

## Association of Chronic *Helicobacter pylori* infection with Iron Deficiency Anemia

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**Abstract-** The study sample consisted of 120 participants divided equally into two groups; 60 patients with H.pylori infectin with iron defecency anemia and 60 healthy individuals. Their age ranged between 30–70 years, 27 of them were males and 33 were females. H. pylori patients were recruited the Al Sadder Teaching Hospital and the Gastrointestinal Diseases center in Al-Najaf AL-Ashraf city, through the duration of December 2019 till February 2020. All patients diagnosed with H.pylori by clinical symptoms and confirmed by H. pylori stool antigen was detected by strips. Verbal consent is taken from each patient before sample. Ten ml of blood are withdrawn by vein puncture from H.pylori patients and healthy control. A tourniquet was applied directly on the skin around the arm, the skin over the vein was sterilized with 70% ethyl alcohol, then blood was collected divided into three part; one (2ml) transfer to EDTA tube for estimation of CBC, part two (2ml) was put in ESR tube with anticoagulant and part three (4 ml) put gel tube to be allowed to clot at room temperature for 15-20 minutes, and then it was centrifuged for 5 minutes at 5000xg , to get the serum, the serum was collected for estimation of iron, ferritin, AST and ALT. The result shows that there were statistically significant differences at 0.05 in Hb level between cases (m= 10.91) and controls (m= 14.26), P value 0.000, which means that Hb level was significantly lower among cases compared to controls. In addition, there were statistically non-significant differences at 0.05 in RBC between cases (m= 4.36) and controls (m= 4.55), P value >0.05, which means that RBC were lower among cases compared to controls. In addition, there were statistically significant differences at 0.05 in WBCs between cases (m= 9.76) and controls (m=8.68), P value <0.05, which means that WBCs were significantly higher among cases compared to controls. The results also shows that there were statistically significant differences at 0.05 in PCV level between cases (m= 32.33) and controls (m= 43.01), P value 0.000, which means that PCV level was significantly lower among cases compared to controls. Furthermore, there were statistically significant differences at 0.05 in MCV level between cases (m= 63.18) and controls (m=83.56), P value 0.000, which means that MCV level was significantly lower among cases compared to controls. On the other hand, there were statistically insignificant differences between the two groups in levels of MCHC (P=>0.05). In addition, there were statistically significant differences at 0.05 in MCH and PLT between cases and controls P value 0.000. The result also shows that there were statistically significant differences at 0.05 in serum iron, ferritin, AST and ALT level between cases and controls, P value 0.001. In addition, there were statistically significant differences at 0.05 in ESR level between cases and controls P value 0.000.

**Index Terms-** H.pylori, iron deficiency anemia.

## INTRODUCTION

*Helicobacter pylori* is a type of helicobacter known as a "gastric" helicobacter. It persists in the intestine, either inside or under the mucous layer anterior to the epithelium in the stomach. In a temporary basis, it also can be found in the duodenum, saliva, and feces. *H. pylori* infection that can cause acute gastritis symptoms. The majority of infected people develop chronic active gastritis, which may cause non-ulcer dyspepsia or duodenal ulcers. 90% of duodenal ulcers and nearly all gastric ulcers have been related to *Helicobacter pylori* (Muhammad & Ali, 2018). Iron deficiency, whether or not it is associated with anemia, is a severe medical issue. It usually takes place as part of a long-term, slow-onset disease during which the iron deficiency evolves and appears clinically over many years (Al-Zaiyadi *et al.*, 2019; Greer *et al.*, 2018). The mechanism by which *Helicobacter pylori* causes iron deficiency anemia is unknown. In *H. pylori*-infected patients, serum hepcidin levels are raised up, but these levels return to normal after the infection is eradicated, allowing the iron to be absorbed. Absorbed by the enterocytes and released from macrophages of the reticuloendothelial system, where they are restricted (Ge & Sun, 2012). Another cause of iron deficiency in *H. pylori* patients is chronic blood loss caused by chronic gastritis, which can be serious enough to causes chronic gastritis, particularly in patients with active bleeding peptic ulcers and those who take NSAIDs such as aspirin on a regular basis (Rahman *et al.*, 2019). Rostami-Nejad *et al.*, (2015), shown that even in celiac disease patients, *H. pylori* linked to iron deficiency anemia, which was clearly evidence based but poorly represented in practice. An association among anemia and *H. pylori* infection is supported by a variety of epidemiological and clinical studies. However, studies from various areas and countries disagree about the connection between anemia and cancer (Al-Badry *et al.*, 2020; Hudaketal.,2017).

## Materials and Methods

### Patients :

The study sample consisted of 120 participants divided equally into two groups; 60 patients with *H.pylori* infectin with iron defecency anemia and 60 healthy individuals. Their age ranged between 30–70 years, 27 of them were males and 33 were females. *H. pylori* patients were recruited the Al Sadder Teaching Hospital and the Gastrointestinal Diseases center in Al-Najaf AL-Ashraf city, through the duration of December 2019 till February 2020. All patients diagnosed with *H.pylori* by clinical symptoms and confirmed by *H. pylori* stool antigen was detected by strips. Verbal consent is taken from each patient before sample.

### Control :

Forty-five apparently healthy were selected as the control, the patient and controls (N: 60) were age and sex matched. All control group was had no family history of disease.

### Exclusion criteria:

- Patients who underwent *H. pylori* eradication therapy or steroids.
- Patients who are receiving immunosuppressive or chemotherapeutic drugs.
- Pregnant female patients.
- Patients who have had a stomach resection or a small bowel operation in the past.
- Vegetarian population
- Malabsorption syndrome and folic acid deficiency patients.

### Sample collection:

Ten ml of blood are withdrawn by vein puncture from *H. pylori* patients and healthy control. A tourniquet was applied directly on the skin around the arm, the skin over the vein was sterilized with 70% ethyl alcohol, then blood was collected divided into three part; one (2ml) transfer to EDTA tube for estimation of CBC, part two (2ml) was put in ESR tube with anticoagulant and part three (4 ml) put gel tube to be allowed to clot at room temperature for 10-15 minutes, and then it was centrifuged for 5 minutes at 5000xg, to get the serum, the serum was collected for estimation of iron, ferritin, AST and ALT.

### Statistical Analysis :

Data of the study participants, *H. pylori* patients and controls, were entered, managed and evaluated by the Statistical Package For Social Sciences (SPSS) version 25 software for windows, IBM, US, 2017. The results were expressed as (Mean  $\pm$  SD), two independent t-test has been used for the comparison between the patients and control groups in the measured parameters. A statistical significance (P. value) of 0.05 or less is regarded as significant.

### Results:

Table 1 indicates that there were statistically significant variations in Hb level between cases (m= 10.91) and controls (m= 14.26), P value 0.000, indicating that cases had significantly lower Hb levels in comparison with controls. Also, there were statistically non significant variances at 0.05 in RBC between cases (m= 4.36) and controls (m= 4.55), P value >0.05, which means that RBC were lower among cases compared to controls. In addition, statistically relevant variations existed at 0.05 in WBCs between cases (m= 9.76) and controls (m=8.68), P value <0.05, which means that WBCs were significantly higher among cases compared to controls. The results also shows that there were statistically significant differences at 0.05 in PCV level between cases (m= 32.33) and controls (m= 43.01), P value 0.000, which means that PCV level was significantly lower among cases compared to controls. Furthermore, there were statistically significant differences at 0.05 in MCV level between cases (m= 63.18) and controls (m=83.56), P value 0.000, which means that MCV level was significantly lower among cases comparison to controls. On the other hand, there were no statistically significant differences in MCHC levels between the two groups (P>0.05). Additionally, there were statistically significant differences at 0.05 in MCH and PLT between cases and controls P value 0.000.

Table (2) shows that there were statistically significant variations between cases and controls in serum iron, ferritin, AST, and ALT levels at 0.05, with a P value of 0.001. Consequently, there were statistically significant variations in ESR levels between cases and controls at the 0.05 level, with a P value of 0.000.

**Table (1): Comparison of mean values of Hb, PCV ,RBC count, WBC count, MCV, MCH, MCHC and PLT of H.pylori patients and controls**

parameter	Group				P. value
	Patients (n=60)		Control (n=60)		
	Mean	SD*	Mean	SD*	
Hb mg/dl	10.91	2.31	14.26	1.39	< 0.001
PCV%	32.33	5.38	43.01	4.92	< 0.001
RBCs x10 <sup>12</sup> /L	4.36	0.89	4.55	0.7	> 0.05
WBCs x10 <sup>9</sup> /L	9.76	2.72	8.68	4.08	< 0.05
MCV (fl)	63.18	6.49	83.56	7.37	< 0.001
MCH (pg)	22.31	4.98	27.72	3.49	< 0.001
MCHC (g/dl)	33.08	1.84	33.16	1.92	> 0.05
PLT x10 <sup>9</sup> /L	292.86	94.25	279.98	100.2	< 0.001

parameter	Group				P. value
	Patients (n=60)		Control (n=60)		
	Mean	SD*	Mean	SD*	
Iron µg/dl	22.31	6.04	82.63	9.49	< 0.001
Ferritin ng/ml	15.72	5.01	70.28	12.3	< 0.001
AST U/L	32.33	10.64	20.98	7.42	< 0.001
ALT U/L	43.02	4.48	17.81	7.42	< 0.001
ESR mm/1h	52.61	24.8	14.91	6.68	< 0.001

**Table (2): Comparison of mean values of iron, ferritin, AST, ALT and ESR of *H.pylori* patients and controls.**

### **Discussion:**

Iron deficiency is related to many of the health problems and is the major cause of anemia around the world. Iron deficiency may occur due to dietary deficiency or chronic blood loss (Means, 2013). Also, *H. Pylori* is the most common chronic microbial infection worldwide, and is considered as a main cause for occurrence of gastric ulcers, duodenal ulcers, atrophic gastritis, and gastric carcinoma (Asaka *et al.*, 2010). Many studies showed different explanation for the mechanism of relationship among *Helicobacter pylori* and iron deficiency and iron deficiency anemia. Baysoy *et al.* revealed that patients with *H. Pylori* has lower gastric ascorbic acid and decreased serum iron levels, and also have physiological and histological gastric changes (Nori *et al.*, 2021; Hussein *et al.*, 2021; Baysoy *et al.*, 2004). Also, a high serum gastrin level and intragastric PH was observed in *H. pylori* infected subjects with iron deficiency anemia, which may lead to atrophic gastritis and achlorhydria (Saleh & Hassan, 2015). Huang *et al.*, showed that patients with iron deficiency anemia show an improvement after eradication of *H. pylori* (Huang *et al.*, 2010). Nakagawa *et al.*, who also found a significance lower serum ferritin level in *H. pylori* positive patients (Nakagawa *et al.*, 2013). Moreover, patients with chronic gastritis related to *H.pylori* infection had increased serum level of hepcidin resulting in decreased iron absorption and iron deficiency anemia (Azab & Esh, 2013). These variable results were explained by, chronic gastritis, gastric or duodenal ulcerations related to *H. pylori* infection and the consequent chronic blood loss has an important role in iron deficiency occurrence in these patients (Monzón *etal.*, 2013).

## Conclusion:

This research suggests that *H. pylori* infection is linked to anemia, haemoglobin, and ferritin levels.

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