Management of Hypertension in Pregnancy

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ABSTRAK

Mortalitas maternal akibat hipertensi mencapai 16% bila dibandingkan dengan penyebab lain seperti sepsis, perdarahan maupun abortus. Ibu hamil dengan hipertensi berpotensi mengalami sejumlah komplikasi antara lain koagulasi intravaskular diseminata (KID), perdarahan otak, gangguan fungsi hati, dan gagal ginjal akut. Sedangkan pada janin dapat berakibat pertumbuhan janin terhambat, prematuritas dan mortalitas perinatal.

Hipertensi pada kehamilan perlu ditatalaksana dengan baik agar dapat menurunkan angka morbiditas serta mortalitas ibu dan janin, yaitu dengan menghindarkan ibu dari resiko peningkatan tekanan darah, mencegah perkembangan penyakit dan mencegah timbulnya kejang dan pertimbangan terminasi kehamilan jika ibu atau janin dalam keadaan bahaya.

Kata kunci: *tekanan darah, hipertensi, eklamsia, preeklamsia, ibu hamil, gestasional.*

ABSTRACT

Hypertension-related maternal mortality reaches 16% when it is compared to other causes of maternal mortality such as sepsis, bleeding or abortus. Pregnant women with hypertension disorder are at increased risk for experiencing numerous complications including disseminated intravascular coagulation (DIC), cerebral hemorrhage, liver dysfunction and acute renal failure; while to the fetus, it may cause intrauterine growth retardation, prematurity and perinatal mortality.

Hypertension in pregnancy should be managed appropriately to reduce maternal and fetal morbidity and mortality rate, i.e. by preventing women from getting the risks of increased blood pressure, preventing disease progression and preventing the development of seizure and considering termination of pregnancy in life-threatening situation for maternal and fetal health.

Key words: *blood pressure, hypertension, eclampsia, preeclampsia, pregnant women, gestational.*

INTRODUCTION

The prevalence of pregnancy-related hypertension in well-developed countries varies between 10-20% and it is the most important cause of maternal and fetal morbidity and mortality.[1] Currently, maternal mortality due to hypertension reaches 16% in addition to other causes such as sepsis, bleeding or abortus.[2] Pregnant women with hypertension are at increased risk for experiencing numerous complications such as disseminated intravascular coagulation (DIC), cerebral hemorrhage, liver dysfunction and acute renal failure; while to the fetus, it may cause intrauterine growth retardation, prematurity and perinatal mortality.[3] Pathogenesis of preeclampsia (PE) is quite complex involving genetic, immunologic and environmental factors. The development of PE

is categorized into 2 stages including abnormal placentation and maternal syndrome.[4]

The classification of hypertension in pregnancy that has been commonly used is the one proposed by The National High Blood Pressure Education Program Working Group on Hypertension in Pregnancy (NHBPEP), in which hypertension is defined as blood pressure that is ≥140/90 mmHg.[5] Numerous problems may develop on the management of hypertension in pregnancy including indication of treatment, target blood pressure that should be achieved, maternal and fetal side effects of antihypertensive drugs.[6] Observational studies in patients with mild chronic hypertension demonstrate that the risk of pregnancies are: preeclampsia (l0-25%), abruptio (0.7-l.0%), premature birth less than 37 weeks (12-34%) and intrauterine fetal growth (8-16%). The risk increases in severe chronic hypertension during the first trimester since the risk of experiencing preeclampsia increases up to 50%. To the fetus, hypertension causes increased risk of intrauterine growth retardation, prematurity and intrauterine death. Moreover, common risks of hypertension such as heart failure, encephalopathy, retinopathy, cerebral hemorrhage and acute renal failure may also occur. However, it should be noted that the benefit of hypertension treatment during pregnancy depends on the severity of the disease.

Physiologically, blood pressure begins to fall inn the second trimester, which may reach mean blood pressure of 15 mmHg lower than the systolic blood pressure before the third trimester of pregnancy. The fall occurs either in subjects with normal blood pressure (normotension) or those with chronic hypertension. Hemodynamical changes, altered renal anatomy and physiology and body adaptation that occur during pregnancy cause early detection can be difficult.[7]

ALTERED RENAL ANATOMY AND FUNCTION DURING PREGNANCY

The changes that occur during pregnancy include increased kidney size of ±1 cm, increased kidney volume by 30% and physiological hydronephrosis that appears until 12 weeks post-partum. In addition, the physiological changes that occur during pregnancy include systemic vasodilation characterized by a significant reduction in systolic blood pressure (SBP) ≥10 mmHg due to local mediators such as prostacyclin and nitric oxide (NO), in which the lowest blood pressure is reached at the gestational age of 22-24 weeks. This condition causes body adaptation by increasing the secretion of renin-angiotensin aldosterone (RAA) that may lead to vasoconstriction, volume and plasma retention, as well as potassium excretion in the urine.

At the same time, to protect the mother and fetus of an excessive increase in the RAA, the body will increase the resistance to the effects of angiotensin II with a reduced amount of angiotensin II receptor accompanied by the production of prostacyclin and NO. At 28 weeks gestation, blood pressure began to rise while still under the blood pressure before pregnancy. Increase in renal plasma flow (RPF) and glomerular filtration rate (GFR) may reach 45% and experienced a peak in the first trimester which causes a decrease in serum creatinine to a range of 0.5 - 0.8 mg/dL.[4]

Current definition of hypertension is the one used by the National High Blood Pressure Education Program Working Group on Hypertension in Pregnancy (NHBPEP), i.e. a blood pressure ≥140/90 mmHg or DBP ≥90 mm Hg, or an increase in SBP ≥30 mmHg and/ or DBP >15 mmHg from the previous measurement, which is measured twice with an interval between measurement of ≥6 hours.[8]

Ideal blood pressure measurement is recommended to be performed at home or known as the Ambulatory Blood Pressure Monitoring (ABPM) and the Pulse Wave Analysis (PWA) measurement.[9,10] Some literatures differentiate blood pressure based on blood pressure levels, namely mild hypertension for SBP between 140-159 mmHg or DBP between 99-109 mmHg. Hypertension is considered to be severe when the SBP ≥160 mmHg or DBP ≥110 mmHg.[4,11-13]

The purpose of NHBPEP classification is to differentiate preeclampsia from eclampsia of other hypertensive disorders in pregnancy since both preeclampsia and eclampsia have a poor prognosis on maternal and fetal morbidity and mortality.[14] The diagnosis criteria of hypertensive disorder in pregnancy are as follows:[14,15]

Chronic Hypertension

Chronic hypertension is defined as SBP ≥140 mmHg or DBP ≥90 mmHg that is observable before pregnancy or before the 20th week of gestation. It can be found at the gestational age of >20 weeks or persist in 12 weeks post-partum. The incidence of chronic hypertension is estimated 1-5% of pregnancies depending on age and ethnicity/race. Recent reports reported that the incidence occurs on Afro-American race and it is 1% for other races.

Gestational Hypertension

It is a hypertension characterized by SBP ≥140 mmHg or DBP ≥ 90 mmHg that develops for the first time at the gestational age of ≥ 20 weeks, without proteinuria or any signs and symptoms of preeclampsia; usually the blood pressure back to normal in 42 days post partum. Patients with gestational hypertension are at risk of having hypertension in their next pregnancy and it can develop into preeclampsia.

Preclampsia

a. Minimal criteria. When there is SBP ≥140 mmHg or DBP ≥90 mmHg at >20 weeks of gestation, along with proteinuria ≥300 mg/24 hour or ≥ +1 on dipstick urinalysis or protein: creatinine ratio in the urine ≥0.3.

b. Additional criteria that support the diagnosis. Blood pressure ≥160/110 mmHg, proteinuria 2.0 g/24 hour or ≥ +2 on dipstick urinalysis, creatinine serum level of >1.2 mg/dL, platelet count <100,000, microangiopathy hemolysis, increased transaminase serum level, headache, cerebral or other visual disorders.

Preeclampsia itself can be classified into 2 categories, namely mild preeclampsia and severe preeclampsia. Mild preeclampsia is the preeclampsia with SBP <160 mmHg or DBP 90-<110 mmHg. It is called severe preeclampsia when we found one of the following signs in the patients: SBP ≥160 mmHg and DBP ≥110 mmHg, proteinuria ≥5 g/24 hours or 4+ on dipstick urinalysis, creatinine serum level >1.2 mg/dL, microangiopathy hemolysis, oliguria, cyanosis and pulmonary edema, increased transaminase serum level, other cerebral or visual disorders, persistent epigastric pain, platelet counts <100,000 cells/mm; increased liver enzymes (alanin aminotransferase (ALT) or aspartate aminotransferase (AST); hemolysis – which is best known as the HELLP syndrome.

Eclampsia

When there is any unexplainable seizure in a woman who had preeclampsia.

Preeclampsia Superimposed on Chronic Hypertension

The possibility of chronic hypertension becomes preeclampsia/eclampsia is 15-30%.[16,17] We should suspect for superimposed preeclampsia when we find out the following symptoms and laboratory abnormalities: a sharp increase of blood pressure (>160/110 mmHg), severe proteinuria (or 2 gram/day), a sudden increase of blood pressure after a period of controlled blood pressure and increased serum creatinine level over 1.2 mg/dL. The management of preeclampsia superimposed on chronic hypertension is similar with the general management of preeclampsia.

Nagay et al.[18] observed phenotypic changes in the cells of smooth muscle afferent artery of the renal glomerulus in patients with chronic hypertension who also experienced preeclampsia. By immunohistochemistry, they demonstrated the occurrence of reduced contractile protein (antimonoclonal smooth miscle cell myosin heavy chain isoform antibodies = SM2) in afferent glomerular arteries of patients with preeclampsia superimposed on chronic hypertension.[18,19]

DIAGNOSIS OF PREECLAMPSIA

Preeclampsia is characterized by hypertension which occurs at >20 gestation, along with proteinuria and the symptoms resolve after birth. Proteinuria is defined as the excretion of protein in the urine of ≥300 mg/24 hour, or protein: creatinine ratio ≥0.3, or when there is a persistent protein finding of 30 mg/dL on random urinalysis (+1 on dipstick urinalysis). Preeclampsia occurs in 6% of pregnancies, usually primigravida. Moreover, preeclampsia is classified as mild and severe preeclampsia, in which both should be managed differently.[14] The following factors increase the risk of preeclampsia:

1. Risk factors associated with the male partner, such as: primigravida, primipaternity, age of extremes (too young or too old for pregnancy), male partner who had married a woman and the woman became pregnant and had preeclampsia, limited exposure to sperm, insemination donor and oocyte donor.
2. Risk factors associated with past medical history and family history of the disease, such as: history of previous preeclampsia, chronic hypertension, renal disease, obesity, gestational diabetes, type-1 DM, antiphospholipid antibodies and hyperhomocysteinemia
3. Risk factors associated with pregnancy, such as: mola hydatidosa, multiple pregnancies, urinary tract infection in pregnancy, hydrops fetalis.

Tabel 1. Diagnostic criteria for severe preeclampsia[4,14]

Symptoms	• Central nervous system disorders such as blurred vision or severe headache
	• Stretched liver capsule that causes pain
Signs	• SBP ≥160 mmHg or DBP ≥110 mmHg
	• Stroke
	• Intrauterine growth retardation (IUGR)
	• Pulmonary edema
	• Cortical blindness
Laboratory Findings	• Proteinuria >5 g/day
	• Oliguria <500 mL/ day and /or creatinine serum level ≥1.2 mg/dL
	• HELLP Syndrome
	• Liver damage with transaminase serum level ≥ 2x of normal range
	• Platelet count <100.000/mm3
	• Coagulopathy, elongated prothrombin time or low fibrinogen blood level.

LABORATORY INVESTIGATION

In addition to blood pressure monitoring, laboratory investigation is also necessary to monitor any changes in blood, kidney and liver that may affect fetal and maternal prognosis. The recommended laboratory investigations to monitor patients with hypertension in their pregnancies are Hb or Ht to observe the possibility of hemoconcentration that support the diagnosis of gestational hypertension. A very low platelet count can be found in HELLP syndrome (hemolysis, elevated liver enzyme levels and low platelet count). Measurements of AST, ALT and LDH enzymes are performed in order to identify liver involvement. Urinalysis is necessary to identify proteinuria or to quantify the amount of protein excretion in the 24-hour urine. Creatinine serum level is measured to identify renal function in pregnancy and usually decreased level can be found. The measurement of uric acid should be considered since elevated uric acid level is usually used as a marker of preeclampsia severity. ECG test is necessary in patients with chronic hypertension; while for pregnancies without hypertension, the measurement of blood glucose and urine culture are also necessary.

Laboratory investigation for patients with hypertension in pregnancy include: hemoglobin and hematocrit level, platelet count, SGOT/ SGPT, LDH serum level, protein urine (24-hour urine collection), urinalysis, uric acid, and serum creatinine level.[20]

If new hypertension develops during pregnancy in women who are previously healthy or in those who are at high risk for preeclampsia, an evaluation of short-term hospitalization is necessary to distinguish primary hypertension from the secondary hypertension using diagnostic procedure and subsequently determine the classification of hypertension in pregnancy as well as execute appropriate treatment.

The assessment of target organ damage includes left ventricular hypertrophy, retinopathy and renal disease. Some authors suggest adrenal ultrasonography and measurement of metanephrine and noremetanephrine in the urine for all pregnant women when their hypertension is caused by pheochromocytoma that may appear asymptomatic and may be fatal if the diagnosis can not be made before birth.[21] USG is useful to determine gestational age, fetal development and fetal heart rate. Any abnormality in Doppler assessment of uterine artery and fetal artery as well as the venous Doppler is useful as a predictor of preeclampsia development and perinatal outcomes.[10]

MANAGEMENT OF HYPERTENSION IN PREGNANCY

The aim of managing hypertension in pregnancy is to reduce fetal and maternal

morbidity and mortality, i.e. by preventing women from getting the risks of increased blood pressure, preventing disease progression and preventing the development of seizure and considering termination of pregnancy if the mother or fetus has a life-threatening situation. The management of pregnancy with hypertension can be seen in **Table 2**.

In preeclampsia, the hypertension resolves to normal condition after birth. However, before birth, this condition is unfavorable for the fetus. Therefore, although it carries a certain degree of risk, conservative treatment is preferable by waiting to the best situation when the baby can be born in a better condition.

When the range of systolic blood pressure is 140-160 or the diastolic blood pressure is 90-99 mmHg, non-pharmacologic treatment can be administered. Short-term hospitalization is useful for establishing diagnosis and excluding the possibility of preeclampsia. The management depends on clinical condition, the severity of hypertension, gestational age, maternal and fetal risks. It may include close monitoring, physical activity restriction, bed rest on the left side. For this condition, a normal diet without salt restriction is recommended.

PHARMACOLOGICAL TREATMENT

The administration of antihypertensive agents should be adjusted individually with the risks and benefits for pregnant women. There are still debates on when starting antihypertensive therapy and on the target blood pressure that should be achieved. Severe hypertension (BP ≥160/100 mmHg) increases cerebrovascular risks and therefore, antihypertensive agents should be administered.[6] However, the use of these agents for mild and moderate hypertension is still controversial. Some studies show that the use of antihypertensive agents in mild hypertension can reduce the risk of developing severe hypertension; however, there is no difference regarding the development of preeclampsia, neonatal death, premature birth and low birth weight (LBW) infants.[22,23]

The National High Blood Pressure Education Program Working Group on Hypertension in Pregnancy (NHBPEP) recommends the administration of antihypertensive agents for SBP ≥150-160 mmHg or DBP >100-110 mmHg or when there is target organ damage, such as left ventricular hypertrophy or reduced renal function. The desired target blood pressure is SBP <140- 150 mmHg and DBP <90-100 mmHg

Table 2. Management of pregnancy with gestational hypertension[12]

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Admit to hospital	no	no	Yes (until blood pressure is 159/109 mmHg or lower)
Treat	no	with oral labetalol as first-line treatment to keep: • diastolic blood pressure between 80-100 mmHg • systolic blood pressure less than 150 mmHg	With oral labetalol as first-line treatment to keep: • diastolic blood pressure between 80-100 mmHg • systolic blood pressure less than 150 mmHg
Measure blood pressure	not more than once a week	at least twice a week	at least four times a day
Test for proteinuria	at each visit using automated reagent-strip reading device or urinary protein creatinine ratio	at each visit using automated reagent-strip reading device or urinary protein creatinine ratio	daily using automated reagent-strip reading device or urinary protein creatinine ratio
Blood tests	only those for routine antenatal care	test kidney function electrolytes full blood count, transaminases bilirubin Do not carry out further blood tests if no proteinuria at subsequent visits	Test at presentation and then monitor weekly: kidney function electrolytes full blood count, transaminases bilirubin

or mean arterial pressure (MAP) <105-125 mmHg. There has not been any definitive and complete data on the safety of target therapy for blood pressure treatment in pregnant women with hypertension.[10,24]

In patients with chronic hypertension who are being pregnant and having high blood pressure, their previous treatment should be continued. However, in those with slightly high blood pressure, the treatment must be given with caution and dose reduction should be employed whenever necessary. Based on data of some studies, it has been demonstrated that the use of antihypertensive agents for mild hypertension may reduce the development of severe hypertension, but show no difference on the development of preeclampsia, neonatal death, premature birth and low birth weight (LBW) infants.[22,23]

Extremely low blood pressure may develop risk of reduced utero-placental perfusion, which may disrupt fetal development. However, there has not been sufficient convincing evidence on the benefit of mild hypertension treatment in pregnancy since the number of studied cases is still very low and therefore, it is not enough to demonstrate the benefit of reduced obstetric complication rate.

Systolic blood pressure of more than 170 or diastolic blood pressure higher than 110 mmHG in pregnant woman must be considered as a medical emergency and the patient is suggested to have hospital care. A patient with such condition must have her blood pressure reduced as soon as possible. Many doctors do not give any drug until the limit of diastolic blood pressure reaches >105-110 mmHg or when the systolic blood pressure has reached 160 mmHg, a limit in which complication of cerebral hemorrhage usually takes place. However, in some conditions, the limit is not so accurate considering that the previous diastolic pressure is less than 75 mmHg. In gestational hypertension (without proteinuria), the limit of blood pressure that calls for treatment usually is above 140 mmHg systolic blood pressure or 80 mmHg diastolic blood pressure. In those who have hypertension and proteinuria or who have symptoms or who have signs of target organ damage (chronic hypertension), the drugs can be given to achieve the normal blood pressure. There are 2 types of antihypertensive drugs, namely for acute or emergency situation, which usually needs parenteral or oral treatment.

Table 3. Management of pregnancy with preeclampsia[12]

Degree of hypertension	Mild hypertension (140/90 to 149/99 mmHg)	Moderate hypertension (150/100 to 159/109 mmHg)	Severe hypertension (160/110 mmHg or higher)
Admit to hospital	yes	yes	yes
Treat	no	with oral labetalol as first-line treatment to keep: • diastolic blood pressure between 80-100 mmHg • systolic blood pressure less than 150 mmHg	with oral labetalol as first-line treatment to keep: • diastolic blood pressure between 80-100 mmHg • systolic blood pressure less than 150 mmHg
Measure blood pressure	at least four times a day	at least four times a day	more than four times a day, depending on clinical circumstances
Test for proteinuria	do not repeat quantification of proteinuria	do not repeat quantification of proteinuria	do not repeat quantification of proteinuria
Blood tests	monitor using the following tests twice a week: kidney function, electrolytes, full blood count, transaminases, bilirubin	monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, bilirubin	monitor using the following tests three times a week: kidney function, electrolytes, full blood count, transaminases, bilirubin

Tabel 4. Antihypertensive drugs in pregnancy

Antihypertensive drugs	Explanation
β- Adrenergic agonist	Dosing: 0.75-3 g/day divided in 3 doses (tid)
	Methyldopa (Risk factor: B) is the first-line antihypertensive drug in pregnancy
	Side effects: dysrhythmia, weakness, sedation, depression, reduced mental stability, dry mouth, decrease in libido, parkinsonism, and hyperprolactinemia, increased serum transaminase level and hemolytic anemia
Calcium channel antagonists	Nifedipine (Risk factor: C) is a second-line drug
	Dosing: 30 mg-120 mg/day with extended-release formulation
	Short-acting nifedipine may cause maternal hypotension and fetal distress; therefore it is not recommended.
	The administration of MgSO4 in pregnant women who had received CCB may cause severe hypotension and neuromuscular blockade
	Verapamil (Risk factor: C) effective and safe for preventing tachycardia effect caused by the β mimetic and relaxation effect on uterine muscle tissues
Vasodilator	Hydralazine (Risk factor: C) is an arterial vasodilator, which is often used in pregnancy due to its minimum hypotension effect.
	Dosing: 75- 150 mg/ day, divided in 3 doses
	Side effects: Lupoid-like syndrome, thrombocytopenia in newborns
β- Adrenenoceptor antagonists	Labetolol (Risk factor: C) is a combination of alpha and beta adrenoceptor antagonist with vasodilation effect, can reduce blood pressure without lowering uteroplacental blood flow.
	No side effect of inhibited fetal growth or hypoglycemia in newborns
	Dosing 200 mg – 2.5 gram/day, divided in 2 doses.
	Atenolol (Risk factor: C) is likely to have side effect of LBW infants; therefore, it should be avoided in early pregnancy.
Diuretics	The use of diuretics as antihypertensive drugs is permitted only if it has been used for a long period of time before pregnancy.
	Loop diuretics, particularly furosemide (risk factor: C) is indicated for severe heart failure, pulmonary edema or oliguria and if there is a risk of hyperbilirubinemia in newborns.
	The use of HCT (hydrochlorothiazide) (B) may cause side effects of neonatal thrombocytopenia, jaundice, maternal pancreatitis, hypokalemia, hyponatremia, in which some studies show that the side effect is similar with those who do not receive diuretic treatment.
	Dosing: HCT 12.5-50 mg/day
	Spironolactone is contraindicated for pregnancy due to its antiandrogenic effect as observed in animal experimental studies.
ACE inhibitor and Angiotensin II receptor (ARB) antagonists	Risk factor: C on the 1st trimester and D on the 2nd and 3rd trimester
	It has risks of oligohydroamnion, intrauterine growth retardation, pulmonary hypoplasia, contracture of joints, neonatal renal failure, hypotension
	It carries potential risk for any woman who is planning a pregnancy

The parenteral drugs include intravenous injection of abetalol, hydralazine and calcium antagonists. Methyldopa 250 mg twice daily can be increased up to maximal 4 gram daily. Labetalol can be given 100 mg twice daily and maximum 400 mg daily. Atenolol, a beta blocker, which no effect of alpha blocker is associated with reduced placental and fetal blood flow during the birth when it is given starting from the early pregnancy. Labetalol, an alpha and beta blocker, can maintain uteroplacental blood flow in maximal condition. A beta blocker drug used for mild hypertension may increase the risk of having small-for-gestational-age infants (with a relative risk of 1.35 on 95% confidence interval), a risk that is not higher compared to other antihypertensive drugs.

More experiences have been found on using calcium antagonists, which have been proven relatively safe for pregnancy. Long-acting nifedipine (maximum dose of 120 mg/ day) and non-dihydropiridin, i.e. verapamil can

be given. However, FDA does not accept fast-acting nifedipine as a treatment for emergency hypertension as well as the sub-lingual treatment as some evidences have demonstrated that the treatment may cause excessive reduction in blood pressure. It can be concluded from studies on treatment of hypertension in pregnancy that the selection of antihypertensive treatment should depend on experiences and knowledge of doctor who is treating the patient, particularly in terms of the maternal and fetal effect of the drug. Although there is no clinical study that provides any evidence of how much reduction in blood pressure is considered to be optimal, many have suggested a target systolic blood pressure of 140-150 mmHg and diastolic blood pressure of 90-100 mmHg. In pregnant women who have experienced target organ damage, it is suggested to reduce the blood pressure to less than 140/90 mmHg until it reaches 120 and 80 mmHg.

INDICATION FOR OUTPATIENT AND HOSPITAL MANAGEMENT

According to BCRCP Obstetric Guideline 11 Hypertension in pregnancy 2006, the following are indications for outpatient and hospital management of hypertension in pregnancy:[3]

1. Indications for outpatient assessment: SBP <140 mmHg and DBP <90 mmHg, proteinuria ≤1+ on dipstick urinalyisis on one occasion, no target organ damage and normal platelet counts. Weekly office visits.
2. Indications to consider hospitalization. SBP ≥140 mmHg and/or DBP ≥90 mmHg, repeated proteinuria >1+, creatinine >30 mg/mmol, hyperuricemia, platelet count <100,000, any adverse features, ultrasound evidence of oligohydroamnios or inadequate fetal growth.
3. Indication for conservative management and termination of pregnancy

   Indication for conservative management:
   - Gestational age < 34 weeks
   - Stable and well-controlled blood pressurel (SBP <160 mmHg/ DBP <110 mmhg) with atwo antihypertensive agents on submaximal dose
   - Platelet count ≥100,000
   - Proteinuria ≤2+ on dipstick (<1 g/day)
   - Good fetal condition (on USG, stress test)

   Indication for termination of pregnancy:
   - Gestational age >34 weeks
   - Severe or refractory hypertension >24 hours
   - Pulmonary edema
   - Refractory renal failure
   - Thrombocytopenia, worsening coagulopathy
   - Eclampsia with neuroprogressive symptoms
   - Progressive reduction of liver function
   - Placental rupture
   - Fetal distress
   - Evidences of IUGR or hydramnion

POST PARTUM HYPERTENSION

Hypertension may develop after birth with a peak on the 3rd – 6th day due to mobilization of extracellular fluid that occur during pregnancy and a continuation of hypertension in pregnancy. The risks of developing post partum hypertension may arise in pregnancy with preeclampsia, premature birth, multipara women with a high level of uric acid and blood urea nitrogen (BUN).

Some literatures explain that severe hypertension, which occurs both during pregnancy and after birth, should be treated. Methyldopa should be avoided after birth due to a risk of post-natal depression. The common first-line agents are atenolol, nifedipin or ACE Inhibitor whenever other antihypertensive agents are necessary. Antihypertensive treatment for preeclampsia lasts for approximately 2 weeks; while for gestational hypertension, it lasts less than a week.

Preeclampsia is a risk factor for post-partum thromboemboli; while other risk factors include obesity, bed rest of >4 days after birth and Caesarian section. Prevention of thromboemboli should be considered unless it is proven to be ineffective.[15,25]

CONCLUSION

A pregnant mother with hypertension has potential risks to have some complications, such as: disseminated intravascular coagulation

(DIC), cerebral hemorrhage, liver dysfunction and acute renal failure. Moreover, for the fetus, it may cause intrauterine fetal growth retardation, prematurity and perinatal mortality. The β-adrenergic agonist, namely methyldopa (risk factor: B) is the first-line antihypertensive drug in pregnancy. Although there is no clinical study that provides any evidence of how much reduction in blood pressure is considered to be optimal, many have suggested a target systolic blood pressure of 140-150 mmHg and diastolic blood pressure of 90-100 mmHg. In pregnant women who have experienced target organ damage, it is suggested to reduce the blood pressure to less than 140/90 mmHg until it reaches 120 and 80 mmHg.

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