



# **Association between Raised Serum Lactate Dehydrogenase and Hypertensive Disorders of Pregnancy**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Objective:** To determine the association between raised serum lactate dehydrogenase (LDH) and hypertensive disorders of pregnancy.

**Material and Methods:** This case control study was conducted in the department of Obstetrics and Gynecology, at Liaquat University of Medical and health Sciences Jamshoro, Hyderabad, for a period of six months from July 2021 to December 2021. All the pregnancy hypertensive disorder women as cases and normotensive women as control of ages between 18 and 45 years with gestational age >28 weeks, irrespective of parity and booking stratus were included. Under aseptic conditions, from each woman of both groups around a 2 ml venous blood sample was taken (before treatment) for the assessment of serum LDH levels. Serum LDH levels more than 280 U/L was considered as raised. All the informations were noted on predesigned proforma by the researcher herself. SPSS version 26 was used for the data analysis.

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**Results:** A total of 100 cases were included, particularly 50 women having hypertensive disorders of pregnancy and 50 normotensive pregnant women were studied. The overall mean age of the female's was  $25.76 \pm 5.39$  years and average BMI was  $32.7 \pm 2.02$  kg/m<sup>2</sup>. Out of all 65.0% were primiparous. Most of the females 76.0% were poor socioeconomically. LDH was raised among 62.0% of the women with hypertensive disorders of pregnancy and it was normal among all normotensive pregnant women. Average serum LDH level was significantly higher in cases as compared to the controls (0.001).

**Conclusion:** Raised serum lactate dehydrogenase (LDH) was observed to be significantly linked to hypertensive disorders of pregnancy. Careful monitoring of serum LDH concentrations during pregnancy in high-risk cases may play a role in early detection and treatment to decrease the morbidity and mortality.

*Keywords: PIH; pregnancy; LDH; diagnosis; marker.*

## 1. INTRODUCTION

Pregnancy-related hypertensive disorder is a global public health issue [1]. Pregnancy-Induced Hypertension (PIH) is characterized as an increased blood pressure of more than 140/90 mm Hg measured at rest on two different occasions in a female during pregnancy after 20 weeks of gestation [2]. Cerebrovascular events, abruptio placentae, disseminated intravascular coagulation and the organ failure are among the maternal morbidities associated with PIH, while newborns are at risk of preterm birth, intrauterine growth retardation (IUGR) and intrauterine death [3,4]. Pregnancy-induced hypertension (PIH) is a worldwide condition that affects 5-15 percent of Indian women and complicates 10-17 percent of all pregnancies and PIH problems are the third highest reason for pregnancy linked mortality, causing severe maternal and fetal complications [5]. As per World Health Organization, around one woman dies every seven minutes from hypertension during pregnancy [6]. The presence of hypertension with proteinuria and/or edema is commonly used to diagnose PIH in late pregnancy [6]. For the prediction or early identification of PIH, clinical, biophysical, and biochemical diagnostics have been proposed. Although clinical presentation of disease, diagnostic criteria and management and prognosis are all identical, the occurrence of fetal and maternal complications obviously varies between the studies [6,7]. Despite the fact that various laboratory and imaging tests have been proposed for hypertension during pregnancy prediction, the best screening model to be extensively employed in clinical practice is still up for debate. Although LDH is an internal enzyme, cellular death causes an increase in its concentration in these patients [8,9]. As a result, serum LDH concentrations could be used to determine the severity of disease by determining the extent of cellular deaths [5]. Multiple

variables have been identified, the most notable of which is endothelial dysfunction, which results in mild - to - moderate microangiopathy of specific organs, increased cell leakiness, hemolysis, and cell death, and finally excessive lactate dehydrogenase (LDH) leakage in serum [8]. This study has been done to determine the association of raised serum lactate dehydrogenase (LDH) with pregnancy induced hypertension disorders. Using the elevated LDH levels as the diagnostic marker for the hypertensive disorders, and quick treatment may help to avert these consequences, resulting in a reduction in maternal and foetal morbidity and mortality.

## 2. MATERIALS AND METHODS

This case control study was conducted in the department of Obstetrics and Gynecology, at Liaquat University of Medical and health Sciences Jamshoro, Hyderabad, for a period of six months from July 2021 to December 2021. All the pregnancy hypertensive disorder women as cases and normotensive women as control of ages between 18 and 45 years with gestational age >28 weeks, irrespective of parity and booking stratus were included in the study. Patients with chronic renal or liver disease, diabetes mellitus, history of thyroid disorder, epilepsy, history of tobacco or alcohol consumption, hyperuricemia, symptomatic infectious illness and multiple gestations were excluded. Pregnancy induced hypertension was labeled as positive according to SBP >140 to <160 mmHg and DBP >90 to <110mmHg. Mild pre-eclampsia was defined as SBP >140 to <160 mmHg and DBP >90 to <110mmHg with proteinuria >0.3gram/24 hours. Severe pre-eclampsia was defined as SBP >160 mmHg and DBP >110 mmHg with proteinuria >5 gram/24 hours. After discussing the study's goal and procedure, verbal informed consent was

obtained from each case. The demographic information was noted in respect of age, parity, gestational age, systolic blood pressure, diastolic bold pressure and socioeconomic status. Under aseptic conditions, from each woman of both groups around a 2 ml venous blood sample was taken (before treatment) for the assessment of serum LDH. Serum LDH levels more than 280 U/L was considered as raised. All the information was noted in predesigned proforma by the researcher herself. SPSS version 26 was used for the data analysis.

### 3. RESULTS

A total of 100 cases, particularly 50 women having hypertensive disorders of pregnancy and 50 normotensive pregnant women were studied. The overall mean age of the females was 25.76±5.39 years, average BMI was 32.7±2.02 kg/m<sup>2</sup>. primiparous women were 65.0% and 35.0% were multiparous. 57.0% females were uneducated and 43.0% were formally educated. As per socioeconomic status, most of the females 76.0% were poor and 24.0% had middle socioeconomic status. As per hypertensive disorders, the eclampsia was commonest 62.0% out of 50 hypertensive disorder cases, followed by PIH 10.0%, mild pre-eclampsia 14.0% and severe pre-eclampsia 14.0%. Table.1

LDH was raised among 62.0% of the women having hypertensive disorders of pregnancy, while it was normal among all normotensive pregnant women. Raised serum lactate dehydrogenase was significantly associated with pregnancy induced hypertension (p=0.001). Average serum LDH level was significantly higher in cases as compared to the controls (0.001). Table.2

### 4. DISCUSSION

Pregnancy hypertensive problems have been recognized for centuries. Endothelial dysfunction produced by substances released by an ischemic placenta has been proposed as a source of disease etiology in many theories. Recently it is reported that the higher levels of LDH have been linked to raised severity of PIH and perinatal complications, although it is observed that LDH could be a valuable biochemical diagnostic for PIH severity [10]. In this study, 50 women of pregnancy hypertensive disorder and 50 normotensive pregnant women were studied, their overall mean age was 25.76±5.39 years, average BMI was 32.7±2.02 kg/m<sup>2</sup>, 65.0% women were primiparous and 76.0% were poor socioeconomically. Consistently Tesfaye AG et al. [6] reported that the average age of the participants was 24.83 years, most of the cases 119 (33.9%) were in the age group of 25-29 years, 59.8% cases from urban regions and the rest of the cases were from rural regions. On other hand Khan S et al. [11] reported that the average age of the study participants was 24.26±2.92 years, the average gestational age was 30.82±3.22 weeks, and the average parity was 2.59±0.80, consequently average systolic blood pressure was 148.48±5.99 mmHg, while average diastolic blood pressure was 94.85±3.05 mmHg. In the study of Prajapati S et al. [8] reported that 72 (40%) belonged to the age group of 25-29 years, and inconsistently they found the majority of the cases 60% were primiparous. Although Awuah SP et al. [12] demonstrated that, out of all hypertensive women multiparous were 57.2%, primiparous were 22.6% and 20.2% were nulliparous. In the comparison of this study the Gudeta TA et al. [13] demonstrated that the 37.3 percent of the

**Table 1. Descriptive statistics of demographic data n=100**

Variables		Statistics		
Age (years)		25.76±5.39		
Gestational age (weeks)		37.23±2.21		
BMI kg/m <sup>2</sup>		32.7±2.02		
Parity	Primiparous	65	65.0%	
	Multiparous	35	35.0%	
Educational status	Illiterate	57	57.0%	
	Educated	43	43.0%	
Socioeconomic status	Poor	76	76.0%	
	Middle	24	24.0%	
Hypertensive disorders (n=50)	PIH	05	10.0%	
	Pre-eclampsia	Mild	07	14.0%
		Severe	07	14.0%
	Eclampsia	31	62.0%	

**Table 2. Comparison of raised LDH in cases and controls n=100**

Variables			Pregnancy induced hypertension		p-value
			Yes n=50	No n=50	
<b>Raised LDH level</b>	Yes	Count	31	--	0.001
		% within PIH	62.0%	--	
	No	Count	19	50	
		% within PIH	38.0%	100.0%	
<b>Total</b>	Count	50	50		
	% within PIH	100.0%	100.0%		
<b>Average serum LDH level</b>			901.32 U/L	277.93 U/L	0.001

total study participants were aged 20–24 years, 51.4 percent of the participants were from rural areas, 36.1 percent of the respondents attended primary school, the majority 66.3 percent were housewives, and 55.3 percent of the participants' family sizes were between 3–4 people. The difference in demographic findings with few other studies, may be because of difference in sample sizes of the studies, study selection criteria and cultural variations.

In this study LDH was raised among 62.0% of the women having hypertensive disorders of pregnancy, while it was normal in all normotensive pregnant women (p=0.001). Consistently Prajapati S et al [8] reported that the cases having severely raised systolic and diastolic blood pressure had raised LDH levels concentrations than the others out of all 180 patients. Similar findings were also observed by Jaiswar et al [14] and Mary et al [15]. Thirty-three females having raised LDH (>800IU/L) and out of these 12 had eclampsia, 6 cases had mild eclampsia, 11 had pre-eclampsia and 4 cases had pregnancy hypertension. Some other studies also reported that LDH concentrations increased significantly as the severity of the PIH increased (P<0.001) [16,17]. Lactate dehydrogenase has had an exciting voyage as a utility marker in several disorders, however its clinical value has been restricted to confirm hemolysis, as a tumor marker, and as a preeclampsia diagnostic biomarker [18]. When it comes to hypertensive problems in pregnancy, the findings of lactate dehydrogenase concentrations using healthy people as a reference are inconsistent, especially when it comes to early symptoms or mild severity [18]. According to a study conducted by Sreelatha S et al, [19] elevated LDH levels are associated with the severity of PIH and adverse neonatal outcome. As a result, it might be regarded a biochemical marker. Despite advances in the field of medical sciences, pregnancy-induced hypertension (PIH) is still regarded a major health-care problem

among pregnant women [5,20]. Obstetricians must be extremely cautious when diagnosing and treating PIH patients in order to prevent the disorder's progression and complications [5].

## 5. CONCLUSION

Raised serum lactate dehydrogenase (LDH) was observed to be significantly associated with hypertensive disorders of pregnancy. As a result, careful monitoring of serum LDH concentrations during pregnancy in high-risk cases may contribute in early detection and treatment of the illness, while for implication as an only diagnostic tool, further large-scale studies are needed.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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