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Role of Serum Lactic Dehydrogenase in Fetomaternal Outcome in Preeclampsia

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Abstract: To evaluate the serum lactic dehydrogenase (LDH) level as a marker of severity of preeclampsia. Antenatal mothers without complications were taken as controls and women with preeclampsia taken as cases. They were evaluated for serum LDH levels. All enrolled women were followed till delivery and their course of pregnancy and fetal outcome were noted. Mean value of LDH in the control group was 395.16± 92.54IU/L. The LDH level in non severe type of preeclampsia was 566± 219IU/L and in severe type of preeclampsia was >600 IU/L where it was highly significant (p<0.001). Antenatal complications and neonatal complications were 25% more in severe preeclampsia where serum LDH levels were >800IU/L. The severity of maternal and fetal complications was correlated well with increased LDH levels in preeclampsia.

Keywords: Pre eclampsia, eclampsia, serum lactic dehydrogenase.

INTRODUCTION

Preeclampsia is a syndrome where hypertension, proteinuria and edema are present in antenatal period. The incidence is 8-10%, amounting to 40 – 80% of maternal deaths in developing countries [1]. Preeclampsia is one of the causes for preterm deliveries comprising of nearly 10-15% of preterm deliveries in any institution. It is a disease involving the vascular endothelium and thereby leading to generalized tissue ischemia and cellular death. LDH is an intracytoplasmic enzyme which is present in heart, kidney, muscle, RBC and WBC. Its levels increase in serum in preeclampsia due to cellular death [2].

So, LDH levels can be used to assess the severity of preeclampsia and the extent of tissue damage [3]. This can be further utilized in decision making in management strategies to improve maternal and fetal outcome [4].

MATERIALS AND METHODS

The study was conducted in a tertiary care hospital, in the Department of Obstetrics and Gynecology with the collaboration of Department of Biochemistry over a period of 24 months between 2016 to 2018.

Inclusion criteria

All antenatal mothers enrolled in the study and were divided into 3 groups.

- Group1- Healthy normal antenatal mothers
- Group 2- Subjects with non severe preeclampsia
- Group3- Subjects with severe preeclampsia

Exclusion criteria

- Pregnancy with chronic hypertension, overt diabetes, epilepsy, renal, liver and thyroid disorders.
- Institutional Ethics Committee had approved the study.

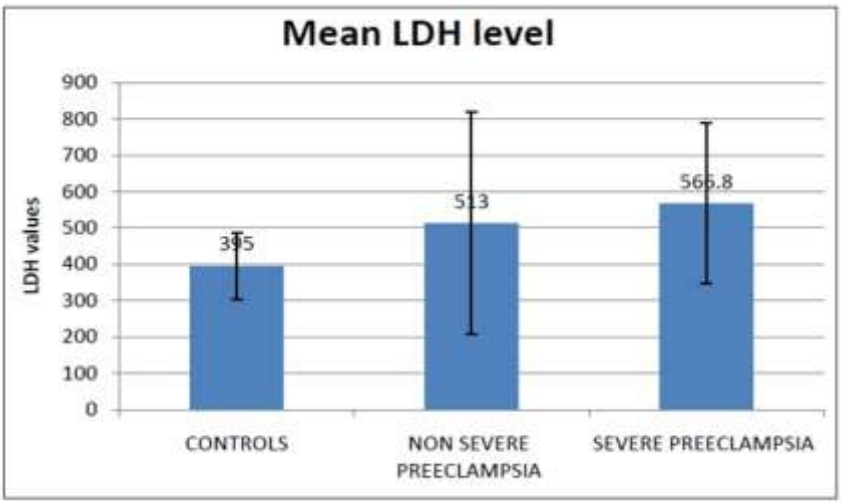
All controls and subjects were followed till delivery and upto one week postpartum period. In their antenatal period, 2 cc of venous blood was taken for estimation of serum LDH levels. The LDH measures the oxidation of L- lactate to pyruvate with simultaneous reduction of nicotinamide adenine dinucleotide (NAD), which leads to change in absorbance at 340 nm which is directly proportional to LDH activity. All subjects and controls were divided into the following 3 groups according to their serum LDH levels.

- Group A- LDH levels <600 IU/L
- Group B- LDH levels 600-800 IU/L
- Group C- LDH levels >800 IU/L

RESULTS AND DISCUSSION

Table-1: Showing Association of Systolic and Diastolic BP with LDH levels in the study population

Groups	LDH Level IU/L Mean	LDH level IU/L SD	Range
Controls(Group 1)	395	92.54	228 – 550
Nonsevere preeclampsia(Group2)	513	306.08	180 – 1589
Severe preeclampsia(Group3)	566.8	219.88	177 – 881



Graph: Association of Systolic and Diastolic BP with LDH levels in the study population

Table-2: Association of SBP with LDH levels

Group Systolic BP (mm of Hg)	< 600 IU/L (n=170) Group A	600 – 800 IU/L (n=14) Group B	>800 IU/L (n=16) Group C	Total (n=200)	P value
90 – 140	116	2	4	122	<0.001
140 – 160	36	4	4	44	<0.001
160 and above	18	8	8	34	<0.001

p<0.001(highly significant)

Table-3: Association of Maternal Complications with LDH

Complication	LDH < 600 Group A	LDH 600 – 800 Group B	LDH > 800 Group C
Need for Blood transfusion	10 (6%)	0	0
Acute kidney injury	4 (2.3%)	2 (14.2%)	0
Ascites	0	0	2 (12.5%)
Sepsis	2 (1.1%)	0	0
Antepartum eclampsia	4 (2.3%)	0	2 (12.5%)
Abruptio placenta	4 (2.3%)	2 (14.2%)	0

Table-4: Correlation of perinatal outcome with LDH levels

Parameters	< 600 IU/L	600 – 800 IU/L	>800 IU/L
Mean gestational age (weeks)	37.7	33	36.2
Mean baby weight (gm)	2690	1530	2700
APGAR Score (5 min)	8.5	4.4	7.5
Outcome of baby			
Stillborn	12 (7%)	6 (43%)	2 (12.5%)
Live born	158 (93%)	8 (57%)	14 (88%)
NICU Admission	12 (7%)	6 (43%)	2 (12.5%)
Neonatal Deaths	8 (5%)	2 (14%)	0
Perinatal Deaths	8 (5%)	8 (57%)	2 (12.5%)

Preeclampsia is a pregnancy specific condition that is characterized by hypertension and proteinuria occurring after 20 weeks of gestation and it complicates 5-8% of all pregnancies [5].

It carries substantial risks for both fetus and mother with a subsequent increase in the perinatal and maternal morbidity and mortality [6].

Lactate dehydrogenase (LDH) is an intra cellular enzyme that converts lactic acid to pyruvic acid and elevated levels indicate cellular death and leakage of enzyme from the cell [7]. High levels of LDH were found in association with severe preeclampsia in a limited number of studies. As severe preeclampsia may lead to numerous multisystem complications, it is hypothesized that elevated levels of LDH may reflect the severity of preeclampsia and the occurrence of complications [8].

In the control group, all had levels of LDH < 600 IU/L, the mean value of LDH being 395.16 ± 92.54 IU/L. Majority of the patients (77.4%) in the nonsevere preeclampsia group had LDH levels < 600 IU/L, 6 (9.2%) patients had LDH in the range of 600-800 IU/L, 8(12.9%) patients had LDH in the range of > 800 IU/L. The mean LDH Level in the non severe preeclampsia group is 513 ± 306.08. Out of 38 cases of severe preeclampsia, 22 (57.8%) patients had levels less than 600 IU/L, 4 cases (10.5%) had levels between 600-800 IU/L, 10 (26.3%) patients had levels > 800 IU/L. The mean LDH in the severe preeclampsia group is 566.8 ± 219.8 ($p < 0.001$) which is highly significant (Table-1).

Patients with higher serum LDH levels also had higher systolic and diastolic blood pressures (Graph, Table-2). Such patients also had increased maternal complications like antepartum eclampsia.

Regarding maternal complications due to preeclampsia in our present study, each group had different course. In the group with LDH <600 IU/L, 10 patients (5.8%) had blood transfusion, 4 (2.3%) had acute kidney injury, 2(1.2%) had postoperative sepsis, 4(2.3%) had antepartum eclampsia, 4 (2.3%) had abruptio placenta. Overall complication rate was 12%. In the group B (with LDH between 600-800 IU/L), 2 patients developed acute kidney injury (14.2%), 2 had abruptio placenta (14.2%). Overall complication rate was 28.5% Out of 16 patients in the group C (with LDH > 800 IU/L), 2(12.5%) had developed gross ascites, 2(12.5%) had antepartum eclampsia. Overall complication rate was 25%. The apparently better perinatal and maternal outcomes between the groups of LDH (600 - 800 and > 800 IU/L might be due to the late onset of severe preeclampsia in our study. When compared to the control group (Group A), the group B and C had significantly higher rate of maternal complications (Table-3).

A study done by Qublan *et al*., noted a similar trend of increase in maternal complications with increase in serum LDH concentrations [9]. Similar findings were also reported by S.P. Jaiswar *et al.*, [10] and Jyoti Hak *et al*., [11].

Regarding perinatal outcome, the mean gestational age at the time of delivery was 37.7 weeks in group A cases, 36 weeks in group B cases and 33 weeks with group C cases where the pregnancy termination was done prematurely due to severity of the disease. Out of 180 babies 93% were live born, 7% were still born, 7% had neonatal intensive care unit admission and 4.7% had perinatal mortality in group A cases. In group B cases 43% had still born, 57% live born and 28% had neonatal intensive care unit admissions and 14% had perinatal death. The overall perinatal mortality is 57% in group B. In the group C 58% had neonatal complications, 39% had uneventful outcome, 38% had neonatal deaths with overall perinatal mortality of 62%. (Table-4), Similar conclusions were found in studies done by S.P. Jaiswar *et al*., [10] and Jyoti Hak *et al*., [11].

CONCLUSIONS

Lactic dehydrogenase is a useful biomarker that reflects the severity of preeclampsia. Higher levels in preeclampsia are associated with higher incidence of maternal and neonatal morbidity and mortality. Identification of high risk patients with elevated levels of lactic dehydrogenase, their close monitoring and prompt management may prevent these complications of preeclampsia with a subsequent decrease in maternal and fetal morbidity and mortality. The highest complication rate for both mother and neonate was noted in group C cases where LDH was > 800 IU/L.

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