International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 110-119 www.ijdmsrjournal.com ISSN: 2582-6018

Profile and Outcome of Hypertensive Crisis Patients Presenting To Emergency Department

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Date of Submission: 01-03-2023 Date of Acceptance: 10-03-2023

ABSTRACT
Background: Hypertensive crisis is one of the major acute complications of hypertension, resulting in an emergency admission to the hospital. According to AHA & European society of hypertension, hypertensive crisis is defined by blood pressure 180/120 with or without target organ damage. It is divided as hypertensive urgency when there is no end-organ damage and as hypertensive emergency associated with end organ damages.
Objectives: To study about the risk factors & clinical presentation of patients in hypertensive crisis coming to emergency department. Comparison of outcome predictors in hypertensive urgency and hypertensive emergency.
Methods: This was a cross-sectional retrospective record based study, with a quantitative approach, conducted in the emergency department of KIMS Bangalore India for a period of 4 months (from Aug 2022 – Nov 2022). All patient presented to emergency department were screened and those who met the inclusion criteria were consecutively enrolled in the study.
Results: In our study total 76 patients were evaluated according to their risk factors, clinical profile and hemodynamics. Initially patients were studied according to the general charactertics. The main findings of our study was the factors helps in the diagnosis of hypertensive emergency and urgency. Out of 7598 patient screened only 76 patients were enrolled in the study. In that 75% patients were hypertensive emergency and 25% patients were hypertensive urgency. 8 out of 76 patient were associated with mortality and all 8 patients were diagnosed as hypertensive emergency. According to our study none of the hypertensive urgency patients were associated with mortality.
Conclusion: According to our study risk factors like alcohol intake, smoking and sedentary lifestyle, comorbidities with poor compliance with antihypertensives and regular follow up has strong correlation with hypertensive urgency and emergency. The most common signs and symptoms associated with our study is neurological impairment followed by dyspnea [1]. The most common end organ damage according to our study is brain followed by lungs then kidney and heart.
Key words: hypertensive emergency, urgency, crisis, end organ damage.

I. INTRODUCTION.

A rise in systolic blood pressure (BP) to 140 mmHg or higher, or in diastolic BP to 90 mmHg or higher, is referred to as hypertension. It is estimated that at least one in four adult has hypertension, but only about 12% of them have under control. According to WHO by April 2022 more than 2.5 million patients with hypertension have been enrolled in various health facilities. India has set a target of 25% reduction in the prevalence of hypertension by 2025.[1,2]. Early detection and treatment of hypertension reduce the risk of consequences like heart attack, heart failure, stroke, renal failure, blindness, and hypertensive crisis, which all have high morbidity and mortality rates and result from poorly controlled hypertension [3]. Patients frequently visit medical facilities due to hypertensive crises, clinical syndromes that result from untreated or improperly treated hypertension.

Hypertensive crisis is one of the major acute complications of hypertension, resulting in an emergency admission to the hospital. According to AHA & European society of hypertension, hypertensive crisis is defined by blood pressure 180/120 with or without target organ damage. It is divided as hypertensive urgency when there is no end-organ damage and as hypertensive emergency associated with end organ damages. Target organ damages includes:

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1 neurological – cerebrovascular accident, hypertensive encephalopathy, SAH/ICH
2 cardiovascular – MI, aortic dissection, acute pulmonary edema, acute left ventricular dysfunction
3 other organs – kidney – acute renal failure, eyes – retinopathy and retinal hemorrhages, eclampsia, microangiopathic hemolytic anemia.

To treat a hypertensive urgency, blood pressure must be gradually lowered with oral medication within 24 hours to avoid damaging the target organ. While in hypertensive emergency patients, immediate blood pressure lowering, or a 25% drop from baseline in 1 hour, is advised to stop further progression of organ damage[4]. The prevalence and characteristics of patients with hypertensive crises have altered over the past forty years, according to a review article on the subject. Mortality and morbidity, however, continue to be still significant. [5]. The symptoms of hypertensive pseudo-crisis, which is defined by a brief increase in blood pressure after unpleasant or emotional experiences, such as headaches, rotating vertigo, anxiety, or panic attacks, and the focus of treatment is symptomatic [6].A study on the subject has shown that among the major findings are pathophysiological changes occurring in the body in case of high blood pressure, such as the self-regulation to maintain adequate and stable blood flow to the brain, heart and kidneys during pressure fluctuations[7].

OBJECTIVE:

- To study about the incidence, risk factors & clinical presentation of patients in hypertensive crisis coming to emergency department.
- Comparison of outcome predictors in hypertensive urgency and hypertensive emergency.

II. METHODS

This was a cross-sectional retrospective record based study, with a quantitative approach, conducted in the emergency department of KIMS Bangalore India for a period of 4 months (from Aug 2022 – Nov 2022). All patient presented to emergency department were screened and those who met the inclusion criteria were consecutively enrolled in the study. A total of 76 patients who met the following inclusion criteria were identified: Invasive blood pressure ≥180/120mmHg and age ≥18 years.

Patients studied according to various parameters like age, sex, risk factors, clinical presentation, hemodynamic parameters along with IBP at arrival, after 1hour, after 2hrs, investigations, diagnosis and outcome. Invasive BP monitoringwasdonetill patient attainedthe desired blood pressure. The primary aim is to study about theincidence, risk factors, clinical presentation and hemodynamic parameters ofhypertensive urgency and emergency . We have compared the various factorshelps to differentiate between hypertensive urgency and emergency and also explained about the mortality associated with it. Patients with symptoms and signs suggestive of end organ damages like chest pain, breathlessness, oliguria, seizures, giddiness, paresthesia, confusion etc& medical diagnoses of cerebrovascular accident, acute renal failure, acute myocardial infarction and acute pulmonary edema, were classified as a hypertensive emergency. Hypertensive urgencies were diagnosed with signs and symptoms without evidence of end organ damage. Data collection was performed using the information on the emergency department records.

Data were entered into an Excel spread sheet and analyzed with Stats Direct version 3.0.133. Descriptive statistics, including counts (percentages), means (standard deviations), medians (interquartile ranges [IQR]), and 95% confidence intervals (CIs) are reported as appropriate. Comparisons between groups were performed using the Chi Square or Fisher's exact test for proportions and Student's T-test or the Mann-Whitney U test for continuous variables, as appropriate to the distribution of the data. Two-sided p-values <0.05 were considered significant. The incidence of hypertensive urgency and emergency were calculated by dividing patients diagnosed with each condition by the total number of patients who visited the ED during the screening periods. In-hospital mortality was calculated by dividing the number of patients who died by the total number of patients enrolled.

III. RESULTS

In our study total 76 patients were evaluated according to their risk factors, clinical profile and hemodynamics. Initially patients were studied according to the general charactertics.

Table 1 explains about the demographics of the patient along with the risk factors. Risk factors include the habits and physical activity of the patients. Physical activity has been classified as mild, moderate and severe. 63% patients with mild activity had hypertensive crisis. 33% of alcoholics and 32% of cigarette smokers are diagnosed with hypertensive crisis. In our study 89% patients were in the age group above 40 with a male predomance (58%). 78% patients were diagnosed with

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hypertension. Out of 76 patients 47 were diagnosed to have other comorbidities among them diabetes mellitus is seen in majority of patients.

CHARACTERTICS	NUMBER	PERCENTAGE
Male	44	58
Female	32	42
Alcohol usage (N=76)	25	33
Cigarette smoke (N=76)	24	32
Physical activity		
Mild	48	63
Moderate	17	22
Heavy	11	15
H/O HTN (N=76)	58	76
On regular medication (N=58)	49	84
Regular clinic visit (N=58)	25	43
Stopped medication (N=58)	16	28
Comorbidities	47	
DM (N=47)	31	41
CKD (N=47)	12	16
IHD (N=47)	4	4

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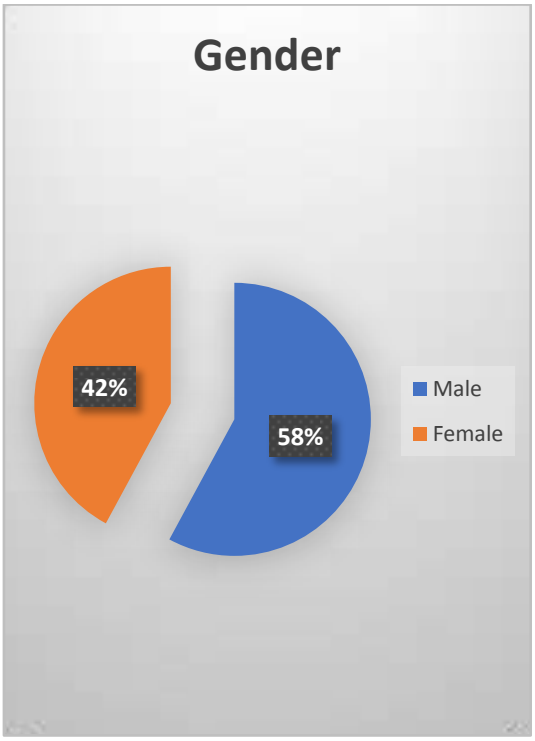

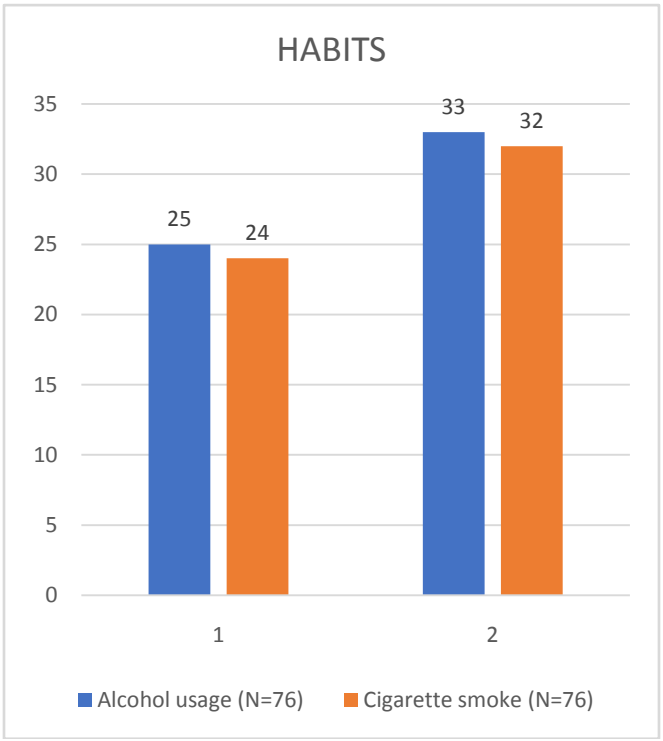

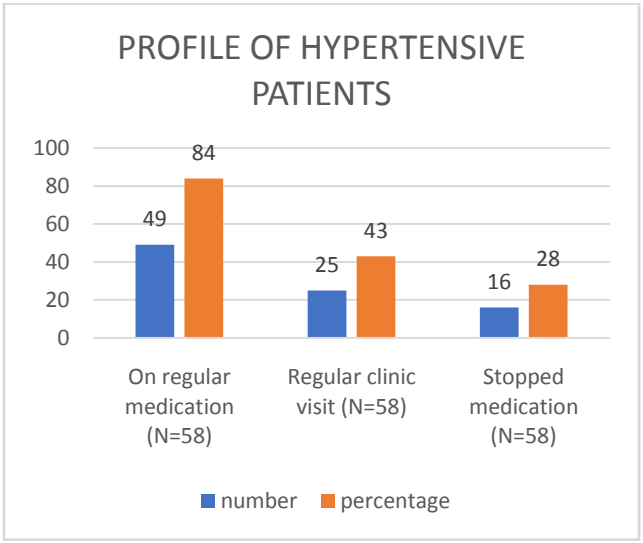

Symptoms on presentation	number	percentage
Weakness	31	41
Vomiting	29	38
Giddiness	26	34
Headache	26	34
AMS	25	33
Blurred vision	22	29
SOB	16	21

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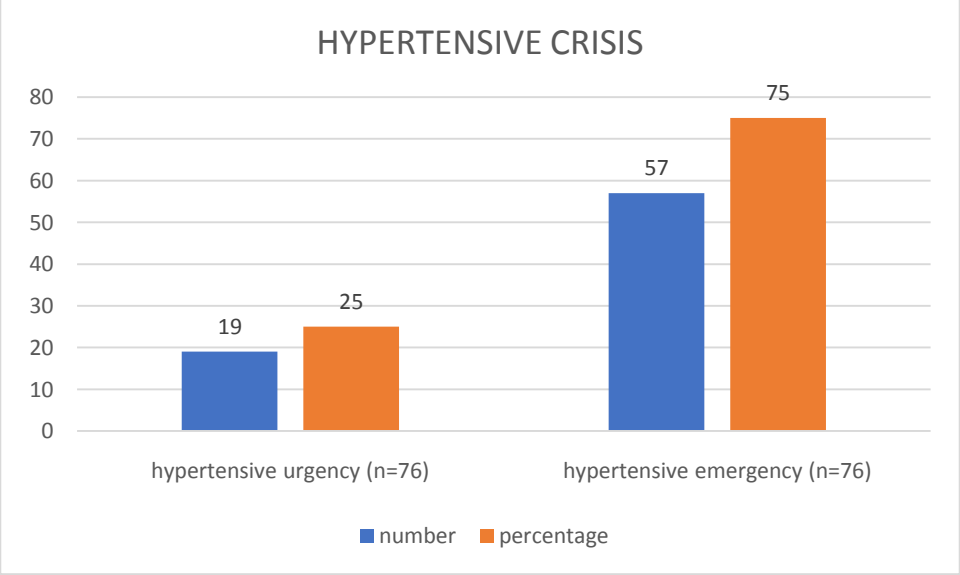
Seizures	15	20
Oliguria	13	17
Pedal edema	10	13
Chest pain	9	12
Epistaxis	7	9

According to table 2 weakness is the most common presentation followed by giddiness, headache, vomiting and altered mental status.

Vital signs	**mean**	**SD**
PR at arrival	99	20
SBP at arrival	191	15
DBP at arrival	114	6
SBP 30 min	174	16
DBP 30 min	103	8
SBP 1 hr	161	17
DBP 1hr	96	8
SBP 2 hr	150	17
DBP 2 hr	90	7
SPO2	95	4
GCS	13	3
GRBS	188	58
Pupil		
B/L pupils reactive to light	69	91
Anisocoria	5	6
Pinpoint	2	3

In table 3 number denotes the average of the vital parameters.



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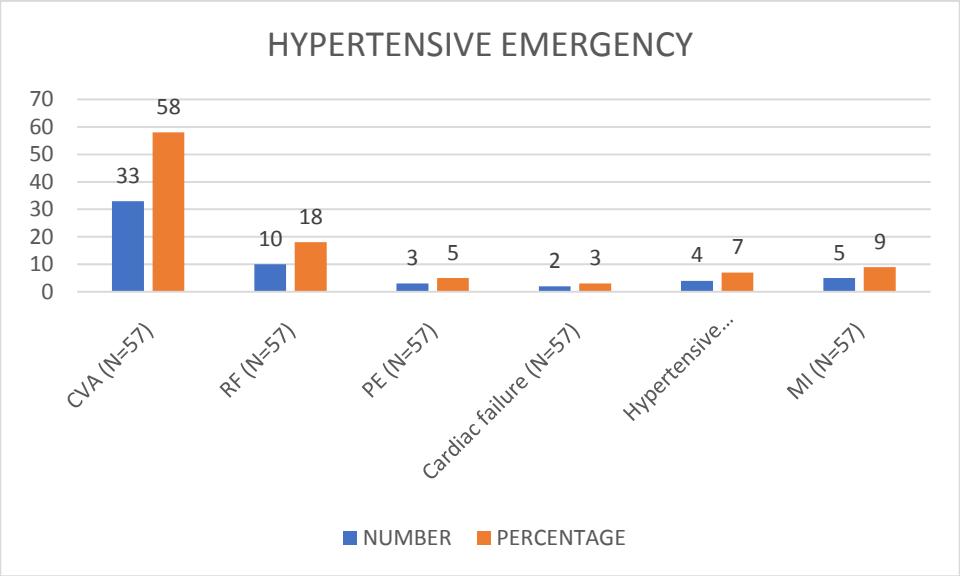
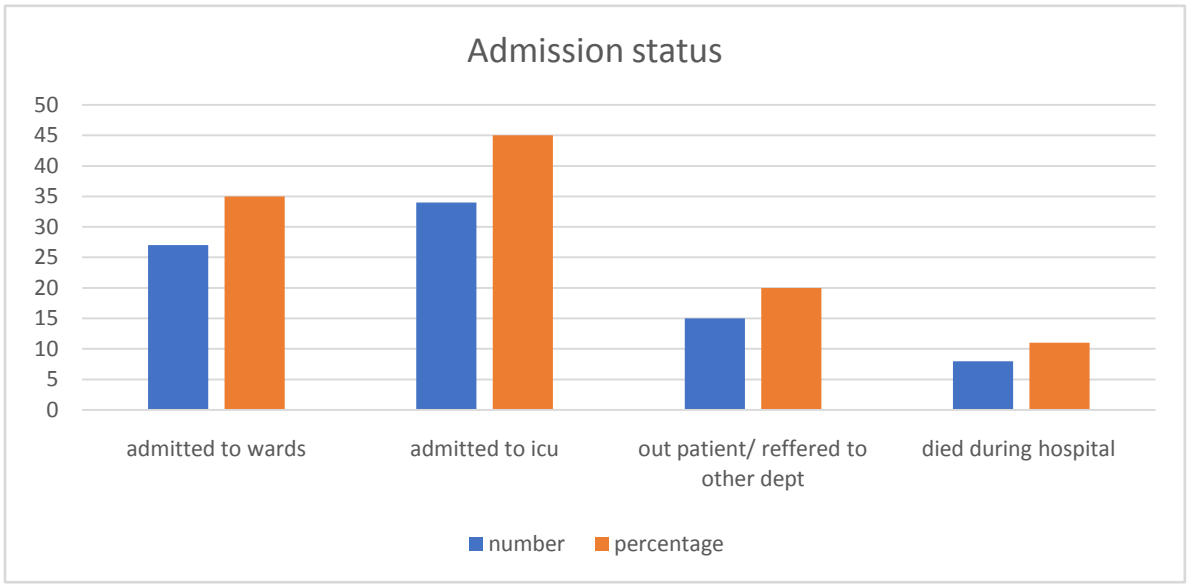


Admission status	NUMBER	PERCENTAGE
Admitted in ward	27	35
Admitted in ICU	34	45
Outpatient/ referred to other dept	15	20
Died during hospital care	8	11



Comparison of factors between hypertensive emergency and hypertensive urgency cases (N=76)

Patients with hypertensive emergency were significantly older than those with hypertensive urgency. There was no statistical significance in relation to sex in these categories, but there was male predominance in both hypertensive emergency and urgency. Patients with hypertensive emergencies also presented higher blood pressure values than those with hypertensive urgency. There was a significant reduction in both systolic and diastolic bp when bp at arrival and after 2hrs are compared. The most common

presentation were weakness, giddiness and headache.

Variable	Hypertensive emergency n (%)	Hypertensive urgency n (%)	P value
Gender			
Male	34 (77)	10 (23)	0.592
Female	23 (72)	9 (28)	
Alcohol use	20 (80)	5 (20)	0.481
No alcohol use	37 (73)	14 (27)	
Cigarette smoker	19 (79)	5 (21)	0.569
Nonsmoker	38 (73)	14 (27)	
Physical activity			
Mild	39 (81)	9 (19)	0.058
Moderate	9 (53)	8 (47)	
Heavy	9 (82)	2 (18)	
H/O HTN	45 (78)	13 (22)	0.350
No H/O HTN	12 (67)	6 (33)	
Regular medication (N=58)			
Yes	38 (78)	11 (22)	0.988
No	7 (78)	2 (22)	
Regular clinic visit (N=58)			
Yes	23 (92)	2 (8)	**0.022**
No	22 (67)	22 (33)	
Stopped medication (N=58)			
Yes	9 (56)	7 (44)	**0.016**
No	36 (86)	6 (14)	
Diabetes mellitus			
Yes	28 (90)	3 (10)	**0.010**
No	29 (64)	16 (36)	
CKD			
Yes	11 (92)	1 (8)	0.146
No	46 (72)	18 (28)	
IHD			
Yes	4 (100)	0	0.235
No	53 (77)	19 (26)	
Symptoms			
AMS	24 (96)	1 (4)	**0.003**
Headache	13 (50)	13 (50)	**0.000**
Chest pain	9 (100)	0	0.065
SOB	15 (94)	1 (6)	0.051
Giddiness	18 (69)	8 (31)	0.402
Seizures	14 (93)	1 (7)	0.067
Blurred vision	15 (68)	7 (32)	0.381
Oliguria	12 (92)	1 (8)	0.113
Weakness	30 (97)	1 (3)	**0.000**
Vomiting	24 (83)	5 (17)	0.220
Epistaxis	0	7 (100)	**0.000**
Pedal edema	10 (100)	0	0.050
	Mean	SD	
Age	54.9	9	0.346
PR	99	20	0.560
SBP at arrival	191	15	**0.002**
DBP at arrival	114	6	**0.035**

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SPO2	95	4	**0.000**
GCS	13	3	**0.000**
GRBS	188	58	**0.010**

IV. DISCUSSION

The main findings of our study was the factors helps in the diagnosis of hypertensive emergency and urgency. Out of 7598 patient screened only 76 patients were enrolled in the study. In that 75% patients were hypertensive emergency and 25% patients were hypertensive urgency. 8 out of 76 patient were associated with mortality and all 8 patients were diagnosed as hypertensive emergency. According to our study none of the hypertensive urgency patients were associated with mortality.

According to our study hypertensive emergency has the highest prevalence. The majority of patients (79%) presented to ED with features suggestive of hypertensive crisis were within a mean age of sixth decade, similar results were obtained in other studies also. Other important risk factors determining hypertensive crisis are alcohol intake and smoking. 35% of total patient found to be chronic alcoholics. 80% of chronic alcoholic patients were diagnosed as hypertensive emergency. According to our study it is not statistically significant in differentiating between hypertensive urgency and emergency. Only 31% of total patients were found to be smokers, in that 79% patients were found to be hypertensive emergency. Smoking is also not a significant factor differentiating between hypertensive emergency and urgency. Other risk factor studied in our study were physical activity. Physical activity was classified as mild, moderate, heavy. Mild is sedentary with light intensity physical activity with a MET<1.0 to <3, moderate-moderate intensity physical activity with MET <3 to <, Heavy – high intensity physical activity with MET >6. Majority of the patients in our study group turned to be in mild physical activity group. Only 15% were found to be in heavy physical activity. Physical activity is also statistically insignificant according to our study for differentiating between hypertensive urgency and emergency. Alcohol intake, smoking and physical activity are risk factors for both hypertensive urgency and emergency, but not a statistically significant factors in differentiating between those two.

According to our study 76% patients were previously diagnosed as hypertensive. In that 84% patients were on regular medication and 43% patients were on regular clinical visits. Criteria for regular clinical visits: Patients with hypertension under control ieBP <135/85 (AOBP) or<140/90 (Non-AOBP) orBP <130/80 in patients with Diabetes requires regular Follow up every 3-6 months. But patients with uncontrolled hypertension ieBP >= 135/85 automated office bp (AOBP) or>= 140/90 (Non-AOBP) orBP >= 130/80 in patients with Diabetes or >=180/110 requires follow up every 1-2 months.[8] Regular medication is considered according to NHM 2016 guidelines suggest that all the 4 drug classes of antihypertensive drugs–thiazide diuretics, calcium channel blockers, ACE inhibitors, Angiotensin receptorsblockers for initiation as well as add-on agents to control BP.Beta-blockers are not considered first line drugs in most guidelines, but may be used in patients with hypertension and associated coronary artery disease or heart failure. Many patients will require combination of drugs for control of hypertension.[9]28% patients stopped medication or on irregular medication. Regular clinical visits is a statistically significant factor(p value 0.022)helps us to differentiating between hypertensive emergency and urgency. According to our study 92% hypertensive emergency patients was on regular clinical visits. Stopped medication or irregular medication is also a significant factor with a p value of 0.016 helps to differentiate between urgency and emergency. Among the comorbidities diabetes mellitus (DM) was found to be present in 31 patients followed by chronickidney disease (CKD) 12 patients and ischemic heart diseases (IHD) 4 patients. 90% of DM patients and 92% of CKD patients and 100% of IHD patients are diagnosed to be hypertensive emergency. Comorbidities are usually associated with hypertensive emergency, so it is a statistically significant factor in differentiating between hypertensive crisis. Weakness is the most common presenting symptoms in hypertensive crisis followed by altered mental status, headache, vomiting. 96% Altered mental status (p value 0.003)has been noted as hypertensive emergency patients according to our study. 97% of patients with weakness (p value 0.000) comes under hypertensive emergency. 100% of epistaxis (p value 0.000) patient presented as hypertensive urgency. 100% pedal edema presented to our study was hypertensive emergency. All these clinical presentation were statistically significant and helps in differentiating between hypertensive urgency and emergency.Otherfactors helps in differentiating hypertensive urgency and emergency are systolic

and diastolic blood pressure at arrival, with a statistically significant p value of 0.002 and 0.035 respectively. According to our study higher the arrival blood pressure, the diagnosis is more likely to be hypertensive emergency. Other important hemodynamic parameter which is statiscally significant to diagnosis hypertensive crisis was Glassgow coma scale (GCS)of the patient. According to our study all hypertensive urgency patients found to have GCS of 15/15. Deranged spo2 and GRBS are also usually found in hypertensive emergency with a significant p value of 0.000 and 0.010. All these statistically significant parameters helps in differentiating between hypertensive emergency and urgency.

Out of 76, 8 patients succumbed to death. Cause of mortality were determined to be hypertensive emergency in all patients who died. In that cerebrovascular accident is the most cause of death in hypertensive emergency.62% mortality of our study was due to cerebrovascular accident, in that intracranial bleed has the highest association. Pulmonary edema is the second common cause of mortality according to our study followed by renal and heart failure. Hypertensive urgency is rarely associated with mortality, in our study there is no hypertensive urgency had mortality. This is due to no end organ damage. 89% patient survived according to our study. The patients had mortality was presented with severe deranged hemodynamic parameters mainly with very high blood pressure and poor GCS.

The importance of this study is based on the symptoms presented by the study population, which made possible the hypertensive crisis classification and the identification of its relation with the risk factors, signs and symptoms expected for each type of the two categories of hypertensive crisis.[1] A study about the subject points out the main finding of fast differentiation between hypertensive urgency and hypertensive emergency, so that the choice of treatment depends on the clinical presentation of the patient [10]. Most patients in our study self-reported risk factors for cardiovascular disease (example. Cigarette smoking, lack of physical exercise, sedentary work), along with poor compliance with antihypertensive medications, which has been associated with hypertensive emergency and urgency [2].

V. CONCLUSION

- According to our study risk factors like alcohol intake, smoking and sedentary lifestyle, comorbidities with poor compliance with antihypertensives and regular follow up has strong correlation with hypertensive urgency and emergency.
- The most common signs and symptoms associated with our study is neurological impairment followed by dyspnea [1]. The most common end organ damage according to our study is brain followed by lungs then kidney and heart.
- Hypertensive crisis was associated with substantial morbidity and mortality, with the most vulnerable being those with hypertensive emergency.[1]
- Symptoms presented by patients in emergency services are considered paramount for the outcome of the hypertensive crisis, and they can prevent the severe progression of this hypertensive complication.[2]
- Treatment should be individualized to each patient based on the type and extent of end organ damage, degree of BP elevation, and the specific side effects that each medications could have on a patient's preexisting comorbidities.[11]
- Limitations: lack of sample size due to the single center study with small cohort Absence of follow up.

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