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RESEARCH ARTICLE

Study of liver function test, renal function test and platelet count in hypertensive disorders of pregnancy

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ABSTRACT

Background: The World Health Organization (WHO) systematically reviews maternal mortality worldwide, and in developed countries, 16 percent of maternal deaths were due to hypertensive disorders. Heightened surveillance permits prompt recognition of ominous changes in blood pressure, critical laboratory findings, clinical signs and symptoms. **Objectives**: 1) To obtain laboratory values of liver function test, renal function tests, platelet count in hypertensive disorder of pregnancy (HDP). 2) To correlate the obtained laboratory values with the clinical severity among the HDP. **Methodology**: In this study, total 100 patients attending antenatal OPD and labor room at TMCH having either gestational hypertension (GH), preeclampsia (PE) or eclampsia (E) were included irrespective of age and parity. Their blood sample was collected and sent for laboratory investigations. LFT, RFT, platelet count reports were collected and analysed. **Results**: Out of 100 study population - 71 cases were primigravida and 29 were multigravida. In liver function tests – total bilirubin was found statistically significant with the mean values 0.54 ± 0.25 in gestational hypertension (GH), 0.62 ± 0.37 in preeclampsia (PE), 0.92 ± 0.36 in eclampsia (E). In renal function tests – blood urea and serum uric acid were statistically significant. Mean value of blood urea was 10.35 ± 3.68 in GH, 14.64 ± 4.98 in PE, 13.92 ± 3.99 in E. Mean value of serum uric acid was 3.41 ± 0.40 in GH, 3.60 ± 0.87 in PE, 4 ± 1.30 in E. Mean values of platelet count was lower in PE (1.30 ± 0.08), E (1.15 ± 0.07) than GH (4.53 ± 2.33). **Conclusion**: Deranged LFT, RFT, low platelet count aid in diagnosis of HDP and correlate with severity of hypertension, helping in providing better management to both the mother and the baby.

Keywords: Liver function tests, renal function tests, platelet count, gestational hypertension, preeclampsia, eclampsia.

Hypertensive disorders of pregnancy (HDP) encompass chronic hypertension, gestational hypertension, preeclampsia and eclampsia syndrome, and preeclampsia superimposed on chronic hypertension. Hypertensive disorders complicate 5 to 10 percent of all the pregnancies [1]. According to National High Blood Pressure Education Programme working group (NHBPEP) [2] and the American college of obstetricians and gynaecology (ACOG), hypertension in pregnancy is defined as a systolic BP of 140mm of Hg or higher and diastolic BP of 90mm of Hg or higher after 20 weeks period of gestation in women with previously recorded normal blood pressure. Preeclampsia is a multisystem disorder damaging cardiovascular system, kidneys, liver and brain. It is an important cause of maternal and fetal morbidity and mortality worldwide. Early detection is important to reduce the maternal and fetal morbidity and mortality.

Abnormal liver function test (LFT) occurs in 20-30% of pregnancies complicated by preeclampsia and is associated with poor maternal and fetal outcome [3,4]. The incidence of HELLP (hemolysis, elevated liver enzyme levels, low platelet count) syndrome is approximately 0.6 % overall in pregnancy and 10-20% of patients with severe pre-eclampsia develop HELLP syndrome [5].

The most common cause of acute kidney injury (AKI) in

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pregnancy is preeclampsia. Serum creatinine >90 umol/l is indicative of renal impairment in pregnancy [6]. Plasma uric acid concentration is typically elevated in preeclampsia. The elevation exceeds due to the reduction in glomerular filtration rate and enhanced tubular reabsorption [7]. Hyperuricemia - sensitivity to detect preeclampsia ranged from 0 to 55%, and specificity was 77 to 95% [8].

Due to vasospasm and micro thrombosis or hemorrhage due to severe thrombocytopenia, acute pulmonary oedema, cerebral oedema, placental abruption, liver hemorrhage/ rupture, chronic hypertension may develop. Maternal death may occur due to disseminated intravascular coagulation, acute renal failure, and stroke. Placental insufficiency may lead to intra uterine growth retardation, premature labor and intra uterine fetal death [9].

Objectives of the study: 1) To obtain laboratory values of liver function test, renal function tests, platelet count in HDP. 2) To correlate the obtained laboratory values with the clinical severity among the HDP.

Materials and methods

The study design was a prospective observational study conducted at tertiary care hospital - Tezpur Medical College and Hospital, Tezpur. It included 100 pregnant patients beyond 20weeks of gestational age with hypertension attending the hospital during period of one year from 1st of August 2021 to 31st of July 2022.

Inclusion criteria:

1. Gestational hypertension
2. Preeclampsia
3. Eclampsia

Exclusion criteria:

1. Chronic hypertension and superimposed preeclampsia or eclampsia
2. Bleeding disorders
3. Thromboembolic episodes
4. Diabetes mellitus
5. Auto immune disorders
6. Patients on long term treatment with steroids, anticoagulants, antiepileptics, antiplatelets.

All the antenatal patients fulfilling inclusion criteria were considered for the study. The consent was taken and the details filled in the proforma after thorough history taking and examination. Blood sample was drawn from the cephalic vein and 3 ml of blood sent in each EDTA vial and clot vial for platelet count estimation, and LFT, RFT investigations respectively. Follow up was done and all the reports collected for analysis.

Statistical analysis: After collecting the data it was entered in MS Excel Windows 10. Statistical analysis was done in SPSS 23. Continuous data were expressed in terms of mean and standard deviation. ANOVA test or Student t test was used for test of association for continuous variables. P value of <0.005 is considered statistically significant.

Ethical issues: The study was conducted after obtaining ethical clearance according to the ethical committee guidelines and protocol. No ethical issue related to animal or human experimentation was noted during the study.

Results

Out of 100 cases, maximum cases (40%) belonged to the age group of 21-25 yrs. Similar result was noted among the

Table 1: Age distribution

Age in years	Gestational hypertension N (%)	Preeclampsia N (%)	Eclampsia N (%)	Total N (%)
≤ 20	17 (23%)	2 (14.3%)	08 (66.7%)	27 (27%)
21-25	31 (42%)	6 (42.8%)	03 (25%)	40 (40%)
26-30	18 (24.2%)	4 (28.6%)	01 (8.3%)	23 (23%)
31-35	7 (9.4%)	2 (14.3%)		09 (09%)
>35	1 (1.4%)			01 (01%)

Table 2: Parity distribution

Parity	Gestational hypertension N (%)	Preeclampsia N (%)	Eclampsia N (%)	Total N (%)
Primigravida	53 (59%)	08 (57%)	10 (83%)	71 (71%)
Multigravida	21 (41%)	06 (43%)	02 (17%)	29 (29%)

Table 3: Gestational age at the time of delivery

Gestational age in weeks	Gestational hypertension N (%)	Preeclampsia N (%)	Eclampsia N (%)	Total N (%)
< 33+6 wks	01 (1.3%)	00	02 (17%)	03 (03%)
34 – 36+6 wks	14 (19%)	06 (43%)	04 (33%)	24 (24%)
≥ 37 wks	59 (79.7%)	08 (57%)	06 (50%)	73 (73%)

Table 4: Liver function tests

Liver function test	Gestational hypertension Mean ± SD	Preeclampsia Mean ± SD	Eclampsia Mean ± SD	P value
LDH (U/L)	430.22 ± 116.26	561.21 ± 21.36	548.75 ± 41.13	0.00
ALKP (U/L)	218.41 ± 108.28	423.85 ± 68.71	457.67 ± 67.66	0.00
AST (U/L)	19.74 ± 10.62	47.92 ± 3.79	43.83 ± 3.89	0.00
ALT (U/L)	15.93 ± 7.84	28.57 ± 3.20	28.33 ± 2.27	0.00
T. Bilirubin (mg/dL)	0.54 ± 0.25	0.62 ± 0.37	0.92 ± 0.36	0.0002*

Table 5: Renal function tests

Values in mg/dL	Gestational hypertension Mean ± SD	Preeclampsia Mean ± SD	Eclampsia Mean ± SD	P value
Blood Urea	10.35 ± 3.68	14.64 ± 4.98	13.92 ± 3.99	0.0001*
S. Creatinine	0.57 ± 0.17	0.58 ± 0.22	0.64 ± 0.23	0.48
S. Uric acid	3.41 ± 0.40	3.60 ± 0.87	4 ± 1.30	0.01*

cases of gestational hypertension and preeclampsia. But in eclampsia group, maximum (66.7%) cases were aged ≤ 20yrs (table 1). 71 out of 100 cases were primigravida (table 2). 73 out of 100 cases delivered at ≥ 37 weeks of gestational age (table 3).

Liver function test (LDH, ALKP, AST, ALT, total serum bilirubin), renal function test (blood urea, serum uric acid, creatinine) and platelet count evaluation was done. Total bilirubin, blood urea and serum uric acid values were found increasing according to the severity of disease and statistically significant (table 4,5,6).

Discussion

We studied liver function tests, renal function tests and the platelet count in total 100 hypertensive mothers categorizing into gestational hypertension/ preeclampsia/ eclampsia. Incidence of GH, PE, E in our study is 74%, 14%, 12% respectively which was similar to the study of Sadia et al [10] and Manoranjan R et al[11]. Incidence of GH rising over recent years acknowledges the early diagnosis, proper management, good follow up and timely referral to higher centre reducing the burden of preeclampsia and eclampsia.

Majority (40%) of study population is 21-25 years old. Similar findings were observed in the study of Meghal Mehta et al [12], TA Gudeta et al [13], and Sadia et al [10]. 71% study population constitutes primigravida of our study which was similar to the study of Jaya et al [14] and Mirzaei et al [15]. Primigravida being at high risk than multigravida as per studies done till date considering exposure to chorionic villi for the first time. 73% study population delivered at ≥ 37 weeks of gestational age. The strict surveillance, early diagnosis, timely intervention has altogether improved the survival of the pregnancy induced hypertensive mothers and their babies, helping continue the pregnancy to the term gestation (at least to 37 weeks of gestation) and have a delivery at term gestation.

PE and E are severely involved in end organ damage having effect on liver elevating the level of liver enzymes. The mean values of liver function tests – LDH, ALKP, AST, ALT, serum total bilirubin are seen to be higher in PE and E than GH which is comparable to the findings of Sonal et al [16] and Sadia et al[10]. The mean values of renal function tests – blood urea, serum creatinine, serum uric acid are raised in PE and E than GH and similar findings are observed in the study of Vyakaranam et al [17], and Sadia et al [10] due to end organ damage involving kidney in PE and E. Low platelet count is mainly found in PE and E due to consumptive coagulopathy. Tejeswini KK et al [18], Damani et al [19], Aruna et al [20] amd N Sharma et al [21] are also observed similar findins in their studies.

Table 6: Platelet count

Parameters	Gestational hypertension Mean ± SD	Preeclampsia Mean ± SD	Eclampsia Mean ± SD	P value Mean ± SD
Platelet count (lakhs/cu mm)	4.53 ± 2.33	1.30 ± 0.08	1.15 ± 0.07	0.00

Conclusion

Hypertensive disorders of pregnancy are the most common leading cause of maternal and fetal morbidity and mortality. Early detection helps us manage and prevent the complications. The raising trend of values of LFT, RFT and decreasing platelet count can alarm us towards deteriorating condition, increasing severity of the disease. Follow up values can be the best guide for further management. These tests are easily available and carry great help, thus should be done in all pregnant women.

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Conflict of interest: None. **Disclaimer:** Nil.

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