Original Article

Indian Journal of Pathology: Research and Practice
Volume 5 Number 2, May - August 2016
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.5216.21

Study of Biochemical Parameters in Pregnancy Induced Hypertension (PIH)

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Abstract

Hypertension is one of the common medical complications of pregnancy and contributes significantly to maternal and perinatal morbidity and mortality. Hypertension is a sign of an underlying pathology which may be pre-existing or appear for the first time during pregnancy. Various Biochemical changes like increase in serum Bilirubin, serum uric acid, LDH, AST, ALT enzymes are seen. *Aims and Objectives:* Evaluation of Biochemical parameters like serum Bilirubin, serum uric acid, LDH, AST, ALT enzymes in PIH. To identify the early Biochemical parameters predictive of preeclampsia and HELLP (Hemolysis, Elevated Liver enzymes and Low Platelet syndrome) syndrome. *Materials and Methods*: A two year study from Aug 2011 to July 2013 was carried out in the Dept. of pathology ESIMC, Bangalore on 100 PIH cases. Biochemical parameters were estimated in all the cases. p values for all parameters were statistically derived and evaluated. *Results:* Total of 100 cases were included in the study. 37 were mild GH (Gestational Hypertension), 9 cases were severe GH, 29 cases were mild preeclampsia and 25 cases were in severe preeclampsia group. Mean value of serum uric acid, LDH and serum Bilirubin in severe preeclampsia was 6.58±5.63, 438.84±483.3 and 0.63±1.04 respectively. Raised LDH, AST, ALT enzymes were observed in severe preeclampsia with a mean value of 31.00±62.05 and 55.60±133.94 in ALT and AST respectively. *Conclusion:* Raised values of Biochemical parameters could prompt progression of PIH and possibility of adverse outcome. Therefore estimation of Biochemical parameters can be considered as an early, simple and rapid procedure in the assessment of severity of pre-eclampsia and to prevent progression to HELLP syndrome and DIC (Disseminated Intravascular Coagulation).

Keywords: Hypertension; Preeclampsia; Eclampsia; Biochemical Parameters.

Introduction

Pregnancy Induced Hypertention (PIH) is defined as hypertension that develops as the direct result of the gravid state. It includes i) Gestational hypertension ii) Preeclampsia iii) Eclampsia. PIH is one of the most common causes of both maternal and neonatal morbidity. It is a multisystem disorder, seen in pregnant women after twenty weeks of gestation. It is a progressive disease with a variable rate of progression [1]. Classical clinical manifestations are hypertension, proteinuria, excessive weight gain and edema [2]. Other features of PIH includes thrombocytopenia, hyperuricemia, abnormal liver function tests and hemoconcentration [3,4].

The incidence of pre-eclampsia in India is reported to be 8-10% of the pregnancy[5]. It is the third leading cause of maternal mortality comprising of 17% of maternal deaths [5,6].

HELLP syndrome was identified as a distinct clinical entity by Dr. Louis Weinstein in 1982. HELLP syndrome is characterized by hemolysis on peripheral blood smear with serum lactate dehydrogenase >600 IU/L; serum aspartate aminotransferase >70 IU/L; and platelet count <100,000/μL [7].

Aims and Objectives

Evaluation of Biochemical parameters like serum

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Bilirubin, uric acid, LDH, AST, ALT in PIH.

To identify the early Biochemical parameters predictive of preeclampsia and HELLP syndrome.

Material and Methods

The study was carried out in the Department of Pathology, ESIC-MC PGIMSR, Rajajinagar, Bangalore from October-2011 to September-2013. One hundred cases diagnosed as PIH with Blood Pressure of ≥140/90 mm of Hg detected after 20th week of gestation were included in the study. Clinical details were collected from all cases. The cases with pre-existing hypertension and associated co morbid diseases such as diabetes mellitus, auto immune disorders, Idiopathic Thrombocytopenic purpura, neoplastic diseases, liver diseases, Gout, heart diseases and cases on anti-coagulants were excluded from the study.

PIH Cases were Classified in to Following Categories

Gestational Hypertension

1. Mild gestational hypertension. (BP 140/90 to 160/ 110 mm of Hg without proteinuria).
2. Severe gestational hypertension.(160/110mm of Hg without proteinuria.

Preeclampsia

1. Mild preeclampsia. (BP 140/90 to 160/110 mm of Hg with proteinuria.
2. Severe preeclampsia.(160/110mm of Hg with proteinuria.

After obtaining consent, under aseptic precaution, venous blood was collected in plain vacutainer tube. Biochemical parameters like serum Bilirubin, serum uric acid, LDH, AST, ALT were done in a fully automated Biochemical analyser COBAS INTEGRA-400. In suspected cases of HELLP syndrome platelet count was done for confirmation.

Statistical Methods

Analysis of variance (ANOVA), Chi-square/ Fisher Exact test has been used .

Statistical Software

SAS 9.2, SPSS 15.0 were used .

Results

One hundred cases diagnosed as PIH were analysed for Biochemical parameters. Of 100 cases 45% of the patients were of the age group 26-30 years. (Table 1) The age of the youngest patient was 19 years and that of oldest was 35 years.

21 to 25 years is the commonest age group for gestational hypertension (G H), both mild (16 cases) and severe (four cases). An equal number of severe G H was also seen in the 26 to30 age group. Mild and severe pre-eclampsia was more frequent in the 26 to 30 age group, (16 and 11cases respectively). This probably indicates that severity of complications increases with the age of the patient (Table 2).

Of the hundred PIH cases, Sixty one cases (61%) were primigravida and remaining Thirty nine cases(39%) were of multi gravida.

In the present study both GH and mild preeclampsia cases were asymptomatic whereas 9% of the cases with severe preeclampsia had headache followed by giddiness (3%), epigastric pain (3%) and blurring of vision (3%).

One case(2.7%) of mild Gestational hypertension (GH), two cases (22.2%) of severe GH, three cases (10.3%) of mild preeclampsia and 13 cases (52%) of severe preeclampsia had uric acid level >5.7 mg/dl with p value of 0.122 (Table 3).

Two cases(5.4%) of mild GH, one case (11.1%) of severe GH, one case (3.4%) of mild preeclampsia and six cases (24%) of severe preeclampsia had LDH levels more than 600 U/L with P –value of 0.195. One case had LDH level of 1331 U/L (Table 4).

Table 1: Age wise distribution of cases

Age in years	Number of patients	%
16-20	07	07.0
21-25	39	39.0
26-30	**45**	**45.0**
31-35	9	9.0
Total	100	100.0

Table 2: Table showing age wise distribution of various categories of PIH cases

Age in years	Mild GH (n=37)		Severe GH (n=9)		Mild Preeclampsia (n=29)		Severe Preeclampsia (n=25)	
	Number	%	Number	%	Number	%	Number	%
16-20	2	5.5	-	-	2	6.8	3	12
21-25	**16**	**43.2**	**4**	**44.4**	10	34.5	**9**	**36**
26-30	14	37.8	4	44.4	**16**	**55.3**	**11**	**44.0**
31-35	5	13.5	1	12.2	1	3.4	2	8.0
Total	37	100.0	9	100.0	29	100.0	25	100.0

Table 3: Table showing Serum uric acid in various categories of PIH

Serum uric acid(mg/dl)	Mild Gestational hypertension		Severe Gestational hypertension		Mild Preeclampsia		Severe Preeclampsia	
	Number	%	Number	%	Number	%	Number	%
<2.5	1	2.7	1	11.1	0	0.0	1	4.0
2.5-5.7	35	94.6	6	66.7	26	89.7	11	44.0
>5.7	**1**	**2.7**	**2**	**22.2**	**3**	**10.3**	**13**	**52.0**
Total	37	100.0	9	100.0	29	100.0	25	100.0

Table 4: Table showing Serum LDH in various categories of PIH

LDH(U/L)	Mild GH		SevereGH		Mild Preeclampsia		Severe Preeclampsia	
	Number	%	Number	%	Number	%	Number	%
<250	20	54.1	4	44.4	20	69.0	12	48.0
250-600	17	45.9	5	55.6	9	31.0	13	52.0
>600	**2**	**5.4**	**1**	**11.1**	**1**	**3.4**	**6**	**24.0**
Total	37	100.0	9	100.0	29	100.0	25	100.0

Table 5: Table showing Serum Bilirubin in various categories of PIH

Serum Bilirubin(mg/dl)	Mild GH		SevereGH		Mild Preeclampsia		Severe Preeclampsia	
	Number	%	Number	%	Number	%	Number	%
0-1.2	37	100.0	9	100.0	28	96.6	23	92.0
>1.2	**0**	**0.0**	**0**	**0.0**	**1**	**3.4**	**2**	**8.0**
Total	37	100.0	9	100.0	29	100.0	25	100.0

Table 6: Table showing Serum ALT and AST in various categories of PIH

Study variables	Mild GH	Severe GH	Mild Preeclampsia	Severe Preeclampsia	P value
ALT	15.00±4.64	17.89±9.8	16.86±8.05	31.00±62.05	0.240
AST	22.92±9.29	20.56±8.37	20.48±5.97	55.60±133.94	0.196

Only one case (3.4%) of mild preeclampsia and two cases(8%) of severe preeclampsia had Serum bilirubin level more than 1.2 mg/dl with p value of 0.670. (Table 5).

Three cases(12%) of severe preeclampsia had ALT levels of >48U/L with p value of 0.240 and AST levels of > 70uU/L with p value of 0.196 (Table 6).

Two cases were confirmed as HELLP syndrome with raised LDH , AST and ALT enzymes and low platelet count.

Discussion

PIH is one of the leading causes of maternal and foetal morbidity and mortality. The pathogenesis of PIH is still unclear. Recent evidence suggests that there may be several underlying causes or predisposing factors leading to endothelial dysfunction and causing the signs of hypertension, proteinuria and edema leading to pre-eclampsia and eclampsia [8,9].

In the present study a total of 100 PIH cases referred to the Department of pathology from ANC clinic were evaluated for Biochemical parameters. Majority of the cases were in the age group of 26-30 years with mean of 25±3.02 which is comparable to Vamsheedhar et al [10], Shivakumar S et al [11]and Prakash J et al [12]. studies with mean age of 24.57±3.46, 24.3 and 24.75±3.360 respectively, however in Onisai et al study he observed that the mean age of PIH was 29.8 years [13].

In the present study 61% of PIH were of primigravidae and 53% of cases were preeclampsia as compared to other studies like Prakash et.al. with 44% [12], Audibert et al. with 53.5% [14] and Jahromi et al. with 56% of cases [15].

Serum Uric acid

In the present study 52% of pre-eclamptic cases were having uric acid levels more than 5.7 mg/dl. However, in the study done by Prakash J, raised uric acid levels was seen in 100% of cases [12].

Serum Bilirubin

In the present study only 8% of the severe pre-eclamptic patients showed increase in serum Bilurubin levels more than 1.2 mg/dl. But in Prakash J study there was increase in serum bilirubin levels in 73% of cases [12].

LDH

In our study LDH was increased in 24% of severe preeclampsia where as in Prakash et al study it was increased in only 9.7% [12].

AST & ALT

In the present study AST & ALT were increased in only 12% of severe preeclamptic cases where as in Prakash J et al study AST & ALT were increased in 38% and 68% of the cases respectively [12].

Two cases were confirmed as HELLP syndrome with raised LDH , AST and ALT enzymes and low platelet count.

Conclusion

Raised values of Biochemical parameters could prompt progression of PIH and possibility of adverse outcome. Therefore estimation of serum uric acid, Bilirubin, LDH, AST and ALT enzymes can be considered as an early, simple and rapid procedure in the assessment of severity of pre-eclampsia and to prevent progression to HELLP syndrome and DIC.

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