

Effects of Helicobacter Pylori Infection on Serum Ferritin Level in Population of Shaheed Benazirabad

GHULAM MUHAMMAD PHUL¹, NASRULLAH AAMER², ALTAF KHAN PATHAN³, MASOOD NABI NOOR⁴, GHULAM MUJTABA SHAH⁵, WASEEM RAJA MEMON⁶

¹Assistant Professor, Physiology department, Gambat Medical College, Gambat, Khairpur Mirs Sindh

²Associate Professor of Medicine, Peoples University of Medical & Health Sciences Nawabshah (SBA)

³Assistant Professor, Physiology Department, Peoples University of Medical & Health Sciences Nawabshah (SBA)

⁴Assistant Professor, Physiology Department, Peoples University of Medical & Health Sciences Nawabshah (SBA)

⁵Lecturer, Physiology Department, Peoples University of Medical & Health Sciences Nawabshah (SBA)

⁶Assistant Professor of Medicine, Peoples University of Medical & Health Sciences Nawabshah (SBA)

Correspondence to: Nasrullah Aamer. Email: aamer.nasrullah@gmail.com

ABSTRACT

Objective: To explore the association between levels of Serum Ferritin and Helicobacter pylori in the population of Shaheed Benazirabad

Material and methods: This case control study was performed at Medical OPD of Peoples University of Medical and Health Sciences Hospital, Nawabshah, from July 2017 to December 2017. Helicobacter pylori positive patients having antibodies against Helicobacter pylori in their blood and presence of H.pylori antigen in their stool with age >18 years and both genders were included as group A. Equal normal cases were selected as group B (control). 5 ml blood samples were taken from each subject to evaluate the serum ferritin level and haemoglobin level. All the data was recorded in self-made proforma.

Results: Total 384 individuals were selected. Mean age of subjects in H-pylori infected group was 37.21±5.11 years and mean in control group was 33.11±4.51 years. Females were most common in both groups. Ferritin level was significantly low in Group-A (88.22±57.1ng/ml) as compared to Group-B (180.25±40.5 ng/ml); p<0.001. Mean Haemoglobin level was decreased in Group-A (10.7±1.7gm/dl) in contrast to normal Group-B (13.6±2.20gm/dl); p-value 0.001.

Conclusion: There was a significant decrease in Serum ferritin level, Hemoglobin, Mean Corpuscular concentration, Mean Hemoglobin level, and Mean Concentration of Corpuscular Hemoglobin in H.pylori infected cases, which lead to microcytic hypochromic anemia.

Keywords: H-pylori, Ferritin level, Haemoglobin level

INTRODUCTION

Anaemia is the commonest global health issue, and about two billion people have been estimated to have anemia throughout the world, particularly it is most common in developing countries.^{1,2} Its adverse health effects have been observed among individuals of all age-groups, resulting from non-nutritional and nutritional factors.¹ Clinically advanced IDA is correlated with retarded growth, raised sensitivity to communicable diseases and elevated mortality rate.³ A gram-negative bacterium, Helicobacter pylori (H. pylori), which resides in stomach, could also be found in further body parts like the eye.^{4,5} Helicobacter pylori penetrates the gastric mucoid lining where they interfere with absorption of nutrients like cobalamin and iron.⁶ The high incidence of both the iron deficiency anemia and the Helicobacter pylori infection in underdeveloped countries justifies that infection due to this bacteria leads to iron deficiency anemia.⁷ Ferritin is present as cytosolic protein within most tissues, and in the serum where it acts as iron transporter, small volumes are secreted. Serum ferritin seems to be an indirect indicator of the overall volume of iron reserved within the body, thus plasma ferritin is utilized as an IDA diagnostic test.⁸ Ferritin is an intracellular protein, which supplies iron in a structured ways, whenever the body needs it. In case of iron overload and deficiency, ferritin plays a role of a buffer.⁹ Study of Durdi Qujek conducted in Babol Iran in 2011 showed significant decline in serum ferritin from 265.03ng/ml in Helicobacter Pylori -ve group to 210.51ng/ml in Helicobacter Pylori +ve group.¹⁰ Red blood cell production occurs in bone marrow and is dependent upon nutritional supply such as iron, folic acid, cobalamin, proteins etc.^{11,12} Different studies worldwide showed that Helicobacter Pylori uses Ferritin as a nutrient and cause depletion of ferritin leading to iron deficiency anemia that results in decreased mean corpuscular volume, decreased mean hemoglobin concentration and raised overall iron binding volume. Peripheral blood smears of patient shows microcytic and hypochromic red blood cells.¹³ Currently it is stated that infection with Helicobacter Pylori is an emerging health problem in developing countries including Pakistan and has very high prevalence (50%)¹⁴. This problem is almost ignored as regarding its adverse effects on nutrients deficiency like iron, which is an essential nutrient for Red blood cell formation. Eventually this study will help the health care

providers to properly manage the patients regarding iron deficiency anemia.

MATERIAL AND METHODS

This case control study was performed at Medical OPD, Peoples University of Medical and health sciences hospital Nawabshah District Shaheed Benazirabad, during six months from July 2017 to December 2017. All the Helicobacter pylori positive patients having antibodies against Helicobacter pylori in blood and H.pylori antigen in stool were included as group A an equal number of healthy subjects (Helicobacter pylori -ve) with age ranging from 15 years to 60 years and either of gender were included as group B. Subjects having any known systemic disease other than Helicobacter pylori infection on basis of history like, gastrointestinal disease, pulmonary disease, renal disease, endocrine disorder and cardiovascular disease were excluded. Blood samples were taken between 10am to 12 pm (noon) by cuboital vein after all aseptic measures. The EDTA (Ethylenediaminetetraacetic acid) containing blood was processed on sysmex hematology auto analyzer. Verbal knowledgeable consent was granted from the agreeable participants. All the study subjects were carefully conversed regarding the objectives, benefits or harms of study. Serum ferritin level was defined normal from 23ng/ml to 336ng/ml in male and 12ng/ml to 306ng/ml in female by ELISA method on Roche E411. Haemoglobin level was taken in male as 13 to 16g/dl and in female 12 to 14g/dl. A self- made proforma was used to record the data, which was analyzed using SPSS version 20.

RESULTS

Total 384 individual were selected in the study. Mean age of Group-A H.pylori infected patients was 37.21±5.11 years, and mean age of Group-B control cases was 33.11±4.51 years. Females were more common 137 in H.pylori infected group as compare to male only 55 out of 192. Mostly study participants 211 were with poor socioeconomic status, 120 cases were with middle socioeconomic status while only 53 individuals were with upper socioeconomic status. Table:1

Table.1: Comparison of Age, gender and socioeconomic status among both study groups n=384

Variables	Study groups	
	Group-A H.pylori +ve (n=192)	Group-B H.pylori -ve (n=192)
Age (years)	37.21±5.11	33.11±4.51
Gender		
Male(n=168)	55	113
Female(n=216)	137	79
p-value	0.9	0.9
Socioeconomic status		
Poor	211	54.94%
Middle	120	31.25%
Upper	53	13.81%

Table.2: Hemoglobin level and serum ferritin level according to study groups (n=384)

Parameter	Groups		P-value
	Group-A H.pylori +ve (n=192)	Group-B H.pylori -ve (n=192)	
Serum Ferritin level			
Normal	110(57.29%)	170(88.54%)	0.001
Lower	82(42.71%)	22(11.46%)	
Mean±SD	88.22 ±57.1µg/L	180.25±40.5µg/L	0.001
Hemoglobin(gm/dl)	10.7±1.7	13.6±2.20	0.001

Mean ferritin level was significantly low 88.22±57.1ng/ml in Group-A (H.pylori infected patients) as compared to Group-B (normal population) as 180.25±40.5 ng/ml p-value 0.001, categorically majority of the individuals of Group-A 82(42.71%) had decrease ferritin level as compared to Group-B control cases 22(11.46%) out of 192 in each group p-value 0.001. Mean haemoglobin level was found significantly decreased 10.7±1.7gm/dl in Group-A H.pylori infected patients as compare to Group-B 13.6±2.20gm/dl; p-value 0.001.Table:2

DISCUSSION

Iron deficiency anemia (IDA) is the world's most frequent factor for nutritional anemia. IDA preventive measures or treatment demands understanding of factors that affect this infection. H.pylori disease is among the factors that trigger IDA, which is highly prevalent in underdeveloped countries, and a few studies claim that the H.pylori eradication procedure can be used to cure the IDA, for which no cause has been identified.¹³ This study has been conducted to see the serum ferritin levels in Helicobacter pylori positive subjects, and observed that H-pylori significantly reduces serum ferritin level, and alters red blood cell morphology. H. Pylori disease is prevalent and it remains uncertain that why complications develop only in a few infected patients.¹⁴ In current study, the haemoglobin and serum ferritin were examined in H-pylori infected cases, which were significantly lower in H.pylori infected patients as compared to normal population. Similarly Zuberi BF et al¹⁵ reported the significant differences in means of ferritin and hemoglobin.

In this study mean age of infected patients was 37.21±5.11 years and 33.11±4.51 years of normal population without significant difference p-value 0.09 Sohail et al¹⁶ also found similar findings. In this series female ratio was higher, which is in agreement with the study of Ali Zamani et al¹³ reporting 43% males and 57% females. Hajiani et al.¹⁷ and Yasir et al.¹⁸ found the predominance of male gender over female in H. Pylori positive cases. In this series most of the patients presented with poor socioeconomic status. H. pylori disease is generally correlated with contradictory outcomes with socioeconomic status, which is why the risk factors for H-pylori disease are yet uncertain.¹⁹⁻²¹

In this study ferritin level was significantly lower 88.22 ± 57.1ng/ml. Similarly, other studies also observed that ferritin level was decreased in H.pylori positive groups as compared to H.pylori negative groups. Anoar KA et al²² reported that 71% of H.pylori positive individuals had low serum ferritin level while 29% had normal serum ferritin²². Gabriele Berg G et al compared serum ferritin level in adult population of Germany with H. pylori infection and found decrease in serum ferritin in H pylori infected subjects in comparison to the H pylori un-infected persons²³. High prevalence

of iron deficiency and decreased ferritin levels in seropositive children in Korea was also found.²⁴ Similarly Zuberi BF et al reported significant differences in means of ferritin, hemoglobin and MCV.¹⁵

CONCLUSION

It was concluded that Helicobacter pylori infection decreases serum ferritin level, as it was decreased in 42.71% in Helicobacter pylori positive subjects. Practicing physician should consider Helicobacter Pylori infection while treating refractory anemia. Further studies should be done to explore mechanism at molecular level to see genetic predisposition of host and genotype of Helicobacter pylori strains.

Conflict of Interest: None declared

REFERENCES

- Shill KB, Karmakar P, Kibria MG, Das A, Rahman MA, Hossain MS, Sattar MM. Prevalence of iron-deficiency anaemia among university students in Noakhali region, Bangladesh. *J Health Popul Nutr* 2014 Mar;32(1):103.
- Ramzi M, Haghpanah S, Malekmakan L, Cohan N, Baseri A, Alamdari A, et al. Anemia and iron deficiency in adolescent school girls in Kavar urban area, Southern Iran. *Iran Red Crescent Med J*. 2011;13:128-33
- Wells JC, Shirley MK. Body composition and the monitoring of non-communicable chronic disease risk. *Global health, epidemiology and genomics*. 2016;1:E18
- Graham DY. History of Helicobacter pylori, duodenal ulcer, gastric cancer. *World Journal of Gastroenterology* : WJG. 2014;20(18):5191-5204.
- Hessein RM, Mahfouz TA, Said AM, Elsherbeny FA. Helicobacter pylori inversely related to clinical and functional severity of adult asthma. *Egyptian Journal of Chest Diseases and Tuberculosis*. 2017 Oct 1;66(4):571-6.
- Franceschi F, Annalisa T, Di Rienzo Teresa D, Ianiro G, Franco S, Viviana G et al. Role of Helicobacter pylori infection on nutrition and metabolism. *World Journal of Gastroenterology*: WJG. 2014 Sep 28;20(36):12809.
- Monzón H, Forné M, Esteve M, Rosinach M, Loras C, Espinos C J et al. Helicobacter pylori infection as a cause of iron deficiency anaemia of unknown origin. *World Journal of Gastroenterology* : WJG. 2013;19(26):4166-71.
- Watt RK. A unified model for ferritin iron loading by the catalytic center: implications for controlling "free iron" during oxidative stress". *Chembiochem* 2013; 14 (4): 415-9.
- Adakalakeswari A, Jayashri R, Sukumar N, Venkataraman H, Pradeepa R, Gokulakrishnan K, et al. Vitamin B 12 deficiency is associated with adverse lipid profile in Europeans and Indians with type 2 diabetes. *CardiovascDiabetol* 2014; 13:129.
- Quejek D, Sadogh M, Savadkoshi S. Association between helicobacter pylori infection and serum iron profile . *Caspian Journal of Internal Medicine*. 2011;2(3):266-269.
- Yip R, Dallman PR. Iron. In: Ziegler EE, Fielor LJ, editors. *Present knowledge in nutrition*. 7th ed. WashingtonDC: ILSI Press;1996. pp. 278-92.
- Underwood EJ, Suttle NF. 3rd ed. Wallingford: CABI International publishing. *The mineral nutrition of live stock*; 1999 p. 614.
- Zamani A, Shariat M, Oloomi YZ, Bahremand S, Akbari AP, Dejakam A. Relationship between Helicobacter pylori infection and serum ferritin level in primary school children in Tehran-Iran. *Acta medica Iranica*. 2011;49(5):314.
- DuBois S, Kearney DJ. Iron-deficiency anemia and Helicobacter pylori infection: a review of the evidence. *Am J Gastroenterol* 2005; 100:453-9.
- Zuberi BF, Afsar S, Qadeer R, Baloch I, Quraishy MS, Kumar A, Akhtar N. Hemoglobin, ferritin, vitamin B12 and helicobacter pylori infection: a study in patients who underwent upper gi endoscopy at civil hospital karachi. *J Coll Physicians Surg Pak*. 2007 Sep 1;17(9):546-9.
- Sohail S, Khalid-ur-rehman TU. Red Blood Cell Count, Hemoglobin and Red Blood Cell Indices in H Pylori Infected Cases. *Group*.; 2014;18:12.
- Hajiani e, Hashemi j and Vosoghi t. Comparison of a 10 day triple and a two-week quadruple therapy in eradicating helicobacter pylori infection in patients referred to imam khomeini hospital clinics ahwaz, iran. *jundishapur journal of natural pharmaceutical products*, 2008; 3(1): 45-52.
- Yasir S, Moin F and Akhtar S M.Frequency of Helicobacter Pylori Infection on Histopathology in Patients with Dyspepsia. *American Journal of Clinical Medicine Research*, 2014; 2(3): 53-56.
- Koch A, Krause TG, Krogfelt K, Olsen OR, Fischer TK, Melbye M. Seroprevalence and risk factors for Helicobacter pylori infection in Greenlanders. *Helicobacter* 2005;10:433-442.
- Kurzeja-Miroslaw A, Celinski K, Slomka M, Madro A, Cichoż-Lach H. The effects of environmental factors on the incidence of Helicobacter pylori infection in the adult population of the Lublin region. *Ann Univ Mariae Curie-Skłodowska [Med]* 2004;59:247-253.
- Bures J, Kopacova M, Koupil I, Vorisek V, Rejchrt S, Beranek M, et al. Epidemiology of Helicobacter pylori infection in the Czech Republic. *Helicobacter* 2006;11:56-65
- Anoar KA. Relationship of Helicobacter Pylori Infection and Serum Ferritin Level. *Int J Med Res Prof*.2016; 2(2): 15-20.
- Berg G, Bode G, Blettner M, Boeing H, Brenner H. Helicobacter pylori infection and serum ferritin: a population-based study among 1806 adults in Germany. *The American journal of gastroenterology*. 2001;96(4):1014-8.
- Seo JK, Ko JS, Choi KD. Serum ferritin and helicobacter pylori infection in children: A sero-epidemiologic study in Korea. *Journal of gastroenterology and hepatology*. 2002;17(7):754-7.