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# Prevalance and Associated Factors of Non Traumatic Intracranial Hemorrhage In Selected Hospitals of Bahirdar City, North West Ethiopia, From March 1 /2021-January 1/2022

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# **BAHIRDAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES DEPARTMENT OF Clinical Radiology**

**Prevalance and Associated Factors of Non Traumatic Intracranial  
Hemorrhage In Selected Hospitals of Bahirdar City, North West Ethiopia,  
From March 1 /2021-January 1/2022**

Investigator: Bera Fentie (Md, Radiology Resident)

**THESIS REPORT SUBMITTED TO THE DEPARTMENT OF CLINICAL  
RADIOLOGY, COLLEGE OF MEDICINE AND HEALTH SCIENCES  
BAHIR DAR UNIVERSITY, IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE SPECIALTY CERTIFICATE IN  
RADIOLOGY**

February, 2022

Bahirdar, Ethiopia

**THESIS ON ASSESSMENT OF PRTEVALANCE OF NON TRAUMATIC  
INTRACRANIAL HEMORRHAGE AND ASSOCIATED FACTORS IN  
FELEGEHIWOT REFERAL HOSPITAL &TIBEBE GIYON  
SPECIALIZED HOSPITAL,BAHIRDAR,ETHIOPIA.**

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## Declaration

The thesis entitled “assessment of Prevalence of non traumatic intracranial hemorrhage and associated factors in Felegehiwot referral hospital and Tibebe Ghion Specialized hospital, submitted in partial fulfillment of the requirements for specialty certificate in clinical radiology, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Name of the candidate

Date

signature

Bera Fentie

Bahir Dar University

College of medicine and health sciences

Department of clinical radiology

School of medicine

**Approval of thesis for defense**

I hereby certify that I have supervised assessment of Prevalence of non traumatic intracranial hemorrhage and associated factors in Felegehiwot referral hospital and Tibebe Ghion Specialized hospital, submitted in partial fulfillment of the requirements for specialty certificate in clinical radiology, by Bera Fentie prepared under my guidance. I recommend the thesis to be submitted for oral defense.

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Signature

Date

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12/06/10

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12/06/10



Bahir Dar University

College of medicine and health sciences, school of medicine

Department of clinical radiology

Approval thesis for defense result

We hereby certify that we have examined this thesis entitled “assessment of Prevalence of non traumatic intracranial hemorrhage and associated factors in Felegehiwot referral hospital and Tibebe Ghion Specialized hospital, submitted in partial fulfillment of the requirements for specialty certificate in clinical radiology by Bera Fentie. We recommend that ----- is approved for specialty certificate in clinical radiology.

Board of Examiners

Examiner's name	Signature	Date
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2-----	-----	

## **ACKNOWLEDGEMENT**

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## Abstract

**Background:** Non-traumatic intracranial hemorrhage is the major public health problem which has global burden. It has high patient mortalities and morbidity with high number of young adult male patients in developing countries and the prevalence is increasing as the epidemiology of disease is changed. The accurate prevalence is not well known in the sub-Saharan countries due to lack of awareness about the problem and the absence of imaging modality. Identification of the major associated factor and preventive measure was tried but no adequate measure is taken with current evidence of high number of patient mortality and morbidity in developing countries. There is no enough study in Ethiopia and our setup. Knowing the prevalence and associated factors of this major public health problem will help to take early preventive measures and to work on the community.

**Objective:** - Our primary aim was to determine the prevalence and associating factor of non traumatic intracranial hemorrhage in TGS & FHRH who have brain imaging result.

**Methods:** Facility based cross sectional study using simple random sampling was conducted with sample size of 442 in selected hospitals of Bahir Dar city from March 2021 to January 2022 by reviewing the charts of patients who had brain CT or MRI with no traumatic brain injury. Descriptive statistics and Binary logistic regression models were used to evaluate associations between non traumatic intracranial hemorrhage and associated factors. P-values less than 0.05 were considered statistically significant.

**Result:** A total of 442 patients were included. The mean age was 62.47 years, and 55.2% were male. The prevalence of non traumatic intracranial hemorrhage was 46.4% with more male patients (57%). Most the patient presented with body weakness with over lap of symptoms. The most common site of intracranial hemorrhage was Basal ganglia and thalamus ( $P < 0.001$ , OR=3.65, 95% CI, 2.76-5.34). Hypertension was the most common associated factor identified (86%) which has strong correlation with intracranial hemorrhage ( $p < .001$ , OR=5.06, 95% CI, 3.13-8.18). Basal ganglia and thalamic hemorrhage has strong correlation with hypertension ( $P < 0.001$ , OR=11.44, 95% CI, 4.53-28.88). There was no strong association found between Intracranial hemorrhage and DM ( $P=0.57$ , OR=1.2)

**Conclusion:** In our study the prevalence of non traumatic intracranial hemorrhage was shown to be high. Some associated factors identified and HTN was significantly associated with intracranial hemorrhage. Basal ganglia and thalamic hemorrhage was strongly associated with HTN.

**Keywords:** Non traumatic intracranial hemorrhage, HTN, Prevalance



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## LIST OF ABBREVIATIONS/ACRONYMS

AVM	Arteriovenous malformation
BDRU	Bahirdar university
CMHS	College of Medicine and health science
CT	Computed tomography
CVA	Cerebrovascular accident
DM	Diabetes mellitus
FHRH	Felegehiwot Referral hospital
GDP	Gross domestic product
HTN	Hypertension
ICH	Intracranial hemorrhage
sICH	Spontaneous intracranial hemorrhage
MRI	Magnetic resonance imaging
TGSH	TibebeGhion specialized hospital

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# 1. INTRODUCTION

## 1.1 Background of the study

Non-traumatic intracranial hemorrhage refers to bleeding in to the substance of the brain in the absence of trauma or surgery. It includes intracerebral, subarachnoid, epidural and subdural hemorrhage (1).

Each year 15 million people worldwide suffer with this problem, and five million of those are left with some type of permanent physical disability and the causes of serious, long-term physical disabilities, and has pervasive negative influences on an individual's quality of life, participation in society, independence, emotions, and productivity (5).

Different study shows that over the last four decades Cerebrovascular disease prevalence in low- and middle-income countries has more than doubled, but incidence in developed countries has decreased. In addition, low- and middle-income countries have some of the highest stroke mortality rates in the world, contributing to between 0.8 million and 5 million deaths annually. The growing research regarding the epidemiology of Cerebrovascular disease in Ethiopia has indicated important differences in the clinical and demographic characteristics of patients compared (3).

The burden of cerebrovascular disease is increasing in many low- and middle-income countries. In Ethiopia, It has become a major cause of morbidity, long-term disability, and mortality(4). Time from onset of the disease to hospital presentation is a critical factor in acute care (2).

In sub-Saharan Africa, the incidence of cerebrovascular disease especially Intracranial hemorrhage increasing like other non-communicable disease which could be the result of changing of epidemiology as a result of changing life style(1, 3). Non-traumatic intracranial hemorrhage most commonly involves the brain parenchyma and subarachnoi .Though data varies from country to country in the world, this entity accounts for at least 10% of cerebrovascular disease and it is a leading cause of death and disability in adults which has high mortality and morbidity(1, 3).

Hypertension is the commonest associated factor for non-traumatic intracranial hemorrhage(4). Long standing chronic hypertension causes cerebral arterial angiopathy which latter prone to be ruptured. A study shows as the systolic blood pressure increased and not managed properly the incidence of ICH will also increased. The commonest location for hypertensive intracranial hemorrhages are:-striatocapsular region followed by thalamus, cerebellum and Pons and lobar hemorrhage is the least common to occur(4, 5).

Non-traumatic Intracranial hemorrhage is a devastating disease with over all incidences of 24.6 per 100,000 person-years with approximately 40,000 to 67,000 cases per year in the United States with high mortality in the first month and rapid diagnosis is the crucial step for immediate proper treatment(5).

In Ethiopia there is no adequate study for the prevalence of cerebrovascular disease due to lack of adequate clinical data, clinical presentation and patient care(2).

studies shows that the prevalence of intracerebral bleeding is highest in the low and mid income countries particularly in sub-Saharan country(6).

## **1.2 Statement of the problem**

There were 16.9 million incident strokes, 33 million stroke survivors and 5.9 million deaths from stroke worldwide in 2010, with most of the burden in low and middle-income countries. There were 34,409 strokes deaths in Ethiopia in 2004 with most of the patients were young males and higher number of non-traumatic intracranial hemorrhage cases reported(7).

Stroke is the second-leading global cause of death behind heart disease in 2013 and is a major cause of permanent disability. The burden of stroke in terms of mortality, morbidity and disability is increasing across the world. It is currently observed to be one of the commonest reasons of admission in many health care setups and becoming an alarming serious public health problem in our country Ethiopia(12).

The case fatality rate is high (40% at one month and 54% at one year), and only 12 to 39 % of survivors can achieve long term functional independence. According to the last world health organization 10.8% total death attributed with this problem and the burden is more increasing in sub-Saharan Africa with mortality reaches to 85%.

Stroke is increasingly becoming a major health problem in Africa countries, with projections that deaths from it will nearly double by 2030(8).

There is a major association with uncontrolled hypertension and diabetes mellitus being the major factors (11) but cardiac disease and non-modifiable associated factor was mentioned.

Globally there are some improvements in diagnosis of stroke and control of associated factors specially hypertension. There are some measurements taken for the prevention of non-traumatic intracranial hemorrhage in sub-Saharan Africa including Ethiopia but still there is no adequate data for the prevalence of non-traumatic intracranial hemorrhage and associated factors.

Previously, especially in the developing countries the diagnosis of intracranial hemorrhage was clinical, no CT and MRI for diagnosis and lack of adequate data for the prevalence of intracranial hemorrhage. Most patients were diagnosed clinically with high false negative result. Currently, there is growing of imaging modalities mainly CT and MRI in sub-Saharan countries which gives a great opportunity to study prevalence of non-traumatic intracranial hemorrhage(9, 10).

In Ethiopia currently there are many patients with chronic disease and among them hypertension is becoming the major concern and most patients come with intracranial hemorrhage due to lack of treatment and follow up. Knowing this prevalence and associated factors can help to do at the community. Knowing associated factors can also help to prevent early and to reduce the risk of non-traumatic intracranial hemorrhage. Currently in most institutions including TGSH & FHRH there are many patients with stroke and knowing the prevalence of non-traumatic intracranial hemorrhage will help to find associated factors and prevention. Currently, I have an opportunity to study the prevalence of non-traumatic intracranial hemorrhage since there are CT in FHRH and other private centers in the city.

### *1.3 Significance of the study*

Knowing the current prevalence of non-traumatic intracranial hemorrhage as well as associated factors will help patients for early treatment and prevention. Knowing the major associated factors can help physicians to work on the community and prevent it.

It will give an opportunity for the physicians to do more on the community and will show the gap for the prevention of non traumatic intracranial hemorrhage and the major associated factors. Knowing the magnitude of the disease will alert the health sectors to take preventive measures. The study can also open a door to other studies on the major associated factors of non traumatic intracranial hemorrhage.

## 2. LITRATURE REVIEW

Adequate isolated study on non-traumatic intracranial hemorrhage is not available in our country and others, but there are some studies which can show the overall stroke patient clinical characteristics and some associated factors. In Ethiopia, the epidemiology of ICH accounts about 50%(2).

A hospital based retrospective study conducted in University of Gondar College of Medicine and Health Science Comprehensive Specialized Hospital (CMHS) from June 20th 2012 and April 30th 2018 on 448 patients (58% female & 42% male) with mean age of 63.9 years (range = 18–100, *SD*:15.1 years). In this study the prevalence of non-traumatic intracranial hemorrhage was 18.2% after CT scan was done and there was strong correlation of hypertension for intracranial hemorrhage (45%). The strength of the study is correlation of hypertension as a main cause of intracranial hemorrhage but in this study CT scan of the brain was not done for 50% the study participants and diagnosis was clinical, which has high false negative result(1).

Samson Getachew Erkabu, MD,\* Yinager Agedie, MD,\* et al conducted a retrospective hospital based study in FHRH, Bahirdar from February 2014 to August 2016 on 508 patients out of which only 303 of patients had CT scan and the mean age of patients were 61-70 yrs (male 63%). In this study the prevalence of non-traumatic intracranial hemorrhage was 40.6% and there was a strong correlation with hypertension and most of them discontinued follow up. The limitation of this study is all the study participants not imaged with CT and this will lower the prevalence.(3).

A retrospective chart and clinical review study done in Tikur Anbessa referral Hospital between January 2000 and March 2005, out of the study population the ratio of male to female were 1.3:1 in which men account 55.7% the study population. The mean age of the study patients were 50.6 yr (13-82). In this study clinical and CT diagnosis was correlated and there was inaccurate clinical diagnosis in 30% of the clinically diagnosed patients ( $Kappa = .334$ ,  $95CI .194-.474$ ). In this study the prevalence of non-traumatic intracranial hemorrhage was 34.6% which is diagnosed with CT scan and it was correlated with hypertension (52%). In this study the average duration of illness before CT scan study was 22 days (1 hr-360 days). The strength of this study was the use of CT scan for diagnosis of intracranial hemorrhage and its correlation with the main



risk factor (hypertension).The limitation of the this study is there was a huge time gap for CT scan as most of chronic intracranial hemorrhage usually after two weeks missed with CT scan and that lowers the prevalence of intracranial hemorrhage(10).

Menbeu Sultan<sup>1\*</sup>, Finot Debebe<sup>2</sup>, Aklilu Azazh<sup>2</sup> et al conducted a study in Tikur Anbessa specialized hospital from December 2010 to December 2014 on 301 patients in this study the prevalence of non-traumatic intracranial hemorrhage was 46.1% from which male accounts 63.3%.There were strong correlation of hypertension and non-traumatic intracranial hemorrhage(74%).It was conducted in a referral hospital where patients diagnosed with CT(11).

A prospective hospital-based study was conducted on 163 patients admitted to Hawassa University Referral Hospital with stroke diagnosis between May 2013 and April 2014.All the patients had brain CT for diagnosis and among them 49.7% had non-traumatic intracranial hemorrhage. Like other studies there was high correlation with hypertension (50.9%) and other factors was identified. The study concludes that there was high prevalence of non-traumatic intracranial hemorrhage as compared to the western studies(7).

Ayalew Zewdiea, Finot Debebeb, Sofia Kebedeb, etal conducted a prospective cross-sectional study in Tikur Anbessa specialized hospital from August 2015 to January 2016 on 104 patients with 56% of male and mean age of 53 yrs.in this study the majority of patients had non-traumatic intracranial hemorrhage 56% with mean time of arrival to hospital was 24 hrs with 15% arrived in less than 3 hrs.There was a strong correlation with hypertension ( $p < .001$ ).As we see the prevalence of intracranial hemorrhage is high in this study since patients come early and the presence of CT as a tertiary hospital helped to peak early(2).

A prospective observational study conducted in Jimma university Medical college, south west Ethiopia from March 10–July 10, 2017 on a total of 116 patients. The mean age of patients was  $55.1 \pm 14.0$  years and males comprised 62.9%.According to this study non-traumatic intracranial hemorrhage accounts 48.3% with significant correlation with hypertension (75.9%) and the diagnosis was based on WHO criteria. Atrial fibrillation was the independent predictor of non-traumatic intracranial hemorrhage (AOR: 0.08, 95% CI: 0.01–0.68).In this study CT or other

imaging modality was not mentioned for diagnosis. They conclude the clinical characteristics of stroke was similar to other low income countries and to have public health campaign for public education about the disease and early intervention (12).

A Prospective study conducted in Sudan, Khartoum Teaching Hospital between December 2003–March 2004 on 128 patients with a diagnosis of stroke in this study 74 (57.8%) were men. The age (mean  $\pm$  standard deviation) of the patients was  $53 \pm 18.5$  years. All the study patients had brain CT scan and 43 (33.6%) patients had non-traumatic intracranial hemorrhage. Hypertension and diabetes mellitus were the strong associated factor identified. In this study the site of intracranial hemorrhage was not mentioned and further study was recommended(13).

A retrospective study conducted in Federal Medical Centre, Ido-Ekiti, South-western Nigeria between November 2006 and October 2009 on 101 patients with clinical history of cerebrovascular disease with mean age of  $68 \pm 12$  years and woman accounts 52.5%. In this study the prevalence of non-traumatic intracranial hemorrhage was 34.7% with most of the patients were hypertensive (85%). The limitation of this study was the diagnosis is clinical and it is difficult to conclude patient has intracranial hemorrhage without CT or other imaging modality(14).

A cross-sectional descriptive study conducted in a sub-Saharan African university teaching hospital from December 2009 till December 2014 on 63 patients diagnosed to have non-traumatic intracranial hemorrhage with CT scan, 38 (60.3%) males, aged 28–85 years, mean 55.7 (SD, 12.7). In this study, the site of hemorrhage was, supratentorial in 90.5%, ganglionic in 50.8%, and thalamic in 58.3% of the latter. The strength of the study was the use of CT in the study participants but the prevalence of non-traumatic intracranial hemorrhage was not determined in this hospital(6).

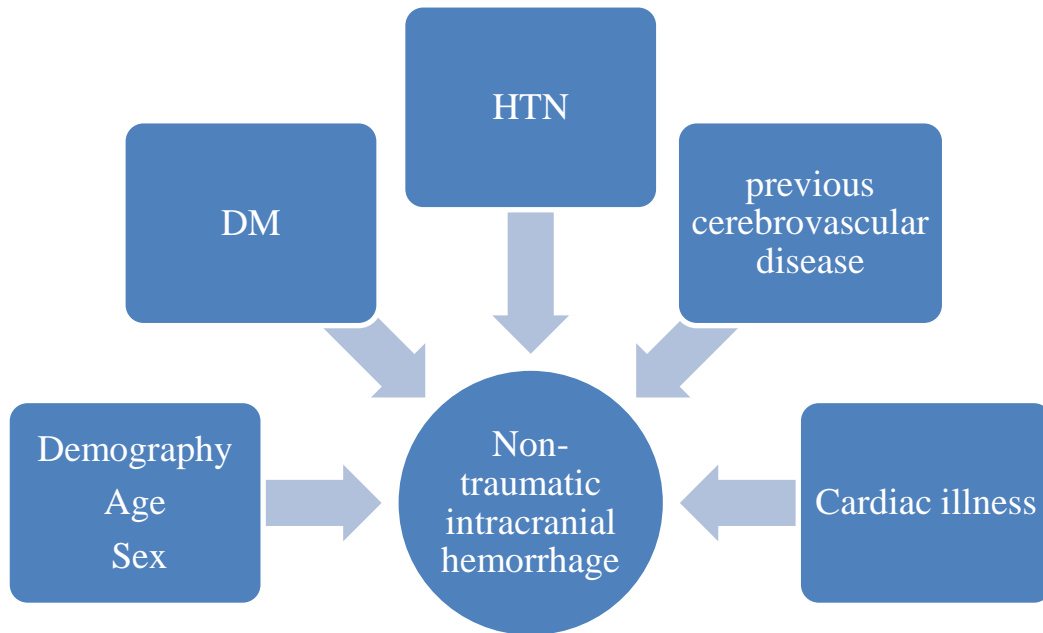
In 2017, a community based three phase door to door study conducted in Egypt, Qena Governorate on 8027 individuals with 4172 males (51.97%) and 3855 females (48.03%). There were 4427 urban residents (55.15%) and 3600 residents (44.85%) from the rural community. In this study both clinical quotations and CT was used for all patients. The prevalence of non-traumatic intracranial hemorrhage was 125 of 100,000 which is significantly lower than ischemic

infarction 797 of 100,000. The strength of this study is the use of CT scan for diagnosis. The prevalence is low as compared to the ischemic infarct that may be due to inadequate sampling and in this study the time between presentation and imaging not mentioned(8).

Barbara Casolla, MD; Solène Moulin, PhD; Maéva Kyheng et al conducted a prospective observational cohort study in Lille, France between November 2004 and March 2009 on 560 patients who had spontaneous ICH. 310 patients with median age of 70 yrs were studied and there were 82 patients who presented at least 1 major vascular event leading to an incidence rate of 20.0% (95% CI, 15.7–24.7) at 5 years after ICH. In the overall cohort, ischemic events were more frequent than hemorrhagic events. However, the incidence strikingly differed according to ICH location: deep ICH was associated with future ischemic events (subhazard ratio, 1.85; 95% CI, 1.01–3.40), whereas lobar ICH was with hemorrhagic events (subhazard ratio, 2.38; 95% CI, 1.17–4.86). In deep ICH, the incidence of ischemic events at 5 years was 6× higher than the incidence of hemorrhagic events. This study concludes ICH survivors are at risk for both cerebral and extracerebral vascular events(15).

Saviluoto et al conducted a retrospective case control study in Finland between March 2015 and December 2016 on 425 patients out of which 127 had previous brain hemorrhage or infarction and in this study there were higher systolic blood pressure and higher age ( $P < 0.0001$  for all). A systolic blood pressure  $\geq 140$  mmHg had an odds ratio (OR) of 3.5 (95% confidence interval [CI] 1.7 to 7.0), and  $> 170$  mmHg had an OR of 8.2 (95% CI 4.5–15.32) for non-traumatic intracranial hemorrhage (reference:  $< 140$  mmHg)(16).

### 3. Conceptual Framework



**Figure 1: Conceptual framework of ASSESSMENT OF PREVALANCE OF NON TRAUMATIC INTRACRANIAL HEMORRHAGE AND ASSOCIATED FACTORS IN TIBEBE GHION SPECIALIZED HOSPITAL & FHRH.**

## **4. OBJECTIVE**

### **4.1. General objectives**

- To assess Prevalence and associated factors of non-traumatic intracranial hemorrhage in TGSB &FHRH.

### **4.2. Specific objectives**

- To determine prevalence of non-traumatic intracranial hemorrhage
- To identify factors with non-traumatic intracranial hemorrhage

## **5. METHODS AND MATERIALS**

### **5.1. Study area and study period**

The study was conducted at TGSB and FHRH, which is found in Bahirdar which is the capital city of Amhara region and 565km North West from Addis Ababa. The city has 3 sub cities and 16 Kebeles. The total population of the city is 239,721 by 2012. The city has two referral hospitals, one district hospital, 4 private hospitals, six higher clinics and health centers owned by government and private sectors. TGSB located about 10 km from the city on the way to Adet. The hospital started giving service in 2011 E.C. It is now serving more than 8 million peoples from parts Amhara and Benshangul Gumuz as in patient and outpatient treatment. It is the training center for undergraduate and specialty training in different clinical medicine fields. The hospital has 350 beds it serves an average of 1200 emergency and outpatient clients daily. The department of clinical radiology has three ultrasound machines and one X-ray machine. The department offers ultrasound, echocardiography, Doppler and X-ray diagnostic services and ultrasound guided procedures. FHRH located along the shore of Lake Tana. A total of 16,289 patients visit the clinics every month. The hospital catchment area is estimated to be 5-7 million people. FHRH is used as a teaching center for Bahir Dar University College of Medicine and Health Sciences(3). Computed topography (CT) scan service available in the hospital which serves for patients who came from TGSB and other health facility.

The study conducted from March 2021 to January 2022.

### **5.2. Study design and period**

Hospital based cross-sectional study design was conducted by reviewing the charts of patients who had Brain CT or MRI for clinical diagnosis of stroke by the investigator from October 2021 to December 2021.

### **5.3. Source population**

All stroke patients at TGSB and FHRH.

### **5.4. Study population**

All stroke patients in TGSB & FHRH evaluated with CT or MRI from March 2021 to January 2022.

## 5.5. Inclusion and exclusion criteria

### 5.5.1. Inclusion criteria

All patients with brain CT or MRI

### 5.5.2. Exclusion criteria

Patient who didn't have CT or MRI report

## 5.6. Sample size and technique

### 5.6.1. Sampling technique

By using simple random sampling method, all patients with brain CT or MRI who fulfill the inclusion criteria during the study period was included in the study

### 5.6.2. Sample size

The sample size for the study conducted using the assumption of level of confidence taken to be 95%, 5% margin of error and p is the proportion of spontaneous intracranial hemorrhage from the previous studies is 50% (7). Based on this assumption the total sample size for the study was calculated using a formula for single population proportion.

$$N = Z^2 PQ / d^2$$

Therefore the sample size with  $Z=1.96$   $P=0.5$   $d=0.05$

$$N = (1.96)^2 (0.5 \times 0.5) / (0.05)^2 N = 384$$

15% added for lost and incomplete cards and the total sample size for the study is = 442

## 5.7. Data collection tools and procedures

The data had been collected in TGS & FHRH by reviewing the charts of study subjects using structured checklist developed for the study by radiology residents. Patient charts reviewed and all necessary information for the study filled and crosschecked at the end of each data collection day. All study subjects with Brain CT or MRI was characterized very well. Important associated factors reviewed and checklist was filled properly. Checklist, Patient chart and registration book was used for the data collection procedure. The data was collected by radiology residents.

## 5.7. Data Analysis

The collected data was entered, compiled and analyzed using SPSS 25 software. Descriptive statistics of mean, proportion and standard deviations of the

studied group and study variables are calculated. The analyzed variables are displayed with bar chart and tables. Binary logistic regression was done for each of variables with odds ratio, 95% CI and Statistical significance level of 0.05 was considered.

### 5.8. Data quality control

The data collector checked the checklist for its completeness. Completeness and consistency of the collected data was checked on daily bases during data collection by the principal investigator. Whenever there were incompleteness and ambiguity of recording, the filled information formats was cross checked with source data on daily base. Individual records with incomplete data important for the study were excluded. Data entry was done by standardized and consistent procedures with clear instructions to ensure data quality.

### 5.9. OPERATIONAL DEFINITIONS

**Non-traumatic or spontaneous intracranial haemorrhage-** is bleeding in the brain or Dural spaces in the absence of any trauma.

**Stroke-** occurs when the blood supply to part of your brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients.

**Hemorrhagic stroke-** happens when a blood vessel bursts, causing bleeding in the brain.

**Ischemic stroke-** is a type of **stroke** caused by a blockage in an artery that supplies blood to the brain

**Hypertension-**high blood pressure ( $\geq 140/90$ )

**Traumatic intracranial hemorrhage-**intracranial bleeding caused by physical trauma to the vessels

A **CT scan** or **computed tomography scan** - is a medical imaging technique that uses computer-processed combinations of multiple X-ray to produce cross-sectional images.

**MRI-**is a medical imaging technique used in radiology to form pictures of the anatomy and the physiological processes of the body.



## **5.10. ETHICAL CONSIDERATIONS**

Before conducting the study, permission and approval letter from the Ethical Review Committee of the college of medicine and health science was given by the ethical committee. A letter from the college administrators was given to each specific wards and chart rooms where data collected. The study participants' identifiers were not documented on the questionnaire. During the data collection procedure, the patient clinical privacy and confidentiality was kept to the maximum.

## **5.11. Dissemination of result**

Based on the findings, one soft copy and two hard copies of the research paper will be submitted to Bahirdar University College of medicine and health sciences after conclusion and recommendation. It will be presented to the department of clinical radiology. Subsequently, attempts will be made to present it on scientific conferences and publish it on scientific journals.

## 6.Result

### 6.1. Socio-demographic characteristics of the study participants

A total of 442 clients were included with mean( $\pm$ SD)age of patients 62.47( $\pm$ 14.809) years.

Among participants of the study,190(42.99%) were Female and 252 (57.01%) Male. From the clients analyzed,237(53.6%) were from rural areas and 205(46.4%) from urban.

Table 1: Socio-demographic characteristics of patients in TGSB &FHRH, from March 2021-January 2022

		Frequency	Percent
Sex	Male	252	57.01
	Female	190	42.99
Age ranges in years	18-38	31	7
	39-59	129	29.2
	60-80	248	56.1
	81-102	34	7.7
Residence	Rural	237	53.6
	Urban	205	46.4

### 6.2. Health status of the study participants

Four hundred thirty one (97.5%) of patients had no previous cerebrovascular disease and 11(2.5%) of them had previous one episode of stroke and treatment. Three hundred twelve (70.6%) of the patients had HTN, 21(4.8%) were Diabetics,19(4.3%) had comorbid HTN&DM, 19(4.3%) had cardiac illness, 7(1.6%) had retroviral infection and 15(3.4%) had other form of illness. There was no health related associated factor identified in about 87(19.7%) of patients. The majority of the study participants presented with body weakness 266(60.2%) followed by failure to communicate and body weakness 119(26.9%).

Table 2: Health status of study participants in TGSH &FHRH, from March 2021-January 2022

		Frequency	Percent
Health status	HTN	312	70.6
	DM	21	4.8
	HTN&DM	19	4.3
	IHD	7	1.6
	Rheumatic heart disease	10	2.3
	HHD	2	0.5
	RVI	7	1.6
	Others	15	3.4
Previous stroke	Yes	11	2.5
	No	431	97.5

Table 3: Patients clinical presentation in TGSH &FHRH, March 2021-January 2022

Clinical presentation	Frequency	Percent
Body weakness and failure to communicate	119	26.9
Body weakness	266	60.2
Failure to communicate	31	7.0
Headache and vomiting	15	3.4
Headache	10	2.3
Abnormal body moment	1	0.2

### 6.3. Prevalence of non-traumatic intracranial hemorrhage

All study patients had imaging result and diagnosis is merely with imaging, 434(98.2%) had brain CT and 8(1.8%) Brain MRI. Among the study patients 205(46.4%) had non-traumatic intracranial hemorrhage with slight male predominance where female accounts 96(46.8%) and Male 109(53.2%). Two hundred seventeen (49.1%) had infarction and 20(4.5%) had normal brain imaging finding.

Majority of the patients with non traumatic intracranial hemorrhage was between 60-80 yrs 105(51.2%) followed by 39-59 yrs 79(38.5%) and the least 81-102 yrs 3(1.4%). The majority number of brain infarction is also in the range of 60-80 yrs 130(54.8%). The most common site of non-traumatic intracranial hemorrhage was basal ganglia and thalamus (P<0.001, OR=3.65, 95% CI, 2.76-5.34).

Table 4.Imaging finding with age groups, in TGSB &FHRH from March 2021-January 2022

Age ranges ( years)	Intracranial hemorrhage( n=205)	Infarction (n=217)	Normal (n=20)
18-38	18(8.7%)	11(5%)	2(10%)
39-59	79(38.5%)	45(20.7%)	5(25%)
60-80	105(51.2%)	130(59.9%)	13(65%)
81-102	3(1.4%)	31(14.2%)	-

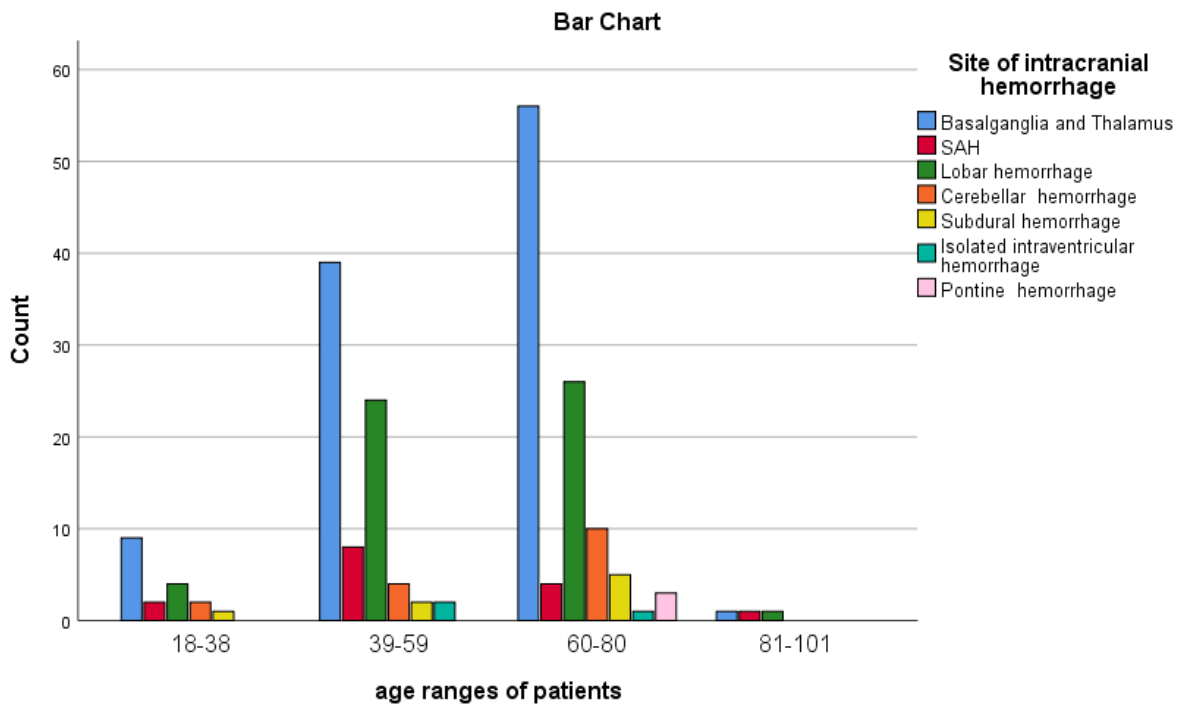


Figure 3: Age ranges of patients with site of intracranial hemorrhage, in FHRH &TGSB, from March 2021- January 2022

Table 5.Site of intracranial hemorrhage, in TGSH &FHRH from March 2021-January 2022

Site of intracranial hemorrhage	Frequency	Percent
Basal ganglia and Thalamus	105	51.2
SAH	15	7.3
Lobar hemorrhage	55	26.8
Cerebellar hemorrhage	16	7.8
Subdural hemorrhage	8	3.9
Isolated intraventricular hemorrhage	3	1.4
Pontine hemorrhage	3	1.4

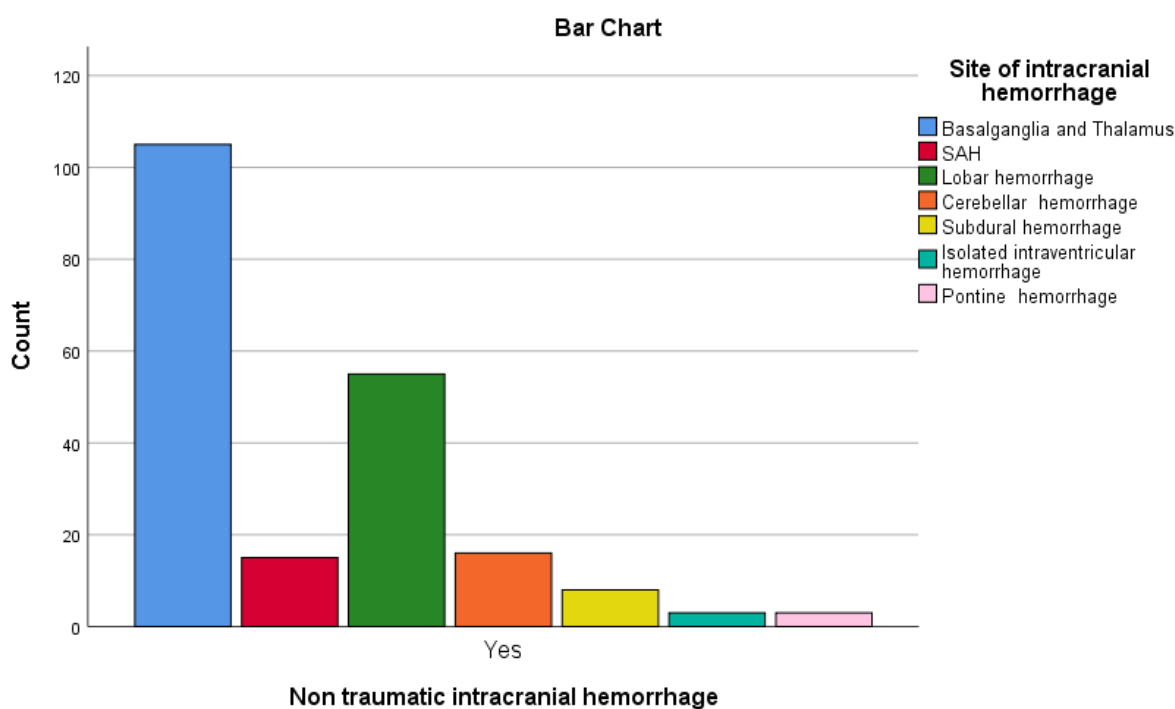


Figure 2: site of intracranial hemorrhage in patient with non traumatic intracranial hemorrhage, FHRH &TGSH, March 2021- January 2022.

#### 6.4. Factors associated with non-traumatic intracranial hemorrhage

There was a strong correlation with non-traumatic intracranial hemorrhage and HTN with p-value of ( $<0.001$ ) and OR of 5.06 (95% CI,3.13-8.18).There was no strong correlation with DM with (p value of =0.57) and OR 1.28(95%CI,0.53-3.0) and other associated factors mentioned (see table 6 below).Previous cerebrovascular disease had no strong correlation with non

traumatic intracranial hemorrhage (p value of 0.09). Basal ganglia and thalamic hemorrhage has strong correlation with hypertension (P<0.001,OR=11.44, 95%CI,4.53-28.88).

Table 6.Binary logistic regression table for variables in TGSH &FHRH from March 2021- January 2022

Variables	Coef (B)	S.E	Odds ratio (Exp(B))	95% CI		p-value
				Lower	Upper	
HTN	1.623	0.245	5.067	3.138	8.184	<0.001
DM	0.252	0.448	1.287	0.535	3.096	0.573
CRVHD	-1.266	.796	0.282	0.059	1.343	0.112
IHD	-	-	0.01	0.01	-	0.9
HHD	0.146	1.417	1.157	0.072	1.8	0.9
RVI	-1.667	1.084	0.189	0.023	1.581	0.12
Previous stroke	1.153	0.684	0.689	0.829	1.2	0.092
Sex	0.293	0.193	1.34	0.918	1.956	0.129

HTN,hypertension;DM,diabetes mellitus;CRVHD,chronic rheumatic valvular heart disease;IHD,ischemic heart disease;HHD,hypertensive heart disease;RVI,retroviral infection

## 7. Discussion

This study provides up-to-date information about non-traumatic intracranial hemorrhage prevalence in TGS and FHRH between March 2021 and January 2022

This study showed 46.4% of the patients reviewed within the study time had non traumatic intracranial hemorrhage which has similar prevalence in a study done in Tikur anbesa specialized hospital(46.1%) (11) . In both studies the diagnosis was based on brain imaging, all of the study participants had Brain CT. A study done in Jimma medical college also had prevalence of non traumatic intracranial hemorrhage (48%) (12) but the diagnosis was based on WHO criteria and the use of imaging modality was not mentioned. A hospital based retrospective study conducted in University of Gondar College of Medicine and Health Science Comprehensive Specialized Hospital (CMHS) showed prevalence of intracranial hemorrhage (18.2%) as compared to our study(1).The main reason for this variation in prevalence could be related to diagnosis pitfall since 50% the study participants had no brain imaging in their study. A study done in Tikur Anbesa referral Hospital and Khartoum teaching hospital also showed prevalence of non traumatic intracranial hemorrhage (34.6% vs 33.6%)(10,13) as compared to this study and this could be due to change of epidemiology of disease and lack of proper hypertension follow up and control in our study. Another studies in Hawassa University Referral Hospital and Tikur Anbesa specialized hospital showed prevalence of non traumatic intracranial hemorrhage(50% vs 56%) (7,2) in both studies hypertension mentioned as a main single most important associated factor with P value of <0.001 for both studies.

In this study significant association was found between HTN and non traumatic intracranial hemorrhage ( $p < 0.001$ , OR=5 with 95% CI,3.13-8.18),which was similar to studies conducted in Gondar university, Tikuranbesa referral hospital, FHRH, Hawassa university(1,11,3,7,2) with P value of <0.001. A study done in Finland with >140 mmHg hypertension has odds ratio (OR) of 3.5 (95% confidence interval [CI] 1.7 to 7.0) for non –traumatic intracranial hemorrhage but in our study objective measurement and their effect was not calculated.

In this study there is no significant correlation between DM and non traumatic intracranial hemorrhage with (p value of 0.57, OR=1.2, 95% CI,0.53-3.0) but it was mentioned one of the strong associated factor for the study done at Khartoum Teaching Hospital(13).This could be due to inadequate diagnosis in our study since majority of patients with non traumatic

intracranial hemorrhage not screened for comorbid illness. This could lead to under diagnosis of DM in stroke patients.

In a study done in Jimma university Medical college(12),AF was the independent predictor of non traumatic intracranial hemorrhage (AOR: 0.08, 95% CI: 0.01–0.68) but in our study AF was not documented in most of the charts. In our study patients with cardiac illness had no strong correlation with non traumatic intracranial hemorrhage as the p value displayed in table 6.A study done in Tikur Anbessa specialized hospital also showed that no strong correlation with cardiac disease and intracranial hemorrhage with P value of 0.81(11).

In our study non traumatic intracranial hemorrhage was more prevalent in the age ranges of 60-80 yrs (51.2%) followed by 39-59 yrs (38,5%) ,A study in Tikur Anbessa specialized hospital (11) showed more number of patients with intracranial hemorrhage in the productive age groups (31-45 yrs and 46-60 yrs) this could be due to late diagnosis of hypertension and lack of proper follow up for hypertension on our study. The other reason could high number of older age groups as study participant in our study. The mean age of our study participants are similar with the age of patients in a study done in Gondar college of medicine and health sciences (62.5% vs 63%) where more young age group included in the study done in FHRH and in Tikur Anbessa specialized hospital (2,10) (mean age of 50 yrs vs 53 yrs) this could be related to associated factors and their prevention as well as change of epidemiology of disease.

Our study showed more male patients with non traumatic intracranial hemorrhage (53.2% ) where similar study conducted in Tikur Anbessa specialized hospital (11) and sub-sahara African university teaching hospital (6) where male accounts (63.3% vs 60%) respectively. In our study there was no strong association between non traumatic intracranial hemorrhage and Gender ( $p = 0.13$ ) but in other studies they didn't mentioned proportions of male and female with intracranial hemorrhage and their association with intracranial hemorrhage.

In our study, the common site of non traumatic intracranial hemorrhage was Basal ganglia and thalamus followed by lobar hemorrhage (51.2% vs 26.8%). Similar study done in sub-sahara African university teaching hospital(6) also showed high number of patients with thalamic hemorrhage (58.3%) followed by lobar hemorrhage (23.8%). In both studies the site of intracranial hemorrhage could be related with main associated factors. In our study lobar hemorrhage is second most common site and it could be related to the patients age since more patients are in age group 60-80 of yrs(56.1%).



In our study, the commonest patient presentation was body weakness followed by failure to communicate and body weakness. A study done in Tikur Anbessa teaching hospital (2) also showed that most of the patients presented with body weakness. In our study patient clinical presentation has no significant importance for the diagnosis of intracranial hemorrhage with P value of 0.11 but a study done in Gondar college of medicine and health sciences showed that patient presented with failure to communicate have high likely intracranial hemorrhage (1) which is not always true unless proven with brain CT.

In our study RVI has no strong association with non traumatic intracranial hemorrhage with P value of 0,12 and OR=0.18,95% CI,0.02-1.5.A study done in Tikur Anbessa referral hospital(2) also showed that RVI has no strong association with non traumatic intracranial hemorrhage (p value 0.48).

### **Limitation of the study**

This is a crosssectional study at the hospital level and it may be difficult to conclude the prevalence at community level. Because the study done in tertiary hospitals where neurologic patients referred, the prevalence of intracranial hemorrhage may be over estimated and in other way round some of the patients with mild symptom may not come to the hospital, others with severe disease may die before come to hospital.

Patient medical records did not consistently include information regarding hypertension proper history and treatment, other modifiable risk factors, and a family history of stroke. The high level of missing data means that we are unable to speak to the prevalence of these modifiable risk factors. All the mentioned associated factors not worked up properly it may be related to the set up and economic factor for laboratory and other tests. The other challenge for this study was miss recording of card no to the registration book where it is not belongs to the patient we want to study. This factor took long time and more money for data collection. Some of the cards didn't have important patient information's for this particular study, for example missing CT scan report though patient is already imaged. The other challenge during data collection was high number of patients left the hospitals against medical advice without brain imaging this could be related to poor set up with absence or impaired of machine in the hospital that makes patients for high cost at private center and most couldn't afford this.

## **8. Conclusion**

In our study the prevalence of non-traumatic intracranial hemorrhage was shown to be high which is more common in old and productive age groups with high no of male patients. Some modifiable associated factors identified and HTN was significantly associated with non-traumatic intracranial hemorrhage. Basal ganglia and thalamic hemorrhage highly associated with HTN.

### **Recommendation/future direction and implications**

Further research shall be done to see the outcome of non traumatic intracranial hemorrhage and other associated factors.

Health workers and health bureaus should do more on HTN at the community level.

For the hospitals, nursing coordinators should have to monitor proper documentations of patient card to the registration books; ward nurses should attach all patients' laboratories and imaging result properly to the card.

### **To health bureaus and health workers**

Early diagnosis and treatment of HTN. Proper follow up of HTN patients.

### **To researchers**

Further research shall be done to see the outcome of non traumatic intracranial hemorrhage and other associated factors. This research should be done at community level,

### **To Hospital Administrative**

CT should be available in the hospital for better patient care.

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## 10. Annexes

### 10.1. Checklists

Tibebe Giyon Teaching and specialized hospital, School of medicine, Department of Radiology, a check list for data collection on the prevalence and imaging patterns of non traumatic intracranial hemorrhage at TGSH & FHRH, Bahirdar, Ethiopia.

#### Section I – Sociodemographic data

1.	Age	____years Card no-----
2.	Sex	a. Male b. Female
3.	Living in	a. Urban b. Rural
4.	Chronic illness	a. DM b. HTN c. Cardiac illness (Rheumatic heart disease, IHD, HHD) d. RVI e. Others (-----specify)

#### Section II –patient clinical presentation

5.	Patient clinical presentation	a. Body weakness & failure to communicate b. body weakness c. failure to communicate d. headache e. vomiting f. abnormal body moment
6.	Previous cerebrovascular disease	a. yes b. no
7.	Types of imaging	a. CT b. MRI
8.	Imaging finding	a. Intracranial hemorrhage b. Infarction c. Normal
9.	Site /patterns of intracranial hemorrhage	a. Basal ganglia & thalamus b. SAH c. Subdural hemorrhage d. Lobar hemorrhage e. Cerebellar hemorrhage f. Pontine g. Isolated Intraventricular hemorrhage
10	Previous CT or MRI (if available)	a. Intracranial hemorrhage b. Infarction