


Connection Preeclampsia Incidence With LDH Levels

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Article Info	ABSTRACT
Keywords: Preeclampsia, LDH, Hypertension	Hypertension is a condition that can affect pregnancy. Preeclampsia is a condition in which hypertension occurs after the 20th week of pregnancy and is accompanied by proteinuria. Lactate dehydrogenase (LDH) is a hydrogen transfer enzyme that catalyzes the oxidation of L-lactate to pyruvate with the intermediary of NAD + as a hydrogen acceptor . This study aims to identify the relationship between the occurrence of preeclampsia with LDH levels . The research was conducted by collecting secondary data from various research journal sources. 20 20 -2024. The research results show that there is connection incident preeclampsia with LDH levels . Lactate dehydrogenase (LDH) undergoes increase in cases preeclampsia . Lactate dehydrogenase useful as marker biochemistry For describe the weight preeclampsia experienced patients . In addition , LDH can also describe possibility emergence complications so that can predict patient prognosis . People in the high lactate dehydrogenase (LDH) group were older and had higher body weight and blood pressure .
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INTRODUCTION

Hypertension is a condition that can affect pregnancy. The impact of hypertension in pregnancy on the fetus and mother is very high. High blood pressure in pregnancy can inhibit the growth of the fetus and uterus, cause fetal death in the womb, and lead to premature birth¹

The criteria for establishing a diagnosis of Hypertension in Pregnancy (HHT) in the United States have evolved over the past 5 decades. The latest definition hypertension in pregnancy from the American College of Obstetricians and Gynecologists (ACOG) published in 2013. The definition hypertension in pregnancy No always standardized , but follow recommendations of the "National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy" when This is pressure blood systolic blood pressure (SBP) 140 mmHg and/or diastolic blood pressure (DBP) 90 mmHg .²

Preeclampsia is a condition where hypertension occurs after the 20th week of pregnancy and is accompanied by proteinuria. In pregnancy with preeclampsia , trophoblast cell invasion occurs only in part of the spiral arteries in the myometrium area so that placental function is disrupted, so the placenta does not meet the blood needs for nutrition and oxygen to the fetus .³

problem with preeclampsia is its sudden and acute onset , often without definite

symptoms. The main symptoms of preeclampsia , such as increased blood pressure (BP), severe headache, nausea, vomiting, blurred vision, sensitivity to light, are very nonspecific. ⁴

One of the pathophysiology Severe preeclampsia is an inadequate change in the shape of the spiral arteries due to abnormal trophoblast invasion, which resulting in placental hypoxia . Under hypoxic conditions , glucose metabolism shifts toward anaerobic glycolysis, which causes increased activity of the enzyme lactate dehydrogenase (LDH). ⁵

Lactate dehydrogenase (LDH) is a hydrogen transfer enzyme that catalyzes the oxidation of L-lactate to pyruvate with NAD + as the hydrogen acceptor. ⁶ Lactate dehydrogenase is an intracellular enzyme found in almost all living cells. LDH is required to maintain glycolysis and adenosine triphosphate (ATP) production under low oxygen conditions by regenerating nicotinamide adenine diphosphate (ATP). adenine oxidized dinucleotide (NAD+) from nicotinamide adenine dinucleotide (NADH). LDH catalyzes the reduction of pyruvate to lactate while generating NAD+. Lactate, a byproduct of this reaction, is produced. LDH influences the formation of lactic acid, and LDH and lactic acid levels generally increase in the presence of cell damage . ⁵

RESEARCH METHODS

This research method uses a literature approach. review to explore the relationship between the incidence of preeclampsia and LDH (Lactate Dehydrogenase) in pregnant women. In the reviewed literature, LDH is known as a biomarker that can reflect the presence of cell damage, including in cases of preeclampsia , which is often characterized by impaired organ function. Through analysis of various existing studies, this study seeks to identify patterns or correlations between increased LDH levels and the development of preeclampsia in pregnant women, as well as how LDH levels can be used as an indicator to detect complications in pregnancy.

The literature reviewed in this study includes articles that describe the results of clinical studies, laboratory tests, and epidemiological analyses involving LDH levels in the diagnosis or management of preeclampsia . By referring to various credible sources, this study focuses on conclusions obtained from empirical data, as well as an evaluation of the reliability of LDH as a diagnostic parameter in the context of preeclampsia . Results from the literature This review is expected to provide further insight into the importance of monitoring LDH levels in mitigating the risk of preeclampsia and its complications.

Discussion

Preeclampsia

Preeclampsia is hypertension after 20 weeks pregnant with pressure blood $\geq 140/90$ mmHg measured twice with an interval of 4 hours accompanied by with proteinuria exceeding 300 mg in urine for 24 hours. ⁷ According to WHO, one of the causes of high maternal mortality is hypertension in pregnancy with a prevalence of 24%. Indonesia is one of the developing countries with high MMR (Maternal Mortality Rate) and perinatal mortality, the third highest in ASEAN and the second highest in the South East Asian Nation Regional Organization. ⁸

From the results of the survey conducted, it shows that there has been a decrease in MMR from year to year, but Indonesia still ranks highest among ASEAN countries, namely 315/100,000 live births in 2012 (SDKI 2012), for that reason, hard work is still needed to

achieve the SDGs target, namely reducing MMR to 70/100,000 live births. in 2030. ⁹

Etiology of occurrence The cause of preeclampsia is not yet known for certain, but there are several factors that can cause it. factors that influence the occurrence of preeclampsia are primigravida / nulliparity , extreme maternal age (35 years old) , family history of preeclampsia / eclampsia , kidney diseases and hypertension that already exists before pregnancy, obesity, diabetes mellitus, trophoblastic disease (70% occurs in cases of hydatidiform mole). ^{7,10}

Preeclampsia marked with ischemia placenta and dysfunction endothelium . Placenta in patients preeclampsia experience failure invasion cell trophoblast which results in flow blood in reduced spiral arteries so that happen hypoxia placenta . Ischemia or hypoxia placenta will cause dysfunction endothelium or endothelium No functioning as should be . Dysfunction endothelium causes maternal vascular to react to vasopressor such as angiotensin II and norepinephrine , circumstances This cause the occurrence imbalance substance vasoactive so that cause hypertension , edema and proteinuria. ¹¹ Signs and symptoms of preeclampsia are hypertension, edema, proteinuria, blurred vision, headache and pain in the epigastrium. ¹²

Management and appropriateness of drugs for pregnancy should be considered, because there are several types of drugs that are avoided by pregnant women such as ARB can increase the risk of teratogenic fetuses, ACE inhibitors such as captopril which can cause retardation and teratogenic, and other drugs including minoxidil and calcium antagonists (diltiazem and verapamil) cannot be used because the safety of these drugs has not been proven. Therefore, pregnant women who take antihypertensive drugs must be monitored carefully because of the increased risk to the mother and fetus because some drugs can enter the uterus and then enter the fetus. ¹

Efforts to prevent preeclampsia can be done through primary prevention and secondary prevention. Primary prevention of preeclampsia can be done by providing access to quality maternal health services, such as screening, especially for gestational age <20 weeks. Screening or early detection is effective in predicting the presence of preeclampsia , so that cases of preeclampsia can be handled early. Preeclampsia screening varies from simple to sophisticated, namely the biomolecular level depending on the availability of sources. power. Secondary prevention that can be done is rest, salt restriction, low-dose aspirin, and calcium supplementation as an effort to reduce AKI . ¹¹

Lactate D ehydrogenase

Lactate Dehydrogenase (LDH) is an intracellular enzyme that converts pyruvic acid to lactic acid during glycolysis and almost all metabolic cells that are in high concentrations found in the heart, skeletal muscle, liver, kidneys. Lactate Dehydrogenase activity in all body cells, especially in the cytoplasm, in varying amounts. Lactate Concentration Dehydrogenase of some tissues can reach 500 times the level of Non Hemolysis in serum. Therefore, it is very susceptible to tissue damage which causes an increase in Lactate Dehydrogenase activity. In this sample examination, it is in the form of serum. Lactate Dehydrogenase activity can be affected by hemolyzed blood samples because red blood cells contain their own LDH protein so that this hemolysis causes an artifactual increase leading to false positive high results . ¹³

Lactate dehydrogenase is an enzyme found in nearly all tissues of the body. Conditions that can cause elevated LDH in the blood include liver disease, anemia, heart attack, fractures,

muscle trauma, cancer, and infections such as encephalitis, meningitis, meningitis, and HIV. LDH is also a nonspecific marker of tissue turnover, which is a normal metabolic process. Many cancers cause a generalized increase in LDH levels or an increase in one of its isozymes. Therefore, LDH can be a nonspecific tumor marker that is not useful in identifying the type of cancer. Because LDH is nonspecific and routine isozyme measurements are not usually available in clinical laboratories, LDH measurements provide incomplete information, and alternative tests such as CK for muscle, ALT for liver, troponin for heart disease, and others are needed.¹⁷

Connection incident preeclampsia with LDH levels

Preeclampsia is a health problem that occurs after 20 weeks of pregnancy which is characterized by hypertension and proteinuria. Proteinuria is defined as urinary protein excretion exceeding 300 mg in 24 hours, urinary protein-creatinine ratio ≥ 0.3 , or the presence of protein of 30 mg/dl (dipstick 1+) in a routine random sample consistently.¹⁵

A number of study state that lactate dehydrogenase (LDH) undergoes increase in cases preeclampsia-eclampsia . Lactate dehydrogenase useful as marker biochemistry For describe the weight preeclampsia-eclampsia experienced patients . In addition , LDH can also describe possibility emergence complications so that can predict patient prognosis.¹⁵ Lactate Dehydrogenase (LDH) is a cytoplasmic enzyme found almost all organs. Organ damage which occurs due to hypoxia in PE patients will increase LDH activity .¹⁶ Normal LDH levels vary from 200 to 400 IU/L. Pregnancy That Alone No influence LDH levels . When the tissue damaged Because injury or disease , occurs improvement LDH levels in the blood.¹⁷

Table 1. Characteristics lactate dehydrogenase.¹⁸

Laktat dehidrogenase (U/L) Tertil	Rendah (≥ 32 hingga 114)	Tengah (≥ 114 hingga 133)	Tinggi (≥ 133 hingga ≤ 491)	P -nilai
Usia, rata-rata \pm SD (tahun)	40,14 \pm 14,11	43,00 \pm 14,14	46,35 \pm 14,02	<0,001
Berat (kg)	78,74 \pm 19,54	81,76 \pm 20,98	85,36 \pm 23,36	<0,001
Tinggi Berdiri (cm)	168,98 \pm 9,50	168,55 \pm 10,19	168,10 \pm 10,13	0,104
Tekanan darah sistolik (mmHg)	117,91 \pm 14,74	120,24 \pm 15,52	125,51 \pm 18,24	<0,001
Tekanan darah diastolik (mmHg)	70,86 \pm 11,16	72,44 \pm 11,34	73,91 \pm 12,93	<0,001
Glukosa, serum (mmol/L)	5,53 \pm 2,17	5,53 \pm 2,04	5,61 \pm 2,04	0,520
Albumin (g/L)	43,18 \pm 3,25	43,40 \pm 3,19	42,91 \pm 3,25	0,001
Globulin (g/L)	28,33 \pm 4,39	28,86 \pm 4,37	29,41 \pm 4,77	<0,001
Kolesterol (mmol/L)	4,81 \pm 0,95	4,99 \pm 1,04	5,10 \pm 1,12	<0,001
Kreatinin (umol/L)	74,74 \pm 19,45	76,74 \pm 23,20	80,73 \pm 36,86	<0,001
Alanin aminotransferase ALT	20,81 \pm 10,72	24,33 \pm 14,26	30,69 \pm 26,50	<0,001

(U/L)				
Laktat dehidrogenase (U/L)	101,28 ± 9,58	122,84 ± 5,37	153,03 ± 22,72	<0,001
FVC Dasar (mL)	4108,70 ± 1026,93	3982,67 ± 1085,83	3776,14 ± 1064,77	<0,001
FEV1 Dasar (mL)	3281,56 ± 862,37	3152,22 ± 880,56	2971,93 ± 879,05	<0,001
Jenis kelamin (%)				0,400
Pria	50.4	53.2	52.1	
Perempuan	49.6	46.8	47.9	
Ras/asal Hispanik (%)				<0,001
Amerika Meksiko	10.6	11.2	10.8	
Hispanik lainnya	10.2	11.8	8.3	

Based on Table 1. People in the high lactate dehydrogenase (LDH) group were older and had higher body weight and blood pressure. The results showed that in groups with different lactate dehydrogenase levels, FVC and FEV 1 were the only variables that decreased with increasing lactate dehydrogenase levels (P < 0.001). Variables with insignificant differences included gender, height, serum glucose levels, and respiratory diseases. Among the serological indices, globulin, cholesterol, creatinine, and ALT showed a gradual increase with increasing lactate dehydrogenase (P < 0.001). Other variables with statistically significant differences .¹⁸

In a study conducted by Eleti et al (2023), from results research is obtained that serum LDH levels significant more height in women from group preeclampsia-eclampsia compared to with woman pregnant normotensive . Higher LDH levels tall relate positive with level badness diseases and complications Mother like solution placenta , hemolysis , increased enzyme heart , number low platelets (HELLP), coagulation intravascular disseminated (DIC), failed kidney acute , bleeding intracranial , pulmonary edema , and death mother and for complications fetus like premature , IUGR, APGAR at 1 minute < 7, APGAR at 5 minutes <7, birth weight low birth weight (LBW), enter the care unit neonatal intensive care unit (NICU), and death fetus in content (IUFD).¹⁹

In a study conducted by Kharb S et al (2023), from results research is obtained that with increasing badness preeclampsia , occurs improvement LDH levels . Preeclamptic women heavy with LDH levels >800 IU/l indicate significant improvement in incident eclampsia , abruption , hemolysis , increased enzyme liver , and syndrome amount low platelets , coagulation intravascular dissemination , and transfer to room maintenance intensive care (ICU) / room maintenance intensive respiratory ICU compared with woman with higher LDH levels low , namely <600 IU/l.²⁰

CONCLUSION

Preeclampsia is hypertension after 20 weeks pregnant with pressure blood ≥ 140/90 mmhg measured twice with a 4 hour interval accompanied by with proteinuria exceeding 300 mg in urine for 24 hours. Lactate Dehydrogenase (LDH) is an intracellular enzyme that converts pyruvic acid to lactic acid during the glycolysis process. In this discussion, it has been

identified that there is a relationship between the occurrence of preeclampsia with LDH levels. Lactate dehydrogenase (LDH) undergoes increase in cases preeclampsia . Lactate dehydrogenase useful as marker biochemistry For describe the weight preeclampsia experienced patients . In writing this literature, the author suggests For study furthermore can done study on preeclampsia with do other examinations besides inspection level enzyme lactate dehydrogenase .

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