

The Hematological Changes in Patients Infected With Helicobacter Pylori

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Abstract: The aim of current work was study the relationship of Helicobacter pylori bacteria to anemia. Samples were collected from the Endoscope Unit for the period from 12/14/2022 to 1/30/2024 at Azadi Teaching Hospital and Al-Watan Al-Ahli Hospital in Kirkuk Governorate, from both sexes for the age group (14-57) years. Stool samples were taken from the same patients Those undergoing laparoscopy for the purpose of investigating the presence of Helicobacter pylori, as well as blood samples for the purpose of performing a complete blood count (CBC) analysis. Tissue biopsy samples were taken by the gastroenterologist using laparoscopic forceps, and (88) samples were obtained from these patients, with two tissue biopsies from each patient. Males were 38% (17) and females were 62% (27). Their ages ranged from (14-57) years. As for the control group, it included (44) healthy individuals and those negative for Helicobacter pylori. The results of the research for all individuals included in the study, after performing a complete blood analysis, showed a significant decrease in the number of red blood cells, the concentration of hemoglobin, the size of agglutinated blood cells, as well as the platelet count for the age groups of people infected with the bacteria with the same age groups for the control groups, which demonstrated the presence of a strong association between Helicobacter pylori infection and poverty. Blood represented by a decrease in the number of red blood cells and the concentration of hemoglobin and platelets, while the study and the results of the complete blood analysis showed a significant ($P,0.05$) increase in the number of platelets and the count of white blood cells for the same previous age groups compared to the control groups, where a high rate of sedimentation of red blood cells is an indicator of the presence of inflammation. In the body, a high rate of white blood cells indicates a systemic humoral immune response against bacterial infection.

Keywords: H. pylori; CBC; anemia; hemoglobin.

Introduction

Initial investigation of Helicobacter pylori in the human stomach dates back to the nineteenth century, attracting the attention of scientists Marshall and Warren [1]. This bacterium is a major factor in the infectious diseases chronic gastritis and gastric ulcer, which are common in humans. In addition, Helicobacter pylori is a serious factor that can contribute to the development of gastric cancer, and it is also closely linked to the development of mucosa associated tissue lymphoma [2]. The incidence of infection with H.pylori bacteria is due to to the virulence genes they carry. Among the most important virulence genes associated with gastrointestinal diseases are cagA, UreA, and vacA. [3]. H.pylori bacteria are color-negative bacilli that move with the help of polar flagella in a movement similar to the launch of an arrow (darting motility), and appear microaerophilic, producing dyes. It is characterized by the phenomenon of polymorphism, as it appears in two forms (coccoid and bacilli), and it forms balls to avoid the

harsh conditions in the stomach cavity [4]. Studies have discovered that *H. pylori* is the only bacteria in the stomach with a healthy low pH (Hypochlohydira). Low acidity can reduce protection from *H. pylori* colonization, atrophic gastritis, or treatment with antibiotics or proton-pump inhibitors (PPI), leading to increased bacterial growth and diversity [5]. These bacteria can infect people through oral-oral transmission and fecal-oral transmission. In addition, the health status of the family plays an important role in the transmission of these bacteria [6]. *Helicobacter pylori* infection also occurs through water and food contaminated with it, or direct contact with it, especially doctors specializing in gastrointestinal diseases and those working with laparoscopic devices, as well as analytical laboratories [7]. Bacteria can be detected using multiple methods, including invasive and non-invasive. The invasive method includes tests such as culture, urease rapid test, and histopathological examination. The sensitivity and specificity of these tests depend on how much time has passed since the injury and whether the patient has received previous treatment [8]. So the aim of current work was study the relationship of *Helicobacter pylori* bacteria to anemia (hemoglobin levels).

Materials and Methods

Samples Sample collection

Samples were collected from the Endoscope Unit for the period from 12/14/2022 to 1/30/2024 at Azadi Teaching Hospital and Al-Watan Al-Ahli Hospital in Kirkuk Governorate, from both sexes for the age group (14-57) years. Stool samples were taken from the same patients Those undergoing laparoscopy for the purpose of investigating the presence of *Helicobacter pylori*, as well as blood samples for the purpose of performing a complete blood count (CBC) analysis.

H. pylori detection tests

Invasive Method tests

Which relies on upper gastrointestinal endoscopy to take gastric biopsies for histopathological tests, bacterial culture test, rapid urease test, and the polymerase chain reaction (PCR) method, but one of the disadvantages of these methods is that they require endoscopic examination to obtain a biopsy sample and are therefore difficult to use in epidemiological studies.

Non-invasive tests

It does not require upper gastrointestinal endoscopy and relies on external samples such as breath (Urea breath test), blood (serological tests), stool antigen test (SAT), and saliva and urine samples to detect IgM, IgG, and IgA antibodies [9-10].

Complete blood count (CBC)

The blood sample is obtained by drawing blood from a vein into special EDTA tubes and mixing the blood well with the anticoagulant. It remains usable at room temperature for up to 10 hours, as it is not appropriate to perform the analysis if the sample exceeds this period. The blood sample can be kept in the refrigerator and remains usable for analysis for 18 hours from the time the sample was collected. The sample may not be frozen. The patient must be in a state of ideal rest for 10 to 15 minutes before the blood sample is drawn. The CBC machine counts blood cells.

Statistical Analysis

The experiment data were statistically analyzed using the statistical analysis program (SPSS) to estimate the means and standard error (Std). Error, and the differences between the means were compared based on Duncan's multiple range test at the probability level of $P \leq 0.05$ [11-12].

Results and Discussion

The current study included 44 patients attending the Endoscope Unit, who were suffering from pain and unclear intestinal disorders, at Azadi Teaching Hospital and Al-Watan Al-Ahli Hospital/Kirkuk Governorate. After they were investigated for infection with *H.pylori* bacteria

by detecting bacterial antigens in stool samples, all of them showed positive results for infection with *Helicobacter pylori*. Tissue biopsy samples were taken by the gastroenterologist using laparoscopic forceps, and (88) samples were obtained from these patients, with two tissue biopsies from each patient. Males were 38% (17) and females were 62% (27). Their ages ranged from (14-57) years. As for the control group, it included (44) healthy individuals and those negative for *Helicobacter pylori*. The individuals included in the study were divided according to age group into four groups as follows:

- The first group: a healthy control group for the age group of (14-35) years, which includes (22) individuals.
- The second group: A group of infected people for the age group of (14-35) years, which included (22) individuals.
- The third group: a healthy control group for the age group of (36-57) years, which included (22) individuals.
- The fourth group: The group of infected people in the age group of (36-57) years, which included (22) individuals. The current study period ranged from the beginning of March 2022 until March 2024.

The results of the current study showed after performing a complete blood analysis for all four individuals in the study, using the CBC machine, which counts blood cells, as shown in Table (1).

Table (1): shows the blood parameters for the study groups

Groups Parameters	14-35 years mean ± standard		36-57 years mean ± standard	
	RBC (X10 ⁶ /μl)	3.81± 0.427 a	4.73± 0.381 b	4.51± 0.317 a
Hb (mg/dl)	13.28± 1.19 a	10.67± 0.54 b	13.03± 1.11 a	9.12± 0.45 b
PCV (%)	40.82± 2.71 a	31.51± 2.16 b	39.72± 2.52 a	28.49± 2.55 b
PLT (X10 ⁶ /μl)	213.4± 15.7 a	281.67± 12.52 b	241.93± 24.93 a	183.3± 10.58 b
ESR (mml)	6.92± 2.15 b	15.62± 4.91 a	8.93± 4.58 b	18.27± 5.06 a
WBC (X10 ⁶ /μl)	6.28± 2.67 b	10.38± 3.56 a	7.42± 1.12 b	11.58± 2.91 a

*Numbers followed by different letters vertically indicate a significant difference at the probability level (P≥0.05).

The results of the current study showed that individual patients suffering from infection with *Helicobacter pylori* bacteria had a significant decrease in the number of red blood cells, the concentration of hemoglobin, and the size of agglutinated blood cells compared with the healthy control group for both age groups. The results of the current study are consistent with [13-14], who confirmed that there is a strong association between *Helicobacter pylori* infection and anemia represented by a decrease in the number of red blood cells, hemoglobin concentration, and platelet numbers. There are many hypotheses that explain the reason for this decrease, but the most logical hypothesis is the hypothesis that shows that gastrointestinal blood loss resulting from chronic infection with *Helicobacter pylori*, which causes ulcers in the stomach and intestines, which in turn leads to internal bleeding. This chronic bleeding can cause continuous blood loss. To the blood, which leads to a decrease in the number of red blood cells and the concentration of hemoglobin and thus anemia [15], while other studies have shown that chronic inflammation and lack of acidity resulting from infection with *Helicobacter pylori* in the stomach of patients may affect the absorption of nutrients, including iron. In the duodenum, which in turn will negatively affect the concentration of hemoglobin and the number of red blood cells in the blood [16]. The results of the current study also agreed with the findings of [17], who studied the relationship between *Helicobacter pylori* infection and anemia in the Chinese population, as he showed that anemia is one of the complications of *Helicobacter pylori* infection because it led to

a decrease in both hemoglobin concentration and red blood cell count. Infection with *Helicobacter pylori* can cause a complex inflammatory and immune response that leads to clear changes in the number and types of blood cells, in addition to general inflammatory indicators such as increased erythrocyte sedimentation rate. The results of the current study agreed with the study [18] in terms of the decrease in platelet counts, as there are also two mechanisms to explain this decrease. The first mechanism is the immune mechanism, as *Helicobacter pylori* bacteria can stimulate the immune system (Autoimmune response) to produce antibodies. It attacks platelets in the wrong way, leading to their destruction and a decrease in their number [19]. Tan and Goh, [20] explained that Antibodies Cross-Reacting occurs between bacterial antibodies and glycoproteins in platelets, leading to a decrease in the number of platelets and thus developing the condition of immune thrombocytopenia (ITP). The second mechanism is chronic inflammation. As infection with *Helicobacter pylori* bacteria leads to chronic inflammation of the stomach, this inflammation can affect the bone marrow, which is the place where platelets are produced, which reduces their production. [21], while the results of Jafarzadeh et al. , [22], Rahman et al., [23], In his study, hemoglobin concentration, iron level in the blood, vitamin B12 levels, and platelet count decreased significantly, and white blood cell counts increased in those infected with *Helicobacter pylori* bacteria as a result of chronic inflammation compared to the control group, as proven. The study revealed a significant improvement in these criteria when treating the injury. The results of the current study showed that individual patients suffering from infection with *Helicobacter pylori* bacteria had a significant increase in the erythrocyte sedimentation rate (ESR) and white blood cell count compared to the healthy control group for both age groups included in the study. The results of the study are consistent. The current findings are based on the findings of Sahin and Tekingunduz [24], which showed that infection with *Helicobacter pylori* bacteria caused a significant increase in the number of white blood cells compared to the control group, but their percentage remained within normal limits. A high erythrocyte sedimentation rate (ESR) is an indicator of inflammation in the body. Infection with *Helicobacter pylori* bacteria causes chronic inflammation of the stomach wall, which leads to an increase in certain proteins in the blood that make red blood cells sediment faster, which increases the erythrocyte sedimentation rate (ESR) [25].

Conclusions

The results of the current study, after conducting a complete blood analysis of all four individuals in the study groups using the CBC machine, which counts blood cells, showed a significant decrease in the red blood cell count, hemoglobin concentration, and the size of agglutinated blood cells, as well as the platelet count for the same age groups compared with the same age groups for the groups. Proper control, which demonstrated a strong association between *Helicobacter pylori* infection and anemia represented by a decrease in the number of red blood cells, hemoglobin concentration, and platelet count.

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