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INSTITUTE OF HEALTH SCIENCES

FACULTY OF MEDICINE

DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE
CLINICAL CHARACTERISTICS AND TREATMENT OUTCOME OF
STROKE PATIENTS MANAGED IN JIMMA UNIVERSITY MEDICAL
CENTER JIMMA, ETHIOPIA, 2023

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MEDICINE

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Abstract

Introduction: Stroke localized or widespread impairment of brain function brought on by blockage and/or rupture of blood vessels that supply the brain, with symptoms lasting 24 h or longer or fatalities with no other obvious explanation other than that of vascular origin. Disability-adjusted life years due to stroke are increasing largely due to population growth and aging. Stroke is one the leading causes of mortality and morbidity globally. The magnitude of stroke-related deaths in Ethiopia is 6.23% out of total deaths, and the age-adjusted death rate of stroke in the country is 89.82 per 100,000 population⁶. Various reports indicated that 90% of the burden of stroke is attributable to modifiable risk factors. The improvement status of stroke during discharge in Ethiopia is 72.28%.

Objective: To assess clinical characteristics and outcome of acute stroke patients managed in JUMC

Methods: Institutional based retrospective cross sectional study will be conducted from Miazia 1, 2015 to Tikimt 30, 2016. A total of 198 charts were included. The charts were selected using systematic random sampling after determining the sampling interval (K) by dividing the number of total charts by the desired sample size and the (K) value becomes 1.5. Data was collected using a pretested questionnaire. Descriptive statistics were computed to present the data and describe the study variables. Logistic regression analysis was done to identify factors associated with the outcome.

Results: A total of 198 charts reviewed in the study, giving a response rate of 100%. From a total of 198 study participants, more than half (65.8%) were discharged with improvement whereas 16(7.5%) of respondents discharged with the same condition as admission, 10(5%) were deteriorated and 42(21.6%) were died in the hospital. The leading cause of death was elevated intracranial pressure (ICP) 20(10.1%) followed by 18((9%) of Multi Organ Failure (MOF) and 4(2%) of aspiration pneumonia.

Conclusion: The management outcome stroke patients generally have still high (21.6% mortality and (7.5% condition as admission, 5% were deteriorated) complication rates. This is due to many factors like late appearance of patients from symptom onset (100% participants arrived greater than 4.5 hours after symptom onset) which hinders institution of important medications like thrombolytics.

Key words: Jimma University Medical Center, stroke management, stroke management outcome, clinical characteristics.

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SECTION 1 INTRODUCTION

1.1. Background

Stroke, also known as a cerebrovascular accident, is a localized or widespread impairment of brain function brought on by blockage and/or rupture of blood vessels that supply the brain, with symptoms lasting 24 h or longer or fatalities with no other obvious explanation other than that of vascular origin¹. Brain cells begin to deteriorate and eventually die in the face of absent blood supply².

Stroke is one of the leading causes of mortality and morbidity globally³. It is prevalent and disabling in >80 million stroke survivors⁴. The burden of stroke disability is greatest in Asia, developing countries, and the stroke belt of the United States⁴. Disability-adjusted life years due to stroke are increasing largely due to population growth and aging⁴. Stroke is one of the leading causes of mortality and morbidity globally⁵.

The magnitude of stroke-related deaths in Ethiopia is 6.23% out of total deaths, and the age-adjusted death rate of stroke in the country is 89.82 per 100,000 population⁶. Various reports indicated that 90% of the burden of stroke is attributable to modifiable risk factors². The improvement status of stroke during discharge in Ethiopia is 72.28%.⁶

1.2. Statement of the Problem

Stroke is an important health challenge with huge magnitude of incidence and prevalence and economic burden. Global prevalence of stroke in 2019 was 101.5 million people, whereas that of ischemic stroke was 77.2 million, that of intracerebral hemorrhage was 20.7 million, and that of subarachnoid hemorrhage was 8.4 million⁷.

The Global Burden of Diseases (GBD) study showed about 80% stroke-related death occurs in LMIC indicating developing countries carry heavy burden of stroke-related disability, mortality, and morbidity⁸.

In Ethiopia, the burden and outcome of hemorrhagic and ischemic stroke vary over time periods and between regions⁸. The majority of patients with stroke died early after admission because of stroke-related acute medical and neurological complications. Because of poor standard of care and late presentation, in-hospital death is higher, and most of the patients were discharged with severe physical disability⁸.

There is a shortage of data regarding treatment outcome and clinical characteristics although high prevalence and burden of stroke in Ethiopia. The lack of adequate data which is specific to the developing world like Ethiopian setting limits formulation of well-designed prevention strategy and treatment. Ethiopia and other sub-Saharan countries have been using data that comes from more advanced countries for prevention, follow-up, and management of stroke⁸.

To the knowledge of the investigator, there is no clear epidemiological data regarding the clinical characteristic and outcome of stroke patients that are managed at JUMC. This retrospective institutional-based cross-sectional study aims at assessing characteristics and clinical outcome of stroke patients managed in JUMC.

1.3. Significance of the Study

Although there are studies regarding clinical characteristics and treatment outcome of patients managed in inpatient setups in Ethiopia, there is conflicting data regarding outcome of stroke patients among various studies conducted in JUMC. This study aims at clinical characteristics and outcome of stroke patients managed in JUMC, Southwest Ethiopia.

This study will strive to fill the gap in data and knowledge regarding clinical characteristics and outcome of stroke patients in Jimma University Medical Center.

SECTION 2 LITRATURE REVIEW

Stroke is a leading cause of disability, dementia and mortality worldwide and is associated with substantial economic costs. Globally, an average of 1 in 4 adults will have a stroke during their lifetime³. Despite major advances in medical research and technology for acute stroke care, treatment and management, in 2013, it accounted for about 6.5 million deaths and 25.7 million stroke survivors were burdened with multiple debilitating impairments worldwide⁹.

The 2019 update on global stroke statistics identified a consistent increase in stroke incidence in low- income and middle- income countries (LMICs) on the basis of stroke incidence studies performed between 1971 and 2014. From 1970 to 2010, 70% of all stroke deaths and 87% of disability owing to stroke occurred in LMICs.

A systemic review and meta-analysis, published in 2021, that was conducted in Sub Saharan Africa showed the pooled estimated prevalence of in-hospital mortality due to stroke was 22%. Stroke mortality in Western Africa (37%) was higher than in Eastern Africa (15%) and Southern Africa (18%)¹⁰.

A systematic review of the interventions for acute stroke management in Africa revealed that the widespread assertion of low applicability and uptake of evidence-based acute stroke care in LMICs. There is wide evidence-practice gap within the context of acute stroke treatment and management across the African region⁹. Increased patient access to brain imaging services such as CT and MRI scans could optimize the benefits of aspirin towards the treatment of acute stroke. In Africa, access to brain scanning services is limited due to service availability and cost to patients⁹.

The nature of acute stroke care is often poor due to the fact that the application of evidence-based acute stroke care interventions for optimal patient outcomes in LMIC remains inadequate⁹. Africa has variable and poor nature of acute stroke services, manifested by high case fatality rates of about 40% in Ghana and 70% in Mozambique⁹.

A scoping review conducted between 1 January 1990 to 31 December 2020 on stroke epidemiology, care, and outcomes in Kenya resulted in in-hospital mortality in public hospitals ranged from 21.6% to 27% while it was only 5% in a private hospital. About a quarter of stroke patients died in 1 month (23.4–26.7%); and about a third (29.8–34.1%) in 3 months¹¹.

Stroke mortality was associated with age (higher in older patients), sex (higher in females) and stroke type (higher in ischemic stroke overall at 12 months but higher in hemorrhagic stroke at 1

month)¹¹. In SAH patients, only half of the patients had surgical or endovascular management and this was delayed for up to 20 days after presentation, especially in public hospitals. A quarter of patients with SAH died in hospitals, and less than half (46%) had favorable functional outcomes on follow-up¹¹.

In an ICU based cross-sectional study carried out at Yaounde Central Hospital between 1st January 2016 to 31st December 2016 on the epidemiological, clinical, radiological profiles and outcome of stroke in reference to sub-Saharan African ICU the result showed that the mean duration of hospitalization was 6.9 ± 6.2 days. In-ICU mortality rate was 56.3%¹². 57.7% cases were hemorrhagic stroke and 42.3% cases were ischemic strokes. The most affected cerebral hemisphere was the right (55.8%) and 34.6 % had mass effects¹². Their mean age was 66.2 ± 13.5 years (range: 35–91 years) and 50% were males¹². The frequencies of comorbidities were hypertension (65.4%), diabetes (7.7%), and HIV/AIDS (7.7%)¹². Their MAP was 110 mmHg and mean GCS was 8.1 ± 2.8 ¹².

A systematic review and meta-analysis, published in 2022, conducted on magnitude and predictors of in-hospital stroke mortality in Ethiopia showed that the magnitude of in-hospital mortality was 14.03¹³. The subgroup analysis of in-hospital mortality based on patient's age shows that mortality was higher in patients whose mean age less than 60 years as compared to those who were older¹³. The type of stroke had determinant effect on stroke outcome. Patients with hemorrhagic stroke type had higher odds of death¹³. GCS during admission less than or equal to 12 and altered mental status have odds of 8.51 and 5.59, respectively, compared with GCS greater than 12 and normal mental status¹³.

In a retrospective cross-sectional study that was conducted among consecutive patients with acute stroke hospitalized between October 2017 and October 2019 at Hiwot Fana Specialized University Hospital to assess in-hospital treatment outcomes of acute stroke and associated factors; the result showed in-hospital mortality was 36.8% for ischemic stroke and 27% for hemorrhagic stroke¹⁴. Aspiration pneumonia (35.0%), cerebral edema (17%), and seizure (14.3%) were the most common complications occurring during hospitalization. Atrial fibrillation was the independent predictor of in-hospital mortality¹⁴.

In an institution-based cross-sectional study that was carried out from January 2016 to December 2019 among stroke patients hospitalized in the medical ward of Dessie Comprehensive Specialized Hospital the outcome was 35.8% cured and discharged without complications, 22.1% of patients left against medical advice, 21.8% died in the hospital².

Out of 67 deaths, 31 happened in the age category of 45 to 64 years, followed by 65 to 84 years, where 26 deaths were reported. The tendency for mortality from strokes rose with age. Furthermore, 14.3% of stroke-related deaths had hypertension, 4.9% had AF and structural heart disease².

A retrospective study of patients with stroke admitted to Ambo University Referral Hospital from April 2016 to May 2019 showed 80.2% were diagnosed with ischemic stroke, 18.0% were hemorrhagic stroke and the remaining 1.8% were undetermined⁶. Hemi-paresis was a clinical presentation in 76.6% patients (i.e, 45% left side and 40% right side weakness), and 25.2% had a CT scan in which 20.7% were from an ischemic stroke while 3.6% were from hemorrhagic stroke. The majority, 66.7% from ischemic stroke and 17.1% from hemorrhagic stroke, had at least one comorbidity/antecedent risk factor. Hypertension 35.1% and 8.1%, and atrial fibrillation 13.5% and 6.3% were the two most frequently identified comorbidity/antecedent risk factors among patients with ischemic and hemorrhagic stroke, respectively⁶.

Total 62.2% of patients, 65.2% from ischemic stroke and 50.0% from hemorrhagic stroke, discharged without complications and the rest 37.8% patients, 34.8% from ischemic and 50.0% from hemorrhagic stroke had poor treatment outcome⁶. The overall in-hospital case-fatality rate was 16.2%, 13.5% from ischemic stroke, and 30.0% from hemorrhagic stroke. Among 93 patients discharged alive, 21.6% were discharged with a neurological deficit. Among 18 patients dead, aspiration pneumonia 66.7% and ICP 16.7% were the most frequently documented cause of death secondary to stroke⁶.

A retrospective cross-sectional study conducted on hospitalized stroke patients in the medical ward of Shashemene Referral Hospital from March to April 2017 showed that 57.5% were males and 42.5% females. Majority of the study participants were married (89%) and most were farmers (41.1%). The mean age and mean length of hospital stay of the patients were 63.2 ± 14.8 years and 6.7 ± 2.5 days, respectively, while the mean time from symptoms onset to hospital admission was 23.50 ± 13.14 hr⁵.

During admission, left-sided body weakness (39.7%) was the most frequently encountered chief complaint among the hospitalized stroke patients. Hypertension (38, 52.05%) was the major comorbidity while AF was the least common (4.1%). Ischemic stroke was the most frequently (65.8%) diagnosed type of stroke followed by hemorrhagic stroke (21.9%)⁵.

More than half (54.8%) of hospitalized stroke patients had good treatment outcome. Chief complaint, comorbid diseases, type of stroke, and other sociodemographic characteristics did not significantly affect treatment outcome of stroke patients⁵.

A two-year hospital-based retrospective cross sectional study that was conducted to analyze the medical records of stroke patients admitted to JUMC from February 1st, 2016 to March 30th 2018 showed that nearly two thirds (67.3%) of patients were male¹. No patient was admitted with stroke during a period in February 1st, 2016 to March 30th, 2018 with the age group of 18-24 years. Majority of the study participants were married (94.5%), and more than half (58.2%) were farmers. The mean age of the patients in this study was $62:33 \pm 15:77$ years. More than one third (40.4%) of studied participants were smokers while 34.54% had history of alcohol consumption¹.

Less than half of the patients (40.91%) were admitted after 24 hours of stroke onset, and none of them arrived at the hospital before 4.5 hours. The mean time from symptom onset to hospital admission was $26:45 \pm 12:54$ hours¹. The average time from hospital admission to initiation of antiplatelet agent and statins [for ischemic stroke] was $25 \pm 6:8$ hours. Greater than one third (36.82%) of the participants were improved and discharged from the hospital while 45.0% of the participants were discharged with physical disability and/or neurological deficit¹. The in-hospital mortality rate was 18.18%¹. Greater than two thirds (70.9%) of the patients were diagnosed with ischemic stroke while the remaining patients (29.1%) were diagnosed with hemorrhagic stroke¹. Less than one third (29.5%) patients complain of the left side body weakness at admission. The other common chief complaints include aphasia (23.6%), right side body weakness (21.9%), and loss of consciousness (21.4%)¹. The most common identified risk factors of stroke were hypertension (45.9%), smoking cigarette (40.5%), and DM (36.4%)¹.

More than one third (35%) of the patients developed in-hospital stroke complications. Pressure sore (18.2%), aspiration pneumonia (7.3%), sepsis (4.1%), seizure (3.2%), and DVT (2.2%) were the identified in-hospital complications¹.

Age ≥ 65 , presence of comorbidity, admission with hemorrhagic stroke, and admission to the hospital after 24 hours of stroke onset were independent predictors of poor treatment outcomes¹.

A prospective observational study that was conducted at the Stroke Unit of Jimma Medical Center (JMC), Ethiopia from July 1, 2020, to January 31, 2021 showed among 153 stroke patients included in the study, 52.9% of the participants were male and the mean age was 57 ± 14.9 years. The majority of the patients 60.1% were from urban/semi-urban areas and almost two-thirds of them 60.8% had no formal education. Hypertension was the most common comorbid condition recorded in about two-thirds of 63.4% of stroke patients. Dyslipidemia and DM were recorded in 38.2% and 18.3% stroke patients respectively. Other risk factors such as smoking were identified only in about 7.2% of the patients¹⁵.

CT-scan was done for 83.0% patients while the rest of the patients were assessed clinically for stroke based on WHO criteria. Based on CT-scan results, 48.0% patients had ischemic stroke and 52.0% had a hemorrhagic stroke. Considering those diagnosed clinically and with brain CT-scan, the overall proportion of ischemic and hemorrhagic stroke was 48.4% and 51.6% respectively¹⁵. Common locations of hemorrhagic stroke were basal ganglia 53.0%, followed by pons/brainstem 18.2% and thalamus by 15.2%. Only 9.2% of stroke patients arrived at the hospital within 4.5 hours of stroke symptom onset. The majority 65.3% of patients presented after 12 hours of onset. 60.8% of the patients had a GCS of 13-15 on admission and two-thirds of patients (66.7%) had severe and very severe stroke conditions based on NIHSS score¹⁵.

94.1% had hemiparesis or hemiplegia on admission and 46.4% had headaches and aphasia on admission¹⁵.

Antihypertensive medications were given to about 52.3% of patients. Statins and aspirin were prescribed for 47.1% and 44.4% of the patients respectively. At discharge, anti-hypertension medications were prescribed for 53.6% followed by statins 39.7% and aspirin 39.1%¹⁵.

The most common in-hospital complications identified were bladder incontinence 34.9%, aspiration pneumonia 21.1%, and increased ICP 19.7%. Except for increased ICP, there was no statistically significant difference regarding complications between stroke subtypes. The median length of hospital stay was 7.6 days. The overall in-hospital mortality rate was 17% and the all-cause 28-day mortality rate was 25.5%. There was no significant difference between stroke subtypes. At 28 day follow up 25.5% and 28.1% had moderate and severe disability respectively¹⁵.

Rural residence, development of aspiration pneumonia, and increased ICP were associated with 28-day mortality. The rate of 28-day mortality in patients from rural areas was 3.5 times higher than in patients who were from urban areas. Patients who develop aspiration pneumonia had 6.6 times more likely to have 28-day mortality. Similarly, stroke patients complicated with increased ICP had about a three-fold increase in the 28-day mortality rate compared to those patients who did not develop increased ICP¹⁵

Conceptual framework



SECTION 3 OBJECTIVES

3.1. General Objective

To assess clinical characteristics and outcome of acute stroke patients managed in JUMC.

3.2. Specific Objectives

To assess demographic characteristics of acute stroke patients managed at JUMC.

To assess prevalence and incidence of acute stroke managed in JUMC

To identify factors associated with acute stroke treatment outcomes of stroke patients managed in JUMC.

SECTION 4 METHODOLOGY

4.1. Study Area

Jimma University Medical Center is one of the oldest public hospitals in Ethiopia. It was established in 1930 E.C during Italian occupation. Geographically, it is located in Jimma City. The City is situated 348 km Southwest of Addis Abeba. After withdrawal of Italian occupants, the hospital had been governed under the Ethiopian government by the name of “Ras Desta Damtew Hospital” and later “Jimma Hospital “during Dergue regime and currently Jimma University Medical Center.

The medical center has over 1,500 health workers, 800 beds capacity and a catchment population of over 15 million people. It provides clinical services for approximately 15,000 inpatients, 160,000 outpatients, 11,000 emergency cases, and 4,500 deliveries per year.

4.2. Study Design and Period

Institutional based retrospective cross sectional study will be conducted from Miazia 1, 2015 to Tikimt 30, 2016.

4.3. Population

4.3.1. Source Population

All stroke patients who will visit Jimma University Medical Center Emergency Department are the source population.

4.3.2. Study Population

All acute stroke patients who fulfill eligibility criteria and managed at Jimma University Medical Center during the study period are the study population.

4.4. Eligibility Criteria

4.4.1. Inclusion Criteria

All acute stroke patients presented to JUMC.

Patients who are diagnosed acute stroke clinically.

Patients diagnosed with acute stroke by imaging.

4.4.2. Exclusion Criteria

Patients under the age of eighteen

Patients with transient ischemic attack by clinical/radiological criteria

Patients who does not fulfill WHO criteria acute stroke diagnosis.

4.5. Study Variables

4.5.1. Dependent Variables

Stroke outcome

4.5.2. Independent Variables

Comorbidities

GCS

Increased ICP

Aspiration pneumonia

Age

Sex

4.6. Sample Size and Sampling

4.6.1. Sample Size

The Sample size will be determined considering single population proportion formula taking assumption of 95% confidence level, 5% margin of error and proportion (P) 45.2 proportion of patients with stroke who had poor outcome from study done in Shashemene hospital.

$$n = (z_{\alpha/2})^2 (p * (1 - p)) / d^2$$

Where: n is the initial sample size

- $Z_{\alpha/2}$ = is standard score value for 95 % confidence for two sides normal distribution = 1.96
- p = is the prevalence of poor outcome = 0.452
- d = is margin of error = 0.05

$$n_i = 380.61$$

Since the source population is < 10,000, the final sample size will be determined by the formula;

$$n_f = \frac{n_i}{1 + \left[\frac{n_i}{N} \right]}$$

where; n_f is final sample size

n_i is initial sample size

N is source population. Hence, $nf = 198$.

4.7. Sampling Technique and Procedures

A systematic random sampling technique will be used to select medical records from hospitalized acute stroke patient.

4.8. Data Collection Procedures

Data will be collected using a structured questionnaire. The data collection tool includes patient demographics, comorbid conditions/clinical characteristics, management/interventions provided in the hospital, outcome, and other necessary data will be collected using a structured questionnaire tool.

The assessment tool will be pretested on 5% of the sample size in the hospital. Training will be given to both data collectors and supervisors. Questionnaires will be checked for completeness and consistency of the responses. The outcome of the study will be analyzed by using different methods. After the data is collected it will be rechecked by a supervisor, coded, entered into the Epidata version 3.1, it will be transported to SPSS version 26 and finally it will be presented using tables, figures and charts.

4.9. Operational Definitions

1. Alcohol intake: any amount of alcohol consumption.
2. Stroke: rapidly developing clinical signs of focal and/or none focal disturbance of brain function lasting longer than 24 hours unless interrupted by death with no apparent cause other than that of vascular origin” confirmed with CT scan/MRI.
3. Transient ischemic attack: A transient ischemic attack is like a stroke, but the symptoms resolve without causing permanent brain damage within 24 hour.
4. Complete resolution from stroke: is when an individual stroke patient is properly discharged with better health and relieved from clinical complaints as well as none of the potential complications are sufficiently developed.
5. Discharged with a neurologic deficit: a stroke patient with improved signs and symptoms but discharged with stroke complications like physical impairment, cognitive impairment, and communication impairment.
6. Complete resolution from stroke: is when an individual stroke patient is properly discharged with better health and relieved from clinical complaints as well as none of the potential complications are sufficiently developed.
7. Death: when a loss of life occurs because of stroke and its complications.
8. Discharged against medical advice: - is when stroke patients refuse all the medical advice despite their health status and treatment outcomes.
9. Glasgow Coma Scale (GCS): tool that helps to measure the level of consciousness.
10. Loss of consciousness: inability to remain awake and aware of one’s environment.

11. Aphasia: is a language disorder that affects the ability to communicate. It's most often caused by damage in the left side of the brain that control speech and language.
12. Hemiplegia/Hemiparesis: is weakness or the inability to move one side of the body, making it hard to perform day-to-day activities like eating or dressing.
13. Convulsion: is an abnormal body movement involving the extremities with loss of consciousness and usually with up rolling of the eyes and drooling of saliva.

4.10. Ethical Considerations

The study will be approved by the Institutional Review board of Jimma University Medical Center before conduction. An ethical clearance letter will be obtained from the ethical review committee of Jimma University. The objective of the study will be explained to the hospital administrators. Confidentiality of the patient's information contained within their registration books, cards, and referral papers will be kept.

4.11. Dissemination of the Study

The result of the study will be submitted to Jimma University, College of health science, faculty of Medicine, and Department of Emergency Medicine and Critical Care.

SECTION 5 RESULT

The result of the study is presented in three subsections: sociodemographic profile, clinical characteristics of stroke at admission, treatment outcome of stroke and factors associated with outcome of patients with stroke. Data to determine the clinical characteristics and treatment outcome of stroke patients was obtained from chart review of a total 199 patient chart which gives a response rate of 100%.

5.1 Sociodemographic Characteristics

The sociodemographic data revealed that the mean age of the study participant was 55.90 ± 14.833 years, 133(33.2%) of the participants were males, 156 (78.4%) were Oromia region, 120 (60.3%) were urban residents. Thirty (15.1%) and 12(6%) of them are from Southwest Ethiopia and Gambella regions respectively. Concerning their gender 133(66.8) were male and 66(33.2%) were female. (Table 1)

Table 1 Sociodemographic profile of stroke patients managed in JUMC, Jimma, Ethiopia 2023. (n=198)

Variable		Frequency	Percent
Sex	Male	133	66.8
	Female	66	33.2
	Total	199	100.0
Place of residence	urban	120	60.3
	rural	79	39.7
	Total	199	100.0
Region	Oromia	156	78.4
	Southwest Ethiopia	30	15.1
	Gambella	12	6.0
	others	1	.5
	Total	199	100.0

5.2 Clinical Characteristics

Regarding their triage category, 79(39.7%) of them were green zone followed by yellow 58(29.1%) with the least 25(12.6%) of were red zone patients. Regarding time of arrival to illness onset all of the study patient come after 4.5 hours of illness onset.

Concerning vital signs parameter at presentation, result found that the mean heart rate, respiratory rate, temperature and mean arterial pressure of 88.5, 23.4, 36.6 and 140.3 respectively.

Concerning chief compliant of respondents, Half 100(50.3%) of respondents were presented with compliant of hemiparesis followed by aphasia 55(27.6%), loss of consciousness 36(18.1%) and abnormal body movement 3(1.5%). All patients had brain image particularly head CT-scan, of them 112(56.3%) showed ischemic pattern and 84(42.2%) hemorrhagic pattern and only 3(1.5%) had others imaging result.

Regarding Comorbidity, One hundred eighty five (93%) had associated comorbidity where more than three-fourth (78%) had Hypertension, 90(45.2%) of structural heart disease followed by atrial fibrillation and diabetes mellitus which is 57(28.6%) and 13(6.5%) respectively.

Table 2 triage categories of stroke patients managed in JUMC, Jimma Ethiopia, 2023

Triage category	red	25	12.6
	yellow	58	29.1
	green	79	39.7
	orange	37	18.6
	Total	199	100.0

Table 3. Clinical characteristics of stroke patients managed in JUMC, Jimma, Ethiopia (n=198)

Variable		Frequency	Percent
Chief complaint	abnormal body movement	3	1.5
	Aphasia	55	27.6
	Heparesis/plegia	100	50.3
	Loss of consciousness	36	18.1
	Other	5	2.5
	Total	199	100.0
Brain image	Yes	195	98.0
	No	4	2.0
	Total	199	100.0
Imaging result	ischemic pattern	112	56.3
	hemorrhagic pattern	84	42.2
	Other(specify)	3	1.5
	Total	199	100.0
Comorbidity	Yes	185	93.0
	No	14	7.0
	Total	199	100.0
Patient status at discharge	improved	131	65.8
	same as admission	15	7.5
	deteriorated	10	5.0
	other(specify)	43	21.6
	Total	199	100.0

With respect to treatment and management provided, all respondents received treatment in the hospital, where majority 162(81.4%) of them took anti-hypertensive agents, 127(63.8%) anti-dyslipidemics and 72(36.2%) had medications that decrease elevated ICP. Of these 30.75% received medications to decrease elevated ICP followed by 25.57% of anti-dyslipidemics only, 22.26% antihypertensives only and 21.42% had taken other unspecified medications.

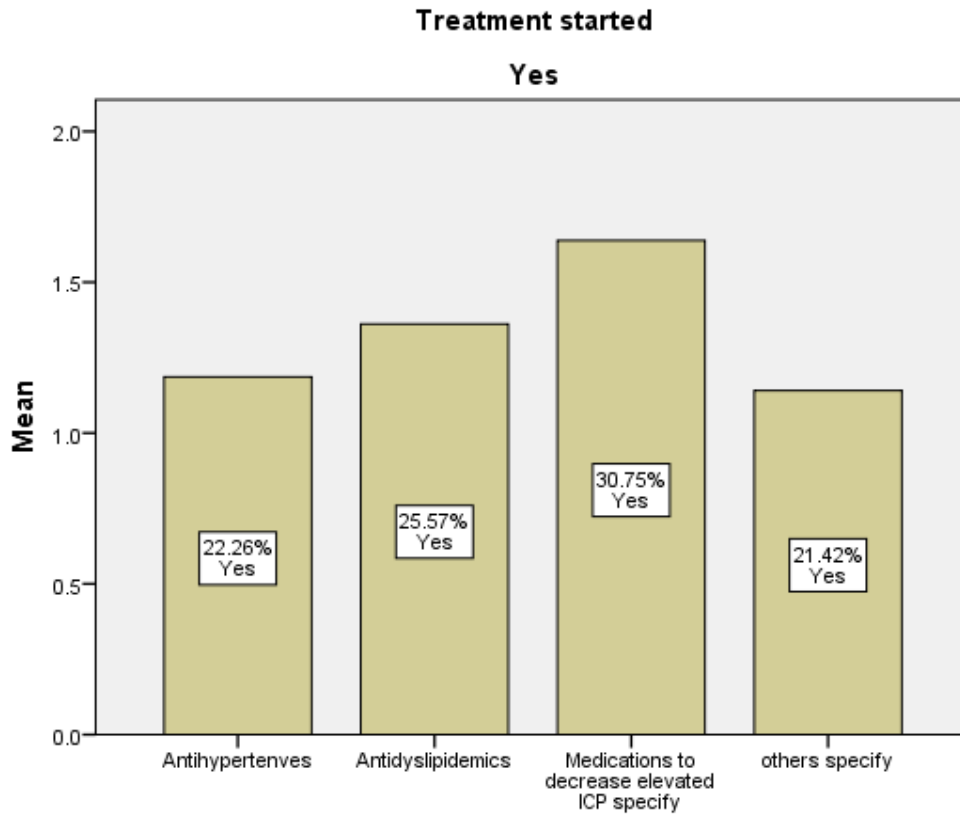


Figure1. Management started and type of medication given in JUMC, Jimma, Ethiopia, 2023. (n=198)

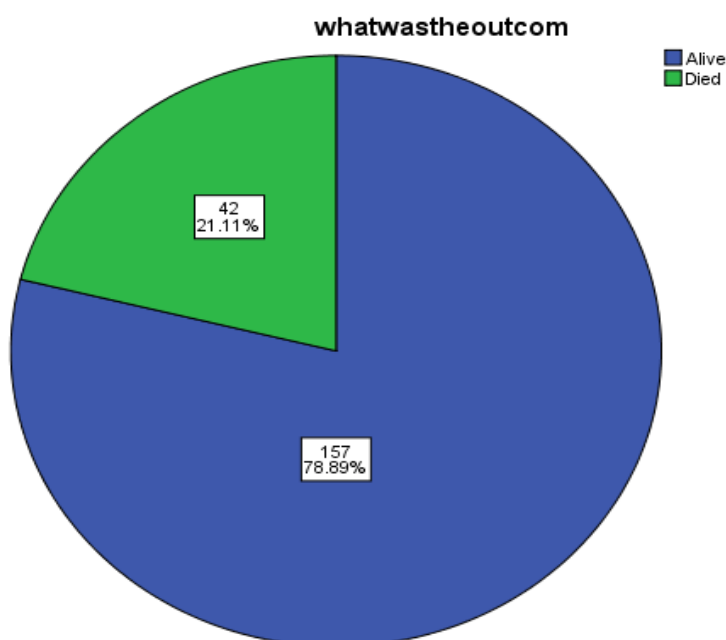
5.3 Management outcome of stroke patients

Concerning patient status during discharge, from a total of 198 study participants, more than half (65.8%) were discharged with improvement whereas 16(7.5%) of respondents discharged with the same condition as admission, 10(5%) were deteriorated and 42(21.6%) were death.

Regarding participants final outcome, nearly three-fourth 157(78.89%) of patients were alive and the rest 42(21.11%) were died. The leading cause of death was elevated intracranial

pressure(ICP) 20(10.1%) followed by 18((9%) of Multi Organ Failure (MOF) and only 4(2%) of aspiration pneumonia.

Figure2. Outcome of stroke among patients managed in JUMC, Jimma, Ethiopia. (n=198)



5.4 Factors Associated with Treatment Outcome of Stroke Patients

The bivariate binary logistic analysis was conducted and the following variables were made candidates for the multivariate regression. Triage category, imaging result, vital sign parameters such as mean arterial pressure, pulse rate, respiratory rate, antidyslipidemics agents, medications that decrease elevated intra cranial pressure and associated comorbidities such as diabetes mellitus are factors that have p-value less than 0.05.

However, an adjusted multivariate logistic analysis revealed that triage category, vital sign at presentation, medications that decrease elevated ICP and associated comorbidities (diabetes mellitus) have statistically significant associations with treatment outcome of stroke patients at a p-value less than 0.05. (Table 4)

Therefore, based on finding from multivariate logistic regression analysis, the odds patients with triage category of yellow zone have 7.519 times more chance of treatment outcome of alive as compared to those patients with other triage category. (AOR. = 7.519; CI: 2.173-26.024; P= 0 .001) and also the odds of triage category at green zone have 6.848 times more likely to have

alive outcome. (AOR. = 6.848; CI: 2.138-21.939; P= 0 .001). Regarding vital signs parameter during admission, the odds of patients with normal range of respiratory rate have 0.901 times or 90.1% more chance to be alive from outcome of stroke treatment as compared to other triage category like red and orange zone. (AOR. = 0.980; CI: 0.954-1.008; P= 0 .016)

Concerning treatment given during admission time, the odds of patients who had received medications to decrease elevated intra cranial pressure have 9.4 times more chance to be alive as compared to those patients who have taken other category of medications. (AOR. = 9.400; CI: 2.200-40.155; P= 0 .002)

In addition, with respect to the presence of associated comorbidities, the odds of patients with diabetes mellitus were 7.311 times more chance of alive as compared to other associated comorbidities such as, hypertension, structural heart disease and atrial fibrillation. (AOR. = 7.311; CI: 1.529-34.962; P= 0 .013)

Table 4. Multiple-logistic regression analysis of associated factors with treatment outcome among stroke patients managed in JUMC, Jimma, Ethiopia, 2023. (n=198)

Variables	COR: 95% C.I.	AOR: 95% C.I.	P-value
Yellow Zone	0.169 (.413-3.218,)	7.519 (2.173-26.024)	0.001
Green zone	0.213 (0.084-0.540)	6.848 (2.138-21.939)	0.001
Respiratory rate	1.155 (1.049-1.271)	0.901 (0.829-0.980)	0.016
Dugs to decrease elevated ICP	0.169 (0.080-0.355)	9.400(2.200-40.155)	0.002
Diabetes Mellitus	5.872 (0.63-0.628)	7.311(1.529-34.962)	0.013

SECTION 6 DISCUSSION

Most of patients in this study are from Oromia region 156 (78.4%) and 120 (60%) are urban residents. The mean age of the study participant was 55.90 ± 14.833 years. Concerning their gender 133 (66.8) were male and 66 (33.2%) were female. This is perhaps urban and male gender received more management in this study.

The overall clinical characteristics and management outcome of stroke patients in this study is 65.8%) were discharged with improvement whereas 7.5% of participants discharged with the same condition as admission, 5% were deteriorated and 21.6% were dead.

Factors associated significantly with clinical outcome were triage category, vital sign at presentation, medications that decrease elevated ICP and associated comorbidities (such as diabetes mellitus). Patients with more severe triage categories and those who received multiple medications, have poorer outcomes in this study.

The odds patients with triage category of yellow zone have 7.519 times more chance of treatment outcome of alive as compared to those patients with other triage category. (AOR. = 7.519; CI: 2.173-26.024; P= 0 .001). The odds of triage category at green zone have 6.848 times more likely to have alive outcome. (AOR. = 6.848; CI: 2.138-21.939; P= 0 .001). This is because more severe triage categories will obviously have poorer outcome.

The odds of patients who had received medications to decrease elevated intra cranial pressure have 9.4 times more chance to be alive as compared to those patients who have taken other category of medications. (AOR. = 9.400; CI: 2.200-40.155; P= 0 .002). This indicates the fact that early diagnosis and management of complications has better outcome for stroke patients.

In addition, with respect to the presence of associated comorbidities, the odds of patients with diabetes mellitus were 7.311 times more chance of alive as compared to other associated comorbidities such as, hypertension, structural heart disease and atrial fibrillation. (AOR. = 7.311; CI: 1.529-34.962; P= 0 .013)

In this study, generally in hospital mortality in the study population is better than the sub-Saharan mortality which is 22% in 2021. This is perhaps due to recent ubiquitous and wide spread adoption of imaging modalities (CT) for all stroke patients.

When the outcomes in this study compared with previous study (2016G.C) in this hospital, there is slight increment of in hospital mortality (21.6% vs 18.18%), higher improvement status at discharge (68.5% vs 36.82%), and decreased discharge with complications/sequel (12.55% vs 45%)¹. These improvement can be attributed to increasing brain imaging access and opening and good functioning stroke unit recently.

SECTION 7 CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

The management outcome stroke patients generally have still high (21.6%) mortality and complication rates. This is due to many factors like late appearance of patients from symptom onset (100% participants arrived greater than 4.5 hours after symptom onset) which hinders institution of important medications like thrombolytics. Unlike many sub-Saharan and Ethiopian medical facilities universal provision of imaging modalities for stroke patients has helped early identification of stroke types and appropriate management and subsequent improved outcome.

7.2 RECOMMENDATION

7.2.1 Jimma University Medical Center

- Would be better to create awareness about stroke and its time sensitive management modalities for the community and EMS providers.
- Would provide regular training for stroke care providers.
- Would improve stroke unite with improved neurocritical care devices and specially trained nurses.
- Hospital need to prepare locally applicable guidelines and protocols for stoke unite and emergency care area.

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APPENDIXES

Appendix 1: Questionnaire

Jimma University Medical College Department of Emergency Medicine and Critical Care questionnaires for the assessment of clinical characteristics and outcome of stroke patients managed at JUMC Emergency Critical Care Department.

Data collection Check List for Stroke Patients

I. Demographic characteristics

1. MRN.....
2. Age in yeas....
3. Sex: a. Male b. Female
4. Marital status: a. Married b. Single c. Divorced d. Widowed
5. Educational level: a. Have formal education b. No formal education
6. Place of residence: a. Urban b. Rural
7. Region of residence a. Oromia B. Gambella c. Southwest Ethiopia d SNNP e. Others

II. Clinical characteristics and comorbid conditions

1. Duration of time to arrive ED after symptom onset; a. Less than 4.5 hour b. Greater than 4.5hour
2. Triage category; a. Red b. Orange c. Yellow d Green
3. Vital sign at ED presentation; BP =_____HR =_____RR =_____ Spo2 =

4. What was chief compliant at presentation? a. Hemiparesis/plegia b. Aphasia c. Loss of consciousness d. Abnormal body movement
5. Has the brain imaging at ED? a. Yes b. No
6. If yes to question no. '5' what type of brain imaging provided? a. CT scan b. MRI c. Other /specify
7. If yes to question no. '5' what was the imaging result? a. Ischemic stroke b. Hemorrhagic stroke c. subarachnoid hemorrhage d. Other/specify

III. Treatment provided and outcome in the hospital

1. What type of management was provided? a. Antihypertensives/specify b. Antilipidemics/specify c. Medications to decrease elevated ICP/specify d. Others /specify
2. What was the outcome? a. Discharged b. Died c. Referred d. left against medical advice
3. If question 2 is answered 'b' what was cause of death? a. increased ICP b. Aspiration pneumonia c. Multiorgan failure d. Other/specify
4. If the answer for question number 2 is 'a' what was the status at discharge ?a. cured b. improved c. deteriorated d. other specify

5. What associated comorbidities were there? a. Hypertension b, Diabetes c. Dyslipidemia
d. atrial fibrillation e. Others specify

Appendix 2

Assurance of principal investigator

I, the undersigned, agree to accept all responsibilities for the scientific and ethical conduct of this research project. I will provide required progress/progresses report as per terms and conditions of the faculty of public health in effect at the time of grant is forwarded as the result of this application. I will communicate timely to my advisor all stakeholders involved in the study including any source of funding for this research.

Name of the student: Dr. Addisu Birlie (EMCCR3)

Signature:  _____

Date: _____

Approval of the Advisor

Name of the advisor: Dr. Abreham Namrud (ECCM, Asst. Professor)

Signature _____

Date _____