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Original Article

Status of Serum Iron Level in Preeclampsia

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Abstract

Background: Preeclampsia complicates 2-8% of all pregnancies and it is the most common medical complication associated with increased maternal and infant mortality and morbidity. In Bangladesh about 16% of maternal death occurs due to preeclampsia and eclampsia.

Objective: To assess the serum iron level in pregnant women with preeclampsia and normal pregnant women.

Methods: A case control study was conducted from January 2015 to December 2015 among 50 patients with preeclampsia as case. The results were compared with 50 apparently healthy pregnant control. Data were collected through the interview. All Statistical analysis done by using SPSS windows package to assess the serum iron level in difference between two groups were evaluated by student's unpaired t-test.

Results: The analysis revealed that serum iron level was significantly ($P < 0.001$) higher in pregnant women with preeclampsia than that of normal pregnant women.

Conclusion: In preeclampsia alteration of serum iron status when compared with healthy pregnant women. Excess iron increase lipid peroxidation. Early detection and supplementation to treat this deficiency may reduce the incidence of preeclampsia.

Keywords: Preeclampsia, serum iron level.

Introduction:

Preeclampsia is a multisystem disorder of unknown aetiology characterized by development of hypertension to the extent of 140/90 mm of Hg or more with proteinuria after 20th weeks of pregnancy in a previously normotensive and non-proteinuria patient.[1] Preeclampsia is a fatal medical disorder of pregnancy. It has been associated with adverse course and outcome of the pregnancy[2] resulting in increased maternal and infant mortality and morbidity.[1] World wide, preeclampsia and eclampsia are estimated to be responsible for approximately 14% maternal deaths per year.[3] Seven hundred and ninety maternal deaths per 100,000 live births have been reported due to preeclampsia. Its incidence in primigravidae is about 10% and in multigravidae is about 5%.[4] In Bangladesh, about 16% of maternal deaths are caused by preeclampsia and eclampsia.[5] Placental ischemia or hypoxia is widely regarded as a key factor of preeclampsia. However, in the presence of catalytic amounts of transition metal ions, particularly iron, which may arise in the ischemic placenta by destruction of red blood cells.[6] When tissues become ischemic reactive oxygen species such as superoxide and hydrogen peroxide are produced.[7] This radical and iron can initiate and promote the process of lipid peroxidation perhaps facilitated by the hyperlipidaemia. Iron are abundant in the placenta, are important in the production of free radicals hyperlipidemia and increase iron levels in the maternal

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compartment in preeclampsia could be responsible for causing oxidative stress in placenta.[8] On the basis of the above mentioned findings the present study to assess the levels of serum iron in women presenting with preeclampsia, compared to that in normal pregnancy.

Materials and Methods:

A case control study was conducted in the Department of Biochemistry Mymensingh Medical College in collaboration with Obstetries and Gynecology department of MMCH, from January 2015 to Dec 2015. According to selection criteria total 100 subjects were studied out of them 50 were case (Gr-I) and 50 were control (Gr-II). Purposive sampling was adopted for collecting data. Data was collected direct interview from patients. The study subjects were selected on the basis of presence of inclusion and exclusion criteria and their informed written consent were taken. For laboratory investigations, desired amount of blood was collected, processed and preserved for estimation of iron level. Data were processed and analyzed by computer Software SPSS version 20. Student's unpaired t-test was used to analyze the data between groups. For analytical tests, the level of significance was 95% confidence limit (P<0.05) was taken as level of significance All values were expressed as Mean ± SD.

Results:

The study showed that serum iron levels was higher in case when compared with control group.

Table-I: Comparison of mean age in the study population.

Age (years)	Group-I (Case) Mean ± SD	Group-II(Control) Mean ± SD	p -value
Age (20-40) Years	24.40 ± 4.18	24.46 ± 3.73	0.94^{ns}

In this study, age range was from 20 to 40 years for both case and control group. It was observed that the mean age of the Gr.I and Gr.II was 24.40 ± 4.18 and 24.46 ± 3.73 years respectively and the level of significance was 0.94. Thus difference in mean age was not significant between preeclamptic and apparently healthy pregnant control group.

Table-II: Comparison of blood pressure in the study population

Blood pressure (mmHg)	Group-I (Case) Mean ± SD (mm of Hg)	Group-II (Control) Mean ± SD (mm of Hg)	p- value
Systolic blood pressure	156.9 ±18.1	112.9 ± 9.9	<0.001**
Diastolic blood pressure	103.2 ±16.1	73.9 ±7.8	<0.001**

Systolic blood pressure

The study revealed that the systolic blood pressure was high in preeclamptic group and normal in apparently healthy pregnant control group. The mean systolic blood pressure of the Gr.I and Gr.II were 156.9 ± 18.1 and 112.9 ± 9.9 mm of Hg respectively. Thus, difference in mean systolic blood pressure was highly significant between Gr.I and Gr.II group (p<0.001).

Diastolic blood pressure

It was observed that the diastolic blood pressure was high in preeclamptic group and normal in apparently healthy pregnant control group. The mean diastolic blood pressure of Gr.I and Gr.II were 103.2 ± 16.1 and 73.9 ± 7.8 mm of Hg respectively. Thus, difference in mean diastolic blood pressure was highly significant between Gr.I and Gr.II group (<0.001).

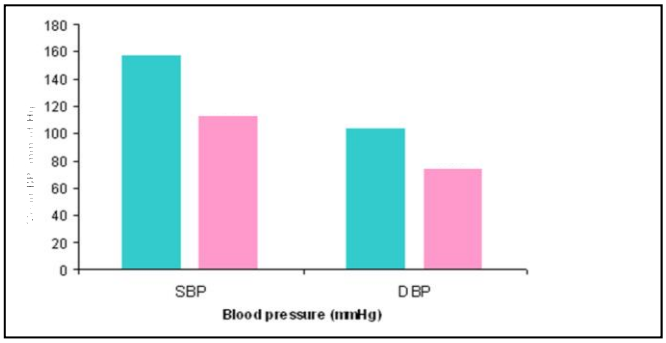

Figure-I: Comparison of mean SBP & DBP in the study population

Table-III: Comparison of gestational age in weeks in the study population

	Group-I (Case) Mean ± SD	Group-II(Control) Mean ± SD	p-value
Gestational weeks	30.5±5.2	28.6±5.0	0.064^{ns}

Table-IV: Comparison of gestational age in trimester in the study population

Trimester	Group-I (Case) No. (%)	Group-II(Control) No. (%)	p -value
2nd trimester	9(18.0%)	14(28.0%)	0.235^{ns}
3rd trimester	41(82.0%)	36(32.0%)	
Total	50(100.0%)	50(100.0%)	

In Gr.I group, out of 50 (case), 9 were 2nd trimester of pregnancy and 41 were 3rd trimester of pregnancy. In Gr.II group, out of 50 normal healthy pregnancy, 14 were 2nd trimester of pregnancy and 36 were 3rd trimester of pregnancy. Out of 50 case 41 (82.02%) were 3rdtrimester and 9(18.0%) were 2nd trimester. Thus, it was observed that in 3rd trimester of pregnancy patients were more prompt

to preeclampsia than 2nd trimester of pregnancy. Mean difference case and control is 30.5 ± 5.2 and 28.6 ± 5.0.

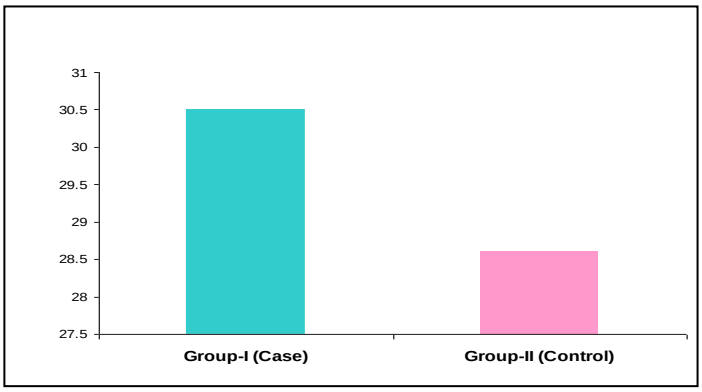

Figure-II: Comparison of mean gestational weeks in the study population

Table-V: Comparison of mean serum iron levels in the study population.

	Group-I (Case) Mean ± SD (µg/dl)	Group-II (Control) Mean ± SD (µg/dl)	p-value
Serum iron	156.9 ± 23.6	97.6 ± 25.5	<0.001**

The study revealed that serum iron level was higher in Gr.I group (preeclamptic women) as compared to Gr.II group (healthy control subjects). Serum iron level was below normal (normal level of serum iron= 50-150 µg/dl) in the normal pregnancy. The mean values of serum iron levels were 156.9 ± 23.6, 97.6 ± 25.5 µg/dl for the Gr.I and Gr.II groups respectively. The difference in mean serum iron levels were highly significant when compared between Gr.I and Gr. II groups (p<0.001).

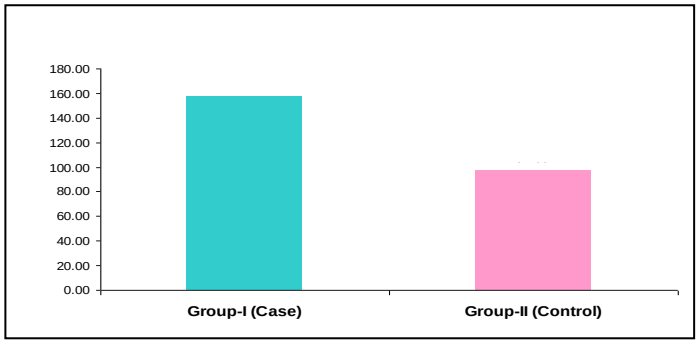

Figure-III: Comparison of mean serum iron levels in the study population

Discussion:

The Present case control study it was found that the mean concentration of serum Iron significantly increased in subjects with preeclampsia when compared to healthy controls (P < 0.001).[9,6] The age range was selected between 20-40 yrs for both case and control. As it was expected there was no statistical significance of difference in age distribution (P> 0.05). In present study systolic and diastolic blood pressure was normal in control group, but both were very high in the preeclamptic group. There was highly significant difference for both systolic and diastolic blood pressure between the case and control (P<0.001).

The present study noticed that the complication of preeclampsia were started on second trimester of gestation and severe in third trimester. Excess iron is postulated as causal factor in the oxidative stress in its radical form.[6] The ability of transferrin to bind with free iron in the circulation is decreased.[10]A decreased transferrin level would have led to iron-dependent OH^- formation from H_2O_2 in these patients. This may be a cause of the increase in lipid peroxidation in the plasma of the patients with mild to severe preeclampsia.[11] The intracellular iron storage ferritin protein can hold up to 4000 iron atoms. In normal pregnancy, serum ferritin concentration depicts replaceable iron storage that is in the liver, spleen and bone-marrow.[12] Serum iron and ferritin level changes during the pregnancy with advancing gestation and reaches at the minimum level during the third trimester of pregnancy as the storage form of iron are depleted because of feto-placental demand and required expansion of red cell mass.[8]

The present study shows that increased iron is important finding in women with preeclampsia. The rationale of routine iron supplementation in non-anaemic women is questionable. Also, routine investigation of serum iron status of pregnant women with high risk for preeclampsia as part of antenatal checkup may help to establish diagnosis of preeclampsia before appearance of its clinical manifestations and unnecessary use of iron in non-anaemic women should be avoided.[9]

Conclusion:

The present study was conducted to evaluate the serum iron status in pregnant women with preeclampsia. In this study serum iron level was significantly high in pre eclamptic group when compared to normal pregnant group. The present study revealed that increased iron is important finding in women with preeclampsia.. Therefore, it may be recommended that routine investigations of these biochemical parameters of pregnant women who attended the antenatal clinic for antenatal checkup should be carried out to detect preeclampsia. So, iron status of pregnant women could be assess before giving iron supplement as these may cause more harm than benefit

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