

Comparative Diagnosis and Epidemiological Determinants of Helicobacter pylori Infection in Wasit, Iraq

Huda Hadi Raheem, and Dhuha Abdul Hadi Hamzah

Department of Biology, College of Education for Pure Science, Wasit University, Iraq.

Abstract

Helicobacter pylori is a leading cause of chronic gastrointestinal disorders around the globe. Herein authors aimed to determine the prevalence of H. pylori infection among symptomatic patients in Al-Kut /Iraq during the year 2022. Authors evaluate the diagnostic performance of H. pylori Stool Antigen Tests (SAT) and H. pylori Blood Antibody (Serology) tests. The 14C-Urea Breath Test (UBT) was performed as a confirmatory test. The overall prevalence of H. pylori infection was very high 51.92% for serology vs. 50.64% for SAT. Infection was confirmed by UBT in 51.85% of the suspected cases. There was a significant correlation between the seasonal trend and high prevalence rates, and notably a marked predilection among females (75%) compared to males (25%).

Keywords: Helicobacter pylori Infection, chronic gastrointestinal disorders, SAT, and UBT.

1. Introduction

Helicobacter pylori is a microaerophilic, Gram-negative, spiral-shaped bacterium highly motile due to its polar flagella and showing strong urease activity [1]. First isolated by Marshall and Warren in 1982, it has since been recognized as a pathogen infecting half of humans globally [2]. Many of which are asymptomatic, though H. pylori

colonization correlates with chronic gastritis, peptic ulcers and gastric adenocarcinoma [3].

The bacterium has many adaptive mechanisms utilized to survive the acidity of gastric juice, most infamously the formation of urease, which neutralizes gastric acid by hydrolyzing urea to produce ammonia and CO₂ [4-6]. There is fecal-oral or oral-oral transmission, often (but not exclusively) modified by socio-economic conditions,

sanitation and quality of drinking water [7]. In Iraq prevalence figures vary from 11.3% to 71.3% [8] and reflect geographical and methodological variances. The purpose of this study is to obtain updated epidemiological data about *H. pylori* in Al-Kut City and study the influence of seasonal, age and gender variables [9,10].

2. Materials and Methods

2. 1 Study Design and Participant Selection

A clinical cross-sectional study was designed and carried out in Al-Kut/Iraq during the year 2022 on 312 patients included 160 males and 152 females with gastrointestinal symptoms. They were randomly recruited from Al-Karama Teaching Hospital and private diagnostic centers. All other subjects were recruited from across the city of Al-Kut. For inclusion criteria every patient from infancy to more than 50 years of age with gastrointestinal symptoms. While exclusion criteria for any previous treatment for *Helicobacter pylori* eradication, and those with antibiotics and other immunosuppressive medications were excluded.

2. 2 Serological Antibody Detection

Venous blood (2 mL) was collected by aseptic venipuncture in clotting vials. On centrifugation at 1500 rpm for 10 minutes the serum was separated and being used in accordance with the manufacturer's stringent instructions, samples were tested with the onsite *H. Pylori* Ab combo rapid test CE, qualitative immunochromatographic inspection for the detection of anti *H. pylori* antibodies in human serum.

2. 3 Stool Antigen Test (SAT)

Fecal specimens were collected in sterile containers. *H. pylori* antigens were directly detected using Onsite *H. Pylori* Ag Rapid test CE. Fecal proteins were extracted in an appropriate buffer; chromatographic analysis was done and the result was interpreted within 15 minutes based on reactions of monoclonal antibodies.

2. 4 14C-Urea Breath Test (UBT)

For active colonization, all positive cases underwent the 14C-UBT using the HUBT-20P analyzer (Headway, China). Patients ingested a 14C capsule of urea, and the presence of CO₂ isotope labels in exhaled air 20 minutes after urea intake confirmed active infection. 2.5 Statistical analysis Data were processed using GraphPad Prism

version 6.0.1. Frequency distributions were calculated, and percentages were obtained. Statistical significance using $p < 0.05$ was applied to demographic variables and infection rates.

2. 5 Ethical Considerations

The ethics committee that approved the study protocol is the IRB of Wasit University. Obtained informed consent from all participants or their legal guardians prior to sample collection.

3. Results

All 312 patients tested, 162 (51.92%) were found to be infected by serology, and in 158 (50.64%) SAT was positive and listed in table 1.

Table 1: Comparative Results of *H. pylori* Infection by Serological and Stool Antigen Tests.

Test	Total No.	Positive		Negative	
		No.	%	No.	%
Serology	312	162	51.92	150	48.08
Stool antigen	312	158	50.64	154	49.36
p-value	0.079 NS				
Discrepancy	51.28				
SD of discrepancy	0.9051				
SEM of discrepancy	0.6400				
95% Confidence interval (95%CI)	43.15 to 59.41				
R squared (partial eta squared)	0.9998				

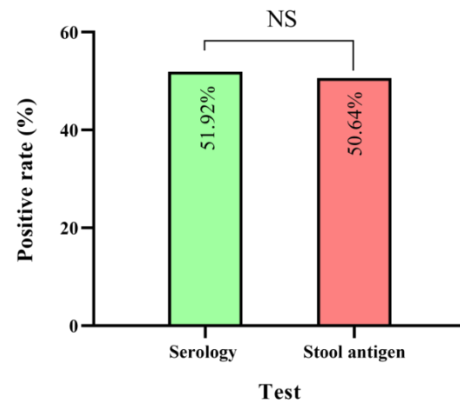


Figure 1: Comparison of positivity rates between Serology and SAT showing no significant difference.

The rate of detection of *H. pylori* infection using 14C-Urea breath test to test infection and by conducting the previous two tests showed that of the 162 patients, 84 (51.85%) were positive and 78 (48.15%) were negative are shown in table 2. Among the 162 seropositive cases, UBT confirmed 84 active infections table 2.

Table 2: Confirmatory 14C-Urea Breath Test (UBT) Results.

Total No.	Positive		Negative	
	No.	%	No.	%
162	84	51.85	78	48.15

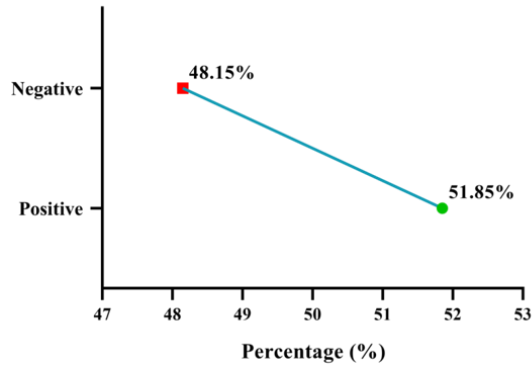


Figure 2: Graphical representation of UBT confirmation rates.

There was a significant ($p = 0.038$) relationship between prevalence of *H. pylori* infection and months of the year. August had the highest infection rate at 16 (19.05%) than in the other months of year, followed by September 11 (13.1%), while October had the lowest infection rate 1 (1.19%) as shown in figure 3, and listed in table 3.

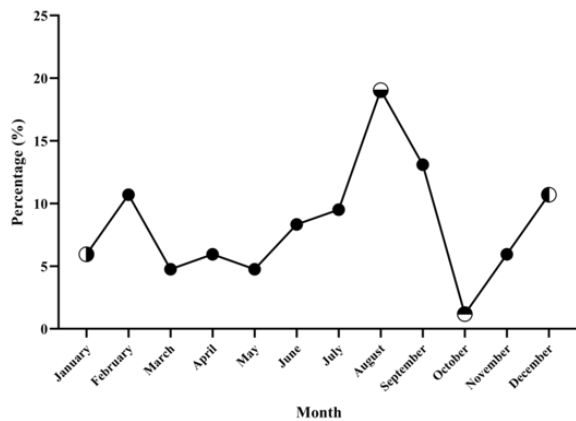


Figure 3: Line graph illustrating the spike in infections during the summer months.

Table 3: incidence of *H. pylori* infection rate according to the months of the year (Total No = 84).

Month	No.	%
January	5	5.95
February	9	10.71
March	4	4.76
April	5	5.95
May	4	4.76
June	7	8.33
July	8	9.52
August	16	19.05 *
September	11	13.1
October	1	1.19
November	5	5.95
December	9	10.71
p-value		0.038 S
Discrepancy		7.357
SD of discrepancy		3.443
SEM of discrepancy		1.038
95% Confidence interval (95%CI)		5.044 to 9.670
R squared (partial eta squared)		0.8340

In the present study no significant ($p = 0.092$) association was found between the rate of *H. pylori* infection and different age groups. The highest rate of infection was found in the 30-50 years age group 26 with 30.95%, followed by the 50-90 years age group 21 with 25%, and the lowest was found in the 0-6 years age group 6 with 7.14%. as listed in table 4 and displayed in figure 4.

Table 4: Infection Rate According to Age Groups (Total N=84).

Group (Year)	Positive	%
0-6	6	7.14
7-12	7	8.33
13-18	8	9.52
19-30	16	19.05
31-50	26	30.95 **
51 -90	21	25 *
p-value	0.092 S	
Discrepancy	11.01	
SD of discrepancy	5.447	
SEM of discrepancy	2.724	
95% Confidence interval (95%CI)	2.342 to 19.68	
R squared (partial eta squared)	0.8449	

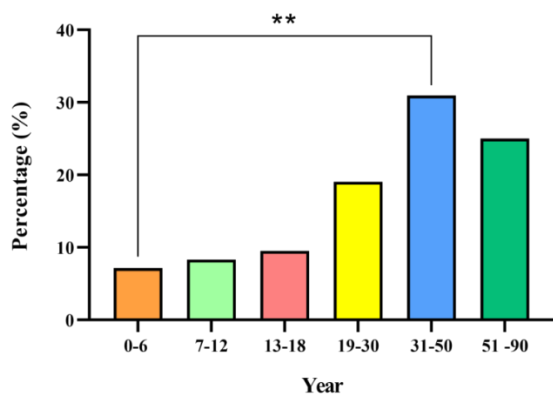


Figure 4: Distribution of H. pylori infection in age groups

Females were found to be more significantly ($p = 0.0029$) than males among positive cases, the infection was found 63 (75%) were female and 21 (25%) were male. Table 5, and figure 5 show gender analysis revealed a highly significant difference ($p = 0.0029$).

Table 5: Prevalence of H. pylori infection rates by gender (Total No=84).

Gander	Positive	
	No.	%
Male	21	25
Female	63	75 **
p-value	0.0029 S	
Discrepancy	50.00	
SD of discrepancy	35.36	
SEM of discrepancy	25.00	
95% Confidence interval (95%CI)	-267.7 to 367.7	
R squared (partial eta squared)	0.8000	

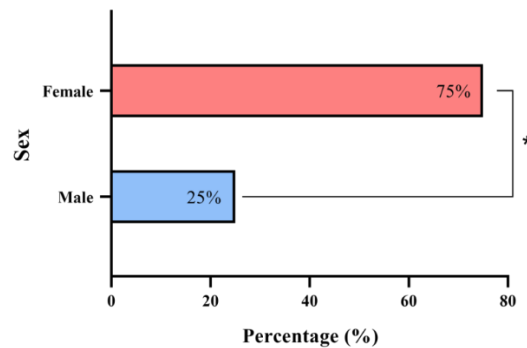


Figure 5: Distribution of H. pylori infection among genders of study patients.

4. Discussion

The observed prevalence of 51.85% was comparable to that reported in Iraq by Majeed and Khoshnaw (53.3%) [11] and in Basra city and other academic groups [12, 13]. The high prevalence was likely attributable to environmental factors and water quality since H. pylori survives in untreated water sources

[14, 15]. The observed increase in August may reflect the influence of high summer temperature in Iraq on the consumption of water from possibly contaminated sources or altered host susceptibility [16, 17]. The predominance of females in this study (75%) needs immunological scrutiny.

The immune response in females might be compromised, perhaps by estrogen modulating gastric mucosal inflammation, thus rendering the females more susceptible or manifesting the disease more than the males. The results correspond to the findings in most other provinces of Iraq and may stem from the route of household contamination of transmitted infection or immune response influenced by male hormones exposure [18, 19]. The test reliability of SAT and UBT as non-endoscopic procedures remains high [20, 21].

5. Conclusion

In conclusion, this study shows that *H. pylori* infection is very endemic in Al-Kut City and its continuation is further documented by the prevalence among symptomatic people being >51%. There is an obvious seasonal pattern with August being the hottest summer month, and this possibly explains the high rate of infection. Females had the highest infection rate, which may

require awareness campaigns and sex specific clinical investigations.

The serology and stool antigen tests will still be relevant screening tools, but the gold standard for the diagnosis of active colonization remains the Urea Breath Test. This high burden of infection suggests the need for cleaner sanitation and access to drinking water, and for better screening program in primary health facilities to decrease the risk of developing the gastric malignancies and chronic gastrointestinal morbidity in the Iraqis.

6. References

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