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TO STUDY THE BIOCHEMICAL AND HEMATOLOGICAL PARAMETERS IN PRE-ECLAMPSIA.

IMTEYAZ GANAI(MD)[1] SHAZIA JEELANI SAMOON(DGO)[1] PARVEEN NAFAE(MD)[1] ARIF KELAM(MD)[2] FAROOQ AHMAD GANIE(MS)[3]

DEPARTMENT OF GYNAECOLOGY AND OBSTETRICS, GOVERNMENT MEDICAL COLLEGE, SRINAGAR[1].
GENERAL MEDICINE[2] AND GENERAL SURGERY[3] SKIMS SRINAGAR KASHMIR INDIA,

Abstract:

To study biochemical and hematological parameters in pre-eclampsia.

Methods: *study was performed on two hundred pregnant (primigravida) women of age ranging between 20 to 25 years and having gestational age between 20 to 34 weeks. Hundred obstetric women were identified as having pre-eclampsia and hundred healthy pregnant subjects were taken as controls, having uncomplicated pregnancies and were normotensive throughout gestation and without proteinuria.*

KEY WORDS: *Pre-eclampsia, serum iron, urea, creatinine and hemoglobin.*

Introduction:

Pre-eclampsia is a multisystem disorder, unique to pregnant women after twenty weeks of gestation. It is progressive disease with a variable mode of presentation and rate of progression.[1] Hypertension, proteinuria, excessive weight gain and edema are classic clinical manifestations.[2] other features include thrombocytopenia, hyperuricemia, abnormal liver function tests and hemoconcentration.[3, 4]

In India the incidence of pre-eclampsia is reported to be 8-10% of the pregnancy.[5] It contributes significantly to the cause of maternal and perinatal mortality and morbidity.[6] It is the third leading cause of maternal mortality responsible for 17% of maternal deaths.[7,5]The dreaded complications associated with pre-eclampsia include; eclampsia, HELLP syndrome, pulmonary edema, abruptio placentae, postpartum circulatory collapse, acute renal failure, hepatic rupture, cerebral hemorrhage and visual disturbances. This condition is also a major cause of neonatal mortality and morbidity, both directly via intrauterine growth restriction and indirectly through its association with the placental abruption and the need for preterm delivery. Pre-eclampsia is defined as the blood pressure of $\geq$ 140/90 mmHg in a woman without a previous

history of arterial hypertension along with the presence of proteinuria ≥300 mg in a 24 hours urine collection or ≥ 1+ by a qualitative urine examination, after 20 weeks of pregnancy.[8]

The risk of pre-eclampsia significantly increases in women with nulliparous state; previous history of pre-eclampsia or eclampsia; those with either preexisting vascular diseases or conditions associated with increased cardiovascular risk, such as renal diseases, hypertension, diabetes, thrombophilia and obesity (body mass index > 29) ;[9] multiple gestation; molar pregnancy; african-american ethnicity.[10]

Aims and Objectives: to study the biochemical and hematological parameters in preeclampsia.

Material and methods: The present study was conducted in the Department of Obstetrics and Gynaecology, Government Lal Ded hospital, Srinagar, which is a 500 bedded tertiary care centre for Obstetrics and Gynaecology and is associated with Government Medical College, Srinagar (jammu & Kashmir). The conducted work was a prospective study. Total of 200 women (primigravidas) were studied among the women attending the antenatal clinic (out patient department) and those admitted in the wards. The subjects were allocated to two groups-

- **Study Group:** Included randomly selected 100 women with pre-eclampsia.
- **Control Group:** Included randomly selected 100 normotensive women.

1. Study Group

Inclusion Criteria:

- Non-smoker Primigravida with Singleton pregnancy.
- Age range between 20 and 25 years.
- Gestation age: 20 to 34 weeks calculated from the first day of last menstrual period.
- Pre-eclampsia which is defined as hypertension with significant proteinuria after 20 weeks of gestation. Hypertension: Blood pressure of ≥140/90 mmHg on at least two occasions 6 hours apart; Significant Proteinuria: urinary protein excretion of ≥300 mg/day quantitatively or ≥1+ on dipstick examination.

Exclusion Criteria:

- Previous history of hypertension and proteinuria before conception or 20 weeks of gestation.
- History of systemic illnesses like diabetes mellitus, renal disease, liver diseases.
- Multiple pregnancies.
- Eclampsia.
- History of hypertension without proteinuria.
- Women with history of recent blood transfusion. .

2. Control Group:

The women representing the control group were chosen from the women who fulfilled the above mentioned criteria but did not develop pre-eclampsia. They were normotensive, with no proteinuria.

The women included in this study were taken from outpatient department and from admission wards after 20 weeks. On development of pre-eclampsia and fulfillment of selection criteria they were enrolled in the study group while others which remained normotensive and fulfilled the selection criteria were allocated to the control group. The women were informed about the procedure and a verbal informed consent was taken before taking the sample. While evaluating the results of the study, relevant clinical data was collected from every patient, which included a detailed history, general, systemic and obstetric examinations and baseline investigations including ultrasonography (for confirmation of gestational age and to rule out any congenital anomaly) were performed.

Blood pressure was measured by the standardized sphygmomanometer from the right arm while the patient was in semi-recumbent position with the arm at the level of heart. The blood sample was taken from the ante- cubital vein of every patient and investigated for: hemoglobin(cyan-met hemoglobin method), bleeding time, clotting time, platelet count, kidney function test (KFT), liver function test (LFT), blood sugar , serum Iron (ferrozine method), urine for protein and microscopic examination.

Results and observations:

Mean age of control group was 23.1 ± 1.4 when compared to study group it was 21.5 ± 1.6, it shows that the mean age of study group was significantly low ($p < 0.001$). Edema was present in 83% of subjects among study group which was significantly higher ($p<0.001$) and family history of pre-eclampsia (6%) was significant in study group ($p<0.005$) as compared to control group. The mean ± SD hemoglobin (10.2 ± 0.6) of women in study group was significantly higher than the mean ± SD hemoglobin (9.4 ± 0.7) of women in control ($p<0.001$).Mean± SD platelet count (130300.0 ± 48845.6) in study group was significantly lower than control (148500.0 ± 39193.3) ($p<0.005$). The mean ± SD serum urea concentration in the study (27.8 ± 8.0 mg/dl) was significantly higher than that in the control (11.1 ± 2.2 mg/dl) ($p<0.001$). The same pattern was seen in the mean ± SD serum creatinine concentration which was significantly higher in study group (0.9 ± 0.2 mg/dl) than in the control (0.3 ± 0.1 mg/dl) ($p<0.001$).

Comparison of Kidney Function in the Studied Subjects			
KFT	Study	Control	p value
Creatinine (mg/dl)	0.9 ± 0.2 (0.4, 1.7)	0.3 ± 0.1 (0.1, 0.5)	0.000 (Sig)
Urea (mg/dl)	27.8 ± 8.0 (8, 46)	11.1 ± 2.2 (8, 18)	0.000 (Sig)

Mean ± SD serum bilrubin (0.9 ± 0.3) was significantly higher (p<0.001) in study group as compared to control group (0.5 ± 0.1). Mean ± SD serum iron (123.3 ± 10.7 µg/dl) was significantly higher (p<0.001) in study group than control (69.7 ± 15.5 µg/dl) group.

Comparison of serum Iron level in the Studied Subjects			
Fe	Study	Control	p value
S. Iron (µg/dl)	123.3 ± 10.7 (99, 145)	69.7 ± 15.5 (35, 103)	0.000 (Sig)

Discussion: Pre-eclampsia is one of the leading causes of maternal and fetal morbidity and mortality. Despite active research for many decades, the etiology of this disorder remains exclusive to human pregnancy is an enigma. Recent evidence suggests that there may be several underlying causes or predispositions leading to endothelial dysfunction and causing the signs of hypertension, proteinuria and edema findings that allow making the diagnosis of the syndrome of pre-eclampsia.[11, 12]

Present study was undertaken to evaluate haematological and biochemical parameters in pre-eclampsia.

The observations from present study has revealed an increase in the serum iron levels in cases of pre-eclampsia (study group) as compared to normotensive women (control group) with mean ± SD (123.3 ± 10.7 µg/dl) in former group and (69.7 ± 15.5 µg/dl) in later group which was statistically significant (p<0.001).

Our observations are in accordance with the work of **Samuels P et al 1987, [13]** who measured serum iron in 30 patients with pre-eclampsia and 24 normal pregnant women. The mean iron concentration was significantly higher in the group with pregnancy-induced hypertension (111 ± 26 micrograms/ml) than in the controls (69 ± 17 micrograms/ml) (p<0.001). Our results are also comparable to results of **Entman SS et al. (1983)[14]** observed Serum iron concentration was increased in women with toxemia of pregnancy (mean 135 mcg/dl) compared to normotensive parturient's (62 mcg/dl). In another similar study by **Rayman MP et al. (2002)[15]** studied serum samples from 40 pre-eclamptic women and matched with serum samples of pregnant control subjects, a number of iron status parameters were measured. Serum iron concentration was significantly higher in the pre-eclamptic patients than in control subjects. Similar observations were made by **Basher K et al. (2006)[16]** selected 82 women in the last half of pregnancy, between 17 to 40 years of age were selected for this purpose before any treatment was given in present pregnancy. Out of them 32 pregnant women were taken as control because they did not show any evidence of complication during the time of selection and 50 pregnant women were randomly selected as cases on the basic of having pre-

eclampsia. Mean value of serum iron was significantly increased in the pre-eclamptic women in comparison to controls.

Tasneem Zafar et al. (2008)[17]studied hundred pregnant women of age ranging between 15-35 years and having gestational age between28 to 34 weeks fifty obstetric patients were identified as having pre-eclampsia. Fifty healthy pregnant subjects were taken as controls, having uncomplicated pregnancies and were normotensive throughout gestation and without proteinuria .Results depict that the serum iron was significantly higher (P<0.001) in pre-eclamptic in comparison with control group.

The increase in serum iron observed in present study may be due to destruction of red blood cells from necrotic and hemorrhagic areas of ischemic placenta or from clinically silent, ongoing hemolytic reactions **Rayman et al. (2002),**[18] and **samuels et al. (1987).**[13]

In present study, increased hemoglobin concentration was observed in pre-eclamptic women than normotensive women (p <0.001).This observation is in accordance to study conducted by **Gupta S nanda et al.** (1997)[19] studied 50 patients with pre-eclampsia and the results were compared with 50 control cases mean reticulocyte counts, plasma free hemoglobin and unconjugated bilirubin levels were also higher in these patients.

Other hematological parameters like platelet count and bleeding time were significantly different in both the groups. In pre-eclamptic women platelet count was less and bleeding time was more than normotensive controls (p <0.001). Similar observations were found by **Bernadette F et al**.[20] **Milenko Ivankovic et al.** (1994)[21] analysed bleeding time and the platelet count in 41 patients with pre-eclampsia. Increased bleeding time was observed in patients with pre-eclampsia.The mechanism of thrombocytopenia in pre-eclampsia is increased platelet destruction, but the mechanism of platelet destruction is unclear. However, some evidence (elevated D-dimer) suggests that these patients have an underlying low grade disseminated intravascular coagulation.[20]

In present study serum bilirubin and renal function (serum urea and creatinine) test observed values where higher in pre-eclamptic women as compared to normotensive control (p<0.001). This observation is in accordance with **Girling JC et al.** (1997)[22] who conducted a prospective observational study of women with pre-eclampsia. The prevalence of elevated @liver function tests was significantly higher in the pre-eclampsia group (54%) than woman with gestational hypertension (14%). AST, ALT and bilirubin were each lower in uncomplicated pregnancy than the non pregnant laboratory reference ranges. **C. W. G. Redman et al.** (1997)[23] observed increased serum urea with advancing pre-eclampsia (p <0.001). The altered kidney function in pre-eclampsia may be due to decreased renal plasma flow (40%) and glomerular filtration rate (30%) associated with pre-eclampsia **S.ananth karumanchi et al.** (2005).[24]

CONCLUSION: Serum iron is significantly increased in pre-eclamptic than normotensive pregnant women,. Therefore prescribe iron preprations to pre-eclamptic pregnant woman only after checking serum iron status to prevent further aggravation of disease.

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