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The Relation between Helicobacter Pylori Seropositivity and Iron Deficiency Anaemia in Iraq-Kurdistan-Sulaimani City

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Abstract

Background: Iron deficiency is the most common cause of anaemia worldwide and is seen in general practice. Iron deficiency anaemia (IDA) is caused by defective synthesis of haemoglobin, resulting in red cells that are contain reduced amounts of haemoglobin (hypochromic) and smaller than normal (microcytic). The health effects of iron deficiency include anemia, decreased work performance and decreased intellectual wellbeing as well as functional alterations of the small bowel.

Objectives: This study was designed to found any relation between Helicobacter pylori positive subjects serologically in Sulaymaniyah city/ Iraqi Kurdistan with Iron deficiency anemia.

Patients and methods: The present study used one hundred twenty female volunteers (eighty female with positive *H pylori* serology and forty subjects with negative serology). Then, volunteers divided to four groups according to the age. *H Pylori* was diagnosed serologically by using anti-*H pylori* IgG and IgM antibodies Elisa kit.

Results: Hb-levels, MCV levels, WBC counts, platelets counts, s. ferritin and total iron binding capacity (TIBC) were measured. Hb-levels and MCV-levels in all patient significantly decreased ($P<0.05$) compared with all control groups. While, the results of WBC and platelets counts showed no significant changes in all patient groups compare with all control groups. S. ferritin in all patient groups significantly decreased ($P<0.05$) compared with all control groups. While, TIBC levels significantly increased in patient groups compare with control groups.

Conclusion: There is a relation between Helicobacter pylori positive serology and iron deficiency anaemia in Kurdistan-Sulaymaniyah city.

Keywords: Iron deficiency anemia; *H pylori*

Introduction

Iron deficiency is the most common cause of anaemia worldwide and is seen in general practice. Iron deficiency anaemia (IDA) is caused by defective synthesis of haemoglobin, resulting in red cells that are contain reduced amounts of haemoglobin (hypochromic) and smaller than normal (microcytic) [1]. The health effects of iron deficiency include anemia, decreased work performance and decreased intellectual well being as well as functional alterations of the small bowel [2].

Iron deficiency develops through three stages: iron depletion, iron-deficiency anemia (IDA) and iron deficient erythropoiesis [3]. Although the mechanisms remain unclear, epidemiologic and clinical studies suggest that infection with Helicobacter pylori (*H pylori*) is associated with iron deficiency and iron deficiency anemia (IDA) [4]. *H pylori* was first isolated in 1983, a gram-negative bacterium found on the luminal surface of the gastric epithelium [5]. *Helicobacter pylori* infection is responsible for many digestive system disorders, including

atrophic gastritis, gastro duodenal ulcer, intestinal metaplasia, gastric adenocarcinoma and gastric mucosa associated lymphoid tissue lymphoma (MALT lymphoma) [6]. Helicobacter pylori have been implicated in some extra-gastric diseases, such as iron-deficiency anemia (IDA) and vitamin B12 deficiency [7,8]. So, this study was designed to found any relation between positive Helicobacter pylori serology & Iron deficiency anemia in sulamania city/Iraqi Kurdistan.

Materials and Methods

One hundred twenty subjects (female) were taken in this study. eighty female patients randomly who referred to hematology outpatient clinic in Hiwa Hemato-Oncology Hospital in Kurdistan-Sulaimani city between July, 2015 to December, 2015, ranged between different age group (10 years-50 years). The oral consent was taken from all patients. *H pylori* test was performed in all patients. *H pylori* was diagnosed serologically by using anti-*H pylori* IgG and anti-*H pylori* IgM antibodies Elisa kit. The tests of anti-*H pylori* and percent of cases in each group showed in Table 1. Epidemiological data such as age, sex, recorded for all of the patients. All subjects were divided to four groups according the age.

Table 1: The tests of anti-*H pylori* in all cases.

Age	*H pylori* (+ve)	*H pylori* (-ve)
19-Oct	13.3%(16)	8.3%(10)
20-29	16.7%(20)	8.3%(10)
30-39	20.8%(25)	8.3%(10)
40-50	15.8%(19)	8.3%(10)

Haematological Analysis

Two ml whole blood sample was collected into Ethylene diaminetetraacetic acid (EDTA) tubes between and analyzed on the same day using an automated haematological analyzer at Butajira hospital. The analyzer aspirates the blood sample, dilutes and counts leukocytes, erythrocytes and thrombocytes, measures Mean Cell Volume (MCV) and Haemoglobin (Hb) [9].

Sample Collections for Serological Analysis

Five milliliters (ml) venous blood was obtained from the subjects. All blood samples were dispensed into dry glass test tubes for clotting and retraction to take place. Sera were obtained after samples were centrifuged at 2000g for five minutes and stored at -20 °C until assayed for laboratory investigations. Levels of serum total iron binding capacity (TIBC) and serum ferritin were measured using standard kits [10].

Statistical analysis

Data were analyzed statistically using a statistical Minitab program under SPSS and Microsoft Excel XP system. The data were presented in simple measure of mean±SD (standard deviation), minimum and maximum values. Results were analyzed statistically using Analysis of Variance (ANOVA) test, in order to evaluate the significance of variability between treated and control groups. Means of data were compared using Duncan's Multiple Range test. Probability levels of more than 0.01 were regarded as statistically non-significant, where as values less than 0.01 were considered as significant as follows:

$P<0.05$ highly significant [11].

Results

Hematological analysis

Table 2: The relation between *H pylori* seropositivity and Hb g/l and MCV.

Age	Hb-Levels			MCV-Levels		
	H pylori (IgM)	*H pylori* (IgG)	Control	*H pylori* (IgM)	*H pylori* (IgG)	Control
19-Oct	11.87±0.15b	11.1±0.36c	12.85±0.29a	64±5b	57.7±2.5c	76±2.5a
20-29	10.1±0.27b	9.3±0.21c	13.76±0.37a	69±6b	58.3±1.5c	80.8±3a
30-39	11.3±0.3b	10.67±0.15c	13.74±0.44a	65.5±3.1b	55.8±3.8c	80.7±3a
40-50	9.8±0.65b	9.4±0.6b	12.58±0.4a	60.5±5.3b	57±3.1b	74.4±3.7a

Table 3: The relation between *H Pylori* seropositivity and WBC ($X10^3$) and platelets($X10^4$).

Age	WBC-Levels ($X10^3$)			Platelets Levels ($X10^4$)		
	H pylori (IgM)	*H pylori* (IgG)	Control	*H pylori* (IgM)	*H pylori* (IgG)	Control
19-Oct	7.1±0.78a	6.8±0.46a	6.93±0.5a	24.7±2.2a	25.3±2.1a	24.9±3.6a
20-29	8.3±0.64a	7.7±0.31a	7.8±0.55a	26.6±2.6a	24.7±2.3a	26.4±0.87a
30-39	7±0.4a	6.7±0.41a	7.08±0.28a	30.8±3.7a	29.6±6a	29.9±3.8a
40-50	7.3±0.43a	7.6±0.17a	73.58±0.5a	27.5±5.2a	26.3±5a	27.4±2.1a

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The results of Hb-levels in all patient groups significantly decreased compared with all control groups as show in Table 2. Also, the results of MCV-levels in all patient groups significantly decreased compared with all control groups as show in Table 2. The levels of Hb and MCV in IgG groups significantly decreased compare with IgM groups in all ages as in Table 2. While, the results of WBC and platelets counts showed no significant changes in all patient groups compare with all control groups as show in Table 3.

Serological analysis

The results of S. ferritin levels in all patient groups significantly decreased compared with all control groups as show in Table 4. While, the results of TIBC-levels in all patient groups significantly raised compared with all control groups as show in Table 4. There are non-significant changes in the levels of S. ferritin and TIBC between IgG and IgM patient groups as show in Table 4.

Table 4: The relation between *H pylori* seropositivity and S. ferritin and TIBC.

Age	S. Ferritin Levels			TIBC-Levels		
	H pylori (IgM)	*H pylori* (IgG)	Control	*H pylori* (IgM)	*H pylori* (IgG)	Control
19-Oct	2.6±0.67b	2.3±0.3b	11.8±1.71a	442±29.7a	488±45.7a	319.7±14.4b
20-29	3.4±0.45b	3.5±0.8b	11.4±0.93a	493.8±41.5a	518±21.4a	415.4±11.1b
30-39	5.7±0.58b	6.1±0.35b	13.3±0.96a	482.8±60a	470.8±34.5a	402.5±45.7b
40-50	3.3±0.57b	3.1±0.55b	11.5±1.29a	460.3±39.6a	471.3±52.2a	427.5±9.6b

Discussion

Iron-deficiency anemia is caused by a lack of iron amount. A reduced amount of haemoglobin and decreased number of red blood cells in the body causes anaemia [12]. *H pylori* infection is a frequent cause of iron-refractory or iron-dependent anaemia in patients [13]. In the results of this study, the levels of Hb and MCV significantly decreased in patient groups compare with control groups in all ages. While, the levels of WBC and platelets counts showed no significant changes in patient groups and control groups.

On other hand, the levels of S. ferritin and TIBC showed significant decrease & rise, respectively in all patient groups compare with control groups in all ages. In study of Jasem [9], they found significant decrease in the levels of S. ferritin in patients who infected by *H pylori*, they suggest the cause of decrease were due to the stomach ulcer that caused by *H pylori* [9]. Also, Annibale [14] referred that *H pylori* lead to Iron-deficiency anemia, they suggest *H pylori* may lead to iron deficiency anemia by impairing iron uptake or increasing the demand for iron [14] that is in agreement with results of present study.

In study of Darvishi et al. [15], they found significant reduction in the levels of S. ferritin and hemoglobin in patients who infected with *H pylori* and significant rise in TIBC-levels compare with control groups. Takezako et al. [16] referred that *H pylori* lead to iron-deficiency anemia. Where, they designed study included patients with *H pylori* infection. They take some parameters in their study; found the levels of WBC and platelets showed no significant changes between patients and normal subjects, which are in agreement with results of present study [16]. On other hand, they found the levels of Hb and MCV showed no significant changes between patients and control groups, that aren't in agreement with the results of our study.

In the study of AL-Kazazz [17], did not find any relation between *H pylori* infection and serum ferritin and TIBC levels. Indeed, there was no significant correlation between *H pylori* infection and patients with iron deficiency and control group. The mechanism by which *H pylori* induces the change in the iron stores is not understood, but it seems to involve several pathways, including gastrointestinal blood loss, enhanced uptake of the iron by the bacterium and decrease absorption of dietary iron. Iron deficiency anemia (IDA) is often caused by gastrointestinal bleeding due to peptic ulcer. *H pylori* infection, which has been proved to play the role in peptic ulcer, has been implicated as a cause of IDA refractory to oral iron treatment [17].

Tari et al. [18] referred that *H pylori* infection can lead to reduction in serum ferritin and rise in TIBC levels and they referred that significant changes in levels of serum ferritin (decreased) and TIBC (increased) in IgG groups and IgM groups. They suggest the relationship; therefore it's seemed important to assess the digestive tract for the management of patients with Iron deficiency anemia although serology is not an accurate way for detection of real *H- pylori* infection of GI-tract if compared to urea breath test, culture, histopathology or stool *H pylori* antigen test, but our study showed that still a large portion of *H pylori* positive serology patients have iron deficiency anemia whom they need treatment of their anemia with eradication of their *H pylori* infection, a part from consequences of this bacterial infection on GIT tract especially in our region with a huge burden of this infection with lack of accurate resources for diagnosis of real & active *H pylori* infection [18]. We think for future we need a lot of researches to find out whether this bacterial infection increases the burden of gastric cancer in our region or not & to find out whether *H pylori* eradication with combined antimicrobials have any role in reduction of iron deficiency anemia or gastric cancer among our patients.

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Conclusion

There is a relation between *Helicobacter pylori* infection and iron deficiency anaemia in Kurdistan- Sulaymaniyah city. This means that majority of referred cases to Hiwa hospital outpatient hematology department who have positive *H pylori* serology have iron deficiency anemia, which probably makes concomitant treatment of iron deficiency anemia & *H pylori* eradication a possible suitable option especially in patients without other sources of obvious blood loss.

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