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Comparison of biochemical/haematological parameters in healthy vs preeclamptic females

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Abstract--Objectives: To evaluate and compare the Biochemical/Haematological parameters in healthy (pregnant subjects) vs preeclamptic females. Methodology: This descriptive cross-sectional study was planned/conducted at IBMS KMU Peshawar and the data was collected from the Dept. of Gynaecology & Obstetrics-Lady Reading Hospital Peshawar, from June 2019 to July 2020. One hundred thirty-eight pregnant subjects between the gestational ages of 26-30 weeks were included in the study. The subjects were divided into two cohorts; Patients with preeclampsia (Group I N=92) and a Normotensive Control Group; women with normal pregnancy (Control group N=46). Blood from the subjects was checked for Haemoglobin (Hb) and Platelet (PLT) levels and Body Mass Index (BMI) among other parameters. Blood was taken and analysed at the Hospital Lab via Cobas 6000 analyser. Data was analysed using SPSS version 26.0 for MacBook Pro. Results: Body mass index of PE

group was significantly higher compared to normal group ($p < 0.001$). Similarly, mean platelet counts and hemoglobin in PE group was lower as compared to normo-tensive group and the differences were statistically significant ($p < 0.05$). There was no significant difference in mean gestational age (weeks) between the two groups (27.83 ± 0.95 vs 27.78 ± 1.07 , $p = 0.33$) was observed. Conclusion: Maternal Hb and PLT levels were notably low in women with PE than normotensive pregnant women. Hb and PLT have the potential for use as predictive clinical test for preeclampsia and could possibly improve the pregnancy outcome.

Keywords---haemoglobin levels, platelet count, preeclampsia, body mass index, biochemistry.

Introduction

PE is a disorder of the pregnancy. The exact pathophysiology of preeclampsia is still not known but the angiogenesis defect and endothelial cell dysfunction are considered to be involved in pathogenesis of preeclampsia.¹ Almost 10% of the pregnancies are complicated by preeclampsia causing almost 70000 of deaths per year and greater loses of perinatal. Preeclampsia is characterized by hypertension of greater than 140 and 90 mm Hg and proteinuria of greater than 300 mg per 24 hours after 20th week of gestation.² Preeclampsia is also characterized by HELLP syndrome, in which there is Hemolysis, Elevated Liver enzymes, and Low Platelet count. Visual disturbances are due to cerebral edema.³ Preeclampsia is actually a syndrome caused by different factors such as immunologic, hematologic, genetic, and environment ones.⁴

Many haemostatic abnormalities have been noticed in association with high blood pressure disorder of pregnancy. Thrombocytopenia is the mainly frequent of these presented in 30% of patients who have preeclampsia. These pregnancies are furthermore associated with qualitative changes suggesting enlarged platelet revenue. There are an enlarged quantity of megakaryocytes in the bonemarrow, reduced platelet duration and an enlarged integer of immature platelets seen in the peripheral blood smear. Numerous studies considered that the greater than before platelet consumption is owing to dispersed intravascular coagulation while other proposed an immune mechanism.⁵

The degree of thrombocytopenia increases with the brutality of the syndrome. Lesser is the number of platelets, the larger is the maternal and fetal morbidity and mortality.⁶ Severe thrombocytopenia is distinct by platelet calculation less than $< 1 \text{ lac} / \text{mm}^3$ points in the direction of the harshness of the sickness where in majority of cases deliverance is advised as the platelet number goes on to decline after that.⁶ The aim of the study is to evaluate the levels of PLT count, Hb level, urinary protein and BMI in women with preeclampsia and compare it with normotensive pregnant women to better understand its role in preeclampsia.

Methodology

This descriptive cross-sectional study was planned/conducted at IBMS KMU and the data was collected from the Dept. of Gynaecology & Obstetrics-Lady Reading Hospital Peshawar, from June 2019 to July 2020. One hundred thirty-eight pregnant subjects between the gestational ages of 26-30 weeks were included in the study. The subjects were divided into two cohorts; Patients with preeclampsia (Group I N=92) and a Normotensive Control Group; women with normal pregnancy (Control group N=46). Ethical approval for the study was taken from the Institutional Ethical Research Board (IERD) at Post Graduate Medical Institute, LRH (Reference No: 201/LRH/MTI). Informed consent was taken from the study participants after the explaining the study objective. Blood from the subjects was checked for Haemoglobin (Hb) and Platelet (PLT) levels and Body Mass Index (BMI) among other parameters. Blood was taken and analysed at the Hospital Lab via Cobas 6000 analyser. Participant's demographic and clinical information including demographic data, BMI, urinary albumin, Hb and PLT count were recorded. Hematological parameters like hemoglobin and platelet count were determined in pathology laboratory LRH after their authorization. Two ml of blood from each sample was transferred to EDTA tube for the determination of Hb and PLT count. BMI was calculated using weight /height in (meter)². The presence of proteins in urine was determined using dipstick method in hypertensive women. Data was analysed using SPSS version 26.0 for MacBook Pro.

Results

The mean and SD for age of patients in PE group was lower (20.83±1.96 years) in contrast to Control group (22.93±2.11 years) with statistically significant ($p<0.001$). The mean gestational age in PE Group (27.83 ± 0.95 weeks) and control Group (27.78 ± 1.07 weeks) was observed Table 1. The mean BMI in pre-eclamptic group was 34.49 ± 5.74 Kg/m² as compared to normal group 25.94 ± 3.31 Kg/m² and the difference was statistically significant. Comparing both groups on the BMI it was revealed that majority of women (72.82%) in the pre-eclamptic group were obese. It was observed that increase in body mass index increased the threat of preeclampsia. The p-value was less than 0.001 which was highly significant. Both groups were also compared based on some routine examination; pre-eclamptic group had lower platelets count and haemoglobin level compared to control group and the differences were statistically significant.

Table 1. Biochemical/Haematological & other Parameters of the study participants

Characteristics		Total	PE Group N=92	Control Group N=46	p Value
Gestational Age (week)		27.83±0.99	27.86±0.95	27.78±1.07	0.664
BMI		31.70±6.46	34.58±5.67	25.95±3.32	<0.001
PLT Counts		191423.91±92871.47	153755.43±82493.51	266760.87±61598.77	<0.001
Hb Level		10.37±1.59	9.65±1.19	11.80±1.30	<0.001
Urinary Protein	No Protein	46 (33.33)	0.00	46(100.00)	
	++	9 (6.52)	9(9.78)	0.00	<0.001
	+++	82 (59.42)	82(89.13)	0.00	
	++++	1 (0.72)	1(1.09)	0.00	

The hemoglobin levels in both groups of study population are given in the Table 2. It has been experiential that most of women in the pre-eclamptic group were anemic. The p value is less than 0.001, which is highly significant.

Table 2. Hb (gm%) in PE vs Controls

Hb (gm%)	PE Group (N)	Control Group (N)
8-9	50	1
10-11	30	14
>12	12	31
Total	92	46
	P value <0.0001	

Table 3 shows on comparing women with first pregnancy among both study groups on the basis of normal, low, and very low platelets count it was found that that the number of women with very low platelets count were 29 (31.5%) in PE group. In Control group 45 (97%) of the pregnant women had platelet count >150 thousand / μ l. The p-value was 0.003 which was less than 0.005 which showed a significant association.

Table 3. PLT Count in PE vs Controls

Platelet Count thousand/ μ l	PE (N)	Control (N)
< 100 thousand/ μ l Very low	29	0
100-150 thousand/ μ l Low	30	1
>150 thousand/ μ l Normal	33	45
Total	92	46
	p Value =0.003	

Discussion

The women in pre-eclamptic were found to be more obese (34.49±5.74kg/m²) in contrast to women in control group (25.94±3.31kg/m²). According to another study which compared normal and low BMI at registration illustrated that the

familiarity of pregnancy with preeclampsia was distinctly condensed with BMI of $< 20\text{kg}/\text{m}^2$.⁷ In our study also, the threat of preeclampsia was ever more increasing with increasing BMI. Thrombocytopenia is one of the most familiar hematological changes found in preeclampsia.⁸ The platelet count according to our result was $(1.54 \pm 8.24 \text{ thousand}/\mu\text{l})$ in PE group as compared to control group $(4.50 \pm 7.84 \text{ thousand}/\mu\text{l})$. Severity of preeclampsia and thrombocytopenia experiential are strongly linked which depicts that the thrombocytopenia is directly comparative to the adversity of the PE. A number of studies considered that the greater platelet consumption is owing to dispersed intravascular coagulation while other proposed it as immune mechanism.^{9,10} The degree of thrombocytopenia increases with severity of preeclampsia. Lesser the number of platelets count, greater the number of maternal and fetal mortality.¹¹ Severe thrombocytopenia is characterized by the platelet count of less than $< 1 \text{ lac}/\text{mm}$, points in the direction of severity of the sickness where in majority of cases in early delivery is advised as the number of platelets goes on decline after that.

Thrombocytopenia is distinct as platelets count of not as much of $100,000/\mu\text{l}$ was found in 11.6% of all patients with preeclampsia as reported by Romero R.¹² In the supposed study the comparative possibility of albumin in urine, thrombocytopenia, and the degree of high blood pressure to maternal and prenatal ending were projected. Thrombocytopenia was the most important attribute to the incidence of abdominal pain, the maintenance of schistocytes in the peripheral smear, liver dysfunction, albumin in urine and the need for blood transfusion. A similar study from India reported a substantial lessening in platelet count when compared 30 normal pregnant women with 90 pre-eclamptic women.¹³ Both groups were also compared based on some routine examination; PE group had low Hb level compared to control group and the differences were statistically significant. Preeclamptic group showed significantly higher urinary protein excretion than control group ($p < 0.001$). It can be concluded that low Hb and urinary protein can be correlated with severity of PE.

Conclusion

Maternal Hb and PLT levels were notably low in women with PE than normotensive pregnant women. Preeclamptic group showed significantly higher urinary protein excretion than control group ($p < 0.001$). It can be concluded that low Hb, PLT and urinary protein can be correlated with severity of PE.

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