



## RESEARCH ARTICLE

## SEROPOSITIVITY OF *HELICOBACTER PYLORI* AND ASSOCIATED RISK FACTORS AMONG DYSPEPTIC PATIENTS

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## Abstract



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**Background and Objectives:** The prevalence of *Helicobacter pylori* infection is 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 dyspepsia patients in Al-Mukalla city– Hadhramout/Yemen.

**Methods:** A cross-sectional study was conducted among 100 suspected patients with dyspeptic disorders where the anti- *H. pylori* antibodies were detected using the *H. pylori* antibody test cassette rapid immune chromatographic assay. Also, a structured questionnaire was completed for each patient to collect socio-demographic data, personal hygienic status and some clinical signs.

**Results:** The prevalence of serological positivity for *H. pylori* infection was 37% with a statistically significant value ( $p=0.000$ ). A high prevalence of *H. pylori* infection was detected among male more than females. The age group 5–18 years followed by age groups 33–46 years and 47–60 years showed the highest prevalence of *H. pylori* infection. There was no significant association between *H. pylori* infection with social, demographic, behavioral, and health variables ( $p>0.05$ ). Clinical signs of heartburn and regurgitation were found to be significant associated with *H. pylori* infection ( $p=0.014$ ).

**Conclusions:** *Helicobacter pylori* infection was found to be associated with dyspepsia. Heartburn and regurgitation have been found as clinical symptoms associated with *H. pylori* infection.

**Key words:** Al-Mukalla city, Dyspepsia, Hadhramout, *Helicobacter pylori*, Seropositivity, Yemen.

## INTRODUCTION

*Helicobacter pylori* (*H. pylori*) is a microaerophilic Gram-negative spiral shaped flagellated bacillus bacterium<sup>1</sup>, found deep in the gastric epithelial cells that secrete mucus in the human stomach where neutral pH is prevalent<sup>2</sup>. It infects 30-50% of the general population worldwide<sup>3</sup>. *H. pylori* has several virulence factors that cause the infection, some of these factors contribute to cause gastric inflammation<sup>4</sup>. Also, *H. pylori* recognized play a causative role in pathogenesis of gastrointestinal diseases such as chronic gastritis, peptic ulcer, gastroduodenal ulcer and it has been associated with the mucosa-associated lymphoid tissue lymphoma and gastric carcinoma<sup>2,4,5</sup>. Some risk factors associated with *H. pylori* infection such as residence in developing countries, health status, improper and handling of swages<sup>6,7</sup>. *H. pylori* infection is frequently and more commonly found in gastroenterologists, intensive care nurses, endoscopy staff, groups of

healthcare workers and especially those caring for development disabled individuals<sup>8</sup>. Non-invasive diagnostic and screening assays 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 assays are valuable for both screening and evaluating therapy of *H. pylori* infection<sup>9</sup>. In Yemen, some previous studies are known about seroprevalence of *H. pylori* infection, but no studies have been conducted that address environmental and nutritional risk factors on seroprevalence of *H. pylori* infection either among children or adults in Yemen in general or in Hadhramout in particular. Therefore, the current study aimed to determine the seroprevalence of *H. pylori* infection by detecting antibodies among dyspepsia patients referred to some hospitals in Al-Mukalla city, as well as to studying possible risk factors associated with *H. pylori* infection.

## MATERIALS AND METHODS

### Study design

This cross-sectional study was carried out in the city of Mukalla- Hadhramout/Yemen. A hundred patients suspected of dyspeptic disorders that referred to some of the main hospitals of the city of Mukalla-Hadhramout were included. Patients were excluded when they were without dyspeptic disorders.

### Data collection tool

Prior samples collection, participants' socio-demographic characteristics, health status and clinical symptoms information were obtained using a structured questionnaire.

### Laboratory method

Serum *H. pylori* antibody was detected using a one-step anti- *H. pylori* test cassette supplied by InTec Products, INC, USA. The advanced quality rapid *H. pylori* antibody 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, and 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). Sensitivity is the ability of a test to correctly classify an individual as diseased. Specificity is the ability of a test to correctly classify an individual as disease free. PPV is the percentage of patients with a positive test who actually have the disease. NPV is the percentage of patients with a negative test who do not have the disease<sup>10</sup>.

### Data analysis

The data of study were analyzed by Statistical Package for Social Sciences (SPSS) version 20. The association between different variables and outcome the seroprevalence of *H. pylori* infection was measured and compared using Pearson chi-square ( $\chi^2$ ) test. The statistical significance level was set at  $p$ -value<0.05.

### Ethics 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 The Faculty of Sciences, Hadhramout University. The objectives, benefits and steps performed of the study was made very clear to the participants and they were assured of the confidentiality related the study.

## RESULTS

The overall estimated seropositivity prevalence of *H. pylori* among dyspeptic patients was 37(37%) with significant statistical analysis ( $p=0.000$ ) 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 as given in Table 2.

**Table 1: Seropositivity of *H. pylori* infection among dyspeptic patients.**

Anti- <i>H. pylori</i> test result		$\chi^2$ test value	$p$ -value
Positive (%)	Negative (%)		
37(37%)	63(63%)	12.749	0.000*

\*Statistically significant  $p$ -value<0.05

**Table 2: Evaluation of anti-*H. pylori* diagnostic test**

Immunological test	Sensitivity	Specificity	PPV	NPV
Anti- <i>H. pylori</i> test	34%	71%	84%	24%

Among the participants, 47% were males and 53% were females, and the range age was 5-60 years. 22% of them were illiterate, 35% have primary education, 26% have completed high school, whereas 16% have a college education and 1% has postgraduate education as shown in Table 3. Seroprevalence of *H. pylori* infection was high in males than females. High rate of *H. pylori* infection was found among the age group of 5-18 years followed by the age group of 33 - 46 years and 47-60 years, also high rate seroprevalence of *H. pylori* infection was found in postgraduate and university education levels. Statistically, there was no significant associated with *H. pylori* infection and socio-demographic variables ( $p>0.05$ ).

**Table 3: 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

*H. pylori* seroprevalence infection showed no significant association with personal habits like food patterns and water sources, as well as, antibiotics drug used ( $p>0.05$ ), whereas clinical symptoms status of the participants complaining heartburn and regurgitation were significantly associated with their *H. pylori* infection ( $p=0.014$ ), as it is shown by the results presented in Table 4.

## DISCUSSION

The present 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 as showed in studies carried out in Iran 34%<sup>11</sup>, India 35.6%<sup>12</sup>, Vietnam 48.8%<sup>13</sup>. Another study showed the anti-*H. pylori* IgG positive was 69.0%<sup>14</sup>. However, the prevalence in current study was lower than that reported in other studies, Ethiopia 98%<sup>15</sup>, Kuwait 88.5%<sup>16</sup>, Afghanistan 75.6%<sup>17</sup>, Cameroon 51.5%<sup>8</sup>. Other studies showed *H. pylori* infection rate 78.1%, 64.39% and 73.9%<sup>18,19,20</sup> respectively. On the other hand, some studies showed low positivity *H. pylori* serum antibody test 28.0%<sup>21</sup> and 24.3%<sup>22</sup>.

**Table 4: Risk factors of *H. pylori* infection prevalence among dyspeptic patients.**

Characteristic	Category	No. of cases	No. of positive	% of positive	$\chi^2$ test value	p-value
Gender	Male	47	21	44.7	2.244	0.134
	Female	53	16	30.2		
Age group (years)	5 – 18	3	2	66.7	1.275	0.735
	19 – 32	38	13	34.2		
	33 – 46	37	14	37.8		
	47 – 60	22	8	36.4		
Educational level	Illiterate	22	9	40.9	4.250	0.373
	Primary	35	12	34.3		
	High school	26	7	26.9		
	University	16	8	50.0		
Food pattern	Postgraduate	1	1	100.0	7.873	0.344
	Fatty, citrus and spicy meals	97	33	34.0		
Water source	Nothing	7	4	57.1	2.018	0.365
	Non filtered	47	14	30.0		
	Filtered	51	22	34.1		
	Filtered and non-filtered	2	1	50.0		
Clinical symptoms	Regurgitation	38	10	26.3	17.550	0.014*
	Heartburn	4	0	0.0		
	Heartburn and regurgitation	37	21	56.8		
	No symptoms	21	6	28.6		
Antibiotics drug used	Used	29	14	48.3	2.228	0.136
	Non-used	71	23	32.4		

\*Statistically significant at  $p$ -value $<0.05$

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 current study. In current validation of anti-*H. pylori* diagnostic test, the sensitivity, specificity, PPV, and NPV of blood test for antibody detection were 34%, 71%, 84% and 24% respectively. Several studies seroprevalent *H. pylori* infection showed different results of tests evaluations. A test serology had high sensitivity but low specificity<sup>23</sup>. Infection of *H. pylori* tested by determining IgG levels by ELISA technique has a sensitivity 94% and specificity 98%<sup>11</sup>. Also, an enzyme immunoassay test showed sensitivity and specificity of 90% and 89% respectively<sup>24</sup>. In current study, seroprevalence of *H. pylori* infection was high in males more 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%<sup>5</sup>. On the other hand, 42.6% of female students tested by serum antibody found to be seropositive for *H. pylori* infection with statistically significant<sup>20</sup>. Other studies showed overall 62% and 63.6% of women were infected with *H. pylori*<sup>8,18</sup>. Also, the seropositive prevalence of *H. pylori* infection were higher in women more than men<sup>13</sup>. The infection of *H. pylori* occurs early in childhood and adolescence and reaches its peak at adulthood at 35 to 44 years<sup>18</sup>. Other study showed *H. pylori* infection was more prevalent at the age of 30–39 years 90.8% with significant difference between both sexes, and women had a higher infection rate than men<sup>27</sup>, while the predictor of seroprevalence of *H. pylori* was found to be the illiteracy<sup>16</sup>. The level of education was statistically related to *H. pylori* infection in the group with high school level<sup>10</sup>. Other study showed that infection of *H. pylori* was higher among school going

children with significant value<sup>21</sup>. In this study, there was a relationship of prevalence *H. pylori* infection with personal habits and hygienic behaviors variables with insignificant statistics. A study conducted in China showed that prevalence of *H. pylori* infection was associated with some foods as eating kipper and fried food<sup>27</sup>, 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*. On contrast, similar results of the seroprevalence *H. pylori* infection were statistically significant higher among individuals with consumption of unboiling water showed in Thailand. A study conducted in Uganda showed that infection rate of *H. pylori* was higher among unsafe source of drinking water with significant value<sup>21</sup>. In current results, the relationship prevalence of *H. pylori* infection with clinical symptoms of the participants complaining heartburn and regurgitation was 21(56.8%) with statistically significant association, 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 pain<sup>16</sup>. Other study showed all patients with upper abdominal pain and frequent burping were *H. pylori* seropositive<sup>18</sup>. Another study revealed that participant's symptoms complained mostly of heart burn, loss of appetite, abdominal pain, nausea, vomiting and dark foul-smelling stool<sup>20</sup>. Other disagree results showed that the antibiotics used was found to be significant risk factor for *H. pylori* seroprevalent infection<sup>12</sup>.

## CONCLUSION

*Helicobacter pylori* infection was found to be associated with dyspepsia. Heartburn and regurgitation have been found as clinical symptoms associated with *H. pylori* infection.

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## AUTHOR'S CONTRIBUTION

**Barajash HM:** writing original draft, methodology. **Bin-Hameed EA:** investigation, conceptualization. **Al-Haddad AM:** formal analysis, interpretation of data. All authors revised the article and approved the final version.

## DATA AVAILABILITY

The datasets generated during this study are available from the corresponding author upon reasonable request.

## CONFLICT OF INTEREST

None to declare.

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