WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF MEDICINE

CLINICAL PROFILE OF PATIENTS WITH HYPERTENSIVE CRISIS IN WOLKITE UNIVERSITY SPECIALIZED TEACHING HOSPITAL ADULT MEDICAL EMERGENCY FROM AUGUST 2021-AUGUST 2022 WOLKITE ETHIOPIA

INVESTIGATORS: -

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-NEBIL SHAFI (MEDICAL INTERN)

ADVISOR: - MR DEREJE M; ASSISTANT PROFESSOR (BSC, MPH)

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ACKNOWLEDGMENT

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ABSTRACT

Background; Hypertension is an Increasing public health problem in many developing countries including Ethiopia. The Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of high BP Reported that chronic hypertension is affecting over 2.8 billion Individuals worldwide. Uncontrolled hypertension, may lead to hypertensive crises, consisting of hypertensive Urgencies or Emergencies with or without End organ damage respectively. There is a paucity of data on patients in hypertensive crises presenting to emergency departments in southern Ethiopia including the ED of WUSTH.

Objective; to assess the clinical profile of patients presented with Hypertensive Crisis to WUSTH medical emergency From August 2021-August 2022

Methodology; an institution based retrospective cross-sectional study was conducted by reviewing records with diagnosis of hypertensive crisis with systolic/diastolic BP raised to >180/110 mmHg admitted to WUSTH from August 2021- August 2022. Patient's medical records with complete information were enrolled consecutively. Socio-demographic, clinical character, and other related variables were collected using a structured checklist. Data was cleaned, entered and analyzed using SPSS version 23. The study findings were summarized using mean, median, frequency and proportions and presented by texts, graphs and tables.

Result; A total of 215/2629(8.1%) patient medical records were included in the analysis. The majority were males 116(53.41%). The mean age of the entire patients was 56 ± 16.483. 142(60%) of patients have a documented history of hypertension and on antihypertensive drugs. The majority of cases 117/215 (54.4%) were hypertensive urgencies. The most common presenting signs and symptoms at admission were headache (n = 61, 28.4%), extremity weakness (48/215, 22.3%) and change in mentation (27/215, 12.5%). RFT, ECG, CXR and brain CT were commonly requested investigations. Nifedipine (94/215) and Captopril (67/215) were the most commonly prescribed oral drugs; Whereas, IV Lasix (10/215) was the most commonly prescribed IV drug for acute BP control. Eight (3.7%) patients died at ED. Almost all hospital mortality was attributed to hypertensive emergencies, stroke accounting for 60% of cases.

Conclusion; in our retrospective study of adult patients with hypertensive crisis hypertensive emergency was related with substantial morbidity and mortality. Hence, hypertensive patients should be strictly managed accordingly, and promoting early screening programs could reduce the risk of TOD .Thus this study recommends further researches to be done to determine the etiology, pathophysiology and the most appropriate strategies for prevention and management of hypertensive crisis.

Key Words: hypertensive crisis, hypertensive emergency, hypertensive urgency, target organ damage

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ACRONYMS

ACC: American College of Cardiology

ACEI: Angiotensin Converting Enzyme Inhibitor.

AHA: American Heart Association

BP: Blood Pressure

BUN: Blood Urea Nitrogen

CBE: Community Based Education

CCB: Calcium Channel Blockers

CXR: Chest X-Ray

DACA: Drug Administration and Control Authority

DBP: Diastolic Blood Pressure

ECG: Echocardiography

ED: Emergency Departments

GCS: Glasgow Coma Scale

HTN: Hypertension

IV: Intravenous

ICU: Intensive Care Unit

JNC: Joint National Committee

MI: Myocardial infarction

OPD: Out Patient Department

PO: Per Os

RBS: Random Blood Sugar

RFT: Renal Function Test

SBP: Systolic Blood Pressure

TOD; Target Organ Damage

WHO; World Health Organization

WUSTH; Wolkite University Specialized Teaching Hospital

CHAPTER ONE; INTRODUCTION

1.1 Background information

Elevated blood pressure (BP) readings were thought to be associated with, but not causing, morbidity and mortality for most of the 20th century.

After large population-based studies in the 1960s, such as the Framingham study, physicians begin to focus on hypertension as a treatable risk factor for stroke, myocardial infarction (MI), peripheral vascular disease, congestive heart failure, and renal disease.

Hypertension is one of the most important common chronic diseases, affecting approximately 1.28 Billion worldwide. (1)

Clinically hypertension can be defined as that level of blood pressure at which institution of treatment reduces blood pressure related morbidity and mortality

The Joint National Committee (JNC) report describes hypertension using a baseline blood pressure of 115/75mmHg, reporting that the risk of cardiovascular disease doubles with each incremental increase of 20/10mmHg.

It classifies hypertension as;

1) Normal < 120/80mmHg
2) Pre HTN 120-139/80-89mmHg
3) Stage I 140-159/90-99mmHg
4) Stage II > 160/100mmHg

Table 1 2017ACC/AHA Blood pressure categories in the new guideline

BLOOD PRESSURE CATEGORY	Systolic mm Hg		Diastolic mm Hg
Normal	Less than 120	And	Less than 80
Elevated	120-129	And	Less than 80
Hypertension stage 1	130-139	Or	80-89
Hypertension stage 2	140 or higher	Or	90 or higher
Hypertensive crisis	Higher than 180	And/or	Higher than 110

In children and adolescents hypertension is generally defined as systolic and on diastolic BP > 95th percentile for age, gender and height

The 2003 JNC on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure JNC 7 defines " hypertensive crisis " as a systolic BP (SBP) >179 mmHg or a diastolic BP (DBP) > 109 mmHg with or without acute target organ involvement, while it is important to define a true emergency from urgency .(22)

Hypertensive emergencies represent severe elevations in BP that are complicated by evidence of progressive target organ dysfunction and require immediate BP reduction (not necessarily to normal levels) to prevent or limit target organ damage (TOD). Examples include hypertensive encephalopathy, sympathetic crisis, perioperative hypertension, acute aortic dissection, acute coronary event, subarachnoid hemorrhage or cerebrovascular accident, pre-eclampsia or eclampsia of pregnancy. (23)

The hypertensive urgency is a less clearly defined condition in which severe uncontrolled hypertension is observed in a patient who may have evidence of previous end-organ damage related to hypertension, but in whom there exists no evidence of ongoing or imminent target organ dysfunction related to the current episode of hypertension.

Most often hypertensive urgency occurs in patients with previously diagnosed chronic hypertension. These patients do not require hospital admission or acute lowering of BP and can be effectively managed in the ED with oral agents and appropriate follow-up within 24 h to several days, depending upon individual patient characteristics. (8)

Although the exact causes of sudden severe hypertension are largely unknown, there are risk factors associated with hypertensive crisis include female sex, obesity, coronary artery disease, somatoform disorder, a high number antihypertensive medications, and non-compliance to medication prescription.(3)

Other risk factors include a sedentary lifestyle, increased age, and Caucasian race, physician treating hypertension poorly, Illicit drug use & insufficient access to care.

Hypertensive urgencies frequently present with headache (22%), epistaxis (17%), faintness, and psychomotor agitation (10%) and hypertensive emergencies frequently present with chest pain (27%), dyspnea (22%) and neurological deficit (21%). (23) (24)

Types of end-organ damage associated with hypertensive emergencies include cerebral infarction (24%), acute pulmonary edema (23%) and hypertensive encephalopathy (16%), as well as cerebral hemorrhage (4.5%).

Important factor that limits morbidity and mortality from these disorders is prompt and carefully considered therapy. Unfortunately, hypertensive emergencies and urgencies are among the most misunderstood and mismanaged of acute medical problems seen today.

The primary goal of intervention in a hypertensive crisis is to safely reduce BP. Immediate reduction in BP is required only in patients with acute end-organ damage (i.e. hypertensive emergency). This requires treatment with a titratable short-acting intravenous (IV) antihypertensive agent, while severe hypertension with no acute end-organ damage is usually treated with oral antihypertensive agents.

Patients with hypertensive emergencies are best treated in an intensive care unit (ICU) with titratable IV hypotensive agents. (3)

1.2 Statement of Problem

Epidemiological data on prevalence and clinical features of patients with hypertensive crises are lacking In spite of their relevance from public health perspective.

Hypertension is a common clinical problem affecting, approximately 1.28 Billion individuals worldwide and Hypertensive crises are among the most mismanaged acute medical problems seen today and it is also very important to know that reflex of rapidly lowering BP Is associated with poor patient outcomes(1).

Trends in the Incidence of Hypertensive Emergencies in US Emergency Departments(ED) From 2016 to 2021, published on American journal of heart association showed that the total hypertensive emergencies by their definition increased by 16.2% per year from 2016 to 2021. Year-over-year hypertensive emergencies remained a rare diagnosis, with an incidence of 677 per million adult ED visits in 2016 and 1640 per million adult ED visits in 2021, yielding an estimated rate increase of 13.9% per year. This year-over-year change in the incidence of hypertensive emergency remained statistically significant. (5) (6)

According to the 2019 World Health Organization (WHO) data, the prevalence of raised blood pressure among adults aged ≥18 years in the African region and particularly in Ethiopia was about 31% and 36%, respectively, for both sexes. Whereas in Gondar, a study report conducted in 2017 showed that the overall prevalence of hypertension was 27.4%. (1)

It has been estimated that approximately 1% of patients with hypertension will develop a hypertensive crisis at some point during their lives. Before the advent of antihypertensive therapy, this complication occurred in up to 7% of the hypertensive population. (1) In this regard, data on clinical features, treatment, and outcome of patients referred to the emergency and internal medicine departments for hypertensive crisis are limited, despite their relevance from a public health perspective. (1)

Despite major public health initiatives in the control of hypertension, hypertensive crisis remains an important clinical problem. Most patients who present with a hypertensive crisis have previously been diagnosed as hypertensive and many have been prescribed antihypertensive therapy with inadequate blood pressure control.

Moreover, compliance of patients with antihypertensive treatment is likely to affect the risk of hypertensive emergencies, but evidence on this issue is lacking. Clinical failures appear frequently due to the improper use of medication instead of the illness itself. (20)

Having evidence in this area will help in clarifying the pathogenesis of the disease, to discuss and plan measures aimed at mitigating the chaos that was identified in the healthcare sector, especially regarding the treatment of hypertensive crisis patients.

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1.3 Significance of the Study

Hypertensive crisis represents substantial burden to health care system in both developed and developing countries including Ethiopia .To the best of our knowledge, there have been no published studies in this respect, in the SNNPR region of Ethiopia. Therefore, the purpose of this study is to address the extent of the problem (hypertensive crisis) by examining the characteristics, treatment practice, and outcome of patients who visit WUSTH adult emergency with raised BP .Understanding the scale of the problem is essential when designing interventions to improve the treatment approach and outcome. Thus, this study was expected to provide essential up-to-date information or figures on burden and characteristics, treatment practice, and outcomes of hypertensive crisis. Implementation of recommendations forwarded from the study will enable to reduce frequent high blood pressure associated admissions, complications and deaths

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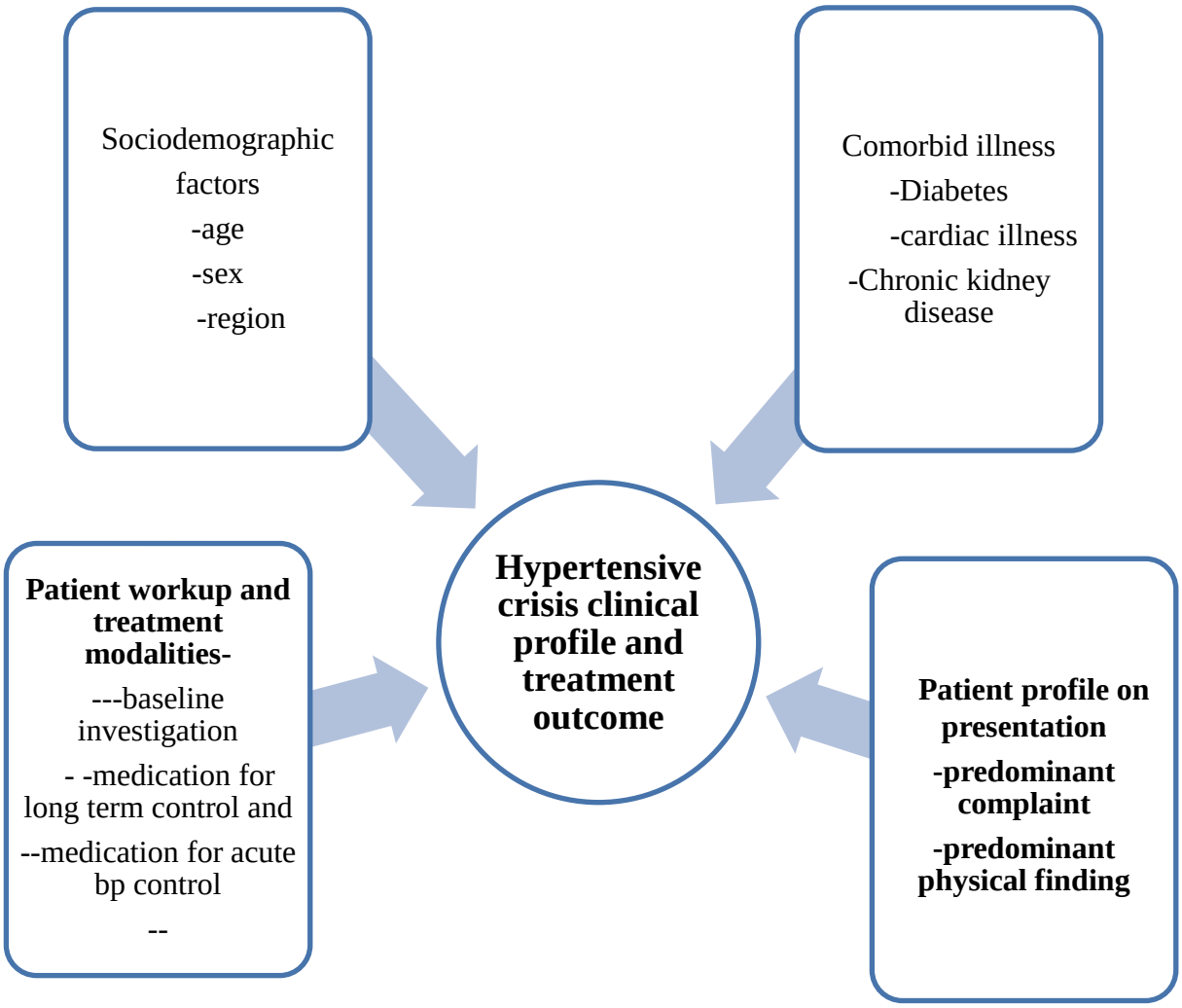

Figure 1 Conceptual Framework for retrospective analysis of clinical profile of patients presented with hypertensive crisis to WUSTH AUGUST 2022

CHAPTER TWO; LITERATURE REVIEW

2.1 Epidemiological profile

Hypertension involves more than 1 billion individuals worldwide and it is among a well-established cardiovascular risk factor. It has been estimated that approximately 1% of patients with hypertension will develop a hypertensive crises at some point during their lives. (5)

The syndrome of hypertensive emergency was first described by Volhard and Fahr in 1914 and Described as signs of vascular injury to the target organs characterized by severe accelerated Hypertension, accompanied by evidence of renal disease.(3).

Hypertensive crises occurred in up to 7% of the hypertensive population before the advent of antihypertensive therapy.

Hypertensive crisis is higher among African-Americans and the elderly; and it affects men about two times more frequently than are women. The lack of a primary care physician and failure to adhere to prescribed antihypertensive medications, the lack of proper follow up are among major risk factors for hypertensive crises.(2)(4)

According to a cross sectional study done on Prevalence, patterns and factors associated with Hypertensive crises in one of hospital emergency department in Uganda shows the hypertensive urgencies and emergencies accounted for 32.5% and 67.5% respectively. (11)

The prevalence of hypertensive crises was 5.1%, (203/4000) of all admissions at the medical section of the accident and Emergency ward of Mulago National Referral Hospital. The study concluded Hypertensive emergencies are common and significantly associated with poor compliance to prescribed anti-hypertensive drugs. (11)

The above figure shows Significantly higher prevalence of hypertensive crises in African settings and poor control of hypertension among hypertensive patient`s which contribute significantly for morbidity and mortality among older age groups which Strongly indicate the necessity of similar pattern studies in Ethiopia. (20)

In Ethiopia, the prevalence of uncontrolled blood pressure is increasing which might predispose patients to HE. According to cross-sectional study conducted in Ayder Comprehensive Specialized Hospital, Gonder, among hypertensive patients a total of 141 patients' records with a diagnosis of a hypertensive crisis were enrolled in the study; the majority were females 77 (54.6%) and residing in the urban setting 104 (73.8%). The mean age of the participants was 58.8 years. (20)

2.2 Distribution of clinical characteristics

A study done from January to October 2017, 9900 Patients admitted to the emergency room at Kassala teaching hospital in Sudan 81(0.81%) patients met criteria for hypertensive crisis. Their age ranging between 28 to 85 years and the mean age± SD was 58± (12.7). (10)

Among 50 patients who presented with features suggestive of Hypertensive emergency during the study period18(22.2%) patients had hemorrhagic stroke while 7(8.6%) patients had ischemic stroke, 13(16%) patients were identified to have renal failure, retinopathy was noticed in 9(11.1%) and only 2(2.5%) patients presented with features suggestive of hypertensive encephalopathy. 18(22.2%) patients had heart failure, 11(13.6%) patients had acute coronary syndrome, stroke was detected in 25(30.8%) , of them.(10)

Both studies shows neurologic complications are among the leading causes of hypertensive crises.

An observational prospective study done by Sanjay Gulhane et al among patients admitted with hypertensive crises in LokmanyaTilak Medical College and Municipal General Hospital, Sion, Mumbai India shows, Predominant presenting symptoms were giddiness (51.5%), headache (40%), breathlessness (30%) and hemiparesis (34.5%). (5%) patients had GCS<5.Low GCS was significantly associated with high mortality (p=0.001). (23)

Mean systolic blood pressure was 207 ± 27 and mean diastolic pressure was 130 ± 22 mm of Hg. High Diastolic BP was significantly associated with mortality (P value 0.004).

End organ damage was, cardiac in 71 patients (35%) neurological in 79 patients (40%), renal in 36 patients (18%), and ophthalmic 14 patients (7%). The in-hospital mortality was 19.5 percent. (13)(23)

2.3 Treatment Goals

For the general treatment of hypertensive crisis most recent guidelines termed “compelling

Conditions”. Hypertensive urgency often requires initiating, reinitiating, modifying, or titrating oral therapy and usually does not require ICU or hospital admission. (14)

The treatment target for hypertensive urgency is a gradual blood pressure reduction over 24–48 hours to the goals as laid out in the most recent rendition of hypertension management Guidelines on the basis of compelling indications. (14)

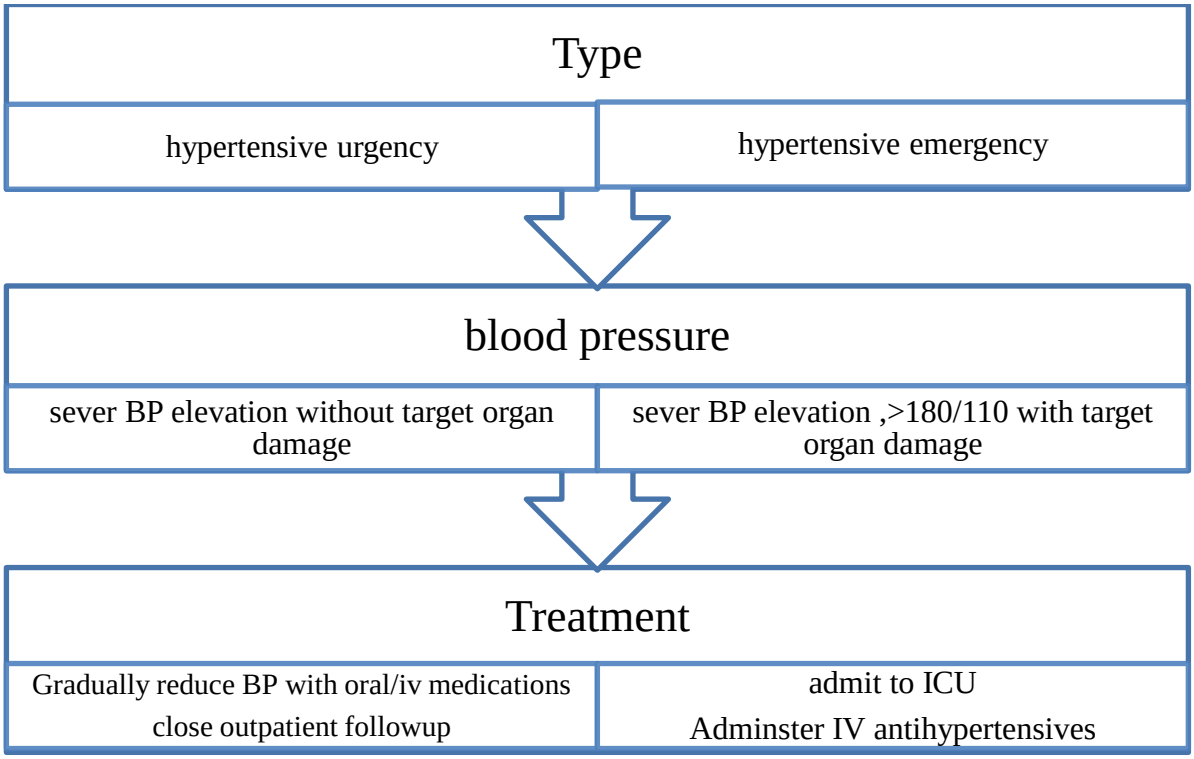

Figure 2 Treatment target for hypertensive crises

Careful communication and discussion with the patient, addressing potential causes of sub optimal adherence and possible outcomes of poorly controlled hypertension should be clearly explained to patients. Up to 75% of hypertensive patients may require more than single antihypertensive drug for their optimal BP control. In such circumstance fixed drug combination is recommended to improve adherence.

The 2019 Frankfurt Hypertension Unit reported that 53% were found to be Non-adherent by using LC-MS analysis for antihypertensive drugs or their metabolites in urine among 76 treatment-resistant hypertensive patients, who did not achieve blood pressure control on a quadruple antihypertensive treatment. Studies suggest that poor adherence to antihypertensive is responsible for about 9% of cardiovascular related events in Europe. (17)

It has been observed in One Cohort study of 13,350 patients comparing fixed-drug with free drug combinations that the fixed-drug combination group had superior adherence rates of 70% when compared to 42%, and a significantly lower risk of composite clinical outcomes like death, hospitalization for stroke. (17)

According to WHO, poor medication access and unequal access to medication is responsible for adherence related complications in developing countries like Ethiopia.

Hypertensive emergency was found in 42 (29.8%) of patients. Intravenous Hydralazine 39 (27.7%) and oral calcium channel blocker 102 (72.3%) were the prescribed drugs for acute blood pressure reduction in the emergency setting. (13)

Table 2 Management of Hypertensive Emergencies According to Standard Treatment Guideline of Ethiopia 4th EDITION, 2020

Clinical Presentation	Timeline and Target BP	First Line Treatment	Alternative
Malignant hypertension with or without thrombotic microangiopathy or acute renal failure	Several hours, MAP −20% to−25%	Labetalol	Hydralazine
Hypertensive encephalopathy	Immediate, MAP −20% to −25%	Labetalol	Hydralazine

Acute ischemic stroke and SBP >220 mm Hg or DBP >120 mm Hg	1 h, MAP −15%	Labetalol	Hydralazine
Acute ischemic stroke with indication for thrombolytic therapy and SBP >185 mm Hg or DBP >110 mm Hg	1 h, MAP −15%	Labetalol	Hydralazine
Acute hemorrhagic stroke and SBP>180 mm Hg	Immediate, 130<SBP<180 mm Hg	Labetalol	Hydralazine
Acute coronary event	Immediate, <140 mm Hg SBP	Nitroglycerine	
Acute cardiogenic pulmonary edema	Immediate,<140 mm Hg SBP	Nitroglycerine (with loop diuretic)	Loop diuretics
Acute aortic disease	Immediate, SBP <120 mm Hg and heart rate <60 bpm	nitroglycerine and metoprolol	Labetalol or metoprolol

CHAPTER THREE; OBJECTIVES OF THE STUDY

3.1 General Objectives

- To assess the clinical profile of patients presented with Hypertensive Crisis to WUSTH medical emergency From August 22,2022 - August 28,2022

3.2 Specific Objectives

- To determine the demographic Characteristics of patients with hypertensive crises
- To assess the frequency of specific clinical findings and Investigation result of patients with hypertensive crises
- To assess the common treatment modalities and clinical outcomes of patients with hypertensive crises after presentation to Emergency department.

CHAPTER FOUR; METHODS AND MATERIALS

4.1 Study area and period

The study was conducted in WUSTH, Gurage Zone, SNNPR, and Southwestern Ethiopia which is located 150 km away from the capital Addis Ababa.

WUSTH is the only specialized hospital in Gurage zone which provides services to clients from Gubre town and its surroundings. It has four major departments (Internal Medicine, Surgery, pediatrics and Gyn/obs and four minor departments (Ophthalmology, dermatology, .psychiatry and dentistry).the hospital delivers 24 hours full service of emergency care service in its emergency department

The study period was from August 22, 2022 – August 30, 2022

4.2 Study design

A Retrospective cross sectional study design was used by reviewing records of patients with diagnosis of hypertensive crisis

4.3 Population

4.3.1 Source population: All patients who presented to WUSTH medical emergency with diagnosis of hypertension from AUGUST 2021 to AUGUST 2022

4.3.2 Study population: All patients with hypertensive crisis from AUGUST 2021 to AUGUST 2022

4.4 Eligibility criteria

4.4.1 Inclusion Criteria; The study inclusion criteria was Age ≥15 and present to the ED with systolic BP of 180 mmHg and higher or diastolic BP of 110 mmHg and higher.

4.4.2 Exclusion Criteria

This study excluded those;

- Age <15 and present to the ED out of study period.
- Female patients presenting with preeclampsia and Ecclampsia
- Patients with head injury and those with unavailable document.

4.5 Sample size determination

Sample size for this study was calculated by using a formula for a **single population proportion.**

$$\mathbf{n} = (Z\alpha/2)^2 \frac{P\,(1 - P)}{d^2}$$

The Following Assumptions was made. Expected prevalence (P) i.e. Proportion of hypertensive crisis was 30.0% In the Emergency unit of Addis Ababa University Tikur Anbessa Specialized Hospital .Desired absolute precision (d) = 5% and Confidence interval of 95%, which means α set at 0.5 Hence, the required minimum sample size (n) is 322.

$$\mathbf{n} = \frac{(1.96)^2\,(0.33)\,(0.67)}{(0.05)^2} \approx 322$$

Since our source population is less than 10,000 we used correction formula

$$no = \frac{n}{1 + \frac{n}{N}}$$

Where no= minimum required sample size if population is less than 10,000

n = minimum required sample size

N = total number of registered cases

$$no = \frac{n}{1 + \frac{n}{N}} \quad \gg\gg\gg \quad no = \frac{322}{1 + \frac{322}{2629}} = 287$$

Total sample size = 287

Sampling Flow Chart

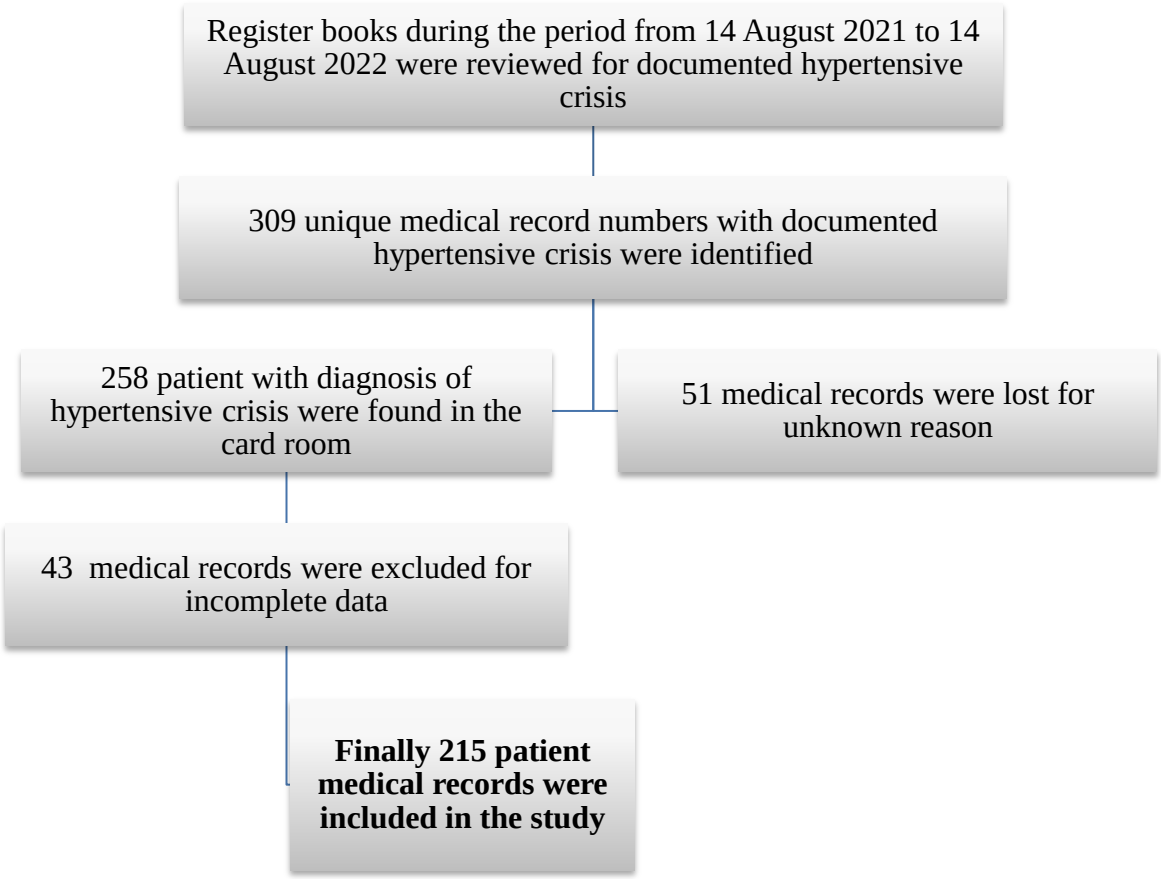

Figure 3 sample selection flow chart for review of patient medical record with hypertensive crisis WUSTH August 2022

4.6 Data collection and measurement

Variables

Dependent variables

- ✓ Hypertensive crisis

Independent variables

- ✓ Age
- ✓ Sex
- ✓ Duration since diagnosis
- ✓ Adherence to treatment
- ✓ Clinical findings
- ✓ Imaging findings
- ✓ Treatment modalities

4.7 Data collection method

Data was collected by using a structured data collection tool. The tool was developed by reviewing different relevant literatures. It was collected by three medical interns working in the department.

4.8 Data analysis

The data was entered and analyzed using SPSS version 23, Descriptive statistics such as frequency, percentage, mean and SD was determined to summarize the patient's characteristics and other variables. The result was described using text, tables and graphs.

4.9 Ethical consideration

- ✓ After a formal letter of ethical clearance and approval was obtained from Wolkite University College of Medicine and Health science official letter of cooperation was written for the institution for allowance of conducting the research. And permission was taken from the WUSTH.

- ✓ Considering ethical consideration patients identification was kept confidential as their names was not displayed in the questionnaire or in the final report.

4.10 Dissemination of findings;

The result of the study will be submitted to Wolkite University, college of medicine and health science, school of medicine. Since the report of the study is expected to be useful in improving early detection and management of patients with hypertensive crisis, the recommendations will be disseminated through WKU to different concerned bodies. If published the results will also be disseminated throughout the scientific community.

4.11 Operational definitions

Hypertensive crisis case was confirmed when patients had admission SBP record of above 180 mmHg and DBP of over 110 mmHg in the emergency department.

Hypertensive emergency was characterized by elevation of SBP/DBP and presence of at least one target organ damage involvement.

Hypertensive urgency was characterized by SBP/DBP elevation with no evidence of target organ damage.

Target organ damage was considered as the presence of evidence of hypertensive encephalopathy, stroke, myocardial infraction, acute pulmonary edema, major bleeding episode, major arrhythmia, and acute renal failure

CHAPTER FIVE; RESULT

Among a total of 2629 patients who was screened for Hypertensive crises From Data Registry, in the adult medical Emergency unit of Wolkite university Specialized Hospital in the Study period augest2021 to December 2022, 215 patients met the criteria for Hypertensive crises. Of these, 117(54.41%) had Hypertensive urgency and 98(45.6%) had Hypertensive Emergency.

The age range is between 21 and 85 and the mean age is 52.97 ± 16.483 and for male 54.199 ±17.144 and for females 51.28±15.46, about 78% of patients are at the age of 40 and above. Patients with hypertensive emergency had higher mean age (53.48 ±15.22 vs 52.49±17.64, when compared to patients with hypertensive urgency.

Table 3 Frequency and percent of sociodemographic characterstics and comorbidities of hypertensive crises patients,WUSTH 2022 WOLKITE,(N=215)

Sociodemographic variable	Overall N=215(100%)	Urgency N=117 (54.4%)	Emergency N=98 (45 5%)
Sex			
Male	116(53.41%)	61(53. 56)	55(47.4)
Female	99 (46.6%)	56(56.4)	43 [43.6]
Age(mean±SD)	(52.97±16.483)	(54.199 ±17.144)	(51.28±15.46)
Age			
<30	14(6.5%)	11(78.9%)	3 (21.10%)
30-39	9 (4.2%)	7(77. 7%)	2(22.22%)
40-49	35[16.3]	27 (77.28%)	8 (22.8%)
50-59	60(27.6%)	3 4(56.66%)	26(43. 33%)
60-70	63 (29.4)	22(36.12%)	41(67.2%)
>70	34 (15.6%)	16(47.2%)	18 (52.7%)
Region			
SNNPR	147 (68.4%)	84(57.2%)	63(42.6%)
Oromia	47 (21.6%)	25 (52.6%)	22(46.6%)

Others	21(9.7%)	11(52.4%)	10 (47.6%)

Clinical variable	Overall N=215 (100%)	Urgency N=117 (54.5%)	Emergency N=98 (45.5%)
SBP(Mean±SD)	190.95±13.73	190.25±14.32	191.69±13.12
DBPMean±SD)	109.66±17.13	102.30±15.03	117.44±15.91
Chronic medical illness			
DM	30(14%)	13(42%)	17(52%)
Heart failure	43(20%)	20(48%)	23(52%)
CKD	17(8%)	10(61%)	7(39%)
Other	28 (11%)	14(50%)	14(50%)
No Chronic medical illness	97(47%)	60(68%)	37(32%)

5.2 sociodemographic characterstics and comorbidities of hypertensive crises patients

With respect to specific age groups, the majority 57 (26.8%) of patients with hypertensive crises are in the age range, between 60-70yrs. 27(12.7%) are 30-39yrs, 39(18.3%) are in the range of 40-49 and 41(19.33%) of patients are in the range of 50-59, 19(8.9%) of case are less than 30yrs. This observation shows increase in the incidence of hypertensive crises as age increases until the age of 70 with maximum figure was observed in the age range 60-70yrs, and the figure drop again after the age of 70yrs (13.6%). The pattern is similar among hypertensive urgency and emergency. The study also revealed, the proportion of patients with hypertensive urgency had also bimodal distribution with more proportion of patients with hypertensive urgency in the age range below 50 and above 70yrs of age when compared to emergency. More numbers of women are affected by hypertensive urgency while the opposite is true for males; more numbers of males are affected by hypertensive emergency. This difference might be because of female populations are vulnerable to emotion related transient rise of blood pressure 0.02).

According to this study about 47% of hypertensive crises patients had no any additional Chronic Medical illness.14% of patients had DM, 20% had Heart failure, 8% had CKD and the remaining 11% had other chronic Medical Illness. About 53% of patients with hypertensive emergency had additional chronic Medical illness, HF is the most common chronic medical illness in patients with hypertensive emergency (23.4%) followed by DM (17.34%).

142 subjects (66%) of patients with hypertensive crises had existing Hypertension and among this 50.3% of patients are those patients with hypertensive Urgency and 49.7% are patients with hypertensive Emergency.

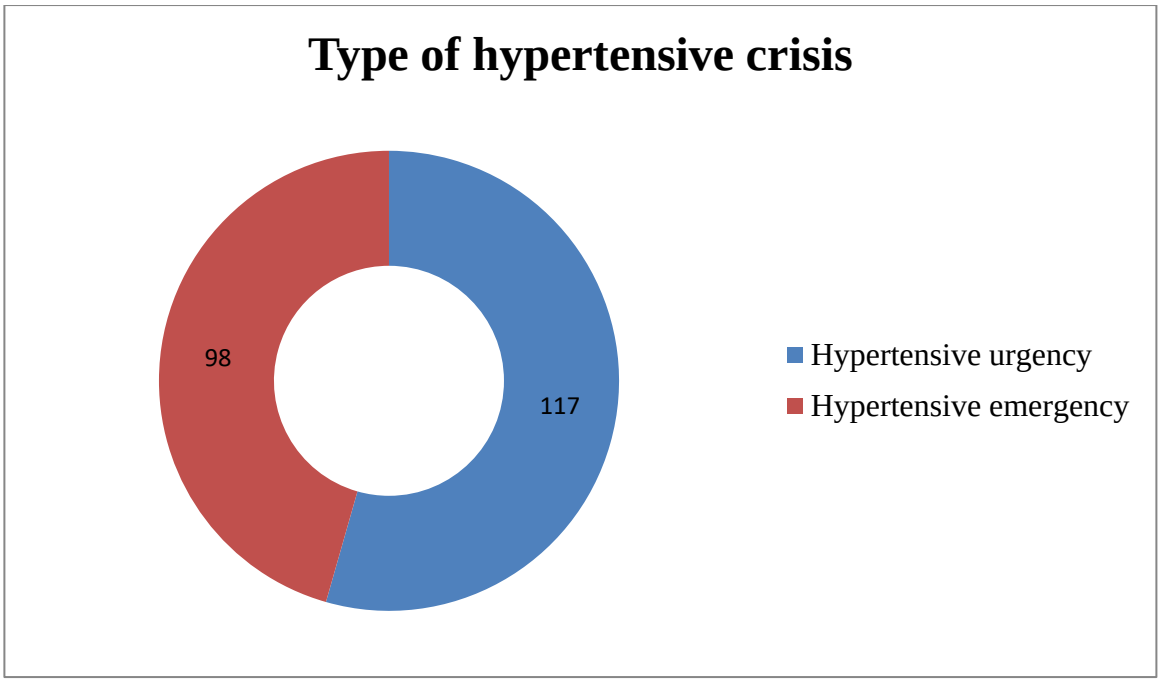

Figure 4 Type of hypertensive crisis among enrolled medical records WUSTH August 2022 (N=215)

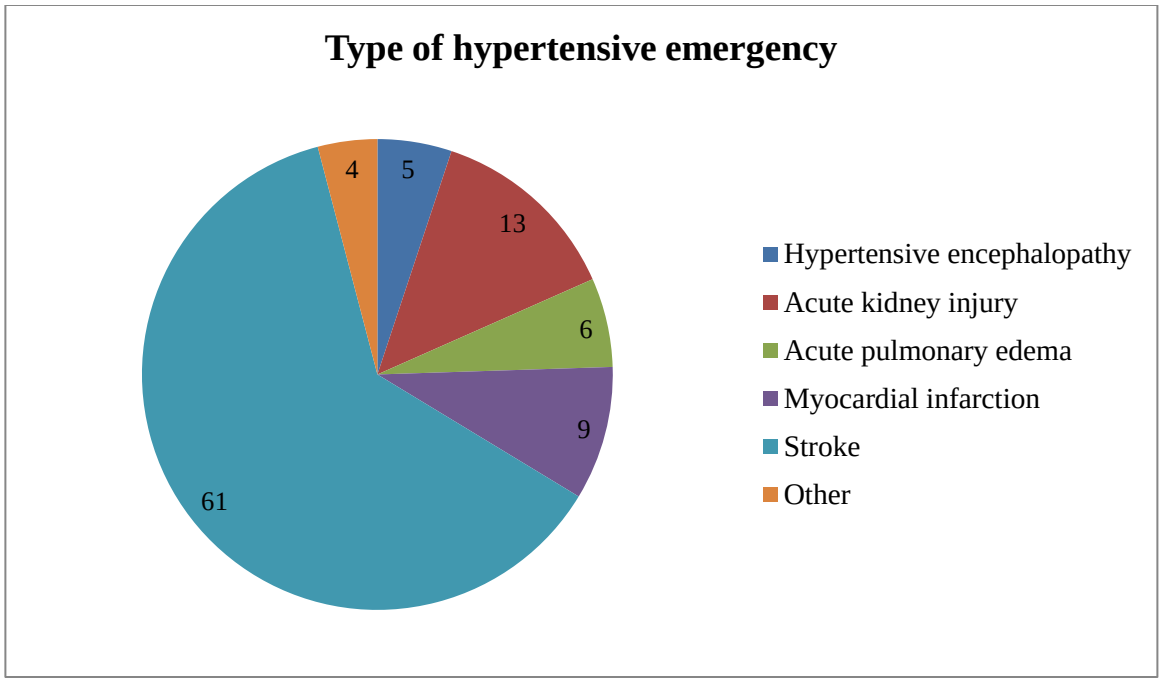

Figure 5 Type of Hypertensive emergency WUSTH August 2022 (N=98)

5.3 Predominant patients complain and frequency of Occurence

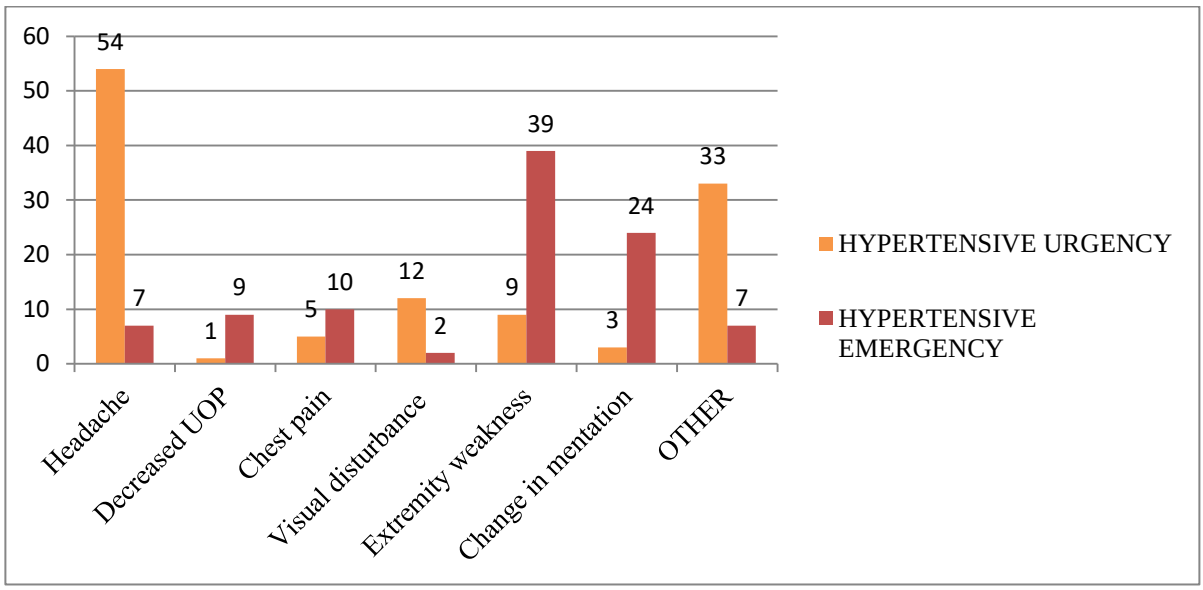

Figure 6 Predominant patients complain and frequency of Occurrence among hypertensive crises patients,WUSTH 2022 WOLKITE,(N=215)

Head ache in 61 (28.81%) of patients and Extremity weakness was Complain of 48(22.09%) patients with hypertensive crises followed by other nonspecific and minor complains 40(18.56), chest pain15 (7), change in mentation 27(12.6%) Decreased urine output 10(4.7%).

Of hypertensive Urgency patients 29(26.6%) of patients complain head ache; while 25(22.93%) of patients, presented with other Nonspecific Complain and 16(16.51%) Major complain was Dizziness. For patients with hypertensive Emergency the Major complain was Extremity weakness 28(27.18), followed by change in Mentation18 (15.53) %.

5.4 Predominant physical finding among hypertensive crises

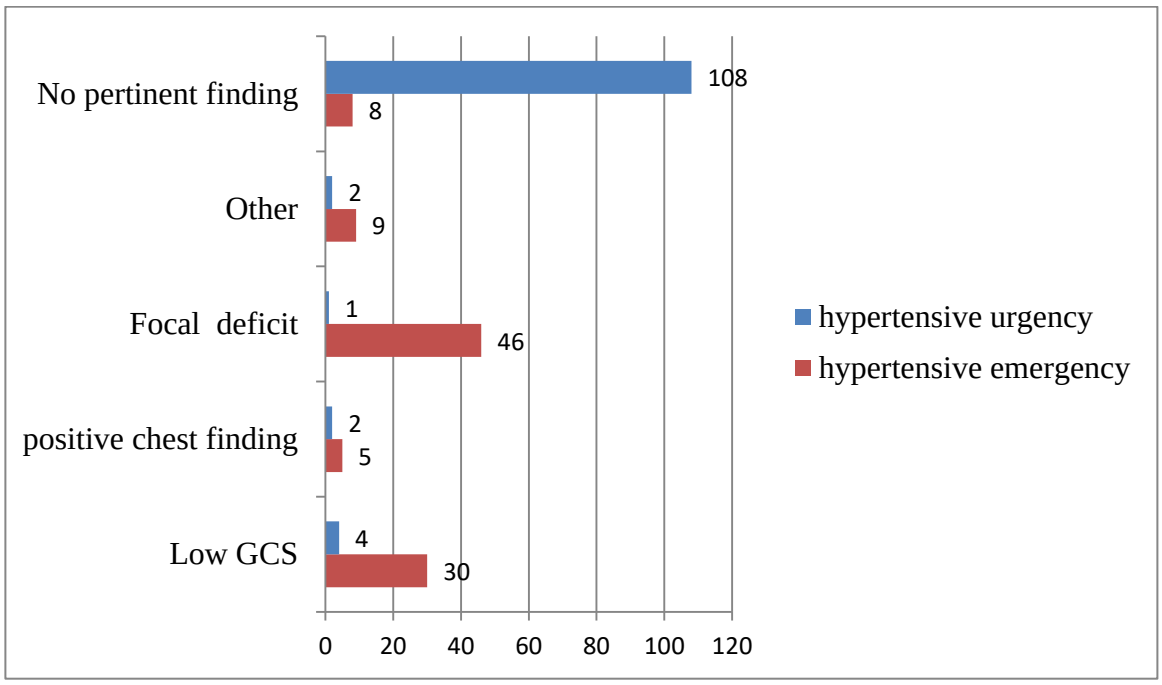

Figure 7 Predominant physical finding hypertensive crises patients,WUSTH 2022 WOLKITE,(N=215)

More than half of patients 116(54.2%) with hypertensive urgency had no any positive physical finding At presentation and the most common physical finding in patients with hypertensive emergency is Focal neurologic deficit which accounts for 21.4% of hypertensive Emergency patients, followed by low GCS and positive chest findings. positive physical finding in patients with hypertensive urgency is mainly because of existing underlying chronic medical illness whose higher Blood pressure is not associated with acute condition.

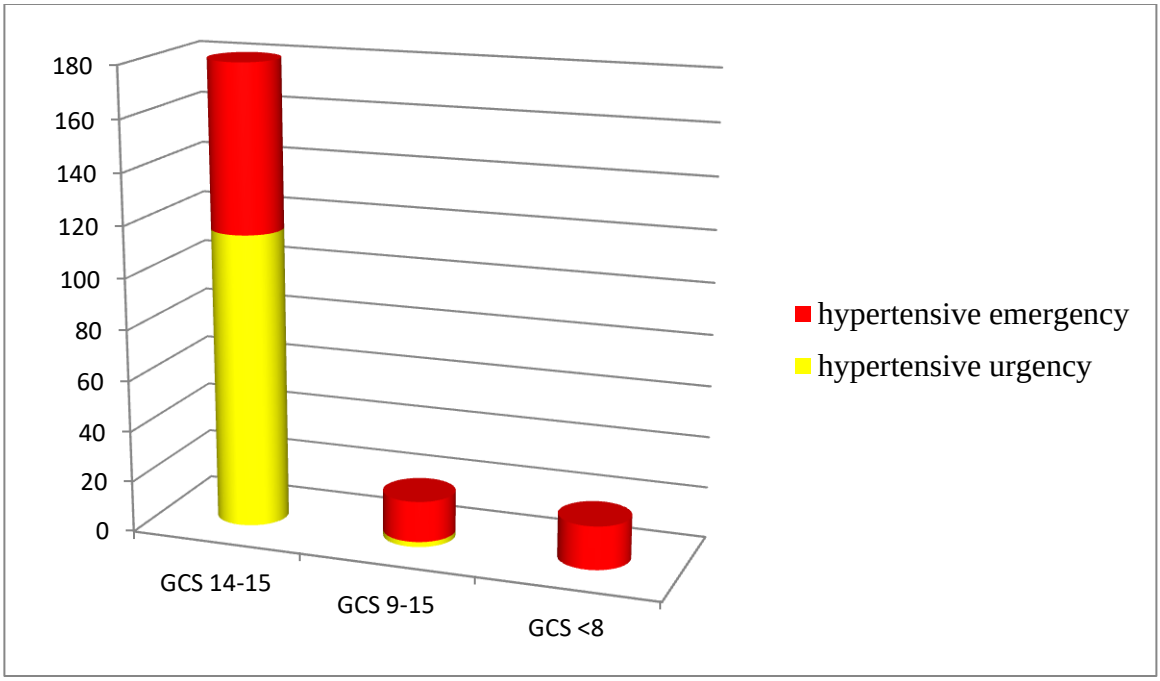

Figure 8 GCS At presentation to ED among hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

186(87.2%) of patients had GCS of 14-15 at presentation, 17(8.3%) had GCS 8-13and the remaining 14(7.3%) percent of cases Has Glasgow coma score of ≤8. patients with hypertensive urgency accounts for 57.29% of patients with GCS 14-15 and In contrast to this, patients with hypertensive emergency accounts for 94.9% of patients with GCS of 8-13 and 94% of patients with GCS<8.this indicates strong association Between low GCS and hypertensive Emergency when compared to hypertensive urgency

5.5 Investigation Results

Table 4 Investigation result of hypertensive crises patients,WUSTH 2022 WOLKITE,(N=215)

Investigation	Result	Type of hypertensive crises		
		hypertensive urgency	hypertensive emergency	Total
RFT result	Normal	111(70.3)	47(29.7%)	158(100.0%)
	Elevated	0(0.0%)	19(100.0%)	19(100.0%)
	Not available	6(15.8%)	32(84.2%)	38(100.0%)
	Total	117(54.4%)	98(45.6%)	215(100.0%)
Chest X-ray result				
	Normal	8(13.1%)	53(86.9%)	61(100.0%)
	Suggestive of pulmonary edema	1(14.3%)	6(85.7%)	7(100.0%)
	Other	2(8.3%)	22(91.7%)	24(100.0%)
	Not available	0(0.0%)	6(100.0%)	6(100.0%)
	Not indicated	106(90.6%)	11(9.4%)	117(100.0%)
	Total	117(54.4%)	98(45.6%)	215100.0%
ECG finding				
	Normal	76(75.6%)	33(24.4%)	(135)100.0%
	ST Segment changes	0(0.0%)	8(100.0%)	8(100.0%)
	Diffuse T wave inversion	1(11.1%)	8(88.9%)	9(100.0%)
	Nonspecific ECG	5(14.3%)	30(85.7%)	35(100.0%)

	Changes			
	Other	1(20.0%)	4(80.0%)	5(100.0%)
	Not available	8(34.8%)	15(65.2%)	23(100.0%)
	Total	117(54.4%)	98(45.6%)	215(100.0%
Brain CT result				
	Normal	0(0.0%)	7(100.0%)	7(100.0%)
	Ischemic change	0(0.0%)	10(100.0%)	10(100.0%)
	Hemorrhagic	0(0.0%)	31(100.0%)	31(100.0%)
	Other	0(0.0%)	3(100.0%)	3(100.0%)
	Not available	1(4.2%)	23(95.8%)	24(100.0%)
	Not indicated	116(82.9%)	24(17.1%)	140(100.0%)
	Total	117(55.5%)	98(45.5%)	215(100%)

As a summary Renal function test was requested for all patients with hypertensive crisis of which 19/215 patients had elevated result 38/215 were unavailable and the remaining 158/215 were normal

CXR was done for 92 patients normal finding was seen in 61/92 and abnormal finding was (28/92) of which most common abnormal finding was suggestive of pulmonary edema (7/92), and there were (6/92) unavailable results

Brain CT was done for 75 patients of which 7/75 were normal,10/75 were ischemic stroke, 31/75 hemorrhagic stroke, 3/75 other and 24/75 results were unavailable.

5.6 Type of oral antihypertensive, Duration and Adherence

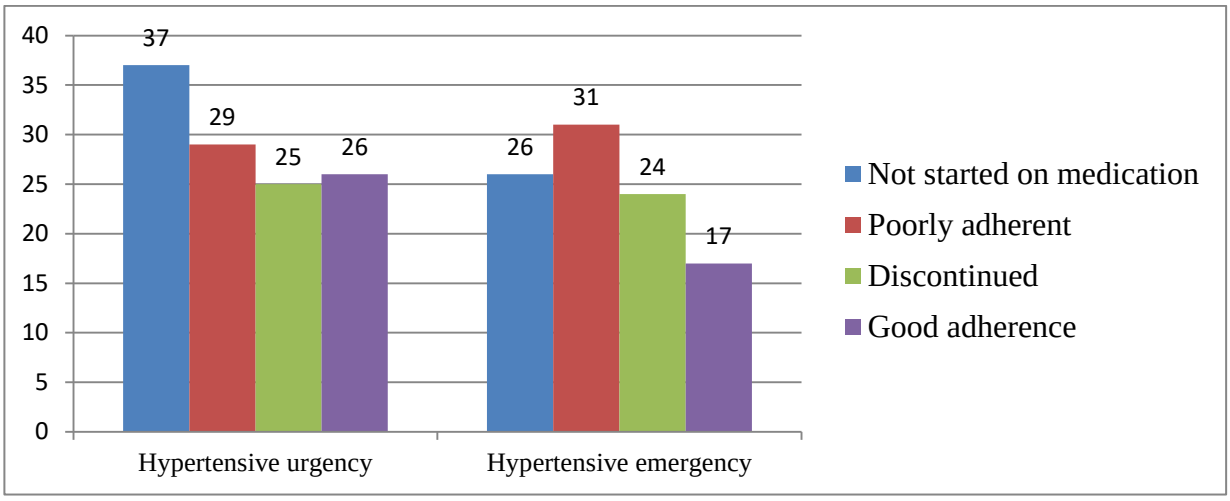

Figure 9 Adherence of patients to oral antihypertensive hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

Among patients with hypertensive crisis 63(29.3%) of patients were not started on any medication, 60(27.9%) of patients had poor adherence, 49(22.7%) had discontinued medications and 43(20%) had good adherence. When comparing the two groups; majority of patients with hypertensive urgency 37(31.6%) were not started on any medication while, majority of patients with hypertensive emergency 31(33.0%) are those with poor adherence to their medication

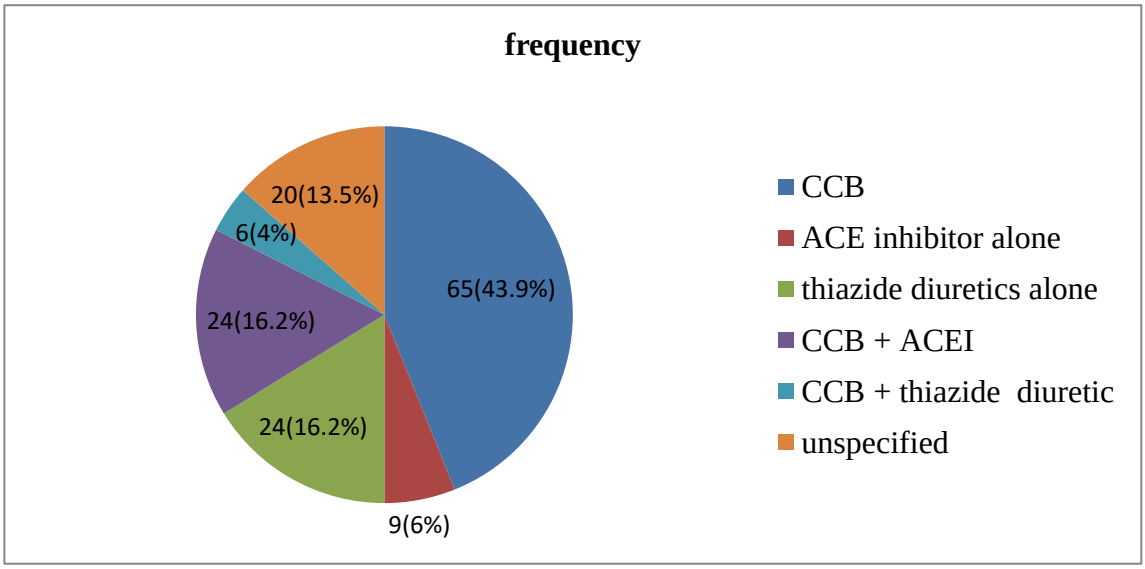

Figure 10 Type of Oral antihypertensive taken by known hypertensive patients among patients with hypertensive crises, WUSTH 2022 WOLKITE,(N=215)

Among 215 subjects enrolled in this study 67(31.1%) were not taking any oral antihypertensive at the time of their visit and the remaining 148(68.9%) was taking different either single or combined oral antihypertensive drugs. The most common single oral agent used was oral calcium channel Blocker alone which accounts for 65(43.9%) of patients followed by thiazide diuretics alone 24(16.2%). And the most common combination drug was a combination of calcium channel blocker with ACE inhibitor 24(16.2%) followed by combination of calcium channel blocker with thiazide diuretics 6(4%).

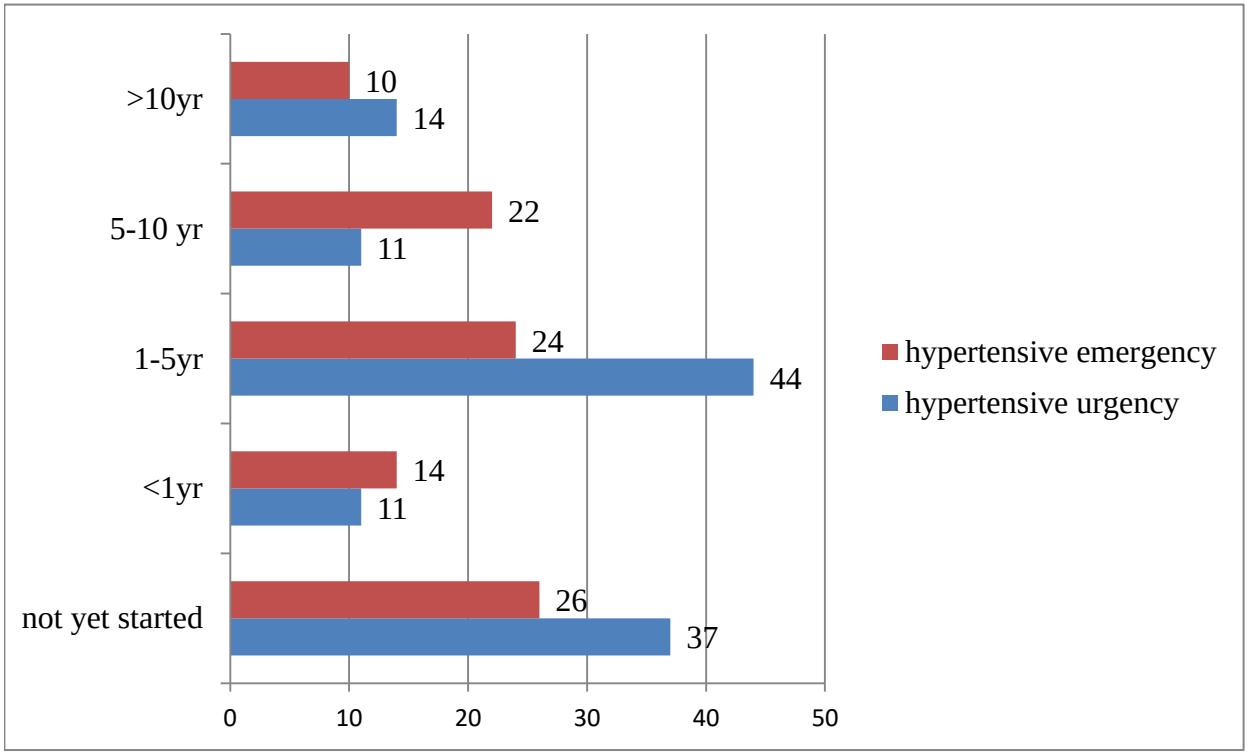

Figure 11 Duration of antihypertensive hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

Among patients with included in the study majority 97 (45%) took oral antihypertensive for < 5yrs, 55(26.7%) %) took oral antihypertensive for >5yrs, the remaining 63(28.3%) were not started on any form of oral antihypertensive.

5.7 Medications for acute BP Control and Outcome

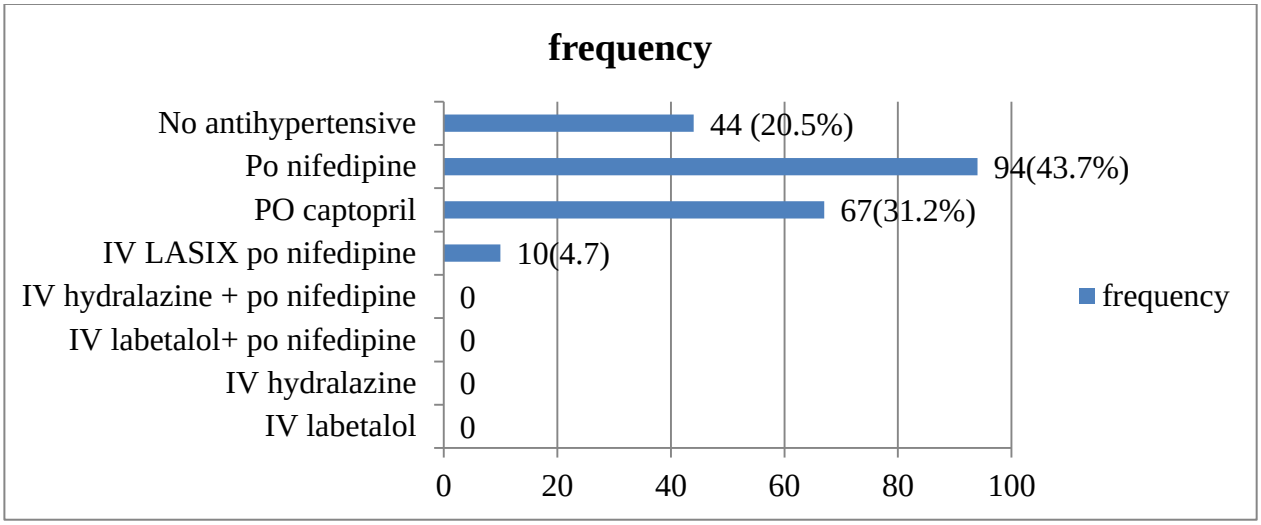

Figure 12 Medications for acute BP control for hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

In the emergency setting PO Nifedipine is the most common drug used for acute BP control in about 94(43.7%) of patients presenting with hypertensive crises , followed by PO Captopril 67(31.2%) and combination of intravenous Lasix with oral Nifedipine 10(4.7%) . there was no patient who took IV labetalol and hydralazine or any combination containing these drugs. 44(20.5%) of patients had not used any antihypertensive for Acute BP control. Those patients who do not receive any medication for acute BP control were mainly because of the absence of specific indications, like patients with stress induced hypertension and those patients with ischemic stroke with target range BP, despite higher blood pressure readings.

5.8 Disposition and Outcome of Patients with Hypertensive Crisis

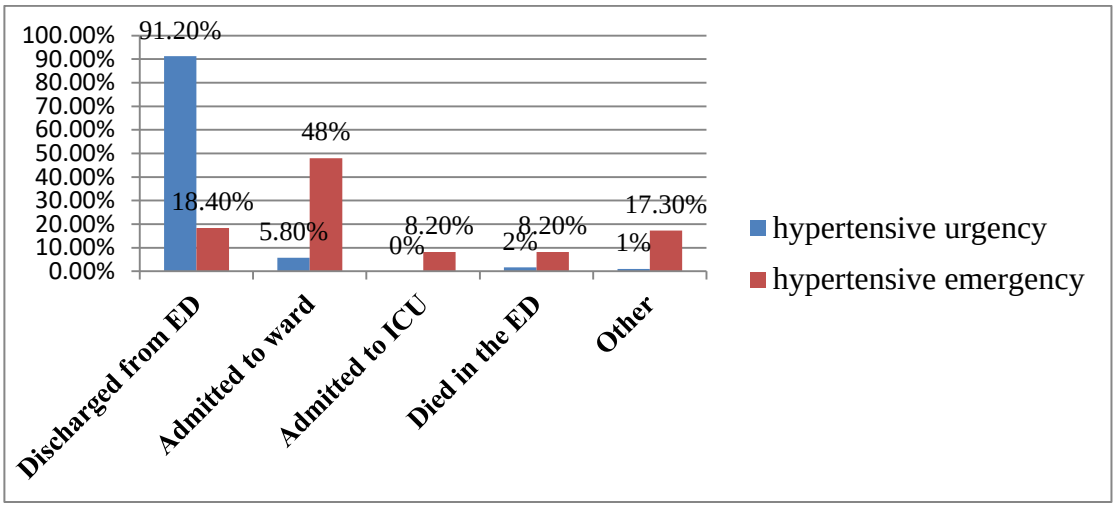

Figure 13 Disposition And Outcome of hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

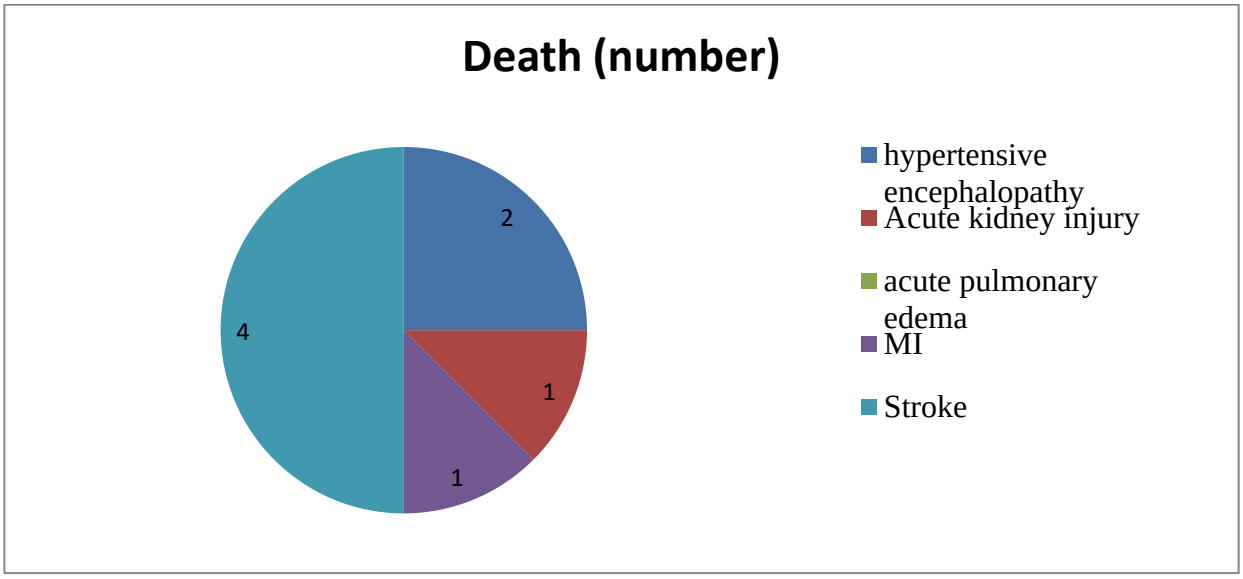

Figure 14 Cause of death among hypertensive crises patients, WUSTH 2022 WOLKITE,(N=215)

Out of 98 hypertensive Emergency patients, 18.4% were discharged from ED, 48% Admitted to ward, 8.2% admitted to ICU, 8.2% were died at ED, and 17.3% were referred. When compared to hypertensive urgency patients with hypertensive emergency are associated with poor outcome and the most common cause of death is related to stroke accounting for more than half (50%), followed by hypertensive encephalopathy (25%), MI (12.5%) and AKI (12.5%).

CHAPTER SIX; DISCUSSION

Although there are inconsistencies, elevation of blood pressure >180/110 is considered as hypertensive crises. A rapid severe elevation in blood pressure with end-organ damage is known as hypertensive emergency and rapid severe elevation in BP in the absence of evidence of organ injury is known as hypertensive urgency.

Although data pertaining to hypertensive crises is lacking in Ethiopian setting; the present study provided evidences on hypertensive crisis in the adult emergency departments of WUSTH for 1 year. This finding has never been reported before and might provide an estimate of profile of patients and related conditions indicating that hypertensive crisis represents an important and common event in the adult emergency, and requires appropriate resources for the diagnosis and appropriate treatment.

In the emergency unit of WUSTH in the Study period August 2021 to August 2022, 215 Patient records which met the criteria for hypertensive crises were studied. Of these, 117 (54.4%) had HU and 98(45.6%) had HE. This narrow difference in proportion between the two groups is a similar finding with one prospective cross sectional study done by Santsh B Salagre et al, Prevalence and Clinical Profile of Patients of Hypertensive Crisis in a Tertiary Care Hospital. As WUSTH is a tertiary hospital and more patients, with abnormal investigation results and critically ill are more likely to be referred to this hospital. This can result higher number of patients with hypertensive emergencies than the general population in this analysis.

The Age range is between 21 and 85 and the mean age is 56 ± 16.483 and for male56.199 ±17.144 and for females 54.28±15.46, about 78% of patients are at the age of 40 and above. Patients with hypertensive emergency had higher mean age (60.48 ±15.22vs 52.49±17.64,) when compared to patients with hypertensive urgency.

This study is consistent with other studies which report the mean age for patients with hypertensive crises like studies done at black lion hospital the mean age is 52.97 and for male 54.199 and for females 51.28, about 75% of patients are at the age of 40 and above

A study done from January to October 2017, 9900 Patients admitted to the emergency room at kassala teaching hospital in Sudan 81(.81%) patients met criteria for hypertensive crisis. Their age ranging between 28 to 85 years and the mean age ±SD was 58± (12.7).According to this study about 43.86% of Hypertensive crises patients had no any additional chronic Medical illness, 22.07% of patients had Heart failure, 12.73% had DM, 4.66% had CKD and the remaining 20.81% of patients had other chronic Medical Illness. About 60% of patients with hypertensive emergency had additional chronic medical illness, HF is the most common chronic medical illness in patients with hypertensive emergency (24%) followed by DM (21.31%). (10)

Our study revealed about 47% of hypertensive crises patients had no any additional Chronic Medical illness.14% of patients had DM, 20% had Heart failure, 8% had CKD and the remaining 11% had other chronic Medical Illness. About 53% of patients with hypertensive emergency had additional chronic Medical illness, HF is the most common chronic medical illness in patients with hypertensive emergency (23.4%) followed by DM (17.34%).

142 subjects (66%) of patients with hypertensive crises had existing Hypertension and among this 50.3% of patients are those patients with hypertensive Urgency and 49.7% are patients with hypertensive Emergency.

A study done from January to October 2017, 9900 Patients admitted to the emergency room at Kassala teaching hospital in Sudan 81(0.81%) patients met criteria for hypertensive crisis. Their age ranging between 28 to 85 years and the mean age± SD was 58± (12.7).

Among 50 patients who presented with features suggestive of hypertensive emergency during the study period 18(22.2%) patients had hemorrhagic stroke while 7(8.6%) patients had ischemic stroke, 13(16%) patients were identified to have renal failure, retinopathy was noticed in 9(11.1%) and only 2(2.5%) patients presented with features suggestive of hypertensive encephalopathy. 18(22.2%) patients had heart failure, 11(13.6%) patients had acute coronary syndrome, stroke was detected in 25(30.8%) , of them.(10)

Both studies shows neurologic complications are among the leading causes of hypertensive crises. Mostly patients with hypertensive urgency are asymptomatic & common complaint in hypertensive Urgency patients is headache followed by other Nonspecific complain and

Dizziness. For patients with hypertensive Emergency the Major complain was Extremity weakness followed by change in mentation, this result keep in touch with Other studies like Santosh B Salagre1etal, Patrick J. Shao1etal., and a report by Shailendra umar 'Clinical Study of Hypertensive Crisis in Medicine Ward'. And this finding also shows Neurorelated conditions are the Leading complain and complications among patients with hypertensive crises.

An observational prospective study done by Sanjay Gulhane et al among patients admitted with hypertensive crises in LokmanyaTilak Medical College and Municipal General Hospital, Sion, Mumbai India shows, Predominant presenting symptoms were (51.5%), headache (40%), breathlessness (30%) and hemiparesis (34.5%). (5%) patients had GCS<5.

In our research, Headache in 61 (28.81%) of patients and Extremity weakness was commonest Complain of 48(22.09%) patients with hypertensive crises followed by other nonspecific and minor complains 40(18.56), chest pain15 (7), change in mentation 27(12.6%) Decreased urine output 10(4.7%).

Of hypertensive Urgency patients 29(26.6%) of patients complain head ache; while 25(22.93%) of patients, presented with other Non-specific Complain and 16(16.51%) Major complain was Dizziness. For patients with hypertensive Emergency the Major complain was Extremity weakness 28(27.18), followed by change in Mentation18 (15.53) %.

More than half of patients 116(54.2%) with hypertensive urgency had no any positive physical finding At presentation and the most common physical finding in patients with hypertensive emergency is Focal neurologic deficit which accounts for 21.4% of hypertensive Emergency patients, followed by low GCS and positive chest findings. positive physical finding in patients with hypertensive urgency is mainly because of existing underlying chronic medical illness whose higher Blood pressure is not associated with acute condition.

186(87.2%) of patients had GCS of 14-15 at presentation, 17(8.3%) had GCS 8-13and the remaining 14(7.3%) percent of cases Has Glasgow coma score of ≤8. patients with hypertensive urgency accounts for 57.29% of patients with GCS 14-15 and In contrast to this, patients with hypertensive emergency accounts for 94.9% of patients with GCS of 8-13 and 94% of patients with GCS<8

The most requested complementary investigation by the healthcare team in this study were renal function tests (serum creatinine, blood urea nitrogen), chest X-ray, electrocardiogram, brain imaging. The practice was in line with the recommendations found in Standard Treatment Guideline of Ethiopia and some of these examinations were also addressed in similar studies from Ethiopia (like in Gonder, Mekelle), Uganda, USA, France, and Brazil which emphasize the importance of these test results and demand in primary care. However there are also other relevant investigations to further diagnose end organ damage like cardiac biomarkers, Echocardiography and Funduscopy which were lacking in our study setup.

It is well known that non adherence to anti-hypertensive treatment is responsible for Hypertensive crises and end organ related morbidity and mortality. Because of Retrospective nature of study and lack advanced laboratory which can analyze Biomedical adherence of patients and more accurate adherence assessment scales like LC-MS assessment scale or visual analog assessment scale, assessment for adherence in this study is based on subjective information from the patients documented on chart. The 2013 Frankfurt Hypertension Unit reported that 53% were found to be Non-adherent by using LC-MS analysis for antihypertensive drugs or their metabolites in urine among 76 treatment resistant hypertensive patients, who did not achieve blood pressure control on a quadruple antihypertensive treatment. Studies suggest that poor adherence to antihypertensive is responsible for about 9%of cardiovascular related events in Europe. According to WHO, poor medication access and unequal access to medication is responsible for adherence related complications in developing countries like Ethiopia.

In this study among patients with hypertensive crisis 63(29.3%) of patients were not started on any medication, 60(27.9%) of patients had poor adherence, 49(22.7%) had discontinued medications and 43(20%) had good adherence. This shows that about 80% of patients in this study are not getting their antihypertensive medications properly, which can contribute for hypertension related complications. When comparing the two groups; majority of patients with hypertensive urgency 37(31.6%) were not started on any medication while, majority of patients with hypertensive emergency 31(33.0%) were those with poor adherence to their medication. This might be because of more patients with hypertensive urgency are younger,

new to the diagnosis of hypertension and less likely to accept their medical condition start and continue their medication, and more likely to try lifestyle modifications when compared to patients with hypertensive emergencies.

Among 215 subjects enrolled in this study 67(31.1%) were not taking any oral antihypertensive at the time of their visit and the remaining 148(68.9%) was taking different either single or combined oral antihypertensive drugs. The most common single oral agent used was oral calcium channel Blocker alone which accounts for 65(43.9%) of patients followed by thiazide diuretics alone 24(16.2%). And the most common combination drug was a combination of calcium channel blocker with ACE inhibitor 24(16.2%) followed by combination of calcium channel blocker with thiazide diuretics 6(4%).

According to study inUniversity of Gondor specialized hospital Captopril (n = 136, 23.9%) and hydralazine (n = 43, 7.6%) were the most commonly prescribed oral and intravenous drugs respectively.
In our emergency setting PO Nifedipine is the most common drug used for acute BP control in about 94(43.7%) of patients presenting with hypertensive crises , followed by PO Captopril 67(31.2%) and combination of intravenous Lasix with oral Nifedipine 10(4.7%) .There was no patient who took IV labetalol and hydralazine or any combination containing these drugs. 44(20.5%) of patients had not used any antihypertensive for Acute BP control. However there are some patients who do not receive any medication for acute BP control were mainly because of the absence of specific indications, like patients with stress induced hypertension and those patients with ischemic stroke with target range BP, despite higher blood pressure readings.

Although some of the first-line treatment measures taken at the admission of patients were in agreement with the recommendations found in Standard Treatment Guideline (STG) of Ethiopia. A number of them were not consistent with the current recommendations from Ethiopian STG, ACC/AHA 2017 guideline and JNC 8. This could be explained by having a shortage of required medications to manage the condition and lack of certain diagnostic equipment which will guide and help the management process.

According study done in Gondor showed in hospital mortality related to hypertensive crisis was 4% and was entirely attributed to hypertensive emergencies of which stroke and acute kidney injury accounts for more than half.

In our study out of 98 hypertensive Emergency patients, 18.4% were discharged from ED, 48% Admitted to ward, 8.2% admitted to ICU, 8.2% were died at ED, and 17.3% were referred. When compared to hypertensive urgency patients with hypertensive emergency are associated with poor outcome and the most common cause of death is related to stroke accounting for more than half (50%), followed by hypertensive encephalopathy (25%), MI (12.5%) and AKI (12.5%).

This study shows similar pattern of patient disposition and outcome. However relatively higher mortality observed in our study was attributed to lack of some emergency investigative modalities and IV medications.

CHAPTER SEVEN; CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

This study concluded slightly higher numbers of patients with hypertensive urgencies were observed among patients with hypertensive crises presenting to emergency unit of our hospital. However significant number of patients had also hypertensive emergency, this might indicate the importance of thorough evaluation and investigation to identify these clinical conditions for early intervention. According to this study although hypertensive crises affects wider range of population age group, about 80% are those with the age of 40 and above. Majority of patients had already existing hypertension and Diabetes mellitus is the most common associated medical illness, this indicate majority of patients are aware of their medical condition and the fact that most patients are either not started on any medication or poor adherence to their medication shows strict medical follow up and Education is helpful in reducing the incidence of hypertensive crises. The most common presenting signs and symptoms at admission were headache, change in mentation (low GCS), chest pain and extremity weakness (focal neurologic deficit). Renal function testing was the most frequently performed testing. During hospitalization, the majority of prescriptions documented for hypertensive crisis favors more oral route of administration. Nifedipine and Captopril were the most commonly prescribed oral drugs. Whereas, IV lasix was the most commonly prescribed IV drug. Almost all hospital mortality was attributed to hypertensive emergencies. Stroke, hypertensive encephalopathy, acute renal failure, acute myocardial infarction and acute pulmonary edema were identified as causes of death.

7.2 RECOMMENDATION

For hypertensive patients

- To have increased health seeking behavior, to be adherent to their medications and to come for regular follow-up or come early whenever they experienced any of danger complaints.

For WUSTH

- Proper documentation of patient medical information with appropriate chart keeping and try to digitalize patient medical record

- Avail emergency workups like cardiac biomarker, echocardiography neuroimaging and have retinal screening for patients suspected to have hypertensive crisis.
- Avail emergency drugs like IV labetalol and hydralazine which were first line drugs for management of patients with hypertensive crisis according to STG 2020 of Ethiopia.
- The hospital should have competent Frontlines like Interns and Nurses trained on handling patients with emergency condition
- Finally we recommend the hospital to have its own protocol for management of patients with hypertensive crisis

For Wolkite University College of Medicine and Health Science

- We recommend WKU College of Medicine and Health Science to facilitate further researches to be done on reason for gaps in management of patients with hypertensive crisis their outcome and associated factors.
- Moreover, university should participate in multicenter prospective study to be done over the country at large to certainly figure out the prevalence of HE and mortality of patients after they admitted to emergency departments with a hypertensive crisis.

CHAPTER EIGHT; STRENGTH AND LIMITATION OF STUDY

The present study had the following strengths and limitations.

To the best of literature search done, it was the first study to describe the magnitude, characteristics, and outcomes of patients presenting with hypertensive crisis across a healthcare system in southwestern Ethiopia.

The limitations were related to the retrospective nature of the study; therefore, the sociodemographic and compliance data obtained through the review of patient medical records lead to lower accuracy than those obtained in a prospective study. Given the data source was patient medical record, the study may not have ascertained all outcomes. Additional events could have occurred in other healthcare systems or homes, and sudden cardiac death at home may not have been captured. Other limitation is the study comprises cases from a single institution with its peculiarities of treatment, which limits the extrapolation of the findings to other situations. Further limitation was related to incomplete and inadequate patient medical records, and the handwriting used by the health professionals made it difficult to grasp the information in many cases.

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ANNEXES

A check list for abstraction of data from patient charts to assess the clinical profile of patients with hypertensive crisis presented to adult emergency unit of WUSTH August 2022

I. Sociodemographic data

1. Age in years
   1) <30
   2) 30-39
   3) 40-49
   4) 50-59
   5) 60-70
   6) >70
2. Sex
   1) Male 2) female

3. Region

1) SNNPR 2) Oromia 3) AA 4) Amhara 5) Tigray 6) Other

II. Comorbid illness

1. Chronic medical illness
   1. DM
   2. Heart failure
   3. CKD
   4. Other

III. Patient profile on presentation

1. Known hypertensive
   1. Yes
   2. No
2. Predominant patients complaint
   1) Head ache
   2) Decreased urine out put
   3) Chest pain
   4) Abnormal body movement
   5) Dizziness
   6) Visual disturbance
   7) Extremity weakness
   8) Change in mentation
   9) Other
3. Predominant physical findings
   1) Low GCS

2) Positive chest finding
3) Peripheral edema
4) Focal neurologic deficit
5) Other
6) No pertinent physical finding

4. GCS at Admission was
    1) 14-15
    2) 9-13
    3) ≤8
5. What was the systolic of the patient at presentation?

    1) 180-190
    2) 191-200
    3) 201-210
    4) 211-220
    5) >220
6. What was the diastolic BP of the patient at initial presentation?
    1) 110-120
    2) 121-130
    3) >130
7. Type of hypertensive emergency
    1) Hypertensive encephalopathy
    2) Acute kidney Injury
    3) Acute pulmonary edema
    4) Myocardial infarction
    5) Stroke
    6) Other

IV. Investigations

1. RFT
    1) Normal
    2) Elevated
    3) Not available
    4) Not indicated
2. Brain CT result
    1) Normal
    2) Ischemic change
    3) ICH
    4) Sub arachnoid hemorrhage
    5) Other(specify)

6) Not available
7) Not indicated

3. Chest X-ray result
   1) Normal
   2) Evidence of pulmonary edema
   3) Other(specify)
   4) Not available
   5) Not indicated
4. ECG
   1) Normal
   2) ST segment changes
   3) Diffuse T wave inversions
   4) Nonspecific ECG Changes
   5) Life threatening Arrhythmias
   6) Other specify
   7) Not available

V. Treatment modalities

1. Duration of oral antihypertensive
   1) <1yr
   2) 1-5yr
   3) 6-10yr
   4) >10yr
   5) Never used
2. Type of Oral antihypertensive used
   1) CCB alone
   2) ACE Inhibitors alone
   3) Thiazide diuretic alone
   4) CCB+ ACE Inhibitors
   5) CCB + thiazide diuretics
   6) Unspecified
   7) other
3. Adherence to oral medication
   1) Not started on medication
   2) Poorly adherent
   3) Discontinued
   4) Good adherence
4. Medications for acute BP Control
   1) IV Labetalol alone
   2) Iv hydralazine alone

3) Po amlodipine
4) IV labetalol + po nifedipine
5) IV hydralazine +po nifedipine
6) Iv Lasix alone
7) IV Lasix +po nifedipine
8) Po captopril
9) Po nifedipine alone
10) Other
11) No antihypertensive

VI. Patient outcome

1. Type of hypertensive crises
   1) Hypertensive urgency
   2) Hypertensive emergency
2. What was the disposition and out come?
   1) Discharged from ED
   2) Admitted to ward
   3) Admitted to ICU
   4) Died in the ED
   5) Other (specify)
3. Was the patient appointed for follow-up after discharge?
   1) Yes
   2) No
4. If yes to Q3 does the patient come to follow up?
   1) Yes
   2) No