STROKE SUBTYPES, RISK FACTORS AND OUTCOME AT DISCHARG OF STROKE PATIENTS ADMITTED TO TIKUR ANBESSA SPECIALIZED HOSPITAL AND ZEWDITU MEMORIAL HOSPITAL, ADDIS ABABA, ETHIOPIA.

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STROKE SUBTYPES, RISK FACTORS AND OUTCOME AT DISCHARG OF STROKE PATIENTS ADMITTED TO TIKUR ANBESSA SPECIALIZED HOSPITAL AND ZEWDITU MEMORIAL HOSPITAL, ADDIS ABABA, ETHIOPIA.

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ABSTRACT

Background: Stroke is the second leading cause of death and adult disability worldwide. A better understanding of stroke risk factors, subtypes and outcome may help guide the efforts at reducing the complication and community burden of stroke. This study aimed to understand stroke risk factors, imaging subtypes, and outcome at discharge among patients admitted to Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital during the study period.

Materials and patients: A total of 115 patients were admitted with diagnosis of stroke, of whom 69 (60%) were males, thereby giving a male to female ratio of 1.5:1, to Tikur Anbessa Specialized Hospital and Zewditu Memorial Hospital Medical Wards after CT or MRI was done from November, 2014 to March31, 2015. Assessment of clinical and laboratory variables, as well as brain computerized tomography, magnetic resonance imaging, and carotid Doppler ultrasound studies were done accordingly. Outcome of the patients at discharge was also assessed.

Results: Of 115 patients studied, 69 (60%) were males. Age at presentation (mean ± standard deviation) was 51.4 ± 12.8 years in males and $47.9.9 \pm 14.6$ years in females ($P = 0.039$)
Neuroimaging was obtained in all patients, revealing cerebral infarction (37%), intracerebral hemorrhage (ICH) (59%), and subarachnoid hemorrhage (SAH) (4%). Doppler study was done only for few patients (only for 8 patients with the diagnosis of ischemic stroke=19.04% of the patients) and carotid stenosis was detected in 8% of patients with cerebral infarction.
 The commonest risk factors identified in this study is hypertension accounting for 43.5%, and Diabetes is the second most common risk factor among our patients involved in the study accounting for 15.7%, Hyperchlostrlemia (10.4%), Atrial Fibrilation (8.7%), and Cigarette smoking (3.2%), HIV infection (1.7%), and Chat chewing (2.5%) were also among identified risk factors .
 Conclusion: Intracerebral hemorrhage was found to be the predominant stroke subtype in this study. This could be due to the fact that hypertension also the commonest risk factor identified. SAH was associated with the highest in hospital mortality of 2 (40%). In many patients the risk factors were detected only after a patient experienced stroke attack and admitted to wards
Key words: stroke outcome, stroke sub-types, Risk factors, stroke, sub-Saharan

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List of Tables and Figures

LIST OF ABBREVIATION

AHA- American Heart Association

ASA-American stroke association

ACS- Acute Coronary Syndrome

BP- Blood Pressure

FBG- Fasting Blood Glucose

RBS-Random Blood Glucose

CNS -Central nervous system

CVA- Cerebirovascular Accident

CT -Computed tomography

MRI-Magnetic Resonance Imaging

DBP- Diastolic Blood Pressure

DM- Diabetes Mellitus

EUSI- European stroke initiative

HHF- Hypertensive Heart Failure

HTN- Hypertension

ICSOL-Intracranial space occupying lesions

AAU-FM-Addis Ababa University Faculty of Medicine

TASH-Tikur Anbessa Specialized Hospital

ZMH-Zewditu Memorial Hospital

JUSH- Jimma University Specialized Hospital

MI- Myocardial Infarction

NCD- None communicable disease

SBP- Systolic Blood Pressure

SD- Standard Deviation

TG- Triglyceride

HDL- High density lipoprotein

LDL-low Density Lipoprotein

TIA- Transient Ischemic Attack

U.S- United States

ACS (UA/NSTEMI)-Acute Coronary Syndrome (Unstable Angina/None ST Elevation Myocardial Infarction)

WHO- World Health Organization

 NCEP/ATP III-National Cholesterol Education /Adult Treatment Panel Three

AF- Atrial fibrillation

LP-Lipid profile

VHD-Valvular Heart Disease

DCM-Dilated cardiomyopathy

MS-Mitral Stenosis

AS-Aortic stenosis

MR-Mitral Regurgitation

AR-Aortic Regurgitation

IHD-Ischemic Heart Disease

AV-Arteriovenous malformation   SA-South Africa

CHAPTER 1: INTRODUCTION

1.1 Background

Stroke is a leading cause of death and disability worldwide. It is defined by the abrupt onset of a neurologic deficit attributable to a focal vascular cause. Stroke is one of the most common medical emergencies and it is a devastating disorder.

Worldwide in adults, stroke is the 2nd most common & leading cause of disability and death according to WHO (2014) report and the 4^{th}leading cause of death in the United States. The annual incidence of stroke is180-300 million according to the latest WHO statistics and it is responsible for 10.8% of total deaths. A recent systematic review of worldwide stroke incidence showed that stroke incidence has declined by 42% in high-income countries over the 4 decades from 1970–1979 to 2000–2008(due to proper management of hypertension and dietary factors).

During the same period, stroke incidence rose more than 100% in low- to middle-income countries (generally due to dietary change to western type and confounding infectious disease with traditional risk factors).

In the African Continent there are a total of 1.89 million stroke survivors among people aged 15 years or more in the year 2009, with a prevalence of 317.3 (314.0–748.2)/100000 population. Comparable figures for the year 2013 based on the same rates would amount to 535 thousand (87.0–625.3) new stroke cases and 2.09 million (2.06–4.93) stroke survivors, suggesting an increase of 10.8% and 9.6% of incident stroke cases and stroke survivors respectively, attributable to population growth and ageing between 2009 and 2013(from first meta analysis of stroke in Africa).

The burden of stroke is increasing in sub-Saharan Africa considering other myriad of medical problems (J. O. JOWI and P. M. MATIVO)

The burden of stoke in Ethiopia is not clearly known but some Hospital studies have shown that stroke is an important cause of hospital morbidity and mortality in our country and the burden of stroke appears to have increased significantly over the past three decades

Hemorrhagic stroke was the most common cause of stroke accounting for 57% of all patients and 59.2% among those who had CT scan and admitted to medical wards of Tikur Anbessa Specialized Hospital (Zenebe G et al)

American stroke and heart association guidelines, lists of risk factors include Age, Sex, African American, Hypertension, Diabetes, Physical Inactivity, Atrial fibrillation, Smoking, Metabolic Syndrome, Obstructive Sleep Apnea,   Carotid stenosis, Nutrition, Under nutrition, Overweight and Obesity and Alcohol Consumption, Acute MI& LV Thrombus, Hypercoagulable States Hyperhomocytinemia, Pregnancy, **V**alvular Heart Disease Cardiomyopathy, **and** Dyslipidemia

Hypertension was the most frequent risk factor identified followed by cardiac disease, 65.6% and 22.7% respectively in Ethiopian patients, Valvular heart disease (VHD) accounted for 40% of all heart diseases, and almost half of these also had atrial fibrillation of which none were on treatment in Ethiopian patients. The overall mortality was 44.5% (Zenebe G et al).

1.2 STATEMENT OF THE PROBLEM

 Stroke, an abrupt onset of a neurological deficit attributable to a vascular cause; is a major cause of death worldwide as well as in Africa (WHO).

The exact burden of stroke is not known in Africa but estimates suggest that 8% of all first-ever strokes occur in Africa and that 5% of the 30 million stroke survivors worldwide live in Africa .Reliable data on stroke incidence and outcomes in sub-Saharan Africa are sparse but some studies show developed countries experience a decline in stroke incidence and mortality rates, while the problem is increasing in sub-Saharan Africa (Jerome H. Chin et al).

The burden of stoke in Ethiopia is not clearly known but some hospital based studies have shown that stroke is an important cause of hospital morbidity and mortality. A study done in Tikur Anbessa hospital showed the burden of stroke appears to have increased significantly over the past three decades. Hemorrhagic stroke was the most common cause of stroke accounting for 57% of all patients and 59.2% among those who had CT scan (Zenebe G et al)

This study will include all stroke patients admitted to Tikur Anbessa specialized and Zewditu Memorial Hospital medical wards during the study period but it is difficult to study patterns, risk factors and outcome of stroke at national level due to time and resources limitation.

The pattern, risk factors and outcome of stroke is unknown in Ethiopia (only there are few hospital based studies with small population size and single center) and regional specific risk factors like chat chewing and infectious diseases particularly HIV were not assessed before.

Hence the this study will help to know the pattern of stroke, prevalence of peculiar risk factor to the region(chat chewing and HIV)among stroke patients, traditional risk factors, outcomes of stroke at discharge, and the relationship between stroke pattern and outcomes.

CHAPTER TWO

2.1 LITERATURE REVIEW

The recommended standard WHO stroke definition is as follows: A focal (or at times global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death), and of presumed vascular origin.

Most of the studies that reported patterns, risk factors and outcomes of stroke have been carried out mainly in Europe and North America. Also there are few hospital based studies with small number of patients in different African countries.

Adeloye D et al in 2014 in meta- analysis of 1227(finally only 19 studies were analyzed) studies done from January 1970 to December 2013 (**pioneer meta-analysis of stroke in Africa**) found that a total of 1.89 million stroke survivors among people aged 15 years or more were estimated in Africa in 2009, with a prevalence of 317.3 (314.0–748.2)/100000 population. Comparable figures for the year 2013 based on

the same rates would amount to 535 thousand (87.0–625.3) new stroke cases and 2.09 million (2.06–4.93) stroke survivors, suggesting an increase of 10.8% and 9.6% of incident stroke cases and stroke survivors respectively, attributable to population growth and ageing between 2009 and 2013.

Xiao-ying Yao et al in 2012 in their retrospective study from January 2004 to December 2009, stroke case review found Female patients were much older than male patients when experiencing their first ischemic stroke attack and had a significantly higher prevalence of diabetes mellitus, heart diseases and Atrial fibrillation. In contrast, male patients were more likely to be current or ex smokers and to drink heavily than female patients. Hypertension was equally frequent in both groups &with regard to family history; more male patients had positive family history of hypertension

Mayo Clin Proc. 2010, a 6-month prospective, multicenter study of the Gulf Registry of Acute Coronary Events (khat chewers, mainly of Yemeni origin) showed that in patients with ACS, khat (Catha edulis) chewing was prevalent and was associated with increased risk of stroke and death (Waleed M. Ali et al). Tillin et al study showed that, compared with Europeans, South Asians and African Caribbean's experienced more strokes (age- and sex-adjusted) and this difference was more marked in those with diabetes

Abu-Odah et al in 2014 in study on 100 patients diagnosed with stroke found that ischemic stroke is the most common sub-type (66 patients)and identified, hypertension,

Psychological troubles, obesity, diabetes, smoking, and hypercholesteremia as a risk factor for stroke. Walker et al in 2013 in their case ascertainment from Tanzanian Stroke Incidence Project

(TSIP) and verbal autopsy included 200 stroke cases (69 from Dar-es-Salaam and 131 from Hai) and 398 controls (138 from Dar-es-Salaam and 260 from Hai) and identified risk factors were previous cardiac illness, HIV, infection a high ratio of total cholesterol to HDL cholesterol, smoking and hypertension was a significant independent risk factors for stroke. In Hai, additional risk factors of diabetes and low HDL cholesterol were also significant. Thorogood et al in 2007 in their cross sectional random sample survey of adults aged over 35 found that a high prevalence of hypertension, obesity in women, and a suggestion of subclinical atheroma despite relatively favorable cholesterol levels in a rural South African population. J. O. JOWI and P. M. MATIVO et al in 2008in their Hospital-based retrospective study conducted in Kenya described that Ischemic stroke is the most common pathological sub-type observed in this study. Hypertension is the leading observed risk factor for stroke. Hospital period prevalence for stroke of 3042/100,000 was found. Seventy five patients (93.8%) were discharged and four (5%) died in hospital.

Thomas Richard et al in 2013 in his Review of current literature concerning the incidence, risk factors and mortality of stroke identified hypertension as the leading risk factor for stroke in Sub-Saharan Africans with a Nigerian study demonstrating >80% prevalence of hypertension in stroke patients

Heikinheimo et al. in 2012 Concluded from their study that mild stroke and male gender were associated with favorable outcome.

They described that HIV-infection is common in stroke patients in Malawi but does not worsen the outcome of stroke. This study hypothesized that it is may be a risk factor for ischemic stroke for young people, who do not have the common stroke risk factors

Most of the studies done in Africa (sub-Saharan countries) show that ischemic stroke is the most common pattern and Hypertension was most common risk factor for both strokes(hemorrhagic & ischemic), other risk factors include: alcohol intake (32.6%), previous stroke (23.6%), family history of stroke (23.2%), HIV infection (25.4%),

Hypercholesterolemia (14%) and tobacco smoking/sniffing (13.4%). In-hospital stroke mortality was 40%.Walker et al in 2013 in their case ascertainment from Tanzanian Stroke Incidence Project (TSIP) and verbal autopsy included 200 stroke cases (69 from Dar-es-Salaam and 131 from Hai) and 398 controls (138 from Dar-es-Salaam and 260 from Hai) and identified risk factors were previous cardiac illness, HIV, infection a high ratio of total cholesterol to HDL cholesterol, smoking and hypertension was a significant independent risk factors for stroke. In Hai, additional risk factors of diabetes and low HDL cholesterol were also significant.

In his review two studies in Tanzania and Gambia recently demonstrated 1-month fatality rates of 24% and 27% respectively.   Fatality rates is <20% in developed countries

Abubakar and Sabir et al from Nigeria in their retrospective study carried out using the case records of patients admitted from January 2007 to December 2009 with the clinical diagnosis of stroke found that the 30-day case fatality of acute stroke was high and hypertension was the most common modifiable risk factor for stroke followed by diabetes.

 In their study they found that cerebral infarction accounted for 64.4% of stroke (using brain CT-scan) while primary intracerebral hemorrhage accounted for 31.1%.

 Thomas Richard et al in 2013 in his Review of current literature concerning the incidence, risk factors and mortality of stroke identified hypertension as the leading risk factor for stroke in Sub-Saharan Africans with a Nigerian study demonstrating >80% prevalence of hypertension in stroke patients

 Sofia et al in 2013 identified that hypertension, Diabetes Mellitus, and Atrial fibrillation were the commonest risk factors of stroke in prospective cross sectional survey of all patients with stroke presenting to TASH ER for consecutive six months respectively and more than half of their patients

(55.3%) had hemorrhagic stroke (peculiar to Ethiopian setup even in comparison to other sub-Saharan countries).

Oli et al in 2002 in their assessment of risk factors for stroke in the young using retrospective case study found that Rheumatic heart disease is an important risk factor among stroke in the young and type of valve involved rather than severity of disease is related to occurrence of stroke.

Few studies done in Ethiopia show that Occurrence of unusually high number of hemorrhagic stroke cases and the major risk factors identified were hypertension, Diabetes Mellitus and Atrial fibrillation. Factors independently associated with mortality were female sex, pneumonia, Glasgow Coma Scale (GCS) less than or equal to 8 and stroke severity at admission, Age & diabetes as a risk factors in patients admitted to Tikur Anbessa Hospital (Sofia et al)

2.2 RELEVANCE OF THE STUDY

Study regarding stroke sub-types, risk factors (particularly regional specific ones will contribute a lot for the future stroke prevention) and outcomes will be critical in improving the inpatient care of stroke patients and for the development of locally sensitive guidelines, research programs and policies both for diagnosis, prevention and care of stoke patients.

This multicenter study will indicate stroke sub-types, risk factors and outcomes among study participant focusing on whether unusual high number of hemorrhagic stroke sub-types in Ethiopia is due to small sample size or presence of other specific regional risk factors.

CHAPTER THREE

Objectives:

3.1 General objective

To determine patterns, risk factors, and outcomes at discharge of stroke patients admitted to TASH and ZMH

3.2 Specific objectives

- To determine stroke subtypes in adult patients admitted with diagnosis of stroke to Tikur Anbessa Specialized Hospital and Zewuditu memorial Hospital medical wards.

- To describe the risk factors of stroke in patients admitted with the diagnosis of stroke to medical wards of Tikur Anbessa Specialized Hospital and Zewuditu memorial Hospital.

- To assess the outcomes in adult patients admitted with stoke (ischemic & hemorrhagic) to medical wards of Tikur Anbessa Specialized Hospital and Zewuditu memorial Hospital

- To describe socio-demographic profiles of patients admitted with stoke to medical ward of Tikur Anbessa Specialized Hospital and Zewuditu memorial Hospital

CHAPTER FOUR

Methods and materials

4.1 Study Area and period (study circumstance)

The study was conducted in Addis Ababa, Tikur Anbessa Specialized University Hospital medical ward, Addis Ababa University, and Zewuditu Memorial Hospital medical ward, Addis Ababa city council from November 2013 to March 31, 2015

Tikur Anbessa Hospital is the largest referral hospital in the country, with 700 beds, was transferred to the School by the Federal Ministry of Health 1998, and it has since become a University teaching hospital. The Hospital is now the main teaching hospital for both clinical and preclinical training of most disciplines. It is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation.

The hospital has CT scan facility in its radiology department and all basic laboratory examination needed for this study.

ZMH is one of the specialized hospitals under the umbrella of Addis Ababa Health bureau and the hospital provide general and specialty care in neurology for their clients.

4.2 Study period

The study was conducted from November, 2014 to March 31, 2015.

4.3 Study design

A cross sectional study was used. A primary data was obtained from patients or care givers and charts of the patients admitted with a diagnosis of stroke to medical wards of TSH & ZMH since day of admission up to either discharge or death by medical residents, and interns.

4.4 Population

4.4.1 Source population

All patients admitted to the medical wards of TASH and ZMH from December, 2014 to May 31, 2015.

4.4.2 Study population

The study population was all patients admitted to the medical wards of TASH and ZMH with a diagnosis of stroke from December 2014 to May31, 2015.

4.5 Inclusion and Exclusion criteria

Inclusion criteria: Patients with recorded diagnosis of stroke/cerebral vascular accident; as per WHO criteria for diagnosis of stroke after confirmed with CT or MRI of the brain,whose age is ≥ **18 years**.

Exclusion criteria:

(1) Lack of neuroimaging

(2) Patients with transient ischemic attack (TIA)

(3) Known cases of ICSOLs (intracranial space occupying lesions)

(4) Patient with Cerebral Venous Thrombosis

4.6 Sample size and Sampling technique

4.6.1 Sample size

The sample was calculated using a formula for estimation of single population proportion taking prevalence of stroke subtypes, risk factors and outcomes in stroke patients admitted to medical wards to be p=50% (prevalence not known) **,** margin of error 5%, and using 95% confidence level.

$n = Z\alpha/2 \ p \ (1-p) \ / \ d^2$

P = 50% used as the expected prevalence of patterns, risk factors and outcomes in stroke patients admitted to TASH and ZMH medical wards being unknown

$Z\alpha/2$ = standard normal variable at 95% confidence level (1.96)

d= precision (margin of error)

$n = Z^2 p(1-p)/w^2 = (1.96)^2 \times 0.5(1-0.5)/(.05)^2 = $ **384 patient**s

The final sample size

n=384

From the morbidity and mortality data of one month presented at each hospital, the total number of stroke patients admitted to medical wards in the year of 2006 E.C was estimated to be 180. Since the source population is less than 10,000, applying a formula for finite population correction the final sample size was calculated as follows.

nf = n/{1+(n/N)}, where

nf is the final sample size

n=384

N=164

nf = 384/(1+384/164)= 115. The total sample size will be 115.

4.6.2 Sampling technique

Convenient sampling of the 115 patients with stroke was conducted. All participants with the diagnosis of stroke and admitted during the study period, and who fulfilled the inclusion criteria, were included but the total sample size was not reached due to time constraint.

4.7 Variables

Dependent variable

- Stoke.

- Stroke outcome

Independent variables

• Fasting Lipid profile

- Fasting Blood Glucose
- Smoking
- Alcohol consumption
- Chat Chewing
- AF
- VHD
- CMP
- Family history of stroke
- Previous stroke

- Anemia
- ACS
- Blood pressure
- BMI
- Diabetes

4.8 Data collection

Data collection was done from 1st December 2014 up to March 31 20145, the admission clinical diagnosis of stroke confirmed with either CT or MRI scan of the brain was taken. The other relevant information was taken from the patient or care giver (attendant) and from his/her chart was entered in the structured questionnaire after a patient admitted with a diagnosis of stroke by Medical residents and interns.

4.8.1 Data collection instruments

Data collection format containing individual patient characteristics was prepared before the data collection time. Patients admitted during the period from 1st December 2014 to March 31, 2015 with a diagnosis of stoke and their outcome at discharge from medical ward were included; then individual patient or his/her immediate attendant who knows the clinical scenario of the patient was interviewed to fill the data collection format with relevant information about patient socio demographic characteristics, awareness and duration of hypertension, history of treatment, diabetes mellitus, alcohol intake, smoking, and drug complaints. Physical examination results, duration on admission, admission blood glucose level, diagnosis and outcome at discharge was taken from patient′s card.

4.8.2 Data collection process

Data collection was done from 1st December 2014 up to March 31 2015. Stroke patients admitted by medical resident whose diagnosis was confirmed by neuroimaging and their chart was used as a source of data. The other relevant information directly from patient or attendant and from his/her chart was entered in the structured questionnaire after a patient admitted with a diagnosis stroke by Medical resident and medical interns.

4.8.3 Data collectors

Data collection was undertaken by 1st year internal medicine residents and medical interns after they were trained for one day about stroke subtypes, risk factors and outcome, objective of the study, variables

on the questionnaire and its implication. Then, they were assigned to fill the data collection format. All data collection activities were supervised by trained medical residents and primary investigator.

4.9 Pre-test

The structured data collection format was pre tested on a sample of 15 patients before actual data collection begins.

4.10 Data quality control

Adequate training was provided for data collectors, and the compilation format was prepared in simple English to maintain clarity and easier understanding by those data collectors. Pre-testing of data collection tools was made. Data was checked for completeness and internal consistencies right after collection by supervisor or principal investigator

4.11 Data processing and analysis

The data collected was first cleaned, edited and entered into a computer and analyzed using software SPSS-20. Descriptive statistics was done for most of the variables. Categorical variables were also compared using Chi-squared tests as applicable & odds ratios (with 95% confidence interval CI) were calculated from the 2x2 tables. Bivariate analysis was used to look for association between various independent variables and dependent variables. Following analysis, when applicable data was interpreted (with 95% CI, at 1-Alpha =0.95) and P-value <0.05 was taken as statistically significant. Results presented in writing, tabulation & figurative presentations from which conclusion and recommendation was made. Results were compared with other studies & discussed.

Dissemination plan

After finalizing the report, the finding of the study will be disseminated to all relevant stakeholders through Presentation and publication. Copies of the research will be submitted to Addis Ababa, TASH and ZMH, from which data were collected, the ministry of health and other concerned institutions and stake holders for possible applications of the study.

4.12 Ethical consideration

The research proposal was submitted to Jimma University Ethical Review Board and Addis Ababa University Department of Neurology and ethical clearance was obtained, then data collection was initiated after a letter of recommendation obtained from the above responsible offices to the head of each medical wards.

Informed written consent was taken from each patient or his/her attendant and data/information from individual patient was kept Confidential

4.14 Operational definition

Clinically, stroke was defined as per WHO criteria

Definition

The recommended standard WHO stroke definition is as follows:

A focal (or at times global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death), and of presumed vascular origin.

This clinical definition has four components:

• A neurological impairment or deficit of

• Sudden onset, and

• Lasting more than 24 hours (or leading to death), and

• Of presumed vascular origin.

Obesity was defined as a BMI of 30 kg/m2 or greater. Hypertension was defined as a previous diagnosis of hypertension or blood pressure readings consistently >=140/90 mmHg. Diabetes was defined as a previous diagnosis or fasting plasma glucose >=126 mg/dl.

Hyperlipidemia was defined to be present if a patient had been taking lipid lowering agents or had total cholesterol >240 mg/dl, triglycerides >200 mg/dl, or low density lipoprotein cholesterol >160 mg/dl, according to Adult Treatment Panel III (ATP‑III) guidelines of the National Cholesterol Education Program (NCEP).

TIA was originally defined as a sudden onset of a focal neurologic symptom and/or sign lasting less than 24 hours (AHA/ASA).

CHAPTER FIVE

5.1 Results

A total of 115 patients were admitted with diagnosis of stroke, of whom 69 (60%) were males, thereby giving a male to female ratio of 1.5:1. Age at presentation (mean ± standard deviation) was 51.4 ± 12.8 years in males and 47.9.9 ± 14.6 years in females ($P = 0.039$). Approximately 36.8(32%) patients were presented first to Tikur Anbessa and Zewditu memorial Hospitals and whereas 63.2(68%) were referred from other governmental and nongovernmental Health facilities. Brain CT or MRI scans were obtained in all patients. These showed 42 (37%) of the patients had ischemic stroke, 68 (59%) had ICH, and5 (4%) had SAH. Patients spent a median of 13 days and a mean of 15.2 days before death or discharge for those patients who were died or discharged during the study period. 115 patients satisfying the clinical definition of stroke per WHO definition as well as CTor MRI proven stroke diagnosis, whose data were collected over 06 months, were analyzed. The average age of presentation for these groups of patients was 51.4 years, the minimum being 18 and maximum 89 years

5.2, Socio-demographic characteristics of the patients

Table 1

Socio-demographic Characteristics	Category	Frequency	Percentage
Age	18-55	60	52.2
	>55	55	47.8

Sex	Male	69	60
	Female	46	40
Educational status	Not read or write	5	4.3
	1-4	10	8.7
	5-8	3	2.6
	9-12	72	62.6
	College/university	25	21.7
Occupation	Government employee	25	21.7
	Merchant	55	47.8
	Farmer	12	10.4
	House wife	15	13.04
	others	8	6.95
Annual Income/in birr	<3000	54	46.9
	3000-600	50	43.5
	>6000	11	9.6
Residence	Urban	74	64.3
	Rural	41	35.7
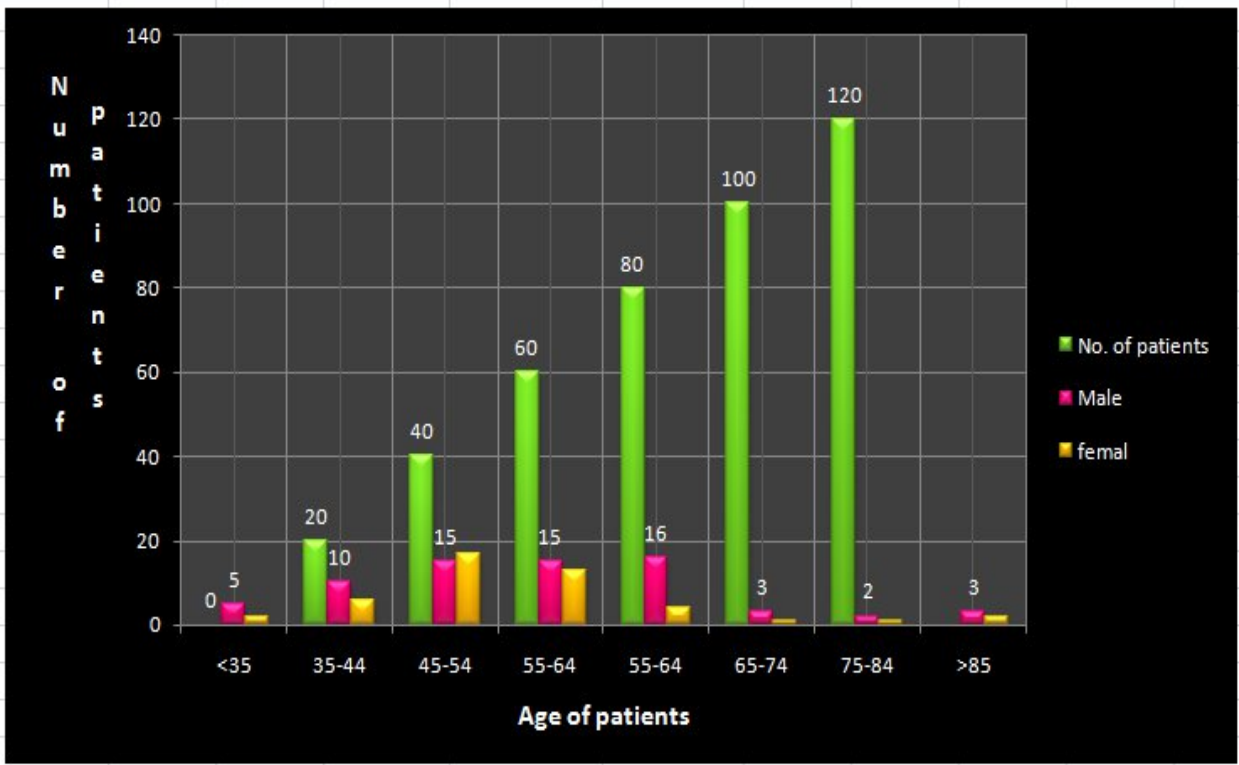
Fig 1: Age and sex category

Table 2, Risk Factors of stroke by age and sex

Table 2: stroke risk factors among stroke patients admitted to the medical wards of TAH and ZMH.				
Risk factors	All patients	Male	Female	Remark
Hypertension	50	35	15	Hypertension and Diabetes are a major risk factors for stroke in these population
Diabetes	18	12	6	
Hyperlipidemia	12	5	7	
Atrial Fibrillation	10	4	6	
Previous history of stroke	5	3	2	
Current smoking	5	4	1	
Obesity	6	1	5	
CHF	5	2	3	
HIV infection	2	1	1	
Carotid artery stenosis	2	2		
No risk factor identified	10	6	4	
Multiple Risk factors(>2 risk factors)	**10**	**8**	**2**	

The two major risk factors identified were hypertension and Diabetes Mellitus with hypertension accounting for50 (43.5 %) patients and Diabetes accounting for18 (15.7%) patients respectively. And 9 (12.5 %) were found to be both hypertensive and diabetic. Hyperlipidemia comes third with a frequency of 12 (10.4%). Among patients participated in the study five (3.2%) (Four male and one female patient) were smokers). Co morbidities like HIV infection were documented in only few patients 2(1.7%) and no risk factor was identified in 10(8.7%). 10 (8.7%) had multiple established risk factors.

5.3 Stroke subtypes.

Among 115 patients included in the six months study, majority had Hemorrhagic stroke 73 (63%) and 42(37%) had Ischemic stroke.
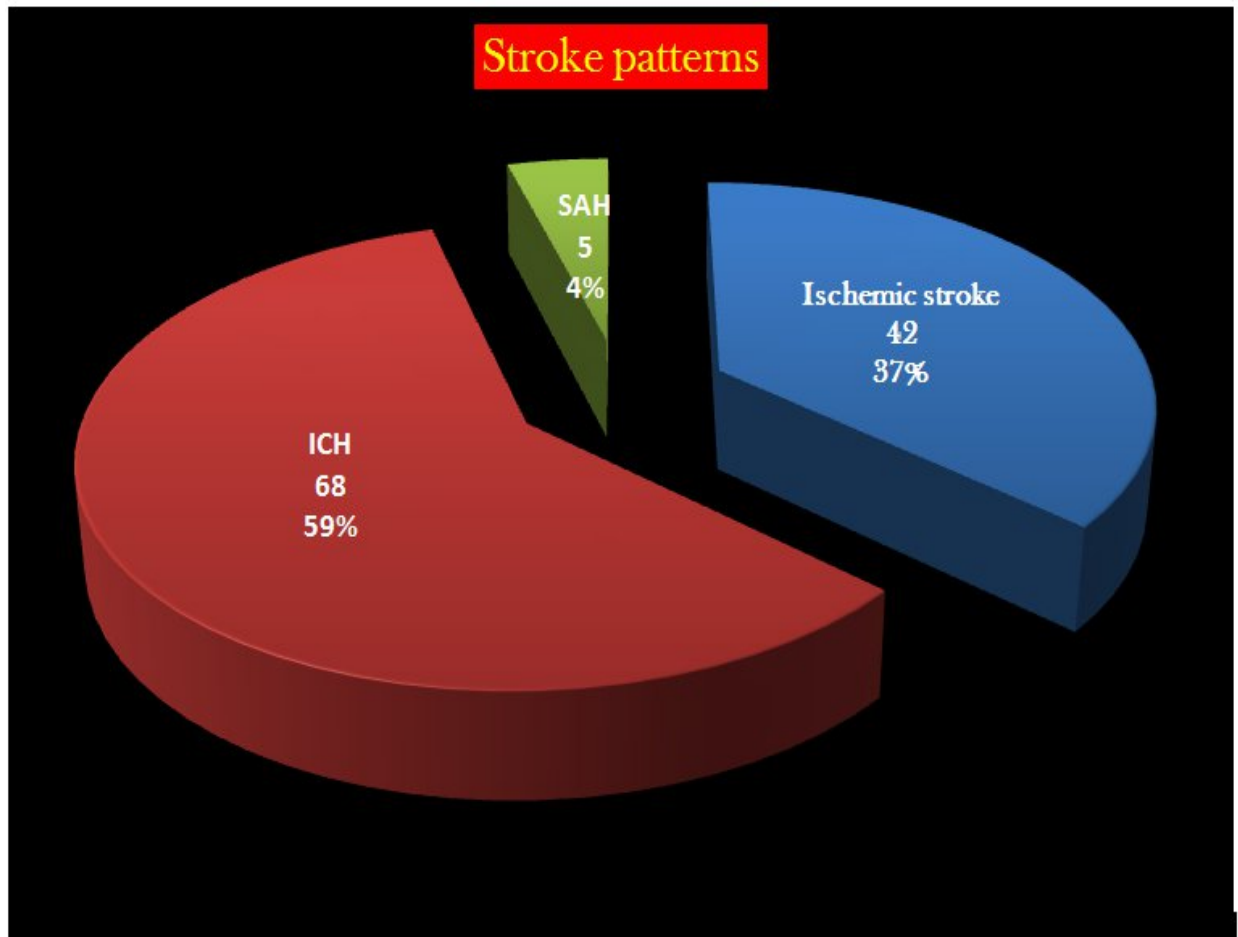
Fig2. Patterns of stroke subtypes in the study population

Table 3: Univariate and multivariate logistic regression analysis of clinical and laboratory parameters associated with in-patient mortality after stroke

Variable	Unadjusted odds ratio (95% CI)	p-value	Adjusted odds ratio (95% CI)	p-value
LDL/unit increase	1.31 (1.20-1.42)	<0.0001	1.22 (1.08 - 1.36)	0.001
Glasgow coma scale/unit increase	0.61 (0.53-0.71)	<0.0001	0.81 (0.62-1.04)	0.10
Random blood sugar/unit increase	1.15 (0.82-1.62)	0.40	0.61(0.63-1.05)	0.02
Serum creatinine concentration>1.2 mg/dl <1.2 mg/dl	2.02 (0.99-4.09) 1.00	0.05	1.40 (0.34 – 5.76) 1.00	0.74
Serum Urea concentration l>20mg/d <20mg/dl	1.45 (0.70-3.02) 1.00	0.32	1.60 (0.44 – 5.86) 1.00	0.78
CT scan with midline shift & hemorrhagic stroke	1.39 (1.21-1.42)	<0.0001	1.23 (1.07 - 1.36)	0.001

Elevated random blood sugar, serum creatinine, blood uria nitrogen, Cholesterol and CTscan midline shifts, Random blood sugar >200mg/dl, Scr>1.2, BUN>20, Per ATP3 guideline and radiologist comment respectively.

CHAPTER SIX

6.1 Discussion

Stroke is a medical emergency that requires prompt intervention. This study included 115 patients who were admitted to Medical wards of Tikur Anbessa & Zewditu Memorial Specialized Hospitals with the diagnosis of stoke. In this study, Hemorrhagic stroke 73(63%) was the most common stroke subtypes. This finding is consistent with previous studies done in Ethiopia showing unusually high number of patients with hemorrhagic subtypes but the number of patients with ischemic stroke42(37%) significantly increased from previous hospital based Ethiopian studies. Among patients with hemorrhagic stroke subarachnoid subtype is associated with poor outcome at discharge from hospital during the study period

This study found that the stroke incidence rate was higher in middle age groups and in men rather than in women. Overall the demographics, risk factor profile and outcomes of stroke in this study were comparable with other studies conducted in sub-Saharan Africa.

The study showed hypertension to be the most prevalent risk factor for stroke, being present in two thirds of the patients 50(43.5),Diabetes(15.7%), Hyperchlostrlemia (10.4%), and Atrial Fibrilation (8.7%) . Most of the patients were not on treatment at admission to respective medical wards. CT scan midline shift and hemorrhagic stroke, raised baseline random blood sugar and Dyslipidemia are associated with poor outcome in hospital stay.

Limitation of the Study

This study has some limitations. The population size is small and most cases referred to these hospitals are difficult cases to manage in the countries specialized, zonal and district hospitals so this may undermine the true number of stroke patients.

Outcome assessment is so gross and standardized outcome predictor scale for stoke is not used in this study and confounder for in hospital mortality is not controlled

Conclusion

In general, in this study, stroke occurred more frequently in men than in women and there is increased number of patients with ischemic stroke which may be shows transmission from unusual high number of hemorrhagic stroke seen in previous hospital based Ethiopian studies.

The major risk factors identified were high blood pressure, Diabetes, Dyslipidemia and Atrial fibrillation. Still Hemorrhagic stroke were the most CT scan findings in the majority of the patients.

Recommendation: Early detection of stroke risk factors and particularly hypertension may reduce stroke related morbidity and mortality. Larger multicenter based studies may provide additional data on stroke subtypes, risk factors and outcome at discharge among Ethiopian patients

Regional specific factors like chat chewing should be further studied whether it has a relationship with stroke or not.

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Consent form and Questionnaires

CONSENT FORM

College of Public Health and Medical Sciences, Department of Internal Medicine JUSH. Questionnaire on pattern, risk factors and outcomes of stroke at discharge of patients admitted to medical ward of TASH and ZMH, from 1st November, 2014 to March 31, 2015G.C

A).INFORMATION TO THE PARTICIPANT/ATTENDANT

Interview code no _____

Greeting and self introduction and consent by translating to his/her language.

Greeting: - Good morning/afternoon.

My name is--We are conducting a scientific research on stroke sub-types, risk factors and outcomes of stroke patients at discharge of patients admitted to medical ward of TASH and ZMH. Therefore, I am happy to inform you that you are one of the potential participants in this study. Your participation is only determined by you. If you feel you will not participate in this study, your decision will be much respected from the outset. It is only if you are willing that I will proceed to ask you some information. Data will be collected with interview and from patient chart. The information gathered will be used for writing a proposal for partial fulfillment of a specialty certificate in Internal Medicine at Jimma University. Here, I want to assure you that any information obtained from you will remain confidential and even there is no need of writing your names or any personally identifiable information.

B) CERTIFICATE OF CONSENT

Do you wish to participate in the study?

If the participant/attendant agrees to participate in the study, proceed with interview and the rest data will be taken from patient's chart after the patient/attendant has signed the consent.

 I have adequate   information about the research and I have decided to participate in the study.

 Signature ----------------------------------

If the participant/attendant says "No, I don't want to participate in the study", thank him (her) and stop .Thank you!

Name of interviewer_____ Date_____/_____/_____

Annex III: Questionnaire designed to assess pattern, risk factors and outcomes of patients admitted with stoke to TASH and ZMH medical wards from November 2014 –March 31 2015

Date of completion of the questionnaire __ __ ____

Part I – Identification, Sociodemographic characteristics and anthropometric measurements of the study participants

1, Card No---------- weight (kg) ----------- Height (cm), BMI --------- Age (yrs) ---------

Waist circumference……………….

1.1, Gender   □M   □F

1.2, Marital status   □Married   □Single   □Divorced   □Widowed

1.3, Occupation   □Farmer   □House wife   □Employee   □Student

                        □Merchant   □ others (specify) ----------------------

1.4, 6, Literacy status   □Illiterate □Semi-literate   □Literate

1.5, Annual Income (birr)   □ <3000   □3000-6000   □>6000

1.6, Living area   □Urban   □ Rural

Part II General medical condition prior stroke:

2.1 Diagnosis------------------------

2. 2 is he/she on treatment: Yes (mention the treatment modality) ----------------------- No-------

2.3, If Yes for how long since the diagnosis--------------------

2.4, if no diagnosis previously, any general medical checkup prior to the onset of the stroke -----------------
--

III Natural course of the stroke:

3.1Time from onset to admission   □< 4.5 hours   □>4.5 hours   □>24 hours

3.2 sudden-------------------- 3.3 evolutional (stuttering) -----------------------

3.4 Symptoms: Focal neurologic deficit (describe it) ---
----,

3.5 Level of consciousness at presentation (GCS) --------------------------------

3.6 prior headache (--------------------------

3.7 Seizure--------------------------

Vomiting----------------------------

3.8 please describe the activity in which the victim is engaged at the onset of stroke

3.8.1 Sleeping---,

3.8.2 Engaged in activity-------------------------------------

3.8.3 sitting---

3.7.4 Engaged in different activity please describe it-------------------------------------

IV Risk factors of stroke:

4.1, Diabetes--

4.2, Hyperlipidemia--

4.3, Hypertension--

4.4 Smoking ---

| 4.5, | Alcohol use: | □Current | □Ex | □Never |

4.6, Chat chewing   □Current   □Ex   □Never

4.7, □ Smoking   □Current   □Ex   □Never

4.8, □ HIV result   4.9, □ Atrial fibrillation

4.10, □ Valvular heart disease (specify which valve is affected if any-------------------)

4.11, □ Cardiomyopathy (DCM, HCM, Other specify-------------------------------)

4.12, □ Anemia (only if it is sickle cell anemia) -------------------------------

4.13, □ ACS   4.14□ previous stroke------------------

4.15, □ Pregnancy   4.16, □ Thrombus in the heart--------------

4.17, □ Family history of stroke   4.18, □ TIA

V: Workup of the patient:

5.1 FBS-------------------------------------,

5.2 Lipid profiles------------------------------

5.3, CT or/and MRI finding (in how many hours after stroke----------------------------)

5.4□, Ischemic (specify the type-------------------------------------)

5.5, □ Hemorrhagic (specify the type--------------------------------),

5.6 □ other (specify the type) ---)

5.7, □ Echo finding--

5.8, □ ECG finding--

5.9, □ Carotid Doppler finding--

5.10, □ RFT, BUN-------------------------- Cr---------------------------------

VI Post stroke medical complication:

6, 1 UTI--------------------6.2 Chest infection----------------------------

6.3 DVT---------------------------- 6.4 AMI----------------------------------

6.4 Neurogenic pulmonary edema------------------------------6.5 Stress ulcers-----------------

6.5 Difficulty of swallowing---------------------- 6.6 Heart failure----------------------------

6.7 Pulmonary embolism-----------------------------6.7 Dehydration---------------------------

6.8 Pressure sores---6.9 orthopedic complications and contractures----------------

VII **Outcome of the participant**

7.1, Days since onset of symptoms & admission--

7.2, Length of hospital stay--in days

7.3 Is patient   Discharged--------------------------------Dead---------------------Referred---------------

7.4   If dead immediate cause of death---

7.5 If discharged------------------------------ 7.6 improved------------------------------

7.7 Persistent vegetative state---------------------- 7.4 Coma----------------------------

Name and Signature of the data collector: Name---------------------------- Signature----------------------

Name and Signature of the principal investigator: Name------------------- Signature----------------------