Original Research Article

Title

Lactate dehydrogenase enzyme level in women with severe preeclampsia: A cross-sectional study

Abstract

Aim: To determine the frequency of raised lactate dehydrogenase enzyme in women with severe preeclampsia.

Study Design: Cross-sectional study.

Place and duration: Obstetrics and Gynecology department at Liaquat University Hospital Hyderabad from June 2018 to December 2018.

Methodology: There were 141 primiparous women with severe preeclampsia, included in this study. After taking history regarding hypertension and obstetrical examination, patients were subjected to relevant investigation that is, 5ml of blood sent to institutional laboratory for the measurement of lactate dehydrogenase enzyme, if it is >400 U/L then it was labeled as raised.

Results: Frequency of raised lactate dehydrogenase enzyme (400 U/L) was 13.48% (19/141) women with severe preeclampsia.

Conclusion: About 14% of women having Pre-eclampsia had raised lactate dehydrogenase enzyme. Severe preeclampsia is associated with severe multisystemic involvement. Raised LDH levels are indicative of cellular damage and severe hypertension in pregnancy.

Key Words: Preeclampsia, Lactate dehydrogenase, hypertension

Introduction

Globally preeclampsia is responsible for fetal and maternal mortality and morbidity[1].

It causes vascular dysfunction and vasospasm. It usually occurs after 20 weeks of pregnancy but it can occur 4-6 weeks postpartum. It is defined as proteinuria, hypertension with or without edema [2]. Preeclampsia affects about 5-10% of all pregnancies[3] and exact incidence of pre-eclampsia is unknown, but in the United States it range from 2% to 6% in healthy women [4, 5].

Hypertension during pregnancy is responsible for significant maternal and fetal morbidity and mortality [6]. Although eclampsia is a lethal condition but preeclampsia caused more death comparatively. Pregnancy induced hypertension (Eclampsia, Preeclampsia) manifest in the third trimester of pregnancy [7].

About 15 % of pregnancies manifest as mild preeclampsia, 8% as moderate and 2% as severe preeclampsia [8]. Altered endothelial cell function is the pathognomic factor in preeclampsia. Lactate dehydrogenase enzyme (LDH) rise in case of tissue damage. Normally LDH is present in many tissues like cardia, renal, hepatic and pulmonary tissues. Endothelial cell dysfunction causes platelet aggregation and vasoconstriction, all these leads to hypertension and atherosclerosis [9]. Levels of LDH in preeclampsia are directly related with fetal outcomes [10].

Preeclampsia causes lot of changes in cardiovascular system.[11]. As a biomarker, LDH levels reflects the severity of preeclampsia [12].

According to a study hypertension and raised diastolic blood pressure very common in preeclampsic women [13].

The objective of this study is to pick up the severity of disease at an earlier stage so that major complication including HELLP syndrome could be prevented by means of earlier and timely

intervention and further management can be planned and implement in order to reduce maternal illness, fetal illness and death.

Methodology:

This Cross-sectional study was conducted at Obstetrics and Gynecology department, Liaquat University Hospital Hyderabad from June to December 2018 by non-probability consecutive sampling technique. Total 141 primiparous women age 20-35 years with severe preeclampsia were included in the study. Women having the history of chronic hypertension, diabetes mellitus, urinary tract infection, fetal congenital anomaly or epilepsy were excluded.

Preeclampsia is defined as the development of new hypertension after 20^{th} week gestation that is accompanied by new onset proteinuria. Severe preeclampsia is defined as systolic blood pressure >160 mmHg and > 300 milligram of protein collected in a 24 hour urine sample after 20th week of gestation.

The study was performed after the permission of ethical committee of hospital, and verbal informed consent for the study from the study participants. Primiparous women with severe preeclampsia visiting OPD of Liaquat university hospital with raised blood pressure were enrolled in the study. After taking history regarding hypertension and obstetrical examination, patient was subjected to relevant investigation i.e. 5ml of blood sent to institutional laboratory for the measurement of lactate dehydrogenase enzyme, if it is >400 U/L was labeled as significant. Age, economic status, educational status and LDH level was noted and entered into the proforma. After collection of data the analyses were conducted by using Statistical Package for Social Science (SPSS) software version 22. Mean and standard deviation were calculated for quantitative variable is age and levels of Lactate Dehydrogenase (LDH). Frequency and percentages were computed for qualitative variables like raised LDH, educational status and

economic status. Effect modifier age, educational status, economic status and gestational age were controlled by stratification. Chi-square test was applied. P value <0.05 was taken as significant.

Results:

There were 141 primiparous women age 20-35 years with severe preeclampsia were included in this study. Most of the patients were 20 to 30 years of age. The average age of the patients was 25.91±3.33 years similarly the average Lactate dehydrogenase Level (LDL) was 386.96 ± 163.95 U/L as presented in table 1.

Most of the socio economic status was low (family income < 10K) rupees) that is 65.25% (92/141) and 25.53% (36/141) were belonged to middle class (family income: 10K to 30K). Regarding educational status of the study patients, 63.12% were illiterate, 21.28% were primary educated and 15.6% metric.

Frequency of raised lactate dehydrogenase enzyme was 13.48% (19/141) women with severe preeclampsia. With respect to age groups, raised lactate dehydrogenase (LDH) was 43.8% (7/16) in 31 to 35 years of age patients, 17.9% (10/141) in 26 to 30 years of age patients and 2.9% (2/69) in 20 to 25 years of age cases. Rate of LDH was significantly high in 31 to 35 years of patients (p=0.0005) as shown in table 2. Rate of LDH was insignificant between gestational ages (table 3) while LDH was high in lower socioeconomic status (16.3%) but statistically insignificant among socioeconomic class as presented in table 4. Table 5 showed that rate of LDH was also insignificant among education level of the patients.

TABLE 1
DESCRIPTIVE STATISTICS OF PATIENTS

Statistics		**Age (Years)**	Lactate Dehydrogenase Level
Mean		25.91	386.96
95% Confidence Interval for Mean	Lower Bound	25.36	359.67
	Upper Bound	26.47	414.26
Median		26	350
Std. Deviation		3.33	163.95
Minimum		20	120
Maximum		35	850

TABLE 2
FREQUENCY OF RAISED LACTATE DEHYDROGENASE ENZYME IN WOMEN WITH SEVERE PREECLAMPSIA WITH RESPECT TO AGE GROUPS

Age Groups (Years)	RAISED LACTATE DEHYDROGENASE		Total	P-Value
	Yes	NO		
20 to 25	2 (2.9%)	67 (97.1%)	69	
26 to 30	10 (17.9%)	46 (82.1%)	56	0.0005
31 to 35	7 (43.8%)	9 (56.3%)	16	

Chi-Square= 20.12

TABLE 3
FREQUENCY OF RAISED LACTATE DEHYDROGENASE ENZYME IN WOMEN WITH SEVERE PREECLAMPSIA WITH RESPECT TO GESTATIONAL AGE

Gestational Age (Weeks)	RAISED LACTATE DEHYDROGENASE		Total	P-Value
	Yes	NO		
28 to 34	11 (13.8%)	69 (86.3%)	80	0.91
>34	8 (13.1%)	53 (86.9%)	61	

Chi-Square= 0.012

TABLE 4
FREQUENCY OF RAISED LACTATE DEHYDROGENASE ENZYME IN WOMEN WITH SEVERE PREECLAMPSIA WITH RESPECT TO SOCIOECONOMIC STATUS

Socioeconomic Status	RAISED LACTATE DEHYDROGENASE		**Total**	**P-Value**
	Yes	**NO**		
Lower	15(16.3%)	77(83.7%)	92	
Middle	3(8.3%)	33(91.7%)	36	0.40
High	1(7.7%)	12(92.3%)	13	

Chi-Square= 1.82

TABLE 5
FREQUENCY OF RAISED LACTATE DEHYDROGENASE ENZYME IN WOMEN WITH SEVERE PREECLAMPSIA WITH RESPECT TO EDUCATIONAL LEVEL

EDUCATIONAL LEVEL	RAISED LACTATE DEHYDROGENASE		**Total**	**P-Value**
	Yes	**NO**		
Illiterate	10(11.2%)	79(88.8%)	89	
Primary	7(23.3%)	23(76.7%)	30	0.032
Metric	2(9.1%)	20(90.9%)	22	

Chi-Square= 0.197

Discussion:

In our study, older age was more often seen in women with severe pre-eclampsia group. With respect to age groups, raised lactate dehydrogenase was 43.8% (7/16) in 31 to 35 years of age patients, 17.9% (10/141) in 26 to 30 years of age patients and 2.9% (2/69) in 20 to 25 years of age cases. Rate of LDL was significantly high in 31 to 35 years of patients (p=0.0005). Serum biomarkers like LDH are prognostics in detecting the severity of preeclampsia. Although other biomarkers like uric acid and ALT are also prognostics but LDH level is more reliable among them. In present study the average age of the patients was 25.91±3.33 years and the average Lactate dehydrogenase Level (LDL) was 386.96 ± 163.95 U/L. The frequency of raised lactate dehydrogenase enzyme was 13.48% (19/141) women with severe preeclampsia. Similarly in a study most of women belonged to the age group of 20-25 years and the mean LDH was significantly higher in women with preeclampsia as compared to normal pregnant women [14]. Furthermore in an Indian study 30.8% women had high LDH level among them half had severe preeclampsia while the remaining 50% had mild preeclampsia. Rise in the LDH levels was observed with increasing severity of preeclampsia [15]. In another similar Pakistani study, mean LDH was 337.89±173.15 in mild preeclampsia while it was it was 556.41±193.02 in severe preeclampsia. It signifies that LDH level increases with the severity of preeclampsia [16].

An international study concludes a positive correlation between increasing severity of preeclampsia and median LDH concentrations (p = 0.037) [17]. According to the results of a study mean LDH was normal (257.24 U/L) in normotensive pregnant women, it increased to 417.84 U/L in preeclampsia while it increased significantly (565.51 U/L) in eclampsia women [18].

Maternal and perinatal morbidity and mortality are linked to hypertension in pregnancy. A number of studies reflected on the magnitude of this problem globally. Elevated levels of LDH in severe preeclampsia is associated with fetal problems like low birth weight, low Apgar score and neonatal mortality. Although we did not monitored the fetal and neonatal outcome in our study but is proven other studies [19, 20].

Conclusion:

In our study about 14% of women having Pre-eclampsia had raised lactate dehydrogenase enzyme. Severe preeclampsia is associated with severe multisystemic involvement. Raised LDH levels are indicative of cellular damage and severe hypertension in pregnancy.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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