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COMPARING THE IRON LEVEL OF PATIENTS INFECTED WITH *HELICOBACTER PYLORI* AG$^+$ AND AB$^+$, THAT SUFFER FROM GASTROINTESTINAL PROBLEMS IN AL-NAJAF PROVINCE

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ABSTRACT

Background: *Helicobacter pylori is a spiral (helical), Gram-negative, microaerophilic bacteria that is typically present in the stomach, it is believed as helical form, which gives rise to the genus name helicobacter, evolved to allow it to pierce the stomach's mucoid lining and spread infection.* ***Aim:*** *This study included two main axes: the first is the diagnosis of H. pylori by antibody test in blood and antigen in feces. The second axis is to estimate the level of iron in patients and compare them with healthy control.* ***Material and method:*** *The total samples included in this study were 105 subjects represented by 80 patients (screened by H. Pylori Ab and Ag rapid test) with the gastrointestinal problems and 25 healthy controls.* ***Results:*** *The number of people infected with H. pylori is (45), divided to 19 were Ab+ 15 were Ag+, and 11 were Ag+ and Ab+. The iron level of all these groups was estimated and compared with the healthy group. So, the results showed that there is only a significant difference between patients who carry antigen and antibody together with (P. value =0.001), as their iron level was very low with (Mean 39.82) as comparing with control. In addition, moreover, there was a significant difference between antigen and antibody carrier patients together with all other groups (antigen positive, antibody positive, gastrointestinal patients without infection with H. pylori) with P. value (0.003, 0.002, 0.001) respectively.* ***Conclusions:*** *The current study revealed that high distribution of H. pylori infection in gastrointestinal disturbance patients and decreased Iron serum level specially in individual with concurrent acute and chronic infection.*

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INTRODUCTION

Gastrointestinal (GI) diseases start from the mouth to the anus, and the most important diseases related to the digestive system are stomach and duodenal peptic ulcers, chronic bowel inflammation, ulcerative colitis and malignant (Harrington *et al*.,2020). Common causes of Gl disarranges are infections, unhealthy food, contamination and side impacts of pharmaceutical specialists (eg, non- steroidal, anti-inflammatory drugs), for a few infections of the GI framework, significant financial contrasts have been detailed. Lower financial bunches have the next chance of procuring a peptic ulcer and stomach and colon cancer (Geyer,2008).

Within the 1980s the microscopic organisms *Helicobacter pylori* were found as a conceivable causal figure of peptic ulcer infection. Afterward, it was moreover appeared that Helicobacter pylori is related with gastric cancer. A later audit concluded that *Helicobacter pylori* is display within the stomach in approximately half of the human populace. As a rule, it does not cause any hurt, but is related with an expanded hazard of peptic ulcer, gastric carcinoma, and gastric lymphoma (Usui *et al*., 2023).

In any case, the component that joins *Helicobacter pylori* infections to peptic ulcer and gastric cancer has not been completely investigated. contend that *Helicobacter pylori* contamination does not cause duodenal ulcer but avoids recuperating of an ulcer delivered by hypersecretion of gastric corrosive. recommends that the bacterial disease is as well common to be considered a coordinate forerunner of cancer, but it gives rise to inveterate irritation, decay, and metaplasia, which in turn makes conditions for carcinogenesis within the writing, a few considers have appeared that other natural components might be hazard components for GI cancers (Salvatori *et al.*, 2023).

Iron is additionally vital for physical development, neurological improvement, cellular working, and amalgamation of a few hormones (Yang *et al*.,2023). **Aim of this study** diagnosing the presence of *H. pylori* by antigen and antibody tests and its role in gastrointestinal infections, investigating the effect of *H. pylori* infections on the level of iron in the body according to the stages of infection.

METHODOLOGY

Study setting

The study was conducted at Gastrointestinal Hospital, Al-Sadr Teaching Hospital, Al-Furat Al-Awsat Hospital and Private laboratories in Al- Najaf city. The total number of subjects involved in the study was 80 cases. Eighty a patients suffering from the gastrointestinal problems with or without *H.pylori* , and twenty five as control group during the period March 2023 to December 2023.

Collection of Blood sample

Using sterile syringes, venous blood samples were drawn. Blood samples were obtained from patient with gastrointestinal disease and control groups by vein puncture. The samples placed without anti-coagulants as gel tubes, to be used for preparing serum for detection *H. Pylori* and iron test. Samples were allowed to clot at 37˚C, and then it was separated using a centrifuge to get serum ready to analysis. In addition to taking samples from the feces to diagnose the *H. Pylori* antigens.

Helicobacter pylori Ab, Ag rapid test

For the purpose of diagnosis *H. Pylori* infection in feces and serum by presence of antigen and antibody depend on Biopanda H. *pylori* Rapid Test Cassette, it is considering as qualitative method.

Iron

Fe3+ iron is reduced to Fe2+ iron by ascorbic acid following the dissociation of iron-transferrin bound in an acidic media. Then formation a color by complex reagent that used in these kits with Fe2+ iron. The amount of iron in the material is exactly proportional to the absorbance, which is thus measured by specific wavelength during spectrophotometer.

RESULTS AND DISCUSSION

Diagnosis of *H. Pylori*

Depending on basic internationally approved methods for diagnosing *H. pylori* through blood for antibody testing and stool for antigen testing, the results showed 45 (**56.25 %**) people who suffer from a problem in the digestive system were infected and carriers of this bacterium, as shown in Table (1).

Table (1) Show Distribution of *Helicobacter pylori* infections in patients with the gastrointestinal tract.

Results		*H. pylori* infection				Without *H. pylori* infection
		Ag+	Ab+	Ag+ Ab+	Total	Ag- Ab-
Patients (80)	No	15	19	11	45	35
	%	18.75	23.75	13.75	56.25	43.75

Iron Estimation

Comparison of iron level between patients suffer from chronic *H. Pylori* infection (Ab $^{+}$) with control group.

In this study. iron was measured for people with chronic *H. pylori* (19 cases) compared with healthy people (25 cases). It shows no significant increase (P>0.05) in the mean serum levels of iron in the patient related with the control group. Where the results in a Table (2), with mean serum concentration of iron in the patient (90.58) compared with its levels in control group (100.08).

Table 2: Levels of iron serum of patient (Ab^{+}) and control groups

Iron level	**Patient groups N = 19**	**Control groups N=25**	**P value**
Mean	90.58	100.08	
Std. deviation	46.864	39.673	0.471

Comparison of iron level between patients suffer from acute *H. Pylori* infection (Ag^{+}) with the control group

In this study, iron was measured for people with *H. Pylori* (15 cases) compared with healthy people (25 cases). It shows no significant increase (P>0.05) in the mean serum levels of iron in the patient related with the control group. Where the results in a Table (3), the mean serum concentration of iron in the patient (82.40) compared with its levels in the control group (100.08).

Table (3): Levels of iron serum of patient (Ag+) and control groups

Iron level	**Patient groups N = 15**	**Control groups N=25**	**P value**
Mean	82.40	100.08	
Std. deviation	45.875	39.673	0.206

Comparison of iron level between patients suffer from *H. Pylori* infection with (Ab + Ag positive) with control group.

In this study, iron was measured for people with *H. Pylori* (11 cases) compared with healthy people (25 cases) It shows significant increase (P<0.05) in the mean blood levels of iron in the patient related with the control group. Where the results in a Table (4), the mean blood concentration of iron in the patient (39.82) compared with its levels in control group (100.08).

Table (4): Levels of iron patient (Ab + Ag+) and control groups

Iron level	Patient groups N = 11	Control groups N=25	P value
Mean	39.82	100.08	
Std. deviation	12.230	39.673	0.001

Comparison of iron level between patients suffer from gastrointestinal problems without *H. Pylori* infection with control group.

In this study, iron was measured for people without *H.Pylori* (35 cases) compared with healthy people (25 cases). It shows no significant increase (P>0.05) in the mean serum levels of iron in the patient related with the control group. Where the results in a Table (5), the mean serum concentration of iron in the patient (106.14) compared with its levels in the control group (100.08).

Table (5): Levels of iron serum of patient without *H. Pylori* infection and control groups

Iron level	**Patient groups N = 35**	**Control groups N=25**	**P value**
Mean	106.14	100.08	
Std. deviation	43.192	39.673	0.582

Comparison of iron level between all patients group suffer from gastrointestinal problems and control group

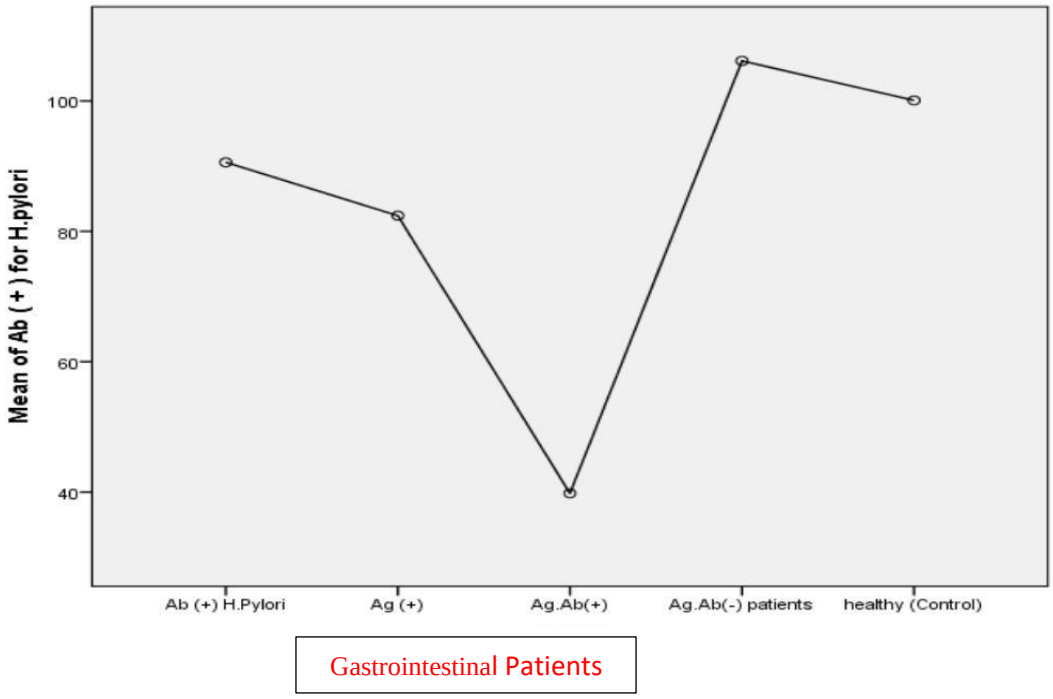
In this study, all samples collected according to the different period of infection and disease were compared with each other. Where the results showed that there was a very high significant difference and a high deficiency between persons infected with both antigen and antibody of *Helicobacter pylori* with those who have antigen only, antibody only, gastrointestinal problems, and healthy control (0.003, 0.002, 0.01, 0.01 respectively) for the level of iron, as shown in the Table (6) and Figure (1).

Table (6) show comparison of iron level between all patients group suffer from gastrointestinal problems and control group

One way ANOVA		**Sig**
Ab (+)	Ag +	1.000
	Ag+ Ab +	0.002
	Ag- Ab – (patient)	0.919
	Healthy (control)	0.998
Ag +	Ab +	1.000
	Ag+ Ab +	0.003
	Ag- Ab – (patient)	0.611
	Healthy (control)	0.899
Ag+Ab +	Ab +	0.002
	Ag +	0.003
	Ag-, Ab – (patient)	0.001

	Healthy (control)	0.001
Ag-Ab - patient	Ab +	0.919
	Ag +	0.611
	Ag+ Ab +	0.001
	Healthy (control)	1.000
Healthy (control)	Ab +	0.998
	Ag +	0.899
	Ag+ Ab +	0.001
	Ag- Ab – (patient)	1.000
The mean difference is significant at the 0.05 level		

Figure: 1 show the mean of iron level between all patients group suffer from gastrointestinal problems and control group



Discussion

Helicobacter pylori is a common microbe that causes infections in the stomach and digestive system and affects most of the world's population, it penetrates the inner mucous layer of the stomach due to its numerous invasive virulence factors (Adinortey *et al*., 2018).

In other study, it was reported that there is a link between people infected with *H. Pylori* bacteria and iron levels in the body as a result of the bacteria exploiting this mineral for the purpose of growth (Haile *et al*.,2021).

Rates of infection with *H. pylori* vary from one region to another. In this study, a large number of gastrointestinal patients were recorded infected with this type of bacteria, and this is consistent with another study showing an increase in the number of infections in developing countries such as Africa and Asia (79.1%), (54.7%) respectively. While the number of infections in developed countries such as North America decreases by a percentage (37.1%) (Hooi *et al*., 2017).

There are many factors that help establish infection with *H. pylori*, including smoking, malnutrition, and exposure for periods of time to carcinogenic substances, all of which contribute to problems with the gastroduodenal, especially gastric cancer (Gonzalez *et al*., 2012).

H. pylori possess quite a lot of strain-specific virulent genes along with essential virulence factors such as (urease and outer membrane protein). Among these strain-specific genes are the vacuolar cytotoxin A gene, the cytotoxin A-related gene, the exogenous inflammatory protein, and the duodenal ulcer-promoting gene, the presence of these genes determines the type of strain and the extent of its danger to the infected person (Huang *et al*., 2016).

H. pylori infection can cause gastritis or peptic ulcer, as it is a Gram-negative bacterium that has adapted to live in the acidic environment of the gastric mucosa. Not only do they affect stomach problems, but they can also cause iron deficiency anemia (IDA). The failure of patients to respond to conventional treatment for iron-deficiency anemia prompted the search for other causative factors (Abadi, 2017).

H. pylori infection and recovery from iron deficiency anemia after treatment of *H. pylori*, even without conventional treatment for anemia. Although the pathogenetic mechanisms are still unclear, there are several theories that can explain the pathogenesis of iron deficiency caused by *H. pylori* infection, including occult blood loss associated with chronic erosive gastritis (Cheok *et al*.,2021).

The decrease in iron absorption associated with chronic gastritis and the decrease in hydrochloric and non-hydrochloric acid. There may also be a role in increasing iron uptake and utilization by bacteria. Thus, the pathogenesis mechanism is multifactorial, and drugs are currently being developed that inhibit heme utilization and other mechanisms of iron uptake by the bacteria, as a full understanding of the bacterial strategies for iron acquisition helps in designing drugs that trap the bacteria and prevent it from iron (Sipponen and Maaroos, 2015).

Anemia caused by a lack of iron is among the most prevalent diseases worldwide. Despite being an undertreated aspect of many gastroenterological disorders, iron deficiency anemia is estimated by the World Health Organization to affect over 30% of the population. Additionally, recurrent anemia affects one-third of patients with inflammatory bowel disease (IBD) (Maas *et al*., 2022).

This study is also consistent with other studies due to chronic gastritis as a result of infection with *H. pylori*, which included gastric chloride deficiency and impairs the conversion of dietary iron from ferric to the ferric form as a result of infection, thus leading to iron deficiency, this is due to the fact that ascorbic acid and acidic intragastric pH are required to convert the majority of dietary iron from ferric to the ferric state for absorption, *H. pylori* is a major contributor to chronic superficial gastritis, leading to atrophy of the gastric glands and a reduction in the amount of gastric acid secreted (Waldum *et al*., 2016).

This study is also agreed with another study showing the effect of *H. pylori* infections on the levels of hepcidin, which is responsible for regulating the level of iron in the body, its synthesis increases in infection and decreases in iron deficiency (Mendoza *et al*., 2019).

CONCLUSION

It can be concluded that more than half of Gastrointestinal patients were infected with *H. pylori* and serum iron levels does differ between patients with or without *H. pylori* Ab and/or Ag as comparing with healthy individuals. Patients with *H. pylori* (Ag+ and Ab+) is positively correlated with decreased iron levels, in addition to the presence of variation in the levels of iron for the duration of the infection.

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