MATERNAL, PERINATAL OUTCOME AND ASSOCIATED FACTORS OF HYPERTENSIVE DISORDERS OF PREGNANCY IN JIMMA UNIVERSITY MEDICAL CENTER, SOUTH WEST ETHIOPIA

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AUGUST, 2019

JIMMA, ETHIOPIA

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Abstract

Background – Hypertensive disorders of pregnancy (HDP) is one of the most common obstetric complications that occurs during pregnancy. It occurs generally in about 5 – 10 % of pregnancy and it accounts for 10 – 15 % of maternal death worldwide. Maternal complications from HDP particularly from preeclampsia and eclampsia includes abruptio placenta, pulmonary edema, ARF, aspiration pneumonia, PPH and maternal death. It also accounts for perinatal mortality particularly from prematurity and associated complications.

Objective-The main objective of this study was to assess maternal and perinatal outcome of hypertensive disorders of pregnancy and associated factors at JUMC.

Method – Hospital based cross sectional study was conducted among mothers admitted to JUMC, from January 1/2019 to June 30/ 2019. The consecutive sampling technique was used to select study participants. Data were collected using a structured questionnaire from both interview of respondents and the respondents' records. Multiple logistic regressions was used to identify independent predictors that showed significant association with dependent variables. Finally statistically significant association was declared at p value < 0.05.

Result: From 1980 total admission to labor ward and maternity ward, 202(10.2%) mothers were diagnosed with HDP. Preeclampsia with severity feature was the most common presentation 121 (60 %) followed by eclampsia 23(10.4%). About one third (32 %) of the mother developed at least one maternal complication. HELLP syndrome was the most common complications (38.5) followed by aspiration pneumonia (20 %) and maternal death (2.4%). There was statistically significant association between place of residency being rural area, having eclampsia and unfavorable maternal outcome. Fifty (23.13 %) of the fetuses developed unfavorable perinatal outcome with at least one complication. There were 29 (14.4 %) still birth and 12 (5.5 %) ENND. Gestational age at delivery of 28 – 33 weeks, having eclampsia, and antepartum onset of HDP of the mother had statistically significant association with unfavorable perinatal outcome.

Conclusion and recommendation: The presence of preeclampsia with severity features and eclampsia has been associated with poor maternal and perinatal outcomes which were manifested by increased maternal ICU admissions, maternal death, preterm delivery rate still birth and ENND. JUMC should give due emphasis for early recognition and management of mothers with HDP.

Key words: hypertensive disorders of pregnancy, maternal outcome, perinatal outcome, JUMC

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ACRONYMS

ARF – Acute renal failure

BMI – Body mass index

BP – Blood pressure

CHP – Chronic hypertension

C/S – Cesarean section

DBP - Diastolic blood pressure

DIC –Disseminated intravascular coagulation

ENND –Early neonatal death

GCS – Glasgow coma scale

HELLP syndrome - Hemolysis , Elevated liver enzymes and Low Platellate count

HDP –Hypertensive disorders of pregnancy

ICH –Intracranial Hemorrhage

ICU – Intensive care unit

IUGR – Intrauterine growth restriction

JUMC – Jimma university medical center

NICU – Neonatal intensive care unit

NRFHRP – Non reassuring fetal heart rate pattern

PE – Pulmonary edema

PPH – Postpartum hemorrhage

PSCH – Preeclampsia superimposed on chronic hypertension

SBP – Systolic blood pressure

SGA – Small for gestational age

SGOT –Serum glutamic oxaloacetic transaminase

WHO – World health organization

CHAPTER ONE -INTRODUCTION

1.1 Background

The term hypertension in pregnancy is commonly used to describe a wide spectrum of patients who may have only mild elevations in blood pressure (BP) or severe hypertension with various organ dysfunctions. The manifestations in these patients may be clinically similar (e.g.,Hypertension ,Proteinuria) ; however, they may result from different underlying causes such as Chronic Hypertension, renal disease.

Hypertensive disorders are the most common medical disorders encountered during pregnancy, occurring in approximately 5 to 10% of all pregnancies (1). They are associated with significant maternal and perinatal morbidity and mortality . and have a wide spectrum of presentation, ranging from minimal elevation of blood pressure to severe hypertension with multiple organ dysfunctions. Among the hypertensive disorders, the pre-eclampsia syndrome, either alone or superimposed on chronic hypertension is the most dangerous. Eclampsia is the convulsive form of preclampsia and affects 0.1% of all the pregnancies (2). New onset non proteinuric hypertension during pregnancy, termed gestational hypertension, followed by signs and symptoms of preclampsia almost half the time.
Women who develop preclampsia in pregnancy are at greater risk of cardiovascular and cerebrovascular events even years after their pregnancies . Hypertension complicating pregnancy is a major cause of preterm births resulting in perinatal deaths of fetuses.. Hypertensive disorders of pregnancy is among the third common causes of PNMR in Ethioipia (2). In low income and middle income countries, preclampsia and eclampsia are associated with 10-15% of direct maternal deaths. WHO estimates the incidence of preeclampsia to be seven times higher in developing countries (2.8% of live births) than in developed countries (0.4%) (3). Incidence of eclampsia in developing nations varies widely, ranging from 1 case per 100 pregnancies to 1 case per 3448 pregnancies. For patients obtaining prenatal care, the incidence is about 1 in 800 patients (3). The incidence of maternal mortality due to HDP is estimated at 20-33% (4) .

Preeclampsia is a multisystem disorder of unknown etiology, unique to pregnancy (4, 7). Preeclampsia can present as HELLP syndrome (hemolysis, elevated liver enzymes and low

platelet count) or eclampsia that is occurrence of convulsions that cannot be attributed to other etiologic factors. Eclampsia is reported to be associated with a maternal mortality rate of 0.5 – 10% usually requiring high quality intensive care (8). Additionally, preeclampsia predisposes toward potentially lethal complications involving placental abruption, disseminated intravascular coagulation, intracranial hemorrhage, hepatic failure, acute renal failure and cardiovascular collapse. Intrauterine fetal growth restriction (IUGR), intrauterine fetal demise and prematurity appear to be the other related obstetric problems (9). All these clinical situations mandate prompt diagnosis and aggressive management in order to reverse adverse maternal and perinatal outcome.

Risk factors associated with preeclampsia include chronic hypertension, multifetal gestation, maternal age over 35 years, obesity, and African American ethnicity (10, 11). According to the report of the National Center for Health Statistics hypertension complicates around 3.7% of pregnancies in the USA and 16% of pregnancy related deaths from 2008 - 2012 were from complications of pregnancy related hypertension. Black women were 3 times at increased risk to die from preeclampsia as white women (12). Hypertensive disorder of pregnancy is the commonest medical complication of pregnancy. The incidence varies in different populations and is also affected by the definition used. Generally the problem is more common in the developing countries than it is in the developed countries. Several studies have shown that nulliparity, extreme ages, race (being black) and others as risk factors for this problem. There is a significant risk of both maternal and perinatal morbidity and mortality in pregnancies affected by the disorder. The complications are more common and worse in the underdeveloped countries; poor pregnancy outcomes are also associated with lack of ANC follow up which is associated with delayed recognition and intervention in the affected mothers (12-16).

The reported incidence of hypertensive disorders of pregnancy in India was 5.38% while preeclampsia, eclampsia and HEELP syndrome accounted for 44%, 40% and 7%, respectively. The rate of maternal mortality was 5.55% and perinatal deaths occurred in 37.5% of the deliveries (12). According to a population based study in South Africa the incidence of hypertensive disorders of pregnancy (HDP) was 12%. Other hospital based studies showed the HDP was the commonest cause of maternal death which contributed for 20.7% of maternal deaths in the country (13). Studies in Ethiopia show that the incidence of HDP is around 8.5% of which majority were due to severe preeclampsia; according to one study eclampsia complicates

0.7% of the pregnancies. These disorders are major causes of maternal and perinatal morbidities and mortalities (14-16).

Hypertensive disorders of pregnancy seem to be one of the major causes of maternal morbidity and mortality leading to 10-15% of maternal deaths specially in developing world. World Health Organization estimates that at least one woman dies every seven minutes from complications of hypertensive disorders of pregnancy. In Ethiopia it is one of the top four causes of maternal mortality accounting for 19%(12) Pregnancies complicated with hypertensive disorders are associated with increased risk of adverse fetal, neonatal and maternal outcome including preterm birth, Intrauterine Growth Retardation (IUGR) and Perinatal death.

The high perinatal mortality in women with HDP is mainly due to premature delivery and growth restriction (17,18). A secondary analysis from the World Health Organization (WHO) multicountry survey has shown that there were about 3- and 5-fold increased risk of perinatal death in women with preeclampsia and eclampsia, respectively, as compared to women with no preeclampsia/eclampsia (19). Specifically, the perinatal mortality in women with hypertensive disorders was reported as 230/1000 births from Pakistan (6), 144/1000 births from Turkey (7), 165/1000 births from Addis Ababa (13), and 317/1000 births from Jimma/Ethiopia (5). Another study, which included only eclamptic mothers, also showed the high perinatal mortality (10).

1.2 Statement of the problem

Hypertension is defined as systolic blood pressure ≥ 140 and diastolic blood pressure ≥ 90 measured at least two times four to six hours apart. It should be measured at heart level either on the left lateral or sitting position after resting for thirty minutes. Proteinuria is defined as more than or equal to + 1protein on dipstick or ≥ 300 mg of protein per 24 hour (1) .

There are five major hypertensive disorders related to pregnancy : preeclampsia, eclampsia, chronic hypertension, preeclampsia superimposed on chronic hypertension and gestational hypertention. Preeclampsia refers to the new onset of hypertension and proteinuria or hypertension and significant end-organ dysfunction with or without proteinuria after 20 weeks of gestation in a previously normotensive woman. Eclampsia refers to the development of grand mal seizures in a woman with preeclampsia in the absence of other neurologic conditions that could account for the seizure. Chronic hypertension is defined as hypertension that antecedes pregnancy or is present on at least two occasions before the 20 weeks of gestation or persists longer than 12 weeks postpartum. Gestational hypertension refers to hypertension without proteinuria that develops after 20 weeks and resolves 12 weeks postpartum (2).

Hypertensive disorders of pregnancy occurs in 5 – 10 % of pregnancy. It is one of the three most common cause of maternal mortality world wide accounting for 10-15% (2) In Ethiopia hypertensive disorders of pregnancy (mainly from preeclampsia and eclampsia) is the third most common cause of maternal mortality accounting for 19 % (2). In JUMC about 20% of maternal death was due to HDD (3). It also accounts for the major cause for maternal near miss. For every one maternal death 20-30 mothers suffer from severe maternal morbidity (3).

The incidence of pregnancy induced hypertension (especially preeclampsia and eclampsia) and the total number of death from the same have come down dramatically in developing countries which is attributed to improvement in prenatal care and management. However in developing countries, it still stands as one of the major complications of pregnancy. Maternal complications includes abruption placenta, pulmonary edema, ARF, aspiration pneumonia, PPH and maternal death (4).

Hypertensive disorders in pregnancy (HDP) remain a major global health issue not only because of the associated high adverse maternal outcomes but there is a close accompaniment of significant perinatal morbidity and mortality (5).

Perinatal mortality rate is a major marker to assess the quality of health care delivery. Perinatal mortality vary widely and it is below 10 for certain developed countries but more than 10 times in developing countries. It is highest in sub-Saharan Africa (5). In Ethiopia, it ranges from 40 to 90 per 1000 total birth in the past decade (34). Hypertensive disorders of pregnancy is among the third common causes of PNMR in Ethiopia (36)

Although most obstetricians worry more about the risk of maternal death in women whose pregnancies are complicated by hypertensive disorders, the risk of perinatal death is more daunting. For instance, the risk of maternal death is less than 1% in severe preeclampsia and whereas that of perinatal death is about 13%. The situation is even worse in eclampsia where the risks of maternal and perinatal deaths occur in about 5% and 28% respectively (4). The other side of the coin is the occurrence of serious short and long term complications in the surviving newborns such as the risk of neuro-developmental deficits especially in poorly resourced countries (6). Generally, there is disproportionately high neonatal mortality in Sub-Saharan Africa and most of these occur during the first 4 weeks of life. It is estimated that for every early neonatal death there is another baby that is born dead (stillbirth) and HDP account for most of these perinatal losses especially in low resource settings (5). The adverse perinatal outcomes associated with hypertensive disorders are generally referable to placental insufficiency, placental abruption and prematurity related complications (5, 6). Adverse perinatal outcomes due to HDP or maternal hypertension are generally most severe in severe preeclampsia/eclampsia and are usually dependent on the gestational age at delivery as well as the severity of the disease process.

The severity of perinatal outcome is inversely proportional to gestational age. Prematurity, IUGR, stillbirth, perinatal asphyxia are common causes of perinatal mortality. There was no study done on perinatal and maternal outcome of hypertensive disorders of pregnancy in the past 7 years in JUMC. So this study will be important to determine the maternal and perinatal outcome of hypertensive disorders of pregnancy and associated factors so as to take intervention on the area based on the result of the study.

1.3 Significance of the study

Hypertension in pregnancy is a common complication of pregnancy and it is associated with significant maternal and fetal morbidity and mortality. Eventhough there are few studies conducted in Ethiopia on HDP to my knowledge there is no evidence on both fetal and maternal out come and associated factors in the study area. Most of the studies done in the country were retrospective. The results of this study is important to have broader and recent picture on the problem. It will help JUMC take action to improve care given in the area. In addition, the finding of this study will help as the cornerstone finding that creates insight among health care planners and administrators and as base line for further research. Further more, the finding will help Jimma Zone health bureau and Jimma town health facilities and other stakeholders like NGO interested working on fetomaternal health.

CHAPTER TWO -LITERATURE REVIEW

2.1. Hypertensive disorders of pregnancy

Hypertensive disorders of pregnancy is considered to be a major worldwide health problem causing an increased risk of perinatal and maternal morbidity and mortality. Many theories regarding its etiology have been suggested including abnormal placentation, immunologic phenomenon, coagulation abnormalities, angiogenesis factors or endothelial damage (1).

The prevalence of hypertensive disorder of pregnancy is different according to the geographic regions of the world and ranges from 1.5% in Sweden to 7.5% in Brazil (2). In India the prevalence of HDP has been reported to be 6-8% (3). These differences can be due to racial reasons, socioeconomic status and some other demographic parameters such as age and parity. Moreover, some centers serve as a referral medical facility for an extended number of primary health care units of the surrounding rural areas. From the study done at JUSH 7 years back the overall prevalence of hypertensive disorder of pregnancy was 8.5%. Severe preeclampsia accounted for 51.9 % of the cases followed by eclampsia (23.4 %),(4).

According to the latest version of classification system by the National High Blood Pressure Education Program (NHBPEP) Working Group, HDP was categorized into six subtypes, which include: gestational hypertension (GH), preeclampsia with severity feature, preeclampsia with out severity feature, eclampsia, preeclampsia superimposed on chronic hypertension (PSCH) and chronic hypertension (CHP) (4). GH is defined as a systolic blood pressure (SBP) of $\geq$ 140 mmHg and/or diastolic blood pressure (DBP) of $\geq$ 90 mmHg without proteinuria, which developed after 20 weeks of gestation and returned to normal within 12 weeks of postpartum. Mild preeclampsia is defined by the minimum criteria of blood pressure $\geq$ 140/90 mmHg after 20 weeks of gestation and proteinuria of $\geq$ 300 mg in a 24-hour urine specimen or 1+ in two random urine samples collected at least 4 hours apart. Severe preeclampsia is diagnosed if there are more severe elevations of blood pressure or evidence of other end-organ dysfunction. Preeclampsia is considered severe if one or more of the following criteria is present as follows (ACOG, 2013) (4): (1) systolic blood pressure (SBP) of $\geq$ 160 mmHg and/or diastolic blood pressure (DBP) of $\geq$ 110 mmHg; (2) Oliguria of less than 500 ml in 24 hours; (3) Cerebral or visual disturbances; (5) Pulmonary edema; (6) Epigastric or right upper-quadrant pain; (7) Impaired liver function;

(8) Thrombocytopenia (platelet counts < 100,000/mm3). Eclampsia is the occurrence of a seizure in women in association with preeclampsia, in the absence of any other cause for seizures. PSCH is defined as the new establishment of proteinuria of ≥ 300 mg in 24 h urine in women of chronic hypertension before 20 weeks of gestation but without proteinuria, or women of chronic hypertension with proteinuria before 20 weeks of gestation but appeared in urine protein or a sudden increase in blood pressure. CHP is defined as blood pressure of ≥ 140/90 mmHg before pregnancy or diagnosed prior to 20 weeks of gestation, or developed hypertension after 20 weeks of gestation and continued for 12 weeks of postpartum. It is very important to differentiate these 6 subtypes of HDP in determining prognosis and management (6).

The extreme ages of reproductive years are well-known risk factors for hypertension during pregnancy with high incidence rates in teenagers. Many authors have identified young age as a risk factor for hypertension during pregnancy (6) . However in another systematic review, it was observed that a maternal age over 40 years roughly doubles the risk of preeclampsia in both primiparous & multiparous women. Similar result found that age above 30 years was associated with a risk for preeclampsia superimposed on chronic hypertension (OR: 5.218; 95% CI: 1.873 to 14.536),(6). Nulliparity is widely reported as a risk factor for hypertensive disorders in pregnancy (7).

2.2. Maternal outcome of hypertensive disorders of pregnancy and associated factors

Hypertensive disorders of pregnancy are responsible for significant maternal and perinatal morbidity and mortality. Gestational hypertension and chronic hypertension cases may have superimposed pre eclampsia; mild preeclampsia may turn into severe pre eclampsia which may further get complicated by eclampsia. Moreover many other clinical conditions may mimic pre eclampsia. So it is always better to have a list of differential diagnosis with deadly acute fatty liver of pregnancy (AFLP), being one of them, in mind, whenever dealing with complicated HDP. WHO estimates that atleast one women dies every seven minutes from complications of hypertensive disorders of pregnancy. For every woman who dies, it is estimated that 20 others suffer severe morbidity or disability (8). The proportion of women surviving severe maternal complications (also called ‘near-miss’ cases) has been proposed as a useful gauge for the evaluation of the quality of maternal health care and its determinants, with the potential to complement the information obtained from the reviews of maternal deaths (9). Maternal near-

miss cases were eight times more frequent in women with pre-eclampsia, and increased to up to 60 times more frequent in women with eclampsia, when compared with women without these conditions(10).

Poor prognostic signs of eclampsia according to Edens criteria includes long interval between convulsion and start of treatment, ante partum eclampsia with long delivery interval, > 10 convulsions, coma between convulsions, fever (temperature > 38 ^{0}c), PR > 120, oliguria (UOP < 400ml/24 hrs), SBP > 2oommHg. The hazards of convulsions in pregnancy have been documented for centuries. Eclamptic convulsions become a life threatening emergency when further complicated by abruption placenta, pulmonary edema, intracerebral hemorrhage, ARF or retinal detachment. There were two maternal death due to intracerebral hemorrhage and one case of retinal detachment, 2.8% HELLP syndrome, 1.4% ARDS and 2.8% cases of ARF (11).

Another study conducted on maternal outcome of hypertensive disorders of pregnancy showed that only one maternal death, accounting for a case fatality rate of 0.5%. More than one third (35.5%) of the women developed complications. There was no maternal admission to ICU and 82 (41%) of the women had a prolonged hospital stay (>7 days). Low urine output and depressed deep tendon reflex were the most common symptoms of magnesium sulphate toxicity that was observed in 45 (22.5%) and 30 (15%) of the pregnant mothers respectively(17). The most common maternal complication according to this study was HELLP syndrome developed in 28 (14%) of the women, 25 (12.5%) of the women developed oliguria and 13 (6.5%), and 5 (2.5%) of the women also developed renal failure and IUGR respectively(12). Studies done at Addis Ababa governmental hospital shows of the 1,809 mothers with preclampsia /eclampsia, 36 % experienced at least one maternal complications . The main complications with HELLP (variant of preclampsia with hemolysis, elevated liver enzymes and low platelate count) syndrome , 257 (39.5) aspiration pneumonia 114 (17.5) , pulmonary edema 114 (17.5) , and abruption placenta , 100 (15.3 %), (13). A study in JUSH reported that HELLP syndrome was one of the most severe forms of the disorder affecting 8.9% of the mothers(4). A study done in china showed one of the common maternal complications was HELLP syndrome occurred in 10.1% of subjects (14) . Study in India showed 2% of the mothers developed HELLP syndrome.

It was found that GA was found to be independent predictors of complication. Accordingly, mothers with gestational age less than 37 weeks were 5.2 times more likely to develop

complication (AOR=5.22, 95% CI = 2.21-12.3),(15). From all the mothers 82 (41%) had a prolonged hospital stay. Most of the mothers who had a prolonged hospital stay developed preeclampsia in the ante partum period. Accordingly, mothers with ant partum PE were 8.7 times more likely to have prolonged hospital stay (AOR=8.7 (95% CI=1.35- 10.02),(15).

History of hypertension in previous pregnancy was observed in 15.5% of cases in study done in India (16). This is comparable with the study done in Pakistan where previous history of hypertension was found in 10 % (16). If a women had severe preeclampsia, she has 20 % risk of developing preeclampsia in subsequent pregnancy(17). If preeclampsia presents clinically before 30 weeks of gestation, the recurrence rate may be as high as 40 % (18).

2.3. Perinatal outcome of hypertensive disorders of pregnancy and associated factors

Fetal complications associated with HDP especially preeclampsia and eclampsia include IUGR, oligohydraminus, preterm delivery, non reassuring fetal heart rate patterns during labor, low APGAR scores at birth and NICU admission. Study done in Thailand reported IUGR in 27.5% of the neonates in severe preeclampsia group (19). Another study done in India reported IUGR in 29.4% and oligo-hydramnios in 7.5% cases (20) .

Other variables, which have shown strong association with perinatal mortality, were very preterm delivery (COR, 8.1; 95% CI, 5.82–11.22), lack of antenatal care follow-up (COR, 2.3; 95% CI, 1.75–2.97), having eclampsia (COR, 2.0; 95% CI, 1.52–2.63), antepartum onset of HDP (COR, 2.6; 95% CI, 1.57–4.38) and the highest diastolic blood pressure (BP) being > 110mmHg (COR, 2.1; 95% CI, 1.11–4.00). There was also a statistically significant association of perinatal mortality with the highest systolic BP ≥ 160mmHg (COR, 1.5; 95% CI, 1.07–1.99) and highest diastolic BP ≥ 110mmHg (COR, 1.7; 95% CI, 1.33–2.31). In the multivariate analysis, the perinatal mortality has increased by about 1.6- and 2.8-fold among multiparous and grand multiparous women, respectively(21,22). The risk of perinatal mortality in very preterm babies was 7.7-fold higher than term babies. Lack of antenatal care and having eclampsia increased the risk of perinatal mortality by more than 2- and 4-fold (21). Antepartum and intrapartum onset of HDP also independently predicted the chance of perinatal mortality by 6.6 and 4-fold as compared to postpartum onset of HDP (22).

Significant association of perinatal mortality with the lowest platelet count of < 100,000/mm3 (COR, 2.3; 95% CI, 1.66–3.31), highest creatinine level of ≥ 1.1mg/dL (COR, 1.5; 95% CI, 1.05–2.03), and highest SGOT raised by ≥ 2-fold from the normal level (COR, 2.9; 95% CI, 1.96–4.22) (23). The independent predictors of stillbirth include multiparity (OR, 1.6), grand multiparity (OR, 2.6), very preterm gestational age (OR, 6.5), lack of antenatal care (OR, 2.1), developing eclampsia (OR, 4.1), and antepartum (OR, 7.8) or intrapartum (OR, 5.0) onset of HDP (23,24).

Among the laboratory findings, lowest platelet count < 100,000/mm3 (OR, 2.2) and SGOT level raised by ≥ 2-fold (OR, 2.2) were independently associated with stillbirths. There was also a strong association of stillbirth with vaginal delivery (OR, 7.1), birth weight < 2.5kg (OR, 4.0) and maternal death (OR, 10.(24). On the other hand, the independent predictors of ENND were very preterm gestational age (OR,3.6), having eclampsia (OR, 2.9), vaginal delivery (OR, 4.1), birth weight < 2.5kg (OR, 6.2), and maternal death (OR, 11.7),(25). Otherwise, the statistically significant association of perinatal mortality, stillbirth and END was not observed with maternal age, number of fetuses, HDP severity symptoms, significant proteinuria, hemoglobin level and type of anticonvulsant or antihypertensive given (26).

Study done at Addis Ababa governmental hospital shows that the most common neonatal complications were still birth which accounts for 363 (30.2 %), prematurity with 395 (32.8 %), respiratory distress syndrome, with 456 (37.9%), low birth weight with 363 (30.2 %) (27).

2.4 Conceptual frame work

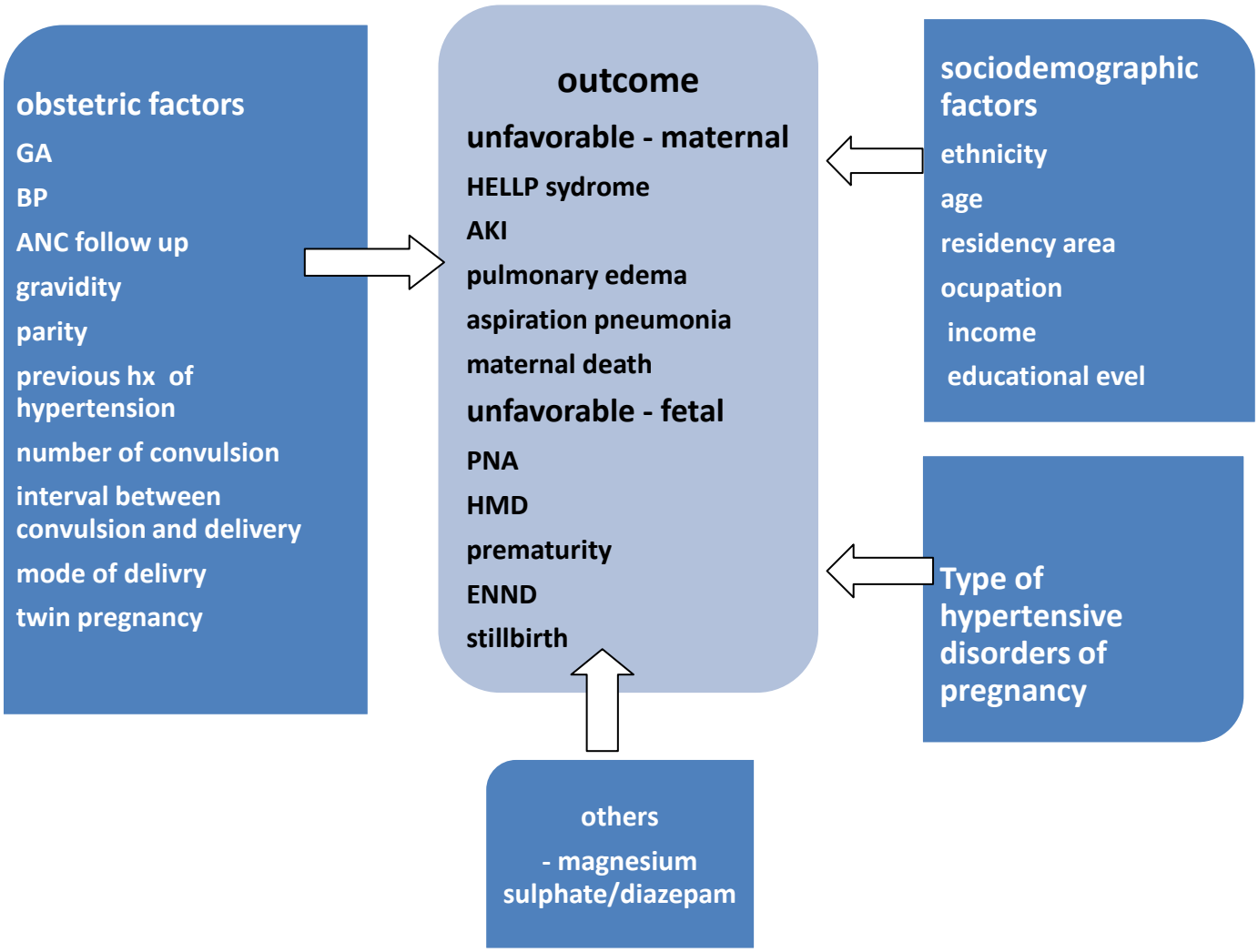

Figure 2.1 Conceptual framework developed after reviewing different literatures

CHAPTER THREE - OBJECTIVE

3.1 General objective

To assess maternal and perinatal outcome of hypertensive disorders of pregnancy and associated factors from January 1/2019 to June 30/2019 G.C at JUMC, Jimma , Ethiopia

3.2 Specific objectives

To assess maternal outcome of hypertensive disorders of pregnancy from January 1/2019 to June 30/2019 G.C at JUMC, Jimma , Ethiopia

To assess perinatal outcome of hypertensive disorders of pregnancy from January 1/2019 to June 30/2019 G.C at JUMC, Jimma , Ethiopia

To identify factors associated with perinatal and maternal outcome of hypertensive disorders of pregnancy from January 1/2019 to June 30/2019 G.C at JUMC, Jimma ,Ethiopia

CHAPTER FOUR -METHODOLOGY

4.1 Study area

Institution based cross-sectional study was conducted from January 2019 to June 2019 G.C in JUMC, which is found in Jimma city, Southwest Ethiopia 369 km from Addis Ababa. Jimma University is one of the higher institutions in Ethiopia. The main campus is situated to the east of the town at about 3 kms from the down town, Jimma Municipality and 4 kms before reaching to King Abajifar Palace. Jimma University Medical Centre (JUMC) which is part of Jimma University (JU), established in 1930, is located in the main campus. It is a referral hospital which provides services for approximately 9,000 in patient and 80,000 outpatient attendances a year with a very wide catchment population of about 15 million people in southwest Ethiopia.

The hospital provides almost all major types of medical care and it has a total of 659 beds of which 52 are found in the maternity ward. The first and second stage rooms of the labor ward have 11 and 5 beds, respectively. The labor and maternity wards are run by midwives, medical interns, resident physicians of obstetrics and gynecology and obstetrics and gynecology consultants. The hospital serves as a referral hospital for the southwestern part of the country and most of the laboring mothers come from rural areas.

4.2 Study period

The study was conducted starting from January 2019 G.C to June 2019 G .C among patients with hypertensive disorders of pregnancy admitted to labor ward JUMC

4.3 Study design

Facility based cross sectional study design was employed among patients with hypertensive disorders of pregnancy admitted to labor ward and maternity ward in JUMC

4.4 Source population

All mothers who were admitted to labor and maternity ward with hypertensive disorders of pregnancy in JUMC during the study period from January 2019 G.C to June 2019 G.C and they were 498 in number (number of mothers diagnosed with hypertensive disorders of pregnancy from January 2018 G.C to June 2018 G.C)

4.5 Study population

Study population was selected subjects among hypertensive disorders of pregnancy admitted to labor and maternity ward .

4.5.1 Inclusion criteria – patients diagnosed with gestational hypertension, preeclampsia with or without severity feature, eclampsia, chronic hypertension, preeclampsia superimposed on chronic hypertension and gestational age ≥ 28 weeks

4.5.2 Exclusion criteria – patients with epilepsy, gestational age < 28 weeks

4.6 Sample size determination

Sample size was determined by using single population proportion formula with the following assumption:

From literature review, the prevalence of maternal complications of hypertensive disorders of pregnancy in Addis Ababa selected government Hospitals is 36%

Confidence interval = 95 % (Z = 1.96)

Margin of error assumed to be 5 % (d = 0.05)

The sample size was calculated by the following standard statistical formula

$n = Z [(\alpha 2)2 p (1-p)]/d2$

$= (1.96)2 \times 0.36 (1- 0.36)/(0.05)2$

$=349$

Since the source population is less than 10,000 we use correction formula, therefore the final sample size will be:

nf = n/ 1+ n/N, nf = the final sample size

= 349/1+ 349/498

= 202

4.7 Sampling technique

Hospital based consecutive sampling technique was conducted from January 2019 to June 2019 G.C. in JUMC.

4.8 Data collection

4.8.1 Data collection techniques and procedures

Pretesting was conducted on 5% of mothers (10) among similar populations outside of the study area at Shenen Gibe hospital. Therefore, pre-tested, structured, an interviewer-administered questionnaire and checklist was employed to collect the data. The questionnaire was adopted, modified and used after reviewing different literature. The tool was prepared in English and translated to local language Afan Oromoo and Amharic and back translated to English to check its consistence. The questionnaire contains sociodemographic characteristics, clinical presentations, laboratory data and others. Data collectors were trained medical interns, oby-gyn residents and midwifes, one day intensive training was given for data collectors on the objectives and contents of the training, the principal investigator monitors the data collection process. The data was collected by reviewing records of the pregnant ladies and supplemented by interviewing the subjects on admission to labor ward. The patients were followed by reviewing records of their charts through their whole stay in the hospital and upto discharge so as to assess presence and development of complications. The neonates admitted to NICU was followed for possible complications until discharge. The neonates who were discharged immediately after 24 hours of delivery, the mothers were asked on phone about neonatal status and for any complications at 7 days of life.

4.9 Data processing and analysis

After checking its completeness collected data was entered to Epidata version 4.1 accordingly and exported to SPSS version 20 for analysis. Two step logistic regressions (bivariate and multivariate) were used to see the effect of the independent variables on the dependent variable by controlling confounders. Variables with p-value < 0.25 were candidate for multivariate logistic regression to identify factors that affect maternal and perinatal outcome. Statistical Significance was declared at p-value < 0.05 to evaluate the strength of association between favorable and unfavorable maternal and perinatal outcome and associated factors. Both crude

odds ratio (COR) and adjusted odds ratio (AOR) with 95% confidence interval were reported and tables, figures and charts were used to present the data.

4.10 Data quality control

Training was given for the data collectors on the objectives of the study and contents of the tools. The questionnaire was pretested and modification was done accordingly. The data collectors were supervised by principal investigator during data collection. The collected data were reviewed and checked for completeness daily and before data entry.

4.11 Study variable

4.11.1 Dependent variable

Maternal and perinatal outcome

4.11.2 Independent variable

Age, Ethnicity

Income

Place of residence

Gravidity, Parity

Educational level

Twin pregnancy

Type of hypertensive disorders of pregnancy

Gestational age

Blood pressure

Previous history of hypertension

Severity symptoms

ANC follow up

Interval between onset of convulsion and delivery

Number of convulsion

Mode of delivery

4.12Ethical consideration

Ethical clearance was obtained from Jimma University Ethical review board. Permission to conduct the study was obtained from JUMC. Verbal consent was obtained from the study subjects and the patient told the right to withdraw or not to participate. Additionally, names of participants were not used in the study and information obtained from patients was held confidentially.

4.13 Plan for disseminating result

The final result of the study will be submitted to College Of Health Science, department of Obstetric and gynecology. It will be presented on different national and international conferences as well as to Jimma university community and efforts will be made to publish on per reviewed journals .

4.14 Operational definition

ENND - neonatal death within 7 days of life

Eclampsia - abnormal body movement which is generalized tonic clonic during pregnancy and other causes being ruled out

Favorable fetal outcome - neonates with 5^{th} minute APGAR score > 7 with and with out complication

Favorable maternal outcome - mothers with hypertensive disorders of pregnancy discharged improved

Perinatal mortality - death after 28 weeks of gestation plus early neonatal death

Maternal near miss - a mother who recovered from severe complications like pulmonary edema, aspiration pneumonia AKI, PPH, HELLP syndrome during pregnancy, intrapartum or postpartum

Unfavorable fetal outcome – still birth, neonate with 5^{th} minutes APGAR score < 7, ENND and those admitted to NICU with complication like PNA, HMD and VLBW

Unfavorable maternal outcome – mothers with hypertensive disorders of pregnancy with maternal complications like HELLP syndrome, abruption placenta, aspiration pneumonia, pulmonary edema , DIC, maternal death

Monthly income: It was measured on daily income of workers based on 2013 millennium development report which was used to classify workers in developing country as extremely poor, moderately poor, near poor, developing middle class and developed middle class based on their daily income of (<$1.25, ≥$1.25 and $2, ≥2 $ and $4, ≥$4 and <$13 and >$13) dollars respectively. By changing the dollar to current currency that is one USA dollar is equal to 28 Ethiopian birr

CHAPTER FIVE – RESULT

5.RESULT

5.1 Sociodemographic characteristics

During the study period there were a total of 1980 deliveries of which 202 (10.2%) were diagnosed to have HDP making response rate of 100 %. Most of the mothers 70(34.7%) were in the age group of 25 -29 years. Majority of study participant were Oromo 157(77.7%) and Muslim by religion 143(70.8%). More than half mothers came from rural areas 123(60.9%). This study revealed that 77(38.1%) of study participants had no formal education which needs an alarming solution. Housewife accounts for 116(57.4%). Most of the mothers were married 193(95.5%) and family income per month ranges from 1075 - 1680 ETB. (see Table 1)

Table 1 : Frequency distribution of sociodemographic characteristics of mothers admitted with HDP JUMC, January 2019 to June 2019 G.C

Variables	Frequency	Percent
Age		
15-19	33	16.3
20-24	38	18.8
25-29	70	34.7
30-34	37	18.3
35 -39	24	11.9
Ethnicity		
Oromo	157	77.7
Amhara	18	8.9
Tigrie	2	1
Gurage	8	4.0
Silte	4	2.0
Other	13	6.4
Religion		
Muslim	143	70.8
Orthodox	39	19.3
Protestant	16	8
Catholic	4	2
Place of residency		
urban	79	39.1
rural	123	60.9

Occupation		
Employee (Governmental or non Government)	22	10.9
Merchant	34	16.8
Daily laborer	2	1.0
House maid	8	4
House wife	116	57.4
Farmer	14	6.9
Student	6	3.0
Educational status		
No formal education	77	38.1
Elementary school	66	32.7
Secondary school	32	15.8
Some University/college	18	8.9
University/ college completed	9	4.5
Income of family per month		
< 1075	34	16.8
1075 - 1680	97	48
1681- 3360	40	19.8
3361- 10920	26	12.8
>10920	5	2.4
Marital status		
single	5	2.5
married	193	95.5
divorced	3	1.5
separated	1	0.5
History of change in partner		
Yes	2	1.0
No	200	99

5.2 Obstetric related variables

The finding of this study shows that 98(48.5%) of mothers were primigravidas. With regard to ANC service 192 (95%) of mothers with HDP had at least one ANC visit. One third (37.6%) had four or more ANC visits. Majority of mothers (61.9%) had ANC follow up at health center. Regarding symptoms of hypertensive disorders, severe headache and blurring of vision were the most common presentation accounting for 121(59.9%) and 97 (48%) respectively. Twenty one (10.4%) had history of abnormal body movement, of which 4 (2 %) had more than five episodes

of abnormal body movement. Eleven (52.3 %) had abnormal body movement before onset of labor. Twenty (9.9%) had previous history of hypertension during pregnancy and 14 (6.9%) had history of diagnosed hypertension before the current pregnancy. Four (2%) had history of diagnosed cardiac disease and three (1 %) had history of diabetes mellitus.

Majority of the mothers (76.7%) visit JUMC with referral from near by health care facility and health centers were the major site to refer to JUMC in 87 (43.1 %) of cases. Of all cases 44 (21.8%) had systolic blood pressure in severe range (≥ 160) and 28 (13.9%) had diastolic blood pressure in severe range (≥ 110). For the majority of mothers 161(80%) onset of labor was spontaneous and induced in 32(16%) of cases. Cesarean delivery was the most common mode of delivery in 79(39.1 %) of cases followed by spontaneous vaginal delivery and forceps assisted delivery accounting for 74(36.6 %) and 37(18.3%) respectively. Non reassuring fetal heart rate and failed induction were the most common indication for cesarean delivery accounting for 42 (53.2%) and 22(29.7%) of cases respectively. In this study preeclampsia with severity feature was the most common HDP accounting for 121(60%) followed by eclampsia accounts for 23 (11.3%). Moreover, there were 21(10.3%) cases of preeclampsia without severity feature, 14 (6.9%) mothers had chronic hypertension, 11(5.4%) had preeclampsia superimposed on chronic hypertension and 12(5.9%) cases were gestational hypertension. HELLP syndrome which is severe forms of hypertensive disorders of pregnancy occurred in 25 (12.4 %) of cases. Majority of mothers with HDP were given magnesium sulphate for seizure prophylaxis in 132(65.3%) and diazepam in one third of cases (34.6 %). Of those given magnesium sulphate 5(2.5 %) developed magnesium sulphate toxicity. Depressed respiratory rate in 2(0.5 %) and depressed deep tendon reflex in three 1.5% cases.(Table 2)

Table 2: Frequency distribution of Obstetric related variables among mothers with HDP admitted to JUMC, January 2019 to June 2019 G.C

Obstetric Variables	**Frequency**	**Percent**
Gravidity		
1	98	48.5
2-4	69	34.2
5-9	35	17.3
Gestational age		
28 to 33	28	13.8

34 to 36	28	13.8
≥37	146	72.4
ANC follow up		
yes	192	95.0
no	10	5.0
Number of ANC follow up		
one	10	5.0
Two to three	107	54.0
Four and above	75	37.6
Place of ANC follow up		
Health Center	125	61.9
private clinic	10	5
Governmental Hospital	47	23.3
Other	10	5.0
Severe headache		
Yes	121	59.9
No	81	40.1
Blurring of vision		
Yes	97	48.0
No	105	52
Epigastric pain		
Yes	80	39.6
No	122	59.4
History of abnormal body movement		
Yes	21	10.4
No	181	89.6
Number of abnormal body movement		
less than 5	17	80.9
more than or equal to 5	4	19.1
Time of occurrence of abnormal body movement		
ante partum	11	52.3
intrapartum	5	23.4
postpartum	5	23.4
Time from the first convulsion to delivery	2	10
Less than 12 hours	12	57
12-24 hours	7	33
More than 24hours		
Previous history of hypertension during pregnancy	20	9.9

Yes		182	90.1
No			
History of diagnosed hypertension before pregnancy		14	6.9
Yes		188	93.3
No			
History of diagnosed cardiac disease			
Yes		4	2.0
No		198	98
History of diagnosed diabetes mellitus			
Yes		3	1
No		199	99
Patient came referred			
Yes		155	76.7
No		47	23.3
Patient came referred from			
health center		87	43.1
district hospital		51	24.3
private clinic		9	5.2
Other		8	4.1
Systolic BP	<140	25	12.4
	140 - 159	133	65.8
	160	44	21.8
Diastolic BP			
< 90		17	8.4
90 - 109		157	77.7
≥ 110		28	13.9
Onset of labor			
spontaneous		161	80
induced		32	16
Mode of delivery			
SVD		79	36.6
forceps assisted		37	18.3
Vacuum assisted		8	4.0
C/D		74	39.1
destructive delivery		4	2.0
Reason for C/D			

NRFHP	42	53.2
failed induction	22	29.7
CPD	4	5
other	8	10.6
protein		
Negative	45	32.2
+1 and above	157	67.8
AST ≥ 2 times elevated		
Yes	25	12.9
No	177	87.6
ALT ≥ 2 times elevated		
Yes	20	9.9
No	182	90.1
Platelet count		
< 100,000	31	15.3
≥ 100,000	171	84.7
Serum creatinine ≥ 2 times elevated		
yes	19	9.4
no	183	90.6
Type of hypertensive disorders of pregnancy		60
Preeclampsia with severity feature	121	11.3
Eclampsia	23	10.3
Preeclampsia without severity feature	21	6.9
Chronic hypertension	14	5.4
Preeclampsia superimposed on chronic hypertension	11	5.9
Gestational hypertension	12	
Onset of HDP		
antepartum	91	45
intrapartum	77	38
postpartum	34	17
HELLP syndrome		
yes	25	12.4
no	177	87.6

Seizure prophlaxis		
magnesium sulfate	132	65.3
diazepam	70	34.6
Magnesium sulphate toxicity		
Yes	5	3.8
No	127	96.2
Magnesium sulphate toxicity detected		
depressed DTR	3	60
depressed RR <12	2	40

5.3 Maternal outcome of hypertensive disorders of pregnancy

Of the total mothers with hypertensive disorders of pregnancy admitted to labor ward 147(68 %) of them had favorable maternal outcome. Sixty five (32 %) of them developed atleast one maternal complications (unfavorable maternal outcome). HELLP syndrome was the most common maternal complication 25(38.5%) followed by abruption placenta 13(20%) followed by aspiration pneumonia 11(16.9 %) and AKI 10(15.3%). A total of 14(6.9 %) cases of mothers with HDP were admitted to ICU. Of these nine (64.2%) cases were transferred to maternity ward and discharged improved. Five (35.3%) cases were complicated by maternal death. Three cases complicated due to eclampsia by pulmonary edema and two due to preeclampsia with severity feature complicated by AKI with encephalopathy.(Table 3)

Table 3 : Maternal outcome among mothers with hypertensive disorders of pregnancy admitted to labor ward, January to June 2019 G.C.

Variables	Frequency	Percentage
Maternal complications		
HELLP syndrome	25	38.5
Abruption placenta	13	20
AKI	10	15.3
Aspiration pneumonia	11	16.9
Pulmonary edema	4	6.2
DIC	2	3
ICU admission		
Yes	14	6.9
No	188	93.1
Outcome after ICU admission		
Died	5	35.7

Transferred to maternity ward and discharged improved	9	64.3
Cause of death		
Pulmonary edema	3	60
AKI with encephalopathy	2	40

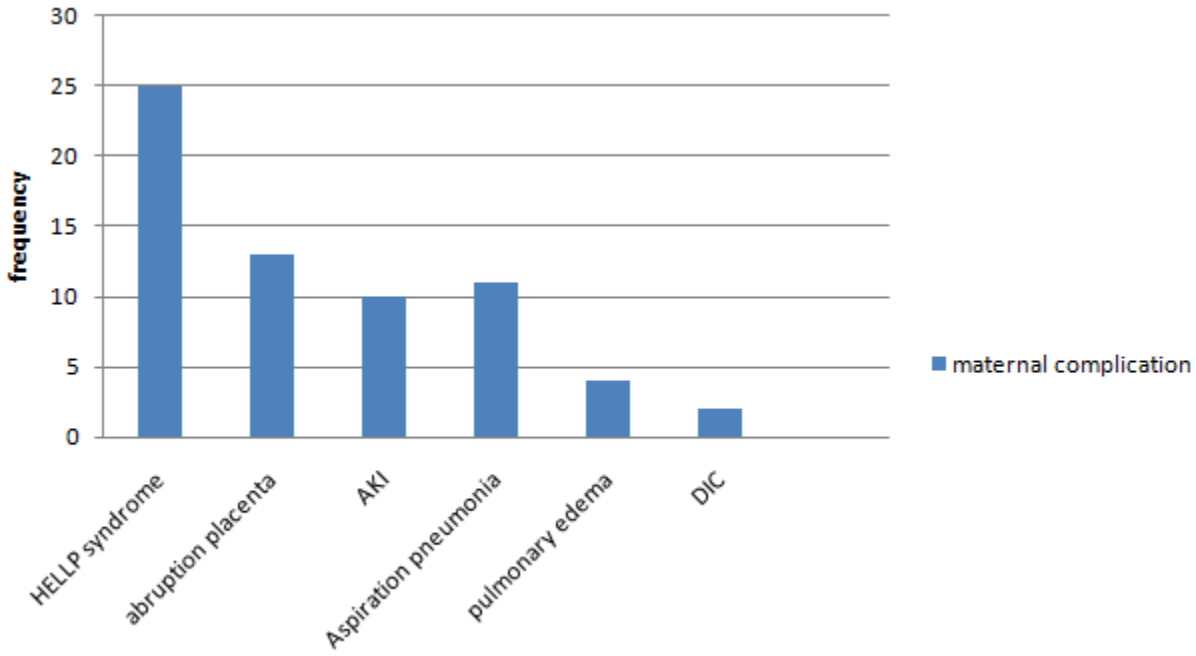

Fig. 1 Maternal complications among mothers with hypertensive disorder of pregnancy admitted to labor ward, JUMC, January to June 2019 G.C

5.4 Perinatal outcome among neonates born to mothers with hypertensive disorders of pregnancy

According to this study, of the total of 202 hypertensive disorders of pregnancy admitted to labor ward, 188(91.6%) were singleton and 14(8.4%) were twin. Most of the neonates 123(60.9%) were in the normal birth weight of 2500- 3999 gm followed by low birth weight (1500 -2499 gm) in 20.3 % and very low birth weight (< 1500 gm) in 11.9 % of cases. A total of 187(85.6%) of neonates were alive and 29(14.4 %) were still birth at delivery. Of the total still births 21(72.4 %) were before admission to labor ward and 3 (10.3 %) were after admission in the maternity ward before onset of labor and 5(17.2 %) were intrapartum. In this study fifty (23.13

%) of the fetuses had developed unfavorable perinatal outcome with at least one complication and 164 (76.87%) had favorable perinatal outcome with no complication.

Five (2.67 %) of the neonate had low APGAR score at 1st minutes less than 4 and twelve (5.9%) had low APGAR score less than 7 at 5th minutes. A total of 30(16 %) neonates were admitted to NICU. HMD and prematurity was the most common indication for NICU admission in 33.3% and in 26.6 % of cases respectively. Twelve (40 %) of neonate admitted to NICU were complicated by ENND. HMD and PNA was the major cause of neonatal death accounting for 7(58.3 %) and 3(25 %) of cases respectively. (see Table)

Table 4: Perinatal outcome among neonate born to mothers with hypertensive disorders of pregnancy admitted to labor ward, JUMC, January 2019 to June 2019 G.C

Variables	N	%
Fetal outcome at delivery		
Alive	187	85.6
Dead	29	14.4
Time of death		
Before admission	21	72.4
After admission	3	10.3
Intrapartum	5	17.2
Number of fetus		
singleton	188	91.6
Twin	14	8.4
Birth weight		
<1500 gm	24	11.9
1500-2499 gm	41	20.3
2500-3999 gm	123	60.9
≥ 4000 gm	1	.5
APGAR score at 1st minutes		
< 4	5	2.67
≥ 4	182	97.3
APGAR score at 5th minutes		
< 7	12	5.9
≥ 7	175	93.6
Neonate admitted to NICU		
Yes	30	16
No	157	84

Indication for NICU admission		
Prematurity	8	26.6
PNA	5	16.6
MAS	3	10
HMD	10	33.3
EONS	3	10
Other	1	3.3
Neonatal outcome at NICU		
Discharged improved	18	60
Complicated by ENND	12	40
Cause of neonatal death		
HMD	7	58.3
PNA	3	25
Other	2	16

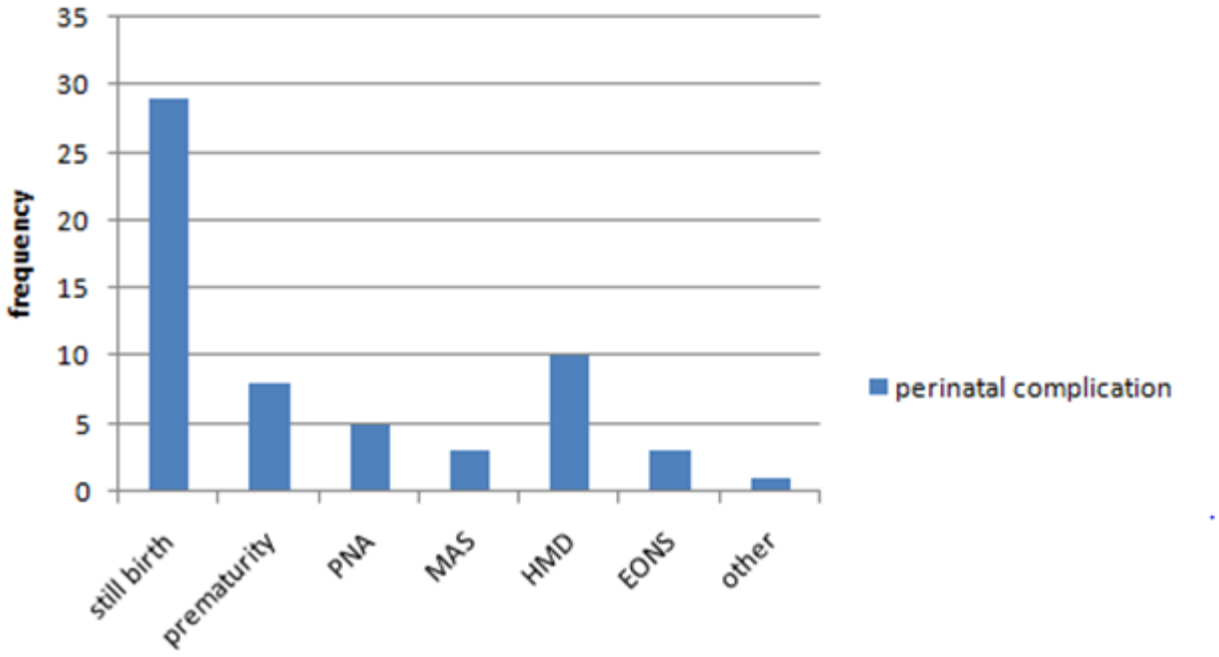

Fig 2 Perinatal complications among neonates born to mothers with hypertensive disorders of pregnancy admitted to labor ward, JUMC, January to June 2019 G.C

5.5 Factors affecting maternal outcome

Out of the 202 mothers 65 had developed at least one complication making the prevalence of unfavorable maternal outcome of 32 % . Place of residence, presence of severity symptoms of HDP, abnormal body movement, mode of delivery, elevated liver enzymes (AST and ALT ≥ 2 times) and low platellate count (< 100,000) were variables identified as candidate variable from bivariate logistic regression analysis and then fitted into the final multivariate logistic regression analysis model using enter method to identify independent factors affecting the maternal outcome. Place of residence and having eclampsia had shown statistically significant association with unfavorable maternal outcome. Those mothers who came from rural areas were 86 % less likely to have favorable maternal outcome than those who came from urban areas (AOR = 0.142 , 95 % CI : 0.025,0.801). Mothers who had history of abnormal body movement had 9.8 times more likely to have unfavorable maternal outcome (AOR = 9.852 ,95 % CI : 2.963, 133). (see Table 5)

Table 5: Factors affecting maternal outcome using multivariate logistic regression among mothers with HDP admitted to labor ward, January 2019 to June 2019 G.C**.**

Variables	Maternal outcome		Crude OR (95% CI)	AOR (95% CI)	P value
	fav	Unfav			
Place of residence		3			
urban	76	38	1	1	1
rural	85		**11.3 (3.359-38.18)**	**0.142(0.025,0.801)**	**0.027***
Severe headache					0.362
Yes	89	32	0.348(0.56,0.775)	2.255(0.392,12.966)	
No	72	9	1	1	
Blurring of vision					
Yes	67	30	3.66(1.714,7.83)	0.529(0.115,2.44)	0.414
No	90	11	1	1	
Epigastric pain					
Yes	54	26	3.474(1.676,7.200)	2.9(0.902,0.801)	0.074
No	101	14	1	1	
Having eclampsia					

Yes No	14 146	9 32	**0.15 (0.062,0.359)** 1	**9.852 (2.963,133)** 1	**0.002***
Mode of delivery SVD forceps assisted Vacuum assisted C/D destructive delivery	69 28 6 57 1	10 9 2 17 3	1 0.048(.005,.511) 0.107(0.01,1.163) 0.111(.007,1.776) 0.099(0.01,1.02)	1 0.6 (0.01,35.479) 0.431(0.007,27.44) 1.803(0.012,262.27) 1.17 (0.021,65.237)	0.806 0.691 0.816 0.939
AST ≥ 2 times elevated Yes No	12 149	14 26	0.341(0.136,0.856) 1	0.579(0.053,6.366) 1	0.655
ALT ≥ 2 times elevated Yes No	12 149	8 32	0.32(0.122,0.852) 1	0.062 (0.04, 1.031) 1	0.053
Platelet count <100,000 ≥ 100,000	2 159	23 18	1 0.01(0.002,0.045)	1 6.286(0.603,65.542)	0.124

5.6. Factors affecting perinatal outcome

Occupation, gestational age, ANC follow up, presence of severity symptoms (severe headache, blurring of vision), history of abnormal body movement, antepartum onset of HDP, systolic BP ≥ 160, ALT ≥ 2 times elevated, HELLP syndrome and presence of AKI were variables identified as a candidate variable from bivariate logistic regression analysis and then fitted into multivariate logistic regression model using enter method to identify independent factors affecting perinatal outome. Gestational age, history of abnormal body movement (having eclampsia), antepartum onset of HDP of the mother had shown strong association with unfavorable perinatal outcome. Neonate delivered at GA 28 -33 weeks had 10 times more likely to have unfavorable fetal outcome than those who delivered at GA of 34 -36 weeks and ≥ 37 weeks (AOR = 10.117,95%

CI: 1.635 , 62.6). Those mothers who had abnormal body movement were 2.7 times more likely to have unfavorable perinatal outcome than those who were not having abnormal body movement (AOR=2.761, 95% CI :1.898,8.487). Antepartum onset of HDP increased the risk of unfavorable perinatal outcome by more than 6 -fold compared with intrapartum and postpartum onset of HDP (AOR = 6.6, 95% CI: 3.4,12.75), (See Table 6).

Table 6 : Factors affecting perinatal outcome among mothers with hypertensive disorders of pregnancy admitted to labor ward, January to June 2019 G.C

Variables	**Neonatal outcome**		**Crude OR(95% CI)**	**AOR (95% CI)**	**P value**
	fav	**unfav**			
Occupation					
Employee	18	4	0.222(0.03,1.535	0.248(0.0232.623)	0.247
Merchant			0.172(0.027,1.108)	0.156 (0.015,1.583)	
Daily laborer	28	5	0.25(0.027,2.319)	0.207(0.011,4.045)	0.116
House maid	8	2	0.2(0.022,1.816)	0.09(0.05,1.88)	0.299
House wife	10	2	0.369(0.069,1.908)	0.408(0.056,2.982)	0.121
Farmer	77	28	0.75(0.11,5.109)	0.691(0.068,6.982)	0.377
Student	8	6	1	1	0.754
	4	2			
Gestational age					
28 to 33	6	22	**7.2(1.284,40.365)**	**10.117(1.635,62.60)**	**0.013***
34 to 36	17	7	0.667(0.819,26.604)	4.228(0.642,27.857)	0.134
≥37	13	21	1	1	
ANC					
Yes	147	45	1	1	
No	5	5	3.267(0.905,11.703)	0.678(0.1,4.61)	0.691
Severe headache					
Yes	84	37	2.304(1.135,4.678)	0.661(0.181,2.414)	0.531
No	68	13	1	1	
Blurring of vision					
Yes	64	33	3.2(1.586,6.475)	1.15(0.465,2.848)	0.762
No	87	14	1	1	
Having eclampsia					
Yes	12	11	**0.306(0.125,0.747)**	**2.761(1.898, 8.487)**	**0.042***
No	140	39			

			1	1	
Onset of HDP					
antepartum	57	34	**2.6 (1.57-4.38)**	**6.6(3.4-12.75)**	**0.003***
intrapartum	62	12	1.4(0.77-2.55)	0.5(0.99-1.04)	0.41
postpartum	13	4	1	1	
Systolic BP					
<140	20	5	1	1	
140 - 159	103	30	0.483(0.151,1.544)	0.535(0.136,2.112)	0.372
≥ 160	29	15	0.563(0.268,1.185)	0.531(0.2,1.408)	0.203
ALT ≥ 2 times elevated					
Yes	12	8	0.453(0.174,1.182)	1.852(0.612,5.608)	0.276
No	139	42	1	1	
HELLP syndrome					
Yes	16	9	0.536(0.22,1.303)	1.029(0.296,3.581)	0.961
No	136	41	1	1	
AKI					
Yes	10	9	0.321(0.122,0.842)	3.478(1.038,11.651)	0.43
No	142	41	1	1	

6 . DISCUSSIONS

The magnitude of HDP in this study is 10.2% which is higher than the study done in the same area eight years back and it is also higher than the global prevalence of HDP which is 5- 10% (6). Majority (48.5%) of the mothers with HDP were primigravida. Similar study conducted in India showed that primigravida accounted for majority of HDP compared to multigravida (4). Study in Addis Ababa showed majority (54%) of HDP were primigarida (9). Ninety five percent of mothers with HDP had ANC follow up of whom 37.6% had four and above visits. Similar studies conducted in Addis Ababa Gandhi Memorial Hospital showed 96.5% had ANC follow up. Another study In Nigeria showed 76.6 % of pregnant mothers with HDP received ANC (19). But, a study in India showed 82% of them had no ANC follow up (15). The higher rate of ANC follow up in the current study could be because of the awareness created by government intervention and improvement in ANC coverage. According to this study, HDP was found to be more common in mothers who had ANC visit during current pregnancy .

In this study preeclampsia with severity feature was the commonest presentation (60%) similar to many other studies. A study in Tikur Anbessa Hospital of Addis Ababa and Gandhi Memorial Hospital showed that 78 % and 82.5 % of HDP respectively were due to preeclampsia with severity feature (11). Study done at Jimma University Specialized hospital showed preeclampsia with severity feature occurred in 51.9 % of cases (6). The large number of preeclampsia with severity feature cases in this study could be due to the fact that the study was undertaken in referral hospital which serves more advanced cases which were difficult to be managed at lower level.

Regarding maternal outcome, 65(32%) of them had unfavorable outcome with at least one complication. HELLP syndrome was the most common complication in 25(38.5 %) followed by abruptio Placenta in 13(20%), aspiration pneumonia in 11 (16.9%), AKI in 10(15.3%) and pulmonary edema in 4(6.2%). Similar study done at Addis Ababa governmental hospital showed 36% experienced at least one complication. The main complications were HELLP syndrome in (39.5%), aspiration pneumonia in 17.5%, pulmonary edema in 17.% and abruption placenta in 15.3% of cases(12).

Almost 70% of mothers were from rural areas and there was statistically significant association between place of residency being rural area and unfavorable maternal outcome. Similar Studies done in Nigeria and Thialand showed maternal complications were more common in those who live in rural areas 3 times and 5 times respectively(21,31). This may be due to the fact that mothers who lives in rural areas are less access to health facility earlier when compared to urban areas which is an important contributing factors for the development of maternal complications. Ten percent of mothers had eclampsia and 19.1% of them had more than 5 episodes of abnormal body movement . About 50% of mothers with eclamptic mothers had antepartum onset. Three percent of eclamptic mother had more than 24 hours from the first convulsion to delivery. But there was no statistically significant association between time of first episode of convulsion to delivery and unfavorable maternal outcome. This may be due to the small sample size.

Nonreassuring fetal heart rate pattern was the common indication for cesarean delivery followed by failed induction. Similar study done in Addis Ababa Gandi Memorial Hospital showed that NRFHRP as the most common indication for cesarean delivery(11). Liver function tests were elevated $\geq$ 2 times (AST in 12.9% and ALT in 9.9%) of cases . Similar study done in India

showed that liver function tests both AST and ALT elevated ≥ 2 times in 17.3% and 18.67% of cases respectively (4). Renal function tests were elevated with serum creatinine level of ≥ 1.2 mg/dl(4). Similar study done in Tigray region showed elevated serum creatinine ≥ 1.2 mg/dl in 59% of cases (7).

HELLP syndrome developed in 12.4% of cases. A study in Addis Ababa reported that HELLP syndrome developed in 14% of the women (11). A study in Jimma showed HELLP syndrome in 8.9% of mothers (6). Study in India showed 2% of the mothers developed HELLP syndrome (4) . A relatively higher HELLP syndrome cases in this study may be due to delays in early detection and timely management of preclamptic women at health center as most of the mothers were HELLP syndrome may developed but platellate transfusion may be impossible.

Five mothers (2.4 %) with hypertensive disorders of pregnancy died during the study period, three due to eclampsia complicated by pulmonary edema and two of preeclampsia with severity feature complicated by AKI with encephalopathy. More over eclampsia contributed for 10 cases of 14 ICU admission. Case fatality rate for eclampsia was 13% which is comparable with study done in Addis Ababa (12.7 %),(16) but higher than the 5.4% in the previous study done in Jimma (6) and 9.5% in zimbabwe (38). There was statistically significant association with mother having eclampsia and unfavorable maternal outcome with P -value of 0.02.

In this study 50 (23.13 %) of the neonates had developed unfavorable perinatal outcome with at least one complication and 164 (76.87%) had favorable perinatal outcome with no complication. The most common perinatal complications were still birth in 29 (58 %), very low birth weight 24 (48%), ENND in 12 (24%) and HMD in 10 (20 %). Similar study done at Addis Ababa governmental hospital shows that the most common neonatal complications were prematurity with 395 (32.8%), respiratory distress syndrome with 456 (37.9%), very low birth weight with 363 (30.2 %), (11). Furthermore, other studies focusing only on eclamptic women reported that perinatal deaths were caused by prematurity in 68% and 43% (20,21). On the other hand, significantly increased odds of perinatal mortality were observed among women with eclampsia, which was consistent with other studies (15, 22). This is probably because of the severe nature of the eclampsia disease, which usually complicates by severe intrauterine asphyxia and severe placental abruption (18).

The perinatal mortality rate of HDP in this study was 189 per 1000 total birth and it was lower than report from Hawasa/ Ethiopia (34) and Addis Ababa/Ethiopia(12). The proportion of still birth was more than 2.5 times higher than early neonatal death 29 (14.4%) still birth versus 12 (5.5% %) early neonatal death.

Gestational age of 28 - 33 weeks at delivery was statistically significant association with unfavorable perinatal outcome similar to other studies done in Hawassa and Addis Ababa (10 ,36). This can be explained as early preterm delivery is a risk factor for prematurity and associated neonatal complications like hyaline membrane disease, bronchopulmonary dysplasia, necrotizing enterocolitis and neonatal sepsis. In this study HMD was the most common cause of neonatal death accounting for 58.3 % of cases. Antepartum onset of HDP was associated with more than 6 times more likely to have unfavorable perinatal outcome with at least one complication. Study done at Hawassa showed three fourth of perinatal death (71%) in women with antepartum onset of HDP (36). About 60% in women with antepartum onset of HDP were either early preterm or late preterm at birth. The implication is that HDP has probably exposed several neonates to premature delivery and its complications.

This study did not show statistically significant association of perinatal mortality with a type of anticonvulsant used in both bivariate and multivariate analyses. One previous study also reported that there was no difference in perinatal mortality between the diazepam and magnesium sulphate groups (16). Another study, however, reported nearly 3- fold reduction in perinatal mortality among magnesium sulphate group (30). It was also noted that magnesium sulphate is superior to diazepam in preventing and controlling convulsion in women with HDP (33), which is indirectly preventing the most perinatal deadly complication (eclampsia). Nevertheless, the inconsistent findings of the effect of magnesium sulphate on perinatal mortality invoke meta-analysis.

The presence of HDP has been linked with poor maternal and perinatal outcomes which were manifested by increased maternal ICU admissions, preterm delivery rate, LBW and PNMR. Moreover, there was a 13 % case fatality rate in those mothers affected by eclampsia. This study also revealed the presence of high intervention rates by induction of labor, caesarean section and instrumental delivery. The fact that the study was undertaken in a tertiary teaching hospital may partly explain the high rate of interventions observed in this study.

Limitation of the study

All hypertensive disorders of pregnancy admitted to labor ward who fulfilled inclusion criteria were taken consecutively until the required sample was met without randomization. Unknown proportion of the entire population was not sampled, the sample may or may not represent the entire population accurately.

The status of hypertensive disorders of pregnancy twelve weeks after delivery was not known and it was difficult to conclude how many of the hypertensive disorders of pregnancy resolved or developed chronic hypertension

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

Preeclampsia with severity feature was the commonest HDP followed by eclampsia. Among mothers with hypertensive disorders of pregnancy admitted to labor ward and gave birth 68% had favorable maternal outcome without complication and 32% had unfavorable maternal outcome with at least one maternal complication. The most common maternal complications were HELLP syndrome, abruption placenta followed by aspiration pneumonia and AKI. Place of residence and having eclampsia had statistically significant association with unfavorable maternal outcome. Among mothers with HDP admitted to labor ward and gave birth, 23.13% of the fetuses had developed unfavorable perinatal outcome with at least one complication and 76.87% had favorable perinatal outcome with no complication. The most common neonatal complications were prematurity, still birth, ENND and HMD. The PNMR due to HDP in this study is 189 per 1000 total births with still birth rate of 134 per 1000 total births. Gestational age at delivery of 28 - 33 weeks, history of abnormal body movement and antepartum onset of HDP of the mother had shown statistically significant association with unfavorable perinatal outcome
.

7.2 Recommendation

Although majority of mothers from rural areas had ANC follow up, there is significant association with unfavorable maternal outcome and residence being rural areas, further research is needed to assess whether it is associated with quality of ANC follow up or not

Care given at neonatal intensive care unit particularly for preterm neonates should be improved as there were 12 (40 %) early neonatal deaths most of them were due to prematurity and associated neonatal complication which might be related to the quality of service given at NICU . Further study needs to be conducted to address the quality of service given at NICU

Eclampsia is associated with high maternal and perinatal unfavorable outcome; early recognition of severity symptoms of preeclampsia and early intervention can decrease eclampsia and associated complications.

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Annex 1

Questionnaire for the study of maternal and fetal outcome of hypertensive disorders of pregnancy and associated at JUMC among pregnant mothers admitted to labor ward and maternity ward

Information sheet and mothers Consent form (English)

Information sheet

Good morning ? / Good afternoon ? My name is ----------. I am final year Obstetrics and gynecology resident at of Jimma University. I am conducting a study on maternal and perinatal outcome of hypertensive disorders of pregnancy in JUMC for my partial fulfillment of the requirements for the master degree in Obstetrics and Gynecology. You are chosen to participate in the study. I want to assure you that all of your answers will be kept secret. I will not keep a record of your name or address. You have the right to stop the interview at any time, or to skip any questions that you don't want to answer.

If you agree to participate in the study, interview will take about 15 minutes to complete. Do you have any questions?

Consent form

Do you agree to be interviewed?

Yes ☐ No ☐

May I begin the interview now? To be signed by interviewer: I certify that I have read the above consent procedure to the participant.

Signed: _____

Questionnaire for the study of maternal and perinatal outcome of hypertensive disorders of pregnancy and associated factors at JUMC among mothers admitted to labor ward and maternity ward

Part 1 Sociodemographic status of mothers admitted with diagnosis of hypertensive disorders of pregnancy

Client's code ----------

1.1 .Age in (years) ----------

1.2 .Ethnicity

1. Oromo 2. Amhara 3. Tigre 4. Gurage 5. Silte 6 . Other (specify) -------

1.3. Religion

1. Muslim 2. Orthodox Christian 3. Protestant 4. Catholic 5. Others (specify) -------

1.4 .Residence area 1. Urban (city) 2. Rural (out side city)

1.5 . Educational status

1. No formal education 2. Elementary school

3. Secondary school completed 4. Some University / College

5. University / College completed 6 . Masters and above

1.6. Marital status

1. single 2. married 3. divorced 4. widowed 5 . separated

1.7.History of change in partner ? 1. Yes 2. No

1.8.History of smoking cigarette? 1.yes 2. no

1.9. Occupational status

1. Employee (government/non government) 2. Merchant (your own business) 3. Daily laborer 4. House maid 5. House wife 6. Farmer 7. Student

1.8. Monthly income (in birr) ----------

2. Obstetric assessment of mothers with hypertensive disorders of pregnancy admitted to labor ward (Reproductive history of the client)

2.1 . Total number of pregnancy (gravidity) ----------

2.2.Total number of delivery at / beyond 28 weeks or 7 months and above (parity) -------

2.3 Total number of living children ---------

2.4. Do you have ANC follow up 1. yes 2. no

2.5 If yes to above question , where was the place of ANC follow up?

1. Health center 2 . private clinic 3 . government hospital 4 .other (specify) -----

2.6. If yes to question number 2.4 , how many times do you have ANC follow up? ---------

2.7. If no to question number 2.4, what was your reason ?----------

2.8. Do you have the following symptoms ?

2.7.1. severe headache 1. yes 2. no

2.7.2. blurring of vision 1. yes 2.no

2.7.3. epigastric or right upper quadrant pain 1. yes 2 . no

2.7.3 . loss of consciousness 1.yes 2.no

2.8 . Do you have history of raised BP during this pregnancy? 1. yes 2. no

2.9. Do you have history of raised BP during previous pregnancy? 1. yes 2. no

2.10. Does the patient has of diagnosed hypertension before pregnancy? 1. yes 2 .no

2.11. Was the mother came referred ? 1. yes 2 .no

2.12. If yes to above(2.11) question , where is the referral from ?

1 .health center 2. district hospital hospital 3. Private clinic 4 .others (specify) -----

2.13 . If yes to above question(2.11), what was the reason for referral ?

1. for investigation (CBC , RFT ,LFT) 2. for maternal ICU admission 3. for anticipation of prematurity (for NICU) 4. due to lack of magnesium sulphate 5. OR not functional (for C/S) 6. Others (specify) ----------

2.14.what was the BP on admission ? ----------

2.15. BMI (kg/m2)

1. < 18.5 2 . 18.5 – 24.9 3. 25 – 29.9 4. ≥ 30

2.16 . Gestational age from reliable LNMP or from early ultrasound ----------

2.17 . Gestational age by duration of amenorrhea if she does not remember LNMP or no early ultrasound ----------

2.18. Onset of labor

1. spontaneous 2. induced 3. elective C/S

2.19. How many hours the mother stayed from onset of labor to delivery ? ----------

2.20. If the mother admitted to maternity ward , how many days she stayed there before decision for delivery?

1. < 7 days 2. 1 week to 2 weeks 3. 2 weeks to 4 weeks 4 . > 4 weeks

2.21 .What was the indication for decision for delivery ?

1. uncontrolled BP with maximum dose of two antihypertensive drug 2 .HELLP syndrome

3. imminent eclampsia 4. term gestational age 5. Other (specify) -------

2.22. Mode of delivery

1. spontaneous vertex delivery (SVD) 3. vacuum assisted

2. forceps assisted 4. C/D 5. destructive delivery

2.23. If C/S , indication of C/S

1. NRFHP 2 . failed induction 3 . prolonged labor (CPD) 4. Others (specify) ----------

3 .Investigation result

3.1. 1. protein (negative , + 1 and above)

3.2 .platellate count on admissi

on ----------

3.3.liver function test 1. AST < 2x elevated 2. AST ≥ 2x elevated

3. ALT < 2× elevated 4. ALT ≥ 2× elevated

3.4. Renal function test , creatinine ----------

3.5. RBS --------

3.6 .Blood film 1. H/P seen 2. no H/P seen

3.9 .urine output per 24 hours ---------

4. Perinatal outcome assessment of hypertensive disorders of pregnancy at JUMC

4.1. fetal birth weight in gram : 1 . < 1500gm 2. 1500ml – 2499 gm

3. 2500gm -3900 gm 4. ≥ 4000gm

4.2 . Fetal outcome at delivery 1 .alive 2. Dead

4.3. If dead , where was the place of death ?

1. before admission 2. After admission (maternity ward) 3. intrapartum

4.4. If the feusl alive at birth , what was the APGAR score (1st minute ------, 5th minute ------)

4.3. Number of fetus 1. singleton 2. twin 3. triplet

4.4 .Sex of the fetus 1. male 2. female

4.5 .Was the neonate admitted to NICU ? 1. yes 2. No

4.6 Does the neonate has signs of IUGR ? 1. Yes 2. no

4.6.If yes to above question (4.5) ,what was the indication ?

1. PNA 2. MAS 3. HMD 4. EONS 5. other (specify) ----------

4.7 what was the neonatal outcome after being managed at NICU ?

1. discharged improved 2. complicated by ENND 3 .other (specify) --------

4.8. What was the neonatal outcome after discharge ? ----------

5. Maternal assessment among hypertensive disorders of pregnancy

5.1 .Does the mother has history of diagnosed renal disease? 1. yes 2. no

5.2.Does the mother has history of diagnosed cardiac disease ? 1. yes 2. no

5.3 .Does the mother has history of diagnosed diabetes mellitus ? 1. yes 2.no

5.4 . Does the mother have history of diagnosed bronchial asthma? 1. Yes 2. no

5.5. Does the mother has history of abnormal body movement during this pregnancy ?

1. yes 2. no

5.6.If the answer is yes to above question , is the abnormal body movement :

1. before onset of labor 2. after onset of labor and before delivery 3. after delivery

5.7. How many episodes of abnormal body movement before delivery ? -------

5.8. Does she have history of diagnosed epilepsy before pregnancy ? 1. Yes 2. no

5.9 .What was the seizure prophylaxis given ?

1. magnesium sulphate 2. diazepam 3. phenytoin 4. Phenobarbital

5.10. If the seizure prophylaxis given is magnesium sulphate , was there magnesium sulphate toxicity?

1. yes 2. no

5.11 . If yes to above question , what was the toxicity detected?

1. depressed DTR 2. depressed RR (< 12) 3. cardiac arrest

5.12 .Maternal complication detected :

1. abruption placenta 2. DIC 3. ARF 4. intracranial hemorrhage 5. HELLP syndrome 6. PPH 7. maternal death

5.13 .Was the mother admitted to ICU?

1 .yes 2 .no

5.14. If yes to above question ,what was the indication for admission ?

1. coma (GCS < 8) 2. respiratory failure (unable to maintain saturation) 3 .ARF

4. pulmonary edema

5.15. If the mother has ARF, was she a candidate for dialysis ? 1. yes 2. no

5.16.If she fulfills criteria for dialysis, was it done ? 1. yes 2. no

5.17 .If no to above question number 5.12 , what was the reason it was not done ?

1. patient being on mechanical ventilation (coma) 2. because of the cost 3. unavailability of dialysis service 4 . other (specify) ----------

5.18. What was the maternal outcome after admission to ICU ?

1. transferred to maternity ward and discharged home improved

2. passed away

5.19 . If the mother was died , what was the possible cause of death?

1 . pulmonary edema 2. AKI 3 .PPH 4. DIC 5. aspiration pneumonia

6 .other (specify)----------

Name of data collector---------- date ---------- sign ----------