Neonatal Outcome from Severe Preeclampsia With and Without HELLP Syndrome at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar

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Abstract. Hemolysis Elevated Liver enzymes and Low Platelets (HELLP syndrome) is a severe complication of preeclampsia. HELLP syndrome is manifestation of impaired liver function. Worsening of the maternal condition in HELLP syndrome also has an impact on the fetus. This study aims to determine neonatal outcomes of mother who have severe preeclampsia with and without HELLP syndrome. A retrospective observational study conducted at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar. Data was taken from a total of 237 medical records of mother giving birth with severe preeclampsia from January 2021 to December 2022. Neonatal outcome include gestational age, birth weight, APGAR score and intrauterine foetal deaths. Correlative analysis using chi square and alternatively using Fisher's test. Neonatal outcomes in woman with severe preeclampsia with HELLP syndrome appear to be in worse condition. In severe preeclampsia with HELLP syndrome neonatal gestational age <37 weeks (65.2%); APGAR score ≤ 6 (56.5%); intrauterine foetal deaths (21.74%). Neonate with lower birth weight (less than 2500 g) were not too different in both groups (with HELLP syndrome 69.6%; without HELLP syndrome 60.3%). There was a significant difference in gestational age (p=0.03), APGAR score (p=0.005) and intrauterine foetal death (p=0.00) of neonates born to severe preeclamtic mother with and without HELLP syndrome. However, there was no significant difference in the birth weight (p=0.385) of neonates in both groups. Neonatal outcome in severe preeclampsia with and without HELLP syndrome show a variety of conditions.

Keywords: Neonatal Outcome, Preeclampsia, HELLP Syndrome.

1 Background

Preeclampsia is one of the causes of maternal death in Indonesia. The report in the maternal mortality ratio (MMR) in Indonesia is 189/100.000 live births in 2022[2] and one of the most common causes is hypertension. There is a trend of increasing maternal mortality associated with hypertension[13].

T. Triwiyanto et al. (eds.), *Proceedings of the 6th International Conference of Health Polytechnic Surabaya (ICoHPS 2023)*, Advances in Health Sciences Research 72,
https://doi.org/10.2991/978-94-6463-324-5_22

Preeclampsia is complications that occur in pregnancy, labor, and puerperium. Preeclampsia is a condition characterized by a sudden increase in blood pressure at more than 20 weeks gestation and accompanied by at least one or more symptoms of proteinuria, organ failure or utero placental dysfunction[5, 7, 22].

The currently accepted pathophysiology of preeclampsia includes 2 stage[19, 21]. Stage 1 occurs due to incomplete remodeling spiral artery in placenta which result in stress on the syncytiotrophoblast. Change that occur in stage 1 result in clinical manifestation in the mother (stage 2). Syncytiotrophoblast stress result in the release of pro-inflammatory cytokines, reactive oxygen species, extracellular veciles, and anti-angiogenic agents into the maternal circulation. This condition result in endothelial damage, multi organ failure which triggers decreased vasodilatation, systemic inflammation and thrombosis[7, 20].

Hemolysis Elevated Liver enzymes and Low Platelets syndrome known as HELLP syndrome is a severe manifestation of preeclampsia[12]. Preeclampsia that develops HELLP syndrome is estimated at 0.2-0.8%. The death rate for HELLP syndrome is estimated at 0-24%[18].

HELLP syndrome is manifestation of impaired liver function. Three main characteristic are found: hemolysis, elevated liver enzymes and low platelet count (lactate dehydrogenase LDH $\geq$600 IU/l, serum aspartate aminotransferase AST >70 unit/L, platelet count <100.000 cells/µl) [7, 10]. HELLP syndrome may also be accompanied by one or more symptoms of headache, nausea, vomiting, epigastric tenderness, sub sternal tenderness, right upper quadrant pain, shoulder pain, visual disturbance, and swelling [3, 10].

Worsening of the condition in HELLP syndrome may have an impact on the condition of the fetus. Perinatal mortality was report at 14.7% higher than that of severe preeclampsia without HELLP syndrome[23]. Another study, there was no significant difference in neonatal and perinatal mortality in the two groups[25]. A high foetal mortality when associate with gestational age[17]. Premature birth, impaired foetal growth and respiratory disorder in neonatal have been associated with HELLP syndrome[18]. Almost similar, neonatal condition also occurs in preeclampsia. Research show that there is a tendency to increase low birth weight, intra uterine growth restriction (IUGR), prematurity, lower APGAR score in neonates born to preeclamtic mother[16]. This is may be because HELLP syndrome is variant of preeclampsia.

It is interesting to look again at the neonatal outcome of preeclampsia with and without HELLP syndrome. Rumah Sakit Umum Pusat (RSUP) Prof. Dr. I.G.N.G. Ngoerah Denpasar is a referral hospital for the Bali and Nusa Tenggara regions. In 2021 RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar treated 102 cases of severe preeclampsia and HELLP syndrome. RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar also treated 392 babies with low birth weight and 170 babies with asphyxia. This study aims to determine neonatal outcomes of mother who have severe preeclampsia with and without HELLP syndrome at Prof. Dr. I.G.N.G. Ngoerah Denpasar.

2 Method

A retrospective observational study conducted at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar. Data was taken from all medical records (a total of 237 medical records) of mother giving birth with severe preeclampsia from January 2021 to December 2022. Diagnosis of severe preeclampsia and HELLP syndrome by obstetrician. Neonatal outcome include gestational age, birth weight, APGAR score and intrauterine foetal deaths. Correlative analysis using chi square and alternatively using Fisher's test, p value = 0.05. This research has received ethical approval from the Research Ethical Committee, Faculty of Medicine, Udayana University number 992/UN 14.2.2.VII.14/LT/2023.

Diagnose of severe preeclampsia using American College of Obstetricians and Gynecologist : Systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 and one or more following condition headache, visual disturbance, right-upper quadrant pain, pulmonary edema, proteinuria (urinary protein >5 g/24 h). HELLP syndrome : platelet account ≤100.000, serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) ≥ 70 IU/L and lactate dehydrogenase ≥600 IU/L.

3 Result

Table 1 shows the incidence of HELLP syndrome in mother with severe preeclampsia. As many as 9.7% of 237 severe preeclampsia develops HELLP syndrome.

Table 1. Severe preeclampsia with and without HELLP syndrome at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar

Severe preeclampsia	n	%
With HELLP syndrome	23	9.7
Without HELLP syndrome	214	90.3

Table 2. Neonatal outcomes from mother with severe preeclampsia at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar

Neonatal outcome	n	%
Gestational age		
< 37 week	104	43.9
37- 41 week	133	56.1
APGAR Score		
≤ 6	73	30,8
7-10	164	69.2
Birth weight		
< 2500 g	145	61.2

≥ 2500 g	92	39.8
Foetal mortality		
Intrauterine foetal death	7	2.95
Life birth	230	97.05

Table 2 show that 43.9% of neonates were born at gestational age less than 37 weeks, 30.8% with lower APGAR score, 61.2% neonates with birth weight less than 2500 g and 2.95% with Intrauterine foetal death.

Table 3. Differences in neonatal outcomes from severe preeclampsia with and without HELLP syndrome at RSUP Prof. Dr. I.G.N.G. Ngoerah Denpasar

Neonatal outcome	With HELLP syndrome (n = 23)		without HELLP syndrome (n = 214)		P value
	f	%	f	%	
Gestational age					
< 37 week	15	65.2	89	41.6	0.03$^{\Phi}$
37- 41 week	8	34.8	125	58.4	
APGAR Score					
≤ 6	13	56.5	60	28.0	0.005 $^{\Phi}$
7-10	10	43.5	154	72.0	
Birth weight					
< 2500 g	16	69.6	129	60.3	0.385 $^{\Phi}$
≥ 2500 g	7	30.4	85	39.7	
Foetal mortality					
Intrauterine foetal death	5	21.74	2	0.94	0.00‡
Life birth	18	78.26	212	99.06	

$^{\Phi}$ chi square; ‡Fisher

Table 3 showed that neonatal outcomes in woman with severe preeclampsia with HELLP syndrome appear to be in worse condition. More neonates were born in gestational age less than 37 weeks (65.2%). More neonates with APGAR score ≤ 6 (56.5%). Also, there were more intrauterine foetal deaths (21.74%) in severe preeclampsia with HELLP syndrome. Neonate with lower birth weight (less than 2500 g) were not too different in both groups (with HELLP syndrome 69.6%; without HELLP syndrome 60.3%).

The test result showed that there was a significant difference in gestational age (p=0.03), APGAR score (p=0.005) and intrauterine foetal death (p=0.00) of neonates born to severe preeclamtic mother with and without HELLP syndrome. However, there was no significant difference in the birth weight (p=0.385) of neonates in both groups.

4 Discussion

In our study, neonatal outcomes in severe preeclampsia with HELLP syndrome showed a worse condition than those without HELLP syndrome. There are significant differences in gestational age, APGAR score and foetal mortality.

HELLP syndrome is a manifestation of abnormal liver function. In preeclampsia with HELLP syndrome, the placenta is the primary cause of liver failure. Spiral artery remodeling and synsitiotrophoblast damage in placenta promote systemic inflammatory and endothelial damage [1, 6, 8]. Damage to the endothelial in liver increases the formation of microthombi, ischemia of the hepatocytes and ultimately liver failure[3, 18]. Three main characteristic are found: hemolysis, elevated liver enzymes and low platelet count[7, 10] (lactate dehydrogenase ≥600 IU/L, platelet account ≤100.000, SGOT and SGPT ≥ 70 IU/L) which has been used in this study.

Deterioration of maternal conditions encourages active delivery so that expulsion of the placenta can encourages improvement in maternal conditions[3, 4]. Worsen of the mother's condition due to liver failure also affects the condition of the fetus[9, 11, 14]. Fetuses delivery at younger gestation age increases the risk of the neonate and challenges in their care[24].

The results of this study are similar with study that held at RSUP Dr. Kariadi Semarang. The study involved 136 medical record of mother with severe preeclampsia during 2013-2016. The results showed that there were worsening perinatal conditions (prematurity, asphyxia and intrauterine foetal death) in severe preeclampsia with HELLP syndrome[23].

The result of this study showed that there was no difference in neonatal birth weight of severe preeclamtic mother with and without HELLP syndrome. The baby's weight is determined from the utero-placental disturbance that occurs in a relatively long periods due to capability transport nutrient and substance needed for fetal growth[12, 15]. Increased in placental resistance and maternal hypertension that occur in preeclampsia and HELLP syndrome result in fetal growth restriction. The research at The Bakırkoy Women and Children Education and Research Hospital in Istanbul, Turkey show that perinatal outcome was determined more by gestational age than by diseases dependent[3, 25].

5 Conclusion

Neonatal outcomes in severe preeclampsia with and without HELLP syndrome show a variety of condition. Gestational age, APGAR score and foetal mortality show a worse condition in severe preeclampsia with HELLP syndrome. But there was no difference in neonatal birth weight in the two groups.

Gestational age needs to be considered in assessing the neonatal outcome in preeclampsia with and without HELLP syndrome. Matching gestational age can be consideration in conducting further research.

6 Conflict of Interest

No conflict of interest that declared by authors.

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