medicina Laboratorial.* 2017; 53(1): 13-19.
3. Liu X, Nie W, Liang J, Li Y. Interaction of Helicobacter pylori with Other Microbiota Species in the Development of Gastric Cancer. *Arch Clin Microbiol.* 2017; 8(2): 37.

4. CalikZ, KarameseM, AcarO, KarameseSA, DicleY, AlbayrakF, CanS, GuvendiB, Turgut A, CicekM, et al. Investigation of Helicobacter pylori antigen in stool samples of patients with upper gastrointestinal complaints. *Braz J Microbiol.* 2016;47(1): 167-171.
5. Chandrababu D, Nandeesh HP, Suvarna D, Aradya HV, Vijaykumar TR, Suresh I, Kothe S.R. Association of H. pylori Infection with Gastroduodenal Disease: A cross Sectional Study from Mysuru, Indi. *Nat J Med Res.* 2016; 6(3): 292-295.
6. David YG, Lee YC, Wu M.S. Rational Helicobacter pylori Therapy: Evidence-Based Medicine Rather Than Medicine-Based Evidence. *Clin Gastro Hepat.* 2014; 12: 177–186.
7. Bello AK, Umar AB, Borodo M.M. Prevalence and risk factors for Helicobacter pylori infection in gastroduodenal diseases in Kano, Nigeria. *Afr. J. Med. Health Sci* 2018; 17: 41-61.
8. AmindeJA, DedinoGA, NgwasiriCA, OmbakuKS, MahopMCA, AmindeLN. Helicobacter pylori infection among patients presenting with dyspepsia at a primary care setting in Cameroon: seroprevalence, five-year trend and predictors. *BMC Infect Dis.* 2019; 19(1): 30.
9. Lee HC, Huang TC, Lin CL, Chen KY, Wang CK, Wu DC. Performance of Routine Helicobacter pylori Invasive Tests in Patients with Dyspepsia. *Gastro Res Pract.* 2013; 184806. DOI: 10.1155/2013/184806.
10. MetanatM, Sharifi-Mood B, Izadi S. Prevalence of Helicobacter pylori infection in healthcare workers. *Turkey J Med Sci.* 2010; 40(6): 965-969.
11. Paul N, Rajahamsan J, Theodore RB. Prevalence of Helicobacter pylori among dyspeptic patients in a tertiary care centre in South Kerala, India. *J Acad Clin Microbiol.* 2016; 18: 105-109.
12. Nguyen TH, Phan TB, Nguyen VB, Nguyen TVH, Phan TTB, Nguyen VB, Hoang TTH, Le TLA, Nguyen TTM, Vu SN. Prevalence and Risk Factors of Helicobacter pylori Infection in Muong Children in Vietnam. *Ann Clin Lab Res.* 2017; 5(1).
13. AlimA, Ataş M, Güneş T, Özkan S, DüNDAR N. Comparison of antigen and antibody detection tests used for diagnosing the Helicobacter pylori infection in symptomatic patients. *Bas Clin Sci.* 2010; 1(4): 61-70.
14. MisganawB, Abera A. The relationship between dyspepsia and H. pylori infection in Southern Ethiopia. *J Med and Med Sci.* 2017; 6(5): 086-090.
15. Waleed M, Alazmi IS, Alateeqi N, Al-Nakib B. Prevalence of Helicobacter pylori infection among new outpatients with dyspepsia in Kuwait. *BMC Gastroenterology.* 2010; 10: 14.
16. HamrahMH, Hamrah MS, HamrahMH, Kanda M, HamrahAE, DahiAE, Homayoun F, HamrahMH, FotouhiA, SakamotoJ. Prevalence of Helicobacter Pylori Infection in Dyspeptic Patients in Andkhoy Afghanistan. *As Pac J Can Prev.* 2017; 18(11): 3123–3127.
17. NobakhtH, Boghratian AH, Sohrabi MR, Panahian M, Rakhshani N, Nikkhah M, Ajdarkosh H, Gholami A, Hemmasi GR, Khonsari MR, et al. Association between Pattern of Gastritis and Gastroesophageal Reflux Disease in Patients with Helicobacter pylori Infection. *Mid East J Diag Dis.* 2016; 8(3): 206-211.
18. MabekuLBK, Ngamga MLN, Leundji H. Potential risk factors and prevalence of Helicobacter pylori infection among adult patients with dyspepsia symptoms in Cameroon. *BMC Infect Dis.* 2018;18: 278.
19. Naz F, Malik S, Afzal S, Anwar SA. Frequency of Seropositivity of Helicobacter pylori in Patients Presenting with Dyspepsia. *Journal Ayub Med CollAbb.* 2013; 25(3-4): 50-54.
20. Samson ES, Okeleke OJ, Richard AY, Gideon FT, Olutoyosi AL, Damilola O. Screening for Helicobacter pylori Infection among Undergraduate Students of a Tertiary Institution using serum Antibody and Stool Antigen Detection Methods. *Sci Tech Res.* 2018; 3(2): 10.

21. Aitila P, Mutyaba M, Okeny S, Kasule MN, Kasule R, Ssedyabane F, Okongo B. Prevalence and Risk Factors of *Helicobacter pylori* Infection among Children Aged 1 to 15 Years at Holy Innocents Children's Hospital, Mbarara, South Western Uganda. *J Trop Med*. 2019; ID 9303072, <https://doi.org/10.1155/2019/9303072>.
22. Lalkhen A, McCluskey A. Clinical tests: sensitivity and specificity. *Continuing Education in Anaesthesia Critical Care and Pain*. 2008; 8(6), 221–223.
23. Šimundić, A.M. Measures of diagnostic accuracy: basic definitions. *Electr J Intern Fed Clinic Chemis Lab Medic*. 2008; 19(4); 203-211.
24. Choi J, Kim CH, Kim D, Chung SJ, Song JH, Kang JM, Yang JI, Park MJ, Kim YS, Yim JY, et al. Prospective Evaluation of a New Stool Antigen Test for the Detection of *Helicobacter pylori*, in Comparison with Histology, Rapid Urease Test, ¹³C-urea Breath Test, and Serology. *J GastroenteroHepato*. 2011; 26(6); 1053-1059.
25. Metanat M, Sharifi-Mood B, Izadi S. Prevalence of *Helicobacter pylori* infection in healthcare workers. *Turkey J Medic Scien*. 2010; 40(6); 965-969.
26. Calvet X, Lario S, Ramírez-La'zaro MJ, Montserrat A, Quesada M, Reeves L, Masters H, Suárez-Lamas D, Gallach M, Sánchez-Delgado J, et al. Comparative Accuracy of 3 Monoclonal Stool Tests for Diagnosis of *Helicobacter pylori* Infection among Patients with Dyspepsia. *Clin Infect Dis*. 2010; 50; 323–328.
27. Zhu Y, Zhou X, Wu J, Su J, Zhang G. Risk Factors and Prevalence of *Helicobacter pylori* Infection in Persistent High Incidence Area of Gastric Carcinoma in Yangzhong City. *Gastro Res Prac*. 2014; Article ID 481365: 10.
28. Gul S, Jawed L, Tariq S, Aziz S. *Helicobacter pylori* Association with Acid Peptic Disease: It's Incidence in Population Having Increase Junk Food Intake. *Trans Biom*. 2016; 7(4): 90.
29. Subsomwong P, Miftahussurur M, Uchida T, Vilaichone RK, Ratanachuek T. Prevalence, risk factors and virulence genes of *Helicobacter pylori* among dyspeptic patients in two different gastric cancer risk regions of Thailand. *PLOS ONE*. 2017;30.

Table 1: Frequency the seropositivity of *H. pylori* infection among dyspeptic patients

Anti- <i>H. pylori</i> test result	χ^2 test value	P-value
------------------------------------	---------------------	---------

Positive (%)	Negative (%)		
37(37%)	63(63%)	12.749	0.000*

*Statistically significant P -value<0.05

Table 2: Data distribution of dyspeptic patients' participants

Characteristic	Category	No.	%
Gender	Male	47	47
	Female	53	53
Age group (years)	5 – 18	3	3
	19 – 32	38	38
	33 – 46	37	37
	47 – 60	22	22
Educational level	Illiterate	22	22
	Primary	35	35
	High school	26	26
	University	16	16
	Postgraduate	1	1

Table 3: Risk factors of *H. pylori* infection prevalence among dyspeptic patients

Characteristic	Category	No. of cases	No. of positive	% of positive	χ^2 test value	P -value
Gender	Male	47	21	57.0	2.244	0.134
	Female	53	16	43.0		
Age group (years)	5 – 18	3	2	5.0	1.275	0.735
	19 – 32	38	13	35.0		
	33 – 46	37	14	38.0		
	47 – 60	22	8	22.0		
Educational level	Illiterate	22	9	24.0	4.250	0.373
	Primary	35	12	32.0		
	High school	26	7	19.0		
	University	16	8	22.0		
	Postgraduate	1	1	3.0		
Food pattern	Fatty, citrus and spicy meals	97	33	89.0	7.873	0.344
	Nothing	7	4	11.0		
Water source	Non filtered	47	14	38.0	2.018	0.365
	Filtered	51	22	59.0		
	Filtered and non-filtered	2	1	3.0		
Clinical	Regurgitation	38	10	27.0	17.550	0.014*

symptoms	Heartburn	4	0	0.0		
	Heartburn and regurgitation	37	21	57		
	No symptoms	21	6	16		
Antibiotics drug used	Used	29	14	38.0	2.228	0.136
	Non-used	71	23	62.0		

*Statistically significant at P -value<0.05

Reviewer's Copy