Original Article

To Assess Mean Serum Ferritin Level in Preeclamptic Patients

Asifa Khuwaja, Fozia Unar and Anila Rehman

ABSTRACT

Objective: To determine Mean serum ferritin level in preeclamptic patients.
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Obstetrics and Gynaecologic Unit 2, Civil Hospital Dow University of Health Sciences, Karachi from 19-04-2012 to19-10-2012.
Materials and Methods: The study included 200 women who presented with preeclampsia in gynae unit 2, or labour room. Patients who full filled the inclusion and exclusion criteria were included in study.
Results: Out of 200 patients means age in years was found 28.17 years. The mean gestational age in weeks was 32.42, while mean ferritin level was 217.34 which is higher than mean of normal pregnant woman.
Conclusion: It was concluded that mean of serum ferritin level was significantly increased in preeclamptic patients which may present with further complications like preterm delivery, increased risk of IUGR, genital tract infection and unfavourable outcome. Surplus iron is which is considered as casual factor in oxidative stress which in its radical state may be responsible for pathogenesis of preeclampsia. Therefore iron status of pregnant women with risk factors of preeclampsia should be assessed before giving iron supplements as these may cause moreharm than benefit.

Key Words: Serum ferritin, Preeclampsia, Pregnancy outcome.

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INTRODUCTION

Preeclampsia which is one of the most grave and life threatening disorder of human pregnancy.[1] It is multisystem disorder of unknown etiology characterized by symptoms of edema, protenuria and high blood pressure.[2]

Preeclampsia occurs in 6% of general population[3]. Nearly 10-15% of maternal deaths in under developed countries are associated with preeclampsia.[4]

Suspected risk factors are primiparity, maternal age, patients below age of 20 and above 35 yrs, black race, multiple gestations, hyddatiform mole, obesity and underlying renal disease.[5]

Preeclampsia is a disease which is progressive in nature with a different mode of presentation and different rate of progression in each patient.[6]

Hypertention, protienuria, excessive weight gain and edema are the clinical presentation of preclampsia.[7] Others include thrombocytopenia, hyperurecimia, abnormal liver enzymes and hemoconcentration[8].

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Generally 3-7% of pregnancies are complicated with preeclampsia. It results in failure of trophoblast invasion into myometrium and the maternal spiral arteries do not undergo their physiological vasodilation. In numerous studies iron status changes has been privileged as a causative factor for endothelial cell damage of preclampsia and concequences[9-10]. As iron is necessary for all cells but the quantity of iron needed by individual tissues is different for all cells during development. While at the same time body must secure itself from iron free redicals, which are highly toxic. Its perniciousness comes from its tendency to generate free radicals that causes cell damage[11]. This change of iron status is related to increased oxidative stress and endothelial dysfunction. Iron or iron species could be a factor for oxidative stress in preeclampsia. Iron radicals released from placental ischemia by devastation of red blood cells can start the process of lipid eroxidation to cause endothelial cell damage.[9]

In under developed countries, preeclampsia is one of the important cause of maternal mortality[12].

Its assumed that lipid peroxidation play important role in the cause of the disease[13]. Iron and hematin proteins, play important role as accelerator of lipid peroxidation in tissues[14]. Many studies have been carried out thought the world on the etiology of preeclampsia. In these studies alteration of iron status is recognised as a risk factor for pathogenesis of preeclampsia[15].

Its proved in studies that oxidative stress also occurs in preeclampsia.[16] Iron and other transitional metals,

which are exuberant in the placenta, are significant in the generation of free radicals[17]. Greater iron levels in the maternal compartment in preeclampsia could be accountable for oxidative stress in placenta[18]. Ferritin level has probable role in pathogenesis of preeclampsia. Serum ferritin concentration in mother is primarily a observation of maternal, iron status and a raised level has association with unfavorable outcome.[19] However, recent studies have shown that the risk of preterm delivery was increased in women with high second trimester serum ferritin concentration.[20]

Mean of serum ferritin in one of study is 48.33 ng/dl[3]. In physiology of pregnancy serum ferritin is decreased in third trimester of pregnancy as their stores of iron are used because of increased iron demamd in pregnancy and iron is needed by fetoplacental unit. While in preeclampsia elevated serum ferritin is observed in third trimester of pregnancy[21,22].

Increased maternal ferritin level leads to preterm delivery, restricted growth of fetus, unfavorable outcome, preeclampsia and also genital tract infection.[23]

Rationale of this study is to estimate the mean serum ferritin level in preeclamptic patients. If this found to be high than the normal range in these patients then strategy could develop to screen all preeclamptic patients.[24]

MATERIALS AND METHODS

Study was conducted after the approval from ethical committee college of physician and surgeons of Pakistan. Patients who fulfilled the inclusion criteria were enrolled in this study. Informed consent were obtained from all patients after explanation of study protocol. All the data were collected through structured proforma designed for this study. The data regarding age, parity, gestational age were taken. 5cc of blood samples were taken in a serum bottle for estimation of mean serum ferritin. serum ferritin level was estimated through CMIA procedure by using Siemens kit immulite 2000.

RESULTS

A total of 200 preeclamptic patients were selected with gestational age from 24 weeks onward till 42 weeks, admitted at obstetrics department CHK.

Table 1 shows, Out of 200 samples, means age in years was found 28.17 years, with an standard deviation of 5.68 years.

The mean gestational age in week was 32.42 with standard deviation of 4.88 , while the mean ferritin level was 217.34 with an standard deviation of 81.88 .

Preeclamptic patients were taken from all parity groups and most of them were falling in parity more than 4,as shown in table 2.

Table 2 shows, out of 200, most of the samples were at fifth parity , 37 (18.5), while only 24 (12) were found at 1st parity level.

In all age groups samples were taken raised ferritin level was found in age group bw 23-26 yrs as shown in table 3.

Table 3 shows, mean of ferrtin level was higher between age 23 – 26 years, however p-value 0.165 found from ANOVA, using F-test shows, there was no significant difference in mean level at different age groups.

Table shows, mean of ferrtin level was higher at po, parity, however p-value found from ANOVA, using F-test shows, there was no significant difference in mean level at different parity levels of gestational age, with p =0.653

Table 4 shows, mean of ferrtin level was higher between gestational age 31 – 35 weeks, however p-value found from ANOVA, using F-test shows, there was no significant difference in mean level at different levels of gestational age, with p = 0.383

Table 5 shows, mean of ferrtin level was higher at po, parity, however p-value found from ANOVA, using F-test shows, there was no significant difference in mean level at different parity levels of gestational age, with p =0.653

Table No.1: Mean and Standard Deviation of Parameters (n=200)

Parameters	Mean	Standard Deviation	Minimum	Maximum
Age in Years	28.17	5.68	18	38
Gestational Age in Weeks	32.42	4.88	24	40
Ferritin Level	217.34	81.88	85	350

Table No.2: Parity Group

Parity	n	%
Po	32	16.0
P1	24	12.0
P2	31	15.5
P3	21	10.5
P4	32	16.0
P5	37	18.5
P6	23	11.5
Total	200	100.0

Table No.3: Mean of ferritin levels with age group

Age Group	N	Mean	Standard Deviation	p-value
18 - 22 yrs	39	199.21	77.91	0.165
23 - 26 yrs	41	233.98	81.02	
>26 years	120	217.55	82.85	
Total	200	217.34	81.88	

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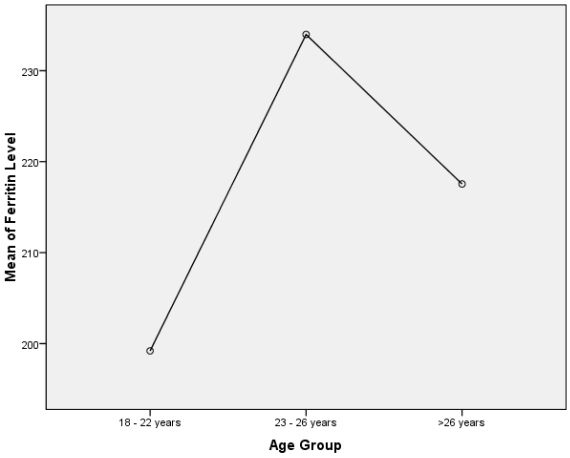

Figure No.1: Mean of ferritin levels with age group

Table No.4: Mean of ferritin levels with gestational age

Gestational Age	N	Mean	Standard Deviation	p-value
24 - 30 weeks	74	207.54	77.514	0.383
31 - 35 weeks	57	227.07	83.864	
>35 weeks	69	219.81	84.799	
Total	200	217.34	81.887	

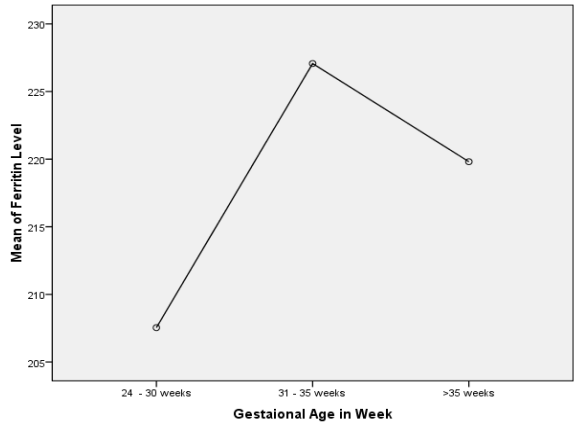

Figure No.2" Mean of ferritin levels with gestational age

Table shows, mean of ferrtin level was higher between gestational age 31 – 35 weeks, however p-value found from ANOVA, using F-test shows, there was no significant difference in mean level at different levels of gestational age, with p = 0.383

Table No.5: Mean of ferritin levels with parity

Parity	N	Mean	Standard Deviation	p-value
Po	32	231.31	87.233	0.653
P1	24	219.92	90.171	
P2	31	207.87	82.281	
P3	21	208.57	79.761	
P4	32	229.69	84.981	
P5	37	200.27	76.565	
P6	23	226.26	73.217	
Total	200	217.34	81.887	

Table shows, mean of ferrtin level was higher at po, parity, however p-value found from ANOVA, using F-test shows, there was no significant difference in mean level at different parity levels of gestational age, with p =0.653

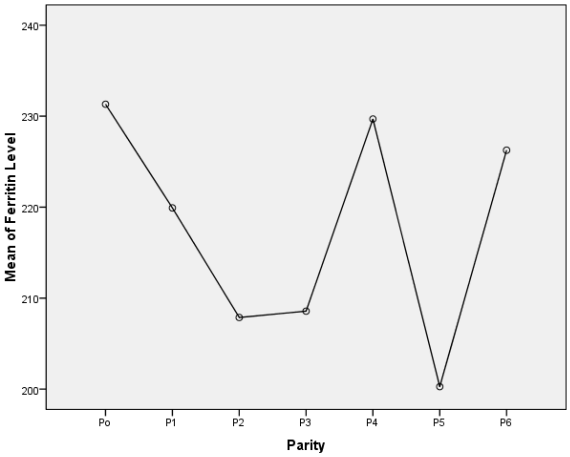

Figure No.3: Mean of ferritin levels with parity

DISCUSSION

Preeclampsia is one of the most important causes of maternal and fetal morbidity and mortality. Spite of huge studies and reaches, exact etiology of this disease is unknown. Metamorphosis of iron binding proteins like ferritin and transferrin, are exceptional in women with preeclampsia. The cause for the high serum ferritin in preeclampsia is undefined. In my study mean of serum ferritin level was seen in preeclamptic pregnant patients at gyne unit II civil hospital Karachi. Mean serum ferritin concentration was raised in preeclamptic patients than the normal range taken 48.33ng/dl.

In the study conducted at Dhaka Medical College from July 2010 to June 2011, It was a case comparison study total hundred women in third trimester of pregnancy were taken. Study showed that mean serum ferritin concentration in cases and controls were 95.06 ± 50.07 ug/l and 45.56 ± 27.44 ug/l respectively.[1] The study

conducted at faridpur medical college it was also case control study. Rational of this study was to appraise the connection of serum ferritin and iron with preeclampsia & eclampsia and its potential role in etiology of pre eclampsia.

In this study mean serum ferritin level in case and control group was 100.03 ± 123.52 µgm/L and 31.53 ± 20.86 µgm/L respectively which is highly significant ($p < 0.001$).

Numerous studies indicates ferritin & iron increases in preeclampsia & eclampsia which have a role as pro-oxidant enhancing lipid per oxidase activity and cause endothelial cell damage. Increased ferritin level has morbific role in development of preeclampsia acting as an acute phase reactant. While decreased ferritin level between 28-30 weeks may be associated with less incidence of preeclampsia.

Rayman et al. in their study showed that there was significant increase in serum iron, ferritin and transferrin saturation and decreased total iron binding capacity in the preeclamptic subjects, than normal controls.[9] Diminished serum feritin concentration indicates iron deficiency anemia, but increased serum ferritin concentration may not be associated with iron overload. Increased serum ferritin level increases blood pressure and aggravates preeclampsia. The excess iron and ferritin may cause endothelial injury by producing free radicals initiating the process of lipid per oxidation. In various studies shows serum iron parameters levels if measured in the earlier weeks of pregnancy may predict occurrence of preeclampsia and poor pregnancy outcome can be prevented to make early diagnosis. Then again iron supplements and increased iron stores have relation to maternal complications e.g. diabities in pregnancy and restricted fetal growth, increased oxidative stress during pregnancy.

So habitual investigation of iron status in women with high risk for preeclampsia & eclampsia should be part of antenatal checkup to establish diagnosis of pre eclampsia before its clinical manifestations and unneeded use of iron in a non anaemic pregnant woman can be stopped.

CONCLUSION

It was concluded mean of ferritin was significantly increased in preeclamptic women which may present with further complications like preterm delivery ,increased risk of IUGR, genital tract infection and unfavourable outcome .surplus iron is casual factor in oxidative stress ie; in radical states which is involved in pathophysiology of preeclampsia. That's why iron status of those pregnant women who are at risk of preeclampsia must be assessed before prescribing iron supplements because this iron may cause more harm than benifit.

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Author's Contribution:

Concept & Design of Study:	Asifa Khuwaja, Anila Rehman
Drafting:	Fozia Unar
Data Analysis:	Fozia Unar, Anila Rehman
Revisiting Critically:	Asifa Khuwaja, Fozia Unar
Final Approval of version:	Asifa Khuwaja

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

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