



Patterns of Hypertensive Disorders of Pregnancy in Selected Hospitals of Tigray, Ethiopia

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Authors' contributions

This work was carried out in collaboration between all authors. Author HBK is the primary author, participated in the conceptualisation, design, acquisition, analysis and interpretation of the data and drafted the manuscript. Author FEG was the primary academic advisor, contributed for design, acquisition, analysis and interpretation of the data and critically revised the manuscript. Author WMA was co-advisor, contributed for design, acquisition, analysis and interpretation of the data and critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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ABSTRACT

Background: Hypertensive disorders of pregnancy is a common maternal health condition representing a spectrum of disease which is associated with increased risk of both adverse maternal and fetal outcomes. Despite the fact, there is limited evidence on the magnitude and trend of hypertensive disorders of pregnancy in Ethiopia.

Objective: This study aimed to describe the pattern of hypertensive disorders of pregnancy in selected hospitals of Tigray region.

Methods: The study was done in 6 randomly selected hospitals of Tigray region by reviewing medical records of all mothers admitted to the maternity units with the diagnosis of hypertensive disorders of pregnancy from September 2012 to August 2017. Data were abstracted using a checklist from the client's chart, delivery registration, health management information system

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database and the admission logbook. Data analysis was performed using SPSS for windows version 20.0 and presented using text, tables, graphs and chart.

Results: A total of 45,329 mothers were admitted for delivery in the selected hospitals in the last five years. Out of the total deliveries, 1347 (3%) were managed for one of the hypertensive disorders of pregnancy during the review period. Of the total cases, 132 (9.8%) were diagnosed for gestational hypertension, 724 (53.7%) suffered from severe preeclampsia and 143 (12.1%) from eclampsia. The overall magnitude of hypertensive disorders of pregnancy showed an increasing trend over the last 5 years ranging from 1.4% in 2013 to 4% in 2017. Similarly, severe preeclampsia/eclampsia showed a sharp increment in the first four years and a slight decline in the last 1 year.

Conclusion: Despite the major achievements in reducing maternal and perinatal morbidity and mortality in Ethiopia, the magnitude of hypertensive disorders of pregnancy remained high and with an increasing trend. Hence, health institutions should implement strong strategies of counselling, screening, and follow-up of mothers in the antenatal clinics.

Keywords: HDP; preeclampsia/eclampsia; gestational hypertension; PIH.

1. BACKGROUND

Globally, over half a million mothers die each year as a result of complications in pregnancy and childbirth; more than 99% of these deaths are in low and middle income countries and more than half occur in sub-Saharan region alone. Hypertensive disorder in pregnancy is one of the common causes of maternal death which complicates about 10% of pregnancies where by 2-8% of them go through preeclampsia/eclampsia [1-3].

Hypertensive disorders of pregnancy are common disorders representing a spectrum of disease that can be developed during pregnancy, labor/delivery or in the postpartum period. They are associated with an increased risk of both adverse maternal and fetal outcomes [1]. According to the national high blood pressure education program working group and task force on hypertension in pregnancy, American College of Obstetricians and Gynaecologists (ACOG), hypertensive disorders of pregnancy is classified into four categories: Chronic hypertension (of any cause that predates pregnancy), gestational hypertension (blood pressure elevation after 20 weeks of gestation in the absence of proteinuria or any of the severe features), preeclampsia-eclampsia (blood pressure elevation after 20 weeks of gestation with proteinuria or any of the severe features) and chronic hypertension superimposed with preeclampsia (chronic hypertension in association with preeclampsia) [1,4-6].

The world health organization (WHO) global analysis on causes of maternal death between 2003 and 2009 reported 14.0% of maternal

deaths due to hypertensive disorders of pregnancy [4]. In united states of America (USA), hypertensive disorders of pregnancy was identified as a cause of death in 12% of maternal demise [5]; the overall prevalence of hypertensive disorders of pregnancy increased from 6.7% to 8.1% in eight years period [6] and the incidence of preeclampsia increased by 25% in the past two decades [1]. Hypertensive disorders of pregnancy are the second major contributors to maternal deaths in developing countries [7]. Hypertensive disorders of pregnancy even remain as the main cause of maternal mortality in some African countries. For example, in a hospital based study in Ghana, hypertensive disorders of pregnancy, is attributed for 31.7% of maternal death surpassing haemorrhage [8].

Even though the overall maternal mortality appears to be decreasing over time, mortality due to hypertensive disorders is increasing. According to the limited information in Ethiopia, maternal mortality associated with hypertensive disorders of pregnancy (HDP), specifically preeclampsia/eclampsia is increasing in the last 25 years in general [9] and mainly in the last decade [10]. In addition, the EmONC study 2008, in Ethiopia showed that 11% of all maternal deaths and 16% of direct maternal deaths were due to the complication of hypertensive disorders/ preeclampsia-eclampsia [11]. In Tigray hypertensive disorder of pregnancy contributed for a direct maternal death of 19% [12] in 2013 to 8.1% in 2015 [13].

Despite the fact that there are some studies regarding the trends of maternal mortality and the causes of maternal death in Ethiopia, studies

on the magnitude and patterns of hypertensive disorders are limited. The studies are not only inadequate in terms of the number, but also they are limited to a single center/institution and conducted in a short period of time (commonly one year) in a small sample which failed to give a complete picture about the issue. Furthermore, some of the studies were conducted more than a decade ago and to our knowledge, there is no a single study in the study area, Tigray region on the topic of interest.

The main rationale for this study is to help policy makers to have a clear picture about the magnitude and distribution of hypertensive disorders of pregnancy and make evidence based decisions and resource mobilisations. Hence, it could contribute towards decreasing maternal and perinatal morbidity and mortality. It will also guide health professionals working in clinical areas to provide evidence based health services to prevent and manage complications associated with hypertensive disorders of pregnancy. Therefore; the aim of this study was to describe the pattern of hypertensive disorders of pregnancy in Tigray region over the last 5 years.

2. METHODS

The study was conducted in Tigray region, Ethiopia. Tigray Region is the northernmost of the nine regions of Ethiopia. It is bordered by Eritrea to the north, Sudan to the west, the Afar region to the east and the Amhara region to the south. The total projected population of the region is 5,396,235 in 2017; of which 2,654,947 are males and 2,741,287 females. Reproductive age group females (15-49years) comprise 23.5% of the population. The annual population growth rate and total fertility rate of the region was 2.5 and 4.6, respectively in 2015. There were 173,892 total expected pregnancies for the year 2015 which gives pregnancy rate of 3.4%. Of which 100 % of them received antenatal care service at least once and 60% have received antenatal care service 4 and more times; besides 63% of them were attended by skilled professionals at delivery. There are 201 health facilities providing basic emergency obstetrics and newborn care (BEmONC) services and 91 health facilities which provide comprehensive emergency obstetric and newborn care (CEmONC) services. Milder forms of hypertensive disorders are managed at the health center level, whereas the severe forms like severe pre-eclampsia and eclampsia are

managed in hospitals. There are 712 health posts, 201 health centers and 15 hospitals in the region. There are 3, 4, 77, 60, and 50 hospitals, health centres, medium clinics, primary clinics and specialty clinics respectively owned by private owners and Non Governmental Organizations (NGOs) [14,15].

This study was conducted in 6 randomly selected hospitals, which are geographically distributed over the entire Tigray region, namely; Ayder comprehensive, specialised, Lemlem Carl, Adigrat, Saint Marry, Suhul and Kahsay Abera hospitals. The average number of delivery is about 1500 and the average number of cases for hypertensive disorders of pregnancy is around 50 in each hospital every year. These hospitals provide comprehensive diagnostic and management services for hypertensive disorders of pregnancy starting from the mild form of gestational hypertensive to the severe forms of preeclampsia/eclampsia and hemolysis, elevated liver enzyme and low platelet (HELLP) syndrome. Thus, a complete record on the patterns of hypertensive disorders can be found in these hospitals. On the contrary, the lower health facilities such as health centers provide only the primary care, so a mother with a severe form of the hypertensive disorder is supposed to be referred to the higher level which makes the follow up interrupted.

This study employed a hospital based retrospective study design and the source population was mothers who were admitted to the maternity ward in the selected hospitals in the last five successive years (September 1, 2012 to August 31, 2017). The study population was mothers admitted to the maternity ward with the diagnosis of hypertensive disorders of pregnancy in the last five years. The inclusion criteria were, gestational age beyond 20 weeks, blood pressure measurement $\geq 140/90$ mmHg and those whose admission cards were identified, retrieved and with complete information. All mothers with the diagnosis of hypertensive disorders and registered in the selected hospitals in the last five years were included in the sample and the sampling techniques used was consecutive sampling.

To collect the data, a checklist was adapted from the national basic emergency obstetrics and newborn care (BEmONC) module [16] and WHO guideline [17] to extract relevant data from the client's medical records. The checklist consisted of information regarding maternal demographic

data, reproductive history, characteristics of pregnancy and delivery. Information regarding the variables of interest was retrieved from delivery and admission records, health management information system (HMIS) records and client cards of all mothers with hypertensive disorders of pregnancy who delivered in the last five years.

Six BSc midwives were recruited as data collectors and trained for 3 days. The data collection proceeded from June to September 2017. The data collection process was overseen by supervisors and the collected data was checked on a daily basis to avoid inconsistencies and errors. The investigator closely followed the supervisors and data collectors. Data was coded, entered, cleaned and analysed using SPSS version 20 software. Descriptive statistics were computed and proportionate cause specific morbidity ratio was calculated for each type of hypertensive disorders of pregnancy (HDP). Data were presented using figures, tables and texts.

In this study some terms were operationalised as follows:

Mild Preeclampsia: Blood pressure (BP) \geq 140/90 mmHg after 20 weeks of pregnancy without severity features.

Severe pre-eclampsia: Diastolic blood pressure of 110 mm Hg or higher; proteinuria of 3+ or higher; signs and symptoms, including headache, hyperreflexia, blurred vision, oliguria, epigastric pain, and pulmonary oedema.

Eclampsia: Convulsions; diastolic blood pressure of 90 mm Hg or higher after 20 weeks of pregnancy; proteinuria of 2+ or higher; signs and symptoms of severe pre-eclampsia may be present.

HDP: Any type, including gestational hypertension, chronic hypertension, preeclampsia/ eclampsia, or preeclampsia/ eclampsia superimposed on chronic hypertension.

Ethical clearance was sought from the Institutional Review Board (IRB) of Addis Ababa University, College of Health Sciences. Support letter was written from the Tigray Regional Health Bureau to respective health institutions. Permission was obtained from the administrators of the institutions to take client's data. It was explained that any client information would not

be revealed; the name of participants would not be written in the form and all information given by the study participants would be kept confidentially. The output of this study would benefit mothers, health facilities, researchers, policy makers and the community.

3. RESULTS

A total of 45,329 mothers were admitted for delivery in the selected hospitals in the last five years. Among all deliveries, 1404 cases of hypertensive disorders in pregnancy were retrieved. However, only 1347 cases were used for analysis after excluding 57 patient cards due to either incomplete or failure to identify. Thus, out of the total deliveries, 1347 (2.97%) were found to have hypertensive disorders of pregnancy and 887 (1.95%) were diagnosed as severe preeclampsia/eclampsia in the review period (from 1st September 2012 to August 31, 2017) (Table 1). Among the participating hospitals, Adigrat hospital took the major share of hypertensive disorders of pregnancy, accounting 24.3%, while the other hospitals have a similar share with an average of 15.16%. More than half of the cases (56.1%) were rural residents. The mean \pm SD age of the mothers was 26.43 \pm 5.88; the minimum and maximum ages were 15 and 48 respectively. Besides, majority of the mothers (83.7) were between 18 and 33 years old and only 1.3% of mothers were less than 18 years (Table 2).

Of the total cases, 132 (9.8%) were diagnosed as gestational hypertension, 724 (75.1%) as preeclampsia, 40(3%) as chronic hypertension and 143 (12.1) as eclampsia (Fig. 2). The majority of the cases were diagnosed either during pregnancy or labor/delivery; only in 28 (2.07%) cases hypertensive disorder was diagnosed in the postpartum period. Three (0.22%) mothers had developed preeclampsia superimposed on chronic hypertension and 16 (1.18%) mother developed atypical preeclampsia/eclampsia. Of the total maternal records reviewed around 60 % were primiparas. The mean value for gravidity and parity were 2.61 and 1.97 respectively. Among the cases 92.3% of them had a history of ANC follow up and 72 % of them attended less than four visits (Table 2).

The overall magnitude of hypertensive disorders of pregnancy showed an increasing trend over the last 5 years, ranging from 1.4% in 2013 to 4% 2017. Similarly, severe preeclampsia/

eclampsia ranged from 0.9 in 2013 to 2.8 in 2016. The hypertensive disorders of pregnancy and severe preeclampsia/eclampsia showed a sharp rise in the last four years and maintained in the last 1 year and even slight decline for severe preeclampsia/eclampsia.

Table 1. Distribution of proportionate cause specific morbidity for hypertensive disorders of pregnancy (HDP) cases in selected hospitals of Tigray, Ethiopia

Year	Total births	Overall HDP		S. pre/eclampsia	
		Frequency	%	Frequency	%
2013	6909	98	1.41	61	0.88
2014	7785	148	1.90	95	1.22
2015	9670	269	2.78	169	1.74
2016	10281	404	3.92	287	2.79
2017	10684	428	4.00	275	2.57
Total/average	45329	1347	2.97	887	1.95

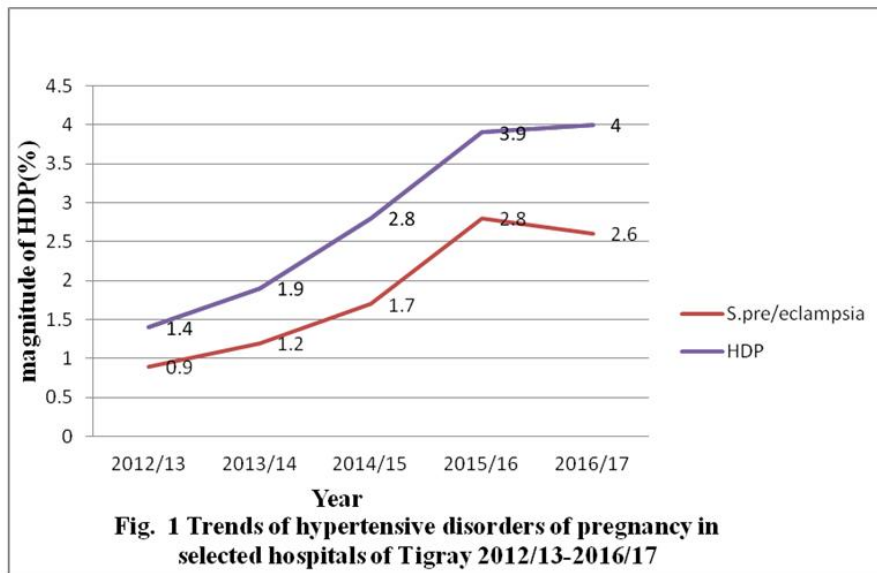


Fig. 1 Trends of hypertensive disorders of pregnancy in selected hospitals of Tigray 2012/13-2016/17

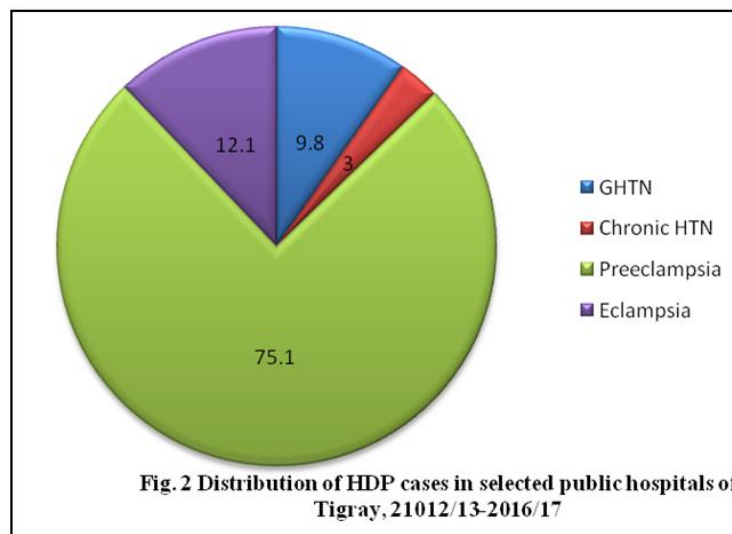


Fig. 2 Distribution of HDP cases in selected public hospitals of Tigray, 2012/13-2016/17

Table 2. Background and obstetrics characteristics of mothers by hypertensive disorders of pregnancy delivered in selected hospitals of Tigray, 2013-2017

S.No	Variable (N=1347)	Frequency	Percent
1	Hospital		
	Ayder referral hospital	215	16.0
	Adigrat Hospital	327	24.3
	Axum Hospital	199	14.8
	Lemlem Carl Hospital	178	13.2
	Kahsay Abera Hospital	230	17.1
	Suhul Hospital	198	14.7
	Total	1347	100
2	Residence		
	Urban	592	43.9
	Rural	755	56.1
3	Year		
	2013	98	7.3
	2014	148	11.0
	2015	269	20.0
	2016	404	30.0
	2017	428	31.8
4	Age category		
	<=18	18	1.3
	19-33	1127	83.7
	34-48	202	15.0
5	ANC follow up		
	Yes	1243	92.3
	No	104	7.7
6	Number of ANC (N=1243)		
	Once	69	5.6
	Twice	356	28.6
	3 times	470	37.8
	4 times	303	24.4
	More than 4 times	45	3.6
7	Gravidity		
	1	519	38.5
	2	296	22.0
	3	193	14.3
	>=4	339	25.2
8	Parity		
	1	804	59.7
	2	222	16.5
	3	128	9.5
	>=4	193	14.3

In all the study sites (hospitals) included in the study severe pre-eclampsia predominated except in Humera hospital where it is surpassed by mild pre-eclampsia. The magnitude of eclampsia is similar and comparable across the hospitals.

The mean \pm SD gestational age at diagnosis of the cases was 36.4weeks. Likewise, the mean value for newborn's weight, Apgar score at 1 minute and Apgar score at 5 minutes were 2.61Kg, 6.48, and 7.43 respectively. Out of the total birth, 13.2% of newborns to cases were

dead and out of them 80.3% accounted for fetal death (born dead). Over the last five years, review period a total of 50 (3.7%) mothers with hypertensive disorders were died. Among the HDP cases admitted to the hospitals 40.1% of them were preterm deliveries and a fifth of deliveries were confirmed to have intrauterine growth restriction. Twenty one point one percent of mothers with hypertensive disorders of pregnancy ended up in caesarean section delivery, whereas 7.1% of them were instrumental delivered (Table 3).

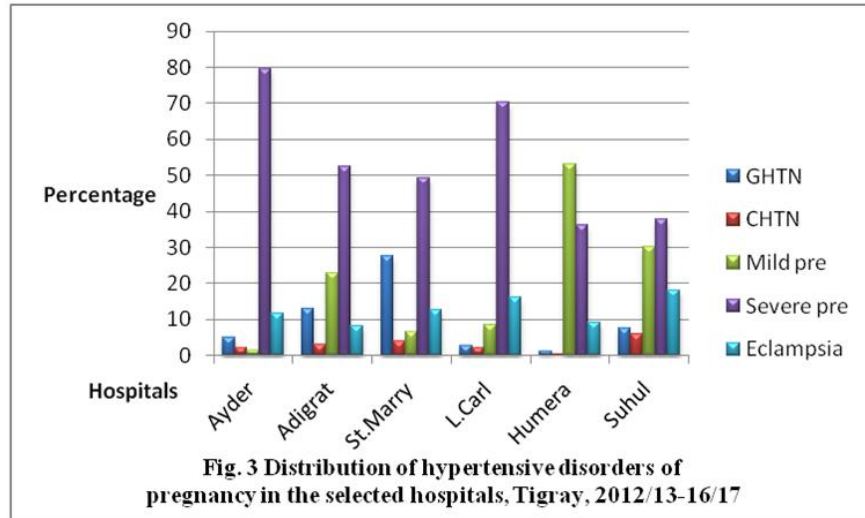


Table 3. Obstetrics complications and delivery outcomes of mothers with HDP delivered in selected hospitals of Tigray, 2013-2017

S.No	Variable	Frequency	Percent
5	Mode of delivery		
	Spontaneous vaginal delivery (SVD)	965	71.6
	Caesarean section (CS)	288	21.4
	Instrumental Delivery	94	7.0
6	Type of instrument (N=94)		
	Vacuum	67	71.3
	Forceps	27	28.7
7	Delivery initiation		
	Spontaneous	841	62.4
	Induced	506	37.6
8	Complication		
	Abruption placenta	53	3.9
	Placenta previa	37	2.7
	Postpartum hemorrhage (PPH)	50	3.7
9	Maternal outcome		
	Alive	1297	96.3
	Dead	50	3.7
10	Intrauterine growth restriction (IUGR)		
	Yes	272	20.2
	No	942	69.9
	Unknown	133	9.9
11	Newborn outcome		
	Alive	1169	86.8
	Death	178	13.2
12	Time of death (N=178)		
	Born Dead	143	80.3
	Immediately After birth	24	13.5
	Within the first 24 hours	5	2.8
	Within the first 7 days	6	3.4
13	A measure taken at delivery		
	Nothing done	1051	78.0
	Admitted to ICU	126	9.4
	Resuscitation done	170	12.6

Table 4. Distribution of background and obstetrics variables by types of hypertensive disorders of pregnancy in selected hospitals of Tigray, 2013-2017

Variables	Types of HDP (Fre /%)					
	Gestational Hypertension	Chronic Hypertension	Mild preeclampsia	Sever Preeclampsia	Eclampsia	HELLP syndrome
Year						
2013	27 (20.5)	3 (7.5)	7 (2.4)	46 (6.4)	14 (9.9)	1 (4.8)
2014	23 (17.4)	2 (5.0)	28 (9.7)	80 (11.0)	14 (9.9)	1 (4.8)
2015	26 (19.7)	6 (15.0)	68 (23.6)	141 (19.5)	26 (18.3)	2 (9.5)
2016	30 (22.7)	8 (20.0)	79 (27.4)	239 (33.0)	41 (28.9)	7 (33.3)
2017	26 (19.7)	21 (52.5)	106 (36.8)	218 (30.1)	47 (33.1)	10 (47.6)
Residence						
Urban	64 (48.5)	20 (50.0)	115 (39.9)	337 (46.5)	47 (32.9)	9 (45.0)
Rural	68 (51.5)	20 (50.0)	173 (60.1)	387 (53.5)	95 (66.9)	12(57.1)
Age						
<=18	2 (1.5)	0 (0.0)	5 (1.7)	6 (0.8)	5 (3.5)	0 (0.0)
19-33	104 (78.8)	29 (72.5)	251 (87.2)	604 (83.4)	118 (83.1)	21 (100)
34-48	26 (19.7)	11 (27.5)	32 (11.1)	114 (15.7)	19 (13.4)	0 (0.0)
ANC follows up						
Yes	102 (77.3)	36 (90.0)	280 (97.2)	677 (93.5)	130 (91.5)	18 (85.7)
No	30 (22.7)	4 (10.0)	8 (2.8)	47 (6.5)	12 (8.5)	3 (14.3)
ANC visit						
Once	1 (1.0)	1 (2.8)	19 (6.8)	38 (5.6)	7 (5.4)	3 (16.7)
Twice	25 (24.5)	7 (19.4)	99 (35.4)	178 (26.3)	42 (32.3)	5 (27.8)
3 times	52 (51.0)	19 (52.8)	110 (39.3)	240 (35.5)	41 (31.5)	8 (44.4)
4 times	22 (21.6)	9 (25.0)	49 (17.5)	189 (27.9)	33 (25.4)	1 (5.6)
more than 4	2 (2.0)	0 (0.0)	3 (1.1)	32 (4.7)	7 (5.4)	1 (5.6)
Gravidity						
1	41 (31.1)	6 (15.0)	117 (40.6)	263 (36.3)	80 (56.3)	12 (57.1)
2	30 (22.7)	11 (27.5)	73 (25.3)	159 (22.0)	19 (13.4)	4 (19.0)
3	23 (17.4)	8 (20.0)	41 (14.2)	102 (14.1)	16 (11.3)	3 (14.3)
>=4	38 (28.8)	15 (37.5)	57 (19.8)	200 (27.6)	27 (19.0)	2 (9.5)

Variables	Types of HDP (Fre /%)					
	Gestational Hypertension	Chronic Hypertension	Mild preeclampsia	Sever Preeclampsia	Eclampsia	HELLP syndrome
Parity						
1	63 (47.7)	18 (45.0)	194 (67.4)	418 (57.7)	96 (67.6)	15 (71.4)
2	30 (22.7)	9 (22.5)	48 (16.7)	114 (15.7)	18 (12.7)	3 (14.3)
3	17 (12.9)	6 (15.0)	20 (6.9)	73 (10.1)	10 (7.0)	2 (9.5)
>=4	22 (16.7)	7 (17.5)	26 (9.0)	119 (16.4)	18 (12.7)	1 (4.8)

Table 5. Distribution of delivery outcomes by types of hypertensive disorders of pregnancy in selected hospitals of Tigray, 2013-2017

Variables	Types of HDP (Fre/%)					
	Gestational Hypertension	Chronic Hypertension	Mild preeclampsia	Severe Preeclampsia	Eclampsia	HELLP syndrome
Mode of delivery						
SVD	102 (77.3)	34 (85.0)	210 (72.9)	508 (70.2)	95 (66.9)	16 (76.2)
CS	24 (18.2)	4 (10.0)	44 (15.3)	174 (24.0)	38 (26.8)	4 (19.0)
Instrumental	6 (4.5)	2 (5.0)	34 (11.8)	42 (5.8)	9 (6.3)	1 (4.8)
Delivery initiation						
Spontaneous	105 (79.5)	28 (70.0)	218 (75.7)	381 (52.6)	95 (66.9)	14 (66.7)
Induced	27 (20.5)	12 (30.0)	70 (24.3)	343 (47.4)	47 (33.1)	7 (33.3)
Maternal outcome						
Alive	127 (96.2)	38 (95.0)	285 (99.0)	695 (96.0)	132 (93.0)	20 (95.2)
Dead	5 (3.8)	2 (5.0)	3 (1.0)	29 (4.0)	10 (7.0)	1 (4.8)
IUGR						
Yes	53 (40.2)	8 (20.0)	29 (10.1)	149 (20.6)	24 (16.9)	9 (42.9)
No	79 (59.8)	31 (77.5)	238 (82.6)	489 (67.5)	95 (66.9)	10 (47.6)
Unknown	0 (0.0)	1 (2.5)	21 (7.3)	86 (11.9)	23 (16.2)	2 (9.5)
Newborn outcome						
Alive	124 (93.9)	36 (90.0)	280 (97.2)	606 (83.7)	109 (76.8)	14 (66.7)
Death	8 (6.1)	4 (10.0)	8 (2.8)	118 (16.3)	33 (23.2)	7 (33.3)

Variables	Types of HDP (Fre/%)					
	Gestational Hypertension	Chronic Hypertension	Mild preeclampsia	Severe Preeclampsia	Eclampsia	HELLP syndrome
Time of death						
Born Dead	3 (37.5)	3 (75.0)	7 (77.8)	94 (81.0)	30 (88.2)	6 (85.7)
Immediately After birth	4 (50.0)	1 (25.0)	2 (22.2)	13 (11.2)	4 (11.8)	0 (0.0)
Within the first 24h	1 (12.5)	0 (0.0)	0 (0.0)	4 (3.4)	0 (0.0)	0 (0.0)
Within the first 7d	0 (0.0)	0 (0.0)	0 (0.0)	5 (4.3)	0 (0.0)	1 (14.3)
A measure taken at delivery						
Nothing done	107 (81.1)	35 (87.5)	243 (84.4)	538 (74.3)	112 (78.9)	16 (76.2)
Admitted to ICU	3 (2.3)	2 (5.0)	22 (7.6)	83 (11.5)	14 (9.9)	2 (9.5)
Resuscitation done	22 (16.7)	3 (7.5)	23 (8.0)	103 (14.2)	16 (11.3)	3 (14.3)
Gestational age						
<=34 weeks	8 (6.1)	5 (12.5)	24 (8.3)	165 (22.8)	34 (23.9)	7 (33.3)
34.1-36.6	26 (19.7)	5 (12.5)	65 (22.6)	175 (24.2)	26 (18.3)	1 (4.8)
>=37	98 (74.2)	30 (75.0)	199 (69.1)	384 (53.0)	82 (57.7)	13 (61.9)
Weight						
Low birth weight	23 (17.4)	11 (28.2)	58 (20.1)	276 (38.8)	53 (37.6)	7 (35.0)
Normal	109 (82.6)	28 (71.8)	230 (79.9)	436 (61.2)	88 (62.4)	13 (65.0)
APGAR score at 1 minute						
Low	19 (14.4)	13 (32.5)	75 (26.0)	239 (33.0)	58 (40.8)	8 (38.1)
Normal	113 (85.6)	27 (67.5)	213 (74.0)	485 (67.0)	84 (59.2)	13 (61.9)
APGAR score at 5 minutes						
Low	8 (6.1)	4 (10.0)	27 (9.4)	154 (21.3)	38 (26.8)	7 (33.3)
Normal	124 (93.9)	36 (90.0)	261 (90.6)	570 (78.7)	104 (73.2)	14 (66.7)

A higher proportion of mild preeclampsia was observed in Humera hospital. Similarly, the proportion of gestational hypertension is comparable with the proportion of HELLP syndrome in St. Marry hospital Aksum. A similar proportion of gestational and chronic hypertension cases were observed in both rural and urban areas.

Out of the total 506 induced delivery cases, 391 (73.7%) were due to severe preeclampsia/eclampsia. Regarding to the measure of delivery 46.7% of newborns born from mothers of severe preeclampsia/eclampsia were resuscitated or admitted to ICU; whereas in the mild cases such as gestational hypertension and mild preeclampsia nothing was done in more than 80% of deliveries. The majority of the fetal deaths (87.4%) occurred among the severe preeclampsia/eclampsia cases.

4. DISCUSSION

The aim of the study was to describe the pattern of hypertensive disorders of pregnancy in selected hospitals of Tigray region over the last 5 years. The present study revealed that the overall magnitude of hypertensive disorders of pregnancy was 2.97%. According to previous studies, wide variations have been reported on the prevalence of hypertensive disorders of pregnancy in different parts of the globe and this is believed to be influenced by parity, genetic predisposition, and environmental factors [18]. Gestational hypertension more often affects nulliparous women than multiparas. The current study is in line with the 3.1% in Urban Ghana by Middendorp et al. [19]; comparable with 2.32% by Zibaeenezhad in Iran [20], 5.22% in China [21], 4.6% in Japan [22], 3.7% in Nigeria [23] 3.9% in Debre Berhan, Ethiopia [24] but lower than the 9.8% in South Wales [25] and 8.5% in Jimma Ethiopia [26]. The reason for the variation might be the fact that some of the studies were conducted in a specialised university referral hospital only which could increase the prevalence. In addition, the time and geographical difference may contribute to the discrepancy. Majority of the cases (56.1%) were from rural areas which is consistent with previous study in Jimma where by 56.9% of mothers affected by HDP were from rural area [26].

The review over the last five years showed an increasing trend for the overall types of hypertensive disorders of pregnancy; it increased from 1.4% in 2013 to 4.0% in 2017 which is

comparable with the 1.8% to 5.7% change in Debre Berhan, Ethiopia over four years period [24] and study by *Kuklina EV* in USA [6]. The overall hypertensive disorder and severe preeclampsia/eclampsia showed an increasing trend except the slight decline for preeclampsia/eclampsia in the last 1 year review period. This could be due to the fact that on one hand, screening and counselling practices in the prenatal care might not be strong to identify gestational hypertension and mild preeclampsia cases and eventually to prevent development of severe preeclampsia; on the other hand magnesium sulphate is routinely given for severe preeclampsia cases in recent years in all hospitals and that could in turn decrease the occurrence of eclampsia to some degree.

The prevalence of preeclampsia and eclampsia among all deliveries were 2.2% and 0.7% respectively which is consistent with the 2.13 % for preeclampsia in Iran [20] but lower than the finding in Mongolia where by researchers reported 4.1% prevalence of preeclampsia [27]. The 0.7% prevalence of eclampsia in this study is higher than the one reported in Iran (0.03%) [20]. The prevalence of chronic hypertension was 0.08% among all deliveries which is lower than previous reports [20, 26]. The lower prevalence might be associated with the predominantly younger population of the cases studied, noting that chronic hypertension is associated with age.

In the current study among hypertensive disorder of pregnancy cases, Preeclampsia (75.1%) took the lion share followed by eclampsia (12.1%) and 65.8% for severe preeclampsia/ eclampsia combined. This finding is by far lower than the 78.2% for severe preeclampsia/ eclampsia in another study at Addis Ababa [28]. The reason for the variation may be the intervention instituted recently, specifically routine administration of magnesium sulphate. However, the commonest type of hypertensive disorder of pregnancy in the current study being preeclampsia (75.1%) is in line with previous reports though the magnitude varies, for instance it was 46.4% in Nigeria [23].

In the present study 40% of deliveries among the hypertensive disorders of pregnancy cases were preterm, of which the majority (79%) were seen in pre-eclamptic mothers. This report is in line with the finding from a study in Bebre Berhan (35.4% were preterm and 82.1% were in pre-eclamptic mothers) [24]. Majority of the fetal deaths (87.4%) occurred among the sever

preeclampsia/eclampsia cases. This is consistent with a study conducted in Sudan [29] in which the rate of small for gestational age and neonatal mortality was higher in pre eclampsia compared to other hypertensive groups. Similarly a study in Kampala, Uganda reported that adverse neonatal outcomes were associated with severe preeclampsia [30]. The caesarean section rate in this study was 21.1% which is higher than the caesarean section rate among mothers with hypertensive disorders of pregnancy reported in Zimbabwe (12.5%) by Muti et al. [31] and by far lower than the case in Nigeria (55.2%) [23] as well as in china (76.95%) [21].

This study tried to show the picture of hypertensive disorders of pregnancy in general and the different types of HDP in particular over the last five years. The nature of the data being record review might have its own limitation as there could be a problem in recording and documentation.

5. CONCLUSION

Hypertensive disorder of pregnancy in Tigray is found to be 2.97%; the overall trend showed hypertensive disorders of pregnancy are increasing over time ranging from 1.4% in 2013 to 4% in 2017. In this study, severe preeclampsia is the most common of all pregnancy related hypertension disorders followed by mild pre-eclampsia and Eclampsia. Despite the major achievements in reducing maternal and perinatal morbidity and mortality associated with HDP in general and sever preeclampsia/eclampsia in particular; much has to be done further to decrease the substantial maternal and perinatal mortality. Health institutions should have strong strategies of screening, counselling, follow-up and referral linkage of mothers in the antenatal clinic. Besides, health offices and health bureaus should avail necessary diagnostic and treatment materials/supply on time; should be able to design a strong supportive supervision and implement mentorship activities to narrow the gap. By doing so, it is possible to identify cases of hypertensive disorders of pregnancy early and in turn decrease the severe forms of preeclampsia and eclampsia.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical clearance was sought from the Institutional Review Board (IRB) of Addis Ababa University, College of Health Sciences. Support letter was written from the Tigray Regional Health Bureau to respective health institutions.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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