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Study on serum Lactate Dehydrogenase-a Biochemical marker in Preeclampsia and Eclampsia

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ABSTRACT
AIMS AND OBJECTIVES:
-To compare serum LDH levels in normal pregnant women and women with preeclampsia and eclampsia in antepartum period.
-To study the correlation of severity of disease, maternal and perinatal outcome and Blood pressure recordings with serum LDH
METHoDOLOGY:
A prospective comparative study was conducted in the department of obstetrics and gynaecology , Andhra medical college ,KGH ,visakhapatnam . Out of 140 women studied , 35 were normal pregnant women,35 were of mild preeclampsia,35 of severe preeclampsia and 35 were of eclampsia.
Exclusion criteria*:These include women with hypertension at <20 weeks gestation , preexisting diabetes mellitus ,renal disorders, chronic liver disorders, thyroid disorders ,epilepsy , and women with hemolytic anemias.*
RESULTS:
LDH levels were significantly elevated in women with preeclampsia and eclampsia. High levels of LDH had significant correlation with high blood pressure as well as poor maternal and perinatal outcome.The incidence of severe pre-eclampsia—2 % & Eclampsia 2.9%, PE & E patients were significantly younger, with low gravidity and parity. They had significantly increased systolic and diastolic pressure, liver enzymes, uric acid, urine albumin, and LDH levels. Serum urea and creatinine were normal in majority of cases. The symptoms and complications of PE along with perinatal mortality were increased significantly in patients with LDH >800 IU/l compared with those who had lower levels. Complications like Retinopathy, ARF, Abruptio, DIC, CVA, MODS, Shock were also associated with high level of serum LDH >800 IU/L. Low birth weight of babies was also associated with high level of serum LDH levels in PE & E patients. The incidence of poor perinatal outcome was higher in PE & E patients with high serum LDH level (>600 IU/L).
CONCLUSION:
High serum LDH levels correlate well with the severity of the disease and poor outcomes in patients of preeclampsia and eclampsia.
KEYWORDS: *Lactic Dehydrogenase, Preeclampsia, Eclampsia, Maternal and perinatal outcome*

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I. Introduction

Of all pregnancies various maternal and fetal complications are due to preeclampsia and eclampsia which account for about 6-8% . These are multisystem disorders of unknown etiology that leads to lot of cellular death.

There is enormous vasculo-endothelial cell damage and cellular death in preeclampsia

LDH an intracellular multifaceted enzyme with 5 isoenzymes all of which occur in placenta and its levels are increased in these women due to cellular death.

Thus serum LDH levels are used to assess the extent of cellular death and the severity of disease in this group of women. It also helps to design the management strategies to improve maternal and fetal outcome.

Normal serum LDH values:

-non pregnant women 115-211 IU/l

-first trimester 78-433IU/l ,second trimester 80 – 447 IU/l , third trimester 82 -524 IU/l.

-serum LDH levels above the reference range was taken as raised

Aim:

- To compare serum LDH levels in normal pregnant women and women with preeclampsia and eclampsia in antepartum period.
- To study the correlation of maternal and perinatal outcome and Blood pressure recordings with serum LDH.

II. Methods

This was a prospective study conducted in the department of Obstetrics and Gynecology , Andhra medical college, visakhapatnam . . Out of 140 women studied over a period of January 2019 to october 2019) , 35 were normal pregnant women,35 were of mild preeclampsia,35 of severe preeclampsia and 35 were of eclampsia. Pregnant women were enrolled in this study in third trimester of pregnancy and divided in to two groups:

Group 1: healthy normal pregnant women(controls)
Group 2: patients with preeclampsia and eclampsia (subjects)
This group was further divided in to
-mild preeclampsia
-severe preeclampsia
-eclampsia
These subjects i.e patients with preeclampsia and eclampsia were also divided according to serum LDH levels
a)<600IU/L
b)600-800IU/L
c)>800IU/L
all women were followed till delivery and early postpartum period and babies till early neonatal period.

Exclusion criteria :

These include women with hypertension at <20 weeks gestation , preexisting diabetes mellitus ,renal disorders, chronic liver disorders, thyroid disorders ,epilepsy , and women with hemolytic anemias.

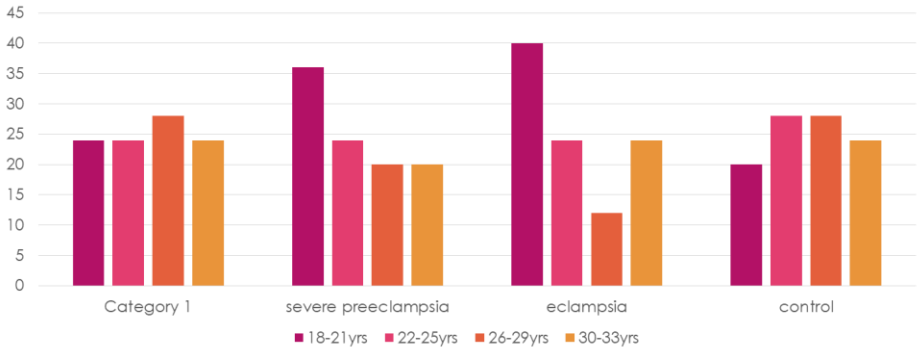
- Coincidental hypertension in pregnancy. Essential hypertension as suggested by: (i) history or documentation of hypertension in the pre-pregnant state; (ii) hypertensive present before 20 weeks of gestation
- Renal diseases
- Coincidental seizures in pregnancy

I. History or documentation of epilepsy in pre-pregnant state.
II. Space occupying lesion in brain like tuberculoma, or brain tumor.
III. Trauma to brain
IV. Hyperpyrexia.

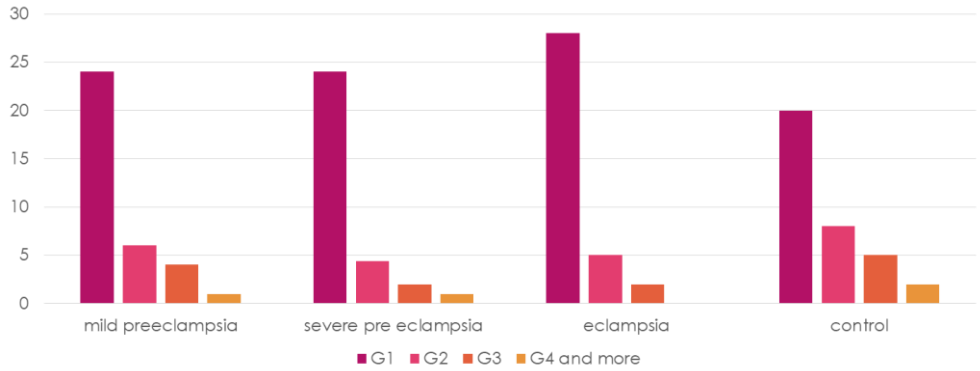
Total 140 patients were studied , out of which 35 (25%) were normal pregnant women which served as control group ; remaining 105 cases includes pregnant women with preeclampsia and eclampsia.
Out of these 105(75%) cases 35 were of mild preeclampsia , 35 were of severe preeclampsia , 35 were of eclampsia.
Maximum no . of patients in control and study group are of 21 - 30 years of age.
Age wise distribution in subjects and controls was almost similar.
Distribution according to parity was also similar.
Distribution of patients with age and parity

Group	Control	Mild preeclampsia	Severe preeclampsia	Eclampsia
Number	35	35	35	35
Age (mean)	25.46	21.2	24.51	18.32
Parity 0	20	24	24	28

- **Age distribution:**



- **Distribution according to parity:**



Association of systolic and diastolic BP with serum LDH levels

- Total no of cases with serum LDH level <600 are 56 ,and between 600-800 are 13 and above 800 are 36.
- Out of 56 cases with <600IU/l

  -9(16%) had normal systolic pressure and 2 had normal diastolic pressure.

  -37(66%) had systolic pressure between 140-<160 and 48 had diastolic pressure between 90 - <110.

  -12(21.42%) had systolic pressure >/=160 and 8 had diastolic pressure>110.
- Out of 13 cases with serum LDH between 600 – 800IU/l

  - 3(23%) had normal systolic pressure and all cases had elevated diastolic pressure.
  - 2(15.38%) had systolic pressure between 140 -<160 and 7 had diastolic pressure between 90-<110.

  -8(61.5%) had systolic pressure >160 and 6 had diastolic >110.
- Out of 36 cases with serum LDH >800IU/l

  -2(5.5%) had normal systolic and 1 had normal diastolic.

  -12(33.3%) had systolic pressure between 140 -<160 and 13 had diastolic pressure between 90-<110.

  -22(61.11%) had systolic >160 and diastolic >110.

Based on the above data it was found that high diastolic BP was associated with higher levels of serum LDH.

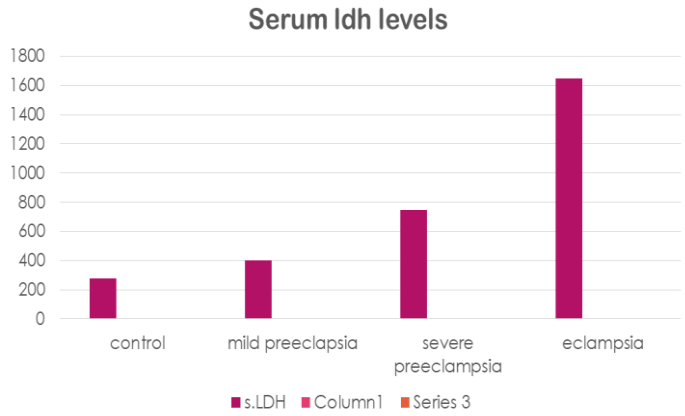
Group	<600IU/l (n=56)	600-800IU/l (n=13)	>800IU/l (n=36)	Total (n=105)
Systolic pressure				
90-<140	9	3	2	14
140-<160	37	2	12	51
>160	12	8	22	42
Diastolic pressure 60<90	2	0	1	3
90-<110	48	7	13	68
>110	8	6	22	36

Association of serum LDH with severity of the disease

- In normal pregnant women that is control group, the serum LDH levels are <600IU/l of an average the mean value is around 278.3 IU/l.
- Most of the women with mild preeclampsia also had LDH <600IU/L (n=33)and only 2 had values between 600-800IU/l.
  then the mean LDH value is about 400.45IU/l
- Out of 35 cases of severe preeclampsia ,
  -20(57.14%) cases had <600IU/l
  -5(14.28%) cases had values between 600-800IU/l
  -10(28.57%) cases had >800IU/l
  then the mean value is 646.75IU/l
- Out of 35 cases of eclampsia,
  -25(71.4%) cases had >800IU/l
  -7(20%) cases had between 600-800IU/l
  -3(8.57%) cases had <600IU/l
  the mean LDH value in eclampsia patients is 1648.7IU/l.

Based on the above data it was clearly observed that there is significant rise in the serum LDH with increasing severity of the disease.

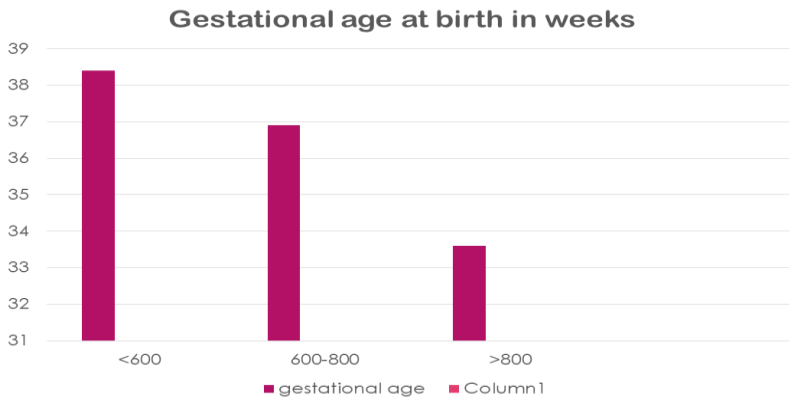
Groups	serum LDH mean values
Controls (n=35)	278.3
Mild preeclampsia(n=35)	400.45
Severe preeclampsia(n=35)	746.75
Eclampsia (n=35)	1648.71
Total	903.16

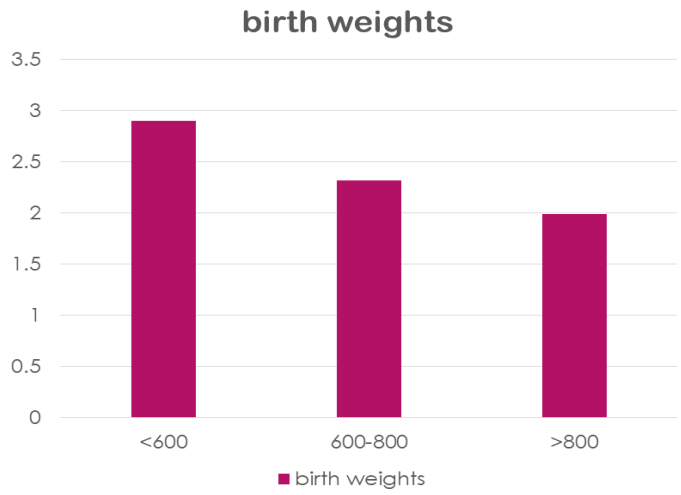


Comparison of serum LDH with perinatal outcome:

- The parameters used to study perinatal outcome are gestational age and birth weight of the babies.
- In case of LDH <600IU/l the mean gestational age at the time of delivery is around 38.4wks,
  and in cases with LDH 600-800IU/l the mean Gestational age is 36.75wks
- In cases with LDH >800Iu/L the mean gestational age is about 33.25+/3wks.
- In cases with LDH <600IU/l the mean birth weight is about 2.92kg
  with LDH 600-800IU/l the mean weight is around 2.62kg
  with LDH >800 the mean birth weight is around 1.99kg

This observation indicates that there is reduction in average birth weight of babies with increased serum LDH levels.





Parameters	<600IU/l	600-800IU/l	>800IU/l
Mean gestational age	38.4wks	36.75wks	33.25wks
Mean baby weight	2.92kg	2.6+/-0.5kg	1.99+/-0.7kg
outcome			
Alive and well	47	5	14
Neonatal complications	11	5	17
Neonatal deaths	5	4	4
Still birth	4	4	13
Perinatal deaths	9	8	17

- 56 cases which had normal LDH values shows
  - 47(83.9%) uneventful perinatal period
  - 11(19.64%) neonatal complications
  - 5(8.92%) neonatal deaths
  - 4(7.14%) still birth

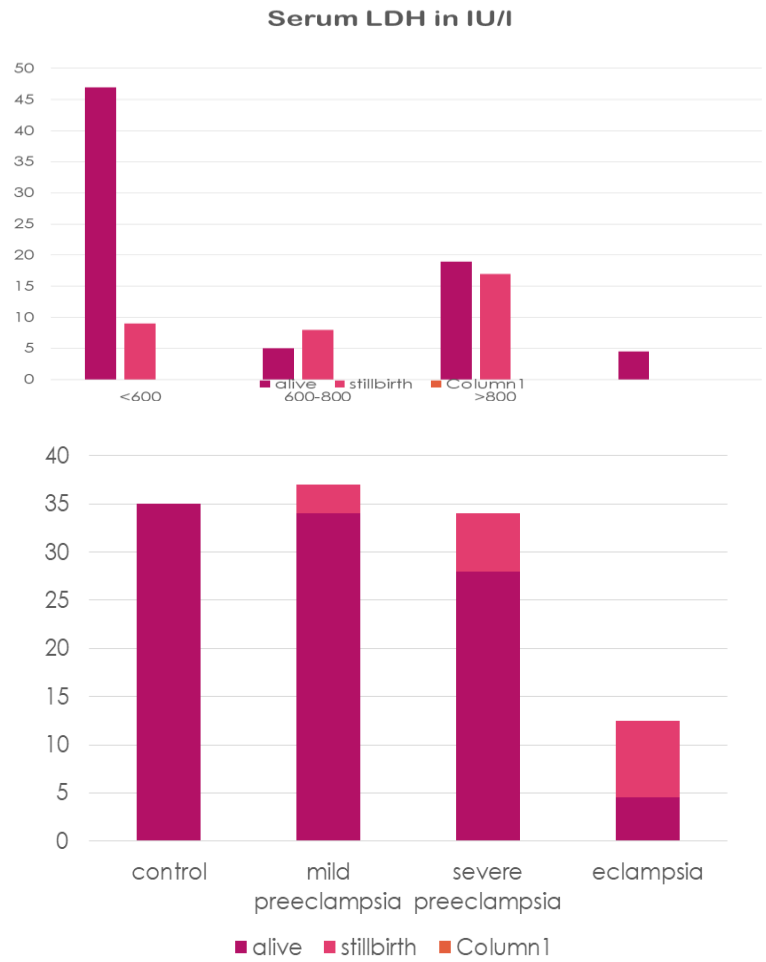
As a result there were 9 perinatal deaths.

- 13 cases with LDH values between 600-800IU/l shows
  - 5(38.4%) neonatal complications
  - 4(30.76%) neonatal deaths
  - 4(30.76%) still birth

8 perinatal deaths were noted.

- 36 cases of serum LDH >800IU/l shows
  - 14(38.88%) uneventful perinatal period
  - 17(47.22%) had neonatal complications
  - 4(11.1%) neonatal deaths
  - 13(36.11%) still births

- ***Total of 17 perinatal deaths were reported.By the above observations the occurrence of neonatal complications , still births and perinatal deaths are higher in women with high serum LDH levels.***



Association of LDH levels with maternal outcome:

- Pregnant women with normal LDH levels, no maternal complications were observed.
- In second group With serum LDH 600-800IU/l there is
  - -1 case of abruption

-1 case of cerebrovascular accidents

 In third group with marked elevation of serum LDH >800IU/l complications were observed in 8 cases.(22.2%)

- 2 cases of cerebrovascular accidents
- 1 cases of HELLP syndrome
- 3 cases of abruption
- 1 case of renal failure
- 1 case of pulmonary edema

This infers that with increased serum LDH there is increased risk of maternal complications.

III. Discussion

- In our hospital, there were 3,025 obstetric admissions during the period of the study (Ianuary 2019–June 2019) in which 62 and 90 patients were diagnosed as PreEclampsia & Eclampsia, respectively. This indicates a frequency of 2 % for PE and 2.9 % for E, but in this study 140 cases were included which were then further investigated and their LDH levels were done
- It is known that hypertensive disorders in pregnancy are commonly associated with certain high risk factors and depict changes in certain hematological parameters also. Demographic variables were studied and it was seen that −81.25 % of PE and 72.1 % of E cases were <25 years of age. 73.5 % of E and 43.75 % PE patients were unbooked. 50 % of PE and 61.76 % of E patients were nulliparous. Ali et al. [14], Demir et al. [15], and Qublan et al. [16] also reported similar data in their respective studies as these are the known risk factors.
- Regarding the mode of delivery, Aali et al. [13] had found that Cesarean section was performed in 57.5 % of E and 66.4 % of PE cases, respectively, and that 34.1 % of PE & 24.2 % of E cases had low birth weight babies. In our study, on the contrary 28.1 % of PE cases & 14.7 % of E cases delivered by Cesarean Sect. 75 % of PE cases and 79.4 % of E cases, had birth weight of their babies <2.5 kg.
- Sudden IUD is one of the major problems seen in these cases. Qublan et al. [15] had found IUD seen in 4.8 % of cases; intrauterine growth retardation in 33.9 % and prematurity in 77.9 % cases of PE. Aali et al. [13] had found that 6.6 % of PE & 15.5 % of E cases had IUD. In the analysis of perinatal outcome in our study, 34.3 % of PE cases and 35.9 % of E cases, respectively, had had poor outcome of pregnancy (baby admitted to nursery). 18.75 % PE & 27.94 % of E cases had had SVD/IUD (Table 1).

IV. Conclusion

- Serum LDH is the earliest marker seen in blood during hypoxia and oxidative stress. It is raised in cases of PE & E. It is a useful biochemical marker as it reflects the severity of and the occurrence of complications of PE & E; these are preventable if identified at an earlier stage and adequately managed at a higher center. The test is easily available.
- Pre-eclampsia and eclampsia was found to be more common in young women who were prime gravida from low socio economic state.
- S.LDH increased as the severity of disease increased.
- The mean blood pressure was found higher.
- Highest morbidity was found in women with s.LDH >800IU/l. complications included abruption , pulmonary edema ,acute renal failure, HEELP syndrome, cerebro vascular accidents, post partum eclampsia.
- Perinatal morbidity was highest in women with S.LDH >600IU/l
- There were preterm births,low birth weight babies,low APGAR scores,more NICU admissions
- Still birth rates were highest in women with s.LDH>800IU/
- All cases were followed in hospital for atleast seven days and discharged.
- Preconceptional counselling and regular ANC during subsequent pregnancy was advised.
- Serum LDH as a biochemical marker is cheap , easily available test which can be offered to all the patients with hypertensive disorders in pregnancy.
- Identification of high risk patients with elevated levels of lactic dehydrogenase, their close monitoring and prompt and correct management may prevent or at least reduce the maternal and fetal complications.

Hence s.LDH along with other severity markers can be used in making decision , regarding the management strategies to improve the maternal and fetal outcome.
This would lead to a decrease in global burden of maternal and perinatal morbidity and mortality.

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