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ASSOCIATION BETWEEN IRON DEFICIENCY AND HELICOBACTER PYLORI INFECTION AMONG SUDANESE PATIENTS IN KHARTOUM STATE – 2018

Duaa M. A. Elkareem[1], Wafa A. Awad[1], Belal M. Khalil[1], Zeinab S. A. Alsayed[2], Tarig A. M. Hamid[1]*

[1]Department of Hematology and Immunohematology - Karry University- Khartoum Sudan.
[2]Department of Hematology and Immunohematology – Sharq Elnile College – Khartoum Sudan.

***Corresponding Author: Tarig A. M. Hamid**
Department of Hematology and Immunohematology - Karry University- Khartoum Sudan.

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ABSTRACT
Helicobacter pylori (H. *Pylori*) are a Gram-negative spirally shaped bacterium. Infection rates are strongly related to poor living conditions; also iron deficiency (ID) is most common nutritional deficiency that associated with poverty. A case-control study was conducted in the Military hospital, Khartoum state, Sudan, where H. pylori infection was diagnosed. Study done during January to April 2018. A total of one hundred and two participants were included, among them 51 with H. *pylori* infection as a case group, and 51 normal individuals as control group. Venous blood samples were collected from each subject; serum was separated for measurement of iron level. The present study showed that There was a significant decrease of s. iron level among case group with a mean (69.6, 98.1 µg/dL) of case to control group respectively, (P; 0.00). Also show there is no correlation between s. iron level compare with gender, H. *pylori* infection duration, treatment and other disease with p value (0.11, 0.34, 0.32, 0.58) respectively. Present study concluded that *Helicobacter pylori* has a significant effect on serum iron level and *H. pylori* infection is a cause of iron deficiency. Indicate there is an association between iron deficiency and *H. pylori* infection.

KEYWORDS: Iron deficiency anemia, serum Iron, helicobacter Pylori infection.

1. INTRODUCTION
Iron deficiency is estimated to be the most common nutritional deficiency in the world, the most common cause of anemia (Iron deficiency anemia) and represent a major public health problem, affects 500–600 million people globally, especially in developing country. Helicobacter pylori (H. *Pylori*) are a Gram-negative spirally shaped bacterium. It is strictly micro Europhilic requires carbon dioxide and rich growth media. Infection rates are strongly related to poor living conditions and overcrowding during childhood (Risk factors). Infection is presumed to an individual through the oral –oral or, possibly, fecal –oral route, and has been suggested to be mostly interfamilial **[Kroot JJ *et al;* (2011)].**

The path physiologic mechanisms by which H. *pylori* is associated with the development of iron deficiency(ID) and iron deficiency anemia (IDA) are not fully understood, and more questions than answers remain. It is still not known why some patients manifest this association and why in other patients it is not present, or there are other associations; or why some of the infections are asymptomatic [Correa *et al*; 2001]. However the eradication of this pathogen not only led to increase in response to oral iron therapy and level of ferritin but also could cure anemia completely in several cases with unexplained IDA **[David G (2005), Hunt RH (1998), Kroot JJ (2011); *et al*].** Over the past decade, it has been linked H. *pylori* and ID development with a recently discovered hormone called Hepcidin [park et al; 2011]. This hormone is produced in the liver and regulates iron metabolism in enterocyte and decrease the releasing of stored iron from macrophages of the reticule endothelial system [Kroot *et al*; 2009]. Hepcidin rises after H. *pylori* infection, acting as an acute phase reactant in response to the inflammation produced in the gastric mucosa, resulting in pathology known as "anemia of inflammation or chronic disease [cherian et al;2008]. Preliminary studies show that serum hepcidin is elevated in patients infected with H. *pylori* [Ozkasap et al; 2003]. And these levels are normalized after eradication of the infection allowing the iron to be absorbed by the enterocytes and released from macrophages of the reticule endothelial system, where they are confined **[Azab *et al*; (2013)].**

Other possible causes of iron imbalance in patients infected with H. pylori are chronic gastritis, which occurs in all individuals infected with H. *pylori*. This can cause bleeding when it becomes erosive gastritis [Yip et al; 1997]. Especially in patients with active bleeding peptic ulcer and in patients who chronically ingest non-

steroidal anti-inflammatory drug including aspirin [Song *et al*; 2013]. Reduced iron absorption as a result of elevated pH of gastric juice has also been attributed to H. *pylori*. The present study was planned to observe whether *H. pylori* infection in the gastric mucosa is responsible for iron deficiency, so as early detection and eradication of *H. pylori* can prevent the development of complications as gastritis, gastric, duodenal ulcer and consequence iron deficiency.

2. MATERIAL AND METHODS

2.1 Study area and population: This case-control study was conducted in the Military hospital, Khartoum state, Sudan, where H. pylori infection was diagnosed. Study done during January to April 2018 and included 102 samples, 51 of these samples were collected from patient diagnosed with H. *pylori* as a case group, and 51 samples were collected from apparently healthy person as control group.

2.2 Sample collection: A total of 3 ml venous blood samples were collected by using sterile disposable syringes and poured into plain containers, immediately centrifuged to obtain serum which separated and stored at 2-8 C^{o}. Serum used for estimation of serum iron level spectrophotometry among tow studied group. Standard stored at 2-30 C^{o}.

2.3 Statistical Analysis All values were expressed as mean ± SD. Statistical analyses were done using the Student's t-test to assess differences among study groups. The level of significance was set at P <0.05.

3. RESULTS

The study has been done on 102 participants, 51from patient with H. *pylori* include 35 female, 16 male as a case group and 51 apparent healthy individual, 35 female and 16 male as control group.

Table 1: Demographic data of two studied group.

	Case Mean ± SD	Control Mean ± SD	p. value
age	27.1 ± 9.3	32.3 ± 14.6	0.033

The mean of age among two studied group were found (27.1, 32.3) (P;0.03) among cases and control group respectively.

Table 2: Comparison of means and SD of serum iron level among the two studied group.

	Case Mean ± SD	Control Mean ± SD	p. value
s. iron level	69.6 ± 23.5	98.1 ± 31.5	0.000

There was a significant decrease of s. iron level among case group with a mean of case to control group (69.6, 98.1 µg/dL) (P; 0.00).

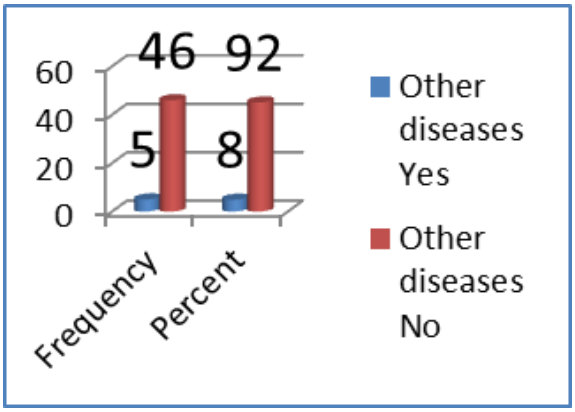

Figure (1): frequency and percentage of patient with disease other than H. pylori infection among case population.

There were 8% of case group has another infection rather than H. pylori infection

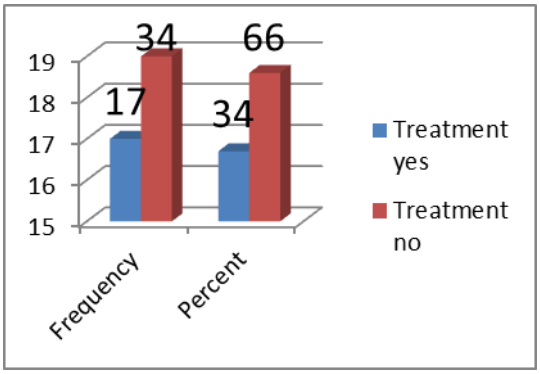

Figure (2): frequency and percentages of H. pylori patient who took a treatment among case population.

There were 16.7% of H. pylori patient whose took an H. pylori treatment among case group.

Table 3: Correlation between S. iron level and gender, H. pylori infection duration, treatment and persistence of other disease among case group.

	Gender	Duration	Other disease	Treatment
P. Value	0.119	0.340	0.580	0.329

There is no association between s. iron level compare with gender, H. *pylori* infection duration, treatment and other disease with p value (0.11, 0.34, 0.32, 0.58) respectively.

4. DISCUSSION

One hundred and tow blood samples were included in the present study, 51 from patient with *H. pylori* as case group and 51 from healthy individual as control group.

Present study show significant decreased of serum iron in case group with a mean (69.6 ± 23.5) than control group (98.1 ± 31.5 µg/dL) (P; 0.00), that agree with other studies, study done by (Durdi, *et al*. 2011) in Shahid Beheshti Hospital of Babol University of Medical Sciences showed significant association between *H. pylori* infections and anemia (P; 0.04), and study done by (Durdi Qujeq etal, 2011) was conducted in Shahid Beheshti Hospital of Babol University of Medical Sciences, Babol, Iran from August 2007 to July 2008. The study group consisted of 35 patients with H. *pylori* and healthy subjects as the control group, the serum iron in *H. pylori* positive group was lower than in the control group (89.67±31.26 vs. 110.92±28.45 µg/dL) (P; 0.04).Means that *H. pylori* infection in the gastric mucosa is responsible for iron deficiency.

Our study disagrees with previous study done by (Tayyibe, et al. 2014) to investigate the association between iron deficiency anemia and *H. Pylori* in patients with normal gastrointestinal tract endoscopy results, which conclude that there was no association between iron deficiency and *H. pylori*. In present study 27% of cases exhibited significant decrease of serum iron while 73% of them within normal level of serum iron, mean that not all H. *pylori* infected patient have an ID, this may influence by confounding factors and may have a relation with genetic susceptibility.

Present study show there is no association between s. iron level compare with gender, H. *pylori* infection duration, treatment and other disease with p value (0.11, 0.34, 0.32, 0.58) respectively.

5. CONCLUSION

It is concluded that Helicobacter pylori has a significant effect on serum iron level and H. pylori infection is a cause of iron deficiency.

Indicate there is an association between iron deficiency and H. pylori infection.

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