

Prevalence of Iron Deficiency Anemia Amongst Patients Infected with Helicobacter Pylori at Tertiary Care Hospital

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ABSTRACT

Background: Anemia is a worldwide public health issue, prevalent in both industrialized and developing nations. In recent studies, an infection with H. pylori has been linked to a variety of hematological problems like iron and vitamin B12 deficiencies.

Objective: To find out the prevalence of iron deficiency anemia amongst patients infected with helicobacter pylori

Methodology: The current study was cross-sectional carried out at the department of medicine, Qazi Hussain Ahmad Medical Complex for duration of one year from 20-July 2020 to 30-July 2021. To determine the iron deficiency anemia, blood samples were taken from all the patients and sent to the concerned laboratory of the hospital for the required diagnostic tests. All the analysis of data was done by using IBM SPSS version 23.

Results: In this study totally 100 patients were included. There were 48 (48%) males and 52 (52%) females' patients. The mean age in the current study was 39.11 (± 10.12) years. Overall, iron deficiency anemia was observed in 35 (35%) patients. Based on the stratification of iron deficiency anemia with age and gender, no significant association was observed ($p > 0.05$).

Conclusion: Our study concludes that the prevalence of iron deficiency anemia amongst patients infected with helicobacter pylori is high. Our study recommends screening of all iron deficiency anemia patients of unknown cause for helicobacter pylori infection.

Keywords: Iron deficiency anemia; Helicobacter pylori; Infection

INTRODUCTION

Anemia is a worldwide public health issue that is prevalent in both industrialized and developing nations ¹. A worldwide prevalence of anemia in people of all ages was estimated to be 32.9% by a research ². It has significant repercussions not only for people's health but also for the growth of society and the economy ³. It makes individuals more susceptible to illnesses, lowers their physical capability, and decreases their ability to function well at work ^{4, 5}. In order to combat the burden of anemia and ensure that patients with the condition are managed appropriately, it is essential to determine the probable variables that contribute to the condition. Numerous studies have found many risk factors for anemia in adults ^{6, 7}. In recent studies, an infection with H. pylori has been linked to a variety of hematological problems such as iron and vitamin B12 deficiencies, ^{8, 9}.

The chronic bacterial infection caused by H. Pylori is quite common worldwide, particularly in impoverished nations. It has been estimated that H. Pylori affects roughly 50% of people globally. Although there is a lot of variance and it has been linked to factors including geographical location, age and socioeconomic level, its general frequency is higher in developing nations ¹⁰. People from all over the world are affected by H. Pylori infection; however the incidence varies by area ¹⁰. There are several diagnostic techniques with varied degrees of specificity and sensitivity for determining H. Pylori infection.

As a consequence of chronic gastritis, which promotes gastric hypochlorhydria, H. pylori infection is linked to anemia through reducing absorption of iron from the food ^{11, 12}. This is because H. pylori infection leads to impaired conversion of the iron in the diet from the ferric to the ferrous state. The majority of dietary iron is in the ferric form; hence ascorbic acid and an acidic intragastric pH are required to convert it to the ferrous state for absorption ¹³. As a consequence, H. pylori is a significant contributor to chronic superficial gastritis, which in turn causes the atrophy of the gastric glands and a reduction in secretion of gastric acid ¹⁴. H. pylori compete with their hosts for iron uptake, and elevated hepcidin synthesis due to H. pylori infection reduces iron release from enterocyte and macrophages ¹². Numerous studies reported linkage between iron deficiency anemia and infection of helicobacter pylori ¹⁵⁻¹⁷. According to the literature very limited data is available on the association of anemia with the helicobacter

pylori infection. Therefore this study was carried out to find out the prevalence of iron deficiency anemia amongst patients infected with helicobacter pylori

MATERIALS AND METHODS

The current study was cross-sectional carried out at the department of medicine, Qazi Hussain Ahmad Medical Complex. The duration of study was one years from 20-July 2020 to 30-July 2021. The study was approved by institutional committee for research and ethics. All the patients of both the gender and age 18-60 years with antigen of helicobacter pylori in stool samples, positive for urea breath test or all the patients of chronic gastritis on gastric biopsy and endoscopy due to helicobacter pylori were included whereas all the patients with other source of chronic blood loss were not included in the current study. Patients with small bowel stomach surgery, patients who donate blood in last three months, patients on anemia treatment, pregnant women and individuals not willing to include in our study were excluded. To determine the level of different diagnostic parameters of iron deficiency anemia, blood samples were taken from all the patients and sent to the concerned laboratory of the hospital.

Iron Deficiency Anemia was defined as patients with hemoglobin level of < 12 g/dl and in males and < 11 g/dl in case of females, a level of ferritin of less than 30 ng/ml, total iron binding capacity of > 450 μ g/dL, Level of Iron in Serum < 50 μ g/dL and reduction in transferrin saturation of $< 20\%$ ¹⁵. All the information's including demographic and clinical details were documented on a pre-designed Performa. All the analysis of data was done by using IBM SPSS version 23. Variables like gender, iron deficiency anemia was documented in the form of frequencies and percentages while variables like age, level of hemoglobin, ferritin and iron level in serum, total iron-binding capacity and transferrin saturation were documented in the form of means and standard deviations. Factors like age and gender were stratified with the iron deficiency anemia by employing chi-square test and a $P \leq 0.05$ was taken as significant.

RESULTS

In this study totally 100 patients were included. There were 48 (48%) males and 52 (52%) females. (Figure 1) The mean age in

the current study was 39.11 years with standard deviation of ± 10.12 . Based on the age wise distribution of patients, 70 (70%) patients were in the age group 18-39 years while 30 (30%) patients were in the age group 40-60 years. (Figure 2) The mean (\pm SD) hemoglobin, serum iron level, Serum ferritin level, total iron-binding capacity and transferrin saturation was 10.25 (± 0.85)g/dl, 52.67 (± 13.99) ug/dl, 126.01 (± 76.12) ng per ml, 284.9 (± 147.23) ug/dl and 26.09 (± 12.37) % respectively. (Figure 3) Amongst the 100 patients, iron deficiency anemia was observed in 35 (35%) patients. (Figure 4) Based on the stratification of iron deficiency anemia with age and gender, no significant association was observed ($p > 0.05$). (Table 1)

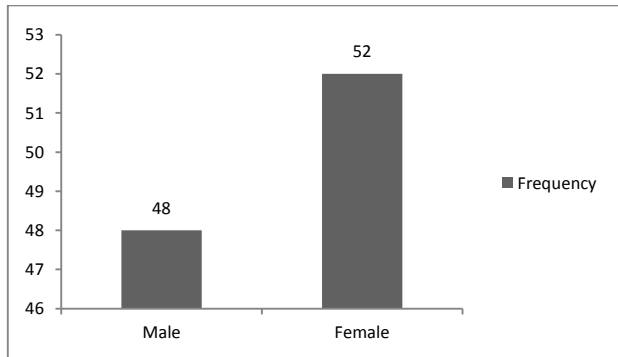


Figure 1: Gender wise distribution of patients

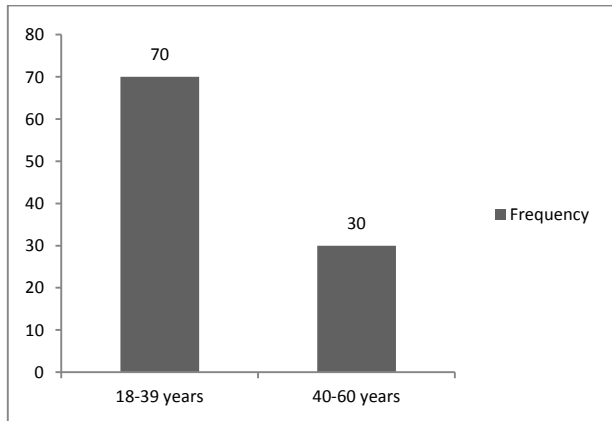


Figure 2: Age wise distribution of patients

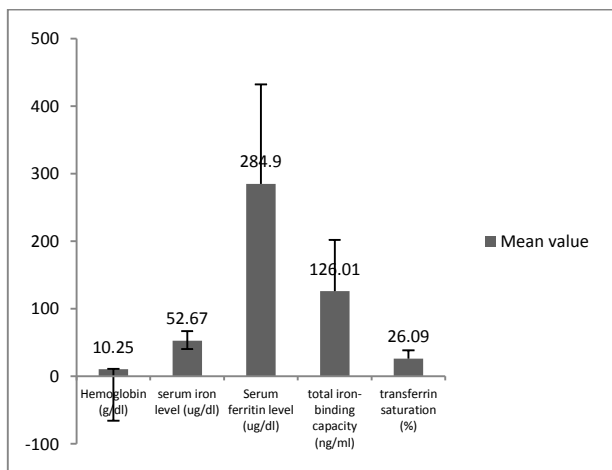


Figure 3: Mean value of different laboratory parameters for iron deficiency anemia

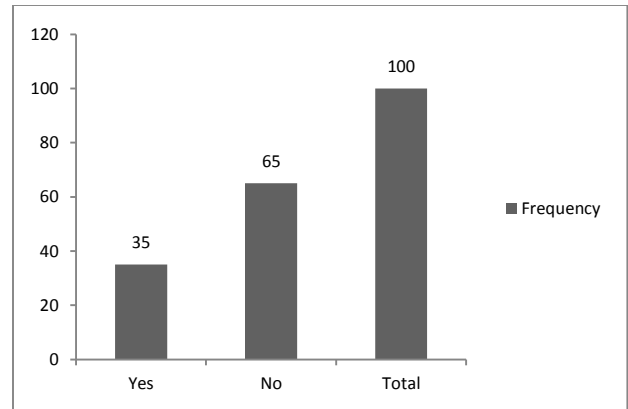


Figure 4: Overall frequency of iron deficiency anemia amongst helicobacter pylori patients

Table 1: Stratification of iron deficiency anemia in h. pyloric patients with respect to age and gender

Parameter	Sub-category	Iron deficiency anemia			P value
		Yes N (%)	No N (%)	Total	
Gender	Male	14 (14%)	34 (34%)	48 (48%)	0.091
	Female	21 (21%)	31 (31%)	52 (52%)	
	Total	35 (35%)	65 (65%)	100 (100%)	
Age	18-39 years	19 (19%)	51 (51%)	70 (70%)	0.321
	40-60 years	16 (16%)	14 (14%)	30 (30%)	
	Total	35 (35%)	65 (65%)	100 (100%)	

DISCUSSION

Numerous studies reported linkage between iron deficiency anemia and infection of helicobacter pylori¹⁵⁻¹⁷. The current study evaluated the prevalence of iron deficiency anemia amongst patients infected with helicobacter pylori.

In our study, amongst the 100 patients, iron deficiency anemia was observed in 35% patients with helicobacter pylori infection. In accordance with our study, another study carried out by Adeel Rahat and colleague reported 37.5% frequency of iron deficiency anemia in helicobacter pylori patients¹⁵. Another study done by Monzón et al. reported 38% prevalence of iron deficiency anemia amongst patients of helicobacter pylori infection¹⁷. So it implies that amongst adults with iron deficiency in which the standard work-up for detecting the basis of iron deficiency anemia provided no evident result, H. pylori gastritis may be a prevalent etiological basis for iron deficiency anemia.

According to one prior research, a substantial majority of individuals with atrophic body gastritis also have iron deficiency anemia, and 61% of these patients had H. Pylori infection¹⁸. According to the findings of a research conducted on adolescents in Korea, the rate of positive sero-positivity for H. Pylori in association with iron deficiency was 35.3%¹⁹.

In the research conducted by Monzón and colleagues, eradication of H. pylori was shown to be associated with remission of iron deficiency anemia with no need for further iron replacement therapy and a relapse-free duration of around two years average follow-up. These findings provide credence to the hypothesis that an infection with H. pylori is associated with anemia due to a lack of iron. There was a tenfold increase in the proportion of people in the second group who gave an objective response, that H. pylori infection was the underlying cause of their iron deficiency anemia in comparison to the first¹⁷.

In the current study, iron deficiency anemia was observed in 14% males and 21% females amongst helicobacter pylori patients. Another study reported concordance findings with our study. They reported 35% IDA in males and 65% in females amongst gastritis patients¹⁵.

A previous study proposed hypothesis that the link between H. Pylori and anemia was due to decreased absorption of iron as a consequence of hypochlorhydria¹⁶.

In our study, the mean (\pm SD) hemoglobin, serum iron level, Serum ferritin level, total iron-binding capacity and transferrin saturation was 10.25 (\pm 0.85)g/dl, 52.67 (\pm 13.99) ug/dl, 126.01 (\pm 76.12) ng per ml, 284.9 (\pm 147.23) ug/dl and 26.09 (\pm 12.37) % respectively. A recent study reported almost comparable findings to our study¹⁵.

Patients with H. Pylori gastritis in addition to IDA are at a greater risk for developing corpus gastritis compared to patients with H. Pylori infection¹⁸. As a consequence of corpus gastritis, a decrease in stomach acid output and an increase in intra-gastric pH may occur, which leads to a reduction in the amount of iron that can be absorbed¹⁸. On the other hand, when H. Pylori is eliminated, stomach acid output may return to normal. Iron absorption by the bacteria itself is additional technique that has been postulated to explain the connection between H. Pylori gastritis and iron insufficiency. H. pylori is one of the many types of microbes that use iron as a growth element in their own activities. It has a 19-kDa iron-binding protein that is similar to ferritin, and as a result, it may serve a crucial function in the storage of excessive iron by the H. Pylori bacteria²⁰. By use of a process that is mediated by receptors, H. pylori is able to remove iron from human lactoferrin²¹. Evidence suggests that H. pylori have an effect on lactoferrin release from the gastric mucosa²². In the current study, iron deficiency anemia was pre-dominant in females with helicobacter pylori infection as compared to male patients. These findings were similar to previous study who also reported pre-dominant iron deficiency in females patients with helicobacter pylori infection¹⁵.

CONCLUSION

Our study concludes that the frequency of iron deficiency anemia is high in patients with helicobacter pylori infections. Moreover frequency of iron deficiency anemia was high in female as compared to male patients with helicobacter pylori. Our study recommends screening of all iron deficiency anemia patients of unknown cause for helicobacter pylori infection.

REFERENCES

- Brunode B, Erin M, Marry C. Worldwide prevalence of anaemia 1993-2005: World Health organization. Geneva, Switzerland. 2008.
- Kassebaum NJ, Jasrasaria R, Naghavi M, Wulf SK, Johns N, Lozano R, et al. A systematic analysis of global anemia burden from 1990 to 2010. *Blood, the Journal of the American Society of Hematology*. 2014;123(5):615-24.
- Pasricha S-R, Drakesmith H, Black J, Hipgrave D, Biggs B-A. Control of iron deficiency anemia in low-and middle-income countries. *Blood, The Journal of the American Society of Hematology*. 2013;121(14):2607-17.
- Kumar V, Choudhry V. Iron deficiency and infection. *The Indian Journal of Pediatrics*. 2010;77(7):789-93.
- Lopez A, Cacoub P, Macdougall IC, Peyrin-Biroulet L. Iron deficiency anaemia. *The Lancet*. 2016;387(10021):907-16.
- Ismail IM, Kahkashan A, Antony A, Sobhith V. Role of socio-demographic and cultural factors on anemia in a tribal population of North Kerala, India. *Int J Community Med Public Health*. 2017;3(5):1183-8.
- Srinivas V, Mankeshwar R. Prevalence and determinants of nutritional anemia in an urban area among unmarried adolescent girls: A community-based cross-sectional study. *International Journal of Medicine and Public Health*. 2015;5(4).
- Hudak L, Jaraisy A, Haj S, Muhsen K. An updated systematic review and meta-analysis on the association between Helicobacter pylori.
- Chivu-Economescu M, Matei L, Necula LG, Dragu DL, Bleotu C, Diaconu CC. New therapeutic options opened by the molecular classification of gastric cancer. *World J Gastroenterol*. 2018;24(18):1942.
- Salih BA. Helicobacter pylori infection in developing countries: the burden for how long? *Saudi journal of gastroenterology: official journal of the Saudi Gastroenterology Association*. 2009;15(3):201.
- Betesh AL, Santa Ana CA, Cole JA, Fordtran JS. Is achlorhydria a cause of iron deficiency anemia? *The American Journal of Clinical Nutrition*. 2015;102(1):9-19.
- Campuzano-Maya G. Helicobacter pylori and Hematologic Diseases. *World J gastroenterology*. 2016;33-9.
- Annibale B, Capurso G, Lahner E, Passi S, Ricci R, Maggio F, et al. Concomitant alterations in intragastric pH and ascorbic acid concentration in patients with Helicobacter pylori gastritis and associated iron deficiency anaemia. *Gut*. 2003;52(4):496-501.
- Waldum HL, Kleveland PM, Sørdal ØF. Helicobacter pylori and gastric acid: an intimate and reciprocal relationship. *Therap Adv Gastroenterol*. 2016;9(6):836-44.
- Rahat A, Kamani L. Frequency of iron deficiency anemia (IDA) among patients with Helicobacter pylori infection. *Pakistan Journal of Medical Sciences*. 2021;37(3):776.
- Harris PR, Serrano CA, Villagrán A, Walker MM, Thomson M, Duarte I, et al. Helicobacter pylori-associated hypochlorhydria in children, and development of iron deficiency. *J Clin Pathol*. 2013;66(4):343-7.
- Monzón H, Forné M, Esteve M, Rosinach M, Loras C, Espinós JC, et al. Helicobacter pylori infection as a cause of iron deficiency anaemia of unknown origin. *World journal of gastroenterology: WJG*. 2013;19(26):4166.
- Annibale B, Capurso G, Martino G, Grossi C, Delle Fave G. Iron deficiency anaemia and Helicobacter pylori infection. *Int J Antimicrob Agents*. 2000;16(4):515-9.
- DuBois S, Kearney DJ. Iron-deficiency anemia and Helicobacter pylori infection: a review of the evidence. *Official journal of the American College of Gastroenterology| ACG*. 2005;100(2):453-9.
- Doig P, Austin JW, Trust T. The Helicobacter pylori 19.6-kilodalton protein is an iron-containing protein resembling ferritin. *J Bacteriol*. 1993;175(2):557-60.
- Husson M-O, Legrand D, Spik G, Leclerc H. Iron acquisition by Helicobacter pylori: importance of human lactoferrin. *Infect Immun*. 1993;61(6):2694-7.
- Choe YH, Oh YJ, Lee NG, Imoto I, Adachi Y, Toyoda N, et al. Lactoferrin sequestration and its contribution to iron-deficiency anemia in Helicobacter pylori-infected gastric mucosa. *J Gastroenterol Hepatol*. 2003;18(8):980-5.