e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2023; 15(11); 405-409

Original Research Article

A Study to Assess the Maternal and Perinatal Outcomes among Women with Pregnancy Induced Hypertension with Normal and High Serum LDH Levels

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Received: 10-05-2023 Revised: 12-06-2023 / Accepted: 22-07-2023
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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the maternal and perinatal outcomes among women with pregnancy induced hypertension with normal and high serum LDH levels.

Material & Methods: This was a prospective observational study conducted in Department of Obstetrics and Gynaecology for one year. 100 patients were studied in present study.

Results: The maximum number of patients of pre-eclampsia were from age group 20-24 years (52%), next being 25-29 years (32%). Maximum number of cases was primigravida (52%), G2 were (32%), G3 were (11%). Maximum number of cases was > 38 weeks of gestation (48%), cases between 36-38 weeks were 26% and between 32-34 weeks were 14%. In our study with serum LDH <600 with urine albumin 2+ was in 7 patients, 1+ in 15 patients, nil in 10 patients, traces in 5 patients and 3+ in 8 patients. Serum LDH between 600 to 800 with urine albumin 1+ was in 7 patients, 2+ was in 8 patients and nil was in 5 patients. Serum LDH >800 with urine albumin 1+ and 2+ was 9 patients each, with 3+ and nil in 1 patient each. P value is 0.001 which was statistically significant. In our study serum LDH <600 had abruption with PPH, DIC, eclampsia and PPH were noted and p value was 0.80 which was statistically not significant. In our study serum LDH <600 had a IUGR in 3 patients, fetal distress in 2 patients, neonatal death in 2 patients. Serum LDH between 600-800 had IUGR and LBW in one patient each. Serum LDH with >800 had IUGR in 2 patients. P value was 0.512 which was statistically not significant.

Conclusion: Higher LDH levels are indicative of maternal and fetal complications. higher serum LDH levels more than 500 IU/L to 600 to 800 IU/L have closer association with severe preeclampsia. Pre-eclampsia patients with raised LDH levels should be closely monitored.

Keywords: Preeclampsia, Eclampsia, LDH (Lactate Dehydrogenase), Pregnancy Induced Hypertension.

Introduction

Pregnancy causes various cardiovascular and metabolic changes in the mother's body of which change in the blood pressure is considered one significant change. Ten million women develop preeclampsia each year around the world. [1] Preeclampsia is characterized by hypertension and proteinuria occurring after 28 weeks of gestation. It complicates 5%–8% of all pregnancies. [2] Across the world, around 76,000 pregnant women die each year from preeclampsia and related hypertensive disorders. And the number of babies who die from these disorders is thought to be on the order of 500,000 per annum. [3]

Preeclampsia is a multisystem disorder and carries substantial risks for both fetus and mother with a subsequent increase in the perinatal and maternal morbidity and mortality. [4] The maternal mortality rate is as high as 14% in developing countries. [5,6] The fetal mortality rate varies from 13-30%. In India, the incidence of preeclampsia is reported to be 8-10% among the pregnant women. [7,8] Studies have shown that LDH activity and gene expression are higher in placentas of pre-eclampsia than normal pregnancy. [9]

The analysis of biochemical markers particularly markers related to vascular dysfunction such as LDH, AST, uric acid may enrich the ability to predict and prevent preeclampsia in near future. [10] Lactate dehydrogenase (LDH) is an intracellular enzyme which converts pyruvic acid to lactic acid during glycolysis. LDH gene expression and activity are higher in placentas of preeclampsia than normal pregnancy. LDH has five is forms and among this LDHA4 seen in preeclampsia is most responsive to hypoxia. Elevated levels of LDH indicates cell damage and dysfunction. The major stimulants for

LDH and its product, lactate, are pH and hypoxia. Hypoxia, when encountered in preeclampsia, increases glycolytic rate thereby increasing the activity of LDH which catalyses' the reversible reaction of pyruvate to lactate. [11,12]

This reaction largely occurs in anaerobic glycolysis (or hypoxic conditions) indicating fatigue in normal persons as lactate accumulates. Preeclampsia produces potentially lethal complications including placental abruption, hepatic failure, acute Renal failure and cardiovascular collapse. The analysis of a combination of biomarkers particularly markers related to vascular dysfunction such as LDH may enrich the ability to predict and prevent preeclampsia in near future. [13] Hence, serum LDH levels can be used to assess the extent of cellular death and thereby the severity of disease and can be of help in making decisions regarding the management strategies to improve the maternal and fetal outcome.

Therefore this study aimed to study of maternal and perinatal outcomes among women with pregnancy induced hypertension with normal and high serum LDH levels.

Material & Methods

This was a prospective observational study conducted in Department of Obstetrics and Gynaecology, PMCH, Patna, Bihar, India for one year. 100 patients were studied in present study.

Inclusion Criteria

- Pregnant women between 18-35 years,
- Singleton pregnancy,
- ≥20weeks of gestation with pregnancy induced hypertension

Exclusion Criteria

- Pregnant women with hypertension developing at or less than 20weeks of gestational age, those who develop gestational diabetes mellitus during this pregnancy, those with pre-existing diabetes mellitus type 1 or 2, thyroid disorder, epilepsy, renal or liver disorder

Methodology

About 150 pregnant women in the third trimester were included in this study. These women were divided into 5 groups with 30 in each group and the groups were as follows:

• Group 1: Healthy Normotensive women (Control group)
• Group 2: Gestational hypertension
• Group 3: Mild Pre-eclampsia
• Group 4: Severe Pre-eclampsia
• Group 5: Eclampsia.

Serum LDH levels were obtained from an intravenous sample from these 150 subjects. These subjects were also divided into three sets according to serum LDH levels as follows

• Set A: 800 IU/L.
• Set B: 600-800 IU/L
• Set C: >800 IU/L.

Serum lactate dehydrogenase levels was estimated in all the subjects. Collection of blood sample for estimation of LDH levels: Four ml venous blood was drawn under aseptic precautions from all subjects in a red vacutainer from antecubital vein. Serum was separated by centrifugation and used for estimation of LDH levels enzymatically by autoanalyzer.

All these pregnant women were followed until delivery and early postpartum period and babies were observed till early neonatal period. Maternal and neonatal outcomes were also noted.

Statistical Analysis

Statistical analysis was made using SPSS version 21.0, categorical data was compared between two groups by using Chi-square/Fisher exact test and quantitative data was compared by Student t-test. For multi-group comparison, One-way analysis of variance (ANOVA) was used.

Results

Table 1: Distribution of age, gravida status and Gestational age (weeks)

Age groups	**N**	**%**
<20	10	10
20-24	52	52
25-29	32	32
>30	6	6
Gravida status		
Primi	52	52
G2	32	32
G3	11	11
>G4	5	5
Gestational age (weeks)		
32-34	12	12
34-36	14	14
36-38	26	26
>38	48	48

The maximum number of patients of pre-eclampsia were from age group 20-24 years (52%), next being 25-29 years (32%). Maximum number of cases was primigravida (52%), G2 were (32%), G3 were (11%). Maximum number of cases was > 38 weeks of gestation (48%), cases between 36-38 weeks were 26% and between 32-34 weeks were 14%.

Table 2: Urine albumin according to LDH

Urine albumin	LDH(IU/l)<600	LDH(IU/l)600-800	LDH(IU/l)>800	P Value
1+	15	7	9	0.001
2+	17	8	9	
3+	8	2	1	
Nil	10	5	1	
Traces	5	3	0	
Total	55	25	20	

In our study with serum LDH <600 with urine albumin 2+ was in 7 patients, 1+ in 15 patients, nil in 10 patients, traces in 5 patients and 3+ in 8 patients. Serum LDH between 600 to 800 with urine albumin 1+ was in 7 patients, 2+ was in 8 patients and nil was in 5 patients. Serum LDH >800 with urine albumin 1+ and 2+ was 9 patients each, with 3+ and nil in 1 patient each. P value is 0.001 which was statistically significant.

Table 3: Maternal outcome according to LDH

	LDH(IU/l)<600	LDH(IU/l)600-800	LDH(IU/l)>800	P Value
	N	N	N	
Abruption with PPH	1	0	0	0.80
DIC	1	0	0	
Eclampsia	1	0	0	
PPH	1	2	1	

In our study serum LDH <600 had abruption with PPH, DIC, eclampsia and PPH were noted and p value was 0.80 which was statistically not significant.

Table 4: Perinatal Outcome according to LDH

	LDH(IU/l)<600	LDH(IU/l)600-800	LDH(IU/l)>800	P Value
	N	N	N	
Fetal distress	2	0	0	0.512
IUD	1	0	0	
IUGR	3	1	2	
LBW	1	1	0	
MSL	1	0	0	
Neonatal death	2	0	1	
Premature	1	0	0	

In our study serum LDH <600 had a IUGR in 3 patients, fetal distress in 2 patients, neonatal death in 2 patients. Serum LDH between 600-800 had IUGR and LBW in one patient each. Serum LDH with >800 had IUGR in 2 patients. P value was 0.512 which was statistically not significant.

Discussion

Pregnancy induced hypertension (PIH) is a common complication in pregnancy, affecting more than 5-10% pregnancies worldwide. [14] Increased awareness and the widespread use of screening methods have led to increased recognition of the problem. In Asia the incidence of PIH is around 5-8%. [15] Preeclampsia is a clinical condition of pregnancy characterized by hypertension, and proteinuria. It is a multisystem disorder affecting nearly every organ and system in the human body. Abnormal placentation, endothelial dysfunction, immunological intolerance and oxidative stress are some of the causes attributed to the development of PIH. [16] PIH is associated with increased maternal morbidity and mortality. It can lead to complications like eclampsia, placental abruption, acute renal failure, pulmonary oedema in the mother. It is also associated with increased foetal complications like growth restriction, foetal distress, hypoxic ischaemic encephalopathy and it may sometimes lead to perinatal mortality. [17]

The maximum number of patients of pre-eclampsia were from age group 20-24 years (52%), next being 25-29 years (32%). Similar findings were noted by Jaiswar et al. [18] Maximum number of cases was primigravida (52%), G2 were (32%), G3 were

(11%). Similar findings were noted by Singh P et al. Pre-eclampsia is a multisystem disorder, unique to pregnant women after twenty weeks of gestation. [19] It is progressive disease with a variable mode of presentation and rate of progression. [20] Pre-eclampsia is one of the leading causes of maternal and fetal morbidity and mortality. [21] In India incidence of preeclampsia as recorded from hospital statistics vary widely from 5-15%. [22] Sarkar et al [23] concluded in their study, the main cause of preeclampsia is due to elevated levels of serum LDH and serum GGT which indicates the tissue damage is related to endothelial vascular damage

Kiren K Malik et al [24] studied the correlation of Lactic dehydrogenase levels with severity of preeclampsia. A total of 120 pregnant women with preeclampsia (60 with mild and 60 with severe preeclampsia) and 60 healthy normotensive controls were studied. The study showed a statistically significant increase in terms of LDH and liver enzymes ($p<0.05$) in patients with severe preeclampsia. Maximum number of cases was > 38 weeks of gestation (48%), cases between 36-38 weeks were 26% and between 32-34 weeks were 14%. Jaiswar et al [25], showed similar results of low gestational age (P=0.25) and low birth weight (P= 0.019) with rising levels of serum LDH. He et al [26], study also proved that serum LDH were significantly higher with babies born between the gestational period of 24-29 weeks versus 30-35 weeks versus 36-40 weeks.

In our study with serum LDH <600 with urine albumin 2+ was in 7 patients, 1+ in 15 patients, nil in 10 patients, traces in 5 patients and 3+ in 8 patients. Serum LDH between 600 to 800 with urine albumin 1+ was in 7 patients, 2+ was in 8 patients and nil was in 5 patients. Serum LDH >800 with urine albumin 1+ and 2+ was 9 patients each, with 3+ and nil in 1 patient each. P value is 0.001 which was statistically significant. In our study serum LDH <600 had abruption with PPH, DIC, eclampsia and PPH were noted and p value was 0.80 which was statistically not significant. In our study serum LDH <600 had a IUGR in 3 patients, fetal distress in 2 patients, neonatal death in 2 patients. Serum LDH between 600-800 had IUGR and LBW in one patient each. Serum LDH with >800 had IUGR in 2 patients. P value was 0.512 which was statistically not significant. In a prospective study by Qublan et al [27] 111 preeclampsia women and 60 normotensive controls were included in the study. The symptoms and complications of preeclampsia along with foetal outcome were analyzed according to the levels of LDH. A significant association of serum LDH levels with severe preeclampsia was demonstrated. Increase in the incidence of perinatal deaths was observed in patients with increasing levels of serum LDH levels. Serum LDH is the earliest marker in blood during hypoxia and oxidative stress. It is raised in cases of pre-eclampsia and eclampsia. Detection of high-risk patients with increased levels of LDH mandates close monitoring, prompt and correct management to decrease both maternal and foetal morbidity and mortality. Estimation of serum Lactate Dehydrogenase can be used as a prognostic marker for preeclampsia and eclampsia.

Conclusion

Higher LDH levels are indicative of maternal and fetal complications. higher serum LDH levels more than 500 IU/L to 600 to 800 IU/L have closer association with severe preeclampsia. Pre-eclampsia patients with raised LDH levels should be closely monitored.

References

1. Preeclampsia Foundation. Preeclampsia and Maternal Mortality: a Global Burden, 2013.
2. Lain KY, Roberts JM. Contemporary concepts of the pathogenesis and management of preeclampsia. JAMA 2002;287:3183-6.
3. Kuklina EV, Ayala C, Callaghan WM. Hypertensive disorders and severe obstetric morbidity in the United States. Obstet Gynecol . 2009;113:1299-306
4. Norwitz ER, Hsu CD, Repke JT. Acute complications of preeclampsia. Clin Obstet Gynecol 2002;45:308-29
5. Sibai BM. Maternal and perinatal outcome in 254 consecutive cases. Am J Obstet Gynecol 1990;163(3):1049-54.
6. Sibai BM, Sarinoglu C, Mercer BM. Pregnancy outcome after eclampsia and long-term prognosis. Am J Obstet Gynecol 1992; 166(6):1757-61.
7. Nodler J, Moolamalla SR, Ledger EM, Nuwayhid BS, Mulla ZD. Elevated antiphospholipid antibody titers and adverse pregnancy outcomes: analysis of a population-based hospital dataset. BMC Pregnancy Childbirth. 2009;9(1):11.
8. Gynecology and Obstetrics preeclampsia. 2016.
9. Tsoi SCM, Zheng J, Xu F. Differential expression of lactate dehydrogenase isozymes (LDH) in human placenta with high expression of LDH-A4 isozyme in the endothelial cells of pre-eclampsia villi. Placenta 2001;22(4):22-6.
10. Hak J, Un-Nisa N, Gupta S. LDH Levels in Pregnancy and its Association with Severity of the Disease and Feto-maternal Outcome in Pre-eclampsia and Eclampsia. Jk science. 2015; 17 (3): 110-13.
11. Lu H, Forbes RA, Verma A. Hypoxia-inducible factor 1 activation by aerobic glycolysis implicates the Warburg effect in carcinogenesis. J Biol Chem. 2002; 277 (26) :23111-5.

12. Lu H, Dalgard CL, Mohyeldin A, McFate T, Tait AS, Verma A. Reversible inactivation of HIF-1 prolyl hydroxylases allows cell metabolism to control basal HIF-1. J Biol Chem 2005;280(51):41928–39.
13. Kamath R, Nayak R, Shantharam M. Serum Uric acid level in preeclampsia and its correlation to maternal and fetal outcome. Int J Biomed Res 2014;5(1):22.
14. Lo JO, Mission JF, Caughey AB. Hypertensive disease of pregnancy and maternal mortality. CurrOpinObstet Gynecol. 2013 Apr;25(2):124-32.
15. John H, Hypertensive disorders in pregnancy In: Cunningham F, Hauth JC., Leveno KJ., Larry G, Dwight R, Catherine Seditors. Williams Obstetrics. 23rd ed. New York: McGRAW-HILL Medical Publishing Division ; 2009. p.761-808.
16. Bansal V, Damania K. Hypertensive disorders in pregnancy In: Arias F, editor. Arias' Practical guide to High-Risk Pregnancy andDelivary. 4th ed. New Delhi: Reed Elsevier India (P) Ltd; 2014.p.186
17. Bhawna MS, Hypertensive disorders. In: Renu M, editor. Ian Donald's Practical obstetric problems. 7th ed. New Delhi: BI publication; 2007. P.166-167.
18. Jaiswar SP, Gupta A, Sachan R, Natu SN, Shaili M. Lactic dehydrogenase: a biochemical marker for preeclampsia– eclampsia. The Journal of Obstetrics and Gynecology of India. 2011 Dec 1;61(6):645-8.
19. Singh P, Gaikwad HS, Marwah S, Mittal PR, Kaur C. Role of serum lactate dehydrogenase in pregnancy induced hypertension with its adverse feto-maternal outcome-a case-control study. J Clin Diagn Resc. 2018 May 1;12(5).
20. Dutta DC. Textbook of Obstetrics. 7th rev ed. New Central BookAgency Priv. Ltd. 2014: 219-40.
21. Shah MR. Hypertensive disorders in pregnancy. 1st edn published by Jaypee. 20 07 1-10.
22. Mackey AP, Berg CJ, Atrash HK. Pregnancy related mortality from preeclampsia and eclampsia. Am J Obstet Gynecol. 2001; 97(4) :533-8.
23. Sarkar PD, Sogani S. Evaluation of serum lactate dehydrogenase and gamma glutamyl transferase in preeclamptic pregnancy and its comparison with normal pregnancy in third trimester. Int J Res Med Sci. 2013;1(4):365-8.
24. Malik KK, Akmal N, Akhtar N. Co-relation of lactic dehydrogenase levels with severity of pre-eclampsia. Biomedica. 2007;23(July-December):107-10.
25. Jaiswar SP, Gupta A, Rekha S. Lactic Dehydrogenase: a biochemical marker for preeclampsia and eclampsia. J Obstet Gynecol India.2011;61(6):645-8.
26. Shu He, Bremme K, Kallner A. Increased concentrations of lactate dehydrogenase in pregnancy with preeclampsia: a predictor for birth of small-for-gestational-age infants. Gynecol Obstet Invest. 1995;39:234-8.
27. Qublan HS, Ammarin V, Bataineh O, Al-Shraideh Z, Tahat Y, Awamleh I, Khreisat B, Nussair B, Amarin ZO. Lactic dehydrogenase as a biochemical marker of adverse pregnancy outcome in severe pre-eclampsia. Medical science monitor: international medical journal of experimental and clinical research. 2005 Jul 25;11(8):CR393-7