

**ORIGINAL ARTICLE****HYPERTENSIVE DISORDERS OF PREGNANCY IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL**Zenebe Wolde<sup>1</sup>, Hailemariam Segni<sup>2</sup>, Mirkuzie Woldie<sup>3</sup>**ABSTRACT**

**Background:** *Hypertensive disorders represent the most common medical complications of pregnancy with a reported incidence between 5 and 10%. The disorders are major causes of maternal and perinatal morbidities and mortalities. This study was conducted to determine the pattern and outcomes of pregnancies complicated by hypertensive disorders.*

**Methods:** *Hospital based cross-sectional study was conducted on all mothers who gave birth in the labor ward of Jimma University Specialized Hospital from April 1, 2009 to March 31, 2010. Data was collected by interviewing the mothers and review of their medical records using structured questionnaire and checklist, respectively. Data analysis was performed using SPSS for windows version 16.0.*

**Result:** *Majority (52.5%) of the mothers were in the age group of 25 - 34 years. The overall prevalence of hypertensive disorders of pregnancy was 8.5%. Severe preeclampsia accounted for 51.9% of the cases followed by eclampsia (23.4%). Residential area of the mothers (urban/rural) was found to have statistically significant association with severity of the disorder. Most (66.5% and 74.7%) of the mothers were nulliparous and had antenatal care follow-up during the index pregnancy, respectively. Antenatal care follow-up and parity had no statistically significant association with severity of the disease. The case fatality rate of hypertensive disorders of pregnancy was 1.3% with perinatal mortality of 317.1/1000 births.*

**Conclusion:** *Pregnancies complicated by hypertensive disorders have poor maternal and perinatal outcomes and rural women were more affected. Quality antenatal care services with good obstetric and neonatal care at delivery are essential for early recognition and management of hypertensive disorders of pregnancy.*

**Keywords:** *Hypertensive disorders, Hypertension, Pregnancy, Eclampsia.*

**INTRODUCTION**

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, or pure Preeclampsia. The three most common forms of hypertension are acute gestational hypertension, preeclampsia, and chronic essential hypertension (1-4).

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Five classes of hypertensive disorders were identified according to the latest classification system described by the National High Blood Pressure Education Working Group (2000) including Preeclampsia, Eclampsia, Transient Hypertension of pregnancy, Chronic Hypertension and Preeclampsia superimposed on Chronic Hypertension (5). In a multicenter study, approximately 30% of hypertensive disorders of pregnancy were due to chronic hypertension while 70% of the cases were diagnosed as gestational hypertension/preeclampsia (6).

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-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 1991-1997 were from complications of pregnancy related hypertension. Black women were 3 times at increased risk to die from preeclampsia as white women (2).

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 HELLP 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 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).

Even though there are few studies exploring HDP in Ethiopia, there has not been a single study in the study area. Based on the limited data available, HDP has been found to be common and has been associated with poor maternal and perinatal outcomes. Therefore, this study was conducted to explore the pattern and outcomes of pregnancies complicated by hypertensive disorders and factors associated with the disorder and pregnancy outcomes.

## **SUBJECTS AND METHODS**

This hospital based prospective cross-sectional study was conducted from April 1, 2009 to March 31, 2010 in JUSH, which is found in Jimma city, Southwest Ethiopia. The hospital provides almost all major types of medical care and it has a total of

300 beds of which 40 are found in the maternity ward. The first and second stage rooms of the labor ward have six and three beds, respectively. The labor and maternity wards are run by midwives, medical and health officer interns, resident physicians of obstetrics and gynecology, and obstetrics and gynecology consultants. The hospital serves as a referral hospital for the south-western part of the country and most of the laboring mothers come from rural areas where almost all deliveries are attended at home.

The source population was all mothers who were admitted to the labor and maternity wards of JUSH during the study period. Of these mothers, those who were admitted with the diagnosis of HDP during the study period were included in the study. Data were collected using questionnaire and check list which contained socio-demographic characteristics of mothers, obstetric history, signs and symptoms at presentation, laboratory data and maternal and perinatal outcomes.

Data were gathered by medical interns and residents in the department of obstetrics and gynecology by reviewing records of the pregnant ladies and supplemented by interviewing the subjects. The patients were followed through their whole stay in the hospital so as to assess presence and development of complications. Analysis was done using SPSS for windows version 16.0 to describe variables and assess associations. Statistical associations were considered significant whenever the p value is less than 0.05.

Ethical clearance was obtained from Jimma University Medical Sciences Faculty (currently College of Public Health and Medical Sciences) ethical review committee and permission to conduct the study was obtained from JUSH. Verbal consent was obtained from the study subjects and the right of the respondents to withdraw or not to participate was respected. Additionally, names of participants were not used in the study and information obtained from patients was held confidentially.

In this study, Gestational Hypertension was defined as an elevated BP during pregnancy or in the first 24 hours postpartum without other signs or symptoms of Preeclampsia or preexisting

hypertension. Moreover, hypertension was defined as a BP greater than or equal to 140 mm Hg Systolic or 90 mm Hg Diastolic. The hypertension should be present on at least two occasions, at least 4 hours apart, but within a maximum of one week period. In particular, preeclampsia was defined as gestational hypertension plus proteinuria. One of the following findings was also necessary for a diagnosis of severe preeclampsia: Severe headache, blurry vision, and altered mental status; epigastric or right upper quadrant pain; elevated level of liver enzymes; BP  $\geq$  160/100mmHg; thrombocytopenia; proteinuria greater than 5g in a 24-hour sample; urine output less than 500ml in 24 hours; pulmonary edema or fetal growth restriction.

On the other hand, any pregnant woman with high BP and has seizure that cannot be attributed to some other cause was diagnosed to have eclampsia. Chronic hypertension was defined as hypertension present before the pregnancy or that has been diagnosed before the 20th week of gestation. Hypertension that persists for more than 42 days postpartum is also classified as chronic hypertension. The diagnosis of superimposed preeclampsia was based on one or more of the following findings: new-onset Proteinuria, severe exacerbation in hypertension, development of symptoms, Thrombocytopenia or abnormal liver enzymes.

Finally, HELLP syndrome was diagnosed when all of the following laboratory criteria were met: evidence of hemolysis on peripheral smear, SGOT (serum glutamic oxaloacetic transaminase)  $>$  72 IU/L, total bilirubin  $>$  1.2mg/dl, LDH (Lactate dehydrogenase) level greater than 600mg/dl, and platelet  $<$  100,000/ml.

## RESULTS

During the yearlong study period, there were a total of 1863 deliveries of which 158 (8.48%) were diagnosed to have HDP and 83 (52.5%) of these mothers were in the age range of 25 - 34 years. Most of the mothers (71.5%) were Oromo by ethnicity where one third (32.9%) had educational level below primary education and 64.6% of them were Muslims by religion. The majority (97.5%) of the mothers were married (Table 1).

**Table 1:** Socio-demographic characteristics of mothers admitted with the diagnosis of HDP, JUSH, April 2009 - March 2010.

Variables (n=158)	Frequency (%)
<b>Age</b>	
≤ 24	69 (43.7)
25-34	83 (52.5)
≥ 35	6 (3.8)
<b>Ethnicity</b>	
Oromo	113 (71.5)
Amhara	22 (13.9)
Kafa	7 (4.4)
Others*	16 (10.1)
<b>Educational status</b>	
Cannot read and write	46 (29.1)
Read and write only	6 (3.8)
Primary education	33 (20.9)
Secondary education	45 (28.5)
Beyond secondary	28 (17.7)
<b>Religion</b>	
Muslim	102 (64.6)
Orthodox	41 (25.9)
Protestant	15 (9.5)

\*Others: Dawro, Gurage

One hundred fifty two (66.7%) of the mothers who were admitted with HDP during the study period were nulliparous. But there was no statistically significant association between parity of the mothers and severity of the disease ( $p=0.511$ ) (Table 2). Of all the study subjects 16 (10.1%) of them gave history of pregnancy induced hypertension (PIH) during their previous pregnancies while only 3 (1.9%) mothers reported family history of PIH. One hundred fifty (95%) of the cases were due to pregnancy induced hypertension. Severe preeclampsia was the most common hypertensive disorder of pregnancy accounting for 51.9% of the cases followed by eclampsia which contributed for 23.4% of the cases. HELLP syndrome which is one of the most severe forms of the disorder affected 8.9% of the mothers. Moreover, there were 12 (7.6%) cases of mild preeclampsia, 8 (5.1%) mothers had simple gestational hypertension and five pregnancies were complicated by chronic hypertension out of which three were cases with superimposed preeclampsia.

**Table 2:** Association of parity, address and ANC follow up with type of HDP, JUSH, April 2009 - March 2010 (n=153).

Variables	Type of HDP					p-value
	Gestational HTN No(%)	Mild Pre-eclampsia No (%)	Severe Pre-eclampsia No (%)	Eclampsia No (%)	HELLP syndrome No (%)	
<b>Parity of mothers</b>						
Primipara	6 (3.9)	9 (5.9)	51 (33.3)	28 (18.3)	8 (5.2)	0.511
Multipara	2 (1.3)	3 (1.9)	31 (20.3)	9 (5.9)	6 (3.9)	
<b>Address*</b>						
Urban	4 (2.6)	7 (4.6)	45 (29.4)	6 (3.9)	4 (2.6)	0.001
Rural	4 (2.6)	5 (3.3)	37 (24.2)	31 (20.3)	10 (6.5)	
<b>ANC follow up</b>						
Yes	6 (3.9)	11 (7.2)	63 (41.2)	22 (14.4)	11 (7.2)	0.166
No	2 (1.3)	1 (0.7)	19 (12.4)	15 (9.8)	3 (1.9)	
<b>Total</b>	<b>8 (5.2)</b>	<b>12 (7.8)</b>	<b>82(53.6)</b>	<b>37 (24.2)</b>	<b>14 (9.2)</b>	

\*If gestational HTN and mild pre-eclampsia are considered mild forms of HDP and the others as sever forms, the  $OR=1.32(0.61<OR<4.94)$ . This shows that although the proportions of mothers with more sever forms of HDP is higher in rural areas; this difference is not statistically significant.

According to this study majority of the mothers who were affected by HDP (56.9%) were from rural area. Moreover, Residence area of the mothers (urban/rural) was found to have statistically significant association with the severity of HDP ( $p=0.001$ ) (Table 2). Twenty six percent of the 153 mothers with the disease had never had ANC visit during the index pregnancy. According to the study, HDP was found to be more common in mothers who had ANC visits during the current pregnancy. Moreover, there were more mothers with ANC visit who were found to be affected with the more severe forms of HDP but this finding is not statistically significant ( $p= 0.166$ ) (Table 2). There were two maternal deaths, both of whom were patients with eclampsia and both deaths occurred within the 1<sup>st</sup> 24 hours after admission. Moreover, eclampsia contributed for 12 of the 14 ICU admissions while the remaining 2 admissions were due to severe preeclampsia.

The rates of low and very low birth weight infants among 146 deliveries in the study subjects were 35.6% and 12.3%, respectively. Severe preeclampsia, eclampsia and HELLP syndrome took the lion share (92.9%) of these infants. There were 42 stillbirths yielding stillbirth rate of 27.5%. Of these still births, 38.1% and 35.7% were among mothers who had severe preeclampsia and eclampsia, respectively. There were also 25 Neonatal Intensive Care Unit (NICU) admissions and 10 Early Neonatal Deaths (ENND) of which majority were for the mothers with severe preeclampsia and eclampsia. The perinatal mortality rate in the study was 317.1 / 1000 births (Table 3). The rate of preterm delivery was 31.6% for all forms of HDP during the study period and 50% of the mothers who were diagnosed to have HELLP syndrome had preterm deliveries.

**Table 3:** Perinatal outcomes of pregnancies complicated by HDP, JUSH, April 2009- March 2010.

Perinatal outcome	Type of HDP				
	Gestational HTN No (%)	Mild Pre-eclampsia No (%)	Severe Pre-eclampsia No (%)	Eclampsia No(%)	HELLP syndrome No (%)
<b>Fetal Weight in Gram ( n= 146 )</b>					
< 1500	0	0	8 (5.5 )	5 ( 3.4)	5 ( 3.4)
1500-2499	2 ( 1.4)	3 ( 2.1)	28 ( 19.2)	14 ( 9.6)	5 ( 3.4)
> 2500	5 (3.4 )	9 ( 6.2)	44 ( 30.1)	14 ( 9.6)	4 ( 2.7)
<b>Total</b>	<b>7 (4.8 )</b>	<b>12 ( 8.2)</b>	<b>80 ( 54.8)</b>	<b>33 ( 22.6)</b>	<b>14 ( 9.6)</b>
<b>Fetal Outcome at delivery (n=153)</b>					
Stillbirth	0	3 ( 1.9)	16 ( 10.5)	15 ( 9.8)	8 ( 5.2)
Low Apgar score	0	2 (1.3 )	18 ( 11.8)	11 ( 7.2)	2 ( 1.3)
Normal Apgar score	8 (5.2 )	7 ( 4.6)	48 ( 31.4)	11 ( 7.2)	4 ( 2.6)
<b>Total</b>	<b>8 (5.2 )</b>	<b>12 ( 7.8)</b>	<b>82 ( 53.6)</b>	<b>37 ( 24.2)</b>	<b>14 ( 9.2)</b>
<b>Neonatal outcomes (N=111)</b>					
No complication	8 ( 7.2)	7 ( 6.3)	44 ( 39.6)	12 ( 10.8)	5 ( 4.5)
NICU* admission	0	1 (0.9 )	17 ( 15.3)	6 ( 5.4)	1 ( 0.9)
ENND**	0	1 (0.9 )	5 (4.5 )	4 ( 3.6)	0
<b>Total</b>	<b>8 ( 7.2)</b>	<b>9 (8.1 )</b>	<b>66 (59.5 )</b>	<b>22 ( 19.8)</b>	<b>6 ( 5.4)</b>

\*Neonatal Intensive Care Unit, \*\*Early Neonatal Death

On the other hand, the rates of instrumental and caesarean deliveries were 12/153 (7.8%) and 52/153 (34%), respectively and 56/153 (36.6%) deliveries were induced while 9/153 (5.9%)

pregnancies needed elective C/S. Major proportion of these intervention occurred in pregnancies complicated by severe preeclampsia and eclampsia (Table 4).

**Table 4:** Types of interventions, onset of labor and gestational age of mothers with HDP, JUSH, April 2009-March 2010 (n=153).

Variables	Type of HDP				
	Gestational HTN No (%)	Mild Pre-eclampsia No (%)	Severe Pre-eclampsia No (%)	Eclampsia No (%)	HELLP syndrome No (%)
<b>Mode of delivery</b>					
Spontaneous	5 (3.3)	6 (3.9)	46 (30.1)	22 (14.4)	10 (6.5)
Instrument	0	2 (1.3)	5 (3.3)	4 (2.6)	1 (0.7)
C/S	3 (1.9)	4 (2.6)	31 (20.3)	11 (7.2)	3 (1.9)
<b>Onset of labor</b>					
Spontaneous	8 (5.2)	10 (6.5)	44 (28.8)	21 (13.7)	5 (3.3)
Induction	0	1 (0.7)	32 (20.9)	15 (9.8)	8 (5.2)
Elective CS	0	1 (0.7)	6 (3.9)	1 (0.7)	1 (0.7)
<b>Gestational age at delivery</b>					
Preterm	0	2 (1.3)	27 (17.7)	13 (8.5)	7 (4.6)
Term	8 (5.2)	8 (5.2)	55 (36.0)	23 (15.0)	7 (4.6)
Post-term	0	2 (1.3)	0	1 (0.7)	0
<b>Total</b>	<b>8 (5.2)</b>	<b>12 (8.2)</b>	<b>82(53.6)</b>	<b>37(24.2)</b>	<b>14 (9.2)</b>

## DISCUSSION

The overall prevalence of HDP ranges between 5-10% globally which is a range which includes the prevalence in this study, 8.5%. Other studies in Ethiopia have also reported a comparable finding. In this study, the largest share of HDP has been taken by severe preeclampsia (51.9%) which was also the case in many other studies. A study in the Tikur Anbesa Hospital of Addis Ababa showed that more than 78% were due to severe preeclampsia. The prevalence of eclampsia in our study was 1.99% which is much greater than findings in other studies in Ethiopia and elsewhere. The small sample size and the fact that the study was undertaken in a tertiary referral hospital may have contributed for increased cases of eclampsia in this study (14-19).

Majority (66.5%) of the mothers affected by the disorder were nullipara which is similar with the finding of a study conducted in Addis. More

severe forms of HDP were found to be more common in nulliparous ladies but there was no statistically significant association between parity and severity of HDP. However, the proportion of mothers from rural area was 56.9% and there was statistically significant association between place of residence and the severity of HDP (14-16).

The proportion of unbooked mothers (25.3%) is comparable with the finding of the study in Addis which was 16%. But another study on eclampsia showed a significant association between the illness and lack of ANC follow up. The finding in this study might be related to the small number of study subjects (14, 16).

There were 2 deaths and 14 ICU admissions in this study and majority of these were due to eclampsia. The case fatality rate for eclampsia was 5.4% which is less than the 13% case fatality rate in the study in Addis Ababa but it is comparable with studies in other African countries ranging

between 5.3% and 7.7% (16). The 31.6% preterm delivery rate is less than the finding in the Addis Ababa study. There was 50% preterm delivery rate in pregnancies complicated by HELLP syndrome. However, a study in Portugal showed a statistically significant association between preterm delivery and severity of HDP. A significant association between HDP and low birth weight was shown by earlier studies in Ethiopia and Portugal but in this study statistical testing was not possible since there were no adequate cases to make the test valid.

The PNMR in this study was shown to be higher than other studies in the country, still most national and global studies revealed the existence of significant relation between PNMR and HDP. The average PNMR in the study area is 138.9 per 1000 live births and HDP contributed for 6.7% of the perinatal mortality rate (20).

The intervention rate by means of induction, caesarean section and instrumental delivery which were 36.6%, 34% and 7.8%, respectively were less than other national and global studies and this finding could be explained by the limited number of study subjects in this study (14-16, 21).

Based on the results of this study the prevalence of HDP is within the global range and majority of the pregnancies affected with the disease are due to the more severe forms of the disorder. The occurrence of the disease has been found to be less in mothers who were not booked for the index pregnancy which is against many other studies but this finding could be as a result of small sample size and should not be taken to discourage the importance of routine ANC follow up. There was significant association between the mothers' place of residence and the different types of HDP which would indirectly reveal poor access to health facility in rural areas which is an important contributing factor for the existence of the more severe forms of the disorder.

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 5.2% 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.

Therefore, the University Hospital and other health facilities in the surrounding should give due emphasis for early recognition and management of mothers with HDP. Moreover, improving the obstetric and neonatal care at delivery is essential to improve the maternal and perinatal outcomes of pregnancies complicated by the disorder.

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