Medical Laboratory Journal
Online ISSN: 2538-4449
Golestan University of Medical Sciences

Serum lactate dehydrogenase levels in pregnant women with and without preeclampsia

Yanglem Ajitkumar Singh [1], Kshetrimayum Roshita Devi [2*], Sangeeta Naorem [3], Victoria Kshetrimayum [3], Sunie Laishram [3], Niketa Ashem [3]

1. Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, India
2. Department of Biochemistry, Shija Academy of Health Sciences, Imphal, Manipur, India
3. Department of Biochemistry, Regional Institute of Medical Sciences, Imphal, Manipur, India

* Correspondence: Kshetrimayum Roshita Devi. Department of Biochemistry, Shija Academy of Health Sciences, Imphal, Manipur, India.
Tel: +917005025942; Email: kshetriroshita@gmail.com

Abstract

Background: Preeclampsia, a hypertensive disorder of pregnancy, affects 10% of pregnancies, causing maternal and fetal complications. It is associated with complications such as elevated serum lactate dehydrogenase (LDH) levels. LDH is an intracellular enzyme that increases in response to cellular death. Since preeclampsia leads to cellular death, serum LDH levels may reflect the severity of preeclampsia and serve as a guide in patient management. This study aims to estimate serum LDH levels in women with preeclampsia and those without, and compare the levels between the two groups.

Methods: A cross-sectional study was conducted in the Department of Biochemistry, in collaboration with the Department of Obstetrics and Gynecology at RIMS, Imphal, from February 2021 to September 2022. The study included 100 participants, 50 diagnosed with preeclampsia and 50 non-preeclamptic women attending RIMS hospital. Blood samples were collected from the patient, and serum LDH levels were estimated using a spectrophotometric method. All the data were analyzed using SPSS V21.0.

Results: The study revealed that serum LDH levels were significantly higher (P-value < 0.05) in women with preeclampsia (510.10 ± 184.26 IU) compared to pregnant women without preeclampsia (284.38 ± 97.35 IU). Serum LDH levels were positively correlated with an increase in blood pressure.

Conclusion: This study showed that serum LDH levels were higher in patients with preeclampsia compared to non-preeclamptic women, and LDH levels were positively correlated with higher blood pressure. Measuring serum LDH levels can help diagnose preeclampsia, allowing for better monitoring and timely management of affected women.

Article Type: Research Article

Article History

Received: 14 March 2023
Received in revised form: 23 August 2024
Accepted: 4 September 2024
Available online: 30 September 2025
DOI: 10.29252/mlj.19.5.9

Keywords

Pregnancy
Blood pressure
Hypertension

Introduction

Preeclampsia is a pregnancy-related disorder characterized by the new onset of hypertension and significant proteinuria in a previously normotensive woman on or after 20 weeks of gestation with or without pathological edema (1,2). Hypertension in preeclampsia is defined as a systolic blood pressure of 140 mmHg or higher and a diastolic pressure of 90 mmHg or higher, confirmed by at least two measurements taken within 6 hours (3,4). This condition can lead to complications such as visual disturbances, oliguria, eclampsia, hemolysis, elevated liver enzymes, thrombocytopenia, pulmonary edema, and fetal growth restriction (5).

Preeclampsia is a medical condition that impacts both the mother and the fetus, involving multiple systems in the body (6). Preeclampsia is a leading cause of death among all maternal deaths and contributes heavily to maternal and perinatal morbidity (7). It affects approximately 5-10% of pregnancies worldwide (8). The primary treatment of preeclampsia is the termination of the pregnancy. Therefore, early diagnosis of women at high risk of preeclampsia is paramount in the management of this condition (9).

Lactate dehydrogenase (LDH) is an intracellular enzyme that converts pyruvic acid to lactic acid during glycolysis. LDH gene expression and activity are higher in placentas of preeclamptic pregnancies compared to those of normal pregnancies (10). Hypoxia in preeclampsia enhances glycolysis and increases LDH activity (11). Organ dysfunction in severe preeclampsia caused by vascular endothelial dysfunction leads to excessive LDH leakage and elevated levels in serum. Therefore, serum LDH levels may be used to assess the severity of preeclampsia and could be helpful in the early management of the disease. This study aimed to estimate serum LDH levels in women with preeclampsia and those without, and to compare the levels of this enzyme between the two groups.

Methods

This hospital-based comparative cross-sectional study was conducted at the Department of Biochemistry in collaboration with the Department of Obstetrics and Gynecology at the Regional Institute of Medical Sciences, Imphal, from February 2021 to September 2022. The study was approved by the Research Ethical Board at RIMS, Imphal. The study population included 100 pregnant women over 18 years; 50 women diagnosed with preeclampsia were considered cases, while 50 pregnant women without preeclampsia served as controls. In our study, we used convenience sampling to select participants. Pregnant women with preexisting hypertension, multiple pregnancies, renal disease, urinary tract infection, gestational diabetes mellitus, smokers, alcohol consumers, thyroid disease, and neoplastic disease were excluded from the study.

Informed written consent was obtained from all participants. Blood samples were collected in plain vials, and serum LDH levels were estimated using the spectrophotometric method on the Randox RX IMOLA Biochemistry Analyzer. The study was approved by the Research Ethical Board at RIMS, Imphal. All data were analyzed using SPSS V21.0. Qualitative data were expressed as frequencies and percentages, and quantitative data were presented as means and standard deviations (SD), then analyzed using an independent t-test. The Pearson correlation coefficient was used to find the correlation between serum LDH and blood pressure.

Results

The age distribution of the women with preeclampsia is presented in Figure 1. As shown, the majority of the cases (54%) fell within the age group of 26-33 years. As shown in Table 1, the mean age of the cases was 30.36 years, while that of the controls was 27.48 years. The difference was found to be statistically significant ($p<0.05$). Both systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly higher in women with preeclampsia compared to pregnant women without preeclampsia (p-value=0.000).

Table 1. Baseline characteristics of cases and controls (n=100)

Parameters	Cases (n=50)	Controls (n=50)	P-value
Age (Years)	30.36± 5.50	27.48±5.96	0.014
SBP (mmHg)	158.56±15.77	115.52±6.96	0.000
DBP (mmHg)	103.68±10.45	75.52±5.08	0.000

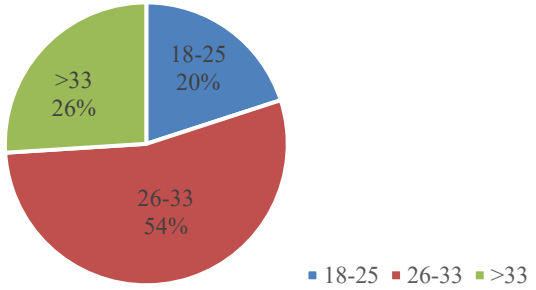

Figure 1. The age distribution of the cases; a majority of the cases (n =50) fell within the age group of 26-33 years

Table 2 shows that the serum LDH level was significantly higher in preeclamptic women (510.10±184.26 IU) compared to pregnant women without preeclampsia (284.38±97.35 IU) (p-value = 0.000).

Table 2. Comparison of serum LDH levels between the cases and controls

Parameter	Cases	Controls	P-value
Serum LDH (IU)	510.10±184.26	284.38±97.35	0.000

Table 3 demonstrates that both SBP and DBP were positively correlated with an increase in serum LDH levels among the preeclamptic women, and this correlation was found to be significant ($p < 0.05$).

Table 3. Correlation between blood pressure parameters and serum LDH levels among cases

Parameter	Pearson correlation (r)	P-value
SBP (mmHg)	0.333	0.018*
DBP (mmHg)	0.391	0.005*

Discussion

As shown in Table 1, the control group was slightly younger than the preeclamptic group in the present study. The mean age in the preeclamptic group was 30.36 ± 5.50 years, while in the control group it was 27.48 ± 5.96 years. This difference was statistically significant ($p = 0.014$). This finding was supported by a study conducted by Lamminpaa et al. (12), who observed that women of advanced maternal age had preeclampsia more often than younger women. Our study showed that SBP and DBP were significantly higher in the cases than in the control group. The mean ± SD of SBP in the cases and controls was found to be 158.56 ± 15.77 mmHg and 115.52 ± 6.96 mmHg, respectively. The mean ± SD of DBP in cases and controls was found to be 103.68 ± 10.45 mmHg and 75.52 ± 5.08 mmHg, respectively.

Table 2 shows that significantly higher serum LDH levels were found in preeclamptic women (Cases) compared to normotensive pregnant women (Controls). The mean ± SD of serum LDH in cases was 510.10 ± 184.26, which was significantly higher than that of the control group, which was 284.38 ± 97.35. Similar results were reported in studies conducted by Jaiswar et al. (13), Hazari et al (14). A literature review demonstrated that in preeclampsia, the progressive endothelial dysfunction in the maternal vascular system induced by toxins released from the hypoxic placenta caused profound vasoconstriction affecting all organ systems, including the liver. This hypoperfusion-induced ischemic injury to hepatic cells and other organs led to an increased release of intracellular LDH into the circulation (15).

Table 3 shows that BP parameters and serum LDH levels were positively correlated among cases, and it was found to be statistically significant ($p < 0.05$). These results correlate with the studies conducted by Umasatyashri et al. (16) and Bhave et al (17). This indicates a significant association between LDH levels and preeclampsia.

Conclusion

Our study demonstrated that serum LDH levels were higher in patients with preeclampsia compared to non-preeclamptic women, and LDH levels were positively correlated with higher blood pressure. Measurement of serum LDH levels may aid in identifying cases of preeclampsia, facilitating close monitoring and prompt, early management of preeclamptic women.

Acknowledgement

This study was supported by the Department of Biochemistry and the Department of Obstetrics and Gynaecology at the Regional Institute of Medical Sciences in Imphal, India. The authors would like to express their sincere gratitude to all participants for their active involvement in the study.

Funding sources

None.

Ethical statement

The Research Ethical Board, RIMS, Imphal, approved the study.

Conflicts of interest

None.

Author contributions

YAS conceived the study, VK and SN supervised the experiment. KRD collected and analyzed the data. KRD, SN, and NA wrote the manuscript. SN analyzed and interpreted the patient data. All authors read and approved the final manuscript.

Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

References

1. Adiga U, D'souza V, Kamath A, Mangalore N. Antioxidant activity and lipid peroxidation in preeclampsia. J Chin Med Assoc. 2007;70(10):435-8. [View at Publisher] [DOI] [PMID] [Google Scholar]
2. Genc H, Uzun H, Benian A, Simsek G, Gelisgen R, Madazli R, et al. Evaluation of oxidative stress markers in first trimester for assessment of preeclampsia risk. Arch Gynecol Obstet. 2011;284(6):1367-73. [View at Publisher] [DOI] [PMID] [Google Scholar]
3. Jia R-Z, Liu X-M, Wang X, Wu H-Q. Relationship between cardiovascular function and fetal growth restriction in women with pre-eclampsia. Int J Gynaecol Obstet. 2010;110(1):61-3. [View at Publisher] [DOI] [PMID] [Google Scholar]
4. Melchiorre K, Sutherland GR, Liberati M, Thilaganathan B. Preeclampsia is associated with persistent postpartum cardiovascular impairment. Hypertension. 2011;58(4):709-15. [View at Publisher] [DOI] [PMID] [Google Scholar]
5. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC III, Westrom KD. Williams Obstetrics. 22nd ed. New York: McGraw-Hill; 2005.p. 761-808 [View at Publisher]
6. Wagner LK. Diagnosis and management of preeclampsia. Am Fam Physician. 2004;70(12):2317-24. [View at Publisher] [PMID] [Google Scholar]
7. Poston L. Endothelial dysfunction in pre-eclampsia. Pharmacol Rep. 2006;58:69-74. [View at Publisher] [PMID] [Google Scholar]

8. Sarsam DS, Shamden M, Al Wazan R. Expectant versus aggressive management in severe preeclampsia remote from term. Singapore Med J. 2008;49(9):698-703. [View at Publisher] [Google Scholar]
9. Osmond C, Kajantie E, Forsén TJ, Eriksson JG, Barker DJ. Infant growth and stroke in adult life: the Helsinki birth cohort study. Stroke. 2007;38(2):264-70. [View at Publisher] [DOI] [PMID] [Google Scholar]
10. 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. [View at Publisher] [DOI] [Google Scholar]
11. Tsoi SC, Zheng J, Xu F, Kay HH. Differential expression of lactate dehydrogenase isozymes (LDH) in human placenta with high expression of LDH-A4isozyme in the endothelial cells of pre-eclampsia villi. Placenta. 2001;22(4):317-22. [View at Publisher] [DOI] [PMID] [Google Scholar]
12. Lamminpää R, Vehviläinen-Julkunen K, Gissler M, Heinonen S. Preeclampsia complicated by advanced maternal age: a registry-based study on primiparous women in Finland 1997-2008. BMC Pregnancy Childbirth. 2012;12:47. [View at Publisher] [DOI] [PMID] [Google Scholar]
13. Jaiswar SP, Gupta A, Sachan R, Natu SN, Shaili M. Lactic dehydrogenase: a biochemical marker for preeclampsia-eclampsia. J Obstet Gynaecol India. 2011;61(6):645-8. [View at Publisher] [DOI] [PMID] [Google Scholar]
14. Hazari NR, Hatolkar VS, Munde SM. Study of serum hepatic enzymes in preeclampsia.IJCMAAS. Sciences. 2014;2(1):1-8. [View at Publisher] [Google Scholar]
15. Munde SM, Hazari NR, Thorat AP, Gaikwad SB, Hatolkar VS. Gamma glutamyl transferase and Lactate dehydrogenase as biochemical markers of severity of preeclampsia. platelets. 2014;8(1). [View at Publisher] [Google Scholar]
16. Umasatyasri Y, Van I, Shamita P. Role of LDH (Lactate dehydrogenase) in preeclampsia eclampsia as a prognostic marker: An observational study. IAIM. 2015;2(9):88-93 [View at Publisher] [Google Scholar]
17. Bhave NV, Shah PK. A correlation of lactate dehydrogenase enzyme levels in pregnancy induced hypertensive disorders with severity of disease, maternal and perinatal outcomes. Int J Reprod Contracept Obstet Gynecol. 2017;6(10):4302-8. [View at Publisher] [DOI] [Google Scholar]

Cite this article as:

Singh YA, Devi KR, Naorem S, Kshetrimayum V, Laishram S, Ashem N. Serum lactate dehydrogenase levels in pregnant women with and without preeclampsia. *Med Lab J.* 2025;19(5):9-11. http://dx.doi.org/10.29252/mlj.19.5.9