CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
http://doi.org/10.5281/zenodo.3831742

Available online at: http://www.iajps.com Research Article

IMPACT OF HELICOBACTER PYLORI INFECTION ON FRAGILITY OF RED BLOOD CELLS

Dr Aaiz Hassan, Dr Muhammad Faheem, Dr Kh. Raees ur Rehman
House Officers, Services Institute of Medical Sciences (SIMS)

Article Received: March 2020 **Accepted:** April 2020 **Published:** May 2020

Abstract:

Background: *Helicobacter pylori disrupts iron and vitamin B12 metabolism, causing gastritis. These two micronutrient deficiencies interfere with the normal morphological properties of red blood cells, making them fragile. When such red blood cells pass through narrow circulating places, such as the red spleen pulp, they rupture.*

Aim: *The purpose of this study is to explain the effect of Helicobacter pylori infection on the fragility of red blood cells.*

Place and Duration: *In the Medicine Unit II of Services Hospital Lahore for one year duration from January 2019 to January 2020.*

Methods: *The study covered 90 people. Group A (30 patients with gastric symptoms and H. pylori infection symptoms) and group B (30 patients with gastric symptoms but without H. pylori infection) and group C (30 patients with normal healthy age and sex). H. pylori infection was considered positive on the basis of positive serology, rapid urease test and histopathological examination. Brittleness of red blood cells was determined by osmotic fragility using different saline concentrations.*

Results: *The fragility of red blood cells did not differ significantly between groups or compared to each other (p-value> 0.05).*

Conclusion: *H. pylori infection did not affect red blood cell fragility.*

Key words: *red blood cell fragility, Helicobacter pylori.*

Corresponding author:
Dr. Aaiz Hassan,
House Officer, Services Institute of Medical Sciences (SIMS)

QR code

Please cite this article in press Aaiz Hassan et al, ***Impact Of Helicobacter Pylori Infection On Fragility Of Red Blood Cells.,*** *Indo Am. J. P. Sci, 2020; 07(05).*

INTRODUCTION:

It is believed that the human stomach is the main reservoir of Helicobacter pylori, where these organisms are usually found in gastric antrum[1]. Helicobacter pylori causes gastroenteritis, gastric and duodenal ulcers. Risk factors involved in the pathogenesis of Helicobacter pylori are low socioeconomic status, overcrowding, poor hygiene, diet, alcohol consumption, occupational exposure, smoking, family history of stomach disease and poor water[2-3]. The prevalence of Helicobacter pylori infection is 30% in developed countries and 50-70% in developing countries. Many studies have shown a strong association of Helicobacter pylori infection with iron deficiency and vitamin B12 deficiency, while other studies have shown weak or no association with iron and vitamin B12 deficiency[4-5]. Iron and vitamin B12 are required for the maturation of red blood cells; both micronutrient deficiencies change the normal morphological properties of red blood cells. Iron deficiency causes the formation of small red blood cells, and such cells are called microcytic cells. Deficiency of vitamin B12 leads to the development of large, immature red blood cells called macrocytes[6-7]. The age of these red blood cells decreases as their membranes become fragile. When such red blood cells pass through narrow circulating places, such as the red spleen pulp, they burst[9]. Assuming that this study affects Helicobacter pylori iron and vitamin B12 levels, it is planned to clarify the effect of Helicobacter pylori infection on the fragility of red blood cells.

MATERIAL AND METHODS:

This is a cross-sectional analytical study conducted at the Medicine Unit II of Services Hospital Lahore for one year duration from January 2019 to January 2020. Patients with Helicobacter pylori infection and patients with gastric symptoms were selected. Ninety people, men and women were selected for the study. The subjects were between 15 and 60 years old. The subjects were divided into three groups. Group 1 consisted of thirty people with Helicobacter pylori infection. Group 2 consisted of thirty people with a history of gastric symptoms without Helicobacter pylori infection. Group 3 included people of healthy age and sex without gastric symptoms and without Helicobacter pylori infection. After clarifying the purpose and procedure of the study, informed consent was obtained from all participants. A detailed medical history of all patients was obtained. Diagnosis of Helicobacter pylori infection was made by means of ELISA for IgG anti-H. Pylori antibodies, rapid urease test and histopathological examination. To obtain osmotic fragility, three milliliters of blood were drawn from a vein in the elbow joint under aseptic conditions in a heparinized tube. Various salt solutions were prepared from a stock solution of sodium chloride, such as 0.9%, 0.75%, 0.65%, 0.6%, 0.55%, 0.5%, 0.4%, 0.35, 0.3%, 0.2% and 0.1% (100 g / l). Five ml of each of the 11 saline solutions were introduced into 11 test tubes and 5 ml of water were given to the twelfth test tube. 50 ml mixed blood was added to each tube and mixed by inverting the tube several times. Incubation was carried out for 30 minutes at room temperature and the contents were mixed again after 30 minutes. All tubes were centrifuged for 5 minutes. At each saline concentration, the red cell lysis fraction was calorimetrically determined.

Statistical analysis: A t-test was used for paired students to observe the difference between men and women between groups. ANOVA was used to determine the significance of the difference between the groups. A p value below 0.05 was considered statistically significant.

RESULTS

Table 1 Comparison of red blood cell osmotic fragility between males and females in group A

Parameter	**Male** (n = 18)	**Female** (n = 12)	**p value**
NaCl Concentration at which hemolysis started	0.48%±0.01%	0.47%±0.01%	0.50*
NaCl Concentration at which hemolysis completed	0.30%	0.30%	1.00*

Table 2 Comparison of red blood cell osmotic fragility between males and females in group B

Parameter	**Male** (n = 16)	**Female** (n = 14)	**p value**
NaCl concentration at which hemolysis started	0.49% ± 0.01%	0.48% ± 0.02%	0.79*
NaCl concentration at which hemolysis completed	0.30%	0.30%	1.00*

* The values are statistically non-significant

Table 3 Comparison of red blood cell osmotic fragility between males and females in group C

Parameter	**Male** (n = 14)	**Female** (n = 16)	**p value**
NaCl Concentration at which hemolysis started	0.48 ± 0.01	0.47 ± 0.01	0.68*
NaCl Concentration at which hemolysis completed	0.30%	0.30%	1.00*

* The values are statistically non-significant

Table 4 Comparison of red blood cell osmotic fragility between groups A, B and C

Parameter	**Group A** (n=30) (*H.pylori* +ve patients)	**Group B** (n=30) (*H.pylori* -ve patients)	**Group C** (n= 30) (Healthy control)	**P value**
NaCl Concentration at which hemolysis started	0.47%± 0.01%	0.48%± 0.01%	0.48±0.01%	0.49*
NaCl Concentration at which hemolysis completed	0.30%	0.30%	0.30%	1.00*

* The values are statistically non-significant

DISCUSSION:

Red blood cells are two-concave discs with highly flexible and deforming properties. The red blood cell membrane consists of three very important proteins, including ankirin, spectin and band-3. These proteins retain the integrity and shape of red blood cells. Red blood cells do not contain normal cellular organelles and have no nucleus, so they cannot divide and synthesize proteins and structural enzymes. Energy demand is also very low. Red blood cells draw energy from anaerobic glycolysis and the hexose monophosphate pathway[9-10]. Due to these properties, the shelf life of red blood is relatively short, only 120 days. In the presence of iron and vitamin B12 deficiency, red blood cell membranes become brittle and red blood cells burst early when they pass through narrow spleen patches. Many studies in the past have reported that Helicobacter pylori caused iron and vitamin B12 deficiency, while other studies did not mention any association. Helicobacter pylori causes iron deficiency by neutralizing and reducing stomach acidity; this leads to a decrease in iron absorption[10]. Final; Helicobacter pylori also causes iron deficiency anemia by reducing the vitamin C content of gastric juice, which is necessary to reduce iron to iron. Infection with Helicobacter pylori causes a decrease in the absorption of vitamin B12 by reducing the secretion of gastric acid and the internal factor required for absorption. Because of the extra-gastric complications of Helicobacter pylori infection mentioned above, we plan to see the effect of Helicobacter pylori infection on the fragility of red blood cells[11-12]. The average life of red blood cells is 120 days, after which the cells become more and more fragile. Fragile cells burst as they pass through the tight pores of the spleen, especially the red pulp of the spleen. When osmotic fragility is normal, when red blood cells are suspended in 0.5% saline, they begin to hemolyze and complete lysis occurs at a concentration of 0.35% saline[13-14]. This study is the first study in which the fragility of red blood cells was carried out on positive and negative Helicobacter pylori individuals. In this study, no significant change in red blood cell fragility was observed between Helicobacter pylori positive and negative individuals. There is very little data in the literature on the fragility of red blood cells. Little data is available in the literature regarding the relationship between Helicobacter pylori infection and red blood cell weakness[15]. When different Helicobacter pylori isolates were treated in vitro with red blood cells from different blood groups, only red blood cells from blood group A showed hemolysis. Another study suggested that anti-Helicobacter pylori antibodies may cross-react with some human red blood cell membrane antigens and cause hemolysis.

CONCLUSION

H. pylori infection did not affect red blood cell fragility.

REFERENCES:

1. Afroz, R., Rahman, K.A., Lotus, M.J., Afrin, T., Yeasmin, N. and Moon, K.J., 2019. Histopathological Evaluation of Gastro Protective Effect of Trigonella Foenum Graecum Seed (Methi) and omeprazole in Experimentally Induced Gastric Ulcer in Rats. *Journal of Dhaka Medical College*, *28*(1), pp.67-75.
2. Ammouri, W. and Adnaoui¹, M., 2020. Pernicious Anaemia: Mechanisms, Diagnosis, and Management. *HEMATOLOGY*.
3. Vasapolli, R., Schütte, K., Schulz, C., Vital, M., Schomburg, D., Pieper, D.H., Vilchez-Vargas, R. and Malfertheiner, P., 2019. Analysis of transcriptionally active bacteria throughout the gastrointestinal tract of healthy individuals. *Gastroenterology*, *157*(4), pp.1081-1092.
4. Fujiwara, T., Katakura, K. and Ohira, H., 2019. Rheumatoid Arthritis and Gastrointestinal Tract Lesions (NSAID Ulcers, Amyloidosis). In *Gastrointestinal and Hepatic Manifestations of Rheumatic Diseases* (pp. 97-121). Springer, Singapore.
5. Salazar, N., González, S., Nogacka, A., Rios-Covián, D., Arboleya, S., Gueimonde Fernández, M. and González de los Reyes-Gavilán, C., 2019. Microbiome: Effects of Ageing and Diet.
6. Lahner, E., Conti, L., Cicone, F., Capriello, S., Cazzato, M., Centanni, M., Annibale, B. and Virili, C., 2019. Thyro-entero-gastric

autoimmunity: pathophysiology and implications for patient management. *Best Practice & Research Clinical Endocrinology & Metabolism*, p.101373.
7. Viji, S., 2019. *A Study on Diagnosis of Helicobater Pylori Infection by Culture and Molecular Methods from Gastric Biopsy Specimens and Serological Assays in Patients with Peptic Ulcer Disease* (Doctoral dissertation, Madras Medical College, Chennai).
8. Ojha, R., Nandani, R., Pandey, R.K., Mishra, A. and Prajapati, V.K., 2019. Emerging role of circulating microRNA in the diagnosis of human infectious diseases. *Journal of cellular physiology*, *234*(2), pp.1030-1043.
9. Hills, R.D., Pontefract, B.A., Mishcon, H.R., Black, C.A., Sutton, S.C. and Theberge, C.R., 2019. Gut microbiome: Profound implications for diet and disease. *Nutrients*, *11*(7), p.1613.
10. Andrès, E., Vogel, T. and Zulfiqar, A., 2019. Anemia in elderly patients: state of art, with a focus on nutritional anemia. In *Anemia in the Young and Old* (pp. 179-193). Springer, Cham.
11. Roza, K. and Rughwani, N., 2020. Physiology of aging. In *Geriatric Practice* (pp. 31-48). Springer, Cham.
12. Kumar, M.S. and Sharma, S.A., 2020. Toxicological effects of marine seaweeds: a cautious insight for human consumption. *Critical Reviews in Food Science and Nutrition*, pp.1-22.
13. Kaboli, P.J., Zhang, L., Xiang, S., Shen, J., Li, M., Zhao, Y., Wu, X., Zhao, Q., Zhang, H., Lin, L. and Yin, J., 2020. Molecular markers of regulatory t cells in cancer immunotherapy with special focus on acute myeloid leukemia (AML)-a systematic review. *Current Medicinal Chemistry*.
14. Zeman, C., 2020. Anthropologically Disrupted Biogeochemical Cycles and the Effect on Sustainable Human Health and Well-Being. *Good Health and Well-Being*, pp.1-16.
15. Su, L., Li, Y., Liu, Y., An, Y. and Shi, L., 2019. Recent Advances and Future Prospects on Adaptive Biomaterials for Antimicrobial Applications. *Macromolecular bioscience*, p.1900289.