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Research Article

Study the Prevalence of Helicobacter Pylori Infection and its Association with Anemia among Dyspeptic Patients in the Holy Province of Karbala

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Abstract:

Background: Infections caused by Helicobacter pylori (H. pylori) are a major crisis in global health. Finding out whether an H. pylori infection is associated with anemia is the primary goal of this study. **Methods:** The 601 patients with systemic dyspepsia at Imam Hussein Medical City in Karbala, Iraq participated in this study. **Results:** The study found that the percentage of females was higher than that of males (53.7%), while the percentage of males was (46.3%), and the age group of 30-59 years was the highest among all patients. The study revealed a prevalence rate of H. pylori infection at 24.3%, which exhibited a significant correlation with both gender and anemia. Patients infected with H. pylori had a significantly higher incidence of anemia (54.9%) than uninfected patients (45.1%). Infected and uninfected people had significantly different mean hemoglobin, corpuscular volume, hemoglobin concentration, hematocrit, and red blood cell counts. **Conclusion:** Dyspepsia patients have a high rate of H. pylori infections, with a strong link to gender and anemia. However, the study's cross-sectional methodology limited its ability to establish causal correlations, suggesting future studies should use a cohort design.

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1.Introduction

Helicobacter pylori (H. pylori) infections affect both rich and poor countries, making them global public health concerns.[1, 2] The burden is more significant in developing nations, where the stated prevalence is at 50.8%, as opposed to 34.7% in developed nations[3]. H. pylori is a gram-negative bacterium with a helix-shaped and bent rod morphology. It leads to atrophic gastritis, gastroduodenal ulcer, gastric ulcer illness, peptic ulcer, stomach malignancies, and symptoms of dyspepsia [4,5].

Nevertheless, most individuals with H. pylori infection often do not exhibit any symptoms, with a prevalence exceeding 80%. H. pylori is crucial in maintaining the natural balance of the stomach ecosystem [6]. Approximately 4.4 billion people worldwide are affected by H. pylori infection [1] The bacteria is most prevalent in Africa, with a rate of 70.1%. The prevalence varies significantly, with Switzerland having a rate of 18.9% and Nigeria having the highest rate of 87.7% [1]..

Among Western Asian countries, Turkey had the most significant incidence rate at 77.2% [7]. H. pylori was prevalent in 74% of dyspeptic patients in Uganda. Haematological symptoms, including anemia and micronutrient shortages like iron and vitamin B12, have been associated with H. pylori infection [8]. It has also been linked to symptoms outside of the stomach, including anemia, stunted development, iron deficiency, and thrombocytopenic purpura [9, 10].

When the H. pylori bacterium is removed, the iron nutritional status returns to normal, and iron supplements are no longer needed, according to many studies [11-14]. While the exact process by which H. pylori infection can lead to anemia and iron deficiency is still unclear, some of the known mechanisms include an increase in intragastric pH, a decrease in ascorbic acid in gastric juices, which disrupts iron absorption from food, increased micro-erosions in gastric mucous, which causes chronic bleeding, neutrophil lactoferrin production, and bacterial iron capture [15].

Another possible mechanism involves increasing hepcidin production, a crucial controller of iron metabolism that inhibits iron absorption in the small intestine. Another potential process is an upregulation of hepcidin synthesis, an essential regulator of iron metabolism that blocks negligible intestine iron absorption [16]. We aimed to determine how many dyspepsia patients had anemia and if it was related to H. pylori infection.

Methodology

Area of Study

The study was conducted at the Digestive and Liver Center in Imam Hussein Medical City in Karbala, about 100 km south of Baghdad.

Period and Study Design

The research period for this prospective cross-sectional study was from October 2021 to April 2022.

Data Collection and Analysis

The study involved patients aged from less than 10, 10-29, 30-59 and 60-90 year with indigestion symptoms, including abdominal discomfort, and underwent upper endoscopy and colonoscopy at Imam Hussein Medical City.

Under local anesthetic, two laparoscopic stomach tissue biopsies were taken from the patients. The samples, which contained 5 cm^3 of Tryptone soy broth, were taken to a lab for testing and microbial examination. The samples were placed directly with the transport medium in a biopsy crushing tool (sterile mortar) and crushed well. Then, 1 cm^3 of the tissue biopsy mixture was transferred to the tube containing the slanted solid medium, Columbia urea agar slant (MCUA). Thus, the transport medium was considered the liquid phase. The tubes were left for a short time to allow the broth mixed with the biopsy to moisten the upper slanted surface of the tube before settling at the bottom. The resulting system would be biphasic, with the solid phase being the

single phase and the liquid phase above it, with a repetition rate for each tissue sample [17].

The inoculated tubes were incubated in a sterile jar containing a gas generation kit to provide standard microaerophilic conditions, which consist of 2-5% oxygen, 5-10% carbon dioxide, 0-10% hydrogen, and 83-87% nitrogen at 37°C for 24 hours. After that, the color change from orange to pink in the solid phase was monitored, indicating the activity of the urease enzyme. A loopful of the urease-positive samples was transferred into two-phase tubes from the bottom of the tube to the top, passing through both phases. They were then streaked on Columbia urea agar and incubated under microaerophilic conditions at 37°C for 3-5 days. The bacterial isolates were identified based on morphological characteristics, including colony shape, color, texture, and size on the used media [17].

The microscopic characteristics of the bacteria were investigated, where all isolates were subjected to microscopic examination under the oil immersion lens using the traditional Gram staining method to identify the shape, arrangement, and reaction of the bacteria with the stain [17].

In order to test for the presence of H. pylori, participants were provided with sterile containers and instructions on how to collect about 1 gram of stool specimen. The test was conducted using stool antigen rapid test strips, manufactured by Zhejiang Orient Gene Biotech Co, LTD in China, and boasting a specificity of 95.7% and a sensitivity of >95, respectively. Stool antigen assays, use proven laboratory-based monoclonal antibodies, provide comparable accuracy to urea breath tests, offer cost-effectiveness, and necessitate less equipment than urea breath tests.

An automated hematology analyzer was used to evaluate complete blood counts after venous blood collection. Thin blood films were prepared for anemia (The haemoglobin concentration should be below 12g/dl for females and below 13g/dl for males).

DATA ANALYSIS

The study utilized SPSS 26.0 to analyze data on H. pylori infection and anemia incidence, using the t-test and logistic regression analysis to assess the correlation with P-Value < 0.05.

CONSIDERATION OF ETHICS

The research adhered to ethical guidelines from the Declaration of Helsinki, obtained patient consent, and received approval from a local ethics committee No. 186 on November 23, 2021.

RESULTS

Participants' Socio-Demographic Characteristics

This study involved 601 dyspepsia patients, divided into four age groups: < 10, 10-29, 30-59, and 60-90 years. The majority were urban dwellers (53.4%), aged 30-59 (49.9%), and had secondary education (31.9%). H. pylori infection was present in 24.3% of people overall (146/601) as shown in Table 1.

TABLE 1. Participants' Socio-Economic Status

Variables	Categories	Frequency	Percent
Age	<10	8	1.3%
	10-29	162	27.0%
	30-59	300	49.9%
	60-90	131	21.8%
Gender	male	278	46.3%
	female	323	53.7%
Residence	Urban	321	53.4%
	Rural	280	46.6%
Educational_status	Higher	148	24.6%
	Secondary	192	31.9%
	Primary	112	18.6%
	Illiterate	149	24.8%
Occupational_status	Employee	209	34.8%
	Student	116	19.3%
	Farmer	142	23.6%
	Daily laborer	134	22.3%
H.pylori infection	*H.pylori*-No	455	75.7%
	H.pylori-Yes	146	24.3%
Anemia	Anemic	206	34.3%
	Non-anemic	395	65.7%

Association Between H. Pylori Infection and the Prevalence of Anemia

The microcytic hypochromic anemia, normocytic normochromic anemia, macrocytic normochromic anemia, and macrocytic hypochromic anemia were the anemia forms linked to H. pylori infection. Anemia was prevalent in 34.3% of dyspeptic patients, with 53.4% in women and 46.3% in men. The average hemoglobin concentration was 10.96 g/dl for females and 11.33 g/dl for men. Anemia incidence was 54.9% in H. pylori-infected patients, while 45.1% in non-infected patients. Anemia prevalence significantly differed between infected and non-infected individuals P= (0.000) as shown in Table 2.

TABLE 2. H. Pylori, Serostatus, and Dyspeptic Anemia

		H.pylori infection			χ2 (P-value)
		H.pylori-No	*H.pylori*-Yes	Total	
Anemia	Anemic	93(45.1%)	113(54.9%)	206(100.0%)	159.177(0.000)
	Non-anemic	362(91.6%)	33(8.4%)	395(100.0%)	
Total		455(75.7%)	146(24.3%)	601(100.0%	

P-Value < 0.05

The study compared parameters related to red blood cells in individuals infected with H.pylori and unaffected individuals, finding significant differences in RBC , HGB, HCT, and MCHC quantity P=(0.000, 0.000, 0.000 and 0.001) respectively as shown in Table 3.

TABLE 3. Correlation Between Red Blood Cell Indices and the Occurrence of *H. Pylori* Infection

Parameter	Mean (SD)		P-value	(95% CI)
	H.Pylori-Yes	*H.Pylori*-No		
RBC	3.5(1.23)	4.3 (0.8)	0.000	(0.81 ,1.03)
HGB	9.0(2.92)	11.67 (2.08)	0.000	(2 .15 ,3.18)
HCT	28.2(9.1)	35.8 (5.9)	0.000	(7 .63 ,9.22)
MCV	84.4(13.9)	84.5 (8.0)	0.978	(.03 ,2.41)
MCH	27.3(5.4)	27.6(3.4)	0.449	(.29,1.03)
MCHC	32.0(1.9)	32.5(1.6)	0.001	(.58 ,.92)

P-Value < 0.05

RBC = red blood cell; HGB = hemoglobin; HCT = hematocrit; MCV =mean corpuscular volume; MCH = mean corpuscular hemoglobin; MCHC = mean corpuscular hemoglobin concentration

MULTIVARIATE ANALYSIS OF H. PYLORI INFECTION FACTORS

Age (P = 0.014), Gender (P = 0.000), educational status (P = 0.000, 0.001, and 0.000), and anemia (P = 0.000) were significantly associated with H. pylori infection in the multivariate analysis. as indicated in Table 4.

Table (4): Analysis of Many H. Pylori Related Variables

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age			10.970	3	.012	
	Age(1)	-2.832	1.153	6.030	1	.014	.059
	Age(2)	.462	.417	1.225	1	.268	1.587
	Age(3)	.558	.331	2.847	1	.092	1.748
	Gender	-1.250	.255	24.098	1	.000	.286
	Residence	.321	.303	1.123	1	.289	1.379
	Educational_Status			17.686	3	.001	
	Educational_Status(1)	-1.707	.486	12.318	1	.000	.181
	Educational_Status(2)	-1.284	.392	10.716	1	.001	.277
	Educational_Status(3)	-1.772	.460	14.840	1	.000	.170
	Occupational_Status			3.597	3	.308	
	Occupational_Status(1)	.652	.469	1.930	1	.165	1.919
	Occupational_Status(2)	-.037	.542	.005	1	.946	.964
	Occupational_Status(3)	-.017	.438	.002	1	.968	.983
	Anemia	-3.081	.279	121.756	1	.000	.046
	Constant	5.430	.795	46.702	1	.000	228.247

a.Step 1 variables: Age, Gender, Residence, Educational_status, Occupational_status, Anemia. B: coefficient constant, SE: standard error, Wald: chi square test, df: degree of freedom, Sig: significant, Exp(B): beta exponential

DISCUSSION

The study revealed that only 24.3% of people with indigestion had H. pylori infection, less than in earlier studies in Africa and Asia (67% and 86.8%, respectively) [13-16]. The number of people with dyspepsia changes by country and ethnic group [19].

The study found a small but statistically significant difference in the number of H. pylori infections in women compared to men (53.7% vs. 46.3%, respectively; P = 0.000). This supports other research that found H. pylori infection is more common in women. [15,16,18,20].

We noticed that the age group 30-59 years and 10-29 years are the most infected with H. pylori (49.9% and 27.0%), respectively. Patients aged 54 to 61 had the highest frequency [17]. People of all ages likely get an H. pylori infection since the bacteria can stay in the body for a long time and make people more likely to get sick. However, other studies show that people younger are more likely to be infected with H. pylori [14,16].

The present study also found a stronger association (P = 0.000) between H. pylori infection and anemia (n = 99, 16.5%) compared with H. pylori -positive and anemia-negative patients (n = 47, 7.8%). A study done in Ethiopia, however, discover a link [25].

The research conducted in Latin American nations did not find any correlation [21], whilst a study conducted in Haiti found a reverse correlation [22]. People who tested positive for H. pylori stool antigen had lower mean (±SD) of hemoglobin and hematocrit than people who tested negative (9.0 (2.1) g/dl versus 11.7 (2.9) g/dl, P = 0.000) and (28.2% (9.1) versus 35.8% (5.9), P = 0.000) correspondingly. Among Turkish teenagers and Ethiopia, the same finding was recorded [23,25]. H. pylori infection and Hgb/HCT levels were not associated with the studies conducted by Fraser et a.l[24] Kermati et al.[25]. Furthermore, patients with dyspepsia who were found to have the H. pylori stool antigen displayed noticeably lower MCHC (P = 0.001) levels compared to those who tested negative. This indicates that the infection has an impact on haematological parameters.

CONCLUSION

H. pylori infection was shown to be relatively common among dyspeptic individuals in the research location, according to this study. It was found that the number of people with an H. pylori infection rose with age. This means that getting the infection is much more likely as your age. People who tested positive for H. pylori had significantly lower levels of hemostatic markers, such as red blood cell (RBC) count, than the general population. This study showed that further investigation is required to identify potential causes of this high infection rate. Also, cohort studies are the way to go to prove that the risk factors cause H. pylori.

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