

Red Blood Cell Count, Hemoglobin and Red Blood Cell Indices in *H Pylori* Infected Cases

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ABSTRACT

Aim: To see changes in red blood cell count, hemoglobin and red blood cell indices in *Helicobacter pylori* infected cases.

Methods: 90 subjects were divided into group A (30 subjects with gastric symptoms and *H. pylori* infection), group B (30 subjects with gastric symptoms but without *H. pylori* infection), and group C (30 normal healthy age and sex matched subjects). The diagnosis of *H. pylori* infection was made by performing antibody serology, rapid urease test and histopathological examination. Red blood cell count, hemoglobin and red blood cell indices were calculated by hematology analyzer.

Results: The results of this study did not show any significant effect on serum ferritin and serum iron (p value > 0.05) within the individual groups nor when compared with each other.

Conclusion: Red blood cell indices were found normal in *H. pylori* infected cases.

Key words: Red blood cells indices, MCV, MCHC, MCH

INTRODUCTION

Human stomach is reported to be the primary reservoir for *Helicobacter pylori* where these organisms are usually found in the gastric antrum. *Helicobacter pylori* produce gastric inflammation, gastric and duodenal ulcers. Risk factors involved in the pathogenesis of *Helicobacter pylori* are low socioeconomic status, crowding, poor hygiene, diet, alcohol consumption, occupational exposure, smoking, family history of gastric diseases and poor water condition. The prevalence of *Helicobacter pylori* infection is 30% in the developed countries and 50-70% in the developing countries¹. Many studies documented strong association of *Helicobacter pylori* infection with the iron deficiency and vitamin B₁₂ deficiency while other studies have shown weak or no relationship with iron and vitamin B₁₂ deficiency².

Iron deficiency in the body occurs mostly due to inappropriate dietary intake, malabsorption, pregnancy, and blood loss. Deficiency of iron in the body leads to iron deficiency anemia in which red blood cells become smaller in size. Red blood cells also have less hemoglobin as well as low mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC). Color index of red blood cells also decreases known as hypochromia^{3,4}. Vitamin B₁₂ is especially important for the final maturation of red blood cells. Vitamin B₁₂ along with folic acid is necessary for the formation of thymidine triphosphate that is very essential building block of DNA. Deficiency of vitamin B₁₂ disturbs

erythropoiesis by causing diminished and abnormal DNA synthesis. This results in the formation of megaloblasts or macrocytes that causes megaloblastic anemia. In vitamin B₁₂ deficiency, the level of MCV, MCH and MCHC increases⁵⁻⁷.

MATERIAL AND METHODS

It was a cross sectional analytical study conducted at the University of Health Sciences, Lahore. Subjects having *Helicobacter pylori* infection with gastric symptoms and subjects having gastric symptoms without this infection were selected from the Services Hospital, Lahore. A total number of ninety subjects including both male and female were selected by random non purposive sampling for the study. The subjects were divided into three groups; A (positive for *Helicobacter pylori* infection), B (subjects with history of gastric symptoms without *Helicobacter pylori* infection) and C (healthy subjects without gastric symptoms and *Helicobacter pylori* infection). Each group comprised of thirty subjects. An informed consent was taken from all the subjects after explaining the study purpose and procedure. Gastric biopsy samples were collected from the subjects having symptoms of gastric disease through gastric endoscopy for the confirmation of *Helicobacter pylori* infection on the basis of rapid urease test and histopathological examination. Five milliliters of blood was drawn from antecubital vein under aseptic measures for determination of red blood cell indices. Red blood cell indices were calculated by using hematology analyzer. Male and female subjects having gastric symptoms for more than one year and normal healthy subjects were included in the study.

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Patients with history of pregnancy, antacid use, iron or multivitamin supplementation and recent surgery were excluded.

Paired student t test was applied to observe the difference between male and females within the groups. One way ANOVA was applied to determine the significance of difference of variables between groups. p value of less than 0.05 was considered statistically significant.

RESULTS

A total number of 90 subjects were included in the study. They were divided into three groups. Group A was composed of 30 subjects having *Helicobacter pylori* infection and gastric symptoms like nausea, vomiting, retrosternal burning, epigastric fullness, burning, and pain. Group B comprised of 30 subjects having history of gastric symptoms but without *Helicobacter pylori* infection. Group C consisted of 30 normal healthy subjects without gastric symptoms and *Helicobacter pylori* infection. The age of subjects was found to be 32.87±12.31 years in group A, 33.27±11.64 years in group B, and 33.60±11.12 years in group C. The difference of Mean±SD age in three groups was non-significant (p > 0.05; Table 1).

In group A, there were 18 males and 12 females while group B comprised of 16 males and 14 females and in group C, these were 14 and 16 respectively. (Table 2). No significant difference (p>0.05) in hemoglobin concentration between males (14.7±0.94 g/dl) and females (14.6±1.2g/dl) in group A. The MCV was 86.57±6.3 fl in males and 86.28±6.9 fl in females of group A. The difference of MCV values between males and females in groups A was non significant (p>0.05). MCH values were not significantly different among males (33.2±2.0 pg) and females (31.9±1.8 pg) in group A. The MCHC values in males (33.2±2.1 g/dl) and females (31.9±1.8g/dl) of group A were also non significantly different (p>0.05). The HCT values in males (44.5±1.2%) and females (43.3±1.0%) in group A were not different (p > 0.05). The RBC count (4.8±1.8 x 10⁶ million/μl and 4.7±1.6 x 10⁶ million/μl) was also non significant between males and females respectively in group A (p >0.05; Table 3).

The difference in hemoglobin concentration between males (14.33±1.53 g/dl) and females in group B (14.1±1.2 g/dl) was non significant (p>0.05). The MCV was 87.98±7.2 fl in males and 86.27±5.1fl in females of group B. The difference of MCV values between males and females in groups B was non significant (p>0.05). MCH values were not significantly different among males (32.58±2.0pg) and females (31.7±2.4 pg) in group B. The MCHC

values in males (32.58±1.9g/dl) and females (31.67±2.4 g/dl) of group B were also non significantly different (p >0.05). The HCT values in males (45.4±1.5%) and females (44.3±1.0%) in group B were not different (p >0.05). The RBC count (4.8±1.6 x 10⁶ million/μl and 4.7±1.5x10⁶ million/μl) was also non significant between males and females respectively in group B (p > 0.05; Table 4).

There was no significant difference (p>0.05) in hemoglobin concentration between males (14.9 ± 0.84 g/dl) and females in group C (14.8±1.10 g/dl). The MCV was 91.45±5.0 fl in males and 83.37±5.1 fl in females of group C. The difference of MCV values between males and females in groups C was non significant (p>0.05). MCH values were not significantly different among males (31.60±1.8 pg) and females (33.20±1.3 pg) in group C. The MCHC values in males (31.60±1.8g/dl) and females (33.20±1.2 g/dl) of group C were also non significantly different (p >0.05). The HCT values in males (44.7±0.9%) and females (44.5±1.1%) in group C were not different (p>0.05). The RBC count (4.8±1.9 x 10⁶ million/μl and 4.8±1.8 x 10⁶ million/μl) was also non significant between males and females respectively in group C (p > 0.05; Table 5).

The difference in hemoglobin concentration between group A (14.86±1.04g/dl), group B (14.25±1.36 g/dl) and group C (14.86±0.97 g/dl) was non significant (p>0.05; Fig. 7). The MCV was 86.45±6.47 fl in group A, 88.86±6.25 fl in group B and 87.14±6.46 fl in group C. The difference of MCV values in three groups was non significant. MCH values were not significantly different among group A (28.10±2.51 pg), group B (29.36±1.84 pg), and group C (28.56±1.71 pg). The MCHC values in group A (32.70±2.02 g/dl), group B (32.16±2.21 g/dl) and group C (32.46±1.72 g/dl) were also non significantly different (p>0.05). The HCT values in group A (44.86±1.04%), group B (45.20±2.25%), and group C (44.40±2.75%) were not different (p >0.05). The RBC count (4.8±1.9 million/μl, 4.8±1.6 million/μl, and 4.8 ±1.9 million/μl) was also non significant between groups A, B and C respectively (Table 6).

Table 1: Age distribution of subjects in groups A, B and C

Group A (<i>H.pylori</i> +ve patients)	32.9±12.3
Group B (<i>H.pylori</i> -ve patients)	33.3±11.6
Group C (Healthy control)	33.6±11.1

Table 2: Sex distribution of subjects in groups A, B and C

	Male	Female
Group A	18	12
Group B	16	14
Group C	14	16

Table 3: Comparison of red blood cell indices between males and females in group A

Parameter	Male (n=18)	Female (n = 12)	p value
Hemoglobin (g/dl)	14.7±0.94	14.6±1.2	0.44*
MCV (fl)	86.57±6.3	86.28±6.9	0.99*
MCHC (g/dl)	33.2±2.1	31.9±1.8	0.07*
MCH (pg)	33.2±2.0	31.9±1.8	0.07*
HCT (%)	44.5±1.2	43.3±1.0	0.35*
RBC Count (million/ μ l)	4.8±1.8 x 10 ⁶	4.7±1.6 x 10 ⁶	0.06*

Table 4: Comparison of red blood cell indices between males and females in group B

Parameter	Male (n=16)	Female (n=14)	p value
Hemoglobin (g/dl)	14.33±1.53	14.1±1.2	0.66*
MCV (fl)	87.98±7.2	86.27±5.1	0.42*
MCHC (g/dl)	32.58±1.9	31.67±2.4	0.26*
MCH (pg)	32.58±2.0	31.7± 2.4	0.26*
HCT (%)	45.4±1.5	44.3±1.0	0.37*
RBC Count (million/ μ l)	4.8±1.6x10 ⁶	4.7±1.5x10 ⁶	0.39*

Table 5: Comparison of red blood cell indices between males and females in group C

Parameter	Male (n=14)	Female (n=16)	p value
Hemoglobin (g/dl)	14.9±0.84	14.8±1.10	0.83*
MCV (fl)	91.45±5.0	83.37±5.1	0.35*
MCHC (g/dl)	31.60±1.8	33.20±1.2	0.29*
MCH (pg)	31.60±1.8	33.20±1.3	0.28*
HCT (%)	44.7±0.9	44.5±1.1	0.31*
RBC Count (million/ μ l)	4.8±1.9 x 10 ⁶	4.8 ±1.8 x 10 ⁶	0.40*

Table 6: Comparison of red blood cell indices between groups A, B and C

Parameter	Group A (n=30)	Group B (n =30)	Group C (n =30)	p value
Hemoglobin (g/dl)	14.9±1.0	14.2±1.3	14.8±0.9	0.06*
MCV (fl)	86.45±6.4	88.8±6.2	87.1±6.4	0.32*
MCHC (g/dl)	32.7±2.0	32.1±2.2	32.4±1.7	0.57*
MCH (pg)	28.1±2.5	29.3±1.8	28.5±1.7	0.57*
HCT (%)	44.8±1.0	45.2±2.2	44.4± 2.7	0.61*
RBC Count (million/ μ l)	4.8±1.9x10 ⁶	4.8±1.6 x 10 ⁶	4.81±1.9 x 10 ⁶	0.91*

DISCUSSION

The present cross-sectional study provides information about the effects of *Helicobacter pylori* infection on the red blood cell indices. The present study showed no significant change in hemoglobin concentration, red blood cell count, MCV, MCH, MCHC and hematocrit values in subjects infected with *H. pylori*. The difference of serum iron and serum ferritin levels between *H. pylori* positive and

negative subjects was also non-significant. Very little data is available in literature regarding association of *H. pylori* with red blood cell indices. Our findings coincided with a recently published study carried in children, adults, and pregnant women of six countries that showed no association of *Helicobacter pylori* infection with ferritin, transferrin receptors, and hemoglobin in any of the Latin American countries.⁸ Findings of the study conducted by Choi *et al*, (2003) were also in accordance with our results. That showed no association between *Helicobacter pylori* infection, and hemoglobin level in both groups⁹.

Many studies had showed association between *Helicobacter pylori* infection and iron deficiency anemia. High prevalence of iron deficiency and decreased ferritin levels in seropositive children in Korea was also found^{10,11}. It was also demonstrated in a survey that in only 40% of children with iron deficiency, *H. pylori* infection was appreciated and hemoglobin levels were found to be normal in these children¹². As most of the studies were conducted in children who were already suffering from iron deficiency due to the fact that in children at times of rapid growth like during infancy and puberty, iron demands increases and sometimes may outstrip absorption¹³. Therefore, it can be assumed that no single study clearly demonstrated any relationship between *Helicobacter pylori* infection and iron deficiency or iron deficiency anemia. Most of these studies did not fulfill the definition of iron deficiency anemia that is deficiency of hemoglobin in the presence of iron deficiency.¹⁴ The results of this study are important because it was carried out in a poor and developing country where poor socioeconomic status, housing, sanitation, and water contamination are major predisposing factors as reported for *Helicobacter pylori* infection.

CONCLUSION

Our study demonstrated no change in red blood cells and red blood cell indices in *H. pylori* infected cases.

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