

Determinants of Hypertensive Crisis Among Hypertensive Patients at Tertiary Hospitals of Tigray, Ethiopia-unmatched case control study

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Abstract

Background- Hypertensive crisis is a life-threatening clinical condition with blood pressure reading $\geq 180/120$ mm Hg which can lead to acute damage to vital organs. In Ethiopia, although major public health initiatives are working in the control of hypertension and hypertensive crisis, death due to hypertensive crisis is increasing from time to time. It is known that hypertension is risk factor for heart failure and hypertensive crisis with worsening target organ is a risk factor for stroke. most of the researches conducted in Ethiopia except few studies, are secondary data (card review) which will not give adequate data such as behavioral characteristics.

Method: This unmatched case control study was conducted from August 10-November 30/ 2024 G.C in tertiary hospitals of Tigray. Systematic random sampling was applied and data was collected using structured questionnaire. Pretest was conducted in saint marry hospital among 5% of study participants and reliability was checked.

Data was coded, and entered to Epi-data software version 4.6 and was exported to Statistical Package for Social Sciences version 25 for analysis. Binary logistic regression was done and those variables having *P* value less than 0.25 on bivariate logistic regression was entered into multivariate logistic regression to control all possible confounders. Association was determined using Odds ratio with 95% confidence interval and *p*-value < 0.05 was considered as statistically significant level.

Result: participants with co morbidity (AOR:4.5 95%(2.068–10.183)),rural residence(AOR-3.3 95%(1.53–7.272)),follow up (AOR-2.8 95%(1.279–6.482)), poor adherence(AOR-4.4 95%(1.985–10.150)) were more likely to develop hypertension crisis than their counterparts .

Conclusion: poor medication adherence, loss of follow up, co morbidity and rural residence were determinant factors of hypertension crisis. patients should regularly follow their follow up and health professionals should early asses and screen for co morbidity and and early detection of hypertension crisis. federal ministry of health should encourage public hospitals to introduce community-based hypertension care centers.

INTRODUCTION

Hypertension is a chronic disease which is characterized by systolic blood pressure (SBP) ≥ 140 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg(1) and leading cause of preventable Disability and mortality worldwide(2) with 9 million deaths each year(3).

Hypertension crisis is abrupt and strong raise in blood pressure(4) with systolic blood Pressure > 180 mmHg or diastolic blood pressure > 120 mmHg.(1, 5, 6). Hypertensive crisis (HC) is an acute complication of hypertension (HTN) characterized by a severe increase in blood Pressure (BP), usually above 180/120mmHg(7).

According to the literature, about 1% of people develop a hypertensive crisis at some point in Their lives(8). In contrast, the prevalence of hypertensive crises among the hypertensive population can reach up to 2%; however, 23% of HC occur in undiagnosed HTN (9). If hypertension remains uncontrolled, it leads to a hypertensive crisis(10, 11). Hypertension is known to be a risk factor for heart failure and hypertensive crisis with worsening target organ is a risk factor for stroke(12, 13). However, different studies show that stroke and heart failure are risk factors for hypertensive crisis(14). in contrast, other studies show that ventricular heart failure and stroke were the result of hypertensive crisis(15, 16). Tigray is expected to have both communicable and non-communicable diseases including hypertension due to limited access to follow up and antihypertensive drugs as evidenced in other wars in the world(17, 18).

Early detection of risk factors, consequences of hypertensive crisis and enhances awareness of society on these determinant factors of hypertension crisis.

METHODS AND MATERIALS

Study area

This study was conducted in tertiary hospitals of Tigray, in both Ayder and Axum comprehensive specialized hospitals. Ayder Comprehensive Specialized Hospital is found in Mekelle, Tigray regional 783 Km far from north of Addis Ababa. Ayder comprehensive specialized hospital serves about 9 million populations in its catchment areas of Tigray, Afar and parts of the Amhara regional states in Ethiopia and has capacity of around 500 beds in four major departments and other specialty units. Patient flow of Ayder comprehensive specialized referral hospital is more than 170, 000 every year. The hospital provides hypertensive service in cardiac unit(19). The hospital provides follow-up care about 256 patients per month or about 64 per week in the clinic(20).

Axum comprehensive specialized hospital is located in Tigray regional state, Axum town which is around 1024km far from Addis Ababa. The hospital serves approximately 70,000–100, 000 patients per year (21). The hospital serves about 2500 hypertensive patients per year.

Study period

the study was conducted from August 10 up to November 30 /2024 G.C.

Study design

Hospital based unmatched case control study was conducted.

Populations

Source populations:

Cases- all adult hypertensive crisis patients diagnosed by internist who visited the adult emergency departments of Axum and Ayder comprehensive specialized hospitals during data collection period.

Controls

all adult hypertensive patients who visited cardiac clinic of Ayder and Axum comprehensive specialized hospitals during data collection period.

Study population:

Cases- all adult hypertensive crisis patients who were selected to participate in the study.

Controls

all adult hypertensive patients who were selected to participate in the study.

Eligibility criteria

Inclusion criteria

Case

all adult (> 18 years old) hypertensive crisis patients who visited the emergency department of Axum and Ayder comprehensive specialized hospitals.

Controls

all adult hypertensive patients who visited the cardiac units of Ayder and Axum comprehensive specialized hospitals.

Exclusion criteria:

For both Cases and controls

Pregnant females (because hypertension in pregnancy is a completely different entity with entirely different pathophysiology and management), critically ill and unconscious hypertensive patients and clients with known psychiatric illness were excluded from the study. Participants who has been asked the questionnaire during the study were also excluded by asking them if they have been interviewed to avoid repetition.

Sample size determination: sample size was calculated using epi info version 7 considering AOR of significant variables (14). (Case to control ratio,1:2,95% CI, with power 80%) from previous study.

Table 1
sample size calculation for determinants of hypertensive crisis among hypertensive patients in Tigray teaching hospitals, 2024 G.C

Variable	Case	Control	Total calculated sample size
History of hypertension (AOR:3.621)	51	101	152
Diabetes mellitus (AOR:4.064)	33	65	98
Stroke (AOR:7.174)	34	67	101
Unemployment (AOR:2.974)	52	106	158
Follow up (AOR :0.222)	42	83	125
Heart failure (AOR:2.911)	54	108	162

Of the above variables with highest sample size (heart failure) was used to determine the sample size. by adding 10% for the non-response rate the final sample size was 178(59 cases and 119 controls).

Sampling technique and procedure

There are two active tertiary referral hospitals in Tigray and the study was conducted in both tertiary hospitals. The calculated sample size was allocated to the study hospitals proportionally based on the number of patients who attend in the hospitals. Study subjects were selected using systematic random sampling. K for cases and controls were calculated by dividing the total cases and controls (N) by the total sample size (n) of cases and controls in both hospitals, respectively. While the first study subject was selected by lottery method, the rest study subjects were selected using the calculated K value in which the patients were selected every K interval of the cases and controls. For cases $(K) = N/n$, $170/59 = 2.88 \approx 3$ using the K value the participants were selected every 3 cases. For controls $(K) = N/n$, $1400/119 = 11.76 \approx 12$ using K value the patients were selected every 12 number intervals and the first study subjects were selected by lottery method.

Table 2
sample size allocation for determinants of hypertensive crisis among hypertensive patients in Tigray
teaching hospitals 2024 G,C

Name of referral hospital	expected Cases per month	Exp. Controls per month	Sample size Allocation	
			Cases	Controls
Ayder referral hospital	50(100 per 2 month)	400(800 per 2 month)	$100 \times 59 / 170 = 35$	$119 \times 800 / 1400 = 68$
Axum referral hospital	35(70 per 2 month)	300(600 per 2 month)	$70 \times 59 / 170 = 24$	$119 \times 600 / 1400 = 51$
Total number of cases per two month	$(35 \times 2) + (50 \times 2)$ $= 170(\text{axum} + \text{ayder CSHS})$	$(300 \times 2) + (400 \times 2) = 1400$	59	119
K value for both cases and controls				
K for cases = $170(N) / 59(n) = 3$				
K for controls = $1400(N) / 119(n) = 12$				

Data collection tool and method

Data was collected by interviewing using structured questionnaire adapted from previous studies(4, 14).the tool consists of socio-demographic factors, behavioral factors, vital sign and clinical profile, knowledge, medication adherence and diet adherence. Medication adherence was assessed using 8 item questions of morisky scale. BMI of the patient was gained by measuring weight of patient in the digital weight measuring scale and height (in centimeter) was measured. then BMI was calculated using $BMI = \text{weight}(\text{in KG}) / \text{height}(\text{cm})^2$. The Fast Alcohol Screening Test (FAST) which is a short version of the Alcohol Use Disorders Identification Test (AUDIT) was used to assess moderation of alcohol consumption. It contains 4 items and a score of 0 for "Never", 1 for "less than monthly", 2 for "monthly", 3 for "weekly" and 4 for "daily or almost daily" (22). Diet adherence have 4-item and rated as 1,2,3,4 for each response of the respondents. Each never response rated as "1", each rarely response rated as "2", each usually response rated as "3" and each always response rated as "4"(4).

Physical exercise and smoking were assessed by interviewing the participants by using standard questionnaire from previous study (23).

Variables

Dependent variable

hypertensive crisis

Independent variables

socio demographic variables age, sex, residence, educational status, marital status income, family history of hypertension).

Behavioral characteristics- cigarette smoking, alcohol drinking, diet adherence physical exercise and knowledge.

Clinical factors: obesity, blood pressure, comorbidity (diabetes mellitus, stroke, heart failure).

Operational definitions

Case

study participant with BP $\geq$ 180/120mmHg.

Controls

study participants with BP) $\geq$ 140/90 mmhg.

BMI

Underweight (< 18.5kg/m²), normal (18.5-24.9kg/m²), overweight (25-29.9), obese (> 30kg/m²)(4).

Medication adherence:

Was assessed using modified morisky medication adherence score to antihypertensive medications having eight questions with possible responses of yes = 1 or no = 0.

Good adherence-if participants score 7–8/8,, poor ,less or = 6/8(24).

Knowledge

Participants who scored below the mean were considered to have poor knowledge and those who will score the mean and above were considered to have good knowledge(25).

Social Support

A support given by an individual family or groups of people to hypertensive person is available in time of need which could be psychological, physical or financial help(26).

Alcohol consumption adherence

respondents who reported, they either never consumed alcohol or whose overall score on FAST < or= 3 were taken as adherent to moderation of alcohol consumption(23).

. **Diet adherence:** respondents who report, they usually or always consumed a diet rich in vegetables, grains and fruits; rarely or never consume salt; rarely or never consume foods rich in spices and saturated fat were considered to be adherent(23).

Physical exercise

Physically adherent - respondents who reported, they exercise for > 30 minutes per day; at least three times per week(23).

Smoker

respondents who reported, they either never smoked or stopped smoking(23).

Data quality control

The questionnaire was translated to local language (Tigrigna) before data collection and translated back to English for consistency. Pretest was conducted in saint marry hospital among 5% of study participants. The reliability of the questionnaire was checked by Cronbach's alpha reliability test (Cronbach alpha = 0.8). Data collectors were trained for one day on how to collect data. In addition to this principal investigator followed data collectors to assure completeness.

Data processing and management

Data was coded, and entered to Epi-data software version 4.6 and was exported to Statistical Package for Social Sciences (SPSS) version 25 for further analysis. Descriptive analysis was performed on all study variables. binary logistic regression was done and those variables having *P* value less than 0.25 on bivariate logistic regression were entered into the multivariate logistic regression to control all possible confounders.

Hosmer-Lemeshow was used to assess the model's suitability. Association was determined using Odds ratio with 95% confidence interval and p-value < 0.05 were considered as statistically significant level. The multi-collinearity test was checked using the variance inflation factor and tolerance. the result was presented in the form of tables and text using frequencies and summary such as mean.

Results

A total of 178 (59 cases and 119 controls) participants were interviewed using a structured questionnaire and all questionnaires were included in the analysis with 100% of response rate. Twenty nine (49.2%) cases and sixty four (53.8%) controls were male. Thirty (50.8%) cases and fifty five(46.2%) controls were females. Forty three (72.9%) of cases and fifty one (42%) of controls were > 65 years old and eleven (18. 6%) of cases and forty seven (39.5%) of controls were between the age of 18–65 years old respectively. regarding marital status fifteen (25.4%) cases and twenty eight (23.5%) controls were married. Eighteen (30.5%) cases and thirty four(28. 6%) of controls attend secondary school and regarding Employment, sixteen (27.1%) of cases were unemployed and thirty five(29.4%) controls work in private sector. Fourty six

(78%) of cases and eighty eight(73.9%) of controls have social support. Eighty-six (72.3%) and 35(59.3%) of participants were urban and rural residents of controls and cases respectively.

Socio demographic factors

Table 3

socio demographic factors of hypertensive crisis among hypertensive participants in teritiary hospitals of Tigray, Ethipopia, from august 10;November 30/2024 G.C

Variable	Categories	Cases(n = 59)	Controls(n = 119)	Total(n = 178)
Sex	Male	29(49.2%)	64(53.8%)	93(52.2%)
	Female	30(50.8%)	55(46.2%)	85(47.8%)
Age	18–45	5(8.5%)	21(17. 6%)	26 (14.6%)
	46–65	11(18. 6%)	47(39.5%)	61(34.3%)
	> 65	43(72.9%)	51(42%)	91(51.1%)
Marital status	Married	15(25.4%)	28(23.5%)	43(24.2%)
	Single	15(25.4%)	28(23.5%)	43(24.2%)
	Widowed	16 (27.1%)	33(27. 7%)	49(27.5%)
	Divorced	13(22%)	30(25.2%)	43(24.2%)
Educational status	Unable to read	12(20.3%)	25(21%)	37 (20.8%)
	Primary	15(25.4%)	28(23.5%)	43(24.2%)
	Secondary	18(30.5%)	34(28.6%)	52(29.2%)
	University	14(23. 7%)	32(26.9%)	46 (25.8%)
Employment	Unemployed	16 (27.1%)	28(23.5%)	44(24. 7%)
	Self employed	15(25.4%)	30(25.2%)	45(25.3%)
	Government employee	15(25.4%)	26 (21.8%)	41(23%)
	Private sector	13(22%)	35(29.4%)	48(27%)
Social support	Yes	46 (78%)	88(73.9%)	134(75.3%)
	No	13(22%)	31(26.1%)	44(24. 7%)
Residence	Urban	24(40.5%)	86 (72.5%)	110(61.8%)
	Rural	35(59.3%)	33(27. 7%)	6 8(38.2%)

Clinical factors

Thirty seven(62.7%) of cases and thirty five(29.4%) of controls have co morbidity. Seventy six(63.9%) of controls and eighteen(30.5%) cases do not have family history of hypertension. Twenty five(42.4%) of cases and sixty five(54.6%) of controls have less than five year duration of hypertension and twenty six(44.1%) of cases and forty seven(39.5%) of controls have 5–10 duration of hypertension. Twenty one(35.6%) of cases and thirty eight(31.9%) of controls have a body mass index of 25-29.9kg/m².Thirty one(52.5%) of cases and sixty two(52.1%) of controls take lipid regulating drugs and twenty eight(47.5%) of cases and fifty seven(47.9%) of controls do not take lipid regulating drugs. Nearly half(52.5%) of cases and seventy(58.8%) of controls takes hypertension education regularly. forty(67.8%) of cases and fifty two(43.7%) of controls missed their hypertension follow up and twenty two(37.3%) of cases and forty six(38.7%) of controls take two drug anti hypertension medication.

Table 4
clinical factors of hypertensive crisis among hypertensive participants in tertiary hospitals of
Tigray, Ethiopia, from august 10-november 30/2024 G.C

Variable	Category	Case	Control	Total
co morbidity	Yes	37(62.7%)	35(29.4%)	72(40.4%)
	No	22(37.3%)	84(70.6%)	106(59.6%)
Type of co morbidity	Diabetes mellitus	11(26.8%)	9(29%)	20(27.8%)
	Chronic kidney disease	12(29.3%)	8(25.8%)	20(27.8%)
	Congestive heart failure	10(24.4%)	8(25.8%)	18(25%)
	Hyperthyroidism	8(19.5%)	6(19.4%)	14(19.4%)
Family history of hypertension	Yes	41(69.5%)	43(36.1%)	84(47.2%)
	No	18(30.5%)	76(63.9%)	94(52.8%)
Duration of hypertension	< 5 year	25(42.4%)	65(54.6%)	90(50.6%)
	5–10 year	26(44.1%)	47(39.5%)	73(41%)
	> 10 years	8(13.6%)	7(5.9%)	15(8.4%)
BMI	18-24.9	20(33.9%)	45(37.8%)	65(35.6%)
	25-29.9	21(35.6%)	38(31.9%)	59(33.1%)
	≥ 30	18(18.6%)	36(30.3%)	54(30.3%)
Lipid regulating drugs	Yes	31(52.5%)	62(52.1%)	93(52.2%)
	No	28(47.5%)	57(47.9%)	85(47.8%)
Hypertension education	Yes, regularly	31(52.5%)	70(58.8%)	101(56.7%)
	Yes, sometimes	20(33.9%)	40(33.6%)	60(33.7%)
	No, never	8(13.6%)	9(7.6%)	17(9.6%)
Follow up missed	Yes	40(67.8%)	52(43.7%)	92(51.7%)
	No	19(32.2%)	67(56.3%)	86(48.3%)
Number of anti hypertensive medications	One drug	19(32.2%)	34(28.6%)	53(29.8%)
	Two drug	22(37.3%)	46(38.7%)	68(38.2%)
	≥three drug	18(30.5%)	39(32.8%)	57(32.8%)

Behavioral factors

Forty three(72.9%) of cases and fifty(42%) of controls were non adherent to anti hypertensive medications and thirty two(54.2%) of cases and fifty six(47.1%) of controls were adherent to exercise. Thirty-five(59.3%) of cases and ninty one(76.5%) of controls were adherent to smoking(non smokers) and twenty eight(47.5%) of cases and seventy(58.8%) of controls were adherent to alcohol(non-alcoholic). Knowledge mean of participants was 0. 714, of these twenty six cases and sixty one controls have mean of above the total mean value.

Table 5
behavioral factors of hypertensive crisis participants among hypertensive participants in tertiary hospitals of Tigray, from Ethiopia from august 10- November 30/ 2024 G.C

Variable	Category	Case	Control	Total
Medication adherence(mmA)	Adherent	16(27.1)	69(58%)	85(47.8%)
	Non-adherent	43(72.9)	50(42%)	93(52.2%)
Exercise	Adherent	32(54.2)	56(47.1%)	88(49.4%)
	Non-adherent	27(45.8)	63(52.9%)	90(50.6%)
Smoking	Adherent	35(59.3)	91(76.5%)	126(70.8)
	Non-adherent	24(40.7)	28(23.5%)	52(29.2%)
Alcohol	Adherent	28(47.5%)	70(58.8%)	98(55.1%)
	Non-adherent	31(52.5%)	49(41.2%)	80(44.9%)
Knowledge	knowledgedable	26(44.1%)	61(51.3%)	87(48.9%)
	Non-knowledgeable	33(55.9%)	58(48.7%)	91(51.1%)

Determinants of hypertensive crisis among hypertensive patients

Each variable was checked and entered into the bivariate logistic regression model. From bivariate logistic regression analysis, residence, co morbidity, family history of hypertension, follow up, smoking, diet, alcohol, advanced age, duration of hypertension and medication adherence were associated with hypertension crisis at p-value < 0.25.

In the multivariate logistic regression analysis, co morbidity(AOR:4.58,95%,CI,2.068–10.183), residence(AOR:3.33,95%CI.1.53–7.27), loss of follow up(AOR:2.87,95%CI,1.279–6.482), medication adherence(AOR:4.48,95%CI,1.985–10.150) were significantly associated factors of hypertensive crisis among hypertensive patients.

Table 6

determinants of hypertension crisis among hypertensive patients using bivariate and multivariate logistic regression in tertiary hospitals of Tigray, Ethiopia, from 10 – November 30/2024 GC.

Variable	Categories	Cases	Controls	COR(95%CI)	AOR(95%CI)	P-value
Residence	Urban	24(40.5%)	86(72.5%)	1	1	0.002
	Rural	35(59.3%)	33(27.7%)	3.801(1.971–7.327)	3.335(1.530–7.272)*	
Comorbidity	Yes	37(62.7%)	35(29.4%)	4.038(2.089–7.80)	4.589(2.068–10.183)*	0.000
	No	22(37.3%)	84(70.6%)	1	1	
Family history of hypertension	Yes	84(70.6%)	43(36.1%)	4.026(2.063–7.856)	1.876(0.769–4.576)	0.114
	No	18(30.5%)	76(63.9%)	1	1	
Follow up missed	Yes	40(67.8%)	52(43.7%)	2.713(1.409–5.224)	2.879(1.279–6.482)*	0.011
	No	19(32.2%)	67(56.3%)	1	1	
Smoking	Adherent	35(59.3)	91(76.5%)	1	1	0.160
	Non adherent	24(40.7)	28(23.5%)	2.229(1.140–4.356)	1.866(0.834–4.450)	
Diet	Adherent	18(30.5%)	47(39.5%)	1	1	0.113
	Non adherent	41(69.5%)	72(60.5%)	1.487(0.765–2.891)	2.066(0.843–5.067)	
Alcohol	Adherent	28(47.5%)	70(58.8%)	1	1	0.272
	Non adherent	31(52.5%)	61(51.3%)	1.582(0.844–2.964)	1.578(0.699–3.562)	
Age	18–45	5(8.5%)	21(17.6%)	1	1	0.511
	46–65	11(18.6%)	47(39.5%)	0.983(0.303–3.185)	0.632(0.161–2.485)	
	> 65	43(72.9%)	51(42%)	3.541(1.231–10.184)	2.753(0.815–9.300)	
Duration of hypertension	< 5 year	25(42.4%)	65(54.6%)	1	1	0.339
	5–10 year	26(44.1%)	47(39.5%)	1.438(.740–2.797)	0.621(0.234–1.65)	
	> 10 year	8(13.6%)	7(5.9%)	2.971(0.975–9.055)	0.726(0.162–3.261)	

Variable	Categories	Cases	Controls	COR(95%CI)	AOR(95%CI)	P-value
Medication adherence	Adherent	16(27.1%)	69(58%)	1	1	0.000
	Non adherent	43(72.9%)	50(42%)	3.709(1.880–7.318)	4.489(1.985–10.150)*	
Attending hypertension education	Yes, regularly	31(52.5%)	70(58.8%)	1	1	0.154
	Yes,sometimes	20(33.9%)	40(33.6%)	1.129(0.570–2.236)	0.511(0.203–1.285)	
	No, never	8(13.6%)	9(7.6%)	2.007(0.708–5.690)	0.752(0.188–2.997)	

Discussion

Unmatched case-control study was conducted to assess determinants of hypertension crisis among hypertensive patients in tertiary hospitals of Tigray, Ethiopia in 2024. This study showed that co morbidity, residence, follow up and medication adherence were determinant factors of hypertension crisis.

Co-morbidity was positively associated with hypertension crisis. This study shows that participants with co-morbidity have 4.5 higher odds of hypertension crisis than their counter parts. This study is similar with previous studies conducted in Israel(27), Addis Ababa(14). This is because patients with co morbidity like chronic kidney disease lack hormonal auto regulation in response to blood pressure alteration(28), which may in turn cause hypertension crisis.

Residence (AOR,3.33) is also positively associated with hypertension crisis among hypertensive patients. Rural residents were positively associated with hypertension crisis than urban residents. this may be due to poor access to medical follow up because among 110 urban residents 62(72.1%) did not miss their follow up but in rural area only less than 30% of the rural residents follow their follow up. This is similar with study done in south Wollo and Oromia special zones(4). This study was inversely associated in study conducted in Peru(8). This may be due to difference in urban and rural population distribution (75.2% and 34.8%) residents of peru were urban and rural residents respectively.

Follow up was also determinant factor for hypertension crisis. There was 2.8 times higher odds of having hypertension crisis among participants who had no follow up than participants who had follow up. This study is congruent with study done in Addis Ababa(14). This is due lack of knowledge about hypertension. Because 54.3% of the non-knowledgeable participants miss their follow up. Thus, patients with loss of follow up may be unaware of current status of their blood pressure which may lead patients to miss their corresponding management in response to their blood pressure alteration.

Medication adherence was also positively associated with hypertension crisis. Non-adherent participants have 4.48 odds of hypertension crisis than adherent participants. This study is in line with study

conducted in Somalia(29),Uganda(30) south Wollo and Oromia special zones(4). this is because non adherence to recommended medication treatment leads to hypertension crisis(31).

On conclusion, even though some studies says that stroke and heart failure are risk factors of HC which contradicts with basic science, in this study both variables have neutral association with HC.

Limitation

Health service-related factors were not included

Conclusion

In this study, residence, co-morbidity, loss of follow up and adherence were determinants of hypertension crisis.

Recommendation

To health professionals

Recommended to assess for adherence, co morbidity for early prevention of hypertension crisis and create awareness on participants on the importance of adherence and follow up.

To participants

Recommend to adhere their medication and follow up

To researchers-

To include health service delivery system in their future study.

For federal ministry of health

Encourage public health institutions to expand community based hypertension care centers.

Abbreviations

AOR -Adjusted Odds Ratio

AUDIT- Alcohol Disorders Identification Test

BMI- Body Mass Index

BP-Blood Pressure

CI-Confidence Interval

DBP-Diastolic Blood Pressur

FAST-Fast Alcohol Screening Test

HC-Hypertension Crisis

HTN-Hypertension

SBP-Systolic Blood Pressure

Declarations

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Authors' Contributions:

T.B.: designed and analyzed the study, and G.B., T.A., G.H., B. G., G.T., and G.G play a role in data analysis and interpretation in the whole research. In addition, they have contributed in preparing the manuscript. Finally all authors have read and approved the final manuscript.

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Availability of data and materials

All data supporting the findings of this study are presented in the manuscript. Additional details and raw data are presented with the corresponding author for reasonable requests.

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Ethical approval and consent to participate

Ethical approval was obtained from the Institutional Review Board of Mekelle University College of Health Sciences (Approval No. MU-IRB 2291/2024). informed verbal consent was obtained from all participants before enrolment in emergency and cardiac units of Ayder and Axum comprehensive referral hospital, Tigray, Ethiopia.

Participants were told there was no risk or damage associated with the study. Every research participant provided written informed permission. At the time of data collection, no personal identifiers, such as participant names, were used.

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Consent for publication

Not applicable

Competing interest

The authors declare no competing interests.

Clinical trial

Not applicable

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