

# Serum Ferritin in Helicobacter Pylori Infected Young Adult Female

Ferritin in  
Helicobacter Pylori

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## ABSTRACT

**Objective:** To determine serum iron (Fe<sup>++</sup>), serum ferritin and total iron binding capacity (TIBC) in Helicobacter pylori (H. pylori) infected young adult female.

**Study Design:** Case control study

**Place and Duration of Study:** This study was conducted at the Department of Pathology, Indus Medical College Tando Muhammad Khan from September 2015- August 2016.

**Materials and Methods:** A sample of 50 healthy controls and 50 H pylori positive female was studied. 5 ml of venous blood was collected after aseptic measures from ante cubital vein. 2 ml was shifted to EDTA mixed tubes for blood cell counts, and 3 ml was centrifuged at 3000 x rpm for ten minutes. Sera were separated to estimate serum iron profile. Helicobacter pylori stool specific antigen (HpSA) was detected by Elisa assay kit (Fortess). SPSS 22.0 (USA) was used for data analysis at 95% CI (P≤ 0.05).

**Results:** The hemoglobin (Hb), hematocrit (Hct), RBC counts, serum Fe<sup>++</sup>, and serum ferritin were decreased with raised TIBC in H.pylori infected female (P<0.05). Serum ferritin in controls and cases (H.pylori +ve) was noted as 140.8 ± 20.09 and 126.5 ± 35.02 ng/dl respectively (P=0.014).

**Conclusion:** The present study reports low serum iron, low serum ferritin and low hemoglobin and raised total iron binding capacity in Helicobacter pylori infected young adult female.

**Key Words:** Helicobacter pylori, Serum iron, Serum ferritin, Young female

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## INTRODUCTION

Helicobacter pylori (H. pylori) are microaerophilic, Gram-negative bacteria. H. pylori infect >50% of the World population and has proved a notorious pathogen. H. pylori are capable of survival in acid (H<sup>+</sup>) of stomach.<sup>1</sup> Mode of transmission of H.pylori is by oral route. Transmission occurs with families and community.<sup>2</sup> Over 80% of H.pylori infected subjects are asymptomatic and remaining complains of symptoms suggestive of acute and chronic gastritis, pangastritis, peptic ulceration and risk of developing gastric cancer.<sup>3</sup> H. pylori survive in the acidic environment by ammonia production by Urease enzyme.<sup>4</sup> H.pylori colonizes the mucosa cells and resides in superficial layers but may invade and enter into mucosal epithelial cells.<sup>5</sup> H.pylori persists for long durations and elicits host immune responses.<sup>6</sup> H.pylori induces autoimmune phenomena against the parietal cells of the stomach thus impair the hydrochloric acid secreting capacity.

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Lack of acid impairs the digestion of food in the stomach. Iron needs presence of acid for becoming soluble from ferric to ferrous form which is absorbed easily, thus its absorption is impaired resulting in iron deficiency.<sup>7</sup> Previous studies suggest link of H.pylori and iron deficiency anemia with low serum ferritin levels.<sup>8</sup> Eradication of H. pylori was reported to improve the total blood iron profile in children and adults.<sup>9</sup> Mechanism of how H.pylori causes iron deficiency anemia is not well established.<sup>10</sup> One suggested mechanisms is alteration of intra-gastric pH which impairs iron absorption. Other possibilities include defects in the expression of iron transporters, and iron consumption by H. pylori itself.<sup>11</sup> Another previous study reported the H.pylori interferes with iron chelation from lactoferrin. H.pylori expresses lactoferrin binding protein which helps in iron chelation resulting in iron deficiency anemia.<sup>12</sup> Ferritin is iron binding storage and transport protein. H.pylori takes up iron form circulating ferritin necessary for bacterial growth.<sup>13</sup> As the H.pylori is prevalent in the country, it needs more studies on the iron deficiency anemia and its effect on serum ferritin levels. In this context, the present study was conducted to determine serum Fe<sup>++</sup>, total iron binding capacity (TIBC) and serum ferritin levels in H.pylori infected young adult female reporting at our tertiary care hospital presenting with the symptoms of dyspepsia.

**MATERIALS AND METHODS**

The study was carried out in the Department of Pathology, subjects of present case control study were selected from the indoor patients admitted in the medical wards of Indus Medical College Tando Muhammad Khan, from September 2015- August 2016. Prior permission was taken from the ethical review committee of the institute. Fifty controls and fifty cases (H.pylori positive) were selected for study. Study subjects were age matched, selected through non-probability (purposive) sampling. Inclusion and exclusion criteria were exercised. Adult female complaining of Epigastric complaints and dyspepsia and H.pylori positive of young age was the inclusion criteria. All volunteers were examined by female medical officer followed by a consultant physician. Volunteers were asked for blood sampling. 5 ml of venous blood was collected after aseptic measures from ante cubital vein. 2 ml was shifted to EDTA mixed tubes for hemoglobin, hematocrit and blood cell counts, and 3 ml was centrifuged at 3000 x rpm for ten minutes. Sera were separated to estimate serum ferritin, serum iron and total iron binding capacity (TIBC). Helicobacter pylori stool specific antigen (HpSA) was detected by Elisa assay kit (Fortess). Immulite immunoassay kit (Chemiluminescent system, UK) was used for serum ferritin detection. Reference range of serum ferritin was 5- 148 ng/ml for females. A young pregnant female taking multi vitamin and multi mineral pill was strict exclusion criterion. Female suffering from major systemic diseases was excluded. Female facilitators were appointed for complying with the study protocol. Cobas e 411 analyzer (Roche Diagnosis GmbH, Mannheim, Germany) was used for biochemistry analysis. A pre-designed pre structured proforma was used for data collection. Written informed consent was mandatory for study protocol. SPSS 22.0 (USA) was used for data analysis. Independent sample Student's t-test was used for comparison between groups for continuous variables. Confidence interval was defined significant at 95% (P≤ 0.05). Results were presented as mean ± standard deviation (SD) and graphs.

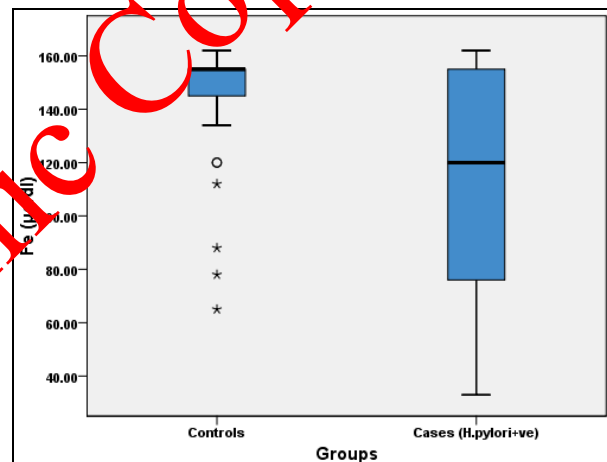
**RESULTS**

The present study included 100 normal healthy adult aged matched female. Table 1 shows the age distribution, hemoglobin (Hb), hematocrit (Hct), RBC counts, serum Fe<sup>++</sup>, TIBC and serum ferritin levels in controls and cases. The Hb, Hct, RBC counts, serum Fe<sup>++</sup>, TIBC and serum ferritin levels were decreased in H.pylori infected female compared to controls. Serum ferritin in controls and cases (H.pylori +ve) was noted as 140.8 ± 20.09 and

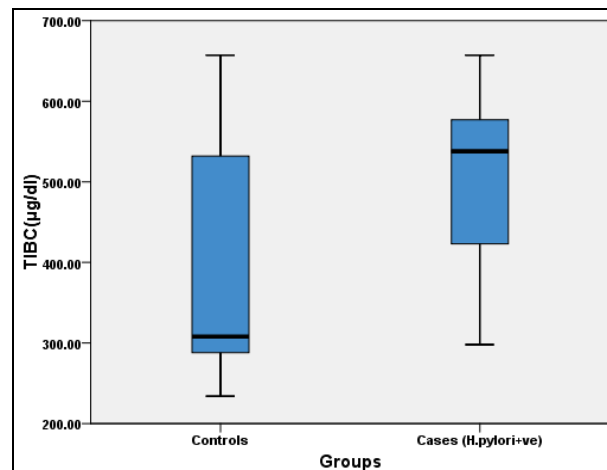
126.5 ± 35.02 ng/dl respectively (P=0.014). Box plot graph 1-3 show the serum Fe<sup>++</sup>, serum TIBC and serum ferritin levels in controls and cases (P<0.05).

**Table No.1: Clinicopathological findings in study population (n=100)**

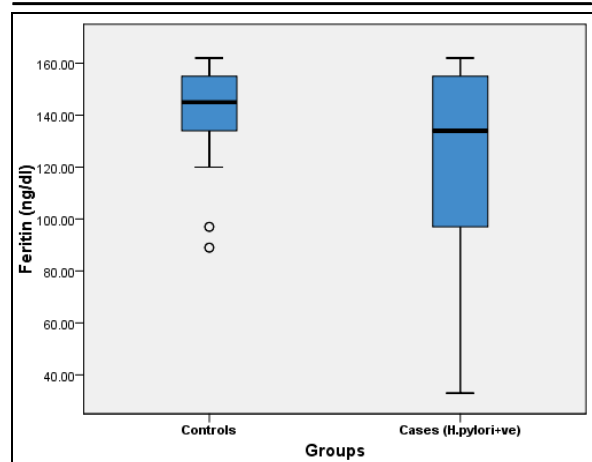
	Groups	Mean	SD	P-value
Age (years)	Controls	35.48	8.83	0.15
	Cases	33.30	3.97	
Hemoglobin (g/dl)	Controls	13.15	2.50	0.039
	Cases	12.51	3.82	
Hematocrit (Hct.) (%)	Controls	41.92	5.29	0.048
	Cases	39.16	8.19	
Red Blood Cell (10 <sup>6</sup> /μL)	Controls	4.25	0.22	0.0001
	Cases	3.95	0.53	
Serum Fe <sup>++</sup> (μg/dl)	Controls	152.72	6.11	0.0001
	Cases	116.92	42.39	
TIBC (μg/dl)	Controls	394.34	137.20	0.0001
	Cases	221.36	108.95	
Serum Ferritin (ng/dl)	Controls	140.80	20.09	0.014
	Cases	126.55	35.02	



**Graph No.1: Serum iron levels in controls and cases**



**Graph No.2. Serum TIBC levels in controls and cases**



**Graph No.3. Serum ferritin levels in controls and cases**

## DISCUSSION

The present is the first study being reported on the serum ferritin in *Helicobacter pylori* (*H. pylori*) infected young adult female from our tertiary care hospital. *H. pylori* are considered a risk factor of iron deficiency and low serum ferritin.<sup>14</sup> *H. pylori* now infect 50% population of World and are prevalent in the Pakistan and similarly the iron deficiency is very common in developing countries.<sup>15</sup> The present study reports low Hb, Hct, RBC counts, serum Fe<sup>++</sup>, serum TIBC and serum ferritin levels in *H.pylori* infected female compared to controls ( $P=0.014$ ). The findings of present study are in agreement with previous studies.<sup>16,17</sup> *H. pylori* stool specific antigen indicates the study subjects were suffering from active infection, this adds to the strength of present study. Previous studies<sup>18,19</sup> from developing countries have reported iron deficiency in *H. pylori* infected subjects; the findings support the present study. *H. pylori* infection is prevalent in developing countries, the reasons include poor sanitary conditions, poverty related problems, poor contaminated nutrition and life style habits. A previous review has indicated high prevalence of *H. pylori* infection from different Gulf countries. Studies from various countries reported high prevalence of *H. pylori* infection in developing countries.<sup>20</sup> The serum ferritin is major storage protein, also circulating in the body fluids, was found low in *H. pylori* infected young adult female in the present study. Serum ferritin is marker of iron status of body.<sup>21</sup> Concomitant inflammation is reported to affect the serum ferritin. In severe inflammatory conditions the serum ferritin, being an acute phase protein, is elevated may be  $>50$  ng/mL.<sup>22</sup> In present study, the serum Fe<sup>++</sup>, serum TIBC and serum ferritin levels were found decreased in *H.pylori* infected female, this occurs due to the disturbed gastric pH and hypochlorhydria resulting in defective iron absorption. Gastric atrophy and parietal cell damage induced by *H.pylori* add to the problem of iron deficiency.<sup>23</sup> Serum

ferritin was found significantly low in *H.pylori* infected young adult female, which is in agreement with previous studies.<sup>16,17</sup> However, a few studies<sup>24,25</sup> reported no such association of low serum ferritin and *H.pylori*; these conflicting results are most probably due to different demographics, dietary habits, and research bias. The findings of low serum ferritin in *H.pylori* infected cases are in agreement with previous studies.<sup>16-20</sup> The findings point towards the positive association of *H.pylori* infectivity and iron malabsorption in the present study. The major limitations of the present research study are; a small sample size and a particular ethnic group, hence the findings cannot be generalized to other settings. Also the inflammatory markers were not analyzed, but this was because of inclusion of young adult healthy study population. The strength of present study lies in its; first- young adult healthy female, 2<sup>nd</sup> – case control design, and 3<sup>rd</sup> – the *H.pylori* stool specific antigen was evaluated. The *H.pylori* stool specific antigen is a marker of active infection. The present study concludes much information has been accumulated on the issue and *H.pylori* infected female should be treated with *H.pylori* eradication therapy by physicians and be prescribed iron supplements.

## CONCLUSION

The present study reports low serum iron, low serum ferritin and low hemoglobin in *Helicobacter pylori* infected young adult female. Timely, therapeutic and preventive measures against *H.pylori* infection may prevent the iron deficiency, iron deficiency anemia and anemia related morbidities in female.

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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