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# Lactate Dehydrogenase as a Prognosticator in Pregnancy Induced Hypertension

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**Abstract:** ***Background: LDH is an intracellular cytoplasmic enzyme which is ubiquitous to all the major organ systems. total serum LDH is highly sensitive but nonspecific test as Serum LDH is abnormal in many disorders. In preeclampsia LDH may be elevated and can indicate the prognosis for both mother and fetus. This study was conducted to assess the relationship between lactate dehydrogenase concentration and the severity of the disease and its complications. Methods: 50 pre-eclamptic women (41 with mild and 9 with severe pre-eclampsia) and 50 healthy normotensive controls were studied prospectively at SREE BALAJI medical college and hospital between January and December 2018. Demographic, hemodynamic and lab data were compared among the three groups. The symptoms and complications of severe pre-eclampsia along with fetal outcome were analyzed according to the levels of LDH.Results: Severely pre-eclamptic patients were significantly younger, with low gravidity and parity. LDH levels were significantly elevated in women with preeclampsia and eclampsia (<0.001). Higher LDH levels had significant correlation with high blood pressure (P < 0.10) as well as poor maternal and perinatal outcome. The symptoms and complications of pre-eclampsia along with perinatal death were increased significantly in patients with LDH >800 IU/l compared with those who had lower levels. Conclusions: Lactate dehydrogenase is a useful biochemical marker that shows the severity of pre-eclampsia. In our study, LDH has been evaluated as a biochemical marker in the prognosis for preeclampsia. Increased levels of LDH require close monitoring and management to prevent maternal and fetal morbidity and mortality.***

**Keywords:**Maternal morbidity, Maternal mortality, Severe preeclampsia, Serum LDH

## 1. Introduction

Pre-eclampsia is a pregnancy-specific condition characterized by hypertension and proteinuria occurring after 20 weeks of gestation. It complicates 5–8% of all pregnancies. Although the precise etiology of preeclampsia is not clear, defective placentation and endothelial dysfunction are considered the main features of pre-eclampsia.

Mild pre-eclampsia is defined as onset of hypertension after 20 weeks of gestation and resolves within 12 weeks postpartum, with diastolic blood pressure >90 and ≤110 mmHg with proteinuria. When SBP> 160 mmhg and DBP >110 mmHg was measured on two occasions 6 hours apart with significant proteinuria (>500 mg/24 h), pre-eclampsia was considered severe.

Various causes that lead to these abnormalities include immunological, genetic, and dietary causes, race, increased oxidative stress, and prostaglandin imbalance. It carries substantial risks for fetus and mother with a subsequent increase in the perinatal and maternal morbidity and mortality.

These are multisystem disorders and leading to a lot of cellular death. LDH is an intracellular enzyme and is increased in these women due to cellular death. So, serum LDH levels can be used to assess the extent of cellular death and hence the severity of disease in this group of women. This can be further used to plan the management strategies to improve the maternal and fetal outcome.

Aim of this study was to compare the LDH levels in normal and preeclampsia patients and to correlate the maternal and perinatal outcome with the serum LDH levels.

## 2. Method

This was a prospective comparative study conducted in the department of Obstetrics and Gynecologyin Sree Balaji Medical College and Hospital.

Pregnant women were enrolled in this study in the third trimester of pregnancy and divided into following groups:

- Group 1—healthy normal pregnant women (controls)
- Group-2—patients of preeclampsia and eclampsia (subjects). This was further subdivided into following subgroups

1) Mild preeclampsia
2) Severe preeclampsia
3) Eclampsia

Subjects were also divided according to the serum LDH levels into following groups:

1) <600 IU/l
2) 600–800 IU/l
3) >800 IU/l

All women were followed until delivery and early postpartum period and babies till early neonatal period.

**Exclusion Criteria**

These included mothers with hypertension at/<20 weeks gestation, preexisting diabetes mellitus, renal disease, liver

disorder, thyroid disorder, epilepsy, haemolytic anaemia, coronary artery disease.

## 3. Results

Total 100 patients were studied, out of which 50 were normal pregnant women which served as control group; remaining 50 cases included pregnancy with eclampsia and preeclampsia. Out of these 50 cases 45 were mild preeclampsia, 4 were severe preeclampsia and 1 case was of eclampsia.

The maximum number of patients in control group as well as study group belonged to the age group of 21–30 years. When compared statistically, the age wise distribution in the subjects was almost similar to the control group ($P = 0.920$). Distribution according to parity was similar in both groups.

Distribution of Age and Parity

| Group | Control | Mild Preeclampsia | Severe Preeclampsia | Eclampsia | P Value |
|---|---|---|---|---|---|
| Number | 50 | 45 | 4 | 1 | |
| Age (Mean) | 25.4+/- 3.9 | 25.8+/- 3.3 | 26.0+/- 3.99 | 28 | |
| Parity 0 | 34 | 33 | 2 | 1 | |

Out of total 24 cases with LDH levels <600 IU/l, 3 had normal SBP, 13 had systolic BP in the range of 140–<160 mm of Hg and 5 had systolic BP 160 and above. Out of 8 patients with LDH levels between 600 and 800 IU/l, 2 had normal systolic BP, 4 had systolic BP in the range of 140–<160 mm of Hg and 2 had SBP 160 or more. In the remaining 18 patients with LDH levels above 800 IU/l, 6 had normal systolic BP, 26 had systolic BP in the range of 140–<160 mm oh Hg and 18 had systolic -BP 160 and above.

On the other hand, out of total 24 cases with LDH levels <600 IU/l, 1 had normal diastolic BP, 18 had diastolic BP in the range of 90–<110 mm of Hg and 4 had diastolic BP 110 and above. Out of 8 patients with LDH levels between 600 and 800 IU/l, none had normal diastolic BP, 4 had diastolic BP in the range of 90–<110 mm of Hg and 3 had diastolic BP 110 or more. In the remaining 18 patients with LDH levels above 800 IU/l, 1 had normal diastolic BP, 10 had diastolic BP in the range of 90–<110 mmHg and 9 had diastolic BP 110 and above.

Association of systolic and diastolic BP with LDH levels

| GROUPS | < 600 IU n - 24 | 600 – 800 IU N – 8 | >800 IU N - 18 | TOTAL N – 50 | P Value |
|---|---|---|---|---|---|
| Systolic BP | | | | | |
| 90 -<140 | 3 | 2 | 1 | 6 | |
| 140 – 160 | 13 | 4 | 9 | 26 | |
| 160 ABOVE | 5 | 2 | 11 | 18 | < 0.001 |
| Diastolic BP | | | | | |
| 60 - <90 | 1 | 0 | 1 | 2 | |
| 90 – 110 | 18 | 4 | 10 | 32 | |
| >110 | 4 | 3 | 9 | 16 | < 0.001 |

It was found that in cases with LDH levels <600 IU/l, the mean baby weight was 2.426 ± 0.791 kg in the group with LDH levels 600–800 IU/l, the mean baby weight was 1.992 ± 0.618 kg. The mean weight in the third group i.e., with LDH levels >800 IU/l was 1.979 ± 0.787 kg. This observation indicates that there is reduction in the average weight of babies with higher level of LDH ($P = 0.019$).
The mean Apgar scores at 1 min ($P < 0.001$) and 5 min ($P = 0.001$) was found to be significantly low in patients with higher LDH levels.

Comparison of perinatal outcome with ldh levels

| Parameters | <600 IU | 600 – 800 IU | 800 IU | P Value |
|---|---|---|---|---|
| Mean Gestational Age (Weeks) | 36.92 +/- 3.44 | 34.77 +/- 3.11 | 35.23 +/- 3.23 | 0.25 |
| Mean Baby Weight (Gram) | 2426 +/- 791 | 1992+/- 618 | 1979 +/- 87 | 0.019 |
| Apgar 1 Min | 6.02 +/- 1.28 | 6.14 +/- 1.07 | 3.91 +/- 2.43 | < 0.001 |
| At 5 Mins | 7.36 +/- 0.80 | 7.29 +/- 0.965 | 5.82 +/- 1.54 | <0.001 |
| At 10 Mins | 8.02 +/- 0.78 | 7.71 +/- 0.95 | 6.55 +/- 1.13 | < 0.001 |

On analyzing the above data it is clearly observed that there is significant rise in the LDH levels with increasing severity of the disease ($P < 0.001$).

## 4. Discussion

In the present study majority of the patients belonged to younger age group and were also nulliparous. This finding was also observed by Qublan et al. [1], where the mean age of normal controls was 30 years and those with the severe preeclampsia was significantly younger with lower parity. Systolic and diastolic BP were significantly higher in patients with higher serum LDH levels ($P < 0.001$).

Qublan et al. [1] found in their study that the mean LDH levels in normal controls was 299 ± 79 IU/l, in patients with mild preeclampsia was 348 ± 76 IU/l and in patients with severe preeclampsia was 774 ± 69.61 IU/l. Thus demonstrating a significant association of serum LDH levels with severe preeclampsia ($P < 0.001$). In the present study the LDH levels were significantly raised with the severity of the disease ($P < 0.001$) and is in accordance with the above study.

The mean gestational age at the time of delivery in the present study was significantly less in patients with increasing LDH levels ($P = 0.025$) indicating an increase in preterm deliveries in patients with higher LDH levels.

The association of low birth weight of infants with increase in serum LDH levels was suggested by He et al. [2] in their study. This was in contrary to Qublan et al. [1] who did not find any significant association. In the present study there was a significant association of low birth weight and increasing LDH levels ($P = 0.019$). This may be due to higher incidence of premature births in this group.

The mean Apgar scores were significantly reduced at 1 min and 5 min, in the present study, indicating mild to severe depression of the newborn baby with increasing LDH levels ($P < 0.001$ and $P = 0.001$) for Apgar score at 1 and 5 min respectively.

Increased incidence of perinatal deaths was observed by Qublan et al. [1] in patients with increasing levels of serum

LDH levels ($P < 0.001$). Intrauterine fetal death was seen in 4.8% of cases, intrauterine growth restriction in 33.9% and prematurity in 77.9%. Neonatal deaths were reported in 95.2% in severe preeclampsia group. Similar findings were observed in the present study showing significant increase in neonatal complications ($P = 0.0.003$), still births ($P < 0.001$) and perinatal deaths ($P = 0.003$).

In severe pre-eclamptic women with LDH levels of >800 IU/l showed a significant increase in complications in terms of eclampsia, abruption placenta and various other complications compared to women who had lower serum LDH levels, in the study of Qublan et al. [1]. A high serum level of LDH (>1,400 IU/l) was shown to have a high predictive value for significant maternal morbidity in a study conducted by Martin et al. [3] Catanzerite et al. [4] reported a subgroup of patients who had elevated LDH manifested with hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome and therefore at a high risk for developing maternal mortality. Demir et al. [5] concluded a statistically significant relation between maternal complications and high LDH levels.

Higher serum LDH levels were associated with increased incidence of maternal complications like abruptio placentae, renal failure, HELLP syndrome, cerebrovascular accidents in the present study. There was a significant increase in maternal morbidity with increased serum LDH levels ($P < 0.001$). Maternal mortality was 13.8% in patients with LDH levels >800 IU/l and this was a significant rise ($P = 0.006$) which was comparable with other studies.

## 5. Conclusion

The study concludes that there is a significant correlation between lactate dehydrogenase level and perinatal, maternal morbidity and mortality in pregnancy induced hypertension.

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