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Role of Lactate Dehydrogenase in Predicting Maternal and Perinatal Outcome in Pre Eclampsia

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ABSTRACT: Introduction: Lactate dehydrogenase (LDH) is an intracellular enzyme and its level is increased due to cellular death.In preeclampsia LDH levels are increased and can be used to assess maternal and perinatal outcome.
Aim of the study: To compare serum LDH levels in normal and preeclamptic women and to correlate LDH levels with maternal and perinatal outcome.
Material and methods: A prospective case control hospital based observational study was conducted in the department of Obstetrics and Gynaecology, Siddhartha Medical College, Vijayawada, Andhra Pradesh. Pregnant women admitted in the labour ward were divided into two groups each consisting of 100 women. Pre eclamptic women (Group II) were further subdivided into 3 groups depending on LDH levels-LDH level < 600 IU/L (subgroup 1), LDH level 600-800 IU/L (subgroup2), and LDH level > 800IU/L (subgroup 3).
LDH levels were measured.Results tabulated and analysed.
Results: Mean age of Group II (pre eclampsia) was significantly lower than Group I (p value < 0.0001) indicating that age was a risk factor for pre eclampsia. Primi gravida women were also a risk factor for pre eclampsia (p value < 0.003). Maternal complications in subgroup 3 (LDH>800 IU/L)were eclampsia in 2 cases(28.57%) , abruption in 4 cases(57.1%), HELLP syndrome in 3 cases(42.85%) , renal failure in 1 case(14.28%), DIC in 1case (14.28%) and pulmonary edema in 2 cases(28.57%). More than one complication was seen in a single patient in this subgroup. Maternal death was seen in 2 cases (28.5%) this subgroup .APGAR SCORE was 8±1.0 in subgroup 1, 6±2.3 in subgroup 2, 3±2.06 in subgroup 3. NICU admissions were 11 (15.27%) in subgroup 1, 8 (38.9%) in subgroup 2 and 3(42.85%) in subgroup 3.Perinatal deaths were 2 (2.7%) in subgroup 1, 5(23.8%) in subgroup 2 and 4(57.14%) in subgroup 3. pValue was <0.0001 which was highly significant. (Table VI).
Conclusion: Pre eclampsia contributes significantly to maternal and perinatal mortality and morbidity. LDH is a useful biochemical marker to predict adverse maternal and perinatal outcome. Monitoring LDH levels can help to reduce complications associated with preeclampsia.
Keywords: Preeclampsia, lactate dehydrogenase, maternal mortality, perinatal mortality.

I. INTRODUCTION

Pregnancy is a physiological state associated with varied biochemical and maternal adaptation in response to physical stimuli provided by foetus and placenta. Hypertensive disorders of pregnancy (HDP) affect 6-8% of all pregnancies and along-with hemorrhage and infection, they form a complex triad contributing immensely to maternal morbidity and mortality. 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. [1] Few studies suggest that there may be several underlying causes leading to endothelial dysfunction and causing the signs of hypertension, proteinuria, and edema. [2,3] Lactate dehydrogenase (LDH) is an intracellular enzyme and its level is increased due to cellular death. So, serum LDH levels can be used to assess the extent of cellular death and thereby the severity of disease. [4]Studies have shown that LDH activity and gene expression are higher in placentas of pre-eclampsia than normal pregnancy. [5,6]
AIM OF THE STUDY

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To compare serum LDH levels in normal and preeclamptic women and to correlate LDH levels with maternal and perinatal outcome.

II. MATERIAL AND METHODS

A prospective case control hospital based observational study was conducted in the department of Obstetrics and Gynaecology, Siddhartha Medical College, Vijayawada, Andhra Pradesh. Pregnant women admitted in the labour ward were divided into two groups each consisting of 100 women.

Group I- Normal healthy pregnant women with singleton pregnancy in the third trimester

Group II-Pregnant women with Preeclampsia

Inclusion criteria –Singleton pregnancy, third trimester with a clinical diagnosis of pre eclampsia diagnosed for the first time after 20 weeks of gestation

Exclusion criteria-Pregnant women with medical disorders, chronic hypertension, diabetes and preeclamptic women in the second trimester are excluded

Pre eclamptic women (Group II) were further subdivided into 3 groups depending on LDH levels

1. LDH level < 600 IU/L
2. LDH level 600-800 IU/L
3. LDH level > 800IU/L

A detailed history, clinical examination and investigation were done and the pregnant women were followed during delivery and one week postpartum. Maternal and perinatal outcome was noted. Results tabulated and analysed using SPSS version 24.

III. RESULTS

Mean age of Group II (pre eclampsia) was significantly lower than Group I (p value < 0.0001) indicating that age was a risk factor for pre eclampsia. Primi gravida women were also a risk factor for pre eclampsia (p value < 0.003) (Table I). In the present study mean LDH levels in control group was 218±13.6, in group IIa was 431±18.2 and in group IIb was 624±24.16 which was highly significant (pValue <0.0001) (Table II). The total number of cases in the subgroup 1 (LDH levels <600IU/L) was 72, in the subgroup 2 (LDH levels 600-800IU/L) was 21 and in the subgroup 3(LDH levels >800IU/L) was 7(Table III). Systolic blood pressure in sub group 1 was less than 140 mmHg in 37 cases, between 140-160 mmHg in 26 cases and was > 160 mmHg in 9 cases. Systolic blood pressure in sub group 2 was less than 140 mmHg in 3 cases, between 140-160 mmHg in 8 cases and was > 160 mmHg in 10 cases. Systolic blood pressure in sub group 3 was between 140-160 mmHg in 2 cases and was > 160 mmHg in 5 cases. Systolic blood pressure was significantly higher in women with high LDH levels (pValue <0.001)

Diastolic blood pressure in sub group 1 was less than 100 mmHg in 18 cases, between 100-110 mmHg in 43 cases and was > 110 mmHg in 11cases .Diastolic blood pressure in sub group 2 was less than 100 mmHg in 2 cases, between 100-110 mmHg in 7 cases and was > 110 mmHg in 12 cases .Diastolic blood pressure in sub group 3 was less than 100 mmHg in 1 case, between 100-110 mmHg in 2 cases and was > 110 mmHg in 4 cases. Diastolic blood pressure was significantly higher in women with high LDH levels (pValue <0.001). (Table IV).

Maternal complications in subgroup 1 were eclampsia in 1 case (1.3%), abruption in 4 cases (5.5%), HELLP syndrome in 1 case (1.3%) and pulmonary edema in 2 cases (2.7%). No cases of maternal death were seen in this subgroup. In subgroup 2 , 5 cases(23.8%) of eclampsia, 7 cases(33.3%) of abruption, 4 cases (19.04%)of HELLP,3 cases (14.28%) of DIC, 4 cases(19.04%) of pulmonary edema, 1 case(4.7%) of renal failure was seen. Maternal death occurred in 1 case (4.7%). Maternal complications in subgroup 3 were eclampsia in 2 cases(28.57%) , abruption in 4 cases(57.1%), HELLP syndrome in 3 cases(42.85%) , renal failure in 1 case(14.28%), DIC in 1case (14.28%) and pulmonary edema in 2 cases(28.57%). More than one complication was seen in a single patient in this subgroup. Maternal death was seen in 2 cases (28.5%) this subgroup (Table V) APGAR SCORE was 8±1.0 in subgroup 1, 6±2.3 in subgroup 2, 3±2.06 in subgroup 3. NICU admissions were 11 (15.27%) in subgroup 1, 8 (38.9%) in subgroup 2 and 3(42.85%) in subgroup 3.Perinatal deaths were 2 (2.7%) in subgroup 1, 5(23.8%) in subgroup 2 and 4(57.14%) in subgroup 3. pValue was <0.0001 which was highly significant. (Table VI).

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TABLE I AGE AND PARITY DISTRIBUTION OF CASES

GROUP	GROUP I(CONTROL) (n=100)	GROUP II (CASE) (n=100)
NUMBER	100	100
AGE(mean)	22±1.26	20±2.43
PRIMI GRAVIDA	38(38%)	51(51%)

TABLE II MEAN LDH LEVELS IN VARIOUS GROUPS

GROUP	GROUP I (CONTROL)	GROUP IIa (Preeclampsia without Severe features)	GROUP IIb (Pre eclampsia With severe features)
Mean LDH levels (IU/L)	218±13.6	431±18.2	624±24.16

TABLE III DISTRIBUTION OF CASES ACCORDING TO LDH LEVELS

GROUP LDH LEVELS	GROUP II (subgroup 1) <600IU/L	GROUP II (subgroup 2) 600-800 IU/L	GROUP II (subgroup 3) >800 IU/L
GROUP IIa (preeclamsia without severe features)	64	3	1
GROUP IIb (preeclamsia with severe features)	8	18	6
TOTAL	72	21	7

TABLE IV BLOOD PRESSURE AND LDH LEVELS

GROUP LDH	GROUP II Subgroup 1 <600 IU/L (n=72)	GROUP II Subgroup 2 600-800 IU/L (n=21)	GROUP II Subgroup 3 >800 IU/L (n=7)
SYSTOLIC			
<140 mmHg	37	3	0
140-160mmHg	26	8	2
>160mmHg	9	10	5
DIASTOLIC			
<100mmHg	18	2	1
100-110mmHg	43	7	2
>110mmHg	11	12	4

TABLE V MATERNAL COMPLICATIONS

GROUP LDH	GROUP II Subgroup 1 <600IU/L	GROUP II Subgroup 2 600-800IU/L	GROUP II Subgroup 3 >800IU/L
ECLAMPSIA	1(1.3%)	5(23.8%)	2(28.57%)
ABRUPTION	4(5.5%)	7(33.3%)	4(57.1%)
HELLP	1(1.3%)	4(19.04%)	3(42.85%)

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DIC	0(0%)	3(14.28%)	1(14.28%)
RENAL FAILURE	0(0%)	1(4.7%)	1(14.28%)
PULMONARY EDEMA	2(2.7%)	4(19.04%)	2(28.57%)
MATERNAL DEATH	0(0%)	1(4.7%)	2(28.5%)

TABLE VI PERINATAL COMPLICATIONS

GROUP LDH	GROUP II Subgroup 1 <600IU/L	GROUP II Subgroup 2 600-800IU/L	GROUP II Subgroup 3 >800IU/L
MEAN Gestational Age (weeks)	35±1.2	32±1.4	28±2.1
Mean Birth weight (grams)	2420±214.2	1980±214	1750±190.4
APGAR SCORE @5'	8±1.0	6±2.3	3±2.06
NICU admission	11(15.27%)	8(38.09%)	3(42.85%)
Perinatal deaths	2(2.7%)	5(23.8%)	4(57.14%)

IV. DISCUSSION

Preeclampsia is a condition that is characterized by hypertension and proteinuria occurring after 28 weeks of gestation. It complicates 5%–8% of all pregnancies[7]

Younger age and primi gravida women were risk factors for pre eclampsia in the present study similar to the study by Qublan et al[4]and Uma satyasri et al[8].

Preeclampsia is associated with increased LDH levels when compared to normal healthy pregnant women. Lactic dehydrogenase (LDH) is an intracellular enzyme that converts lactic acid to pyruvic acid, and elevated levels indicate cellular death and leakage of the enzyme from the cell. High levels of LDH were found in association with severe pre-eclampsia in a limited number of studies [9]. Qublan et al[4] demonstrated a significant association of LDH levels with severe preeclampsia. Jharia et al[10] assessed the role of LDH in predicting adverse outcomes of preeclampsia. Mungavalasa et al[11] conducted a case control study and found higher serum LDH levels in preeclampsia. In the present study mean LDH levels in control group was 218±13.6, in group IIa was 431±18.2 and in group IIb was 624±24.16 which was highly significant (pValue <0.0001). In the study by Talwar P et al [12] mean LDH in control was 191.5±23.53, 413.7±61.5 in mild preeclampsia and 568.88±60.8 in severe preeclampsia similar to the present study. In the study by Jyothi Hak et al[13] mean LDH in control was 179.1±23.13, 394.23±119.23 in mild preeclampsia and 740.6±142.24 in severe preeclampsia.

In the study by Qublan et al and Uma satyasri et al systolic and diastolic blood pressure was significantly higher in women with high LDH levels. In the present study systolic and diastolic blood pressure was significantly higher in women with high LDH levels (pValue <0.001).

Maternal complications were associated with higher LDH levels. In the study by Catanzarite et al[14] elevated LDH levels manifested with HELLP syndrome similar to the present study.Demir et al[15] found that maternal complications were associated with high LDH levels. Maternal mortality was 13.8% in patients with LDH levels > 800IU/L similar to the present study (28.5%).In the present study ,eclampsia was seen in 28.57% of cases and abruption in 57.1% of

cases when LDH levels were>800IU/L similar to study by Jaiswal SP et al[16]

Perinatal outcome correlated with high LDH levels. In the present study NICU admissions were 42.85% and perinatal deaths were 57.14% .Jharia et al found poor perinatal outcomes in women with LDH levels >600 IU/L .Mungavalasa et al and Kharb et al studies showed poor perinatal outcomes in women with high LDH levels similar to the present study.

V. CONCLUSION

Pre eclampsia contributes significantly to maternal and perinatal mortality and morbidity. LDH is a useful biochemical marker to predict adverse maternal and perinatal outcome. Monitoring LDH levels can help to reduce complications associated with preeclampsia.

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