

Evaluation on the Levels of C-Reactive Protein and Some Trace Elements in *H. Pylori* Infected Women in Owerri, IMO.

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Abstract

This study was carried out to evaluate the level of C-reactive protein (CRP) and some trace elements (Iron and Zinc) in *H. pylori* infected women. The study was conducted on a sample size of 60 women aged 18-50 years, comprising 30 *H.pylori* positive individuals and 30 without *H.pylori* negative as control group. Five (5) millilitres of blood was drawn from the antecubital vein by venepuncture technique from the subjects and dispensed into a plain tube using the standard methods of phlebotomy. The blood samples were evaluated using the standard method of analysis; C-reactive protein was evaluated using ELISA method, Zinc and Iron were analyzed using Atomic Absorption Spectrophotometry method. The study showed a significantly high ($p=0.000$) value of CRP of *H.pylori* infected women ($12.29 \pm 4.58\text{mg/l}$) than in control ($6.38 \pm 2.26 \text{ mg/l}$), which suggests an inflammatory response. There was a significant difference ($p=0.000$) in the mean value of Iron in women with *H.pylori* infection ($63.80 \pm 23.24 \text{ mcg/dl}$) compared to control ($107.86 \pm 39.18 \text{ mcg/dl}$), this means that *H.pylori* infected women are at risk of anaemia. This study also shows a low significantly difference ($p=0.005$) in zinc of women infected with *H.pylori* ($67.66 \pm 22.42 \text{ mg/dl}$) compared to the control ($83.00 \pm 22.97\text{mg/dl}$). The Pearson's correlation shows there was a significant negative correlation ($r=-0.644$, $p=0.000$) of CRP with Iron in *H.pylori* infected women. There were no significant correlation ($r=-0.241$, $p=0.199$) of CRP with Zinc in *H.pylori* infected women.

Keywords: C-reactive protein; trace elements; *H.pylori*; women; Owerri

Introduction

A gram-negative bacterium called *Helicobacter pylori* (*H. pylori*) infects the lining of the human stomach and affects roughly 25–50% of people in wealthy nations and 70% of those in underdeveloped nations. Numerous gastrointestinal conditions, including gastritis, peptic ulcers, gastric cancer, and mucosa-associated lymphoid tissue, have been linked to this [1]. Chronic inflammation brought on by an *H. pylori* infection causes the host's body to produce inflammatory markers and exhibit dysregulation of trace metals like iron and zinc [2]. Recent studies have examined the systemic implications of *H. pylori* infection in addition to its link to stomach disorders. The liver produces the acute-phase protein C-reactive protein (CRP) in reaction to inflammation, and trace elements are vital for many physiological functions. Examining the connection between *H. pylori* infection, C-reactive protein (CRP) levels, and trace element status could shed light on the illness's systemic impact and possible health consequences for people [3].

A reliable indicator of inflammation is C-reactive protein (CRP). Numerous inflammatory disorders, including viral illnesses, are linked to elevated CRP levels. It is well known that an *H. pylori* infection causes the stomach mucosa

to become chronically inflamed, which could lead to elevated CRP levels [4].

Many biological processes depend on trace elements like iron, copper, and zinc. This covers enzymatic activity, antioxidant defence, and immune response modulation. The amounts and distribution of these trace elements have been thought to be impacted by *H. pylori* infection because of changes in the secretion, absorption, and transportation of gastric acid. According to certain research, people with *H. pylori* infection had lower serum zinc levels [5].

H. pylori infection has been connected to a number of extragastric illnesses, such as metabolic disorders, cardiovascular diseases, and autoimmune ailments. One common underlying feature in many disorders is chronic low-grade inflammation, which is evidenced by high CRP levels. A variety of stomach disorders, including mild gastritis, peptic ulcers, peptic ulcer diseases (PUD), and gastric cancer, can be brought on by an *H. pylori* infection [6]. Vitamin (e.g., vitamin B12, vitamin C) and trace element (iron) deficits may result from this infection's interference with the body's ability

to absorb vital nutrients. By reducing absorption from hypochlorhydria or achlorhydria caused by chronic gastritis, decreasing the concentration of gastric juice and ascorbic acid, which is known to facilitate iron absorption by reducing iron III to iron II, increasing the production of hepcidine linked to *H. pylori* gastritis, sequestering iron in lactoferrin in the gastric mucosa through a receptor-mediated process, and decreasing the availability of iron, *H. pylori* impacts iron metabolism in the following ways [7].

Anaemia and other nutritional deficiencies brought on by this deficit can worsen general health and well-being by causing symptoms including tiredness, exhaustion, shortness of breath, and cognitive impairment [8].

H. pylori is extremely contagious and is mainly spread by oral-oral or fecal-oral routes. The pathogen can spread quickly among populations in places with inadequate sanitation and crowded living arrangements, increasing the likelihood of infection. Pregnancy problems may rise if you have *H. pylori*. Preterm birth, intrauterine growth restriction (IUGR), and pregnancy-induced hypertension (preeclampsia) are all linked to *H. pylori* infection, according to research [9].

This study aims to assess the levels of C-reactive protein (CRP) and certain trace elements in women infected with *Helicobacter pylori* because of the detrimental impact of *H. pylori* infection on women's health.

Materials and Methods

Study Area

The study area was carried out at the Federal University of Technology, Owerri. Owerri experiences a tropical rainforest climate with high precipitation throughout the year. The rainy season typically starts in March or April and lasts until October or November, with peak rainfall occurring in July and August. The main seasons are dry and wet. The population is around 1.2 million people as of 2021. Owerri is bounded 5° 48' N -7° 03' E.

Advocacy, Mobilization and Pre-Survey Contacts

The ethical approval was obtained from Federal University Teaching Hospital, Owerri. With consent from the committee, heads of units and patients were informed about the study, and sample collection dates were fixed.

Study Population

The present study included a total of 60 subjects. Thirty (30) were women with *H.pylori* infection and thirty (30) women without *H.pylori* infection (control) subjects aged between 18-50 years.

Selection Criteria

A. Inclusion Criteria

The inclusion criteria are as follows:

- Women of age 18-50years
- Women who have been confirmed with *Helicobacter pylori* infection using the strip test method for *Helicobacter pylori*.

Results

Table 1: Serum C-reactive protein in *H.pylori* infected female versus control

Serum C-reactive protein was significantly higher ($p=0.000$) in *H.pylori*-infected women (12.29 ± 4.58) compared to the control (6.38 ± 2.26) in Table 1.

Table 1. Frequency of bioethical dilemmas in case reports (n = 56)

Variables	<i>H.pylori</i>	Control	t-value	p-value
(Mean \pm S.D)	(n=30)	(n=30)		
CRP (mg/L)	12.29 \pm 4.58	6.38 \pm 2.26	6.910	0.000

- Women who do not have a significant chronic disease such as HIV, Hepatitis B except for *Helicobacter pylori*
- Control groups are uninfected women or women without *Helicobacter pylori*-related diseases
- Subject who gave their consent

B. Exclusion Criteria

The exclusion criteria are as follows:

- Subject who did not give their consent
- Subjects with chronic diseases such as cardiovascular diseases, autoimmune disorders, or chronic inflammatory diseases such as HIV, Hepatitis B, etc.
- Subjects on medications known to affect C-reactive protein levels or trace element status such as corticosteroids, and nonsteroidal anti-inflammatory drugs.
- Subjects who smoke heavily or consume a lot of alcohol
- Subjects below 18years and above 50years.

Study Design

A cross-sectional study was conducted in July 2023 and all eligible subjects signed a written informed consent for the study period and were sampled.

The 60 subjects were divided into two groups, Group 1 consisted of 30 *H. pylori* women while Group 2 consisted of 30 healthy women.

Sample Collection

The patient was prepared and the site for collection for phlebotomy was cleaned with a 70% alcohol swab. Five (5) milliliters of blood were drawn from the antecubital vein by venepuncture technique from the subjects. The collected samples were dispensed into a plain tube, labeled carefully, and left in an undisturbed position. It was left undisturbed for approximately 30 minutes to allow the blood to clot fully. After clotting, the tube was carefully transferred into a centrifuge and spun at 5000rpm for 5 minutes. The serum was separated using a Pasteur pipette, transferred into a sterile plain sample tube, and stored at 4°C for further testing.

Laboratory Procedures

All reagents were commercially procured and the manufacturer's standard operational procedures were strictly followed.

The determination of C-reactive Protein was done Using ELISA Method while the determination of trace elements concentration was done using the AAS assay method. This is based on the principle that atomic absorption spectroscopy revolves around the unique interaction between light and atoms. When atoms in the ground state absorb energy in the form of light, they transition to higher energy levels or excited states. However, only photons with specific energies corresponding to the energy difference between the ground and excited states are absorbed, resulting in characteristic absorption spectra.

Lower 95% C.I	10.57	5.53		
Higher 95% C.I	14.0	7.23		

Table 2 Serum Zinc and Serum Iron in *H.pylori* infected women versus control

In Table 2., Serum Zinc was significantly low($p=0.005$) in *H.pylori*-infected women with a mean deviation (67 ± 22.42) compared to control with mean deviation (83.00 ± 22.97).

Serum Iron was significantly higher ($p=0.000$) in control (107.86 ± 39.18) compared to *H.pylori* infected women (63.80 ± 80)

Table 2. Serum Zinc and Serum Iron in *H.pylori* infected women versus control

Variables	<i>H.pylori</i>	Control	t-value	p-value
(Mean \pm S.D)	(n=30)	(n=30)		
Zinc (mg/dl)	67.66 ± 22.42	83.00 ± 22.97	-3.049	0.005
Lower 95% C.I	59.29	74.42		
Higher 95% C.I	76.04	91.57		
Iron (mcg/dl)	63.80 ± 23.24	107.86 ± 39.18	-5.21	0.000
Lower 95% C.I	55.12	93.23		
Higher 95% C.I	72.47	122.49		

Table 3: Pearson's Correlation of Serum C-reactive Protein with Zinc and Iron in Women Infected with *H. pylori*

Variable	N	r-value	p-value	
(Mean \pm S.D)				
Zinc	30	-0.241	0.199	Not significant
Iron	30	-0.644	0.000	Significant

There was a significant negative correlation ($r=-0.644$, $p=0.000$) of CRP with Iron in *H.pylori* infected women. There was no significant correlation ($r=-0.241$, $p=0.199$) of CRP with Zinc in *H.pylori* infected women.

Discussion

One of the main causes of gastritis, or inflammation of the stomach lining, and peptic ulcers, or sores in the stomach or upper small intestines, is an *H. pylori* infection. Both conditions can be excruciating and, in extreme situations, can result in bleeding or perforation, which can be fatal [10]. In certain patients, a prolonged *H. pylori* infection is linked to a higher risk of severe anaemia or stomach cancer.

According to this study, women with *H. pylori* infection had a significantly higher C-reactive protein level than controls ($p<0.05$). This demonstrates that women have a strong systemic inflammatory response. Chronic gastritis is strongly triggered by *H. pylori*, which causes inflammation both locally and systemically. A typical indicator for determining the degree of inflammation in the body is C-reactive protein, which is a chemical that the liver produces in reaction to inflammation. [11]

Due to factors such as inflammation-induced changes in iron metabolism and reduced iron absorption from stomach inflammation, the iron content in this study has a significant statistical significance ($p<0.05$). The pathophysiology of disorders linked to *H. pylori* may be influenced by these iron-related alterations. [12]

On the other hand, this study also reveals a non-significant difference ($p>0.05$) between zinc and control, which may be due to the intricate and varied nature of zinc regulation in the immune response. An essential component that aids in the growth and activation of immune cells is zinc. Additionally, it aids in the synthesis of collagen, a protein essential for the repair of bones, cartilage, and skin [13]. *H. pylori* can survive in the stomach's extremely acidic environment by a variety of strategies, including the production of an enzyme called urease, which allows the bacterium to balance the stomach's pH. The environment becomes less acidic and more

conducive to living when urease aids in the conversion of urea into ammonia [14].

Zinc plays a role in the activation of the urease enzyme as a cofactor. Human physiology allows *H. pylori* to use zinc, and it interacts with zinc to help it survive in the stomach, which adds to its harmful effects [15].

Conclusion

This study has demonstrated that *Helicobacter pylori* causes the body to become inflamed. Long-term inflammation has been linked to a number of illnesses, such as stomach cancer, gastrointestinal diseases, and cardiovascular disease. Although zinc is necessary for wound healing and immunological function, there is no discernible variation in the mean value of zinc.

Anaemia, which is caused by the bacteria interfering with nutrient absorption and utilisation and may result in deficits in these vital micronutrients, was indicated by a marked drop in the body's iron levels. Iron deficiency is detrimental to the body since it is necessary for the production of red blood cells and the transportation of oxygen.

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