



## **Helicobacter Pylori: Prevalence and Relationship to Hematological Parameters of Symptomatic Patients who Conducted Gastrosocopy at King Abdulaziz University Hospital, Jeddah**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Background:** *Helicobacter pylori* (*H. pylori*) is one of the most important public health problems worldwide. The study was done to determine the epidemiology of *H. pylori*, and its relation to the hematological parameters of symptomatic patients who conducted upper gastrointestinal (GIT) endoscopy at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia.

**Methods:** A retrospective cohort study was done during the academic year 2016/2017. All records of the eligible cases who complained from GIT manifestations, and conducted upper GIT

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endoscopy at KAUH (during 2015) were assessed. Only cases with samples taken from the gastric mucosa and examined by the Rapid Urease Test (RUT) were included. Results of two sets of Complete Blood Count (CBC) before and 6 months after treatment of *H. pylori* were taken. Cases were interviewed at 2017 for follow-up.

**Results:** Two-thousand patients' files were reviewed with a 29.5% prevalence of *H. pylori*. The most frequently reported clinical presentation of *H. pylori* was epigastric pain (54.3%). Males had a significantly higher rate of infection compared to females. *H. pylori* was associated with gastric ulcer and gastritis. There was no association between *H. pylori* and the hematological parameters of patients. Treatment of *H. pylori* caused a little increase in RBCs & hemoglobin level.

**Conclusions:** Nearly thirty percent of the symptomatic patients who conducted upper gastroendoscopy at KAUH were infected with *H. pylori*. Infection was associated with gastritis and gastric ulcer. There is no association between *H. pylori* and hematological parameters. Screening and management of symptomatic cases for *H. pylori* is recommended.

**Keywords:** *Helicobacter pylori*; prevalence; symptoms; endoscopy; haematological parameters.

## 1. BACKGROUND

The discovery of *Helicobacter pylori* (*H. pylori*) in 1983 is considered one of the most important breakthroughs in the modern gastroenterology [1,2]. *H. pylori* is one of the most important public health problems [3]. Globally, it was estimated during 2015 that 4.4 billion persons were infected with *H. pylori* [1], and such a prevalence of over 50% of the world's population makes it the commonest global chronic infection. There is a noticeable discrepancy between the prevalence of infection in both developed and developing countries [4].

*H. pylori* bacterium is one of the commonest microbiological agents globally, [3,4] and in the Kingdom of Saudi Arabia (KSA). A recent study in KSA revealed that *H. pylori* was highly prevalent among Saudi children from Jeddah and Riyadh [5]. Although most of individuals infected with *H. pylori* are asymptomatic, it colonizes in the gastric mucosa and implicated in causing gastritis, [6] peptic ulcer disease and gastric malignancy (carcinoma and gastric mucosa-associated lymphoid tissue lymphoma) [7]. Hence, *H. pylori* is classified as a class I carcinogen [4,8]. It is considered to be the commonest etiological factor of infection-related cancers [9]. Consequently, screening and management of *H. pylori* is a recommended approach for risk reduction of cancer risk reduction strategy in high-risk populations [4,9].

*H. pylori* was suggested to be associated with extra-gastrointestinal conditions, including those from dermatologic, cardiopulmonary, metabolic and neurologic disorders. *H. pylori* may be associated also with haematological manifestations as iron deficiency, vitamin B12

deficiency [4,10,11]. Furthermore, Idiopathic Thrombocytopenic Purpura (ITP) is the commonest autoimmune hematologic disease that affecting individuals of different ages. *H. pylori* was suggested to be associated with ITP [12].

There is inadequate recent studies done to illustrate the current prevalence and the associated factors of *H. pylori* among patients conducted upper GIT endoscopy at King Abdulaziz University Hospital (KAUH). Furthermore, the relationship between *H. pylori* infection and different haematological parameters was not adequately assessed among Saudi patients, especially in Jeddah. So, such study is needed.

The current study was conducted to determine the epidemiology of *Helicobacter pylori*, and its relation to the haematological parameters of symptomatic patients who conducted upper gastrointestinal endoscopy at KAUH, Jeddah.

## 2. MATERIALS AND METHODS

A retrospective cohort study was conducted during the academic year 2016/2017. All records of the eligible patients who complained from GIT manifestations and conducted upper GIT endoscopy at Gastroenterology Unit of KAUH during 2015 were assessed. Only cases with samples taken from the gastric mucosa, and examined by the Rapid Urease Test (RUT) were included. The exclusion criteria included patients with malignancy, portal hypertension, liver and kidney diseases. Furthermore, those on non-steroidal anti-inflammatory drugs (NSAIDs), proton pump inhibitors (PPI), cytotoxic drugs or

steroids were also excluded. In addition, patients below 18 years or patients with immune thrombocytopenia due to any other causes were also excluded. The protocol of our hospital makes the patients to come after 6 months of treatment of *H. pylori* for follow-up. The results of two sets of Complete Blood Count (CBC) before, and after 6 months of *H. pylori* treatment were taken from patients' files (initial and follow-up data).

Data was collected through reviewing of medical records. During 2017, telephone interviews were conducted for follow-up of patients (who accepted to participate).

A data collection sheet was constructed (through hospital data extraction sheet, and by patient's interviewing questionnaire). Personal & socio-demographic data were collected. History of chronic medical condition, the indications of conduction of endoscopy and the findings of endoscopy were also taken. Results of RUT were taken. One biopsy was placed immediately on the RUT and examined at 10-minute intervals for the next six hours. If positive result was recorded, a second biopsy with histopathological examination using Giemsa stain was taken. Patients were classified as being *H. pylori*-positive if any of these assays were positive [13]. Results of two sets of CBC were take; before and after 6 months of treatment of *H. pylori*.

SPSS version 20 was used for the analysis. Descriptive and inferential statistics were conducted. Chi-square and Fisher's exact test were used for the categorical data. Student's t-parametric test, and Mann Whitney non-parametric test were used for comparing between two means between patients diagnosed with and without *H. Pylori*. Paired-t test was used to compare between the means of haemtological parameters before and after treatment of *H. pylori*. Odds Ratio (OR) and 95% Confidence Intervals (CI) were calculated. Statistical significance was considered at the level of  $P$ -value  $< 0.05$ .

## 2.1 Ethical Statement

The study followed the ethical standards of "Helsinki declaration". Approval was obtained from the Institutional Review Board (IRB) of KAUH, with a Reference Number of 99-16. All information is confidential. Consent was taken from each participant who accepted to participate in telephone interview.

## 3. RESULTS

The flow-diagram for selecting the eligible cases is presented in Figure 1. The files of a total of 2000 symptomatic persons who conducted upper GIT endoscopy at KAUH during the year 2015 were reviewed. From these file, 312 files fulfilled the eligibility criteria. Out of the 312 eligible patients, 92 (29.5%) had *H. pylori* positive results, while 220 (70.5%) had negative results using RUT.

Table 1 shows that males had a higher prevalence of *H. pylori* infection (36.6%) compared to females (24.3%), with a statistical significant difference ( $P < .05$ ). The prevalence was also higher (36.6%) among those aged  $\geq 30$  years compared to the younger patients (22.8%). However, there is no statistical difference ( $P > .05$ ). Similarly, the rate of *H. pylori* was also higher among smokers, married, diabetics, and hypertensive patients, but without statistical significant differences ( $P > 0.05$ ).

Table 2 demonstrates that the most frequent clinical presentation of *H. pylori* was epigastric pain (54.3%), followed by each of heartburn and feeling of fullness (26.1% for each), then bloating (21.7%). Vomiting (6.5%), nausea (5.4%), melena (4.3%) and hematemesis (4.3%) were the following complaints.

In the context of endoscopic findings, Table 3 shows presence of significant associations between *H. pylori* with each of gastritis (OR= 2.15, 95% CI: 1.27-3.66) and gastric ulcer (OR= 4.14, 95% CI: 1.95-8.81). On the other hand, there is no significant association between *H. pylori* and duodenitis, gastric cancer, gastric polyp, hiatal hernia, esophagitis, Barrett's esophagus, or esophageal varices.

Table 4 domenstrates comparisons between hematological parameters of patients diagnosed with *H. pylori* and those without infection. The mean count of the Red Blood Cells (RBCs) was slightly lower among patients who had positive *H. pylori* ( $4.70 \pm .73$  million) compared to the mean between persons with negative results ( $4.74 \pm .96$ ). However, there is no statistical significant difference ( $P > .05$ ). Similar findings were also seen regarding the hemoglobin and hematocrit levels. No statistical significant associations were found between the platelets counts, White Blood Cell counts (WBCs) and the presence of *H. pylori* ( $P > 0.05$ ).

Regarding the changes of the haemtological parameters after the treatment of cases of

*H. pylori*, our results showed that the mean haemoglobin level of the cases with *H. pylori* was slightly increased from  $12.58 \pm 2.54$  mg/dl before the treatment to reach  $12.78 \pm 2.33$  mg/dl after it, but without statistical significant difference (Paired  $t = 0.8$ ,  $P > .05$ ). Similar findings were observed concerning RBCs count and hemtocrite level. The number of platelets didn't change after treatment of *H. pylori* ( $P > .05$ ).

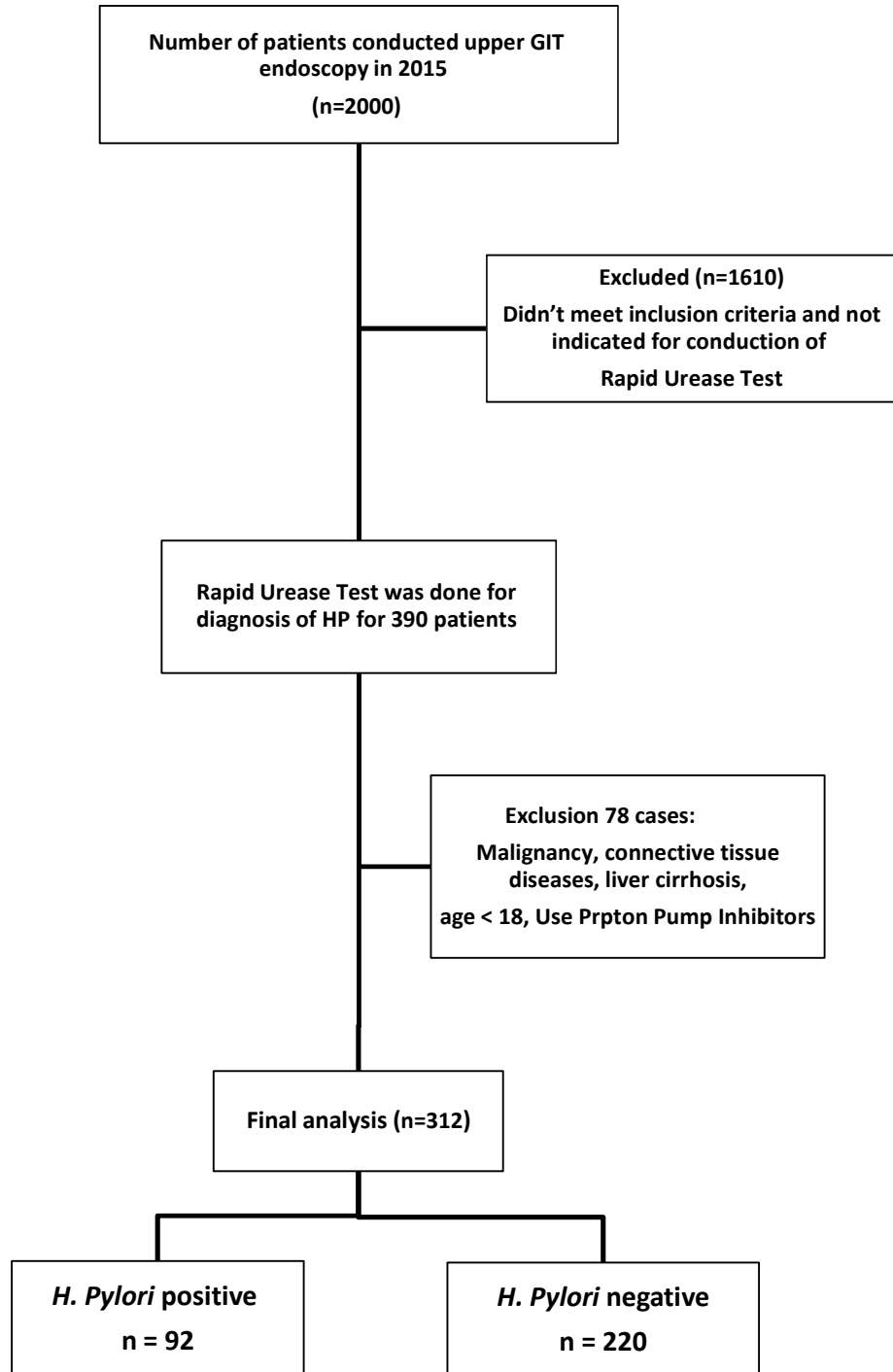


Figure 1. Flow-diagram for selection of *Helicobacter pylori* cases among symptomatic patients who conducted upper gastrointestinal endoscopy, King Abdulaziz University, 2015

**Table 1. Relationship between *Helicobacter pylori* & characteristics of patients who conducted upper gastrointestinal endoscopy at King Abdulaziz University Hospital**

<i>H. pylori</i>	+Ve (92) No. (%)	-Ve (220) No. (%)	$\chi^2$ (p)	OR 95% CI
<b>Variables</b>				
<b>Gender</b>				
Male	48 (36.6)	83(63.4)	5.56	1.80
Female	44 (24.3)	137(75.7)	(.01)	(1.10-.94)
<b>Age</b>				
< 30 years	18 (22.8)	61 (77.2)	2.29	0.63
≥ 30 years	74 (31.8)	159 (68.2)	(.13)	(0.35-1.15)
<b>Marital status</b>				
Married	61(30.8)	137(69.2)	.46	1.19
Single	31(27.2)	83 (72.8)	(.5)	(0.72-1.99)
<b>Smoking</b>				
Yes	10(38.5)	16 (61.5)	1.10	1.56
No	82(28.7)	204(71.3)	(.29)	(0.68-3.57)
<b>Diabetes</b>				
Yes	30 (38.0)	49 (62.0)	3.665	1.69
No	62(26.6)	171(73.4)	(.056)	(0.99-2.89)
<b>Hypertension</b>				
Yes	24(37.5)	40(62.5)	2.49	1.59
No	68(27.4)	180(72.6)	(.115)	(0.89-2.83)

**Table 2. Presenting symptoms of cases diagnosed as having *Helicobacter pylori* infection among patients who conducted upper gastro-endoscopy at King Abdulaziz University Hospital**

Symptoms	No. (%) No.= 92
Epigastric pain	50 (54.3)
Heartburn	24 (26.1)
Fullness	24 (26.1)
Bloating	20 (21.7)
Vomiting	6 (6.5)
Nausea	5 (5.4)
Melena	4 (4.3)
Hematemesis	4 (4.3)
Fatigue	2 (2.2)
Dysphagia	2 (2.2)
Loss of appetite	2 (2.2)
Haematochezia	2 (2.2)
Diarrhoea	1 (1.1)

N.B. Each symptom was separately collected from the file

#### 4. DISCUSSION

Our results revealed that the prevalence of *H. pylori* among the symptomatic patients who conducted upper GIT endoscopy at KAUH in 2015 was 29.5%. Similar prevalence was reported from a recent study done among school students complained from abdominal pain in

Makkah city, Saudi Arabia [14]. On the other hand, a much higher rate (59.0%) of *H. pylori* was reported among patients who conducted endoscopy at the same university hospital during 2005 [13]. This differences between our and the previous results may be due to differences between the time of conduction of both studies. Decline of *H. pylori* prevalence overtime can be due to improvements of sanitation and personal hygiene, [15] during the period of 10-years. Similarly, another study from Ethiopia showed some decrease in the prevalence of *H. pylori* overtime [16]. On the other hand, a recent study from Turkey revealed that *H. pylori* prevalence between patients who conducted upper GIT endoscopy, with sampling from duodenal biopsy, was higher than our rate (47.9%) [17]. This discrepancy may be due to the differences between countries, or due to type of diagnostic test, type patients or the sample size taken. However, a lower sero-prevalence (about 15%) of *H. pylori* was reported from two studies done among normal adults from Australia [18] and Indonesia [19]. The cause of such difference between our study and the two previous studies may be because our study was a hospital-based study done among symptomatic patients who complained from GIT symptoms and conducted a diagnostic endoscopy, while the earlier studies were community-based studies that done among normal persons. This may be also due to differences between countries.

**Table 3. Endoscopic findings of patients diagnosed with or without *Helicobacter pylori* at King Abdulaziz University Hospital**

<i>H. pylori</i>	+Ve (No=92) No. (%)	-Ve (No =220) No. (%)	X <sup>2</sup> (P)	OR (CI)
<b>Endoscopic findings</b>				
<b>Normal</b>				
Yes	12 (20.3)	47 (79.7)	2.92	0.55
No	80 (31.6)	173 (68.4)	(.09)	(0.28-1.10)
<b>Gastritis</b>				
Yes	67 (25.4)	122 (64.6)	8.20	2.15
No	25 (20.3)	98 (79.7)	(.004)	(1.27-3.66)
<b>Gastric ulcer</b>				
Yes	19 (59.4)	13 (40.6)	15.32	4.14
No	73 (26.1)	207 (73.9)	(.000)	(1.95-8.81)
<b>Duodenal ulcer*</b>				
Yes	4 (26.7)	11 (73.3)	.060	.86
No	88 (29.6)	209 (70.4)	(.806)	(.27-2.79)
<b>Gastric cancer*</b>				
Yes	1 (25.0)	3 (75.0)	.039	.80
No	91 (29.5)	217 (70.5)	(.84)	(.08-7.74)
<b>Duodenitis</b>				
Yes	15 (41.7)	21 (58.3)	2.90	1.85
No	77 (27.9)	199 (72.1)	(.08)	(0.09-3.77)
<b>Hiatal hernia</b>				
Yes	30 (23.8)	96 (76.2)	3.28	.63
No	62 (33.3)	124 (66.7)	(.07)	(0.49-1.04)
<b>Esophagitis</b>				
Yes	10 (28.6)	25 (71.4)	.01	0.95
No	82 (29.6)	195 (70.4)	(.90)	(.44-2.07)

\* Fisher's exact test

**Table 4. Comparisons between the means of different blood parameters among patients diagnosed with *Helicobacter pylori* and those with negative results**

<i>H. pylori</i>	+Ve Mean ± SD	-Ve Mean ± SD	Test of significance*	P- value
<b>Blood parameters</b>				
WBCs (thousands)	7.50 ± 3.41	7.60±3.37	-0.21•	.84
RBCs (million)	4.70 ± .73	4.74±.69	-0.356	.72
Haemoglobin (g/dl)	12.58±2.54	12.78±2.33	-0.581	.56
Haematocrit (%)	38.08±6.439	38.75±5.60	-0.805	.42
Platelets (thousands)	300.17± 113.97	297.71± 97.89	0.169•	.86
Neutrophil (thousands)	4.53±3.239	4.49±4.90	0.049•	.96
Lymphocytes (%)	22.7±8.72	27.7±2.71	-1.46•	.14
Monocytes (%)	6.0±2.4	6.1±3.7	-1.46•	.94
Eosinophil (%)	2.19± 1.9	2.24± 2.8	-0.14•	.88
Basophile (%)	0.8±0.24	0.7±0.40	0.16•	.87

Test of significance: Student's t-test or Mann Whitney test

•: Mann Whitney test

There is a debate regarding the role of gender in infection with *H. pylori* [16]. In the present study, males had a significantly higher rate of infection with *H. pylori* compared to females, which agrees with a 5-year trend of the agent from Ethiopia

[16] and with a study from India [20]. On the other hand, a recent study, 2018, reported that the prevalence of *H. pylori* was higher among females [6]. These gender differences in rate of infection may be attributed to the variations

between countries, rates of exposure, and the susceptibility to infection among both genders, samples, and the diagnostic method.

In our study, older patients had a higher prevalence of *H. pylori* than the younger ( $P > 0.05$ ), which coincides with results from Indonesia [19] and the USA [21]. Furthermore, results of the current study reported absence of significant association between smoking and *H. pylori*, which coincides with result from a Pakistani study [3].

In the current study, the commonest complaints of patients with *H. pylori* infection was Epigastric pain (54.3%) which is in line with results of a study from Uganda [22]. Similarly, findings from another recent Ethiopian study, 2018, revealed that *H. pylori* was associated with upper GIT complaints such as Epigastric burning/pain [23].

In the present study, associations were found between *H. pylori* and each of gastritis and gastric ulcer, which agree with the results from Uganda [22]. *These findings occurred because infection with H. pylori can increase the "pro-inflammatory cytokine gene expressions in gastric epithelial cells by stimulation of NF- $\kappa$ B signalling" which may be implicated in causing gastritis and other gastric complications [7].* However, our results didn't find an association between *H. pylori* and gastric carcinoma, which may be attributed to small number of cases. It was estimated that only 1 - 3% of *H. pylori* infected persons can cause gastric carcinoma [9].

The current study demonstrated absence of statistical association between *H. pylori* and each of thrombocytopenia, anaemia or other haematological parameters. Similarly, a study done among pregnant women from Khartoum, Sudan, also reported absence of associations between *H. pylori* infection and anaemia and thrombocytopenia [24]. Similar finding was obtained from another study from Mexico [25]. The USA study [21] also concluded that *H. pylori* was not implicated in the pathogenesis of ITP. On the other hand, a study done among 30 patients with ITP and equal number of controls found presence of association between it and *H. pylori* [26]. This discrepancy between studies may be attributed to differences between sample sizes, or study populations.

The current study showed that treatment of *H. pylori* infection was not associated with

significant increase in the platelets count. Emilia et al., reported that platelets count improved in some cases after treatment of *H. pylori* and not on the others [27]. However, a meta-analysis done for seventeen studies, 2007, revealed that platelet counts increased in patients with ITP with successful eradication of *H. pylori* infection compared to their control groups [28]. Similar results were reported from Korea [29] and Pakistan [30]. The cause of such discrepancy between the current and previous studies may be attributed to differences between populations, sample size or the received treatment.

As our study is retrospective study, it has some limitations of the incompleteness of some data.

## 5. CONCLUSION

The prevalence of *H. pylori* among symptomatic patients who conducted upper GIT endoscopy at KAUH was 29.5%. Males had a significantly higher prevalence of infection than females. The commonest clinical presentation of *H. pylori* was Epigastric pain (54.3%), followed by each of heartburn and each of feeling of fullness. Patients who had *H. pylori* were about 4 times more prone to gastric ulcer and about twice more prone to gastritis. There is no statistical significant association between *H. pylori* and counts of each of platelets, RBCs or other haematological parameters. Treatment of *H. pylori* caused some increase in RBCs and haemoglobin levels but without statistical significance ( $P > .05$ ). Screening and management for *H. pylori* infection among symptomatic patients is recommended. Conduction of prospective studies are needed.

## CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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