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Master's thesis

HYPERTENSION DISORDERS OF PREGNANCY

Master of Science in Nursing

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ABSTRACT

Hypertension is the most common medical disorder of pregnancy and is reported to complicate up to 1 in 10 pregnancies and affects an estimated 240,000 women in the United States every year. Although physicians for millennia have recognized preeclampsia, relatively little is known about its pathogenesis and prevention. The primary concern about elevated blood pressure relates to the potential harmful effects on both mother and fetus. These potential adverse effects range in severity from trivial to life threatening. Hypertensive disorders of pregnancy are a leading cause of maternal morbidity and mortality. The data for this project was collected through general health assessment, collection of laboratory tests results, clinical and statistical data, assessment of risks factors and complications hypertension in pregnancy. It has been shown that the presence hypertension disorder in pregnant women aggravates the clinical picture of the disease and may cause hemodynamic disturbances in women. It has been established that the use of metabolic (magnesium sulfate), hemodynamic (antihypertensive drugs) agents under dynamic observation, the implementation of non-drug measures (physiotherapy exercises, psychoprophylactic preparation for childbirth, therapeutic and protective regimen) decrease severity symptoms and the expected better outcome of pregnancy for women and fetus. In the course of the study, we determined nursing's role in educating pregnant women, monitoring and preventing hypertension disorders in pregnancy. These findings indicate effectiveness of implementation of nursing care for pregnant women with hypertensive disorder. Hypertensive disorders are complicated and require close monitoring by the patient and the healthcare team. Nurses must ensure that the patient receives all the education that she needs and understands the importance of caring for herself. The patient must also be taught when to call for help. Education must be specific for the woman’s condition and must be thorough. It

must also cover preeclampsia for all women, because of the risk of postpartum preeclampsia. Women in low socioeconomic conditions or with low literacy levels need education that is tailored for them and that they can understand. Collaboration is necessary for these women once they are in the hospital.

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LIST OF ABBREVIATION

ALT=Alanine aminotransferase
ACOG= American College of Obstetricians and Gynecologists
ARDS= Acute respiratory distress syndrome
ARF= Acute renal failure
AWHONN=Association of Women's Health, Obstetric and Neonatal Nurses
AST=Aspartate aminotransferase
BP=Blood pressure
CMQCC=California Maternal Quality Care Collaborative
CBC =Complete blood count
CDC=Centers for Disease Control and Prevention
CVA= cerebrovascular accident
DIC=disseminated intravascular coagulation
ED=Emergency department
HR=Heart rate
HELLP syndrome =hemolysis, elevated liver enzymes, and low platelets
HDP=Hypertensive disorders in pregnancy
ICU= Intensive care unit
IUD= Intrauterine death
IUGR= Intrauterine growth restriction
LDH=Lactate dehydrogenase
LBW= Low birth weight
LOC=Level of consciousness
MFM=Maternal-fetal medicine
NICE=National Institute for Health and Care Excellence
NND= Neonatal death
P. edema= Pulmonary edema
PIH=Pregnancy-induced hypertension
PPH= Postpartum hemorrhage
PRES= Posterior reversible encephalopathy syndrome
RDS= respiratory distress syndrome
SGA=Small-for-gestational-age
SBAR=Standardized hand-off
SV=Stroke volume

INTRODUCTION

The relevance of the study:

This is the most common medical disorder of pregnancy and is reported to complicate up to 1 in 10 pregnancies and affects an estimated 240,000 women in the United States every year. Although physicians for millennia have recognized preeclampsia, relatively little is known about its pathogenesis and prevention. The primary concern about elevated blood pressure relates to the potential harmful effects on both mother and fetus. These potential adverse effects range in severity from trivial to life threatening. Hypertensive disorders of pregnancy are a leading cause of maternal morbidity and mortality[3,25,48].Worldwide there is disagreement about many aspects of the classification, diagnosis, and management of the hypertensive disorders of pregnancy. This lack of consensus hampers our ability to study not only the immediate rates of adverse maternal and fetal outcomes for the various hypertensive disorders in pregnancy, particularly preeclampsia, but also the long-term health outcomes of women and babies who survive this condition. It also impacts on research into the pathophysiology of this condition and has almost certainly delayed the development of effective screening tests and treatments, leading to poorer pregnancy outcomes[28,35,46].Hypertension in pregnancy is a major contributor to maternal and perinatal mortality and morbidity. Every year 70,000 women die and there are half a million stillbirths or neonatal deaths owing to hypertensive disorders of pregnancy – the vast majority being in the developing world. Those who survive, especially those who had preterm-eclampsia, the issues of hypertensive, cerebral and cardiovascular events in the future resulting in premature deaths. Hypertensive disorders are the most common medical complications in pregnancy and the second leading cause of maternal death in the U.S. About 5% to 10% of pregnancies are affected by a hypertensive disorder, including chronic (pre-pregnancy) hypertension and gestational hypertension, preeclampsia, and preeclampsia superimposed on chronic hypertension [14,26,41]. All hypertensive disorders in pregnancy pose significant maternal and fetal risk. However, the severity of long-term sequelae from preeclampsia/eclampsia and HELLP syndrome are of special concern. Treatment and diagnostic criteria for hypertension in pregnancy continue to improve. Unfortunately, there is an increasing incidence of hypertensive disorders in pregnancy as more and

younger women experience cardiometabolic disease and obesity [8,26,43].As a nurse in a perinatal setting, you must evaluate patients for hypertensive disorders. The disease process may be subtle. Hypertension may occur at any time, and the results can be profoundly damaging. You must be vigilant and knowledgeable about hypertensive disorders in pregnancy to keep mothers and babies safe. Maternal mortality rates in the U.S. continue to rise. Over a third of maternal deaths are attributed to hypertensive disorders alone.

Hypertensive disorders are also contributing factors to half of all maternal deaths [7,24,51]. Hypertension in pregnancy can lead to severe adverse outcomes for women and fetuses. Preeclampsia is the primary condition that can cause the most severe complications, including maternal and fetal death. All maternal organ systems can be affected by preeclampsia, including long-term effects. Potential maternal adverse outcomes of preeclampsia include [20,25.50]:seizures; cerebral symptoms; visual problems; renal insufficiencies; pulmonary edema; thrombocytopenia; disseminated intravascular coagulation; impaired liver function. Fetal/neonatal risks include: premature birth; small for gestational age due to intrauterine growth restriction ;hypoxia.

Death related to pregnancy complications, such as placental abruption.

Vaginal birth is the safest and preferred route of delivery for women with hypertensive disorders. Often, women need to be induced when a hypertensive disorder is diagnosed. The goal of induction is to eliminate the gestational factors exacerbating hypertension and/ or preeclampsia, and to diminish serious maternal and fetal risk. However, induction of labor increases the incidence of cesarean section. Cesarean sections in turn create additional maternal risks, including potential infection, reaction to anesthetic agents, blood clots, blood loss, and organ damage[17,21,49]. Maternal/fetal outcomes are related to the degree of disease and the occurrence of preeclampsia superimposed on preexisting chronic hypertension. Vaginal birth is the safest and preferred route of delivery for women with hypertensive disorders. Often, women need to be induced when a hypertensive disorder is diagnosed. The goal of induction is to eliminate the gestational factors exacerbating hypertension and/ or preeclampsia, and to diminish serious maternal and fetal risk. However, induction of labor increases the incidence of cesarean section. Cesarean sections in turn create additional maternal risks, including potential infection, reaction to anesthetic agents, blood clots, blood loss, and organ damage [18,22,47]. Maternal/fetal outcomes are related to the degree of disease and the occurrence of preeclampsia superimposed on preexisting chronic hypertension. Racial bias

within healthcare systems creates greater incidence of poor maternal/fetal outcomes for certain minority groups. Maternal morbidity and mortality are disproportionately higher among non-Hispanic Black and American Indian/Alaskan Native women, who experience substantially higher risk compared with their white counterparts [15,23,31].Black women are diagnosed with hypertension more often than other racial and ethnic groups and are more likely to experience delayed treatment of hypertensive emergencies, resulting in greater morbidity. Non-Hispanic Black women are 3 to 5 times more likely to die in childbirth compared to other racial groups[5,10,29]. CDC data shows that biases resulting in inequitable treatment and healthcare access are a primary cause of this disproportionately higher risk. Working to achieve healthcare equity and reduce disparities is vital to reducing maternal morbidity and mortality. Many maternal deaths are the result of preventable missteps. Inadequate control of elevated blood pressure (BP) and failure to diagnose and treat pulmonary edema are two commonly preventable errors leading to maternal death [11,19,32]. You must know what signs and symptoms to look for, and how to monitor and treat elevated blood pressure promptly.

The aim of the study:

Perform an analysis and an assessment of hypertensive disorders of pregnancy. Provide scientific rationale for nursing role in recognition hypertensive disorder, treatment and postpartum care of patients .

Study objectives:

1.To identify etiology, epidemiology, risk factors, causes, diagnosis, complications, types of hypertension disorder in pregnancy.

2.To define assessment and management hypertensive disorder in pregnancy.

3.To investigate the specific aspects of diagnosis and screening for hypertensive disorder in pregnancy.

4.To study monitoring, non-pharmacological and pharmacological treatments hypertensive disorders in pregnancy.

5.To investigate the effectiveness of implementation of nursing care for pregnant women with hypertensive disorder.

The object of research:

Many women do well in pregnancy, but they can be at risk for several pregnancy complications, including PIH, eclampsia, superimposed preeclampsia, HELLP syndrome, fetal growth restriction, placental abruption, preterm birth, and cesarean section.

The subjects of the study:

Pregnant women determine risk for hypertension disorder in pregnancy, providing nursing care and management to prevent complications for pregnant women and fetus.

The methods of study:

General health assessment, collection of laboratory tests results, clinical and statistical data, assessment of risks factors and complications hypertension in pregnancy.

The scientific and practical value of the study:

The results of the study deepen knowledge about the etiology and epidemiology, risk factors, causes, diagnosis, types of hypertensive disorders in pregnant women, complications, principles of diagnosis and treatment. It has been established that hypertension disorders in pregnant women is accompanied by proatherogenic and prediabetic metabolic changes, cardiovascular remodeling, microcirculation and uteroplacental blood flow disorders, worsens the course of pregnancy and perinatal outcomes. It has been proven that preconception preparation, the provision of complex specialized care, the use of antihypertensive, antiplatelet and metabolic therapy can reduce the formation of the cardiorenal complications, reduce the incidence of maternal and fetal complications, and improve childbirth outcomes. It has been shown that the presence hypertension disorder in pregnant women aggravates the clinical picture of the disease and may cause hemodynamic disturbances in women. It has been established that the use of metabolic (magnesium sulfate), hemodynamic (antihypertensive drugs) agents under dynamic observation, the implementation of non-drug measures (physiotherapy exercises, psychoprophylactic preparation for childbirth, therapeutic and protective regimen) decrease severity symptoms and the expected better outcome of pregnancy for women and fetus. In the course of the study, we determined nursing's role in educating pregnant women, monitoring and preventing hypertension disorders in pregnancy.

CHAPTER 1. ETIOLOGY AND EPIDEMIOLOGY, TYPES OF HYPERTENSION IN PREGNANCY (REVIEW OF LITERATURE)

1.1. Etiology and Epidemiology

Hypertensive disorders in pregnancy (HDP) represent some of the most important problems faced by public health because HDP is a major cause of maternal and perinatal morbidity and mortality. Several epidemiological studies have been performed to determine the prevalence and risk factors of HDP as well as its subtypes. The prevalence of HDP, gestational hypertension and preeclampsia are 5.2-8.2%, 1.8-4.4% and 0.2-9.2%, respectively. Body mass index, anemia and lower education appear to be modifiable risk factors for HDP. Maternal age, primiparous, multiple pregnancy, HDP in previous pregnancy, gestational diabetes mellitus, preexisting hypertension, preexisting type 2 diabetes mellitus, preexisting urinary tract infection and a family history of hypertension, type 2 diabetes mellitus and preeclampsia appear to be nonmodifiable risk factors. Genetic variants including a single-nucleotide polymorphism in the angiotensinogen gene have also been reported to be nonmodifiable risk factors. Epidemiological studies have recently examined the associations between a history of HDP and its subtypes and future risks of other diseases. These studies have reported associations between a history of HDP and a risk of coronary heart disease, heart failure, dysrhythmia, stroke, hypertension, diabetes mellitus, end-stage renal dysfunction and cardiomyopathy. HDP is not associated with the future incidence of total cancer. In conclusion, HDP is not a rare complication of pregnancy and the influence of HDP remains for an extended duration. Physicians should consider the effects of HDP when treating chronic diseases in women[6,12,33].

According to the CDC [5], high blood pressure occurs in as many as 1 in 12 to 17 pregnancies in women aged 20 to 44. Hospitals are seeing increased cases of women with preeclampsia and other hypertensive disorders, which are a leading cause of maternal morbidity and mortality in the U.S. and account for 17% of all maternal mortality [5]. These disorders are also a leading contributor to preterm delivery, which leads to neonatal morbidity and mortality.

Early-onset preeclampsia has increased over 140% in the U.S. in recent years, leading to more preterm deliveries [18,29]. Women are spending more time in the hospital for close monitoring of hypertensive disorders than ever before.

Additionally, postpartum preeclampsia can occur up to 6 weeks after delivery, although the Preeclampsia Foundation [14,27,30] has found that most cases of postpartum preeclampsia occur within 7 days after birth.

Postpartum preeclampsia can occur even if a woman had no complications during pregnancy. Therefore, it is important for all patients to know about the risks and signs of preeclampsia. Some women need to be readmitted for treatment of postpartum preeclampsia. Definitions and guidelines for preeclampsia have changed. It is important to keep up-to-date on current evidence when caring for patients with hypertensive disorders.

1.2.Risk Factors. Causes. Diagnosis

Risk Factors

There are multiple risk factors for preeclampsia, but a woman can develop preeclampsia without having any risk factors. For women with known risk factors, having pre-conceptual counseling to improve overall health can improve their odds of having fewer complications. Controlling blood pressure (BP) and managing excessive weight during pregnancy are two important steps to improving health. Controlling diabetes and treating obstructive sleep disorders can also lead to overall improvements in women's health. Known risk factors for preeclampsia include[1,7,29]:antiphospholipid antibody syndrome; assisted reproductive technology; race: increased incidence in African Americans; chronic hypertension; family history of preeclampsia; gestational diabetes; advanced maternal age: 35 years or older; teenage pregnancy between the ages of 15-19;multifetal gestations; nulliparity; obstructive sleep apnea; preeclampsia in a previous pregnancy; pregestational diabetes; pre-pregnancy body mass index greater than30;renal disease; systemic lupus erythematosus; thrombophilia.

According to Ross et al.[16,36], Black women have an increased preeclampsia risk in comparison to white women, regardless of socioeconomic status. Hormonal changes in pregnancy lead to cardiovascular adaptations in women. Surges in hormones lead to systemic vasodilation. At the same time, there is an expansion in plasma blood volume, which leads to physiologic anemia and increased stroke volume (SV). Heart rate (HR) then increases, leading to increased cardiac output (CO), which lowers BP. This process may mask pre-pregnancy hypertension. Women of childbearing age may also not have regular doctor's visits prior to pregnancy.

All of this contributes to a high percentage of women who may have subclinical, chronic hypertension but not know it until there are complications in pregnancy [4,13]. No matter the cause, treatments and assessments are essential in promoting good outcomes for women with hypertension.

Causes

The exact pathophysiology of preeclampsia is unknown. It may be related to reduced placental perfusion. Another theory is that in some women, cytotrophoblast invasion of the uterine spiral arteries is shallow, resulting in placental hypoxia, which then leads to other inflammatory events. This induces platelet aggregation and disrupts the balance of angiogenic factors, resulting in endothelial dysfunction [8,37]. The disruption manifests clinically as preeclampsia syndrome. Preeclampsia is attributed to several factors, including [1,9]:chronic uteroplacental ischemia; exaggerated maternal inflammatory response to deported trophoblasts; genomic imprinting; immune maladaptation; increased trophoblast apoptosis or necrosis; very low-density lipoprotein toxicity. During the postpartum period, women may also develop preeclampsia due to iatrogenic factors, such as: excessive administration of fluids, leading to complications of fluid overload, such as pulmonary edema; administration of vasoactive agents.

Diagnosis

Diagnosis of hypertensive disorders is based on systolic BP elevated to 140 mmHg or higher and/or a diastolic BP elevated to 90 mmHg or higher, after 20 weeks of gestation, taken at least 4 hours apart on two separate occasions [1,9,44].A diagnosis of preeclampsia with severe features can be made with the presence of any of the following symptoms[1,5,45]:thrombocytopenia (platelet count less than 100,000) and/or proteinuria; severe persistent right upper quadrant or epigastric pain; pulmonary edema; renal insufficiency; impaired liver function; new-onset headache unresponsive to acetaminophen; visual disturbances. While most cases of preeclampsia occur after 34 weeks' gestation, they can occur earlier in an atypical presentation and are usually more severe. Evaluate for an atypical presentation of preeclampsia if the patient presents with vague symptoms, such as [1,12,38]:abdominal pain; headache; shortness of breath; complaints of "not feeling right"; generalized swelling. Healthcare providers should always listen to their patients. A vague symptom of not feeling right can preclude a serious complication. These women could require hospitalization for close observation and/or early delivery.

It is essential that nurses and providers in various areas of care are aware of the signs and symptoms, complications, and treatments for hypertensive disorders. Women of childbearing age with hypertensive disorders may present to the emergency department (ED), the ICU, or a telemetry unit. All healthcare providers should know how to manage these women promptly whether they are pregnant or postpartum. A woman who comes to the ED may have to wait a long time in the waiting room before she is seen. It is important that the ED staff are educated to ask women if they are pregnant or have had a baby recently. ED nurses need to know the symptoms of preeclampsia and ED providers need to know how to treat the preeclampsia or obtain a consult from an obstetrician. Timely treatment is an important part of the care that the ED must provide. While it is important to raise awareness among healthcare workers, it is also important to teach women to volunteer this information if they go to an ED. Patients must know to advocate for themselves and speak up when they seek treatment[3,10,42].

Patients of all socioeconomic statuses should have access to prenatal care and should be educated on when and where to seek additional care, as needed. These patients may need help in developing a plan of where to obtain care. The educational needs of these patients will be reviewed.

1.3.Types of Hypertension in Pregnancy . Complications

Types of Hypertension in Pregnancy

Pregnant patient getting her blood pressure taken at doctor's office

Classification of hypertension depends on when the hypertension is diagnosed, how elevated the BPs are, and if there are any other signs and symptoms. Hypertensive disorders can be classified as: chronic hypertension (not pregnancy related);eclampsia; gestational hypertension; HELLP syndrome; postpartum preeclampsia; preeclampsia: with severe features; without severe features; superimposed[5,19,40].

Chronic Hypertension

Chronic hypertension is unrelated to pregnancy. The definition of chronic hypertension is a chronic elevation in BP to or above 140 mmHg systolic and/or 90 mmHg diastolic before pregnancy or 20 weeks' gestation, which is recorded on at least two separate occasions [1,7,39]. According to Friel[10], chronic hypertension occurs in 1 to 5% of pregnant women. Although it is not related to pregnancy, women with chronic hypertension risk developing superimposed preeclampsia [10,20].This condition is diagnosed after 20 weeks' gestation if

the woman has worsening BP, worsening proteinuria, and/or new signs and symptoms of preeclampsia, and will need close monitoring [1,7].

Eclampsia

Eclampsia is new-onset focal, tonic-colonic, or multifocal seizures, without other causes, such as epilepsy, intracranial hemorrhage, cerebral arterial ischemia and infarction, or drug use [1,7]. Eclamptic seizures can be life-threatening to the woman and her fetus. They can occur in antepartum (around 53% of cases), intrapartum (around 19% of cases), or postpartum (around 28% of cases)[2,12]. A headache is the most common pre-seizure symptom. Any pregnant woman with a headache not relieved with acetaminophen should be evaluated. Magnesium sulfate (MgSO4®) can prevent seizures in women who are at risk.

Gestational Hypertension

A diagnosis of gestational hypertension is made when previously normal BP readings become elevated during pregnancy. Criteria for diagnosing gestational hypertension is a systolic BP of 140 mmHg or higher, and/or a diastolic BP of 90 mmHg or higher, after 20 weeks' gestation, recorded at least 4 hours on two separate occasions [1,9]. BP returns to normal in the postpartum period. Preeclampsia develops in about 50% of women diagnosed with gestational hypertension [12,19]. Women diagnosed with gestational hypertension prior to 32 weeks are at an even higher risk of developing preeclampsia. These women need close monitoring due to this risk. Outcomes are usually good in women who do not develop preeclampsia.

HELLP Syndrome

HELLP syndrome is diagnosed in women with hemolysis, elevated liver enzymes, and low platelet count. It increases the rates of maternal morbidity and mortality, making it one of the more severe forms of preeclampsia [12,19,34]. HELLP syndrome typically occurs in the third trimester but can also occur in the postpartum period. HELLP syndrome occurs in only about 1% of all pregnancies, but it does complicate about 20% of pregnancies in women who have preeclampsia with severe features [12,19,23].A diagnosis of HELLP syndrome is usually made when the following three findings are present [1,9]:lactate dehydrogenase (LDH) is elevated to 600 IU/L or more; alanine aminotransferase (ALT) and Aspartate aminotransferase (AST) are elevated to more than twice the upper limit of normal; platelet count is less than 100 × 109/L. Patients with HELLP syndrome need to be delivered as soon as possible. Complications of HELLP syndrome may include [1]:acute kidney failure; adult

respiratory distress syndrome; disseminated intravascular coagulation (DIC);placental abruption; pulmonary edema; sepsis; stroke. Women with HELLP syndrome may experience the following symptoms [2,19,22]:feeling tired; pain in the upper right part of the belly; bad headaches; nausea or vomiting. They may also experience swelling, especially in their hands and face, as well as vision problems [2,19.22]. These women may have a general feeling of malaise. Fetal outcomes depend on the gestational age in which HELLP syndrome occurs.

Preeclampsia

Preeclampsia with or without severe features is more complicated to define. Preeclampsia is associated with new-onset hypertension occurring after 20 weeks of gestation and often presents close to term [1,5,33].New-onset proteinuria may also occur. However, hypertension and other signs or symptoms of preeclampsia may present in some women without proteinuria [1.5,33]. The range of BP readings, the presence of proteinuria, and the presence or absence of other symptoms all influence whether the preeclampsia has or does not have severe features. A diagnosis of preeclampsia is made when a woman with previously normal BP sees an elevation of the systolic BP to 140 mmHg or higher or diastolic BP higher than 90 mmHg or more, after 20 weeks' gestation and two elevated readings are recorded at least 4 hours apart [1.7,49]. Diagnosis is also made when the systolic BP rises to 160 mmHg or more, or diastolic BP rises to 110 mmHg or more, without the need for two confirmations spaced 4 hours apart [1,7,49].To diagnose preeclampsia, there must also be the presence of proteinuria with the following findings [1,8]:300 mg or more in a 24-hour urine sample AND a urine protein/creatinine ratio ≥ 0.3, OR urine dipstick of 2+.OR there must be a new onset of any of the following symptoms[1,4,23]: thrombocytopenia -platelet count < 100 × 109/L; renal insufficiency-serum creatinine concentrations > 1.1 mg/dL.

OR doubling without the presence of other renal diseases; impaired liver function -elevated blood concentrations of liver transaminases at twice the normal concentration; pulmonary edema; new-onset headache not responsive to medication not caused by other diagnoses or visual symptoms. Women with gestational hypertension in the absence of proteinuria should be diagnosed with preeclampsia with severe features if they have any of the following signs or symptoms[1,4,23]:thrombocytopenia (platelet count < 100 x 109/L);impaired liver function shown through abnormally elevated blood concentrations of the liver; new-onset headache not responsive to acetaminophen

(Tylenol®);pulmonary edema; renal insufficiency; severe persistent epigastric or right upper quadrant pain and not caused by other diagnoses; visual disturbances. Other criteria for diagnosis are as follows [1,4,23]

Postpartum Preeclampsia

Postpartum hypertension or preeclampsia can be cases of exacerbated hypertension or new onset in the postpartum period. The causes for this postpartum occurrence may be volume retention, sympathomimetic activation, and/or direct vasoconstriction. This usually occurs in the 7 days following delivery but can occur up to 6 weeks after delivery. Elevated BPs with or without symptoms may be considered postpartum preeclampsia for up to 12 weeks post-delivery. After 12 weeks, a diagnosis of chronic hypertension should be made [4,28,43].

Complications

Maternal complication

Hypertensive disorders of pregnancy are associated with immune, vascular, and hormonal factors that can cause detrimental long-lasting effects in both mother and baby. Complications of preeclampsia for the woman may include [1,25,33].Complications of preeclampsia for the woman may include [1,25,33]:hypertensive encephalopathy-stroke, which is the leading cause of maternal morbidity from preeclampsia; cardiovascular disease; eclampsia; hemolysis, elevated liver enzymes, low platelet count (HELLP syndrome), leading to liver damage; placental abruption; renal damage.

Fetal complication

High blood pressure during pregnancy can affect the development of the placenta, causing the nutrient and oxygen supply to the baby to be limited. This can lead to an early delivery, low birth weight, placental separation (abruption) and other complications for the baby: fetal growth restriction; hypoxia; oligohydramnios; preterm birth; uteroplacental insufficiency; death. Emphasis for the treatment of preeclampsia has been on using magnesium sulfate (MgSO4®) to prevent seizures. However, treating elevated BPs (>160/110 mmHg) can help to prevent stroke [12,23,47]. Fetal and placenta delivery is the most important intervention for treating preeclampsia [1,2,25]. However, the timing of the delivery and the evaluation of the risks and benefits are important considerations in the management of these women. There are guidelines that can help providers determine when to induce labor or perform a cesarean section, depending on the gestational age and medical status of the woman. Maternal morbidity and mortality from preeclampsia are linked to delays in:

deciding to seek care; being able to reach care in time; getting adequate treatment. Nurses and providers can impact all three components by educating the patient and providing fast, evidence-based treatment options when the patient comes to the hospital. The treatments in the hospital setting include the administration of antihypertensives and magnesium sulfate. Nurses and providers working in the inpatient setting need to be aware of evidence-based guidelines to help guide the appropriate treatment of these women.

Thus, we conclude from the first chapter. Hypertension in pregnancy is becoming more common and presents a significant risk to the mother and fetus. It is important to understand how to diagnose hypertensive disorders based on elevated BP, as well as any associated symptoms that may be present.

It is important to know the types of hypertension and how they are diagnosed. Chronic hypertension, eclampsia, gestational hypertension, HELLP syndrome, and postpartum preeclampsia are easily defined. Preeclampsia with or without severe features is more complicated to define. Many risk factors increase a woman’s chance of developing hypertension, although not all women with hypertension have risk factors. It is important for nurses to recognize hypertension in pregnancy. There are many complications from hypertension for the woman and fetus, including increased maternal morbidity and mortality, fetal growth restriction, or even death. Close monitoring and frequent assessment of the woman and her fetus, and timely management of hypertension is essential to prevent poor outcomes.

CHAPTER 2. ASSESSMENT AND MANAGEMENT

2.1.Assessments.Patient History and Physical Exam. Risk Factor

A thorough history and physical should be done on all women with hypertension. The history should include assessment for any of the following conditions: diabetes; elevated BP prior to pregnancy; obstructive sleep apnea; pre-pregnancy obesity; previous obstetrics complications; renal disease; systemic lupus erythematosus; thrombocytopenia. A complete physical examination should include an assessment for: abdominal pain or epigastric pain; edema; elevated BPs; headaches and response to medication; hyperreflexia ; malaise; nausea and vomiting; neurological assessment; oliguria; sudden weight gain; vision changes.

Risk Factor Management

Currently, there is no diagnostic test to identify the likelihood of developing preeclampsia nor any prevention methods, though low-dose aspirin (81 mg/day) may reduce the risk of severe preeclampsia [1,7,50]. Optimal therapeutic benefit can be obtained by initiating low-dose aspirin therapy between 12 weeks' and 16 weeks' gestation, and therapy may be extended for up to 28 weeks of gestation [1,7,50]. Women with high-risk factors or more than one moderate risk factor for preeclampsia should continue low-dose aspirin therapy until delivery [1,7,50].

High-risk factors for gestational hypertension may include:

previous pregnancy with preeclampsia; multifetal gestation; ultrasound of identical twins; renal disease; autoimmune disease; type 1 or type 2 diabetes mellitus; chronic hypertension [1,7,50].

Moderate risk factors for gestational hypertension may include: first pregnancy; maternal age of 35 years or older; body mass index of more than 30;family history of preeclampsia; sociodemographic characteristics; personal history factors [1,7,50]. Women with risk factors for hypertensive disorders may require additional monitoring by a maternal-fetal medicine (MFM) specialist.

Additional Monitoring and Assessments.

If the woman is admitted to the hospital for preeclampsia, a thorough admission assessment is required. Lab work should also be monitored and includes: ALT;AST;CBC (platelets);LDH; urine test for proteinuria (24-hour urine or urine protein/creatinine ratio); uric acid (may also be considered).Pregnant woman being monitored in hospital bed. In addition to a

routine admission assessment, frequent assessments and close monitoring are necessary. The following assessments for the woman and her fetus (if still pregnant) are recommended[2,9,25].

For a patient with preeclampsia WITHOUT severe features:

During the **ANTEPARTUM** period: BP, pulse, respirations, SpO2 every 4 hours; temperature checks, per facility protocol; lung sounds every 4 hours; level of consciousness (LOC) assessment every 8 hours; edema assessment every 8 hours; assessment for visual disturbances, headache, and/or epigastric pain every 8 hours; uterine activity monitoring and fetal status assessment every shift; Intake and output every hour, with 8-hour and 24-hour totals [6,33,48].

During the **INTRAPARTUM** period: BP, pulse, respirations, SpO2 every 1 hour; temperature checks, per facility protocol; lung sounds every 4 hours; LOC assessment every 8 hours; edema assessment every 8 hours; assessment for visual disturbances, headache, and/or epigastric pain every 8 hours; fetal status and uterine activity continuous; intake and output every hour, with 8-hour and 24-hour totals [6,33,48].

During **POSTPARTUM** period: BP, pulse, respirations, SpO2 every 4 hours; temperature checks, per facility protocol; lung sounds every 4 hours; LOC assessment every 8 hours; edema assessment every 8 hours ;assessment for visual disturbances, headache, and/or epigastric pain every 8 hours; intake and output every hour, with 8-hour and 24-hour totals [6,33,48].

For **ALL** patients with preeclampsia **WITH** severe features and/or patients on magnesium sulfate (MgSO4®) [6,33,48]:BP, pulse, respirations every 5 minutes during MgSO4 bolus, then every 30 minutes while on MgSO4. Can decrease monitoring to every 60 minutes when one or more of the following conditions are met: preeclampsia without severe features ;BP stable without increases for a minimum of 2 hours; no antihypertensive medications within 6 hours; antepartum patient; latent phase of labor.SpO2 continuous during MgSO4 infusion while in labor, assessed with other vital signs if postpartum; temperature per facility protocol; lung sounds every 2 hours;

deep tendon reflexes every 4 hours; LOC assessment every 4 hours; edema assessment every 4 hours; assessment for visual disturbances, headache, and/or epigastric pain every 4 hours; fetal status evaluation and continuous assessment of uterine activity (except postpartum).

Intake; medication and IV solutions drips should all be administered using an IV infusion pump; total hourly intake should be limited to < 125 ml/hr.; keep the patient NPO with ice chips, or as permitted.

Output: insert foley with urometer; calculate hourly, end of shift, and 24-hour totals. Women in the hospital must be watched for signs and symptoms of worsening or severe preeclampsia, and the provider should be notified of any of the following findings[6,33,48]:increasing BP; headache; altered LOC (restless, agitation, hallucinations, lethargy, confusion);visual disturbances (floaters, spots, blurred vision, blind spot);upper abdominal pain; urine output < 30 mL/hr;SpO2 <95%;cough; tachypnea > 26 breaths per minute; tachycardia > 120 bpm; adventitious breath sounds; eclamptic seizure; Magnesium toxicity.

BP measurement is an important part of the assessment and should be done correctly. A manual BP reading with a mercury sphygmomanometer is the most accurate reading. This should be used when available. It is important to: ensure that equipment is in working order; obtain the correct size cuff. The width of the bladder should be 40% of the circumference of the arm and encircle 80% of the arm; have the patient sit quietly or be semi-reclined with their back supported and their arm at heart level, with their feet flat on the ground or fully supported, for 5 to 10 minutes prior to taking BP; use the bare upper arm without clothing; make sure the patient avoids caffeine or nicotine within 30 minutes of BP reading, but this should not delay intervention; support the patient's arm at heart level, seated in semi-Fowler's position; obtain auscultatory measurement by using the first audible sound (Korotkoff I) as the systolic pressure and using the disappearance of sound (Korotkoff V) as the diastolic pressure; read to the nearest 2 mmHg; instruct the patient to remain silent; take at least one additional reading within 15 minutes and use the highest reading; repeat within 15 minutes if the reading is greater than or equal to 140/90. If it is still elevated, further evaluate for preeclampsia[6,33,48].It is important to know that getting accurate BP measurements can be challenging in obese women. In these situations, using an appropriately sized cuff is essential. If the patient has an upper-arm circumference of more than 34 cm, BP accuracy can be improved through the use of large adult cuffs or thigh cuffs. If the patient has an upper-arm circumference of more than 50 cm, the American Heart Association recommends using a cuff on the forearm. To estimate systolic BP, feel for the appearance of the radial pulse at the wrist. While forearm measurements may not be as accurate or reliable, they may be necessary to obtain readings.

2.2. Treatment. Non-Pharmacological. Monitoring. Pharmacological.

Treatment

Once a diagnosis is made, the patient and fetus will require close monitoring. Delivery is the only way to treat preeclampsia. The decision to deliver the fetus or continue the pregnancy is based upon the gestational age and the status of the woman. Risks and benefits must be weighed. If the woman has not seen a perinatologist, one may be consulted if the woman's condition is deteriorating, or there are concerns for the health of the fetus.

Non-Pharmacological Treatments

Some basic non-pharmacologic treatments can be followed. They may not cure hypertension but can improve BP. A healthy diet with fruits, vegetables, and whole grains is important for pregnancy and BP control. Lowering sodium intake can also improve BP [13,26,47]. Avoiding alcohol and smoking is important as well. While regular activity should be maintained, rest is key to lowering stress [2,29,41], and women with severe BP may need more rest. It may be helpful to teach the woman how to lower her stress by using techniques such as meditation, keeping a journal, or listening to music. It is important to maintain a calm, quiet atmosphere and control environmental stressors. In the hospital setting, keeping the room quiet and darkened, and limiting visitors can help to maintain a soothing environment.

Monitoring

Maintaining a systolic BP of 110 to 140 mmHg and a diastolic BP of 85 mmHg is the goal of treatment, except in women with chronic hypertension [12,25,46]. In those cases, it is important to maintain blood pressure less than 160/110 mmHg.

Severe hypertension is associated with higher rates of pregnancy loss or high-level neonatal care for >48 hours, small-for-gestational-age (SGA), preterm delivery, maternal death, and other poor obstetric outcomes compared to those with non-severe hypertension [12,25,46]. There is debate as to the exact target blood pressure for these women. Experts are conflicted in agreeing on the perfect target blood pressure, but it is important to treat severe range BPs. BPs that are too low can cause decreased blood perfusion to the placenta, increasing risks for the fetus [12,25,49]. At gestational age < 34 weeks, weigh the risks and benefits of continuing the pregnancy against the progression of maternal disease, to determine timing of delivery [1,21,44]. Any of the following complications may require delivery [1,21,44]:repeated severe hypertension

episodes despite maintenance treatment with three classes of antihypertensive agents; progressive thrombocytopenia; progressively abnormal liver or renal enzyme tests; pulmonary edema; abnormal neurological features, such as repeated visual scotomata, severe intractable headache, or convulsions; non-reassuring fetal status.

Pharmacological Treatment

For fetal lung maturation between 24+0- and 34+0-weeks' gestation, prenatal corticosteroids are recommended [1,22,49].Pregnant woman taking medication.

Unless BPs are consistently over 150/100 mmHg, medication for chronic hypertension is usually not required. Treatment recommendations include the following [4,23,35]:Labetalol (Trandate®), if systolic BP is 160 mmHg or higher or diastolic BP is 110 mmHg or higher; Extended release of nifedipine (Adalt®) if systolic BP is 120 to 159 mmHg or diastolic BP is 80 to 109 mmHg or higher. Discuss with the patient whether to treat chronic hypertension at lower BP levels, as overtreatment can cause adverse perinatal outcomes due to hypoperfusion of the placenta. Medications used to treat chronic hypertension include: Methyldopa (Aldomet®);Labetalol (Trandate®);Nifedipine (Adalt®).

A woman taking thiazide diuretics (Clorpres®, Capozide®) before pregnancy may continue taking this during pregnancy, but if preeclampsia develops, therapy should be stopped to avoid worsening intravascular volume depletion [12,19,27].Eclampsia can be prevented by administering magnesium sulfate (MgSO4®) to women with preeclampsia with severe features who are at risk of having a seizure. Once a seizure occurs, management includes a 4 to 6 g bolus MgSO4, unless the woman already is receiving it, then another 2 g bolus should be administered. General seizure precautions should be followed, such as [12,22,41]:maintain a calm environment; protect the airway; avoid polypharmacy; prevent maternal injury; avoid a STAT cesarean section.

During a seizure, the fetus may experience hypoxic bradycardia but will usually recover. Close monitoring is needed after the seizure. If the patient is already on magnesium sulfate but continues to have recurrent seizures, another loading dose of magnesium sulfate (MgSO4®) 2 g IV over 5 minutes can be given [1,19,22]. If the patient still continues to have seizures, consider the use of alternative anticonvulsants, such as [6,24]:Lorazepam (Ativan®) 4 mg IV over 2 to 5 minutes (can repeat in 5 to 15 minutes) to a maximum of 8 mg in 12 hours; Diazepam (Valium®) 5 to 10 mg IV slowly (can repeat every 15 minutes up to 30 mg);Midazolam (Versed®) 1 to 2 mg IV (can repeat in 5 to 10

minutes);Phenytoin (Dilantin®) 1000 mg IV over 20 minutes; use of other agents, such as propofol (Diprivan®), per protocol.

Magnesium sulfate IV

Magnesium Sulfate IV is a high-alert drug that works well to prevent seizures, it can cause side effects and magnesium toxicity, especially in women with renal impairment. The standard MgSO4 maintenance dose should be lower in patients with renal insufficiency, and serial serum magnesium levels should be closely monitored in these patients during MgSO4® therapy[1]. Magnesium sulfate therapy is also contraindicated in women with myasthenia gravis [1,18,27].

Because magnesium administration carries many risks for the woman and fetus, it should be commercially prepared in a standardized concentration to decrease the risk of concentration error. The size of the bag should be different from oxytocin (Pitocin®). Use piggyback bags for the loading dose when possible and label the bag and tubing. Use order sets with the word magnesium spelled out. An infusion pump should always be used.

Perform an independent double check with two nurses at initiation of magnesium sulfate (MgSO4®), when the dose is changed, and at shift change. It is essential to perform good nursing assessments when caring for a woman on magnesium sulfate. Magnesium toxicity can cause respiratory paralysis, central nervous system depression, and cardiac arrest [6,12,33]. Routine serum magnesium testing is not required in women with normal renal function. Test serum magnesium levels in a woman with absent reflexes, elevated creatinine levels, respiratory depression, or decreased urine output [6,12,33].Loss of reflexes are usually the first sign seen in magnesium toxicity, so a nurse’s assessments are crucial. If a nurse assesses the patient and suspects magnesium toxicity, they should stop the infusion and call the provider immediately. To counteract magnesium toxicity, administer 1 g calcium gluconate intravenously over 2 minutes. Women who are receiving MgSO4 require close monitoring and should have lower nurse-to-patient ratios. According to Simpson [17,29,44], a woman receiving MgSO4 who is antepartum or intrapartum should have one nurse dedicated to her care. A nurse caring for a postpartum woman on MgSO4 can care for that couplet plus one additional couplet.

Medications used to treat hypertension depend on the stage of pregnancy:
Antepartum [6,12,33]:
Methyldopa (Aldomet®);initial dose is 250 mg orally twice a day; increase dosage, as needed, to a total of 2 g a day unless depression, excessive somnolence, or symptomatic orthostatic hypotension occurs.
Labetalol (Trandate®):this medication is the most commonly used beta-blocker and has some alpha-1 blocking effects; it can be used alone or in conjunction with methyldopa (Aldomet®) when the maximum daily dose has been reached; the usual dose of labetalol is 100 mg administered 2 or 3 times a day; increase dosage, as needed, to a total maximum daily dose of 2400 mg; adverse effects of beta-blockers include decreased maternal energy levels, increased risk of fetal growth restriction, and maternal depression.
Extended-release nifedipine (Adalat®):this is a calcium channel blocker; the medication may be preferred because it is given once a day (initial dose of 30 mg up to a maximum daily dose of 120 mg);adverse effects include pretibial edema and headaches.
Thiazide diuretics (Clorpres®, Capozide®): only use if the potential benefit outweighs the potential risk to the fetus; adjust the dosage to minimize adverse effects (such as hypokalemia).
Intrapartum [6,12,33]:
Labetalol (Trandate®):this medication is given by 10 to 20 mg IV, then 20 to 80 mg every 10 to 30 minutes to a maximum dose of 300 mg; tachycardia is less common with this medication: avoid in women with asthma, decompensated cardiac function, preexisting myocardial disease, bradycardia, and heart block.
Nifedipine (Adalat®):the initial dose of this medication is 10 to 20 mg orally and repeated in 20 minutes if needed; the subsequent dose is 10 to 20 mg every 2 to 6 hours with a maximum daily dose of 180 mg; side effects of this medication include reflex tachycardia or headaches.
Hydralazine (Apresoline®): the initial dose of this medication is 5 mg IV; the subsequent dose is 5 to 10 mg IV every 20 to 40 minutes to a maximum dose of 20 mg; higher or frequent doses are associated with headaches, maternal hypotension, and abnormal fetal heart tracings.
Sodium nitroprusside (Nitropress®):this medication is rarely used; it is a very potent vasodilator with immediate effect; this medication must be used by experienced providers and accompanied by invasive (arterial line) BP monitoring, which can be done in an ICU setting.

Magnesium sulfate is used to prevent seizures, and the patient must be closely assessed prior to and following administration. Regular dosage is to use a 4 to 6 g loading dose, followed by a 1 to 2 g maintenance dose, for 24 hours after delivery [1,6,18]. It is contraindicated with myasthenia gravis and should be used with caution with renal insufficiency, as the patient may need a 1 g maintenance dose [1,6,18].Magnesium toxicity may occur. With any signs of magnesium toxicity, immediately take the following steps[1,6,18]:discontinue magnesium sulfate (MgSO4®) infusion; obtain a stat serum magnesium level in the following situations; hypotension; respiratory depression; respiratory arrest; oliguria; shortness of breath; chest pains: electrocardiographic changes.

Use calcium gluconate as the antidote for magnesium toxicity. This medication can be given at a dosage of 1 g IV over 3 minutes [1,6,18].

Educate the patient about the side effects of magnesium sulfate (MgSO4®) and how to treat them, such as [1,6,18]:cutaneous sweating, flushing, malaise, drowsiness, weakness; keep the room cool and monitor patient movement; assist the patient with getting out of bed; transient decreased frequency and amplitude of contractions when loading dose administered; provide continuous fetal monitoring and monitor uterine contractions.

IV site soreness: apply ice or warm soaks to the site.

Decreased depth and rate of respiration, shortness of breath (SOB): if SOB is not relieved with oxygen, discontinue use.

Diuresis: monitor strict intake and output; Magnesium sulfate (MgSO4®) is excreted in urine. A < 30 ml/hr. output may lead to magnesium toxicity; disappearance of deep tendon reflexes; notify the provider if reflexes are absent or there is a change from the baseline; heart block (increased QRS, decreased PR interval), chest pain; avoid use of magnesium sulfate (MgSO4®) in patients with cardiac conduction abnormalities. Women with chronic cocaine/amphetamine abuse can have elevated BPs, but treatment can cause an exaggerated decrease in BP. Phentolamine (Regitine®) is used more frequently for cocaine/amphetamine-induced hypertension because there is less risk of severe hypotension[1.6,18].

Daily **low-dose aspirin** use in pregnancy is considered safe and is associated with a low likelihood of serious maternal, or fetal complications, or both, related to use. The American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine support the USPSTF guideline criteria for prevention of preeclampsia. Low-dose aspirin (81 mg/d) prophylaxis is recommended in women at high risk of preeclampsia and should be initiated

between 12 weeks and 28 weeks of gestation (optimally before 16 weeks) and continued daily until delivery. Low-dose aspirin prophylaxis should be considered for women with more than one of several moderate risk factors for preeclampsia. Women at risk of preeclampsia are defined based on the presence of one or more high-risk factors (history of preeclampsia, multifetal gestation, renal disease, autoimmune disease, type 1 or type 2 diabetes, and chronic hypertension) or more than one moderate-risk factor (first pregnancy, maternal age of 35 years or older, a body mass index greater than 30, family history of preeclampsia, sociodemographic characteristics, and personal history factors).

In the absence of high-risk factors for preeclampsia, current evidence does not support the use of prophylactic low-dose aspirin for the prevention of early pregnancy loss, fetal growth restriction, stillbirth, or preterm birth[15,17,47].

Fluid Management

Fluid management is important in women with preeclampsia. Endothelial damage can cause electrolytes, plasma, and water to leak from the intravascular space. This leakage can also shift fluid into the interstitial space, causing central and/or peripheral edema. As fluids shift out of the intravascular space, hypovolemia is possible. Fluid administration is important to preserve organ perfusion but must be limited to prevent pulmonary edema. Renal endothelial damage is sensitive to these fluid changes that can cause oliguria and proteinuria. Assessing renal function is important to determine the degree of renal dysfunction. Pulmonary edema occurs more frequently, while permanent renal damage due to preeclampsia is rare, so fluids are usually restricted to a total of ≤ 125 mL/hr. [1,6,18].

Pregnant patient receiving IV fluids

For a patient with oliguria (less than 30 ml per hour for 2 hours, or less than 500 ml in 24 hours), administer a trial of IV fluid boluses (Lactated Ringer's or normal saline), usually starting with 250 to 500 ml [1,6,18]. If hypovolemia is still suspected once the patient has received a total of 1000 ml of a crystalloid IV fluid without resolution of the oliguria, consider administering blood or a colloid (albumin) to enhance urine output and renal perfusion [1,6,18]. If the patient is hydrated and still has oliguria, furosemide may be needed for diuresis. If the patient has reduced O2 saturation (below 95%) and oliguria, pulmonary edema should be strongly suspected, and diuresis is needed [1,6,18].

Early recognition of signs and symptoms of maternal or fetal deterioration are an important part of preventing maternal or neonatal morbidity or mortality

[2,831]. Written criteria describing early warning signs and intervention strategies can help to improve outcomes [6,7,29], hospitals should have a policy that outlines maternal early warning criteria. If a woman has any of the following, a 10-minute recheck should be done[7]:Systolic BP: < 90 mmHg or > 160 mmHg ; Diastolic BP: > 100 mmHg; heart rate: < 50 or > 120 beats per minute (bpm);respiratory rate: < 10 or > 30 breaths per minute (bpm):oxygen saturation: < 95%;oliguria: ml/hr. x 2h < 35.If confirmed, a provider (attending or in-house) should be at the bedside within 10 minutes.

If a woman has the following, she does not require a 10-minute recheck and a provider should be at the bedside within 10 minutes: maternal confusion, agitation, or unresponsiveness; patients with hypertension reporting shortness of breath or a non-remitting headache.

2.3.Further Monitoring. Indications for Delivery

Further Monitoring

Women with gestational hypertension need education about signs and symptoms of complications, as well as the need to maintain a healthy lifestyle. They also need to understand the close, additional monitoring that they will receive, and why it is important to keep their appointments. These women must understand the education that is provided[4,16,37]. Women with gestational hypertension will likely be induced or have a scheduled cesarean section (if indicated) at 37 weeks' gestation. Vaginal birth is preferred because there are fewer complications that can occur. If the woman has had a previous cesarean section or has other indications for a cesarean section, then one should be scheduled. Once a diagnosis of gestational hypertension is made, serial ultrasounds should be done to determine fetal growth and weekly antepartum testing should be scheduled, including a non-stress test and an ultrasound to determine the amount of amniotic fluid. Another part of monitoring is weekly lab work for preeclampsia (e.g., creatinine levels, complete blood count, alanine transaminase, and/or aspartate transaminase levels) and close BP monitoring. Women who are being monitored should immediately report any concerning, persistent, or unusual symptoms. Women with HELLP syndrome require close inpatient observation, preferably in a tertiary care center. No matter what the gestational age, delivery is usually recommended. The patient may need close observation in an intensive care unit. Women with HELLP syndrome may present with nausea and vomiting, general malaise, or right upper quadrant pain. Women with HELLP syndrome can deteriorate quickly[20,31,49]. One

potential complication of HELLP syndrome is disseminated intravascular coagulation (DIC). This is a serious complication that can cause a massive hemorrhage after delivery. It is important to listen to patient concerns and evaluate them thoroughly.

All postpartum women should receive education on postpartum preeclampsia, including what signs and symptoms to report and when to report them. These patients may require readmission to the hospital and MgSO4 to prevent seizures.

Oral labetalol (Trandate®) or nifedipine (Adalt®) are commonly used to treat postpartum hypertension[18,27,51].

Preeclampsia treatment includes close monitoring of the woman and her fetus. Newly diagnosed preeclampsia may require hospitalization for increased surveillance. Women diagnosed with preeclampsia without severe features at < 37 weeks require serial ultrasounds, including Doppler studies, to determine fetal growth and weekly antepartum testing, including a non-stress test and an ultrasound, to determine the amount of amniotic fluid[16,26,50]. These women also need weekly lab work for preeclampsia (e.g., creatinine levels, complete blood count, alanine transaminase, and/or aspartate transaminase levels) and close BP monitoring. Delivery is usually indicated at ≥ 37 weeks.

Indications for Delivery

Women with preeclampsia with severe features require inpatient hospitalization and treatment, depending on the stage of the pregnancy: if the woman is ≥ 34 weeks, delivery is usually indicated; if the woman is < 34 weeks, consider expectant management ;if continuing the pregnancy, closely monitor both the mother and fetus. Regularly perform laboratory testing (complete blood count including liver enzymes, platelets, and serum creatinine) [1,18,22].

To prepare for possible deterioration of maternal or fetal condition, delivery should be an option at any time. Some examples of maternal deterioration are: eclampsia; HELLP syndrome; myocardial infarction; new or worsening renal dysfunction (serum creatinine > 1.1 mg/dL or twice baseline);persistent headaches, which do not improve with medication; pulmonary edema; right upper pain or epigastric pain; stroke; suspected vaginal bleeding or acute placental abruption in the absence of placenta previa; systolic BP 160 mmHg or more or diastolic BP 110 mmHg or more (uncontrolled severe range) despite the use of antihypertensive medication; visual disturbances, altered level of consciousness, or motor deficit. Fetal deterioration may include [1,12,33]:abnormal fetal testing; fetal death; fetus not expected to survive at the

time of maternal diagnosis (e.g., extreme prematurity or lethal anomaly);persistent reversed end-diastolic flow in the umbilical artery.

Fetal growth restriction has been an indication for delivery < 34 weeks in the past [1.7.12]. If there is fetal growth restriction with normal fluid volume, normal Doppler studies, and normal antenatal fetal testing, expected management may continue. Corticosteroids should be given, but delivery should not be delayed in the case of deterioration to complete the steroid course. Vaginal birth is the preferred method of delivery unless there is an obstetric complication requiring a cesarean section. Cervical ripening for an unfavorable cervix is acceptable. Once induction of labor begins, the two main goals for the woman with severe features are control of hypertension and prevention of seizures. A timely delivery is important to prevent seizures. Magnesium sulfate (MgSO4®) should be given to women with severe features, and it should continue for 24 hours after delivery. Magnesium sulfate (MgSO4®) is more effective for decreasing maternal mortality and preventing recurrent eclamptic seizures than phenytoin (Phenytek®), diazepam (Diastat®), or a combination of chlorpromazine (Thorazine®), promethazine (Phenergan®), and meperidine (Demerol®) [1,7,12]. A 4 to 6 g loading dose of magnesium sulfate (MgSO4®) should be given as a bolus, followed by a 2gm/hour maintenance dose. In women with renal insufficiency, 1gm/hour may be used These women also need serial magnesium serum levels. In a woman with normal kidney function, thorough assessments are most important to determine magnesium toxicity. A therapeutic range of magnesium is 5-9 mg/dL. A woman with severe range BPs of systolic ≥160 and/or diastolic ≥110 requires treatment within 30 to 60 minutes [1,7,12]. Treating severe hypertension helps to prevent myocardial ischemia, renal injury or failure, congestive heart failure, and ischemic or hemorrhagic stroke (ACOG, 2020). The medications that are recommended to treat severe hypertension are IV labetalol (Trandate®), IV hydralazine (Apresoline®), or oral nifedipine (Adalt®).

Thus, we conclude from the second chapter. In this chapter, we reviewed: assessments, medical history and physical examination, risk factor management, additional monitoring and evaluation, treatment, non-drug, monitoring, pharmacological treatment, types of drugs and methods of administration, management of the infusion system. Nursing assessments are an essential part of the care of pregnant women with hypertension. Nurses know their patients well and spend a good amount of time with them. The nurse must use their assessment skills and critical thinking skills. A woman with hypertension is at

risk for morbidity and mortality for herself and her fetus. Treatments for hypertension are specific to the woman's health status and can change quickly if the woman deteriorates. Nurses must be aware of the types of medications and non-pharmacologic interventions that can be used to treat hypertension. The nurse should also be aware of when to call a provider. Quick, effective treatments can prevent poor outcomes.

CHAPTER 3.THE OBJECT OF RESEARCH AND METHODS OF STUDY

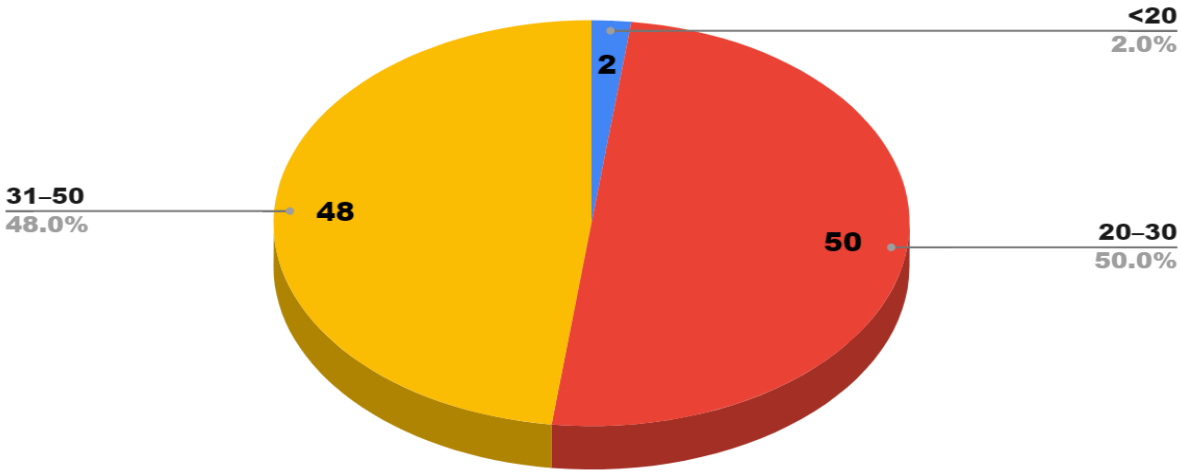
3.1.The object of research. Materials and methods

Pregnancy-related hypertensive disorders are a significant cause of adverse maternal and fetal outcomes, especially in developing areas of the world. Preeclampsia and eclampsia are the most significant causes of maternal and perinatal morbidity and mortality. The object of research included 100 presents the sociodemographic characteristics of the recruited study participants who met the inclusion criteria of this study. As 17 patients met the exclusion criteria, 100 pregnant women were enrolled and included in this study. Women with pregnancy-related hypertensive disorders admitted for delivery were included in the study. The mean age was 30.86±6.57 years and the majority (48%) were between 31 and 50 years. All of the study participants reported no history of smoking before or during pregnancy and 48% had a secondary education level.

Materials and methods

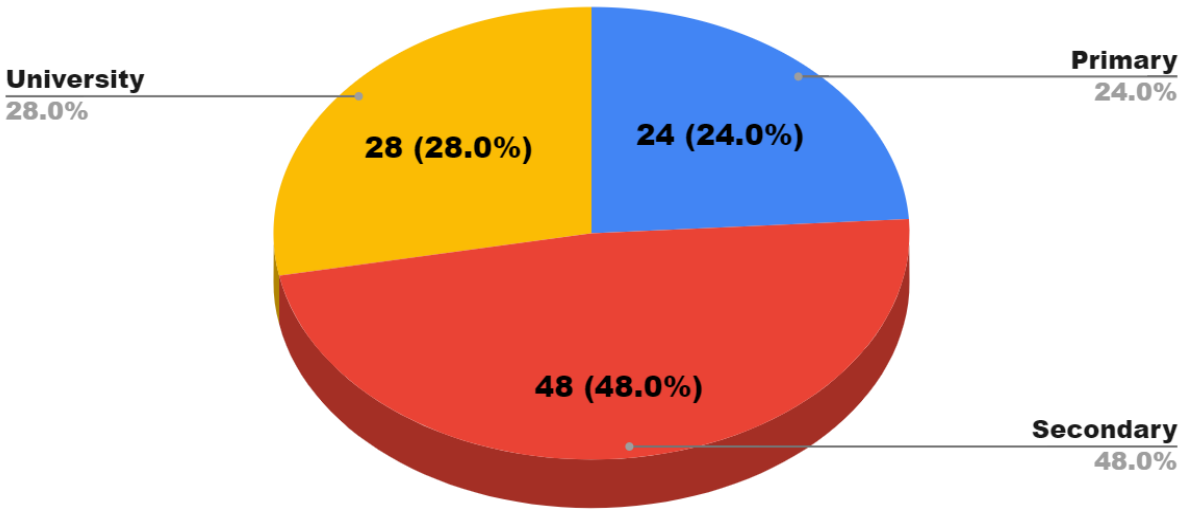
The study was approved by the institutional review board, and written informed consent was obtained from all patients. Eligible patients included those diagnosed with at least one pregnancy-related hypertensive disorder (chronic HTN, chronic HTN superimposed, PIH, preeclampsia, eclampsia, and HELLP syndrome) who were admitted in the department for delivery/expulsion. Hypertensive disorder of pregnancy was diagnosed per ACOG definition. Patients with no pregnancy-related hypertensive disorder, who did not consent to participate, or those who were received in such an emergency that they were in delirium and were unable to communicate were excluded from the study. Patient age, gestational age confirmed via ultrasound, blood pressure, and type of pregnancy-related hypertensive disorder were recorded for all participants. All patients were observed for the development of any complication during their hospital stay (before, during, and after delivery/expulsion). The maternal outcome was recorded, and the incidence of any neonatal complication was observed. The mean and standard deviation was calculated for numerical values such as age and blood pressure at the time of admission. Frequencies were calculated for hypertensive disorders of pregnancy, as well as maternal and fetal complications.

Figure 1.The distribution of study patient by age



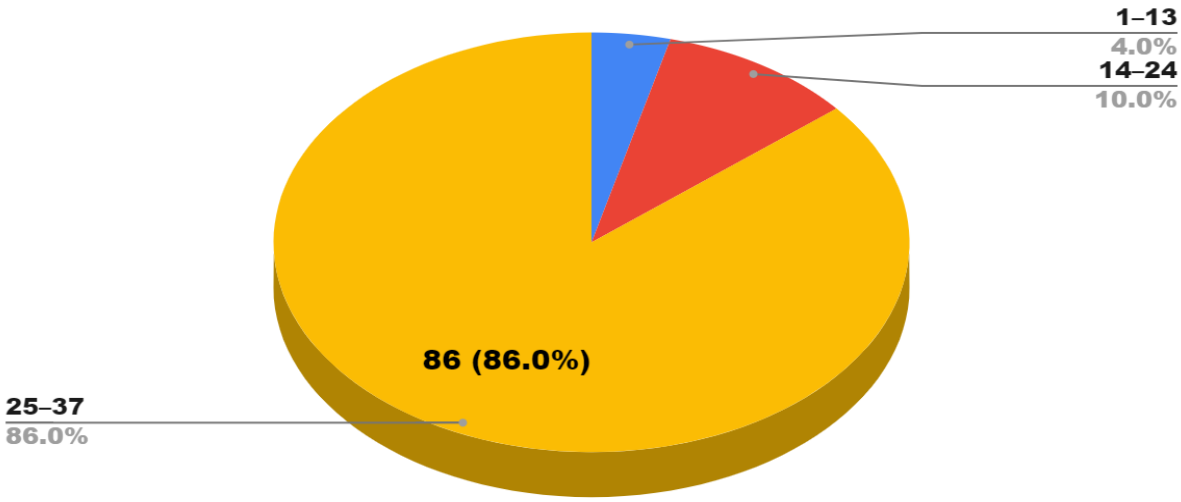
The distribution of study patients by age was as follows: 31-50 years 48 pts (48%); 20-30years 50 pts(50%);<20years 2pts(2%).

Figure 2. The distribution of study by educational level



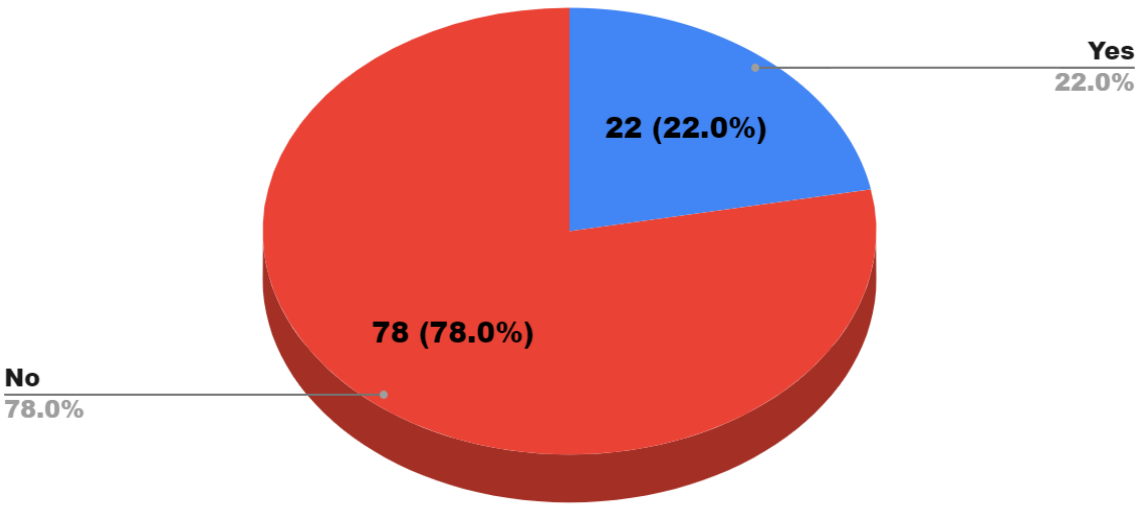
The distribution of study patients by educational level :48% had a secondary education level;28 % university and 24 % primary.

Figure 3.The distribution of study patients by Obstetric GA (w...



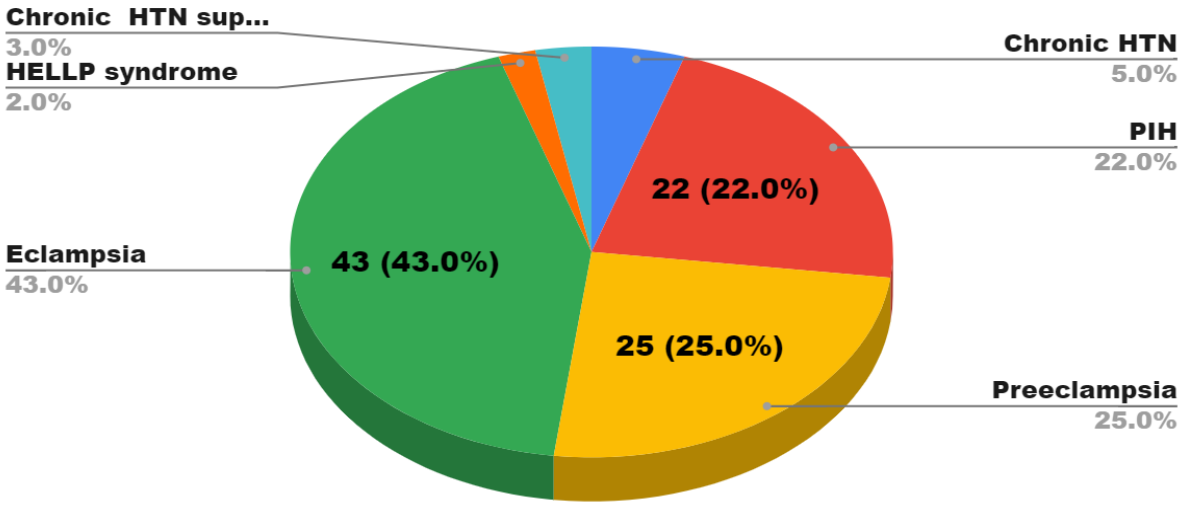
The distribution of study patients by Obstetric GA (weeks):1-13 weeks 4 pts (4 %);14-24 weeks 10 pts (10%);25-37 weeks 86 pts (86%).

Figure 4.The distribution of study by presence of GDM



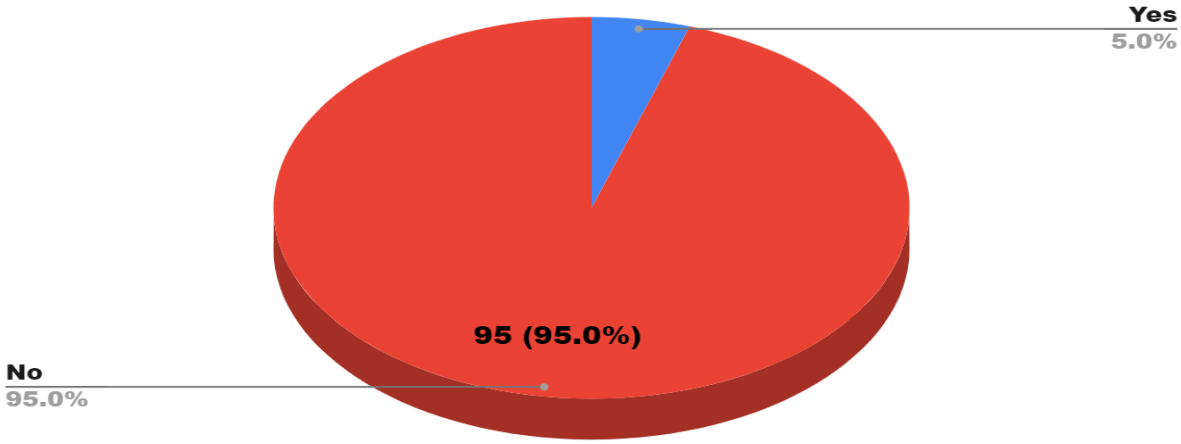
The distribution of study patients by presence of GDM : 22 pts (22%) had and 78 pts (78%) did not.

Figure 5.The distribution of study by type of hypertensive disorders



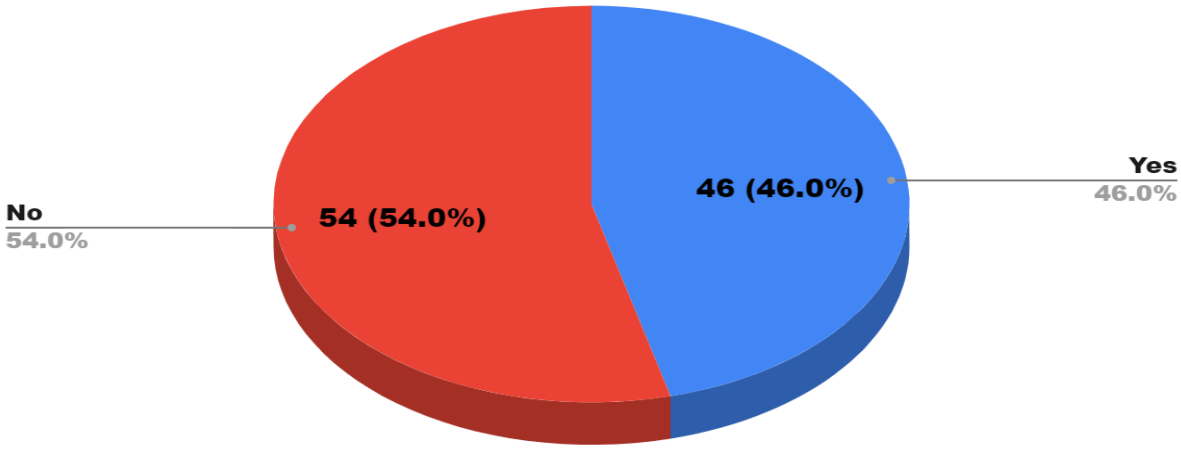
The distribution of study by type of hypertensive disorders :Chronic HTN 5pts (5%);PIH 22 pts(22%);Preeclampsia 25pts (25%);Eclampsia 43pt (43%);HELLP syndrome 2 pt. (2%);Chronic HTN superimposed 3pt (3%).

Figure 6.The distribution of study by CV family history



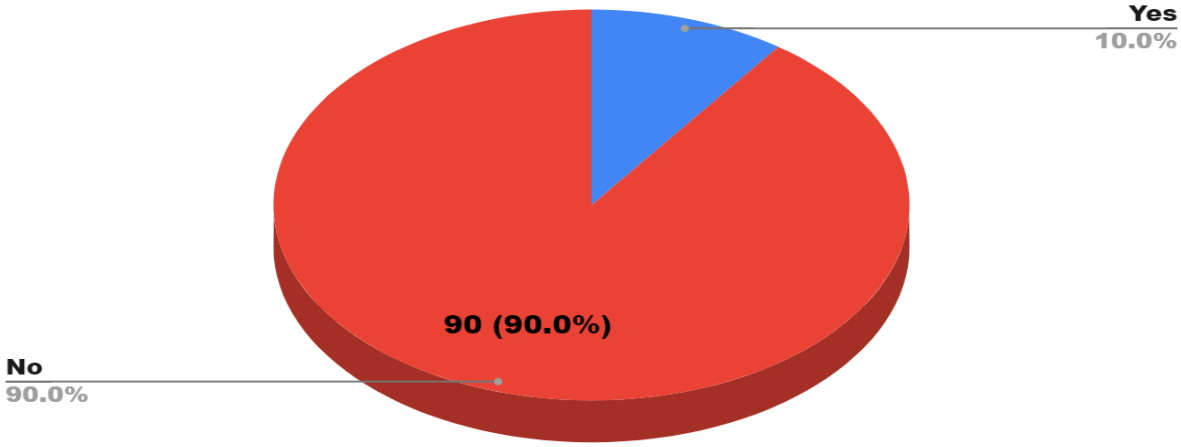
The distribution of study patients by CV family history:5 pt. (5%) had and 95 pts (95%) did not.

Figure 7.The distribution of study by past surgical history



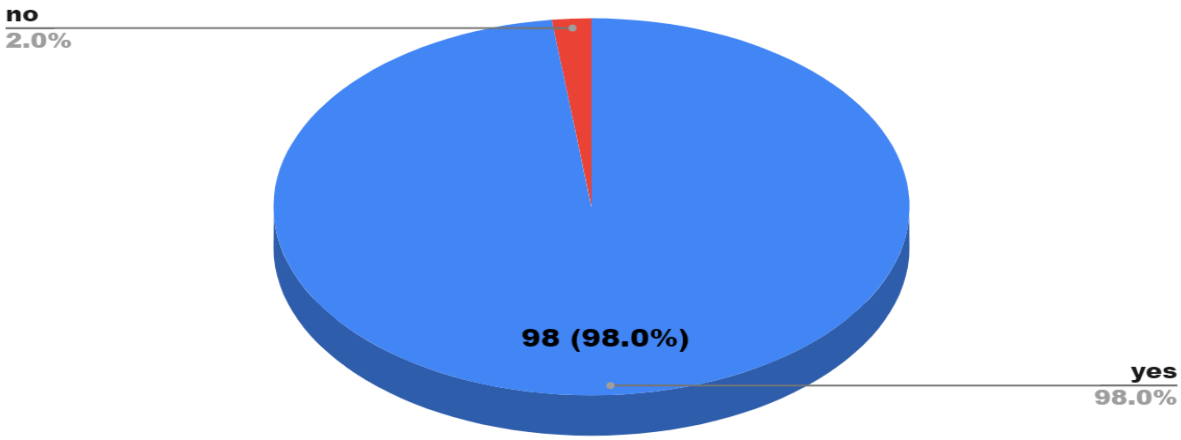
The distribution of study patient's by past surgical history:46 pts (46%) had and 54 pts (54%) did not.

Figure 8.The distribution of study by medical conditions



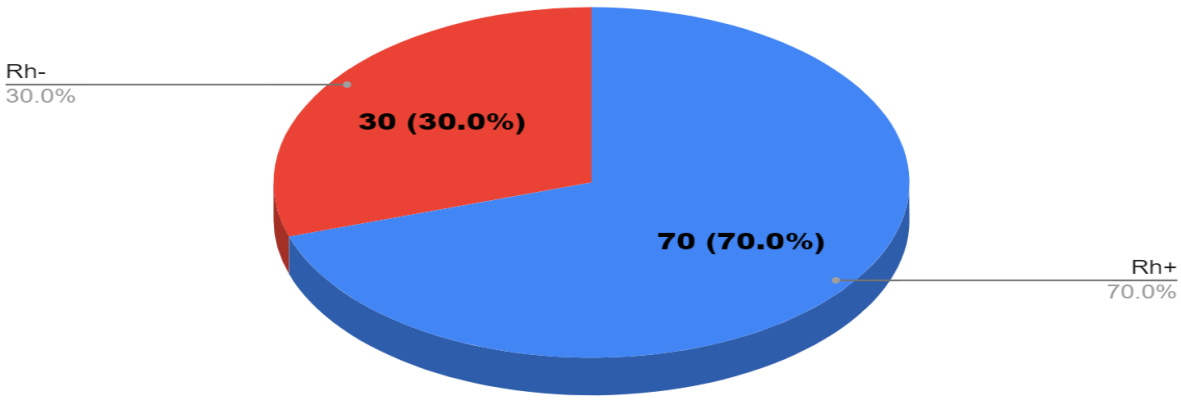
The distribution of study patients by medical conditions:10pts (10 %) had and 90 pts (90%) did not.

Figure 9.The distribution of study by antihypertensive medicat...



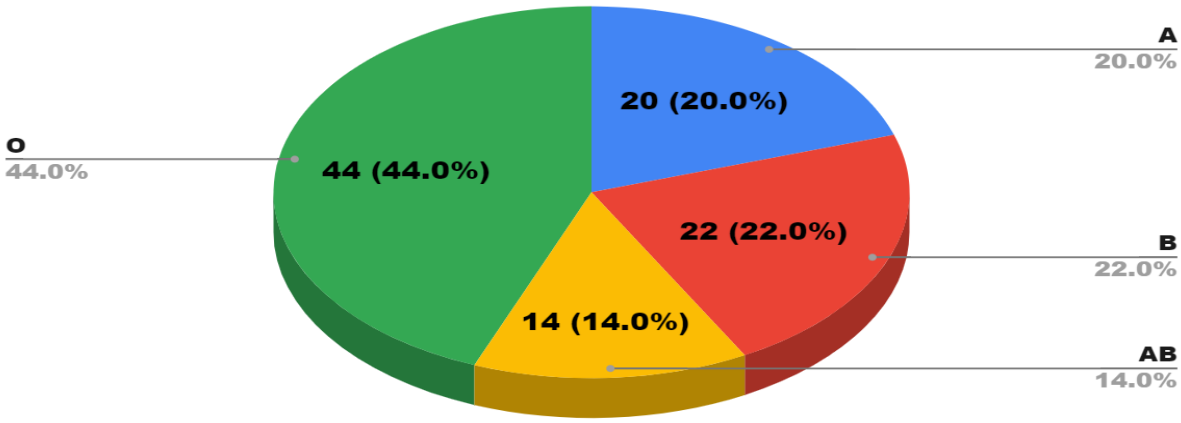
The distribution of study patients by antihypertensive medication:98 pts (98%) was on antihypertensive medication and 2 pts (2 %) was not.

Figure 10.The distribution of study by Rh factor



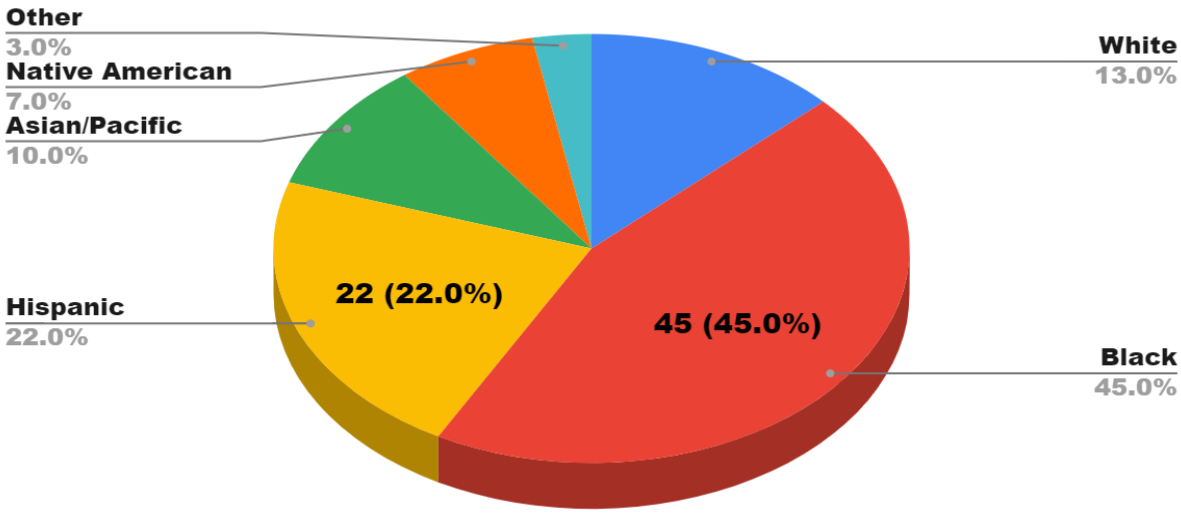
The distribution of study patients by Rh factor : 30 pts (30%) was Rh- and 70 pts (70%) was Rh +.

Figure 11.The distribution of study by Blood group type



The distribution of study patients by Blood group type : 44 Pts (44%) had O ; 20 pts (20%) had A ; 22 pts (22 %) had B ;14 pts (14%) had AB.

Figure 12 .The distribution of study patients by race



The distribution of study patients by race: 13 pt. (13%) was white ; 45 pts (45%) was Black ; 22 pts (22%) was Hispanic ; 10 pt. (10%) was Asian/pacific; 7 pts (7%) was native American and 3 pt. (3 %) was of other race.

Regarding the obstetric characteristics, 86% of the study participants were diagnosed at 25–37 weeks, 10% at 14–24 weeks, and 4% at 1–13 weeks GA. From the study participants, 22% had GDM. For the types of hypertensive disorders diagnosed among the participants, 48% had GH, followed by 42% preeclampsia and 10% chronic hypertension,0% HELLP syndrome.

In terms of the clinical and health characteristics, 98% reported intake of antihypertensive medication. For the maternal ABO blood group distribution, it was found that 70% of the study participants had Rh+ factor. Meanwhile, 44% patients were found to have O blood group phenotype. Other characteristics of the study participants are shown in Figure [1-12].

In this study, the majority of pregnant women diagnosed with different hypertensive disorders of pregnancy within both groups A and B were at a GA between 25 and 37 weeks (84% vs. 88%, respectively). Our results were in agreement with previous studies, which reported that in pregnancy, a substantial change in BP is observed. In early pregnancy, a decrease in BP is observed followed by a steep rise in the latter half of pregnancy. There is also evidence that even women without preexisting hypertension or preeclampsia have an increased BP, where the maximum level is reached, which is associated with reduced fetal growth. Table [3.1] presents the clinical characteristics of pregnant women with and without daily low-dose aspirin administration. Among those, 50% was observed for pregnant women using daily low-dose aspirin versus those without aspirin usage. Accordingly, an equal incidence (48%) at the age range of 31–50 years was also observed in both groups A and B. The majority of the study participants within both groups A and B were at a GA between 25 and 37 weeks (84% vs. 88%, respectively). In this study, the prevalence of GDM among pregnant women within both groups A and B was insignificant (20% vs. 24%; P = 0.0870, respectively).

(Table 3.1)

Clinical characteristics of pregnant women with and without daily low-dose aspirin usage

Variable	Group A (with aspirin) (total = 50) N (%)	Group B (without aspirin) (total = 50) N (%)	P value
Age (years) <20 20–30 31–50	 0 26(52) 24(48)	 2(4) 24 (48) 24(48)	0.0896 * NS
GA (weeks) 1–13 14–24 25–37	 4 (8) 4 (8) 42 (84	 0 6 (12) 44 (88)	0.090 * NS
Presence of GDM Yes No	 10 (20) 40 (80)	 12 (24) 38 (76)	0.0870 * NS
Gestational medications methyldopa (250 mg tab.) Yes No	 48 (96) 2(4)	 50(100) 0	0.0894 * NS
Frequency of methyldopa (250 mg tab.) 2 times/day 3 times/day	 42 (84) 16 (32)	 8 (16) 34 (68)	0.0001**

SBP (mm Hg)DBP (mm Hg)	128.8 ± 9.6 84.4 ± 5.2	144 ± 16.4 93.6 ± 13.1	0.088 * NS 0.0933 * NS
Presence of proteinuria Yes No	 12 (24) 38 (76)	 30 (60) 20 (40)	0.0001**
Preeclampsia incidence	12 (24)	30 (60)	0.0001**
Eclampsia incidence Yes No	 0 50 (100)	 10 (20) 40 (80)	0.0001**

*NS = non-significant**P < 0.05 = significant

No significant difference was reported regarding the use of antihypertensive medication (methyldopa, 250 mg tablet) among the study participants of both groups A versus B, (96% vs. 100%; P = 0.0894, respectively). However, the frequency of daily dose intake of methyldopa (250 mg) tablet (two vs. three times daily) was significant (P = 0.0001) among pregnant women with group A (84% on 2 times/day vs. 16% on 3 times/day) compared to those within group B (32% on 2 times/day vs. 68% on 3 times/day) as shown in Table [3.1].

Although no significant changes were observed regarding BP measurements (SBP and DBP), the average SBP and DBP readings were comparable within both the groups (SBP: 128.8 ± 9.6 vs. 144 ± 16.4 mm Hg; P = 0.088) and (DBP: 84.4 ± 5.2 vs. 93.6 ± 13.1 mm Hg; P = 0.0933) as shown in Table[3.1].

A significant incidence of preeclampsia was observed among pregnant women within group B compared to those in group A (60% vs. 24%; P = 0.0001, respectively). In addition, only 24% of the pregnant women within group A had proteinuria versus 60% within group B; P = 0.0001. Furthermore, all pregnant women (100%) within group A were safe from the incidence of eclampsia in comparison to those within group B (20%; P = 0.0001) as shown in Table [3.1].

A large review of 59 trials, conducted on 37,560 women, found that daily low-dose aspirin reduced the risk of preeclampsia by 17%, the risk of fetal or neonatal deaths by 14%, and the relative risk of preterm births by 8%. A meta-analysis study found that daily low-dose aspirin was associated with a significant reduction in the overall risk ratio of preeclampsia regardless of the time to delivery. This is the first study in a real-life setting, for better understanding of clinical characteristics elicited from the benefits of daily low-dose aspirin administration throughout the gestational period alongside antihypertensive medication in pregnant women with different hypertensive disorders. However, the study has some limitations that should be taken into consideration, resulting from hidden confounders and biases because of the retrospective nature of the study. Another limitation was the small sample size for the population that was recruited during this study and patients' recruitment at the obstetric clinic of a single hospital. Finally, there was inability to identify adherence for medications being recommended for the patients, which might limit the ability to detect improvements in some outcomes.

3.2.Maternal and Fetal Outcomes

Results

The major pregnancy-related hypertensive disorder was eclampsia (n=48; 43.24%) and preeclampsia (n=28; 25.23%). Among the women who developed one or more complications during or after delivery, postpartum hemorrhage (PPH) was the most frequent (n=31; 27.6%).

Materials and methods

The study was approved by the institutional review board, and written informed consent was obtained from all patients. Eligible patients included those diagnosed with at least one pregnancy-related hypertensive disorder (chronic HTN, chronic HTN superimposed, PIH, preeclampsia, eclampsia, and HELLP syndrome) who were admitted in the department for delivery/expulsion. Hypertensive disorder of pregnancy was diagnosed per ACOG definition. Patients with no pregnancy-related hypertensive disorder, who did not consent to participate, or those who were received in such an emergency that they were in delirium and were unable to communicate were excluded from the study.

Patient age, gestational age confirmed via ultrasound, blood pressure, and type of pregnancy-related hypertensive disorder were recorded for all participants. All patients were observed for the development of any complication during their hospital stay (before, during, and after delivery/expulsion). The maternal

outcome was recorded, and the incidence of any neonatal complication was observed.

The mean and standard deviation was calculated for numerical values such as age and blood pressure at the time of admission. Frequencies were calculated for hypertensive disorders of pregnancy, as well as maternal and fetal complications.

Results

There were 2,000 deliveries conducted in the study period. Out of these, 100 (5.56%) were diagnosed cases of pregnancy-related hypertensive disorders, which were included in the study. The mean age of participants was 23 ± 5 years. Mean systolic pressure was 160.95 ± 13.86 mmHg, mean diastolic pressure was 103.68 ± 6.291 mmHg, and mean gestational age was 35.95 ± 2.849 weeks. The frequency of various hypertensive disorders in our sample is shown in Figure [5].All of these women were observed for the development of any complication. There were no complications in 38 (33.9%) women. Among the women who developed one or more complications during or after delivery, postpartum hemorrhage (PPH) was the most frequent (31/112; 27.6%). Most of the women with PPH were either preeclamptic or eclamptic. After PPH, placental abruption was the second most frequent maternal complication (19/112; 16.9%). Most of the women who developed placental abruption had PIH. All details of maternal complications are shown in Table Table3.2.

(Table 3.2)

Trends of maternal complications

ARDS, acute respiratory distress syndrome; ARF, acute renal failure; CVA, cerebrovascular accident; DIC, disseminated intravascular coagulation; HELLP, hemolysis elevated liver enzymes low platelets; HTN, hypertension; P. edema, pulmonary edema; PIH, pregnancy-induced hypertension; PPH, postpartum hemorrhage; PRES, posterior reversible encephalopathy syndrome.

Pregnancy-related HTN disorders (N=100)	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications	Maternal Complications
	Placental abruption	DIC	PPH	ARF	ARDS	PRES	P. edema	CVA	No complication
PIH(n=22; 23.2%)	9 (47.3 %)	0	9(29 %)	0	0	0	2(28.5 %)	0	6(15. 8%)
PREECLAMPSIA (n=25, 25%)	6(31.6 %)	2(40 %)	9(29 %)	2(28.5 %)	2(50 %)	0	1(14.3 %)	0	6(15. 8%)
Eclam	3	0	11	3	1	2(100	4	3	21

psia (n=43; 42.8%)	(15.8 %)		(35.5 %)	(42.8 %)	(25%)	%)	(57.2 %)	(100%)	(55.3 %)
HELLP (n=2; 1.8%)	0	2(40 %)	0	1 (14.3 %)	1 (25%)	0	0	0	0
Chronic HTN (n=5; 4.5%)	0	0	0	0	0	0	0	0	5 (13.2 %)
Chronic HTN superimposed (n=3; 2.7%	1 (5.2%)	2 (6.5%)	1 (14.3 %)	0	0	0	0	0	0
Total (N=100; 100%)	19 (100 %)	5 (100 %)	31 (100 %	7 (100 %)	4 (100 %)	2 (100 %)	7 (100 %)	3 (100%)	38 (100 %)

When the neonatal outcome was evaluated, 11 intrauterine deaths, four stillbirths, and two neonatal deaths were observed. There were no multiple pregnancies in the study sample. When the remaining 95 alive newborns were examined, 44 were alert and healthy with no immediate neonatal complication. Among the remaining 51 newborns with complications, 14 babies were

diagnosed with meconium aspiration syndrome, 12 were preterm, 10 had low birth weight (LBW), 10 had intrauterine growth restriction (IUGR), and five were diagnosed with respiratory distress syndrome (RDS). No complications were seen in the babies of mothers with chronic HTN and chronic HTN superimposed. All details of neonatal outcomes are shown in Table Table3.3.

(Table 3.3)

Trends of neonatal complications

HELLP, hemolysis elevated liver enzymes low platelets; HTN, hypertension; IUD, intrauterine death; IUGR, intrauterine growth restriction; LBW, low birth weight; NND, neonatal death; PIH, pregnancy-induced hypertension; RDS, respiratory distress syndrome.

Pregnancy-related HTN disorders (N=100)	Neonatal Complications IUGR	Neonatal Complications Preterm	Neonatal Complications RDS	Neonatal Complications Meconium aspiration	Neonatal Complications IUD	Neonatal Complications Stillbirth	Neonatal Complications LBW	Neonatal Complications NND	Neonatal Complications No complication
PIH (n=22; 23.2%)	1 (10%)	0	1 (20%)	4 (28.5%)	3 (27.3%)	0	3 (30%)	2 (100%)	12 (27.3%)
Preeclampsia (n=25; 25%)	1 (10%)	3 (25%)	3 (60%)	3 (21.4%)	2 (18.2%)	0	5 (50%)	0	11 (25%)

Eclampsia (n=43; 42.8%)	8 (80%)	8 (66.7%)	1 (20%)	7 (50%)	5 (45.5%)	4 (100%)	2 (20%)	0	13 (29.5%)
HELLP (n=2; 1.7%)	0	1 (8.3%)	0	0	1 (9%)	0	0	0	0
Chronic HTN (n=5; 4.5%)	0	0	0	0	0	0	0	0	5 (11.4%)
Chronic HTN superimposed (n=3; 2.7%)	0	0	0	0	0	0	0	0	3 (6.8%)
Total (N=100; 100%)	10 (100%)	12 (100%)	5 (100%)	14 (100%)	11 (100%)	4 (100%)	10 (100%)	2 (100%)	44 (100%)

Pregnancy-related disorder (eclampsia) was responsible for one-third of maternal deaths in women admitted for delivery in a tertiary care hospital. In this study, 5.56% of pregnant women were diagnosed with pregnancy-related hypertensive disorders; the major contributors were eclampsia (43.24%) and

preeclampsia (25.23%). A report published by the American Journal of Obstetrics and Gynecology stated that 4% to 6% of pregnancies are complicated by hypertensive disorders. Another study indicated that the incidence of pregnancy-related hypertensive disorders may be as high as up to 22%. Various reasons have been identified for the high prevalence of eclampsia and preeclampsia in the local literature, including lack of education, awareness, resources, and superstitious beliefs regarding seeking medical aid. Another major challenge is a delay in diagnosis and recognition of preeclampsia and eclampsia, which accounts for high maternal complications as well as mortality, which is otherwise preventable.

Preeclampsia and eclampsia are the major causes of high morbidity and mortality for both mother and baby, particularly in developing countries. Placental abruption and PPH were the most common maternal complications in pregnant women with preeclampsia and eclampsia in this study. Other complications experienced were disseminated intravascular coagulation, acute renal failure, acute RDS, posterior reversible encephalopathy syndrome, and pulmonary edema. This result was comparable to the results of studies conducted in India, which also reported placental abruption as a major concern. Pregnancy-related hypertensive disorders are not only a concern for maternal health but also fetal health. The most common neonatal complication seen in preeclampsia in this study was LBW. In his study, Xiong et al. found a positive association not only between LBW and preeclampsia but also between gestational age and preeclampsia. The most common fetal complications in pregnant women with eclampsia in this study were IUGR and preterm birth. A study also identified eclampsia as a risk factor for preterm birth. In this study, there were four stillbirths, all in eclamptic women.

The incidence of hypertensive disorders of pregnancy is 5.56% hospital. The most prevalent hypertensive disorders were preeclampsia and eclampsia. The most common associated maternal complications were placental abruption and PPH. The most common associated fetal complications were meconium aspiration syndrome, followed by preterm birth, IUGR, and LBW. Efforts should be made to reduce the risk factors responsible for the high incidence of preeclampsia and eclampsia at the grass-roots level. Awareness and resources should be made available at all levels to reduce the maternal and fetal complications associated with hypertensive disorders of pregnancy. Programs should be introduced to raise awareness at the community level, and health

facilities should be well equipped to make early detection and manage preeclampsia and other hypertensive disorders adequately.

Pregnancy-related hypertensive disorders are common and adversely impact maternal and fetal outcomes. Efforts should be made at both the community and hospital levels to increase awareness regarding hypertensive disorder of pregnancy and reduce its associated morbidity and mortality.

3.3. Recommendations for improving the quality of life of pregnant women with hypertension

Treatment recommendation for hypertension in pregnancy is of high importance and widely considered. Although patients with hypertension have relatively good outcomes, difficulty in differentiating various hypertensive conditions, inability to predict which patients are at highest risk, and variability in the progression of preeclampsia and possibly eclampsia make these disorders the greatest challenge of clinical medicine in obstetrics. In this study, the majority of pregnant women diagnosed with different hypertensive disorders of pregnancy within both groups A and B were at a GA between 25 and 37 weeks (84% vs. 88%, respectively). Our results were in agreement with previous studies, which reported that in pregnancy, a substantial change in BP is observed. In early pregnancy, a decrease in BP is observed followed by a steep rise in the latter half of pregnancy. There is also evidence that even women without preexisting hypertension or preeclampsia have an increased BP, where the maximum level is reached, which is associated with reduced fetal growth. In our study, despite no significant difference (P = 0.0870) was observed regarding the prevalence of GDM between patients of groups A and B (might be related to the small sample size), it is well known that coexisting gestational medical conditions, such as GDM, are associated with a high risk of other CV conditions such as preeclampsia in the second pregnancy. In this regard, the development of GDM or hyperglycemia during pregnancy represents a risk factor for future maternal complications and is linked to an increased risk of metabolic syndrome and adverse CV outcomes for the mother later in life. A retrospective study by Schneider et al. found that preeclampsia increased among women with GDM (adjusted odds ratio, 1.29, 95% confidence interval, 1.19–1.41).In clinical practice settings, methyldopa and labetalol are appropriate first-line agents for managing and controlling hypertensive disorders of pregnancy. In this regard, methyldopa (250 mg) tablet was the principal antihypertensive medication recommended for pregnant women with hypertension within both groups of the

study. However, the frequency of daily dose intake of this medication varied between groups and was significantly used in low frequency (two vs. three times daily; P = 0.0001) among pregnant women with hypertension within group A compared to those within group B as shown in Table [3.1]. It could be concluded that the coadministration of antihypertensive medication (methyldopa) with low-dose aspirin (75 mg/day) has a synergistic beneficial effect in further lowering and controlling BP as well as impending pregnant women with hypertension to be in a more progressive phase (preeclampsia). In this study, the impact and response to this combination was manifested as a noticeable lowering of SBP and DBP for pregnant women within group A compared to those within group B (though it was an insignificant difference). Previous reviews and clinical trials suggested that low-dose aspirin lowers BP and could effectively be used for preventing hypertension and other CV events in patients with and without hypertension Similar results were obtained in another study by Hermida et al. who found that BP was significantly lowered when low-dose aspirin (100 mg/day) was administered to pregnant women who are at higher risk for GH or preeclampsia. In this study, the beneficial therapeutic effects of daily low-dose aspirin administration were observed in the form of a significant low incidence of preeclampsia (24%) within group A compared to group B (60%; P = 0.0001) [Table 3. 1]. The aforementioned result was also associated with significantly low incidence of proteinuria within group A compared to group B (24% vs. 60%; P = 0.0001, respectively). Moreover, all pregnant women within group A were safe from the incidence of eclampsia in comparison to those within group B, which was attributed to the beneficial effect of coadministration of low-dose aspirin with antihypertensive medication as shown in Table[3.1] Although the exact underlying cause of preeclampsia remains to be fully elucidated, literature reported that abnormalities involving angiogenesis, oxidative stress, and inflammation are implicated in which platelet TXA2/PGI2 imbalance is presented from 13 weeks of gestation in high-risk patients. TXA2 increases significantly, whereas prostacyclin (PGI2) drops sharply. This imbalance can be reversed by 2 weeks of daily low-dose aspirin therapy, which inhibits TXA2 secretion, and thus platelet aggregation, without altering secretion of endothelial prostacyclin (PGI2).Until recently, numerous clinical trials for the primary and secondary prevention of preeclampsia, using different supplements and medications, including calcium, or the antioxidants (vitamins C and E), have failed. Provided that there is no contraindication, guidelines suggest that women at high-to-moderate risk to hypertensive

pregnancy disorders (such as chronic hypertension, DM, first pregnancy, family history of preeclampsia, and multiple pregnancy) may be advised to take daily aspirin (75 mg) administered from 12 weeks until the term. Bujold et al. reported that administration of daily low-dose aspirin initiated at ≤16 weeks of gestation significantly decreases the risk of preeclampsia and other adverse maternal and neonatal outcomes.

CHAPTER 4. THE NURSING ROLE IN PATIENT EDUCATION, MONITORING, PREVENTION HYPERTENSION IN PREGNANCY

4.1. Patient Education. Monitoring. Prevention

Monitoring

Expectant mother monitoring her blood pressure at home

It is important to teach women how to monitor their BP at home and identify any signs or symptoms of complications. By monitoring their BP at home, women can actively participate in their care and identify potential concerns in a timely manner. Home-based monitoring also eliminates any possible BP elevations due to white-coat syndrome in the practice setting. According to Braunthal & Brateanu [4]studies have found that home monitoring decreases the number of outpatient visits. It is important that the home BP monitor is validated by the provider's office.

Education

Pregnant woman receiving educational information from her provider. For a woman to receive proper treatment and prevent poor outcomes, she needs to know when and where to seek care. To better understand this, she must know the signs and symptoms of preeclampsia. According to the California Maternal Quality Care Collaborative [6,19,42], studies show that women who have signs and symptoms of preeclampsia and seek care promptly have fewer adverse outcomes [6,19,42]. Many women have little understanding of preeclampsia, and women with low literacy levels in poor socioeconomic conditions have even less of an understanding. It is important to provide educational materials that these patients can understand. This may include handouts with pictures. Women of low socioeconomic status are vulnerable to preeclampsia. They are less likely to receive prenatal care. Long working hours and physical exertion can increase stress and risk for these women. These women may also have problems getting transportation to appointments. According to Kim et al [11,24,38], women with higher education are likely to have more antenatal visits than their less-educated counterparts. It is a national problem that needs to be addressed. All women need access to prenatal care, including access to transportation. It is also important to teach women how to improve lifestyle factors that influence overall health and wellbeing, such as working less, eating healthy, and exercising. The nurse must teach women why it is so important to keep her appointments and practice healthy lifestyle habits during pregnancy.

Women without any hypertensive disorders during pregnancy or labor should also receive education about postpartum preeclampsia. Any woman without a history of preeclampsia can develop it in the postpartum period. Women who had postpartum preeclampsia with a prior delivery have an increased risk of developing it again. Women who had preeclampsia should monitor their BPs after discharge and should follow up with their provider within 1 week if they are on medication or within 2 weeks if they are on no medication for hypertension. Some healthcare systems have developed programs that allow the woman to text her BPs for monitoring once discharged. More of these programs are likely to exist in the future. It is also important that women also receive education about future risks. Women who had preeclampsia previously may develop it again with another pregnancy and could develop future complications, such as cardiovascular disease or hypertension. It is essential that these women know that they should seek medical care from a primary provider. Many times, young women giving birth do not have primary providers, but should now choose one. They should also maintain a healthy lifestyle by eating a healthy diet and getting regular exercise. Nurses caring for these women must educate on possible future outcomes. General Education: educate about patient and fetal diagnosis and treatment; explain the importance of good prenatal care for mother and baby; discuss continued adequate nutrition and a low sodium diet; explain the need to control preexisting hypertension; discuss signs and symptoms of preeclampsia and eclampsia, such as: epigastric pain; headache; pregnant woman experiencing a headache; vision changes; discuss early recognition and prompt treatment of preeclampsia; discuss the likelihood of premature birth if BP cannot be controlled. Prevention: control hypertension before becoming pregnant; high-risk individuals should have strict dietary measures of low sodium, supplemental magnesium, and low-fat meals.

4.2.Discharge Instructions While Pregnant and After Delivery

Discharge Instructions While Pregnant: educate patients in care of the premature infant; give explicit instructions on what to do if BP elevates and when to call 911; refer the patient for professional counseling if the potential for fetal demise exists; instruct patients to return to the obstetrician frequently for follow-up visits, as scheduled; women on bed rest at home need to get assistance and remain off their feet as directed by their physician.

Discharge Instructions After Delivery

Instructions for ALL women discharged after delivery should be standardized. The nurse should focus on conditions specific to the woman, but also review all of the discharge instructions. It is important that patients understand that they do not need all the risk factors to seek attention. Include significant others or family in the education if possible. The Association of Women's Health, Obstetric, and Neonatal Nurses [3]has developed instructions that can be given to all postpartum discharged women. These are called POST BIRTH instructions and include instructions to [3,19,38]:Call 911 if they have: pain in chest; obstructed breathing or shortness of breath; seizures; thoughts of harming self or baby. Call the healthcare provider if they have:-bleeding, soaking through one pad per hour, or passing clot larger than the size of an egg; an incision that is not healing ;a red or swollen leg that is warm or painful to touch; a temperature of 100.4°F or higher; a headache that does not get better after taking medication or bad headache with vision changes; other instructions important for women to know are to call their provider if they: have belly pain, especially in the upper area below the ribs; see spots or flashing lights; have blurry or double vision; have swelling that gets worse; gain more than 3 pounds within 3 days; have any new or unusual symptoms; have any concerns or questions. The above items are important for all women. EDs and urgent care facilities should receive education about postpartum preeclampsia. It is possible that they are not aware or that they make the woman wait in the waiting room for an extended time when she should be receiving timely treatment.

Thus, we conclude from the fourth chapter. In this chapter, we reviewed :nursing role in patient education, monitoring, discharge instructions while pregnant and after delivery, prevention of hypertension in pregnancy. Collaboration and communication can help to improve outcomes. Teamwork, Collaboration, and Communication. Collaboration is an important part of the care for women with hypertensive disorders. Besides the obstetrician and primary nurse, many other team members need to be aware of women who are admitted to the hospital. The charge nurse and the in-house obstetrician (if there is one) should be aware of the patient and their plan of care and should be notified of a change in status. The neonatologist and the neonatal intensive care unit should also be prepared for a possible preterm neonate or sick neonate. Anesthesia should also be involved in the plan of care for this patient. They may need to administer medications or place a central line for monitoring.

Intensivists in the critical care unit may also be part of the care of these women during labor and delivery. Teamwork and communication are essential to obstetric quality and safety. Communication and teamwork are linked to improved perinatal outcomes. Fostering an environment where there is staff empowerment to speak up when they observe a lack of protocol compliance or other problems is essential in reducing or eliminating complications.

According to the [6,19,47], effective communication, teamwork, and shared decision-making are fundamentals of quality patient care. Effective, reliable teams are often focused on the potential for failure. These team members constantly monitor and crosscheck each other as well as the clinical processes performed to identify potential problems. All staff, patients, and family members should speak up regarding their concerns until a resolution is determined and agreed on by all [6,19,47]. They should also listen and respond in a supportive manner regardless of their own agreement. This can be difficult for an organization to accomplish. All members of the team must be willing to listen and work together. Conflict can be handled by[6,19,47]:addressing it immediately rather than letting concerns fester; taking the time to carefully listen to concerns; being willing to own part of the problem by setting aside assumptions. If concerns are not addressed, then the chain of command must be initiated to address the concern. One way to prevent conflict is to standardize protocols for selecting and administering medication, assessing risk, and the parameters for monitoring the patient and notifying the primary provider.

When standardized protocols are used, there is no room for error or disagreement.

Standardized protocols should be used in all inpatient settings where possible. Differences in communication styles can be managed by team training, standardized hand-off (SBAR), rounds, and huddles. Unresolved concerns can be managed by asking for plans, restating concerns, and developing clear lines for problem resolution (e.g., MFM consult, etc.). Different opinions of treatments, the meaning of signs and symptoms, or complicated fetal heart tracings can be prevented by using standardized policies, protocols, and assessments. Collaboration with other providers and nurses can also help to determine the best care for the patient. Disruptive behavior can be handled by peers standing up to unprofessional behavior, hospital administration addressing issues, and an anonymous reporting system. Simulation drills are important to improve outcomes for high-risk, low-frequency complications, such as eclampsia. Drills can improve outcomes when a debrief is done after the drill.

Inter-professional team training during simulation allows for (CMQCC, n.d.):testing of new procedures and policies; demonstrating skills in a realistic environment; identifying systems issues and testing new systems; continuing to learn and share techniques that can improve communication and treatment team coordination; drills are a great way to practice complicated cases to see where the weaknesses are. Hypertensive disorders are complicated and require close monitoring by the patient and the healthcare team. Nurses must ensure that the patient receives all the education that she needs and understands the importance of caring for herself. The patient must also be taught when to call for help. Education must be specific for the woman's condition and must be thorough. It must also cover preeclampsia for all women, because of the risk of postpartum preeclampsia. Women in low socioeconomic conditions or with low literacy levels need education that is tailored for them and that they can understand. Collaboration is necessary for these women once they are in the hospital. All team members should be involved in planning care. Teamwork and communication are essential to obstetrics, especially to a high-risk pregnancy, such as preeclampsia. A culture of open communication, teamwork, and collaboration is essential. Hypertensive disorders are complicated. They can cause serious complications for a woman and her fetus.

They require multidisciplinary care with a collaborative approach and thorough nursing assessments. Sometimes the patient's condition can deteriorate rapidly, presenting a medical emergency. It is important for all nurses caring for pregnant and postpartum women to know what hypertensive disorders are and how to treat them.

CONCLUSIONS

1.The study identifies etiology, epidemiology, risk factors, causes, diagnosis, complications, types of hypertension disorder in pregnancy.

Hypertension in pregnancy is becoming more common and presents a significant risk to the mother and fetus. It is important to understand how to diagnose hypertensive disorders based on elevated BP, as well as any associated symptoms that may be present. It is important to know the types of hypertension and how they are diagnosed. Chronic hypertension, eclampsia, gestational hypertension, HELLP syndrome, and postpartum preeclampsia are easily defined. Preeclampsia with or without severe features is more complicated to define. Many risk factors increase a woman's chance of developing hypertension, although not all women with hypertension have risk factors. It is important for nurses to recognize hypertension in pregnancy. There are many complications from hypertension for the woman and fetus, including increased maternal morbidity and mortality, fetal growth restriction, or even death. Close monitoring and frequent assessment of the woman and her fetus, and timely management of hypertension is essential to prevent poor outcomes.

2.We have defined and studied the assessment and management hypertensive disorder in pregnancy. Nursing assessments are an essential part of the care of pregnant women with hypertension. Nurses know their patients well and spend a good amount of time with them. The nurse must use their assessment skills and critical thinking skills. A woman with hypertension is at risk for morbidity and mortality for herself and her fetus. Treatments for hypertension are specific to the woman's health status and can change quickly if the woman deteriorates. Nurses must be aware of the types of medications and non-pharmacologic interventions that can be used to treat hypertension. The nurse should also be aware of when to call a provider. Quick, effective treatments can prevent poor outcomes. Collaboration and communication can help to improve outcomes. Teamwork, Collaboration, and Communication. Collaboration is an important part of the care for women with hypertensive disorders. Besides the obstetrician and primary nurse, many other team members need to be aware of women who are admitted to the hospital. The charge nurse and the in-house obstetrician (if there is one) should be aware of the patient and their plan of care and should be notified of a change in status. The neonatologist and the neonatal intensive care

unit should also be prepared for a possible preterm neonate or sick neonate. Anesthesia should also be involved in the plan of care for this patient. They may need to administer medications or place a central line for monitoring. Intensivists in the critical care unit may also be part of the care of these women during labor and delivery. Teamwork and communication are essential to obstetric quality and safety. Communication and teamwork are linked to improved perinatal outcomes. Fostering an environment where there is staff empowerment to speak up when they observe a lack of protocol compliance or other problems is essential in reducing or eliminating complications. According to the [6,9,33,47], effective communication, teamwork, and shared decision-making are fundamentals of quality patient care. Effective, reliable teams are often focused on the potential for failure. These team members constantly monitor and crosscheck each other as well as the clinical processes performed to identify potential problems. All staff, patients, and family members should speak up regarding their concerns until a resolution is determined and agreed on by all [6,9,33,47]. They should also listen and respond in a supportive manner regardless of their own agreement. This can be difficult for an organization to accomplish. All members of the team must be willing to listen and work together. Conflict can be handled by[6,9,33,47]:addressing it immediately rather than letting concerns fester; taking the time to carefully listen to concerns.

Being willing to own part of the problem by setting aside assumptions

If concerns are not addressed, then the chain of command must be initiated to address the concern.

3.The investigator has defined the specific aspects of diagnosis and screening for hypertensive disorder in pregnancy. One way to prevent conflict is to standardize protocols for selecting and administering medication, assessing risk, and the parameters for monitoring the patient and notifying the primary provider. When standardized protocols are used, there is no room for error or disagreement. Standardized protocols should be used in all inpatient settings where possible. There are some important ways to handle or prevent sources of conflict in the hospital setting. Differences in communication styles can be managed by team training, standardized hand-off (SBAR), rounds, and huddles. Unresolved concerns can be managed by asking for plans, restating concerns, and developing clear lines for problem resolution (e.g., MFM consult, etc.). Different opinions of treatments, the meaning of signs and symptoms, or complicated fetal heart tracings can be prevented by using standardized policies, protocols, and assessments. Collaboration with other providers and nurses can

also help to determine the best care for the patient. Disruptive behavior can be handled by peers standing up to unprofessional behavior, hospital administration addressing issues, and an anonymous reporting system. Simulation drills are important to improve outcomes for high-risk, low-frequency complications, such as eclampsia. Drills can improve outcomes when a debrief is done after the drill. Inter-professional team training during simulation allows for (CMQCC, n.d.):testing of new procedures and policies; demonstrating skills in a realistic environment; identifying systems issues and testing new systems. Continuing to learn and share techniques that can improve communication and treatment team coordination. Drills are a great way to practice complicated cases to see where the weaknesses are. Hypertension in pregnancy is a common complication of pregnancy and one associated with significant maternal and fetal morbidity and mortality. The central issue in the management of hypertension in pregnancy is achieving a balance between the maternal benefits derived from improved BP control, and the fetal risks resulting from intrauterine medication toxicity and possible uteroplacental hypoperfusion. For the severe forms of hypertensive pregnancy disorders, including eclampsia, severe preeclampsia and HELLP syndrome, delivery remains the standard of care. Women with mild preeclampsia prior to 32 weeks' gestation may be candidates for expectant management, but after 37 weeks, current evidence supports induction of labor to prevent adverse maternal and fetal outcomes. Women with chronic hypertension should undergo a pre-pregnancy evaluation, with a focus on end-organ damage, medication profile, potential secondary causes of hypertension, and counseling on the risks of pregnancy, including the development of superimposed preeclampsia. Women must be followed carefully during pregnancy and in the intra- and post-partum settings. There is ongoing research focusing on the appropriate management of hypertension in pregnancy and the long-term consequences for the mother that may influence future recommendations in this field.

4.The study has investigated monitoring, non-pharmacological and pharmacological treatments hypertensive disorders in pregnancy. Treatment strategies fall into two general categories – the management of acute hypertensive syndromes of pregnancy, such as preeclampsia/eclampsia, and the management of chronic hypertension. While the definitive treatment for acute hypertensive syndromes of pregnancy is delivery, expectant management with close observation may be appropriate in carefully selected patients, especially before 32 weeks' gestation. Women with chronic hypertension should ideally be

evaluated prior to pregnancy, with a focus on the presence of end-organ damage, evidence of secondary causes of hypertension (such as renal artery stenosis due to fibromuscular dysplasia, primary hyperaldosteronism and pheochromocytoma), medication adjustments, and counseling regarding the risks of preeclampsia and adverse fetal events. Women with hypertensive pregnancy disorders should have a comprehensive plan of care, which includes prenatal counseling, frequent visits during pregnancy, timely delivery, appropriate intrapartum monitoring and care, and postpartum follow up. Care of these patients involves counseling at every step of the pregnancy to ensure that the woman is aware of the risks to her and her fetus such that she can make informed decisions. In cases of non-severe hypertension, the most commonly recommended first-line agents are methyldopa, labetalol, and nifedipine. Despite the differences in guidelines, there appears to be consensus that severe hypertension and non-severe hypertension with evidence of end-organ damage need to be controlled; yet the ideal target ranges below 160/110 mmHg remain a source of debate. Intravenous hydralazine, immediate release nifedipine, and intravenous labetalol remain the drugs of choice for severe hypertension. Oral extended release nifedipine, oral labetalol, and methyldopa are the generally accepted first-line agents for non-severe hypertension. Beta-blockers and diuretics are acceptable, while RAAS inhibitors remain contraindicated.

5. The study has investigated the effectiveness of implementation of nursing care for pregnant women with hypertensive disorder. Hypertensive disorders are complicated and require close monitoring by the patient and the healthcare team. Nurses must ensure that the patient receives all the education that she needs and understands the importance of caring for herself. The patient must also be taught when to call for help. Education must be specific for the woman’s condition and must be thorough. It must also cover preeclampsia for all women, because of the risk of postpartum preeclampsia. Women in low socioeconomic conditions or with low literacy levels need education that is tailored for them and that they can understand. Collaboration is necessary for these women once they are in the hospital. All team members should be involved in planning care. Teamwork and communication are essential to obstetrics, especially to a high-risk pregnancy, such as preeclampsia. A culture of open communication, teamwork, and collaboration is essential. Hypertensive disorders are complicated. They can cause serious complications for a woman and her fetus. They require multidisciplinary care with a collaborative approach and thorough nursing assessments. Sometimes the patient’s condition can deteriorate rapidly,

presenting a medical emergency. It is important for all nurses caring for pregnant and postpartum women to know what hypertensive disorders are and how to treat them.

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