

Iron Status in Pre-Eclampsia: A Case-Comparison Study

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ABSTRACT

Preeclampsia is one of the most leading causes of maternal mortality in developing countries. Many studies have demonstrated the relation between alteration of iron status and preeclampsia. The aim of the study was to assess the status of iron in preeclampsia. This case control study was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from July 2010 to June 2011. A total number of 100 pregnant women in the third trimester of pregnancy attending the Obstetrics & Gynaecology Department of Dhaka Medical College Hospital were selected purposively as study subjects. Among them 50 diagnosed cases of preeclampsia were selected as cases and 50 normal healthy pregnant women as controls. Serum ferritin and serum iron concentration were measured in all study subjects. The mean serum ferritin concentration in cases and controls were 95.06 ± 50.07 $\mu\text{g/l}$ and 45.56 ± 27.44 $\mu\text{g/l}$ respectively. Mean serum iron concentration in cases was 121.78 ± 41.93 $\mu\text{g/dl}$ and that in controls was 61.04 ± 24.18 $\mu\text{g/dl}$. The present study showed significant differences of mean serum ferritin and serum iron between cases and controls. The study revealed presence of significantly higher level of serum ferritin and serum iron in preeclamptic group.

Key words: Preeclampsia, serum ferritin, serum iron

Introduction

Preeclampsia is the most serious medical disorder of human pregnancy, which complicates about 5-10% of pregnancy worldwide¹. Approximately 10-15% of maternal mortality in developing countries are associated with preeclampsia². In Bangladesh, the incidence of preeclampsia is alarmingly high, about 16% of maternal deaths are associated with it³. Preeclampsia is still regarded as 'a disease of theories' and its etiology has remained poorly understood⁴. However, endothelial dysfunction has been considered to play a central role in the pathophysiology of preeclampsia⁵. In many studies alteration of iron status has been claimed as a factor for vascular endothelial cell damage of preeclampsia and its consequences⁶⁻⁸. Iron is essential to nearly all cells but the amount of iron required by

individual tissues varies during development. At the same time body must protect itself from free iron, which is highly toxic. Its toxicity comes from its propensity to generate free radicals that causes cell damage⁹. Alteration of iron status is related to increased oxidative stress and endothelial dysfunction. Increased oxidative stress is catalysed in presence of free transitional metal ions, particularly iron. Iron or iron species could be a factor in generation of oxidative stress in preeclampsia. Iron species released from ischemic placenta by destruction of red blood cells can initiate the process of lipid peroxidation to cause endothelial cell damage of preeclampsia⁶. In a developing country like Bangladesh, preeclampsia is one of the significant causes of maternal mortality. Therefore, preeclampsia and thereby maternal

mortality might be reduced through serial monitoring of serum iron status as a part of antenatal check-up. So the present study was designed to assess the status of iron in preeclampsia.

Materials & Methods

A case-comparison study was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from July 2010 to June 2011. A total number of 100 pregnant women in the third trimester of pregnancy were attending the Obstetrics & Gynaecology Department of Dhaka Medical College Hospital were selected purposively as study subjects. Among them 50 diagnosed cases of preeclampsia were selected as cases (age range 18 to 35 years) and 50 normal healthy pregnant women as controls (age range 18 to 32 years). Pregnant women with pre-existing hypertension, renal disease, liver disease, diabetes mellitus, some autoimmune diseases and haemoglobin disorder were excluded from the study by history, clinical examination and relevant laboratory investigations. With all aseptic precautions morning fasting blood samples were collected from all the study subjects for estimation of serum ferritin, serum iron concentration. Statistical analysis was performed by using computer based software, Statistical Package for Social Sciences (SPSS) for Windows version 14.0. Mean values of different parameters were compared to determine the differences between two groups by using Student's unpaired 't' test. For all statistical analysis, two tailed 'p' value <0.05 was considered as a lowest level of significance.

Results

The study showed that mean serum ferritin concentration in cases and controls were $95.06 \pm 50.07 \mu\text{g/l}$ and $45.56 \pm 27.44 \mu\text{g/l}$ respectively. There was highly significant difference of mean serum ferritin concentration between cases and controls ($p = 0.0001$) (Table - I). The study also showed that mean serum

iron concentration in cases was $121.78 \pm 41.93 \mu\text{g/dl}$ and that in controls was $61.04 \pm 24.18 \mu\text{g/dl}$. Mean serum iron concentration was found to be significantly higher ($p = 0.0001$) (Table - II) in cases compared to that of controls.

Table-I: Comparison of serum ferritin concentration between cases and controls:

Parameters	Case (n=50) Mean±SD	Control (n=50) Mean±SD	t value	p value
Serum ferritin ($\mu\text{g/l}$)	95.06 ± 50.07	45.56 ± 27.44	6.131	0.0001***
Range	12 - 154	10 - 110		

Student's unpaired 't' test was done as a test of significance

Table-II: Comparison of serum iron concentration between cases and controls

Parameters	Case (n=50) Mean±SD	Control (n=50) Mean±SD	t value	p value
Serum iron ($\mu\text{g/dl}$)	121.78 ± 41.93	61.04 ± 24.18	8.873	0.0001***
Range	23-154	22 - 122		

Student's unpaired 't' test was done as a test of significance

Discussion

Pre-eclampsia is one of the most important complications of pregnancy that is associated with increased maternal mortality and morbidity¹⁰. Approximately 50,000 women die each year from this complication worldwide². Numerous studies on etiology and biochemical variables in preeclamptic women have been carried out throughout the world. Among them alteration of iron status is identified as a risk factor for pathogenesis of preeclampsia by some researchers^{6,7}. Therefore, the present study has been undertaken to assess the iron status in preeclampsia. There was highly significant difference of mean serum ferritin and mean serum iron concentration between cases and controls. The result of the present study were in

accordance with other similar studies like Rayman et al.⁶ Recent study by Siddiqui et al.⁸ also revealed that serum ferritin and serum iron concentration were significantly higher ($p < 0.05$) in preeclamptic women in comparison to normal pregnant women which are similar to the findings of present study. However, Ugwaja et al.¹¹ in their study did not find significant ($p > 0.05$) difference between two groups. This result does not agree with the result of present study. From the above discussion it can be concluded that preeclamptic group had significantly higher level of serum ferritin and serum iron though the levels were within normal reference range in both groups. So It is needed to explore that whether increased level of serum ferritin and serum iron are associated with preeclampsia or not.

In conclusion, the present study revealed presence of significantly higher level of serum ferritin and serum iron in pre-eclamptic group. So elevated serum ferritin and serum iron concentration might play an important role in the etiopathogenesis of preeclampsia.

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