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ORIGINAL RESEARCH

Evaluation of serum LDH levels in women with preeclampsia and its effect on maternal and perinatal outcome

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***ABSTRACT*:**

Background: Hypertensive disorder of pregnancy occurs in approximately 6-8% of all pregnancies. The most serious consequences for the mother and the baby are the result of preeclampsia and eclampsia. Lactate Dehydrogenase (LDH) is an intracellular enzyme. Recently LDH has been suggested as potential marker to predict severity of preeclampsia. **Material and methods:** A total of 120 patients were included in this study. These patients were divided into 3 groups of 40 each: Group 1: patients with severity of preeclamsia being mild ; Group 2: patients with severity of preeclamsia being severe ; Group 3: normal pregnancy group. All patients were randomly selected irrespective of their age, based on their reporting into the labour room department. Detailed demographic data of all the patients was collected. Their blood samples were taken. These were sent to laboratory for assessment of serum LDH levels. An auto-analyser was used to measure serum LDH levels. **Results:** The present study was conducted on 120 patients. It was observed that the mean LDH levels in the normotensive group were 170 IU/L. The mean LDH levels in mild pre-eclampsia and severe pre-eclamsia group were 324.6 and 645.8 respectively. The study obtained significant results when comparing normotensive group versus mild pre-eclampsia group with a P-value of 0.01. These figures were not statistically significant. Other parameters like mean birth weight, mean APGAR at 1 minute and 5 minutes, neonatal complications and mortality all showed a significant co-relation with increase in serum LDH levels of more than 800 IU/L. **Conclusion:** LDH levels showed significant variations in pre-eclampsia patients and thus screening of all cases of Preeclampsia and Eclampsia with LDH levels should be made mandatory.

Key words: Eclampsia, hypertension, gestation, lactate dehydrogenase.

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INTRODUCTION

One of the important conditions in pregnant women is hypertensive disorder with serious maternal and fetal complications.[1] Among hypertensive disorders, preeclampsia is one of the most important life threatening one for both mothers and neonates worldwide, with 10–15% of the 500,000 maternal deaths each year.[1-2] Preeclampsia is a multisystem disorder which complicates 5-8% of all pregnancies.1 It is still regarded as disease of theories and its etiology has been poorly understood. There is increasing evidence that endothelial cell and altered endothelial cell function play an important role in the pathogenesis of preeclampsia.[3]

Lactate dehydrogenase (LDH) is an intracellular enzyme which converts pyruvic acid to lactic acid during the process of glycolysis. Glycolysis is the major energy pathway in the placenta. Hypoxia in preeclampsia (PE) further enhances glycolysis and increases LDH activity. Studies have shown that LDH activity & gene expression are higher in placentas of PE than normal pregnancy.[4-6]

The levels of LDH in serum are increased in clinical situations associated with cell damage, leak, hemolysis, and cell death. Hence, serum LDH levels can be used to assess the extent of cellular death and thereby the severity of disease and can be of help in making decisions regarding the management

strategies to improve the maternal and fetal outcome.[7] This study was undertaken to assess and compare the serum LDH levels in women with preeclampsia and normal pregnant women and its effect on maternal and perinatal outcome in preeclampsia.

MATERIALS AND METHODS

This study was conducted to analyse role of Serum lactate dehydrogenase as a predictor of adverse feto-maternal outcomes in cases of pre-eclampsia and eclampsia. A total of 120 patients were included in this study. These patients were divided into 3 groups of 40 each as follows:

- Group 1: patients with severity of preeclamsia being mild.
- Group 2: patients with severity of preeclamsia being severe.
- Group 3: normal pregnancy group.

All patients were randomly selected irrespective of their age, based on their reporting into the labour room department. Following exclusion criteria was followed:

- History of renal disease
- History of epilepsy
- Known drug allergies
- Uncontrolled diabetes.

Detailed demographic data of all the patients was collected. Their blood samples were taken. These were sent to laboratory for assessment of serum LDH levels. An auto-analyser was used to measure serum LDH levels. From the reports received from the labs, the entire data was recorded in Microsoft excel sheets. SPSS software was used for statistical analysis of the assimilated data. Student t test and chi-square test were used for evaluation of level of significance.

RESULTS

The present study was conducted on 120 patients. It was observed that the mean LDH levels in the normotensive group were 170 IU/L. The mean LDH levels in mild pre-eclampsia and severe pre-eclamsia group were 324.6 and 645.8 respectively. (table 1)

Table 1: Mean LDH levels

Group	Mean LDH levels (IU/L)	SD
Normotensive group	170.34	45.72
Mild pre-eclampsia group	324.6	74.86
Severe pre-eclampsia group	645.8	133.47

The study obtained significant results when comparing normotensive group versus mild pre-eclampsia group with a P-value of .01. Similar significant results were also obtained on comparison between mild pre-eclampsia group versus severe pre-eclampsia group; and normotensive group versus severe pre-eclampsia group with P-values of .03 and .01 respectively. (Table 2)

Table 2: Comparison of mean LDH levels among different study groups

Comparison	t- value	p- value
Normotensive group versus Mild pre-eclampsia group	-1.846	0.01*
Mild pre-eclampsia group versus Severe pre-eclampsia group	-2.012	0.03*
Normotensive group versus Severe pre-eclampsia group	-1.901	0.01*

The mean gestational age was calculated to be around 38.02 weeks and 37.02 weeks with LDH levels of less than 800 and more than 800 respectively. These figures were not statistically significant. Other parameters like mean birth weight, mean APGAR at 1 minute and 5 minutes, neonatal complications and mortality all showed a significant co-relation with increase in serum LDH levels of more than 800 IU/L. (Table 3)

Table 3: Correlation of perinatal outcome with LDH levels

Parameter	LDH levels less than 800 IU/L	LDH levels of more than 800 IU/L	p- value
Mean gestational age (Weeks)	38.02	37.02	0.69
Mean birth weight (Kg)	2.85	2.24	0.00*
Mean APGAR at 1 minute	7.36	5.46	0.01*
Mean APGAR at 5 minutes	9.02	7.21	0.01*
Neonatal complications (% of patients)	19.34	33.67	0.02*
Neonatal Mortality (% of patients)	15.48	28.56	0.01*

DISCUSSION

Pregnancy causes profound anatomical, physiological, and metabolic changes in maternal tissues. These well-orchestrated changes can go wrong at some stage of pregnancy resulting in various feto-maternal complications. One of the commonest and most dreaded complications is hypertension (preeclampsia (PE)/gestational hypertension (GHTN) which can further complicate into eclampsia (E). They are still the major killers in developing countries. 10 % of all pregnancies are complicated by hypertension. PE & E account for about half of these cases worldwide and have been recognized and described for years despite the general lack of understanding of the disease.[8]The effects of LDH in pregnancy related complications like preeclampsia is now gaining attention. LDH is an intracellular enzyme and its level is increased in these women due to cellular death. Though cellular enzymes in the extracellular space have no metabolic function, they are still of benefit because they serve as indicators suggestive of disturbance of cellular integrity induced by pathological conditions and is used to detect cell damage or cell death.[9] The analysis of a combination of biomarkers particularly markers related to vascular dysfunction such as LDH may enrich the ability to predict and prevent preeclampsia in near future.[10]

The present study was conducted on 120 patients. It was observed that the mean LDH levels in the normotensive group were 170 IU/L. The mean LDH levels in mild pre-eclampsia and severe pre-eclamsia group were 324.6 and 645.8 respectively (table 1). S He et al studied increased concentrations of lactate dehydrogenase in pregnancy with preeclampsia. Lactate dehydrogenase (LDH), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) concentrations and platelet counts were measured in 26 normal pregnant women and 51 preeclamptic women. In the normal-pregnancy group, no significant changes were found in the results of these tests. In the preeclampsia group, ALT and AST concentrations were not significantly higher than those in normal pregnancy, but the LDH concentrations increased and the platelet counts decreased significantly through the pregnancy. The increases in LDH did not correlate with changes in ALT or AST. Preeclamptic women with small-for-gestational-age (SGA) infants had significantly higher LDH concentrations than those in the appropriate-for-gestational-age (AGA) group, but ALT and AST concentrations did not increase significantly. As reasons for the LDH increase in our subjects, liver damage was excluded and more active glycolysis in addition to severe cell damage due to chronic anoxemia were inferred. It is suggested that an increase in LDH is predictive of SGA infants in preeclamptic pregnancy, especially in those with normal liver function.[11]

The study obtained significant results when comparing normotensive group versus mild pre-eclampsia group with a P-value of .01. Similar significant results were also obtained on comparison between mild pre-eclampsia group versus severe pre-eclampsia group; and normotensive group versus severe pre-eclampsia group with P-values of .03 and .01 respectively (table 2). V A Catanzarite et al reported a subgroup of patients with fulminant hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome, manifesting extreme elevation of aspartate aminotransferase (AST; SGOT) and lactate dehydrogenase (LDH) levels and abnormal mental status. These gravidas are at high risk for mortality. Only four patients treated by the authors over a 10-year period have had AST more than 2000 IU/L and LDH more than 3000 IU/L in the HELLP syndrome. This report is based on retrospective chart review. All patients manifested disordered mental status, jaundice, intense hemolysis, and extreme hypertension. One patient had developed multiple organ system failure, was moribund at initial perinatal consultation, and died. The three others were treated with aggressive afterload reduction and plasma infusion or plasmapheresis; two survived. Fulminant HELLP syndrome occurs rarely, but marks a group of patients at high risk for mortality. Optimal therapy is unclear; early intervention, including afterload reduction, volume expansion, and consideration of plasma infusions or plasmapheresis, is recommended.[12]

The mean gestational age was calculated to be around 38.02 weeks and 37.02 weeks with LDH levels of less than 800 and more than 800 respectively. These figures were not statistically significant. Other parameters like mean birth weight, mean APGAR at 1 minute and 5 minutes, neonatal complications and mortality all showed a significant co-relation with increase in serum LDH levels of more than 800 IU/L (table 3). Richard M Burwick et al evaluated the prevalence and impact of hemolysis in hypertensive disorders of pregnancy, we performed a retrospective cohort study at a single center, among women screened for hemolysis using lactate dehydrogenase (LDH) levels. They compared LDH levels by hypertensive disorder (chronic hypertension, gestational hypertension, preeclampsia, and preeclampsia with severe features) and evaluated impact on adverse pregnancy outcomes. Data were analyzed by χ^2 or t test, ANOVA, test of medians, and logistic regression. Among 8645 deliveries, 1188 (13.7%) had a hypertensive disorder. Of these, 812 (68.4%) had LDH measurement before delivery: chronic hypertension (n=152); gestational hypertension (n=209); preeclampsia (n=216); and preeclampsia with severe features (n=235). LDH ≥400 U/L (≥1.6× normal) was more common in preeclampsia with severe features compared with other hypertensive disorders of pregnancy (9.8% versus 2.3%; P<0.001); adjusted odds ratio 4.52 (95% confidence interval, 2.2-9.2; P<0.001). LDH ≥400 U/L was associated with adverse maternal outcomes (41.7% versus 15.3%; P<0.001), adjusted odds ratio

3.05 (95% confidence interval, 1.4-6.7; P=0.006), and adverse neonatal outcomes (eg, preterm birth 59.4% versus 22.5%; P<0.001). We find that elevated LDH levels are associated with adverse maternal and neonatal outcomes in hypertension and preeclampsia, independent of hemolysis, elevated liver enzymes, and low platelet count syndrome. Therefore, elevated LDH levels (≥1.6× normal or ≥400 U/L) may be considered a severe feature of preeclampsia.[13]

CONCLUSION

From the above study the author concluded that LDH levels showed significant variations in pre-eclampsia patients and thus screening of all cases of Preeclampsia and Eclampsia with LDH levels should be made mandatory.

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