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COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF EMERGENCY MEDICINE

**DETERMINANTS OF HYPERTENSIVE CRISIS AMONG PATIENTS
AT ADULT EMERGENCY DEPARTMENT OF SELECTED PUBLIC
HOSPITALS IN ADDIS ABABA, 2021: A CASE-CONTROL STUDY**

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MSc Thesis

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HOSPITALS IN ADDIS ABABA, 2021: A CASE-CONTROL STUDY**

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Acronym and Abbreviation

AaBET:	Addis Ababa Burn Emergency & Trauma Hospital
AACAHB:	Addis Ababa City Administration Health Bureau
ACC:	American College of Cardiology
ACS:	Coronary Syndrome
AHA:	American Heart Association
BP:	Blood Pressure
CHD:	Coronary Heart Disease
CKD:	Chronic Renal Disease
CVD:	Cardio- Vascular Disease
DBP:	Diastolic Blood Pressure
DM:	Diabetes Mellitus
ED:	Emergency Department
ETB:	Ethiopian Birr
HTN:	Hypertension
MI:	Myocardial Infarction
M-IISH:	Menelik II Specialized Hospital
mmHg:	Millimeter of mercury
NHANES:	National Health and Nutrition Examination Survey
SBP:	Systolic Blood Pressure
SPHMMC:	Saint Paul's Hospital Millennium Medical College
SPSH:	Saint Peter's Specialized Hospital
SPSS:	Statistical Package for Social Sciences
TASH:	Tikur Anbessa Specialized Hospital
TBH:	Tirunesh Bejing Hospital
USA:	United States of America
Y-12SH:	Yekatit 12 Specialized Hospital

Abstract

Background: Hypertension is one of the major health problems that can cause significant morbidity and mortality in the world. It affects about 1.13 billion world population. 1-2% of this population have hypertensive crisis. Hypertensive crisis is becoming the main health issue in countries with low-income level. However, limited studies have been conducted in Ethiopia. The aim of this study is to assess determinants of hypertensive crisis among patients visited adult emergency department of selected public hospitals in Addis Ababa, 2021

Method: Hospital based unmatched case-control study was conducted among 85 cases and 170 controls at adult emergency department of selected public hospitals in Addis Ababa from March 15 to May 15 2021. Patients presented with hypertensive crisis were considered as cases and hypertensives but without hypertensive crisis were considered as controls. Data were collected by trained nurses using structured questionnaire and entered to Epi Data version 4.6 and exported into SPSS version 26 for analysis. Descriptive statistics was done and presented using text, frequency tables, charts and graphs. Binary logistic regression was done and variables with p-value less than 0.25 were eligible for the final model. A multivariable logistic regression was also performed. Finally, statistical significant level was declared at a p-value of less than 0.05.

Result: The proportion of participants presented with history of previous HTN was higher among cases than controls (82.4% and 64.1%) respectively and the likelihood ratio of hypertensive crisis was 3.6 times (AOR= 3.621: 95% CI 1.634,8.024,P=0.002) higher among participants with history of previous HTN compared to without history of previous HTN. There was also 4 times increased risk of hypertensive crisis among participants presented with diabetes mellitus than participants presented without it (AOR=4.179: 95% CI 2.064, 8.643, P=0.000). Similarly, participants presented with heart failure had 3 times higher odds (AOR= 3.056: 95% CI 1.516, 6.162, P=0.002) compared to participants without heart failure.

Conclusion: This study demonstrated statistically significant association of unemployment, diabetes mellitus, stroke, heart failure, history of previous hypertension, family history of hypertension and regular follow up with hypertensive crisis. The government, health facilities and health care workers should give attention for hypertensive crisis and the associated determinants.

Keywords: Hypertension, Hypertensive crisis, Determinants, Public hospitals, Addis Ababa

1 INTRODUCTION

1.1 Background

Hypertension (HTN) is one of the major health problems globally that can be diagnosed when systolic blood pressure (SBP) is ≥ 140 mm Hg and/or diastolic blood pressure (DBP) is ≥ 90 mmHg with 2-3 measurements of 1-4 week time gap or by only single measurement when blood pressure is $\geq 180/110$ mm Hg and there is evidence of organ damage like cardiovascular diseases (CVD)(1). HTN is mainly an increased arterial blood pressure and it is the major contributing factor for the occurrence of morbidity and mortality both in low-income and high-income countries(2).

The prevalence in the USA is > 65 million or about 45% of adult population (3) and even a third of the population. Of these, around 30% are not diagnosed and only 14-29% had proper BP regulation. It is mainly related to main organ impairment, majorly myocardial infarction, heart disease, stroke, and renal disease (4).

It also affects 27 - 40% of the adult population in Europe(5,6) and 40% of adult Russians(7). HTN is also a common health problem that affects 29.6% of Chines(8).

In Africa, its prevalence is more than other continents specifically in the Sub-Saharan region and the Eastern Mediterranean area, it rises to 30% and 26% of the total population respectively(9,10).

Blood Pressure $\geq 180/120$ mmHg is severe elevation and the patient will be diagnosed as hypertensive crisis (HTN-crisis) (11,12). HTN-crisis can be categorized into two namely hypertensive urgencies (HTN-urgency) and hypertensive emergencies (HTN-emergency) based on the presence or absence of target organ damage. HTN-emergency was initially defined by Volhard and Fahr since 1914 (13), denotes a condition of severe hypertension usually BP of $\geq 180/120$ mmHg which is related to serious injury to vital organs; mostly the heart, brain, kidney, eye, lung or blood vessels that necessitates rapid diagnosis and proper management to reduce or avoid end-organ damage, whereas HTN-urgency is a condition described by the existence of severe increased BP without evidence of acute organ damage that can be better managed by oral drugs with the aim of BP decrement over days to weeks(1,14–16).

Hypertensive emergency can be explained based on the organs involved as aortic dissection, acute hypertensive pulmonary edema, acute myocardial infarction, acute renal failure, hypertensive encephalopathy, acute coronary syndrome, focal neurologic deficits, stroke and hypertensive retinopathy(16–18).

Hypertensive crises mostly associated with discontinuation or poor adherence to antihypertensive medications and previous history of hypertension; others risk factors include vascular diseases, drug and substance abuse, glomerulonephritis, brain injury(19), being female, high body mass index, cardiac illness, presence of mental illness(17,20). It can also be connected with psychoemotional stress, inappropriate consumption of salt and fluid, consumption of stimulant substances, excess alcohol intake and history of preeclampsia in women(7). It is also associated with endocrine disorders especially Diabetes mellitus (DM) and pheochromocytoma(21).

Patients with hypertensive crisis can show sign and symptoms depending on the organs damaged like chest pain, headache, epistaxis, shortness of breath, dizziness, flank pain, oliguria, bloody urine, blurred vision, nausea, vomiting, palpitation, altered mental status, diaphoresis, anxiety and other manifestations(15,16). These clinical features differ from patient to patient depending on organ injury and sometimes occur irrespective of organ damage (13,16).

1.2 Statement of the problem

Hypertension is a tremendously common medical problem which touches about 1.13 billion people with the prediction to rise to 1.56 billion in the year 2025 and about 7.1 million annual death are recorded worldwide (5,7,22). It affects 30-45% of the adult population globally(23).

Hypertensive crisis accounts 1-2% of world's HTN prevalence(7,24) and among known hypertensive patients who had been treated previously, acute severe hypertension which includes HTN-emergency and HTN-urgency accounts for 1-15%(6). HTN-crisis can cause significant morbidity and mortality in the world(25) and accounts one- fourth of total medical emergencies and urgencies in Pakistan(26).

Around 25% of all medical emergency department (ED), visits were due to HTN-emergency(5) and consequence on the different organs accounts 36% of Cardiovascular conditions including acute heart failure, 24% of cerebral infarction, 16% of hypertensive encephalopathy, 12% of acute coronary syndrome (ACS)(acute myocardial infarction and/or unstable angina), 4.5% of eclampsia during pregnancy, 4% intracerebral or subarachnoid hemorrhage and 2% of Aortic dissection patients (21). HTN-emergency related annual death rate is >79%, with the median 10.4 month length of survival if not managed properly(11).

Although HTN-crisis is not well studied in Ethiopia, there were 523 patients visited Gondar university hospital from 2013 to 2016 and 159 patients visited Ayder specialized hospital from 2018 to 2019 with(27,28). Even though it becomes reason for increased morbidity, mortality and disability, there is still a great scarcity of researches which indicate evidences on determinants of HTN-crisis in Ethiopia. Therefore, this study will help to identify determinants of HTN-crisis among adult patients in Addis Ababa.

1.3 Significance of the study

Nowadays the prevalence of cardiovascular diseases including hypertension is increasing in the world. HTN-crisis is an advanced and complicated medical condition in the ED with many complications involving vital organs and leaves permanent disabilities up to death. To reduce and prevent these conditions and related consequences, clinicians have to understand the, sociodemographic, comorbid and behavioral determinants of HTN-crisis.

Although HTN-crisis is life threatening cardiovascular condition at the ED, there are no sufficient researches which indicate its determinants in the past. Therefore, the result of this study will fill this gap and gives some other evidences.

This study will identify determinants of HTN-crisis and will help for public education about the prevention of those modifiable factors. It will help health care workers to act on those factors which have an association with the condition. It will also be used as an evidenced data for health planners and policymakers. Furthermore, the result will be important for the Federal Ministry of Health, Ethiopia, Addis Ababa City Administration Health Bureau, the study area and other hospitals to develop, revise or amend their guidelines. Since the study is the first in Addis Ababa, it will be used as a baseline for future similar and related studies and probe researchers' interest for further studies.

2 LITERATURE REVIEW

Hypertensive crisis is becoming a major health problem around the globe with an increased prevalence in countries with low socioeconomic status. Identifying its determinants is quite important for the prevention and management of the condition. In order to see this study from different perspectives, different studies conducted worldwide were reviewed. The literature search was performed through different search engines like PubMed, Science HUB, Google scholar, and Hinari. The following are research articles which details about HTN-crisis and its determinants.

2.1 Determinants of hypertensive crisis

2.1.1 Sociodemographic Characteristics

A matched case-control study conducted at Newark Beth Israel Medical Center in USA indicated that the prevalence of HTN-crisis was 11.44%. The mean age of cases and controls was almost similar (59.29 ± 15.03 vs 59.91 ± 15.33). HTN-crisis was more prevalent among participants with the age group of 45-65 years with a proportion of 45.3% for cases and 46.9% for controls. There were more males than females in both groups. There were more than 40% increased odds among males of having HTN emergencies (OR 1.43, 95% CI 1.16–1.76, $p < .007$). Patients 65 years and older had 80% increased odds of developing HTN emergencies (OR 1.8, 95% CI 1.3–2.8, $p = .002$)(29).

The study conducted in Tuzla incorporating 180 HTN patients (60% females), 85 (47.22%) were presented with HTN-crisis. More than half of the HTN-crisis cases were females. There was no age group difference in HTN-emergency and HTN-urgency. Control groups comprised of 52.78% of the participants. Statistically, there was no difference in proportions among control and cases according to their distribution by gender. 69% were hypertensive previously for less than 10 years, 26.76% of participants were hypertensive for 11-20 years and only 4.23% were hypertensive for the more than 20 years(24).

A study done in Brazil, the multi nominal logistics regression showed that participants whose age was older than 60 years were less likely to develop HTN-emergency and HTN-urgency (OR=0.50, 95% CI= 0.27, 0.92, $p = 0.042$)(25).

The multi-center study conducted in Italy, logistic regression analysis, after adjustment for age, patients with hypertensive emergencies had higher risk of being men (OR= 1.34, 95% CI 1.06–1.70)(30).

The study conducted in Uganda among 100 hypertension and 203 HTN-crisis participants indicated the mean age of all participants was 55.3 ± 17.1 . The majority of them (41.4% and 42%) were at the age b/n 45 and 65 years both among HTN and HTN- crisis respectively. The proportion of participants at the age of less than 45 and greater than 65 years was equal in proportion (29.6%) in both groups. Regarding sex, proportion of females was more than males (53.2% vs 55.0 %) respectively. When we see their educational status, the largest proportions were those with primary education (32% and 47%). Those with none educated and secondary education level were almost equal ((25.4%) vs 24.6% respectively for HTN-crisis. Participants with tertiary levels of education constitute only 7.4% of cases and 10% of controls. Those unemployed participants were more than employed among the groups (64% vs 62%). Their marital status shows more than half of the participants were married in both the groups followed by widowed with less proportion of divorced and single (53.7%, 54%, 25.1 % and 26 %) respectively(31).

In Tanzania, a hospital-based study was conducted among 203 HTN-crisis patients aged above 18 years. Males account for less proportion of participants (46.8%). More proportion of participants were married than widowed, single, and divorced with the proportion of (71.9%, 12.8%, 8.4% and 6.9%) respectively. Coming to their educational level more proportion were with primary school level (54.7%). Those with secondary school were (22.2%), university levels were (10.3%) and none educated (6.4%). 46.8% were unemployed. The mean heart rate and SpO₂ at room air were 93% and 98% respectively(32).

A study conducted in eastern Sudan among 81 HTN-crisis patients revealed that 45.7% were males and 61.7% were from urban area. 44.4% were known hypertensives and 35. % had poor adherence to their medications. 23.5% smoke cigarette and only 4.9% abuse alcohol(9).

According to the study conducted in Mekele, Ayder hospital among 141 HTN-crisis patients, those with history of known HTN had less likely to develop HTN-emergency (AOR=0.405;

95% CI: 0.176-0.933; $p=0.034$) and the odds of female was 2.5 times higher (AOR=2.494; 95% CI: 1.111–5.596; $p=0.027$) than male(27).

2.1.2 Comorbid determinants

A study conducted in USA indicated that about 52% of patients had DM and there was 1.6 times higher odds of developing HTN-emergency (OR= 1.6, 95% CI= 1.3–1.97, $P<.0001$). ACS was also increasing 4.05 times the risk of developing HTN-emergency (OR=4.05, 95% CI= 3.22–5.10, $P<.0001$). Heart failure and CKD were 7.07 times (OR=7.07, 95% CI=5.65–8.99, $P<.0001$) and 3.71 times (OR= 3.71, 95%CI=2.99–4.62, $P<.0001$) higher odds of having HTN-emergency. The odds of ischemic stroke was also 2.77 times higher(29).

A matched case control study was conducted at Henry Ford Hospital, in Michigan, USA among 143 cases and 485 controls whose mean age was 52 ± 13 for cases and 53 ± 11 for controls. Only 38% of cases and 41% of controls were males. Different comorbidities were recorded among both groups; 18.9% of cases and 18.1% of controls were with DM. 7.0% and 6.2% of cases and controls respectively were diagnosed with ACS. CKD, CHF and Stroke for cases and controls were recorded with the proportion of (4.9% and 2.3%), (4.2% and 1.4% 6), 0% and 2.3% respectively). 2.8% of cases had history cigarette smoking. Variables which had strong association with hypertensive crisis were CKD(AOR= 1.48; 95% CI 0.43, 5.14) and heart failure (AOR 3.48; 95% CI 1.18, 1.42)(33).

As a study employed in Switzerland among 85 participants, comorbidities like DM, stroke, and hyperthyroidism were more common among cases than controls with proportion of (30.8% vs 19.4%, 23.1% vs 4.2% and 7.7% vs 0.0% respectively. Variables which were significantly associated with HTN-crisis were a hypertensive heart disease (HR=4.14: 95% CI 1.16, 14.8), coronary artery disease (HR= 3.73: 95% CI 1.09, 12.80) and thyroid disease (HR= 1.74: 95% CI 0.52, 5.82)(34)

Another study was conducted at the emergency room of Rajavithi hospital, a tertiary care center in Bangkok, Thailand among 307 HTN-crisis patients age above 18years. Most of the participants were males and females account only (37.5%). Previous HTN was the most common comorbidity (80.8%). Less commonly, DM (35.8%), CKD (15%), ACS (7.2%) and stroke (6.5%) were recorded. Their mean SBP and DBP were 200 and 110 ± 21 with mean heart rate of 85 ± 21 (35).

Most of the HTN-crisis participants (86.9%) had history of previous HTN with the mean duration of 37 ± 67 months according to a study conducted at Gondar university hospital. The study also tried to show the major comorbidities. Heart failure was reported among 24.2% of the participants. About 17% had CKD and DM. Other less common comorbid conditions were migraine, ACS, asthma and other conditions with the proportion of 4%, 3.6%, 3.2% and 2.8% respectively(28)

2.1.3 Behavioral and other determinants

In the New York study, 93.4% had history of previous HTN, 61.5 %. Only 0.2-2.2% of participants smokes cigarette and other substances. 15% of cigarette smokers had less likely to develop HTN- emergency (36).

The study conducted in Switzerland, the proportion of alcohol abusers was approximately equal among cases and controls which were 15.4% and 16.7% respectively. The proportion of cigarette smokers is high among controls than cases (48.6% vs 38.5 “Some factors were significantly associated with the occurrence of HTN-crisis: female sex ($P < 0.01$ and nonadherence to medication (76.9% vs 22.2%, $P = 0.02$)(34”).

In Burkina Faso study among 166 participants, more than half (60.8%) were presented with known HTN and the mean duration pf HTN in years was 5.1 ± 5.1 . Off them, 37.4% were cigarette smokers, 27.7% alcohol abusers. Only 42.6% had good adherence to their treatment and 33.7% were obese. 6.6% of HTN-crisis participants had also DM(22).

The Tanzania’s study showed that among 203 HTN-crisis cases, 80.2% had HTN history. 21.8% were current alcohol users and previous users were 26.7%. HTN-crisis was more prevalent among previous cigarette smokers than current smokers (26.7 % vs 7.4%). More proportions of the participants were paste cigarette smokers as well as past alcohol abusers. Even though exercise is important to prevent as well as to control and to reduce high blood BP only 20.5% had regular exercise; of these, some of them (39 %) do their exercise daily, 29.5% of them do 2-3 times per week and 22% only once a week. Jumping and walking were the exercise done by the participants 34.1% vs 29.3%). Adherence to antihypertensive medications and having regular follow-up are also the most important to prevent HTN-C, but only 59% of them had good adherence to medication, and only 36.4% had regular follow up(32).

According to the study conducted in Uganda, 79.3% of HTN-crisis and 94% of HTN participants had a history of HTN (OR=0.24, CI= 0.10 – 0.60, P= 0.002). DM was nearly associated (OR=0.59, 95% CI= 0.38 – 1.04, P= 0.067). Stroke, CKD, drinking alcohol and cigarette smoking had no association with HTN-crisis (OR= 1.24, CI= 0.76 – 2.00, P= 0.387 and (OR= 1.32, CI= .68-2.59, P= 0.411) respectively(31).

2.2 Conceptual framework

This conceptual framework was developed after systematic and careful review of different literatures which are related to hypertensive crisis. It shows the possible relation of hypertensive crisis with different independent variables and it was developed based on evidences found from findings of literatures.

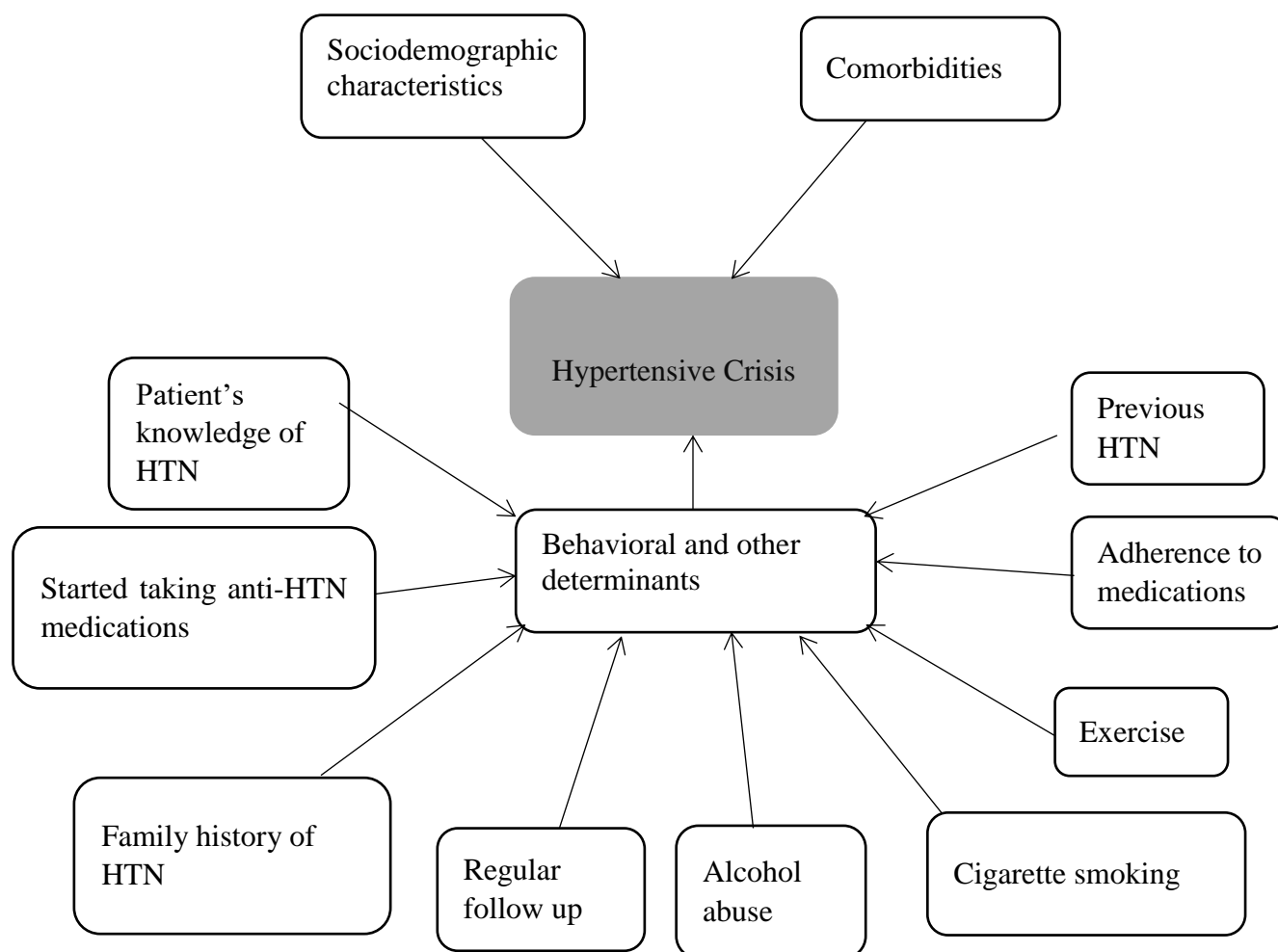


Figure 1. Conceptual framework showing determinants of hypertensive crisis

3 OBJECTIVE OF THE STUDY

3.1 General objective

To assess determinants of hypertensive crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, 2021

3.2 Specific objectives

- To assess sociodemographic characteristics of hypertensive crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, 2021.
- To assess common comorbid determinants of hypertensive crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, 2021.
- To identify behavioral determinants of hypertensive crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, 2021.

4 METHODS AND MATERIALS

4.1 Study Area and period

4.1.1 Study area

The study was conducted at adult ED of selected public hospitals in Addis Ababa. There are around 15 governmental hospitals in the city. For this study seven hospitals (Tikur Anbessa specialized hospital (TASH), Saint Paul's hospital millennium medical college (SPHMMC), Saint Peter's specialized hospital (SPSH), Addis Ababa Burn Emergency & Trauma hospital (AaBET), Yekatit 12 specialized hospital(Y-12SH), Menelik II specialized hospital (M-IISH) and Tirunesh Bejing Hospital (TBH)) were selected using lottery method. All the selected hospitals are giving services for patients from Addis Ababa and all over the country. They have also their own organized ED which is staffed by senior emergency medicine and critical care and other physicians, emergency and critical care master's nurses, BSc nurse and other supportive staff. Many patients with medical emergencies including cardiovascular disorders visit the ED of these hospitals.

4.1.2 Study period

The study was conducted from March 15 to May 15, 2021 at adult ED of the selected public hospitals in Addis Ababa.

4.2 Study design

Hospital based unmatched case-control study was conducted to identify determinants of hypertensive crisis.

4.3 Population

4.3.1 Source population

All patients with HTN who visited adult ED of public hospitals in Addis Ababa were the source population.

4.3.2 Study population

All patients with HTN who visited adult ED of the selected public hospitals in Addis Ababa from 15th March to 15th May 2021 were study population.

4.3.3 Study unit

All selected patients with HTN who visited adult ED of the selected public hospitals in Addis Ababa from 15th March to 15th May, 2021 and fulfill the eligibility criteria.

4.4 Eligibility criteria

4.4.1 Inclusion criteria

All patients who visited adult ED of the selected public hospitals in Addis Ababa from 15th March to 15th May 2021 with HTN- crisis were included as **cases**

All selected adult patients who visited adult ED of the selected public hospitals in Addis Ababa from 15th March to 15th May 2021 with hypertension without HTN- crisis were included as **controls**.

4.4.2 Exclusion criteria

- All HTN patients age below 18 years.
- Patients who fulfilled the inclusion criteria but not voluntary to participate in the study.
- Patients who fulfilled the inclusion criteria but not mentally competent.
- Patients who fulfilled the inclusion criteria but they were seriously ill during the study period.

4.5 Sample size determination

To determine the sample size, various factors significantly associated with the outcome variable were considered from previous study, and the larger sample size was taken for the study. The required sample size was determined using Epi info version 7.0 and the double population proportion formula with the assumptions of 95% CI, 80% power, case to control ratio of 1: 2, and 5% margin of error. Moreover, the percent of cases among female patients (P1) and the percent of controls exposed (P2) were taken as 36.4% and 63.6% respectively with an adjusted odds ratio of 2.494 from the previous study (27). To get the maximum sample size, P2 and the corresponding adjusted odds ratio were taken. Then the total calculated sample was 252 (84 cases and 168 controls). For the possibility of none respondents, 5% of the total sample size was added and the final sample was 265(88 cases & 177 controls).

Table 1 Summary of sample size calculation to assess determinants of hypertensive crisis at selected public hospitals in Addis Ababa

Variables	proportions	Sample size			Adding 5% for nonresponse rate	Remark
		cases	controls	Total		
Being female	P1= 36.4%				141(47 cases & 94 controls)	
	P2= 63.6%	45	89	134		
	P2= 63.6% AOR= 2.494	84	168	252	265(88 cases & 177 controls)	Sample
Previous HTN history	P1= 25.7 %				46(15 cases & 31 controls)	
	P2= 74.3 %	15	29	44		

Where: -P1= percent of cases among female patients
P2= percent of controls exposed
AOR= adjusted odds ratio

4.6 Sampling techniques and procedures

The study was conducted at seven selected public hospitals in Addis Ababa. Based on the 2019 reports obtained from the ED registry and Electronic Health Management Information System of the study hospitals, 116 patients with HTN-crisis visited their ED from March 15 to May 15, 2019(TASH=20, SPHMMC=19, SPSH=22, AaBET=10, Y-12SH=10, M-IISH= 14 and TBH=21). Taking these data, an estimated number of study units were allocated proportionally as shown below in **figure 2**. All the cases and two conveniently selected controls per each case were interviewed until the required sample size was obtained. Because of COVID -19 pandemic, the number of patients was very low since last year. Therefore, the 2019 data was used in order not to underestimate the sample size.

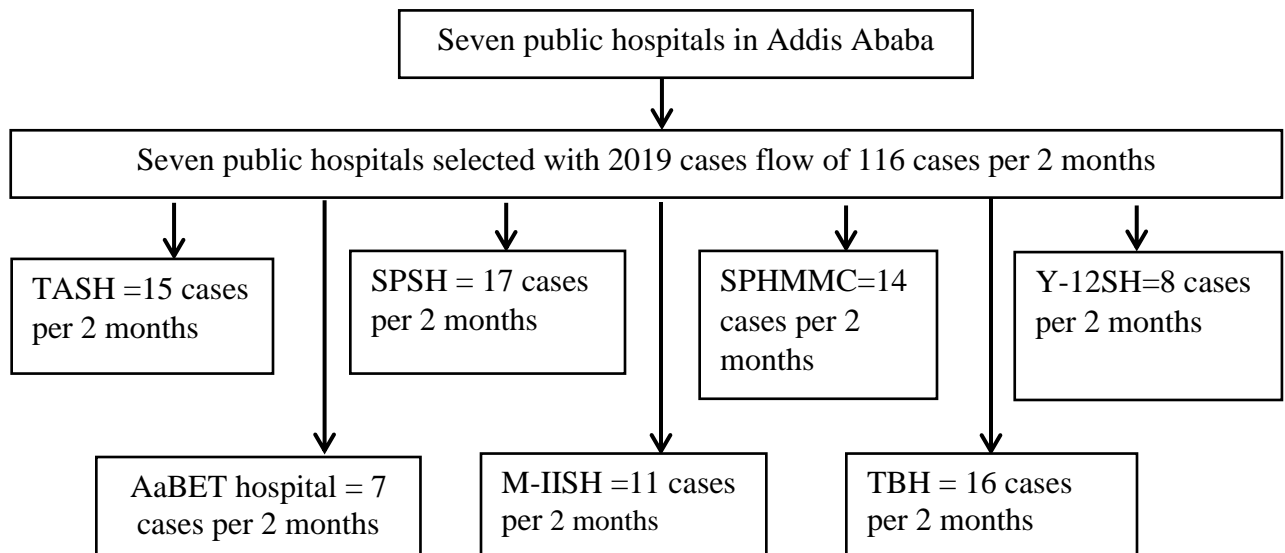


Figure 2. Sampling techniques and proportional allocation of sample to assess determinants of HTN-crisis

4.7 Study variables

4.7.1 Dependent variable

- Hypertensive crisis

4.7.2 Independent variables

➤ Sociodemographic characteristic

- Age in years
- Sex
- Residence
- Educational status
- Employment
- Marital status
- Monthly income

➤ Comorbidities

- DM
- Stroke
- Coronary syndrome
- Congestive heart failure

- Chronic renal disease
- Asthma
- Hyperthyroidism
- Migraine
- Others

➤ **Behavioral determinants**

- Known hypertension
- Patients knowledge of HTN
- Regular follow up
- Started taking antihypertensive medications
- Adherence to antihypertensive medication
- Cigarette smoking
- Alcohol abuse
- Family history of HTN
- Exercise

4.8 Data collection tools

The data were collected by using structured questionnaire which was adapted from previous studies(22,27–29,31–33,35,37,38) The tools are comprised of four parts; sociodemographic variables, patients’ vital signs, comorbidities, and behavioral determinants. Participants ‘level of adherence to their anti-HTN medications and level of knowledge about hypertension were assessed with separate tools. The questionnaire was translated to Amharic during data collection for interview and translated back to English during analysis.

4.9 Data collection procedures and techniques

Seven nurses as a data collector, one nurse as a supervisor and one data clerk were recruited and trained on the objectives of the study, the nature of variables, and way of approach to study units, and other issues. The data were collected with face-to-face interview with patients using structured and pretested questionnaire. The same interview was conducted for both cases and controls. Data regarding patient’s diagnoses, vital signs and comorbidities were taken from their medical records. All the cases and two consecutive controls selected conveniently

who visited the selected hospitals during the study period and fulfill the inclusion criteria were interviewed until the calculated sample was obtained.

4.10 Data quality assurance

The questionnaire was checked for its coherence & completeness and pretested among 5% of the total sample size at Zewditu Memorial hospital. Training was given for data collectors, the data clerk and the supervisor prior to the actual data collection started for one day. The collected data were also checked daily for completeness and appropriateness.

4.11 Data analysis and presentation

The data were checked for completeness and entered into Epi data version 4.6 then exported to SPSS version 26 for analysis. Descriptive statistics was done to see the distribution of variables and presented using texts, frequency tables, charts and graphs. Pearson Chi-square test was done to assess association between determinant factors and HTN-crisis. Binary logistic regression was done for each variable and variables with p-value less than 0.25 were eligible for the final model. Correlation between independent variables was checked. Multivariable logistic regression was performed to identify the independent predictors of HTN-crisis and to control the effect of potential confounding variables using adjusted odds ratios with the corresponding 95% confidence intervals. Model fitness was also checked with Hosmer-Lemeshow fitness test. Finally, statistically significant level was declared at a p-value less than 0.05.

4.12 Operational definition

Comorbid determinants: disease conditions which were diagnosed from hypertensive patients prior to the current presentation. It includes cardiovascular, endocrine, neurological, respiratory and other illnesses.

Behavioral determinants: are activities or behaviors which hypertensive patients do and don't do and can affect the condition of hypertensive patient's. Status of antihypertensive medication adherence, follow-up, substance abuse, exercise, and etc. are considered as behavioral determinants in this study.

Public hospitals: are hospitals which are owned as well as administered by the government and giving health care services for the community. They are not established for profit purpose.

Morisky medication adherence scale: is an 8 item assessment tool to assess hypertensive patients' level of adherence to their anti-hypertensive medications. Patients who score < 6 out of 8 is considered having **low adherence**; those who score ≥ 6 but <8 as having **medium adherence** and those who score 8 will be considered as having **high adherence** level(38).

Patient knowledge about hypertension: is a 14 item assessment tool to assess hypertensive patients' level of knowledge about hypertension. For this study, participants who score below the mean will be considered as having **poor knowledge** and those who score the mean and above will be considered as having **good knowledge**.

4.13 Ethical consideration

Letter of permission was obtained from Addis Ababa University, College of Health Sciences, and department of Emergency Medicine to conduct the study. Then the letter was submitted to the selected hospitals and Addis Ababa City Administration Health Bureau (ACAHB). An ethical clearance or letter of cooperation was also obtained from these institutions after review of the proposal. Any personal identifiers like name were not used at the time of data collection. Data collectors were informed to keep patients' confidentialities. Written informed consent was taken from each participant.

4.14 Dissemination plan

The result of this study will be disseminated to Addis Ababa University, College of Health Sciences, School of Medicine, Department of Emergency Medicine and the Library. It will also be submitted to ACAHB and the selected hospitals. It will be presented for associations and different nongovernmental organizations. The result will also be uploaded to Addis Ababa University's portal and published on journals.

5 RESULT

In this hospital based unmatched case control study, a total of 255 participants (85 cases and 170 controls) who visited seven selected public hospitals in Addis Ababa [(Tikur Anbessa hospital=15, Saint Paul's hospital=14, Saint Peter's hospital=16, Addis Ababa Burn Emergency and Trauma Hospital=7, Yekatit-12=8, Menelik II hospital= 10 and Tirunesh Bejing hospital= 15] were involved with 96.23% response rate.

5.1 Sociodemographic characteristics of participants

The mean age of both groups was approximately similar (56.15 ± 14.004 for cases and 55.34 ± 12.768 for controls). 54.1% of cases and 57.6% of controls were under the age group of 45-65 years. The proportion of males was more than females in both cases and controls (57.6% and 69.4%) respectively. Similarly, the proportion of urban residents was higher among cases and controls with the proportion of (70.6% & 82.9%) respectively. Regarding employment and marital status of the participants, more proportion of cases and controls were employed and married (63.5% vs 78.8% and 50.6% vs 68.2%) respectively (**Table 2**). The mean SBP with its standard deviation was 195.06 ± 18.989 and 151.98 ± 16.489 for cases and controls respectively. Their mean DBP was also 116.19 ± 13.514 for cases and 97.42 ± 9.751 for controls.

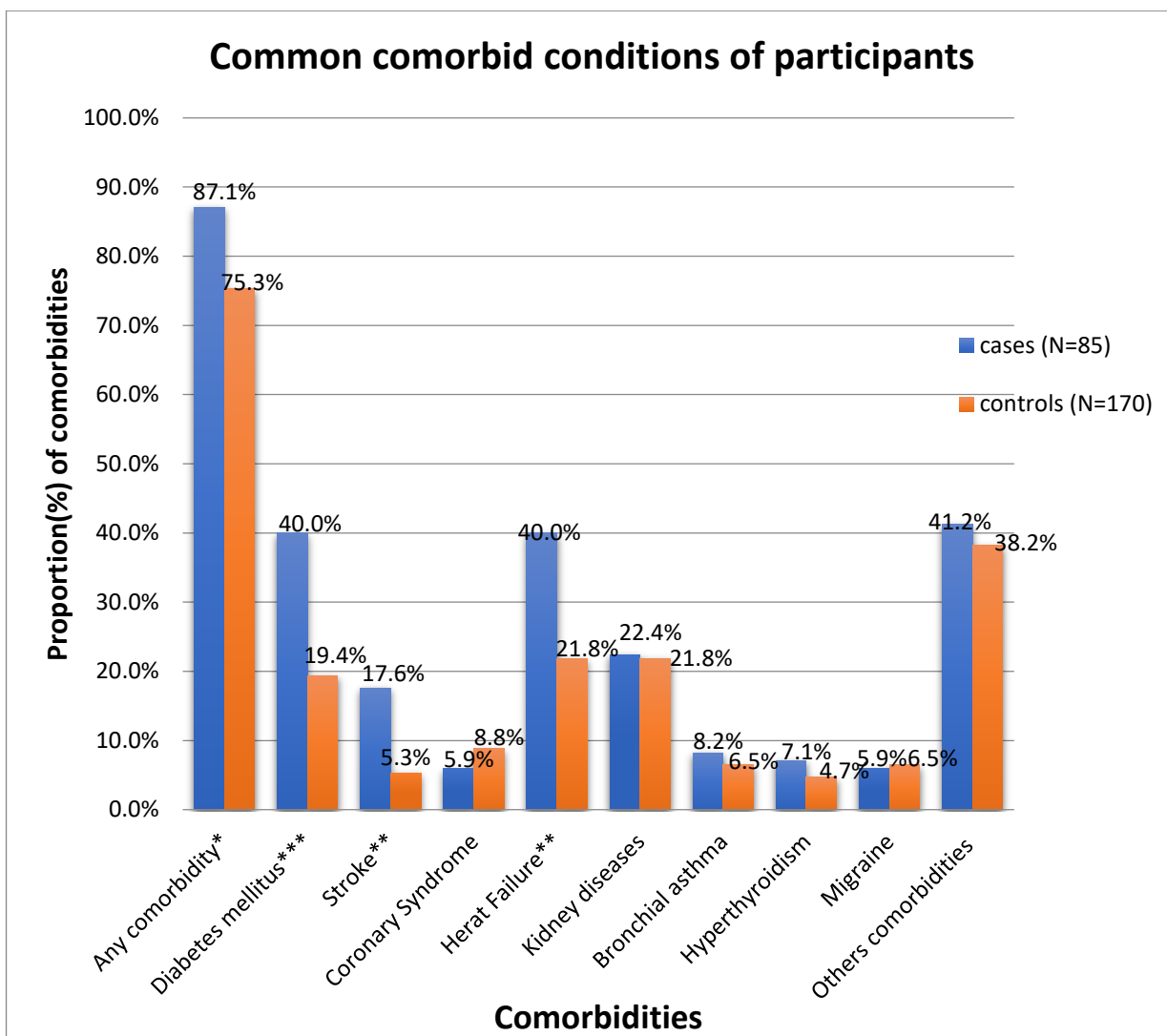
Table 2. Sociodemographic and economic characteristics of participants at selected public hospitals in Addis Ababa, Ethiopia, 2021

Variables		Group of patients(N=255)		X ² ,P-value
		Cases n (%)	Controls n (%)	
Age category	18-45	17(20.0)	36(21.2)	X ² = 0.714, P >0.05
	46-65	46(54.1)	98(57.6)	
	>65	22(25.9)	36(21.2)	
Sex	Female	36(42.4)	52(30.6)	X ² =3.470, P>0.05
	Male	49(57.6)	118(69.4)	
Residence	Rural	25(29.4)	29(17.1)	X ² = 5.180 P <0.05
	Urban	60(70.6)	141(82.9)	
Educational status	None educated	15(17.6)	25(14.7)	X ² = 3.993, P >0.05
	Elementary school	24(28.26)	35(20.6)	
	Secondary school	12(14.1)	39(22.9)	
	Tertiary	34(40.0)	71(41.8)	
Employment	Unemployed	31(36.5)	36(21.2)	X ² = 6.843, P <0.01
	Employed	54(63.5)	134(78.8)	
Marital status	Married	43(50.6)	116(68.2)	X ² = 13.562, P <0.01
	Single	29(34.1)	25(14.7)	
	Divorced	6(7.1)	17(10.0)	
	Widowed	7(8.2)	12(7.1)	
Monthly income in ETB	<500	7(8.2)	17(10.0)	X ² = 0.928, P >0.05
	500-999	14(16.5)	21(12.4)	
	≥1000	64(75.3)	132(77.6)	

Key: n= number of participants, ETB Ethiopian Birr, X2 = chi square

5.2 Participants' comorbid conditions

Most of the participants of both groups were presented with different comorbid conditions (87.1% of cases and 75.3% of controls). The proportion of participants presented with DM and heart failure was equally higher among cases than controls (40%) followed by kidney disease (22.4%). On the other hand the proportion of other comorbidities was 41.2% for cases and 38.2% for controls (**Figure 3**).



*= $p < 0.05$, **= $p < 0.01$, ***= $p < 0.001$, other comorbidities: any comorbidity other than the above listed

Figure 3. Comorbid determinants of HTN- crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, Ethiopia, 2021

5.3 Behavioral and other determinants

Most of the participants in the case as well as the control groups had history of previous HTN (82.4% and 64.1% respectively). 37.1% of cases and 48.6% of controls were hypertensive for 2-5 years. 24.3% of cases and 22.9% of controls were hypertensive for more than 10 year. 20% of cases and 17.4 % controls were hypertensive for less than 2 years. Additionally, about 18.6% of cases and 11% of controls were hypertensive for 6-10 years. Only 67.1% of cases and 61.8% of controls were on antihypertensive medications. Similarly, only 18.8% of cases and 35.3% of controls had regular follow up. About 72.9% of case and 57.1% of controls had family history of hypertension. The proportion of cigarette smokers was higher among cases than controls (21.2% and 15.9% respectively). Among smoker higher proportion of cases (61.1%) and controls (55.6%) were previous smokers. Similarly, the proportion of participants who drink alcohol among the cases (41.2%) was more than controls (32.4%). From participants who drink alcohol, majority of both groups were previous alcohol drinkers (60.0% of cases and 65.5%). On the other hand the proportion of participants who did physical exercise among the cases (25.9%) was less than controls (28.8%) (**Table3**).

Table 3. Behavioral determinants of HTN- crisis among patients at emergency department of selected public hospitals in Addis Ababa, Ethiopia, 2021

Variables	Group of patients		X ² , P- value	
	Cases n (%)	Controls n (%)		
History of previous HTN	70(82.4)	109(64.1)	X ² =9.007, P<0.01	
Regular follow-up	16(18.8)	60(35.3)	X ² =7.348, P<0.01	
Family history of HTN	62(72.9)	97(57.1)	X ² =6.089, P<0.05	
Smoking cigarette (N=255)	18(21.2)	27(15.9)	X ² =1.093, p>0.05	
Average daily consumption of cigarette in pieces	≥20	7(38.9)	10(37.0)	X ² =0.016, P>0.05
	<20	11(61.1)	17(63.0)	
Alcohol drinking (N=25)		35 (41.2)	55(32.4)	X ² =1.932, p>0.05
Type of alcohol	Beer	17(48.6)	30(55.6)	X ² =0.416, P>0.05
	Wine	5(14.3)	10(18.5)	X ² =0.272, P>0.05
	Traditional alcoholic drinks	23(65.7)	39(72.2)	X ² =0.426, P>0.05
	Others alcoholic drinks	8(23.5)	13(24.1)	X ² =0.003, P>0.05
Regular physical exercise (N=25)		22(25.9)	49(28.8)	X ² =0.244, p>0.05
Frequency of exercise per week in days	<3 days	13(59.1)	30(61.2)	X ² =0.029, P>0.05
	≥3 days	9(40.9)	19(38.8)	
Type of exercise	Walking	17(77.3)	39(79.6)	X ² =0.049, P>0.05
	Jumping	5 (22.7)	11(22.4)	X ² =0.001, P>0.05
	Other exercises	10(45.5)	20(40.8)	X ² =0.134, P>0.05

Key: X² = chi square, n= number of participants, N=sample size

Other alcoholic drinks include those other than the above list available with different names

Other exercises include running and any other physical activity including gymnasium.

Medication adherence level of participants

It was assessed with an 8 item Morisky medication adherence assessment tool (**Table 4**). Participants who scored less than 6 were considered as having low adherence level. Those scored above 6 but below 8 were also considered as having medium adherence level and who scored 8 were considered as having high adherence level. In this study, higher proportion of both groups had (47.4% of cases and 46.7% controls) had medium level of adherence. Approximately equal proportion of both groups had low adherence level. On the other hand, only 21.0% cases and 21.9% of controls had high level of adherence (**Figure 4**).

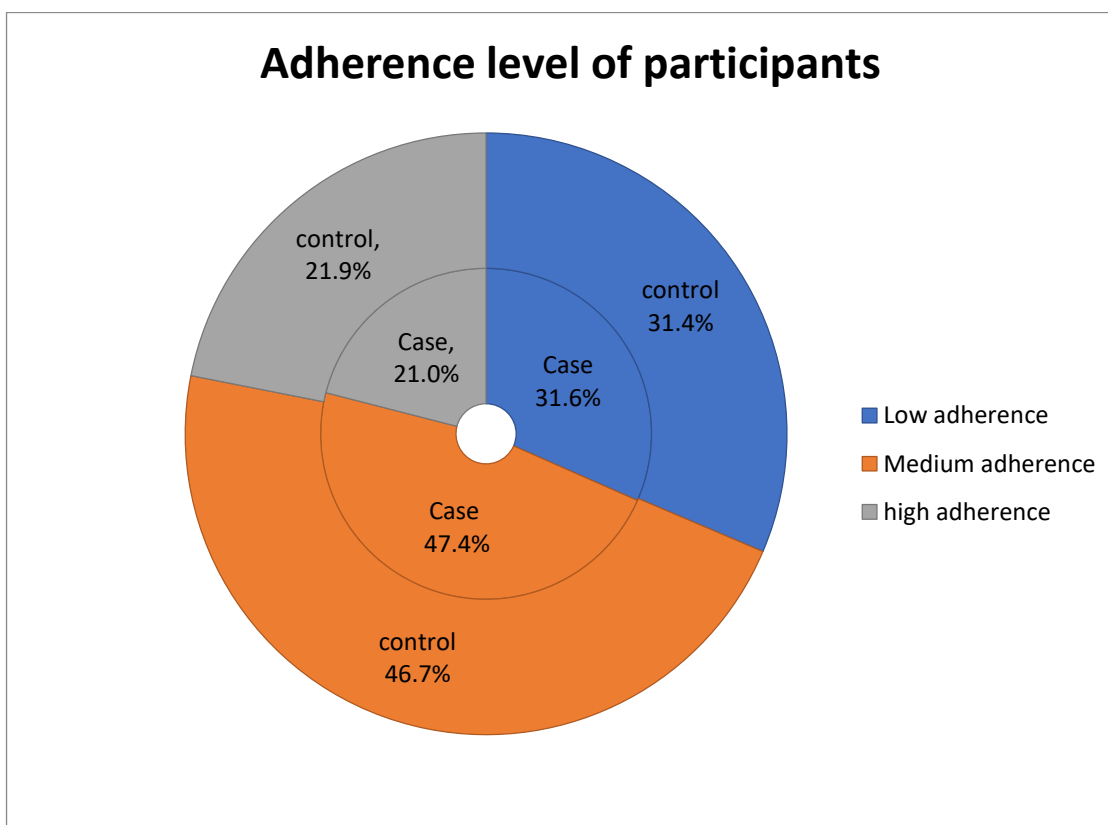


Figure 4. Participants' level of adherence to anti HTN medication about hypertension at selected public hospitals in Addis Ababa, Ethiopia, 2021

Table 4. Morisky medication adherence assessment tool to assess participants' adherence level to their antihypertensive medication at selected public hospitals in Addis Ababa, Ethiopia, 2021

variables	Cases n (%)		Controls n (%)	
	Yes	No	Yes	No
Do you sometimes forget to take your medication?	33(57.9)	24(42.1)	38(36.2)	67(63.8)
Thinking over the past two weeks, were there any days when you did not take your medicine for reasons other than forgetting?	13(22.8)	44(77.2)	22(21.0)	83(79.0)
Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	16(28.1)	41(71.9)	15(14.3)	90(85.7)
When you travel or leave home, do you sometimes forget to bring along your medication?	21(36.8)	36(63.2)	33(31.4)	72(68.6)
Did you take your medicine yesterday?	49(86.0)	8(14.0)	82(78.1)	23(21.9)
When you feel like your health concern is under control, do you sometimes stop taking your medicine?	23(40.4)	34(59.6)	32(30.5)	73(69.5)
Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	8(14.0)	49(86.0)	12(11.4)	93(88.6)
How often do you have difficulty remembering to take all your medications?	Never	11(19.3)	43(41.0)	
	Once in awhile	16(28.1)	36(34.3)	
	Sometimes	25(43.9)	21(20.0)	
	Usually	3(5.3)	4(3.8)	
	All the time	2(3.5)	1(1.0)	

Patient knowledge about hypertension

It was assessed with a 14 item assessment tool. The mean score of participants was 10.91(**Table 5**). Participants who scored below the mean were considered as having poor knowledge and those who scored the mean above the mean as having good knowledge. This study showed higher proportion of both cases and controls (70.6% and 71.2% respectively) had good knowledge (**Figure 5**).

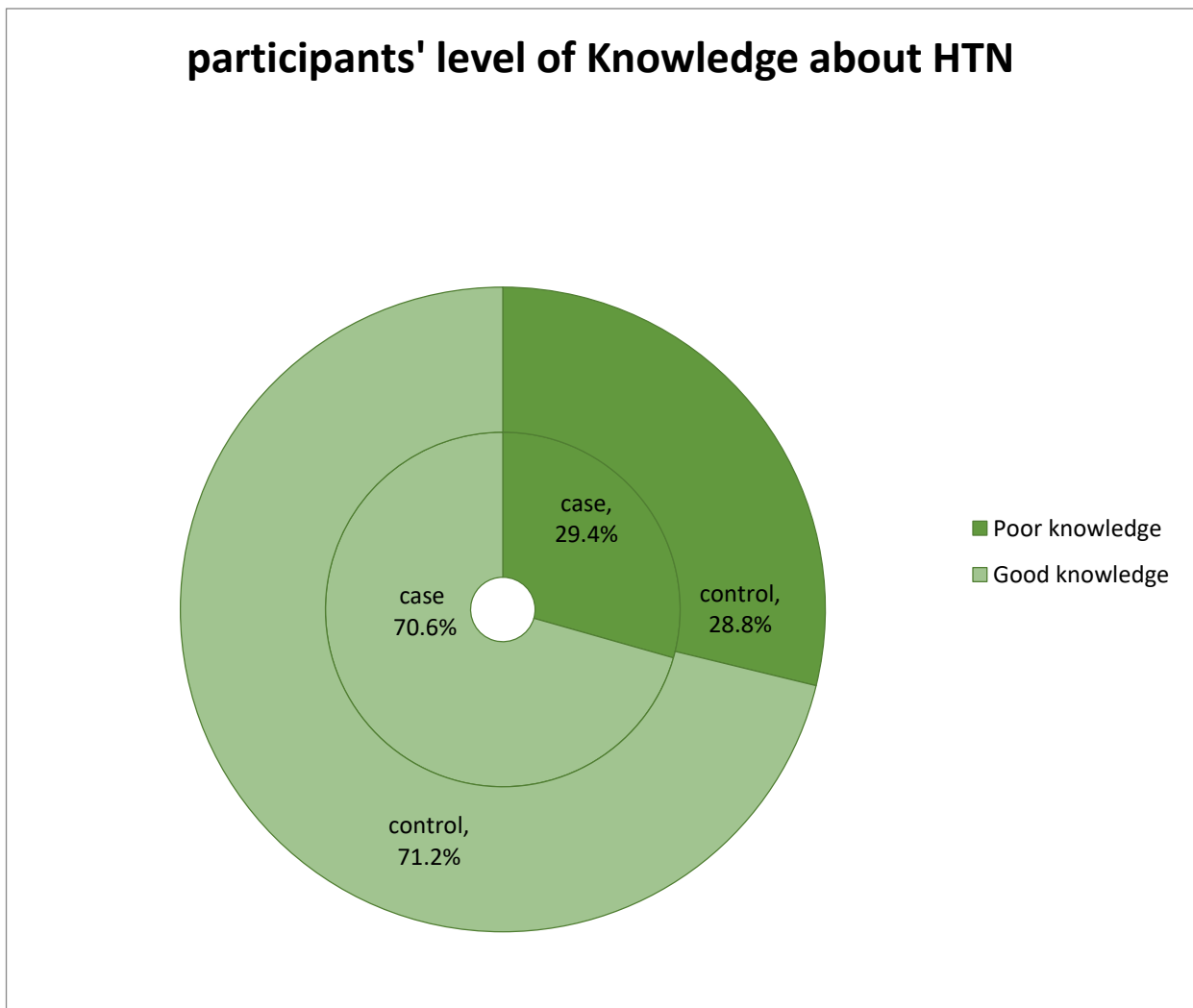


Figure 5. participants' level of knowledge about hypertension at selected public hospitals in Addis Ababa, Ethiopia, 2021

Table 5. Tool to assess participants' level of knowledge about hypertension at selected public hospitals in Addis Ababa, Ethiopia, 2021

Variables	Case n (%)		Controls n (%)	
	Yes	No	yes	no
Knowing normal values of BP as 120/80mmHg	71(83.5)	14(16.5)	124(72.9)	46(27.1)
Increase in BP > 140/90mmHg called HTN	67(78.8)	18(21.2)	97(57.1)	73(42.9)
HTN can progress along with the age	72(84.7)	13(15.3)	140(82.4)	30(17.6)
Both sexes have equal chance of developing HTN	43(50.6)	42(49.4)	69(40.6)	101(59.4)
HTN is a treatable condition	71(83.5)	14(16.5)	146(85.9)	24(14.1)
Risk of developing HT if there is a family history of HTN	61(71.8)	24(28.2)	124(72.9)	46(27.1)
Aging is greater risk of HTN	75(88.2)	10(11.8)	140(82.4)	30(17.6)
Smoking is a risk factor for HTN	76(89.4)	9(10.6)	143(84.1)	27(15.9)
Eating fatty foods is a risk factor for HTN	82(96.5)	3(3.5)	152(89.4)	18(10.6)
Overweight is a risk factor for HTN	78(91.8)	7(8.2)	146(85.9)	24(14.1)
Regular physical exercise reduces HTN	76(89.4)	9(10.6)	133(78.2)	37(21.8)
More salt consumption increases BP	77(90.6)	8(9.4)	139(81.8)	31(18.2)
Medication is alone in controlling HTN	45(52.9)	40(47.1)	105(61.8)	65(38.2)
HTN can lead to life-threatening condition	77(90.6)	8(9.4)	158(92.9)	12(7.1)
Mean score	10.91			

5.4 Factors associated with hypertensive crisis.

After adjustment was done for sex, address, employment, marital status, presence of any comorbidity, diabetes mellitus, stroke, heart failure, history of previous hypertension, regular follow up, family history of hypertension, and alcohol consumption; unemployment, [AOR=2.974: 95% CI 1.378, 6.416], DM [AOR= 4.064: 95% CI 1.862, 8.870], stroke [AOR= 7.174: 95% CI 2.294, 22.441], heart failure [AOR= 2.911: 95% CI 1.354, 6.262], history of previous HTN [AOR= 3.621:95CI 1.634, 8.024], regular follow up [AOR= 0.222: 95% CI 0.096, 0.512], and family history of hypertension [AOR= 2.263: 95% CI 1.119, 4.575] had significant association with HTN- crisis (**Table 6**).

Table 6. Factors associated with HTN- crisis among patients at adult emergency department of selected public hospitals in Addis Ababa, 2021

Variable name	COR(95% CI)	AOR(95% CI)
Sex(female)	1.667(0.972,2.861)	1.432(0.726,2.822)
Residence(rural)	2.026(1.096,3.4)	1.985(0.939, 4.194)
Marital status(Single)	3.129(1.651,5.930)	2.135(0.967,4.713)
Unemployment	2.137(1.203,3.797)	2.974(1.378,6.416)**
Comorbidity	2.207(1.071,4.548)	0.889(0.330,2.397)
DM	2.768(1.555,4.928)	4.064(1.862,8.870)***
Stroke	4.990(1.949,12.772)	7.174(2.294,22.441)**
Heart failure	2.369(1.360,4.223)	2.911(1.354,6.262)**
History of previous HTN	2.612(1.378,4.951)	3.621(1.634,8.024)**
Regular follow up	0.245(0.227,0.797)	0.222(0.096,0.512)***
Family history of HTN	2.029(1.151,3.576)	2.263(1.119,4.575)*
Drinking Alcohol	1.464(0.854,2.507)	1.270(0.650,2.481)

Key: *= $p < 0.05$, ** = p -value < 0.01 , *** = $p < 0.001$, COR= crude odds ratio, AOR= adjusted odds ratio, CI=confidence interval,

6 DISCUSSION

This study was conducted to assess determinants of HTN-crisis among patients visited adult ED of selected public hospitals in Addis Ababa. The study found some determinant factors which were significantly associated with HTN-crisis.

As the result of this study indicated the likelihood ratio of HTN-crisis was approximately 3 times higher among unemployed participants than those employed (AOR= 2.748: 95% CI 1.366, 5.529). The possible reason might be being unemployed can be the cause for stress which further causes and aggravates HTN-crisis. Unemployed people cannot get enough money for health care bills and these people especially with chronic conditions, their status might become worse.

In this study the odd of DM participants was 4 times higher (AOR= 4.064: 95% CI 1.86, 8.870) compared to those without DM. This result was supported by a case control study conducted in USA which revealed participants with DM had 1.6 times higher odds than those without DM (OR= 1.6, 95% CI= 1.30–1.97) (29). This consistency might be because of similarity in study design. Even though the USA study supported this study's significance association of DM with HTN-crisis, it considered HTN-emergency as case and HTN-urgency as control group and it included large sample size. But, this significance was not supported by another matched case control study conducted in USA which found no association between DM and hypertensive crisis(33). This discrepancy might be because of the better health care access in USA and adherence to preventive as well as treatment modalities might also be better among USA people. Even the economic status of people in the two countries is different. Additionally the two USA studies used different case and control groups.

This study also revealed that the odd of stroke was 7 times higher compared to those without stroke (AOR= 7.174: 95% CI 2.294, 22.441). This significance was not supported by cross sectional study conducted in Uganda which did not revealed any association between stroke and HTN- crisis(31). This discrepancy might be due to variation of study design and sample size. On the other hand, this significance association was supported by a case control study conducted in USA which revealed the odds of cerebrovascular accident was 2.77 times higher among the case groups(AOR= 2.77: 95% CI 2.11, 3.62)(29). This might be because of similarity in case of study design.

This study also indicated strong association of heart failure and HTN-crisis with the likelihood ratio of nearly 3 times higher compared to participants presented without heart failure (AOR= 2.911: 95% CI 1.354, 6.262). This result was in line with longitudinal study conducted in Switzerland which showed hypertensive heart disease had 4 times higher risk of developing HTN-crisis (HR=4.14: 95% CI 1.16, 14.8)(34) and two case control studies conducted in USA which showed the odds of heart failure was 3.48 times (AOR 3.48: 95% CI 1.18, 1.42) and 7 times (OR=7.07, 95% CI=5.65–8.99) higher than those without heart failure respectively(29,33). This resemblance with the Switzerland study might be due to the similarity of source of data (prospective) and the USA might be studies due to similarity in study design. Although the result of the Switzerland study was in line with this study, the Swiss study assessed association of hypertensive heart diseases with HTN-crisis.

The study also depicted as there was 3.6 times higher odds among participants who had history of previous HTN compared to those without previous HTN history (AOR= 3.621: 95% CI 1.634, 9.8042). This result contradicted with cross sectional studies conducted in Ethiopia and Uganda which indicated the less likelihood ratio of HTN-crisis among participants who had previous HTN history (AOR=0.405; 95% CI: 0.176, 0.933) and (AOR= 0.24: 95% CI= 0.10, 0.60) respectively(27,31). This difference might be because these were retrospective descriptive studies which might not assess determinant factors appropriately as they had less power than this case control study. This significance association might be due to poor adherence to medication and poor BP control of participants with previous HTN history in this study.

This study also revealed participants who had regular follow up had less likely to develop HTN-crisis than those who had not regular follow up (AOR= 0.222: 95% CI 0.096, 0.512). It is believed that those people who had regular follow up for their HTN can control their BP better than who had no follow up and this study proves this assumption.

According to this study's finding, there was 2 times higher risk of developing HTN-crisis among participants with family history of HTN than participants without the condition(AOR= 2.263: 95% CI 1.119,4.575). This might be genetic predisposition of the condition. Participants whose family had HTN history might share similar environment and other exposure with their family which can be risk for hypertensive crisis.

7 STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

This case control study is appropriate to assess relationship between determinant factors and an outcome variable compared to cross sectional, case report and case series studies.

In addition, this research was multi-center study which could incorporate variety of cases and controls and increases its representativeness.

7.2 Limitation

Although the study had strengths there might be limitations as well. The first limitation may be recall bias on some variables like duration of hypertension and daily average cigarette consumption. Similarly, some participants might not be happy to tell their net monthly income.

The other limitation might be using hospital based controls which are closing similar with cases. This may cause under estimation of some findings and over estimation of others.

The sample size was also small and this can be another limitation.

Since this study is new in its design and very few studies conducted, it was very difficult to discuss with other work.

8 CONCLUSION

This study demonstrated statistically strong association of being unemployment, DM, stroke, heart failure, history of previous hypertension and family history of hypertension with HTN-crisis. On the other hand participants who had regular follow up were less likely to develop HTN-crisis.

9 RECOMMENDATIONS

Federal ministry of health and Addis Ababa health bureau

This study showed statistically strong association between comorbidities like previous HTN history, DM, stroke, and heart failure with HTN-crisis. These are preventable factors. Therefore, the government should give special attention for the prevention of these factors. There should also be specialty trained professionals who can identify and manage these conditions early.

Hospitals

Hospitals should incorporate preventive modalities of HTC-crisis and other chronic illnesses in their plan. They should also recruit specialty trained professionals. They should facilitate and create conducive environment so that patients with HTN-crisis and other associated illnesses can be treated, educated and can have regular follow up. They should also work together with primary health facilities which are close to the community.

Health care providers

They should identify and treat HTN-crisis and associated chronic diseases early, schedule for follow-up care and educate patients about the preventive modalities of the conditions.

Researchers

There is greater scarcity of researches on HTN-crisis. Therefore, further studies are very important in the area.

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11 ANNEXES

11.1 Annex I: Participant Information Sheet

Dear participants!!

My name isI am here on behalf of Hailemariam Gezie who is a master's student in Addis Ababa university school of medicine, department of emergency medicine and critical care. He is working his thesis on “**determinants of hypertensive crisis among patients at adult ED of selected public hospitals in Addis Ababa; a case control study**”. The purpose of this study is to assess determinants of hypertensive crisis among patients at ED of selected public hospitals. It has no any direct incentive but it will help to improve health services provided by health facilities. The study has no and will not cause any harm to you and others except it will take only maximum of 30 minutes for the interview. The information you will tell us will be kept confidential and never be exposed to anyone except the principal investigator. You have also the right to refuse and discontinue the interview.

Are you willing to participate on the study? If you are willing to participate in this study, please sign the agreement form.

11.2 Annex II: Informed Consent

I have read this form or it has been read to me in the language I understand. I understand that I can discontinue the interview without any problem. Therefore

- 1) I agree to participate
- 2) I refuse to participate

If the participant agrees to participate, skip to the next page. If no, skip to the next participant

.....

Name of investigator: Hailemariam Gezie

Address: Mob +251918378595

E-mail: hailehg21@gmail.com

Supervisor address Tel

Name of data collector:

Date of interview

11.3 Anne III: Questionnaire

Part one: sociodemographic status

Ser. No	Items	Responses
101	What is your age in years?	_____
102	What is your sex?	1. Male 2. Female
103	Where is your residency?	1. Urban 2. Rural
104	What is your educational status?	1. Primary school 2. Secondary school 3. College diploma 4. University degree 5. None educated 5. Others
105	What is your employment status?	1. Unemployed 2. Self- Employed 3. Governmental Employee 4. Private Sector
106	What is your marital status?	1. Single 2. Married 3. Divorced 4. Widowed
107	How much is your monthly income?	_____ ETB

Part two: patient's vital signs

Ser. No	Vital signs	Readings
108	BP	_____ mmHg

Part three comorbidities

Ser. No	Comorbidities	1. Yes	2. No
201	Have you ever been diagnosed with any comorbidity in the past?(if yes go to next question; if no skip to part four)		
202	Which of the following comorbidities you diagnosed with?	Multiple answers are possible	
203	Diabetes mellitus		
204	Stroke		
205	Coronary syndrome		
206	Congestive heart failure		
207	Kidney disease		

208	Asthma		
209	Hyperthyroidism		
210	Migraine		
211	Others		

Part four: Other determinants

A. Morisky Medication Adherence Scale

Ser. No	Questions	1. Yes	2. No
301	Do you sometimes forget to take your medication?		
302	Thinking over the past two weeks, were there any days when you did not take your medicine for reasons other than forgetting?		
303	Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?		
304	When you travel or leave home, do you sometimes forget to bring along your medication		
305	Did you take your medicine yesterday?		
306	When you feel like your health concern is under control, do you sometimes stop taking your medicine?		
307	Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?		
308	How often do you have difficulty remembering to take all your medications?	Never(4) Once in a while (3) Sometime(2) Usually(1) All the time(0)	

B. Patient's knowledge of hypertension

No	Questions	1. Yes	2. No
401	Knowing normal values of BP as 120/80mmHg		
402	Increase in BP > 140/90mmHg called HTN		
403	HTN can progress along with the age		
404	Both sexes have equal chance of developing HTN		
405	HTN is a treatable condition		
406	Risk of developing HT if there is a family history of HTN		
407	Aging is greater risk of HTN		
408	Smoking is a risk factor for HTN		
409	Eating fatty foods is a risk factor for HTN		
410	Overweight is a risk factor for HTN		
411	Regular physical exercise reduces HTN		
412	More salt consumption increases BP		
413	Medication is alone in controlling HTN		
414	HTN can lead to life-threatening condition		

C. Other personal behavior related determinants

Ser. No	Questions	1. Yes	2. No	Remarks
501	Previous HTN?			if yes go to the next question No 502 below, if no skip to 505)
502	Duration of hypertension from diagnosis in years			
503	Have you started taking medications?			
504	Do you have regular follow up?			
505	Family history of HTN?			
506	Have you ever smoke cigarette?			if yes go to the next question No 507 below, if no skip to 5011)

507	Are you currently smoking cigarette?			
508	Did you smoke cigarette in the past?			
509	For how long you smoke?			(_____years)
510	How much pieces you smoke (are smoking) per day?			(_____)
511	Have you ever drink alcohol?			if yes go to the next question No 512 below, if no skip to 516)
512	Are you currently drinking alcohol?			
513	Did you drink alcohol in the past?			
514	What type of alcohol you drink?	(1.Beer 2. Win 3. Traditional drinks 4. Other(specify_____))		
515	Do you do physical exercise?			if yes go to the next question No 517 below, if no skip to 519)
516	How often do you do exercise per week?	(_____days)		
517	What type of exercise you do?	1. Walking 2.Jumping 3. Others (specify_____)		

አማርኛ ቅጽ

የጥናት ተሳታፊዎች መረጃ ፎርም

ጤና ይስጥልኝ! ስሜ _____ ይባላል፡ እዚህ የተገኘሁት ኃይለማርያም ገዜን በመወከል ሲሆን፤

እርሱም በአዲስ አበባ ዩኒቨርሲቲ በድንገተኛ ህክምናና ጽኑ ህመማን ክብካቤ ነርሲንግ ሁለተኛ ድግሪውን በመማር ላይ ይገኛል። የትምህርቱ አካል የሆነውን ጥናት ለከፍተኛ የደም ግፊት የሚያጋልጡ ሁኔታዎች ላይ በመስራት ላይ ይገኛል። ጥናቱ ለእርሱም ብቻ ቀጥተኛ የሆነ ጥቅም የለውም። ነገር ግን በጤና ተቋማት የሚሰጡ አገልግሎቶችን ለማሻሻል ያግዛል። በተጨማሪም ጥናቱ በእርሱም ሆነ በሌሎች ላይ የሚያመጣው ምንም አይነት ጉዳት የለም። ነገር ግን ለቃለ መጠይቁ ከጊዜዎ ቢበዛ 30 ደቂቃ ይስዳል። ከእርሱም የሚገኘው መረጃ ከአጥኝው ውጭ ለሌላ ተላልፎ አይሰጥም። በጥናቱ ያለመሳተፍም ሆነ የመቋረጥ መብት አለዎት።

በጥናቱ ለመሳተፍ ፈቃደኛ ነዎ?

ከሆኑ እባክዎ ቀጥሎ ያለው ቅጽ ላይ ይፈረሙ።

የስምምነት ፎርም

ከዚህ በላይ ያለውን መረጃ አንብቤና በሚገባኝ ቋንቋ ተገልጾልኝ፤ የጥናቱ ዓላማ፣ ጥቅም፣ ጉዳትና ምስጢራዊነት የተረዳሁ ሲሆን በጥናቱ ስለመሳተፌም ያለምንም ግፊት በራሴው ፍላጎት የሚከተለውን ወስኛለሁ።

1. በጥናቱ ለመሳተፍ ወስኛለሁ (ወደ ሚቀጥለው ፎርም ይለፉ)
2. በጥናቱ ለመሳተፍ አልተስማማሁም (ሌላ የጥናት ተሳታፊ ጋር ይሂዱ)

ፊርማ _____

የጥናቱ መሪ: ኃይለማርያም ገዜ

አድራሻ: +251918378595/ hailehg21@gmail.com

የተቆጣጣሪ ስም _____

ቃለ መጠይቁን ያደረገው ስም _____ ፊርማ _____

ቀን:- _____

አማርኛ መጠይቆች

ክፍል አንድ፡ ማህበራዊ ሁኔታን የተመለከቱ ጥያቄዎች

መ.ቁ	ጥያቄዎች	ምላሾች
101	ዕድሜዎ በዓመት ስንት ነዉ ?	_____
102	ጾታዎ ምንድን ነዉ?	1. ወንድ 2. ሴት
103	መኖሪያዎ የት ነዉ?	1. ከተማ 2. ገጠር
104	የትምህርት ሁኔታዎ ምን ይመስላል ?	1. የመጀመሪያ ደረጃ 2. ሁለተኛ ደረጃ 3. የኮሌጅ ድጥሎማ 4. የዩኒቨርሲቲ ድግሪ 5. አልተማርኩም 5. ሌላ(ባህላዊ/ሃይማኖታዊ)
105	የስራ ሁኔታዎ ምን ይመስላል ?	1. ስራ የለኝም 2. የግል ስራ 3. የመንግስት ስራ 4. የግል ድርጅት
106	የጋብቻ ሁኔታዎ ምን ይመስላል?	1. ያለገባ/ች 2. ያገባ/ች 3. የተፋታ/ች 4. የሞተበት/ባት
107	የወር ገቢዎ ስንት ብር ነዉ?	

ክፍል ሁለት፡ የህመምተኛዉ/ዋ ወሳኝ ምልክቶች

መ.ቁ	ወሳኝ ምልክት/vital sign	ንባብ/reading
108	የደም ግፊት/BP	_____ mmHg

ክፍል ሦስት፡ የተጨማሪ/ተዛማጅ በሽታዎች ሁኔታን የተመለከቱ ጥያቄዎች

መ.ቁ	ጥያቄዎች እና ተጨማሪ/ተዛማጅ በሽታዎች	1. አዎ	2. የለም
201	ከደም ግፊቱ በተጨማሪ ሌላ በሽታ አለብዎ ? (አዎ ከሆነ ወደ ጥያቄ ቁጥር 202 ይቀጥሉ የለም ከሆነ ወደ ክፍል አራት ይለፉ)- ካርድ በማየት ጭምር የሚሞላ		
202	ከጥያቄ ቁጥር 203-211 ካሉት የትኛዉ ተጨማሪ በሽታ አለብዎ?	ከአንድ በላይ መልስ ይቻላል	
203	የስኳር በሽታ/DM		
204	ስትሮክ		

205	የልብ ደም ቧንቧ በሽታ/coronary syndrome		
206	የልብ ድካም/CHF		
207	የኩላሊት በሽታ/KD		
208	አስም/Asthma		
209	የታይሮይድ ሆርሞን ከመጥጠን በላይ መንጭት/Hyperthyroidism		
210	ከፍተኛ የራስ ምታ/ማይግሬይን/migraine		
211	ሌሎች/Other(ይጠቀስ)_____		

ክፍል አራት: ሌሎች ለከፍተኛ የደም ግፊት የሚያጋልጡ ሁኔታዎች የተመከቱ ጥያቄዎች

ሀ. ሞሪስኪ መደታነት በአግባቡ እየተወሰደ መሆኑን መለኪያ

መ.ቁ	ጥያቄዎች	1. አዎ	3. የለም
301	አንዳንድ ጊዜ መድኃኒቱን መውሰድ ይረሳሉ?		
302	ባለፉት ሁለት ሳምንታት ከመርሳት ውጭ ባለ ምክንያት መድኃኒቱን ያልወሰዱበት ቀን ነበር ?		
303	በመውሰደዎ ሁኔታዎ እየተባባሰ ስለመሰለዎ ብቻ ሀኪምዎን ሳያማክሩ መድኃኒቱን ቀንሰዉ ወይም አቋርጠዉ ያዉቃሉ?		
304	ከቤት ሲወጡ ወይም መንገድ ሲጓዙ አንዳንዴ መድኃኒት መያዘዎን ይረሳሉ?		
305	ትናንት መድኃኒቱን ወስደዋል?		
306	የጤና ሁኔታዎን እየተቆጣጠሩት እንደሆነ ሲሰማዎ መድኃኒቱን አቁመዉ ያዉቃሉ?		
307	ለአንዳንድ ሰዎች በየቀኑ መድኃኒት መውሰድ በጣም አስቸጋሪ ነዉ :: እርሰወስ መድኃኒቱን በአግባቡ ስለመውሰድ ከራሰዎ ጋር ተሟግተዉ ያዉቃሉ?		
308	መድኃኒቱን ለመውሰድ ምን ያህል ጊዜ የመርሳት ችግር አጋጥሞ ያዉቃል	በፍጹም(4) አንዴ ብቻ (3) አልፎ አልፎ(2) በአብዛኛዉ(1) ሁልጊዜ(0)	

ለ. ታማሚው ስለደም ግፊት ያለው እውቀት

.ቁ	ጥያቄዎች	1.አዎ	2. የለም
401	ጤናማ የሆነዉ የደም ግፊት መጠን 120/80mmHg ነዉ;		

402	የደም ግፊት መጠን ከ140/90mmHg በላይ ሲሆን የደም ግፊት በሽታ ይባላል።		
403	የደም ግፊት ከእድሜ ጋር አብሮ ይጨምራል።		
404	ሴቶች አና ወንዶች እኩል በደም ግፊት በሽታ የመያዝ እድል አላቸው።		
405	የደም ግፊት በሽታ ሊታከም ይችላል።		
406	በቤተሰብ ውስጥ በደም ግፊት በሽታ የተያዘ ካለ የመያዝ ሁኔታን የጨምራል።		
407	እርጅና ለደም ግፊት በሽታ ያጋልጣል።		
408	ሲጋራ ማጨስ ለደም ግፊት በሽታ ያጋልጣል።		
409	ቅባታማ ምግቦችን መመገብ ለደም ግፊት በሽታ ያጋልጣል።		
410	የከብደት መጨመር ለደም ግፊት በሽታ ያጋልጣል።		
411	መደበኛ አካላዊ እንቅስቃሴ ማድረግ የደም ግፊትን ይቀንሳል።		
412	ጨዋ አብዝቶ መመገብ የደም ግፊትን ይጨምራል።		
413	መድኃኒት ብቻውን የደም ግፊት በሽታን ይቆጣጠራል።		
414	የደም ግፊት በሽታ ለህይወት አስጊ ሁኔታ ላይ ሊጥል ይችላል።		

ሐ.ሌሎች ከግለሰባዊ ድርጊት ጋር የተያያዙ አጋላጭ ሁኔታዎች

መ.ቁ	ጥያቄዎች	1.አ ዎ	2.የ ለም	ምርመራ
501	የደም ግፊት በሽታው ቀድሞ የታወቀ ነዉ?			(መልሰዎ አዎ ከሆነ ወደ ጥያቄ ቁጥር 502፤ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 505 ይለፉ)
502	የደም ግፊት እንዳለበዎ ከታወቀ ስንት ጊዜ ሁነ?			
503	የደም ግፊት መቆጣጠሪያ መድኃኒት መውሰድ ጀምረዋል			
504	መደበኛ ክትተል ያደርጋሉ? 1. አዎ 2. የለም			
505	ከቤተሰብ በደም ግፊት በሽታ የተያዘ ሰው አለ?			
506	ሲጋራ አጭሰዉ ያዉቃሉ?			(መልሰዎ አዎ ከሆነ ወደ ጥያቄ ቁጥር

				507፤ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 511 ይለፉ)
507	እስከ አሁን ያጨሳሉ?			
50	በፊት ሲጋራ አጭሰው ያዉቃሉ?			
509	ለምን ያህል ጊዜ አጭሱ?			(_____ ዓመት)
510	በቀን ምን ያህል ሲጋራ ያጨሳሉ/ያጭሱ ነበር			(_____)
511	አልኮል ጠጥተው ያዉቃሉ?			(መልሱን አዎ ከሆነ ወደ ጥያቄ ቁጥር 512፤ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 516 ይለፉ)
512	አሁንም ይጠጣሉ?			
513	በፊትስ ይጠጡ ነበር?			
514	ምን አይነት አልኮል ነው የሚጠጡት?	1. ቢራ 2. ወይን 3. ባህላዊ መጠጥ 4. ሌላ(ይጠቀስ)_____		
515	መደበኛ አካላዊ እንቅስቃሴ ለ 30 ደቂቃ ይሰራሉ?			(መልሱን አዎ ከሆነ ወደ ጥያቄ ቁጥር 517 ይለፉ)
516	በሰዎች ስንት ቀን ይሰራሉ?	(___ ቀን)		
517	ምን አይነት እንቅስቃሴ ይሰራሉ?	1. እርምጃ 2. ዝላይ 3. ሌላ(ይጠቀስ)___		