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PREDICTORS OF ATRIAL FIBRILLATION AMONG PATIENTS WITH ACUTE ISCHEMIC STROKE ATTENDING REGIONAL REFERRAL HOSPITALS IN DAR ES SALAAM

By

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CERTIFICATION

It is hereby certified that the undersigned has read and hereby recommends acceptance by Kairuki University, a dissertation titled: PREDICTORS OF ATRIAL FIBRILLATION AMONG PATIENTS WITH ACUTE ISCHEMIC STROKE ATTENDING REGIONAL REFERRAL HOSPITALS IN DAR-ES-SALAAM, in partial fulfillment of the requirements for the degree of Master of Medicine (Internal Medicine).

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DEDICATION

This dissertation is dedicated to my beloved family.

To my parents, for being my guiding light and lifelong inspiration.

To my husband, for your constant encouragement, understanding, and belief in me.

To my siblings, for your love and support throughout this journey.

Your sacrifices, prayers, and presence have been my greatest strength throughout this journey.

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ABSTRACT

Background: Atrial fibrillation (AF) is a sustained cardiac arrhythmia and a major independent risk factor for ischemic stroke, often associated with increased stroke severity, poor functional outcomes, and higher mortality. In Tanzania, limited data exist on the prevalence and predictors of AF among acute ischemic stroke (AIS) patients, particularly in Dar-es-salaam.

Objective: To determine the predictors for AF among patients with acute AIS attending Regional Referral Hospitals in Dar es Salaam, Tanzania.

Methodology: A hospital-based cross-sectional analytical study was conducted from October 2024 to July 2025 at three regional referral hospitals. Consecutive adult patients (≥18 years) with CT-confirmed AIS within 7 days of onset were enrolled. Data on sociodemographic characteristics, clinical history, and stroke severity using the National Institutes of Health Stroke Scale (NIHSS) were collected. A standard 12-lead ECG was performed on all participants to detect AF. Associations between independent variables and AF were assessed using generalized linear models with Poisson distribution and robust variance estimation.

Results: A total of 119 AIS patients were included (mean age 64 years; 58% female). The prevalence of AF was 16% (n=19). In multivariable analysis, age >60 years was a strong independent predictor of AF (aPR = 22.3, 95% CI: 3.1–161.0, p=0.002), and a higher level of education was protective for AF (aPR 0.07, 95% CI: 0.01-0.32, p=0.0007). Hypertension was present in all AF patients (100%), while the combination of hypertension and heart failure markedly increased AF risk (aPR = 7.53, 95% CI: 2.69–21.08, p=0.0001). Poor adherence to medications also increased the risk of AF. Patients with AF presented with significantly higher NIHSS scores, indicating greater stroke severity.

Conclusion: AF was present in approximately one in six AIS patients, with advanced age, low education level, hypertension, comorbid heart failure and poor adherence to medication being significant predictors. AF was also associated with more severe strokes. Routine AF screening, especially among elderly and hypertensive stroke patients, and early initiation of appropriate secondary prevention strategies are warranted in Tanzania's hospitals.

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ABBREVIATIONS

AAD Antiarrhythmic drugs

ACE Angiotensin-converting enzyme

ACEi Angiotensin-converting enzyme inhibitor

AF Atrial fibrillation

AF-CARE- Atrial fibrillation—[C] Comorbidity and risk factor management, [A] Avoid stroke and thromboembolism, [R] Reduce symptoms by rate and rhythm control, [E] Evaluation and dynamic reassessment

CHA2DS2-VASc- Congestive heart failure, hypertension, age ≥75 years (2 points), diabetes mellitus, prior stroke or TIA or thromboembolism (2 points), vascular disease, age 65–74 years, sex category

CRT Cardiac resynchronization therapy

CT Computed tomography

CTA Computed tomography angiography

DAPT Dual antiplatelet therapy

DOAC Direct oral anticoagulant

ECG Electrocardiogram

ECV Electrical cardioversion

EHRA European Heart Rhythm Association

HbA1c Hemoglobin A1c (glycated or glycosylated hemoglobin)

HF	Heart failure
LAA	Left atrial appendage
LAAO	Left atrial appendage occlusion
NYHA	New York Heart Association
OAC	Oral anticoagulant(s)
OR	Odds ratio
OSA	Obstructive sleep apnea
PAD	Peripheral arterial disease
PCI	Percutaneous intervention
RR	Relative risk
TE	Thromboembolism
TIA	Transient ischemic attack
TOE	Transesophageal echocardiography
TSH	Thyroid-stimulating hormone
TTE	Transthoracic echocardiogram
TTR	Time in therapeutic range
UFH	Unfractionated heparin
VKA	Vitamin K antagonist

OPERATIONAL DEFINITIONS

Atrial fibrillation is a supraventricular arrhythmia characterized by uncoordinated atrial activation, which results in a loss of effective atrial contraction seen on ECG as the absence of discernible p waves and irregular activation of the ventricles.[1]

Acute ischemic stroke is a critical medical emergency characterized by the sudden onset of focal neurological deficits within a vascular territory stemming from underlying thrombotic or embolic cerebrovascular pathologies.[2]

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

ATRIAL FIBRILLATION

Atrial fibrillation (AF) is a known supraventricular arrhythmia characterized by uncoordinated atrial activation, which results in a loss of effective atrial contraction[1]. AF can b seen on the surface electrocardiogram (ECG) by the absence of discernible and regular P waves due to irregular activation of the ventricles. This results in no specific pattern to RR intervals, in the absence of an atrioventricular block[1]

EPIDEMIOLOGY OF ATRIAL FIBRILLATION

The incidence of atrial fibrillation (AF) is projected to double in the forthcoming decades due to an aging population, increased comorbidities, enhanced awareness, and novel detection technologies.[1] AF exhibits high prevalence, with a lifetime risk of 1 in 3-5 for individuals over 45 years of age.

The Global Burden of Disease (GBD) 2019 study revealed that over 59 million individuals had AF in 2019, from 33.5 million in 2010.[2] Projections indicate that AF prevalence will reach 15.9 million in America by 2050 and 17.9 million in Europe by 2060[2]. However, the GBD study demonstrated age-standardized prevalence remained constant between 1990 and 2019, suggesting that increased life expectancy globally is driving the rising prevalence.[3]

In contrast, the Framingham Heart Study reported a fourfold rise in the age-adjusted prevalence of AF over a 50-year follow-up. The incidence of AF also differs across racial and ethnic groups, with white individuals shown to be at a higher risk compared to Black, Asian, or Hispanic populationss[3]. AF prevalence and incidence also occur more frequently

in men than in women. These disparities may be attributed to sex-specific differences in AF risk factors[3].

Atrial fibrillation (AF) is linked to a higher risk of death.[1] In 2017 alone, it was responsible for over 250,000 worldwide, with an age-standardized mortality rate of 4.0 per 100,000 people.[4] The most frequent cause of death in patients with AF is heart failure. [5] Even in the absence of major thromboembolic risk factors, it still carries a considerable mortality burden, about 15.5 per 1000 person-years.[5] Also, Patients with OAC-related bleeding have been seen to have higher mortality.

PATHOPHYSIOLOGY OF ATRIAL FIBRILLATION (AF)

Atrial fibrillation develops when changes occur in the structure and function of the atria. These changes—such as electrical disturbances and scarring (fibrosis) make it easier for AF to start and harder for it to stop, allowing the condition to gradually progress over time[1].

Ectopic activity in the pulmonary veins is critically associated with AF onset. Several factors predispose the pulmonary veins to generate ectopic activity, including cardiovascular risk factors, and both ion-channel and structural abnormalities[6]

Compared to atrial cells, pulmonary veins exhibit smaller L-type Ca2+ currents (ICa,L), inward-rectifier K+ currents (IK1), and larger delayed-rectifier K+ currents. These electrophysiological properties shorten the action potential duration, making the pulmonary veins more prone to re-entry and to generating spontaneous ectopic beats through delayed afterdepolarizations. [7]

In addition, the pulmonary veins are positioned adjacent to the major cardiac autonomic ganglia, which influence atrial electrical activity and, further increase susceptibility to AF [8]. Fibrous tissue content is higher in patients with AF than in those without AF, and

correlates with adverse clinical outcomes[8]. Spontaneous atrial ectopic activity also appears to be a significant trigger for re-entry[8] .

CLINICAL FEATURES OF ATRIAL FIBRILLATION (AF)

Symptoms related to episodes of Atrial Fibrillation (AF) are variable and broad; 90% of patients with AF have symptoms of variable severity[1]. Even in symptomatic patients, some AF episodes may remain asymptomatic[1] The occurance of symptoms is not related to the incidence of stroke or systemic embolism.[2]

Cardiac-specific AF symptoms, such as palpitations, shortness of breath, chest pain, dizziness, and syncope are less frequent than non-specific symptoms, such as fatigue, anxiety, and depression but they significantly affect their quality of life.[9] The literature suggests that women with AF appear to be more symptomatic and have poorer quality of life. [9]

AF-related symptoms are evaluated using the modified European Heart Rhythm Association (mEHRA) classification, which works in a way similar to the New York Heart Association (NYHA) functional classification for heart failure. This system helps reflect a patient's quality of life, disease progression, and related clinical outcomes.[10]

CLASSIFICATION OF ATRIAL FIBRILLATION (AF)

First diagnosed Atrial Fibrillation is the one identified for the first time, irrespective of symptoms, pattern, or duration [1]

Paroxysmal Atrial Fibrillation Resolves on its own within 7 days or after an intervention [1]

Persistent Atrial Fibrillation describes episodes of AF that do not stop on their own. By definition, if the arrhythmia lasts longer than 7 days, it is classified as persistent [1].

Long-standing persistent Atrial Fibrillation is defined as continuous AF lasting for 12 months or more, in which rhythm control remains a possible treatment approach.[1]

Permanent Atrial Fibrillation is when no further efforts to restore normal sinus rhythm are intended, following a shared decision made between the patient and the physician[1]

DIAGNOSIS OF ATRIAL FIBRILLATION (AF)

Accurate diagnosis requires a thorough review of the patient's medical history to identify risk factors and comorbid conditions that need management. A 12-lead ECG is essential for all patients with atrial fibrillation, as it confirms the rhythm, measures ventricular rate, and helps detect structural heart disease, conduction abnormalities, or ischemia[11].

Laboratory tests—including kidney function, serum electrolytes, liver function, complete blood count, blood glucose or HbA1c, and thyroid function—should be performed to identify any coexisting conditions that could worsen atrial fibrillation or raise the risk of bleeding or thromboembolic events.[12] A transthoracic echocardiogram (TTE) will inform management decisions, or in patients exhibiting a change in cardiovascular signs or symptoms.

In certain patients, additional tests may be considered. Ambulatory ECG monitoring can help determine the overall burden of AF and how well the ventricular rate is controlled. An exercise ECG may also be performed to assess rate control during physical activity or to evaluate the impact of class IC antiarrhythmic medications[13]

Additional investigations may be required to guide management in selected patients. Blood tests such as NT-proBNP and troponin can provide valuable information on cardiovascular status and help refine stroke or bleeding risk assessment. Transesophageal echocardiography is particularly useful for detecting left atrial thrombus and evaluating

valvular disease. In cases where coronary artery disease is suspected, coronary CT angiography or other forms of ischemia imaging can be performed.[13] Cardiac MRI (CMR) can be used to assess atrial and ventricular cardiomyopathies and to guide planning for interventional procedures. In addition, brain imaging together with cognitive function assessment may be performed to detect cerebrovascular disease and to evaluate the risk of dementia.[13]

The diagnosis of asymptomatic episodes in stroke patients is more complex; therefore, various monitoring strategies have been implemented to improve atrial fibrillation detection. Guidelines recommend the use of insertable cardiac event recorders, 72-hour Holter monitoring, and prolonged cardiac rhythm monitoring (PCRM).

MANAGEMENT OF ATRIAL FIBRILLATION (AF)

The 2024 European Society of Cardiology (ESC) guidelines on atrial fibrillation introduced an updated management approach through the AF-CARE framework. This model builds on earlier strategies and brings them together into four key pillars: managing comorbidities and risk factors (C), preventing stroke and thromboembolism (A), controlling symptoms with rate or rhythm strategies (R), and ongoing evaluation with dynamic reassessment (E).[1]

C- Comorbidities and risk factors for Atrial Fibrillation (AF) management

Effective management of atrial fibrillation involves addressing comorbid conditions like hypertension, heart failure, diabetes, obesity, and sleep apnea, alongside lifestyle changes that promote physical activity and limit alcohol intake. Recognizing and treating these comorbidities and related risk factors is a key part of comprehensive AF care.[1]

A- Avoid stroke and thromboembolism

If atrial fibrillation is left untreated, the risk of ischemic stroke rises fivefold, and about one in every five strokes is linked to AF. Consequently, the standard practice is to

prescribe oral anticoagulants to all eligible patients, except those at low risk of stroke or thromboembolism. The effectiveness of oral anticoagulation in preventing ischemic stroke in AF patients is well proven, whereas antiplatelet therapy alone such as aspirin or aspirin combined with clopidogrel is not recommended for stroke prevention.[1]

Percutaneous left atrial appendage occlusion (LAAO) is a device-based approach designed to reduce the risk of ischemic stroke in patients with atrial fibrillation. The Amulet occluder is an alternative LAAO device that has been shown to be as safe and effective as the Watchman device in preventing thromboembolic events. Additionally, surgical occlusion or removal of the left atrial appendage during cardiac surgery can also help lower stroke risk in AF patients.[1]

R- Reduce symptoms of Atrial Fibrillation (AF) by rate and rhythm control

Rate control is recommended as an initial treatment in the acute phase, either alongside rhythm control therapies or on its own to manage heart rate and alleviate symptoms. In some cases, atrioventricular (AV) node ablation followed by pacemaker implantation—known as the "ablate and pace" approach—can help reduce and stabilize heart rate in patients with atrial fibrillation. For patients with severe symptoms, permanent AF, and at least one prior hospitalization for heart failure, AV node ablation combined with cardiac resynchronization therapy (CRT) should be considered.[1]

Rhythm control involves treatments aimed at restoring and keeping the heart in normal sinus rhythm. These approaches include cardioversion, antiarrhythmic medications, catheter-based ablation, endoscopic or hybrid ablation techniques, and open-heart surgical procedures. Urgent electrical cardioversion is advised for patients experiencing acute or worsening hemodynamic instability believed to be caused by atrial fibrillation.[1]

D- Evaluation and dynamic reassessment of Atrial Fibrillation (AF)

This includes all the actions healthcare providers and patients take to assess related comorbidities and risk factors, guide therapy, and continuously evaluate treatment to ensure it remains suitable for the individual patient.[1]

A patient's medical history and test results should be periodically reviewed to account for the evolving nature of comorbidities and risk factors. These evaluations should be tailored to the individual and adapt to any changes in their clinical condition. Typically, a follow-up review is recommended six months after the initial assessment, and at least once a year thereafter by a healthcare professional in primary or secondary care.[1]

ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS

BURDEN OF ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS.

Atrial fibrillation (AF) has a major impact on acute ischemic stroke, as it not only increases the severity of the stroke but also contributes to poorer outcomes. Recent studies suggest that AF is present in approximately 15% to 32.7% of patients with acute ischemic stroke, with evidence pointing to a rising trend over time.[3]

The discrepancies in atrial fibrillation (AF) prevalence may be explained by disparities in the studied populations, methods of detection, and periods examined. Implementing various monitoring techniques for early AF detection is crucial in managing acute ischemic stroke patients and developing effective secondary prevention strategies.[1]

EFFECTS OF ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS

Patients who experience stroke and have atrial fibrillation (AF) have considerably higher mortality and disability rates than those without[14]. In one study, it was found that the fatality rate for AF patients one-month post-stroke was 27% compared to 14% for non-AF patients.[3] This gap increased further at six months, with rates reaching 40% and 20%, respectively; even after adjusting for other variables, the risk of death associated with AF remained significant at both 1 month and 6 months following stroke.[3]

in patients who have experienced a stroke, factors like advanced age, the severity of the stroke, and the presence of heart failure are closely associated with a worse long-term prognosis in those with atrial fibrillation.[15]. Moreover, the timing of hospital admission may affect outcomes, with AF patients admitted on weekends for stroke facing the highest risks of readmission, death from cardiovascular causes, and overall mortality [15].

PATHOPHYSIOLOGY OF ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS

Atrial fibrillation (AF) plays a significant role in the pathophysiology of acute ischemic stroke and contributes to both its occurrence and severity[5]. The main mechanism is the formation of a thrombus in the left atrium due to sluggish blood flow. This clot can then travel to the brain, resulting in an ischemic stroke[16]. This thrombogenic state predisposes patients with AF to acute embolic strokes[17]

In patients with atrial fibrillation, acute ischemic stroke is linked to changes in cerebral blood flow dynamics, which may contribute to the severity and progression of neurological injury [5]. Research has demonstrated that patients with AF exhibit significantly reduced mean blood flow velocities in the middle cerebral arteries of both the affected and unaffected hemispheres when compared to those with normal sinus rhythm[5]. This diminished cerebral perfusion may contribute to a more severe clinical course and poorer outcomes following stroke in patients with atrial fibrillation[5]

The association between Atrial Fibrillation (AF) and acute ischemic stroke is not one-sided; recent studies have indicated that acute ischemic stroke may trigger AF through neurological pathways [5]. An investigation comparing patients with newly identified AF, previously known AF, and normal heart rhythm revealed that those recently diagnosed with AF exhibit a higher rate of insular involvement; This indicates that injury to the

autonomic nervous system may contribute to the development of atrial fibrillation after a stroke[5].

This complex pathophysiology of acute ischemic stroke is further complicated by its systemic effects[5]. These include suppression of the peripheral immune system, overactivation of autonomic and neuroendocrine pathways, and impairment of motor pathways, leading to dysfunction across multiple organ systems[5]. These widespread effects may intensify the influence of AF on stroke severity and outcomes.

Recent studies focusing on biomarkers have identified several factors that may contribute to stroke risk in patients with AF.[6] These factors are associated with various physiological processes, including fibrosis and remodeling, cardiac dysfunction, calcification of blood vessels, metabolic processes, and integrity and ischemia of mucosal tissues[6].

Therefore, the development of atrial fibrillation in the context of acute ischemic stroke reflects a complex interaction of factors, including thromboembolism, disruptions in cerebral blood flow, possible neurogenic triggers of AF, and the broader systemic consequences of the stroke[18]. This multifaceted relationship contributes to the increased severity and poorer outcomes observed in ischemic strokes associated with AF[18].

PREDICTORS OF ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS

In patients who have experienced a stroke, atrial fibrillation (AF) can be anticipated using a combination of clinical, imaging, and laboratory markers. Variables such as advanced age, underlying cardiovascular risk factors, and echocardiographic findings can help identify individuals who might benefit from extended cardiac monitoring to detect AF after a stroke or transient ischemic attack (TIA) .[19]

Age is consistently identified as a robust predictor of AF in patients[19,20] . Additional clinical factors linked to increased AF risk include hypertension, diabetes mellitus, congestive heart failure, and previous stroke or TIA.[19] The CHA2DS2-VASc score, which incorporates these risk factors, has demonstrated a good predictive accuracy for stroke risk in patients with AF.[21]

Electrocardiogram (ECG) findings, particularly left atrial enlargement, have been consistently reported as predictors.[19] The occurrence of premature atrial contractions on admission ECG and QRS duration have also been recognized as potential risk indicators.[19]

However, some studies have yielded conflicting results regarding certain predictors. For example, while most studies suggest female sex as an independent predictor of stroke risk,[4,19,20] one study found that a large left atrial diameter correlated with AF detection only in males.

Furthermore, although low thyroid-stimulating hormone (TSH) levels are typically associated with AF, one study found that higher TSH levels were predictive of AF in cryptogenic stroke patients.[22,23]

MANAGEMENT OF ATRIAL FIBRILLATION (AF) IN STROKE PATIENTS

Managing atrial fibrillation in patients with ischemic stroke requires a careful balance, particularly regarding anticoagulation therapy. While anticoagulants are essential for preventing recurrent strokes, they also carry an increased risk of systemic bleeding, including potentially serious intracerebral hemorrhage.[23–25]

In the acute phase of an ischemic stroke, managing anticoagulation requires careful judgment and close attention to balance the benefits and risks, it does not modify the acute stroke treatment, but it presents unique challenges in managing anticoagulation during the hyperacute and acute phases[24]

For patients already receiving anticoagulation therapy who develop ischemic stroke, careful evaluation is necessary to determine possible causes, including ensuring appropriate dosing and good adherence to treatment.[25]

Regular assessment of renal function and bleeding risk using tools like the HAS-BLED score is essential for optimal management[24]

STRATEGIES FOR PREVENTING STROKE IN PATIENTS WITH ATRIAL FIBRILLATION (AF)

Atrial fibrillation (AF) significantly increases the risk of thromboembolism.[1] Without proper treatment and depending on individual patient factors, AF can elevate the likelihood of ischemic stroke by five times, with AF being linked to 20% of all strokes.

The standard protocol involves administering oral anticoagulation (OAC) to all eligible individuals, excluding those with a minimal risk of initial stroke or thromboembolism. Oral anticoagulants (OAC) have been shown to be highly effective in reducing the risk of ischemic stroke in patients with atrial fibrillation.[26]

For stroke prevention in AF, the use of antiplatelet medications alone (such as aspirin or a combination of aspirin and clopidogrel) is not advised.[26]

Despite the significant reduction in ischemic stroke risk provided by OAC for AF patients, some risk persists.[27] Notably, one-third of AF patients who experience an ischemic stroke are already undergoing anticoagulation treatment, with various underlying causes.[27]

1.2 PROBLEM STATEMENT

Atrial fibrillation (AF) is a cardiac arrhythmia that significantly increases the risk of ischemic stroke. Studies have shown that AF is present in a substantial proportion of patients with ischemic stroke, ranging from 18.1% to 33.4% [28]. The prevalence of AF among stroke patients has been increasing over time, with one study reporting a 1.4-fold increase over 12 years [29].

Furthermore, Atrial Fibrillation (AF) is often undiagnosed before the occurrence of a stroke. In one study, only 5% of patients had known AF before their stroke, while 32.4% were diagnosed with AF after the event [30] .This highlights the importance of thorough screening and identifying predictors of AF in this population, including advanced age, female gender, hypertension, Diabetes Mellitus, chronic kidney disease, congestive heart failure, and stroke severity [31]

Understanding the predictors of Atrial Fibrillation can help clinicians identify high-risk patients and implement appropriate preventive strategies to reduce the burden of stroke associated with AF. However, few studies have been conducted in our country to determine how frequently patients with ischemic stroke have atrial fibrillation, the factors that predict its development, and the effects it has on patient outcomes.

1.3 RATIONALE OF THE STUDY

Atrial fibrillation (AF) is the most prevalent sustained cardiac arrhythmia and a major independent risk factor for ischemic stroke. It increases the risk of stroke by nearly fivefold and is associated with higher morbidity, greater stroke severity, and increased mortality. In addition, strokes related to AF tend to be more disabling, have larger infarct volumes, and are associated with poorer functional outcomes compared to strokes of other etiologies.

In sub-Saharan Africa (SSA), including Tanzania, the prevalence of AF is rising, driven by population aging and an increasing burden of hypertension, diabetes, and heart failure. Despite this, AF remains under-diagnosed due to limited access to routine ECG screening, inadequate stroke surveillance systems, and low awareness among clinicians and patients. As a result, many individuals first present with AF during or after an ischemic stroke, when preventive opportunities have already been missed.

Timely identification of AF in acute ischemic stroke (AIS) patients is critical because it directly influences management decisions, including the initiation of anti-coagulation therapy for secondary prevention. However, the prevalence and predictors of AF among Tanzanian AIS patients are not well defined, and evidence on population-specific risk factors is scarce.

Understanding the sociodemographic and clinical predictors of AF in AIS can guide the development of cost-effective screening strategies, improve diagnostic yield, and support individualized management approaches. Moreover, it can inform local and national stroke prevention policies by identifying high-risk groups who would benefit most from targeted cardiac evaluation and secondary prophylaxis.

Therefore, this study was designed to determine the prevalence and predictors of atrial fibrillation among patients with acute ischemic stroke attending regional referral hospitals in Dar-es-Salaam, Tanzania. The findings are expected to contribute essential epidemiological data, enhance early AF detection in stroke care, and inform integrated cardiovascular disease management within resource-limited settings.

1.4 RESEARCH QUESTIONS

1. What is the prevalence of atrial fibrillation among patients with acute ischemic stroke?
2. What are the sociodemographic predictors of Atrial Fibrillation in acute ischemic stroke patients?
3. What are the clinical predictors of Atrial Fibrillation in acute ischemic stroke patients?
4. What is the severity of the acute ischemic stroke in patients with Atrial Fibrillation?

1.5 OBJECTIVES

Broad objectives

1. To identify the predictors of Atrial Fibrillation among patients with Acute Ischemic stroke attending regional referral hospitals in Dar-es-salaam.

Specific objectives

1. To determine the prevalence of Atrial Fibrillation in patients presenting with acute Ischemic stroke attending Regional Referral hospitals in Dar-es-salaam.
2. To identify sociodemographic predictors for the occurance of Atrial Fibrillation in patients with acute Ischemic stroke attending Regional Referral hospitals in Dar-es-salaam.
3. To identify the clinical predictors of Atrial Fibrillation in patients with acute Ischemic stroke in attending Regional Referral hospitals in Dar-es-salaam.
4. To assess the severity of stroke among patients who have Atrial Fibrillation attending regional referral hospitals in Dar-es-salaam.

1.6 THEORETICAL AND CONCEPTUAL FRAMEWORK

Various independent variables/predictive factors have been correlated with predisposition to Atrial Fibrillation (AF) in patients with acute ischemic stroke. These include socio-demographic and clinical characteristics as shown in the conceptual framework below. Sociodemographic characteristics included age, sex, race, education level, smoking, alcohol intake, and socioeconomic status. Clinical characteristics include comorbid conditions such as obesity, diabetes mellitus, hypertension, heart failure, chronic kidney disease, hyperthyroidism, and prior stroke.

ECG findings such as the absence of P-waves and presence of fibrillatory waves are key to diagnosis of AF, furthermore presence of premature atrial contractions and prolonged QRS interval are predictors of AF in patients with acute ischemic stroke.

Atrial fibrillation (AF) in patients with acute ischemic stroke is associated with greater morbidity and mortality. Stroke severity is commonly measured using the National Institutes of Health Stroke Scale (NIHSS), which evaluates functions such as consciousness, language, attention (neglect), visual fields, eye movements, motor ability, coordination, speech (dysarthria), and sensory perception. On this scale, a score of 0 indicates no symptoms, scores below 5 represent a minor stroke, 6–15 a moderate stroke, 16–20 a moderate-to-severe stroke, and 21–42 a severe stroke.

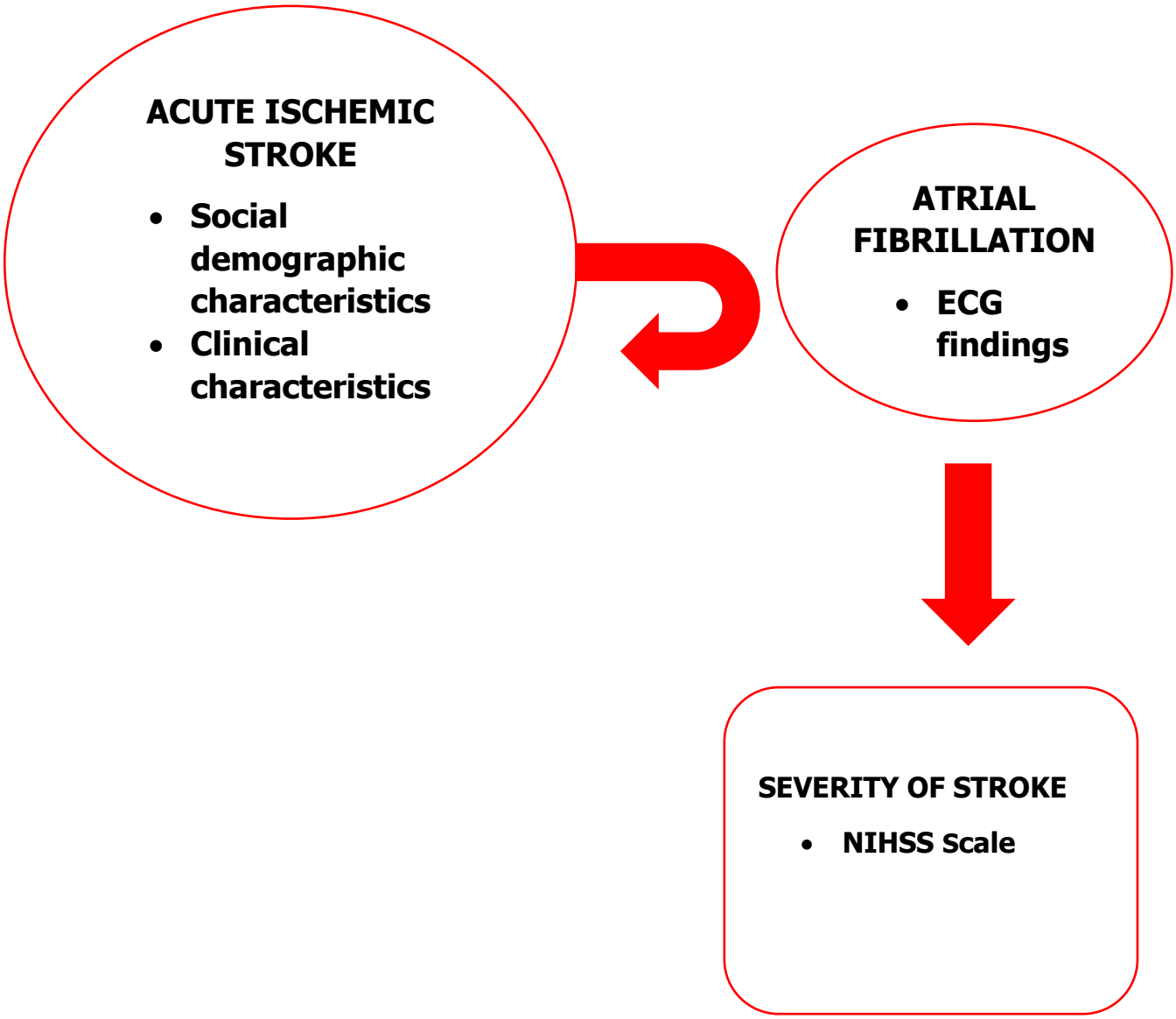


Figure 1: Conceptual framework

CHAPTER TWO

2.0 LITERATURE REVIEW

PREVALENCE OF ATRIAL FIBRILLATION

The prevalence of atrial fibrillation (AF) varies widely across different populations and studies, with recent studies indicating higher rates than previously thought. Approximately 2.2 million adults are affected by atrial fibrillation, with the condition occurring in 8.8% of individuals aged over 80 years in the United States [13]

According to a Retrospective study conducted between 2005 and 2010 in the National Swedish Patient Register, the prevalence of clinically diagnosed AF in adults was found to be 2.9%[20]. This is significantly higher than the 0.4-1.0% estimate in American guidelines. [20]

A descriptive-analytical study conducted in China examined the prevalence and incidence of atrial fibrillation, associated risk factors, common comorbidities, and patterns of antithrombotic therapy use, it was found that the prevalence of AF, with ranges from 0.49% to 8.8% in community-based rates and 4.4% to 35.7% [32].

The prevalence of AF varies significantly across demographics and risk factors. For instance, in the Cardiovascular Health Study, AF was diagnosed in 4.8% of women and 6.2% of men aged ≥65 years [33]. The prevalence was notably higher (9.1%) in individuals with clinical cardiovascular disease compared to those without (1.6%) [33]

A study conducted in the Almaty region aimed to assess the prevalence of atrial fibrillation (AF) and its associated risk factors. Among 1,575 participants, 52 individuals (3.3%) were found to have AF. The study identified advancing age, cardiovascular diseases, type 2 diabetes mellitus, and overweight as the main risk factors for developing AF. [19]

A systematic review of cardiac arrhythmias in SSA of 2020 reported AF prevalence of 16–22% in heart failure, 10–28% in rheumatic heart disease, and 3–7% in cardiology admissions, but <1% in the general population.[34]

In a cross-sectional study conducted between 2005 and 2009 in the Cardiology Unit of the Douala General Hospital, 2581 patients were seen in this unit, of which 182 had AF. Their mean age was 59 years, and there were 100 females. Hypertension was the most frequent risk factor, and 97 of the patients were symptomatic. Hypertensive heart disease, idiopathic dilated cardiomyopathy, and valvular heart disease were the main etiologic factors of AF.

In Tanzania, a study by Chen Y et al., conducted from October 2018 to May 2020 at a tertiary hospital in Mwanza, included 403 patients with heart failure (mean age 60 years; 234 [58%] female). The prevalence of atrial fibrillation (AF) among these patients was 17%. Factors significantly associated with AF included low income, alcohol consumption, and a longer duration of heart failure. During a three-month follow-up, 120 participants (30%) died, including 31 of the 70 patients with AF (44%). Mortality was also significantly linked to higher heart rate on ECG, more advanced New York Heart Association (NYHA) heart failure class, rural residence, and the presence of anemia.[35]

PREVALENCE OF ISCHEMIC STROKE

The burden of ischemic stroke has shown significant trends and variations over the past few decades. Ischemic stroke continues to be a leading cause of mortality and long-term disability across the globe, with the global number of deaths increasing from 2.04 million in 1990 to 3.29 million in 2019 [36].

The Global Burden of Disease (GBD) studies have offered detailed insights into the impact of ischemic stroke across various regions and over time. Although the global age-standardized incidence rate (ASIR) of ischemic stroke declined between 1990 and 2019,

the total number of new strokes, deaths, and disability-adjusted life years (DALYs) has risen, largely driven by population growth and aging [37,38].

Furthermore, there are significant disparities in the burden of ischemic stroke across different regions and sociodemographic index (SDI) levels. High-middle and middle SDI regions have shown higher age-standardized incidence, death, and DALY rates compared to other SDI regions [37]. East Asia has emerged as the region with the highest ASIR for ischemic stroke in 2019 and the largest increase from 1990.[38] Additionally, the burden of ischemic stroke has been increasing in younger populations, particularly in low and middle-SDI countries.[38]Sub-Saharan Africa bears the highest global burden of stroke, with a steadily rising incidence currently estimated at 316 cases per 100,000 people.[39]

In Tanzania, a study by Hertz et al. found that among 2,418 adult hospital admissions, 204 cases (8.4%) were due to stroke, with ischemic heart disease identified as the cause in only one case (0.3%). Additionally, after accounting for population growth, the annual rate of stroke admissions increased dramatically over 43 years, rising from 2.9 per 100,000 population in 1974 to 202.2 per 100,000 in 2017—a roughly 70-fold increase.[40]

OCCURRENCE OF ATRIAL FIBRILLATION (AF) IN PATIENTS WITH ISCHEMIC STROKE

The reported prevalence of atrial fibrillation (AF) among patients with ischemic stroke differs across studies but is generally high, with rates ranging from 18.1% to 33.4%.[21,28] A significant increase in AF prevalence among ischemic stroke patients has been observed, with one study reporting 1.4 times increase over 12 years, from 23.3% to 32.7%. [29]

In another study, it was found that the overall prevalence of Atrial Fibrillation (AF), including both previously known and newly diagnosed cases, can be as high as 28.6% [41]

and using a comprehensive approach, they detected AF in one-third of patients admitted with first-ever ischemic stroke.[41]

Atrial fibrillation (AF) is an important contributor to the risk of ischemic stroke, with studies showing that 22.6% of ischemic stroke hospitalizations reported AF as a secondary diagnosis.[21]

The prevalence of Atrial Fibrillation (AF) in patients with ischemic stroke increases with age, and is associated with other risk factors such as high CHA2DS2-VASc scores.[33] Additionally, factors such as renal dysfunction, valvular heart disease, and low ejection fraction are significantly associated with AF in patients with stroke.[28].

Additionally, paroxysmal Atrial Fibrillation (pxAF) appears to be more common than persistent Atrial Fibrillation (pAF) in stroke patients. This was seen in a study that found 62.6% of AF cases in stroke patients were pxAF.[41] These findings emphasize the value of comprehensive detection strategies, given that paroxysmal AF may often go unnoticed.

In sub-Saharan Africa (SSA), studies report that the prevalence of atrial fibrillation (AF) among patients with ischemic stroke varies between 6.7% and 34.8%.[42] A cross-sectional study conducted in Cameroon found that 7.1% of patients in a cardiology unit had atrial fibrillation (AF).[43] Another systematic review reported that, across case series of stroke patients in sub-Saharan Africa, the pooled prevalence of atrial fibrillation (AF) was 9.6% among those with ischemic stroke [44].

In a cross-sectional study at Douala General Hospital between 2005-2009 among 2581 patients, the most frequent complications seen were heart failure in 77 patients and 27 patients had ischemic stroke.

A systematic review of case-control studies and case series conducted in sub-Saharan Africa from 1980 to 2016, which included 12 studies encompassing 4,387 stroke patients, found that hypertension was more common in hemorrhagic stroke than in ischemic stroke

(73.5% vs. 62.8%). In contrast, diabetes mellitus (DM) and atrial fibrillation (AF) were more frequently observed in patients with ischemic stroke compared to those with hemorrhagic stroke (15.9% vs. 10.6% and 9.6% vs. 2.3%, respectively).[45]

In a cross-sectional study conducted in Uganda from March 2012 to April 2013, 241 patients with atrial fibrillation were enrolled. Among them, over two-thirds (68.4%) were newly diagnosed with AF, and 31 patients (18%) experienced an incident stroke during their hospital admission.[46]

BURDEN OF ATRIAL FIBRILLATION (AF) IN GENERAL POPULATION

In 2010, the global age-adjusted prevalence of AF was estimated at 0.5%, corresponding to approximately 33 million individuals, and this number is projected to double by 2050.[1] AF contributes substantially to morbidity and mortality, yet it can remain asymptomatic and remains undiagnosed until patients present with ischemic stroke.[14]

Patients with atrial fibrillation (AF) frequently experience high rates of hospitalization and complications due to the presence of other concurrent medical conditions. [2,4] Heart failure is the most frequent non-fatal complication in patients with atrial fibrillation (AF), affecting roughly half of them over time. The primary adverse consequences associated with AF include ischemic stroke, ischemic heart disease, and other thromboembolic events.[2]

Hospitalization rates for atrial fibrillation (AF) differ considerably across populations, with the age-specific incidence of admissions rising notably, especially among older individuals.[4]

Atrial fibrillation (AF) is linked to a higher risk of death. In 2017, it was responsible for more than 250,000 deaths worldwide, with an age-adjusted mortality rate of 4.0 per 100,000 people. Among those with AF, heart failure is the most common cause of death,

often arising from a complicated interplay between cardiovascular and other health conditions.[4]

In Africa, patients with atrial fibrillation (AF) are generally younger and more likely to have rheumatic valvular heart disease compared to those in other parts of the world. Although the overall prevalence of AF in sub-Saharan Africa is currently lower than in developed countries, it is expected to rise sharply in the coming years. Despite this lower prevalence, mortality among African patients with AF remains high, mainly due to limited access to healthcare and inadequate treatment options.[42]

In Tanzania, a 2022 study by Chen Y et al. involving 403 heart failure patients found that, at a 3-month follow-up, 120 participants (30%) had died, including 44% (31 out of 70) of those with atrial fibrillation (AF). Factors significantly associated with higher mortality included elevated heart rates on ECG, more advanced New York Heart Association (NYHA) heart failure class, living in rural areas, and the presence of anemia.[35]

BURDEN OF STROKE IN GENERAL POPULATION

Stroke remains a significant cause of mortality and morbidity worldwide, with varying trends across different countries and populations. Research indicates that stroke-related death rates have generally decreased in many Western countries over recent decades, likely reflecting reductions in both the occurrence of strokes and their fatality rates..[47] However, this trend was not uniform across all regions and populations.

Stroke outcomes differ considerably across populations and demographic groups. Recent findings emphasize the need to take into account factors like age, sex, existing health conditions, and access to rehabilitation services when evaluating recovery and prognosis.[48,49]

Similarly, a Polish study reported a significant decrease in stroke case fatality and mortality between 1991/1992 and 2005, possibly due to improved acute stroke management and secondary prevention strategies[50]. In contrast, some Eastern European countries have maintained high stroke mortality rates for decades[50]

Although mortality rates have generally declined, morbidity remains a significant concern. A Canadian study found that nearly one-third of first-ever stroke survivors experienced unplanned hospital readmissions or death within one year, with over half of these readmissions considered potentially avoidable or stroke-related[51]

Furthermore, socioeconomic factors play a crucial role in stroke outcomes, with low socioeconomic status associated with higher incidence, case-fatality rates, and mortality from ischemic stroke[52].

In sub-Saharan Africa (SSA), stroke poses a particularly serious health challenge, with the region having the highest age-adjusted rates of stroke incidence, prevalence, and mortality in the world. [53]. The impact of stroke in SSA is disproportionately high compared to high-income countries, where stroke incidence has declined over the past four decades due to better awareness and control of vascular risk factors[53]. A study in SSA revealed that stroke affects a relatively younger age group, placing a significant toll on the developing economy[53].

In another study, the one-month pooled stroke case-fatality rate in SSA is alarmingly high at 24.1%, increasing to 33.2% at one year.[39] These rates can be attributed to weak healthcare systems and prevalent vascular risk factors[39].Hemorrhagic strokes tend to have a higher risk of death within the first month, whereas ischemic strokes are linked to an increased risk of mortality over a six-month period . [39]

A systematic review of hospital-based studies in Kenya from 2003 to 2017 found that stroke patients were mostly women in their seventies, often with high blood pressure. In-hospital mortality ranged from 5% to 27%, while death within one month of the stroke occurred in 23.4% to 26.7% of patients.[54]

A cohort study conducted at a tertiary teaching hospital in northwestern Tanzania included 135 patients with an average age of 64.5 years. High blood pressure was common, affecting 76% of participants, though only 20% were taking regular antihypertensive medication. The overall 30-day mortality rate was 37%. When comparing stroke types, 25% of patients with hemorrhagic stroke had died by day 5, while 23% of those with ischemic stroke had died by the same time. Aspiration pneumonia was the most frequent medical complication, affecting 41.3% of patients.[55]

THE BURDEN OF ATRIAL FIBRILLATION (AF) IN ISCHEMIC STROKE PATIENTS

Atrial fibrillation (AF) is associated with significantly higher morbidity and mortality rates in patients with acute ischemic stroke (AIS).[14]

In a large study of over 930,000 AIS patients, those with AF had higher in-hospital mortality (9.9% vs 6.1%) and increased rates of complications like acute kidney injury, bleeding, and infections [14]. Another study found mortality rates of 14.1% for AIS patients with AF compared to 6.2% without AF [56]

Even with overall advancements in stroke care, atrial fibrillation (AF) continues to consistently worsen outcomes for patients with acute ischemic stroke (AIS) [14].Several factors contribute to worse outcomes in patients with atrial fibrillation (AF), including being female, having other health conditions like diabetes or hypertension, and developing stroke-related complications such as pneumonia or sepsis. On the other hand,

treatment with rt-PA has been shown to reduce mortality in AF patients experiencing an acute ischemic stroke [56]

Atrial Fibrillation -related stroke is associated with greater morbidity and mortality than other ischemic stroke etiologies and imposes a substantial economic burden on the healthcare system.[26] A study found that strokes linked to atrial fibrillation (AF) tend to result in higher death rates, more complications, longer hospital stays, and health-care costs that are about 20% higher compared to strokes not related to AF.[14]

Patients presenting with Atrial Fibrillation (AF) have a greater frequency of bedridden state (41.2% vs 23.7%) and increased odds of being bedridden (OR 2.23) compared to those without stroke. AF is also linked to higher in-hospital mortality rates (13.0% vs 7.3%) and a greater likelihood of adverse events during hospitalization. [57]

Furthermore, the effect of Atrial Fibrillation (AF) on stroke outcomes may vary according to sex and ethnicity. For example, the link between atrial fibrillation (AF) and a lower likelihood of being discharged home was more pronounced in women than in men, and among white patients in Florida compared to other racial and ethnic groups. [58]

CLINICAL CHARACTERISTICS ASSOCIATED WITH THE DEVELOPMENT OF ATRIAL FIBRILLATION (AF) IN ISCHEMIC STROKE PATIENTS

Atrial fibrillation (AF) is associated with a significantly increased risk of stroke, and several clinical characteristics influence this risk. Age and sex are important factors, with older patients and females at higher risk [59]. Advanced age is consistently identified as the most significant independent risk factor for developing AF and subsequent stroke[23]. The prevalence of AF increases dramatically with age, reaching up to 70% in patients aged 65-85 years [23]. Stroke risk also increases with age in AF patients, particularly after age 75 [48,60]

However, some research suggests that the age threshold for increased stroke risk may be lower in certain populations, with one study proposing age ≥55 years as an appropriate threshold for Asian group with AF [61]

The CHA2DS2-VASc score is generally used to assess risk of stroke in AF patients, incorporating factors such as congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, previous stroke/TIA, vascular disease, and female sex [62,63] In another study done in the Almaty region, the main predictors for occuranvce of AF were age, cardiovascular diseases, type 2 diabetes mellitus, and overweight[19].

Ethnic differences in stroke risk profiles were observed. A study comparing Japanese and UK AF patients with previous strokes found that UK patients had a greater risk of recurrent stroke despite being older and having higher CHA2DS2-VASc scores [59]. This suggests that factors other than traditional risk scores may influence the stroke risk in patients with AF.

Recent evidence points to atrial fibrosis and the concept of atrial cardiopathy as important contributors to stroke risk in patients [64–66] The presence of a prothrombotic atrial substrate, which can precede and promote AF, may lead to thromboembolic events independent of the arrhythmia itself [63].

Interestingly, neuroimaging features have been found to improve the prediction of AF in stroke patients when combined with traditional risk scores like CHADS2 and CHA2DS2-VASc. Specifically, acute cortical involvement, acute insular cortex involvement, and prior cortical infarction were independently associated with newly detected AF [67]. Additionally, the presence of supraventricular runs (SVRs) on Holter monitoring and increased left atrial diameter have been linked to future AF development in stroke patients[68]

A case-control study examining patients with atrial fibrillation (AF) aimed at understanding the causes and risk factors for ischemic strokes occurring during treatment with non-vitamin K antagonist oral anticoagulants (NOACs) found that most strokes were cardioembolic in origin. The study also identified that off-label low doses of NOACs, enlarged atria, high cholesterol levels, and elevated CHA_2DS_2-VASc scores were linked to a higher risk of cerebrovascular events.

DIAGNOSIS OF ATRIAL FIBRILLATION (AF) IN ISCHEMIC STROKE PATIENTS

Atrial fibrillation (AF) is diagnosed by recognizing common symptoms alongside distinctive patterns seen on a standard 12-lead ECG. Various studies have explored different monitoring strategies to improve AF detection in stroke patients.

In cryptogenic stroke patients, insertable cardiac event recorders detected Atrial Fibrillation (AF) in approximately 27.3% of cases over one year [69]. For transient ischemic attack (TIA) patients, the incidence of AF detected by ECG and 72-hour Holter monitoring was lower at 3.5% [70]

Prolonged cardiac rhythm monitoring (PCRM) revealed paroxysmal Atrial Fibrillation (PAF) in 37.5% of stroke patients, with similar frequencies in both cryptogenic and non-cryptogenic stroke cases [71]. This contradicts the common assumption that AF is primarily associated with cryptogenic strokes. Additionally, ECG-detected AF was associated with a 5-fold higher adjusted recurrent ischemic stroke risk than AF detected by prolonged cardiac monitoring (PCM) in a cohort with >80% anticoagulation rate[72].

Therefore, longer monitoring periods generally improves the detection of Atrial Fibrillation (AF) in patients with stroke. Continuous long-term monitoring using insertable cardiac monitors (ICMs) is significantly more effective than intermittent monitoring strategies for identifying AF in cryptogenic stroke patients [73]. For patients with frequent atrial

premature beats (≥70/24 hours), repeated prolonged ECG monitoring is recommended, as they are at greater risk of developing paroxysmal AF[74].

ASSESSMENT OF SEVERITY OF STROKE

Stroke severity assessment is important for accurate diagnosis, proper management, and optimal clinical outcome. The National Institutes of Health Stroke Scale (NIHSS) is widely used for quantitatively assessing stroke severity[75,76] and predicting outcomes in patients with acute ischemic stroke. Multiple studies have demonstrated its reliability and validity in various clinical settings.

National Institute of Health Stroke Scale (NIHSS) scores correlate strongly with ischemic lesion volumes measured by CT perfusion imaging ($r = 0.82$, $p < 0.0001$), indicating its effectiveness in predicting the extent of brain damage [77]

The scale also shows good correlation with other assessment tools like the Montreal Cognitive Assessment (MoCA) and quantitative EEG parameters, further supporting its utility in evaluating stroke severity [78]

The MoCA evaluates multiple cognitive domains, including memory, attention, executive functions, language, and visuospatial abilities, making it a comprehensive tool for assessing global cognition in older adults [79,80].

Quantitative EEG (qEEG) measures have been found to strongly correlate with NIHSS and Montreal Cognitive Assessment (MoCA) scores in patients with acute ischemic stroke, suggesting that qEEG could be a useful tool for predicting the severity of stroke at the time of presentation(49)

Several alternative methods have been developed for assessing stroke severity. The Unassisted Tele Stroke Scale (UTSS) allows for rapid and reliable assessment of stroke severity through telemedicine without bedside assistance[76]. Additionally, artificial

intelligence techniques have been applied to automate NIHSS scoring on electronic health records, demonstrating high accuracy and significantly reduced processing time since manual scoring of NIHSS can be labor-intensive and time-consuming. [81]

CHAPTER THREE

3.0 METHODOLOGY

3.1 STUDY DESIGN

A hospital-based cross-sectional descriptive study.

3.2 STUDY SETTING

This study was conducted in the three regional referral hospitals in Dar- es- Salaam.

Mwananyamala Regional Referral Hospital is a public facility that provides healthcare to roughly 2.2 million people from Kinondoni and Ubungo districts. The hospital has a 252-bed capacity and houses both a medical ward and an intensive care unit. Amana Regional Referral Hospital, located in the Ilala district, has 362 inpatient beds and serves an estimated 1.2 million residents in its catchment area. Temeke Regional Referral Hospital, with 304 beds, caters to about 2 million people from the Temeke district as well as nearby districts including Mkuranga, Rufiji, and Kisarawe.

3.3 GENERAL POPULATION

All the patients presenting with acute ischemic stroke.

3.4 TARGET POPULATION

All patients diagnosed with acute ischemic stroke in Dar-es-salaam.

3.5 STUDY POPULATION

The study included admitted patients diagnosed with acute ischemic stroke in medical wards of regional referral hospitals in Dar-es-salaam. The estimated number of patients per month with acute ischemic stroke was retrieved by the principal investigator from department registries (HMIS/MTUHA) of respective study areas and found to be approximately 25 patients at Mwananyamala RRH, Amana RRH 25 patients and 25

patients at Temeke RRH. Therefore, for the allocated period of data collection (8 weeks), a total of 150 patients could be obtained.

3.6 SAMPLE SIZE ESTIMATION

Slovin's formula for the minimum required sample size was used in this study.

Where by: $n = N/(1+Ne^2)$

n- Minimum required sample size = 109

N- Population size = 150

e- Margin of error = 0.05 of 95% confidence interval.

Justification of the formula

The Slovin's formula was used; this formula is preferred when the population size is known and provides a direct method to achieve adequate and accurate sample size, as it gives proportionate representation of the population concerning the specified margin of error.

3.7 STUDY VARIABLES

Independent variables:

The main social and demographic details considered included a gender, age, and educational background. Behavioral factors such as Smoking history**,** Alcohol consumption and Comorbid conditions such as Hypertension**,** Diabetes mellitus, chronic kidney disease, heart failure, hyperthyroidism, and prior stroke.

Dependent variable:

The dependent variables for this study were the presence of Atrial Fibrillation and Severity of acute ischemic stroke.

3.8 SAMPLING PROCEDURE

A consecutive recruitment technique was used to enroll patients who had been diagnosed with acute ischemic stroke and met the inclusion criteria into the study until the required sample size was achieved.

Patients who met the study criteria were approached; the aims of the study were clearly explained to them, and those willing to take part gave their consent. The study involved obtaining a history and administering an ECG.

INCLUSION CRITERIA

1. All patients with confirmed acute ischemic stroke through CT scan or MRI by the attending physician.
2. All adult patients aged 18 years and above
3. All patients willing to consent themselves or a caregiver's consent

EXCLUSION CRITERIA

1. Presence of preexisting neurological co-morbidity
2. Stroke of more than 7 days

Justification of exclusion criteria

Patients with preexisting neurological comorbidities such as epilepsy, Parkinson's disease, multiple sclerosis, or advanced dementia were excluded to ensure accuracy of diagnosis and validity of outcome assessment. These features can mask or mimic the presentation of acute ischemic stroke or alter neuroimaging findings, making it difficult to determine whether neurological deficits are attributable to the index event or to prior disease.

Patients presenting more than seven days after stroke onset were excluded to ensure accurate identification of atrial fibrillation in the acute phase, reduce misclassification and recall bias, maintain uniformity in stroke severity assessment, and align with established definitions of acute ischemic stroke used in clinical research. This restriction improved the validity and comparability of the study findings.

3.9 DATA COLLECTION

The principal investigator recruited participants consecutively in one regional referral hospital for 2 weeks and moved to another for two weeks until desired the sample size

was achieved. Information on patients' sociodemographic and clinical characteristics such as age, sex, alcohol consumption, smoking habits, and existing comorbidities was collected using a structured form. Stroke severity was evaluated with the National Institutes of Health Stroke Scale (NIHSS), and each patient underwent an ECG to check for the presence of atrial fibrillation."

3.10 DATA COLLECTION PROCEDURES

Data collection form

A structured interview-based questionnaire was administered to the patients/caregivers of enrolled patients, and other information was extracted from the patients' records. Sociodemographic characteristics, such as age, gender, education level, employment status, and marital status, were documented. Behavioral characteristics such as cigarette smoking and alcohol use were documented. Clinical characteristics, including comorbidities such as hypertension, diabetes mellitus, chronic kidney disease, heart failure, thyroid disease, and history of prior stroke. Furthermore, medication history including use of antiplatelets, anticoagulants, and lipid-lowering drugs, were documented

National Institute of Health Stroke Scale (NIHSS) administration

Stroke severity was assessed using the 15-item NIHSS tool, which was administered to all enrolled patients within 24 hours of admission, and the findings were recorded in the data collection form. The principal investigator personally examined each patient and assigned scores accordingly. The NIHSS evaluates several domains, including level of consciousness, language, neglect, visual fields, eye movements, motor strength, ataxia, speech clarity (dysarthria), and sensory function. Scores range from 0, indicating no stroke symptoms, to 1–5 for a minor stroke, 6–15 for a moderate stroke, 16–20 for a moderately severe stroke, and 21–42 for a severe stroke.

Electrocardiogram (ECG) measurement

An ECG was performed with a standard 12-lead ECG machine, Xuzhou Sunbright Electronics brand, model no. SUN-8122 was manufactured in China, 2021. Printouts were generated and interpreted by the attending physician. The results were then recorded in the respective data collection form.

The ACC/AHA/ESC guidelines were used to diagnose Atrial fibrillation by 12-lead ECG, which requires the following:

1. Irregular ventricular rate
2. The ECG showed no distinct P waves.
3. The usual P waves were replaced by irregular oscillatory or fibrillatory waves of varying size, shape, and timing, often accompanied by an irregular and frequently rapid ventricular response when atrioventricular conduction was preserved.

Also, other relevant findings from the ECG apart from atrial fibrillation such as presence of left atrial enlargment (LAE), premature atrial contractions (PAC) and prolonged QRS duration were documented.

3.11 DATA ANALYSIS

Data were entered and cleaned in Microsoft Excel and exported to **Stata version 17** (StataCorp LLC, College Station, TX, USA) for analysis. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means with standard deviations or, where appropriate, medians with interquartile ranges. The prevalence of atrial fibrillation (AF) was calculated as the proportion of participants diagnosed with AF on ECG out of the total sample, with 95% confidence intervals. Bivariate associations between independent variables and AF were assessed using **generalised linear models (GLM) with Poisson distribution and log link**, reporting prevalence ratios (PR) and 95% confidence intervals. Robust standard errors

were applied to account for potential variance over-dispersion. Where data were sparse or zero cells occurred, exact methods were applied.

Variables with a p-value of less than 0.20 in the bivariate analysis were included in a multivariable **Poisson regression model with robust variance estimation** to calculate adjusted prevalence ratios (aPR) along with their 95% confidence intervals. A p-value of less than 0.05 was considered statistically significant.

CHAPTER THREE

4.0 ETHICAL CONSIDERATIONS

Approval for the study was obtained from the Department of Internal Medicine at Kairuki University, and ethical clearance was granted by the Institutional Research and Ethical Committee (IREC) of the same university. In addition, permission to carry out the study was secured from the administrations of Mwananyamala Regional Referral Hospital, Amana Regional Referral Hospital, and Temeke Regional Referral Hospital.

Written informed consent was obtained from all participants before recruitment, and participation was entirely voluntary. No patient was coerced, and those who chose not to take part were not subjected to any form of discrimination. Strict confidentiality was maintained throughout, with all data securely stored and only accessible to relevant authorities when necessary.

For patient benefit, the stroke units and departments were notified of any cases of atrial fibrillation (AF) identified during the study to ensure appropriate follow-up and management.

CHAPTER FIVE

5.0 RESULTS

5.1 Patient characteristics

A total of 119 patients with acute ischemic stroke, confirmed clinically and by CT scan, were enrolled in the study. Of these, 42% (50) were men and 58% (69) were women. The mean age was 64 years, ranging from 37 to 92 years, with most patients being over 60 years old. The majority were married (69%), and nearly half (45%) had attained at least a secondary level of education. Lifestyle factors showed that 18% of participants were current smokers, while 26% reported alcohol use. Hypertension was the most common comorbidity, followed by diabetes mellitus.

Table 1: Distribution of patients with acute ischemic stroke (N=119)

Variables		**frequency**	**Percentage (%)**
Age (years)	<41	1	0.8
	41-60	46	38.7
	>60	72	60.5
Gender	Male	50	42
	Female	69	58
Marital status	Single	37	31.1
	Married	82	69.9
Education level	No formal education	1	0.8
	Primary education	40	33.6
	Secondary education	54	45.4
	College/University education	24	20.2
History of smoking	Yes	22	18.5
	No	97	81.5
History of alcohol use	Yes	31	26.1
	No	88	73.9
Total		**119**	**100**

5.2 Prevalence of Atrial Fibrillation among patients with acute ischemic stroke

Among the patients studied, 16% were found to have atrial fibrillation, as shown in Figure 2.

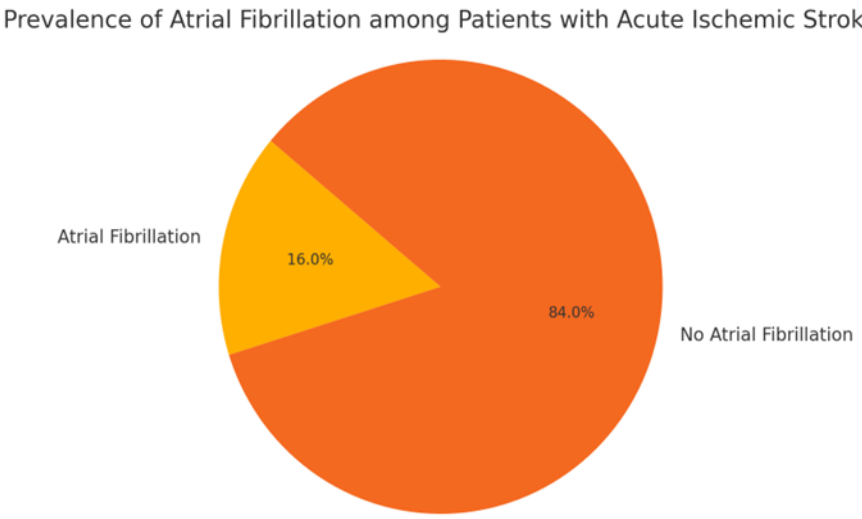


Figure 2: Pie chart showing the prevalence of Atrial Fibrillation (AF) among patients with acute ischemic stroke (AIS)

Table 2: Distribution of Atrial fibrillation among patients with acute ischemic stroke (n=119)

VARIABLE		FREQUENCY	PERCENTAGE
AF	YES	19	16%
	NO	100	84%

5.3 Sociodemographic predictors of Atrial Fibrillation (AF) among patients with acute Ischemic stroke.

Table 3: Distribution of socio-demographic predictors of AF among patients with Acute ischemic stroke (N=119)

Characteristics		AF	NO AF	PR	95%CI	P-value	aPR	95% CI	P-value
Age group	<40	0	1	-	-	-	-	-	-
	41-60	9	37	Ref	0	0	Ref	0	0
	>60	10	62	5.28	0.7-39.7	0.106	22.3	3.1-161.0	0.002
gender	Male	7	43	Ref			Ref		
	Female	12	57	1.24	0.53-2.93	0.6203	1.16	0.42-3.18	0.7756
Marital status	Single/widowed	5	32	Ref	0	0	Ref	0	0
	Married	14	68	1.26	0.49-3.25	0.6275	2.9	0.92-9.15	0.0699
Level of Education	No formal education	1	0	Ref			Ref		
	Primary level	9	31	0.24	0.13-0.42	0.0002	0.32	0.18-0.57	0.0007
	Secondary level	7	47	0.13	0.06-0.26	0.0000	0.27	0.13-0.41	0.0001
	College/university	2	22	0.08	0.02-0.31	0.0002	0.07	0.01-0.32	0.0007
Smoking	Yes	4	18	Ref			Ref		
	No	15	82	0.85	0.31-2.31	0.7513	0.97	0.18-5.14	0.9689
alcohol	Yes	5	26	Ref			Ref		
	No	14	74	0.99	0.39-2.51	0.9771	1.29	0.36-0.63	0.6973

Patients who were above 60 years had a greater likelihood of having AF compared to those aged 41–60 years (reference group). Crude PR was 5.28 (95% CI: 0.7–39.7, p = 0.106), which was not statistically significant initially. However, after adjustment, the adjusted PR increased to 22.3 (95% CI: 3.1–161.0, p = 0.002), indicating a strong and statistically significant association. Patients aged <40 had no reported cases of AF and

were not analysed. Therefore, advanced age (>60 years) is a powerful independent predictor of AF, highlighting the need for targeted screening in elderly stroke patients.

Females showed a marginally greater occurrence of atrial fibrillation than male. Crude PR = 1.24 (95% CI: 0.53–2.93, p = 0.6203); Adjusted PR = 1.16 (95% CI: 0.42–3.18, p = 0.7756). Therefore, there was no significant link between gender and atrial fibrillation among the participants

The prevalence of atrial fibrillation was higher among married individuals than among single or widowed participants, though this difference was not significant.. Crude PR = 1.26 (95% CI: 0.49–3.25, p = 0.6275); Adjusted PR = 2.9 (95% CI: 0.92–9.15, p = 0.0699). Therefore, marital status was not significantly associated with AF, but the adjusted analysis suggests a possible trend worth further investigation.

Higher levels of education were independently associated with significantly lower likelihood of AF in patients presenting with acute ischemic stroke. Primary education: PR = 0.24 (95% CI: 0.13–0.42, p = 0.0002); aPR = 0.32 (95% CI: 0.18–0.57, p = 0.007). Secondary education: PR = 0.13 (95% CI: 0.06–0.26, p = 0.0000); aPR = 0.27 (95% CI: 0.13–0.41, p = 0.0001). College/University: PR = 0.08 (95% CI: 0.02–0.26, p = 0.0002); aPR = 0.07 (95% CI: 0.01–0.32, p = 0.0007), the PR and aPR decrease progressively suggesting a gradient which strengthens the validity of the association, furthermore all confidence intervals are well below 1.0 which indicate statistical significance.

No significant association was found between smoking and AF. Crude PR = 0.85 (95% CI: 0.31–2.31, p = 0.7513); aPR = 0.97 (95% CI: 0.18–5.14, p = 0.9689). Therefore, Smoking was not a meaningful predictor of AF in this population.

Alcohol intake was also not significantly associated with AF. Crude PR = 0.99 (95% CI: 0.39–2.51, p = 0.9771); aPR = 1.29 (95% CI: 0.36–4.63, p = 0.6973). This implies that alcohol consumption did not predict the risk of AF in this cohort.

Therefore, this study of patients with acute ischemic stroke, advanced age (>60 years) and low level of education were significant independent predictors of atrial fibrillation. Other predictors, including gender, marital status, smoking, and alcohol intake, did not show a significant association with AF. These findings emphasize the influence of both age and education as a social determinants of health on the risk of atrial fibrillation.

5.4. Clinical predictors of Atrial Fibrillation (AF) among patients with acute ischemic stroke.

Table 4: Distribution of comorbidities among patients with acute ischemic stroke (N=119)

VARIABLE		AF	NO AF	PR	95%CI	P-value	aPR	95% CI	P-value
Hypertension	yes	19	91	0	0	0.0	0	0	0
	No	0	8	Ref			Ref		
Diabetes	Yes	5	36	1.47	0.57-3.8	0.4245	0.51	0.15-1.68	0.2669
	No	14	64	Ref			Ref		
Heart failure	Yes	5	4	0.23	0.11-0.49	0.0002	0.12	0.04-0.38	0.0003
	No	14	96	Ref			Ref		
CKD	Yes	1	5	0.96	0.15-6.02	0.9615	0.64	0.05-8.17	0.7287
	no	18	95	Ref			Ref		
Prior stroke	Yes	5	12	0.47	0.19-1.13	0.0906	0.15	0.04-0.49	0.0018
	No	14	88	Ref			Ref		
HTN + DM	Yes	5	28	0.93	0.36-2.38	0.8809	1.69	0.62-4.65	0.3077
HTN+ HF	Yes	5	4	4.37	2.04-9.35	0.0002	7.53	2.69-21.08	0.0001
HTN+STROKE	Yes	5	12	2.14	0.89-5.18	0.0906	3.43	1.27-9.22	0.0148
HTN+ CKD	Yes	1	3	1.6	0.28-9.19	0.5999	0.68	0.07-7.06	0.749

100% (19/19) of patients with Atrial Fibrillation (AF) had hypertension, while none of the AF patients were non-hypertensive. The prevalence ratio could not be calculated meaningfully due to the absence of AF cases in the non-hypertensive group. Both crude and adjusted PRs are reported as 0 due to this zero-cell issue (perfect prediction). This means that hypertension shows a perfect positive association with AF in this sample. Although statistical modeling couldn't estimate a ratio, the fact that all AF patients had hypertension underscores its strong predictive value for AF in stroke patients.

Diabetes was not significantly associated with Atrial Fibrillation (AF) in either crude or adjusted analyses. Crude PR = 1.47 (95% CI: 0.57–3.8), p = 0.4245, aPR = 0.51 (95% CI: 0.15–1.68), p = 0.2669. While AF was slightly more common among diabetics in the

crude model, the adjusted model suggests a trend toward lower risk—but not statistically significant.

Heart failure was significantly associated with atrial fibrillation, and this association persisted even after adjustment, Crude PR = 0.23 (95% CI: 0.11–0.49), p = 0.0002 aPR = 0.12 (95% CI: 0.04–0.38), p = 0.0003. Patients with AF were significantly more likely to have underlying heart failure, consistent with its role in promoting atrial remodeling and arrhythmogenesis.

Chronic Kidney Disease (CKD) was not significantly predict with Atrial Fibrillation (AF), Crude PR = 0.96 (95% CI: 0.15–6.02), p = 0.9615, aPR = 0.64 (95% CI: 0.05–8.17), p = 0.7287. Both crude and adjusted models show no meaningful relationship, possibly due to small numbers.

Prior stroke did not show a significant association with AF in the adjusted model. Crude PR = 0.47 (95% CI: 0.19–1.13), p = 0.0906, aPR = 0.15 (95% CI: 0.04–0.49), p = 0.0018. This may reflect underdiagnosis of paroxysmal AF in earlier strokes or that AF was newly diagnosed in this episode.

The co-existence of hypertension and diabetes did not show a significant association with atrial fibrillation. Adjusted results suggest a possible trend, but not statistically significant. Crude PR = 0.93 (95% CI: 0.36–2.38), p = 0.8809, aPR = 1.69 (95% CI: 0.62–4.65), p = 0.3077.

The combination of hypertension and heart failure showed a very strong and statistically significant association with Atrial Fibrillation (AF). Patients with both conditions had over 7 times higher adjusted prevalence of AF. Crude PR = 4.37 (95% CI: 2.04–9.35), p = 0.0002, aPR = 7.53 (95% CI: 2.69–21.08), p = 0.0001.

The combination of hypertension and prior stroke was significantly associated with Atrial Fibrillation (AF) after adjustment. Crude PR = 2.14 (95% CI: 0.89–5.18), p = 0.0906, aPR

= 3.43 (95% CI: 1.27–9.22), p = 0.0148. Highlights the importance of monitoring AF in hypertensive patients with prior stroke.

The combination of hypertension with chronic kidney disease (CKD) did not show a significant association with Atrial Fibrillation (AF). Crude PR = 1.6 (95% CI: 0.28–9.19), p = 0.5999, aPR = 0.68 (95% CI: 0.07–7.06), p = 0.749. Wide confidence intervals suggest limited statistical power.

Therefore, it can be stated that hypertension and its combinations, particularly with heart failure and prior stroke, are the most strongly and independently associated comorbidities with atrial fibrillation. Heart failure alone also demonstrated a strong independent association. Diabetes, Chronic Kidney Disease, and lifestyle factors like smoking or alcohol were not significantly associated. These findings are consistent with the pathophysiological basis of AF and highlight the need for targeted screening in high-risk groups.

Table 5: Distribution of medications used among patients with acute ischemic stroke (N=119)

VARIABLE		AF	NO AF	PR	95% CI	P-value	aPR	95% CI	P-vlaue
Asp/clop	Yes	16	47	1.56	0.38-2.74	0.0097	20.24	54.8-95.2	0.597
	No	3	53						
Atova/rosuva	Yes	13	41	0.96	0.06-1.86	0.0363	20.39	67.9-108.7	0.6508
	No	6	59						
Both meds	Yes	11	13	1.69	0.9-2.49	0.0	18.31	94.73-58.1	0.6386
	No	8	87						
Not on meds	Yes	1	23	1.51	3.48-8.45	0.1305	19.92	66.2-106.0	0.65
	No	18	77						
Poor adherence	Yes	3	3	1.26	0.34-2.18	0.0072	2.57	1.11-4.03	0.0005
	No	16	97						

The use of anti-platelet initially appeared to be a statistically significant association with AF. However, after adjusting for confounders, this association disappeared, and the confidence interval became very wide and crossed zero. Crude PR = 1.56 (95% CI: 0.38–2.74), p = 0.0097, aPR = 20.24 (95% CI: 54.8 to 95.2), p = 0.597. This suggests that the crude association may have been confounded by other clinical factors, and antiplatelet use was not independently associated with AF.

Statins use showed a borderline significant crude association, but this did not persist after adjustment. Crude PR = 0.96 (95% CI: 0.06–1.86), p = 0.0363, aPR = 20.39 (95% CI: –67.9 to 108.7), p = 0.6508. The adjusted PR was non-significant with a wide confidence interval, indicating no independent association between statin use and Atrial Fibrillation in this population.

While the crude model suggested a strong association between dual medication use and Atrial Fibrillation (AF), this was nullified in the adjusted analysis. Crude PR = 1.69 (95% CI: 0.9–2.49), p = 0.000, Adjusted PR = 18.31 (95% CI: 94.7 to 58.1), p = 0.6386. The negative adjusted PR and wide confidence interval highlight instability of the model, likely due to small sample size or multicollinearity.

Being off medications showed no significant association with Atrial Fibrillation (AF), neither in crude nor adjusted models. Crude PR = –1.51 (95% CI: 3.48 to 8.45), p = 0.1305, Adjusted PR = 19.92 (95% CI: –66.2 to 106.0), p = 0.650. The negative PR in the crude model and high variability after adjustment suggest no reliable association.

Poor medication adherence is the only factor that remained important predictor of AF after adjustment. Crude PR = 1.26 (95% CI: 0.34–2.18), p = 0.0072, Adjusted PR = 2.57 (95% CI: 1.11–4.03), p = 0.0005. Patients with poor adherence had a 2.57 times higher prevalence of AF than those with good adherence, and this was statistically significant with a narrow CI. Therefore, Poor adherence poses a significant risk of AF among stroke patients and may reflect poorer overall cardiovascular risk management.

The most important and statistically significant finding is that poor medication adherence independently increases the risk of AF. Other medications; aspirin/clopidogrel, statins, or their combination did not show significant independent associations after adjustment. Crude associations observed for medication use may be confounded by indication or severity of illness. These findings reinforce the importance of improving adherence to prescribed therapies in stroke prevention and Atrial Fibrillation management programs.

Table 6: Distribution of selected Electrocardiogram (ECG) features among patients with acute ischemic stroke (N=119)

VARIABLE	AF	NO AF	PR	95% CI	P-value	aPR	aPR 95% CI	P-value
LAE	7	28	0.34	0.60-3.25	0.4349	0.41	0.63-3.63	0.3595
PAC	2	3	0.99	0.84-8.58	0.0954	1.06	0.84-9.97	0.0941
Prolonged QRS	2	10	0.05	0.28-4.01	0.9441	0.28	0.33-5.37	0.6924

There was no statistically significant association in left atrial enlargement (LAE) and AF in either the crude or adjusted models. Crude PR = 0.34 (95% CI: –0.51 to 1.18), p = 0.4349, Adjusted PR = 0.41 (95% CI: –0.47 to 1.29), p = 0.3595. Although LAE is pathophysiologically linked to AF (due to increased atrial pressure and structural remodeling), the lack of significance here may reflect small sample size, underdiagnosis, or measurement limitations in detecting LAE consistently.

Premature atrial contractions (PACs) showed a near-null association with AF in both models, with wide confidence intervals that crossed zero. Crude PR = 0.99 (95% CI: –0.17 to 2.15), p = 0.0954, Adjusted PR = 1.06 (95% CI: –0.18 to 2.3), p = 0.0941. Although PACs are considered markers of atrial irritability and may precede the development of AF, their presence in this study was not predictive of established AF. This may be due to low detection on single ECG snapshots, as PACs are often intermittent.

Prolonged QRS duration had the lowest prevalence ratio among all ECG features and showed no association with AF. Crude PR = 0.05 (95% CI: –1.29 to 1.39), p = 0.9441 Adjusted PR = 0.28 (95% CI: –1.12 to 1.68), p = 0.6924. This is consistent with the fact that prolonged QRS duration primarily reflects ventricular conduction delay (e.g., bundle

branch block), which is not directly linked to atrial electrical abnormalities or atrial arrhythmias like AF.

In this study, none of the evaluated ECG features—Left Atrial Enlargement, Premature Atrial Contractions, or Prolonged QRS—showed a statistically significant or independent association with atrial fibrillation in stroke patients. The lack of significance may reflect limited sample sizes, underreporting, or intermittent nature of some findings like PACs. From a clinical perspective, while LAE and PACs are known predictors of AF development in larger populations or ambulatory monitoring studies, single ECG readings in acute settings may miss episodic findings.

These results emphasize the importance of extended cardiac monitoring (e.g., Holter, telemetry) when trying to detect paroxysmal AF rather than relying solely on baseline ECG features.

5.5. Stroke severity among patients with Atrial Fibrillation (AF)

Stroke severity, measured by the NIHSS score, was analyzed as a continuous variable to compare patients with atrial fibrillation to those without. Descriptive statistics and a Mann-Whitney U test were performed. Categorical stroke severity scores were compared between patients with and without atrial fibrillation using a chi-square test.

Table 7: Distribution of continuous scores of the National Institute of Health Stroke Scale in patients with acute ischemic stroke (N=119)

AFIB	Mean	Median	Std Dev	Min	Max	Count	Mann-Whitney U	p-value
NO	16.54	15.0	8.26	3	39	100	1091.5	0.3057
YES	18.47	18.0	8.85	4	40	19		

Table 8: Distribution of categorical scores of the National Institute of Health Stroke Scale in patients with acute ischemic stroke (N=119)

Stroke Severity	No AFIB	AFIB	Total
1-mild	3	1	4
2-Moderate	44	6	50
3-mod-severe	29	6	35
4-severe	24	6	30
All	100	19	119
Total	**200**	**38**	**238**

Chi-square test result: $\chi^2 = 1.229$, df = 3, p = 0.7459

Patients with atrial fibrillation (AF) had a higher average NIHSS score (Mean = 18.47, Median = 18.0) compared to those without AF (Mean = 16.54, Median = 15.0). The Mann-Whitney U test statistic was 1091.5 with a p-value of 0.3057. Although this suggests a trend toward more severe stroke among AF patients, the difference was not statistically significant. The standard deviations and ranges further highlight overlap in stroke severity across both groups. Thus, while there may be clinical concern, no statistically significant conclusion can be drawn from this data.

When NIHSS scores were categorized into severity levels (Mild, Moderate, Moderately Severe, Severe), the distribution among patients with and without atrial fibrillation was evaluated using a chi-square test. The chi-square test statistic was 1.229 with 3 degrees of freedom and a p-value of 0.7459. This analysis also failed to demonstrate a significant relationship between stroke severity category and the presence of atrial fibrillation. Although AF patients appeared more frequently in the moderately severe and severe groups, this was not statistically meaningful.

Both the continuous and categorical analyses of stroke severity using NIHSS scores suggest a trend toward greater severity among those with atrial fibrillation although it was not statistically significant. This implies that although AF may contribute to more severe clinical presentations, this association was not confirmed in this sample. Larger sample sizes or multicenter data may be needed to detect meaningful differences

CHAPTER SIX

6.0 DISCUSSION

This chapter provides a detailed comparison and interpretation of the prevalence, and predictors of atrial fibrillation (AF) in patients with acute ischemic stroke, as observed in this study conducted in Dar es Salaam, Tanzania, and supported by evidence from previous international studies.

6.1 Prevalence of Atrial Fibrillation (AF) Among Acute Ischemic Stroke Patients

In this study, Atrial fibrillation was present in 16.0% of patients with acute ischemic stroke. This aligns with the findings from several studies. For example, a study conducted in China by Shenjun Li et al reported a prevalence of 20.3% among 1,061 stroke patients, demonstrating a slightly higher rate but consistent with the global trend of AF as a common comorbidity in stroke patients.

Similarly, in Vietnam, a study reported an AF prevalence of 18.1% among 2,038 stroke and TIA patients, further supporting the significance of AF in stroke pathophysiology. The similarity in prevalence across these studies underscores the importance of early detection and management of AF to reduce stroke burden globally.[82]

The findings of this study can be compared with those from a similar cross-sectional study conducted by Habiba I. at Kenyatta National Hospital in Kenya. This study, which similarly looked at atrial fibrillation among acute ischemic stroke patients, reported a higher prevalence of approximately 27%, in contrast to the 16% seen in the present study, a difference that may reflect variations in study populations, diagnostic methods, or cor-morbidity patterns between the two settings.[83,84]

Detection methods significantly affect the reported prevalence of AF. A study employed 48-hour Holter monitoring and detected paroxysmal AF in 6.5% of stroke patients, while

another one compared continuous stroke unit ECG monitoring with 24-hour Holter ECG and highlighted the benefit of prolonged monitoring in identifying transient AF episodes missed by standard ECG.[83,84]

In this study, detection relied on conventional ECG at admission, which may underestimate paroxysmal AF cases. The implication is that adopting extended ECG monitoring tools, such as 48-hour Holter or continuous telemetry, could improve detection and thereby influence treatment decisions and secondary prevention strategies.

6.2 Predictors of Atrial Fibrillation (AF) among patients with acute ischemic stroke.

The present study identified older age (>60 years) as the strongest social-demographic predictor of Atrial Fibrillation (AF), even after controlling for other factors. This can be explained by both pathophysiological mechanisms and supported by global literature.

The mechanisms linking aging and AF include age-related structural remodeling due to fibrosis secondary to fibrofatty infiltration of atrial myocardium, including the SA node and pulmonary vein ostia, dilation, especially of the left atrium, and conduction abnormalities, which all increase the likelihood of ectopic foci and trigger sustained AF. Furthermore, there is electrical remodeling due to reduced expression of ion channels and altered refractory periods, which create an environment that supports reentrant arrhythmias.

Also, older individuals are more likely to have accumulation of comorbidities like hypertension, diabetes, heart failure and chronic kidney disease, all of which are independently associated with AF. Aging is also associated with a state of chronic low-grade inflammation (inflammaging) and endothelial dysfunction, which both promote thromboembolic risk and arrhythmogenesis.

Findings from the Framingham Heart Study and the ARIC study indicate that the likelihood of developing atrial fibrillation increases markedly with age, notably beyond

60[85,86]. Furthermore, both Western and African population studies report that age >60 or >65 is consistently the strongest predictor of AF in stroke patients[87]. The study from Kenyatta Hospital by Habiba et al also found that older age was the leading predictor of AF in stroke patients[88].

In this study found that higher education levels had a protective association with Atrial fibrillation (AF). This is plausible since individuals with higher education may have better health literacy, earlier diagnosis and management of risk factors, greater medication adherence, and lower burden of undiagnosed AF.

The ARIC study reported that individuals with lower levels of education had a significantly higher risk of developing atrial fibrillation. Similarly, a study in Sweden found that the incidence of AF was greater among those with lower educational attainment, particularly in men. Importantly, low education remained an independent predictor of AF even after accounting for other cardiovascular risk factors.[89].

The SIREN study of Ghana and Nigeria reported an increased prevalence of AF among stroke patients with lower education levels, although not always reaching statistical significance after multivariate adjustment.[90]

All these studies suggested that low education may be a proxy for poor health care access, lack of awareness about cardiovascular risk factors, and lower screening rates for AF, limited understanding of AF symptoms, leading to late diagnosis, poor control of comorbidities (e.g., HTN), and increased risk of stroke. Higher education was associated with better health-seeking behavior, medication use, and control of hypertension.

This study identified hypertension, diabetes, heart failure, prior stroke, and chronic kidney disease as common comorbidities in patients with AF. These findings are supported by a study that found advanced age, renal dysfunction, valvular heart disease, and low ejection fraction were significantly associated with AF in stroke patients. Notably, renal

dysfunction (aOR 3.91) and low ejection fraction (aOR 2.61) had strong associations with AF[82].

However, in this study, hypertension was the strongest predictor of atrial fibrillation. This is because hypertension contributes to the initiation, maintenance, and progression of AF through mechanisms like left atrial enlargement and remodeling, by stimulation of RAAS, which promotes inflammation, oxidative stress, and fibroblast activation, all resulting in endothelial dysfunction and a prothrombotic state. Also, hypertension causes sympathetic overactivity and baroreceptor dysfunction, which increases atrial excitability and predisposes to AF[6].

This is supported by global studies, including the RE-LY and ARIC studies, which showed that hypertension is not only a precursor to AF but also significantly increases the risk of ischemic stroke in those with AF.[85]

In the SIREN study, in Ghana, hypertension was the most prevalent risk factor (over 80%) among patients with AF and ischemic stroke, and in Nigeria, hypertension was also the leading predictor for AF[90]. Even the Kenyan study found that hypertension was an important risk for AF in stroke patients[88].

Furthermore, the combination of hypertension and heart failure also showed a strong association with the risk of developing atrial fibrillation (AF). This can be explained by the fact that they have a synergistic effect in causing left atrial enlargement, atrial myopathy, structural and electrical remodeling, as well as neurohormonal activation. They also exhibit a shared risk profile such as obesity, diabetes, renal impairment and sleep apnea, which compound the arrhythmogenic burden.

This finding are similar with global reports from the Framingham study, ARIC study, SIREN study, and the Kenyan study that reported a combination of hypertension and

heart failure increased the risk of new onset AF more than either condition alone, supporting their synergistic effect.

This study also found that poor adherence to medications is a strong predictor of AF in patients with acute ischemic stroke. This could be because antiplatelets are essential to prevent platelet aggregation, which could contribute to microvascular ischemia and endothelial inflammation, increasing the risk of AF and silent infarcts. Statins, on the other hand, have pleiotropic effects in reducing oxidative stress, inhibiting inflammation, and stabilizing the cardiac membrane, hence lowering the incidence of AF. Furthermore, anticoagulants in patients with known AF prevent further thrombus formation.

The findings in this study are supported by global data from the RE-LY Trial, which demonstrated that inconsistent use of anticoagulants in AF patients increases stroke risk, and the ACTIVE-A Trial reported that patients not adhering to anti platelet therapy had higher thrombotic and recurrent stroke risks, especially in the elderly.[91,92]

Meta-analyses show that statins significantly reduce AF incidence by modulating inflammation and oxidative stress. Non-use or discontinuation is associated with higher AF recurrence, especially post-stroke or in patients with structural heart disease[1].

According to the SIREN study, inadequate adherence to medications for secondary prevention was linked to recurrent stroke and increased AF burden, largely due to medication costs, limited follow-up, and lack of patient education[87].

6.3 Atrial Fibrillation (AF) and Stroke Severity

Several studies have explored the relationship between AF and stroke severity. For instance, a study found that ischemic strokes associated with AF were more severe, with higher rates of bedridden states and worse functional outcomes compared to non-AF-related strokes.[93] Another one reported an odds ratio of 2.23 for bedridden state post-

stroke in AF patients (95% CI: 1.87–2.59), indicating a statistically significant association.[94]

Although in this study, the association between AF and NIHSS score is not significant, due to the small sample size, further studies with a larger cohort would strengthen the understanding of AF's impact on stroke prognosis.

CHAPTER EIGHT

8.0 STRENGTHS, LIMITATIONS, AND MITIGATION STRATEGIES

8.1 Strengths

One of the primary strengths of this study is that it represents one of the few investigations conducted within Tanzanian to explore the occurance and clinical impact of AF in patients with acute ischemic stroke. This adds valuable local data to a field where regional evidence is limited and provides insights into a population often underrepresented in global stroke epidemiology.

Additionally, the study employed a robust analytical approach, utilizing both crude and adjusted prevalence ratios, chi-square tests, and stratified analysis across comorbidities and medications. This comprehensive statistical modeling enhances the reliability and depth of the findings.

Another strength lies in the inclusion of a clinically diverse patient cohort, encompassing a wide range of coexisting diseases such as hypertension, diabetes mellitus, heart failure, and chronic kidney disease. These factors enabled a nuanced understanding of how AF interacts with various clinical conditions to influence stroke outcomes. The use of the NIHSS score to assess stroke severity further strengthens the clinical relevance of the findings, offering standardized insights into stroke burden in AF patients.

8.2 Limitations

Despite its contributions, the study has several limitations. First, the cross-sectional design limits the ability to draw causal inferences regarding the temporal relationship between AF and stroke severity or outcomes.

Secondly, the potential underdiagnosis of paroxysmal AF is a concern, as continuous ECG monitoring or 24-hour Holter recordings were not employed due to feasibility constraints. This may have led to an underestimation of AF prevalence.

Third, although the NIHSS score was used to classify stroke severity, misclassification bias remains possible if assessments were influenced by inter-observer variability.

Additionally, the sample size, while adequate for initial estimates, was relatively small, thereby limiting the generalizability of the findings to broader Tanzanian or sub-Saharan African populations.

Lastly, the patients had no echocardiographic or imaging evaluations, which could have helped confirm structural heart abnormalities linked to AF.

8.3 Mitigation Strategies

To address the above limitations, future studies should adopt prospective or longitudinal designs to better capture temporal associations and explore long-term outcomes such as stroke recurrence and mortality. Multicenter collaboration is also recommended to enhance the sample size and population diversity, thereby improving generalizability.The implementation of continuous ECG or Holter monitoring—though resource-intensive—could significantly improve the detection of paroxysmal AF, particularly in stroke units. . Standardized training and inter-rater reliability check for NIHSS scoring should be introduced to minimize subjectivity and ensure consistent assessment of stroke severity. Additionally, incorporating routine echocardiographic assessments would help in identifying underlying structural causes of AF, enriching the clinical interpretation of data.

CHAPTER NINE

9.0 CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSION

This study has demonstrated a significant prevalence of AF in patients with acute ischemic stroke in Regional Referral Hospitals in Dar es Salaam. It also demonstrated that older age >60 years, low level of education, hypertension, heart failure, and poor adherence to medications are strong predictors of AF in patients with acute ischemic stroke.

The findings confirm a substantial burden of AF in this population, with associations observed between AF and poor stroke severity outcomes. The comparisons with international studies reinforce the global impact of AF, which is a modifiable risks for stroke. The results align closely with data from both high-income and low-income settings, affirming the necessity for early diagnosis and treatment of AF.

9.2 RECOMMENDATIONS

In light of the findings from this study, routine screening for atrial fibrillation (AF) in patients presenting with acute ischemic stroke should be prioritized, especially in resource-constrained settings.

Moreover, public health efforts should emphasize raising awareness among both clinicians and the general population regarding the strong association between AF and ischemic stroke. Education campaigns and continuous medical education should aim to increase recognition of these risk factors and encourage early screening. Increased awareness will facilitate timely interventions and reinforce the importance of stroke prevention strategies in patients with predisposing conditions.

From this study, the need for clear stroke severity stratification using NIHSS scores and training of practitioners is emphasized [93].Lastly, longitudinal cohort studies are necessary to assess long-term outcomes in patients with AF-associated stroke, including stroke recurrence, mortality, and functional recovery. One study showed that AF was associated with increased odds of bedridden states post-stroke and greater disability, supporting the need for ongoing follow-up to evaluate the long-term impact of AF in ischemic stroke survivors[94]. Such studies will also provide important information about the effectiveness of secondary prevention over time.

REFERENCES

1. Van Gelder IC, Rienstra M, Bunting K V, et al. 2024 ESC Guidelines for the management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). *Eur Heart J*. 2024;45(36):3314-3414. doi:10.1093/eurheartj/ehae176

2. Li H, Song X, Liang Y, et al. Global, regional, and national burden of disease study of atrial fibrillation/flutter, 1990–2019: results from a global burden of disease study, 2019. *BMC Public Health*. 2022;22(1):2015. doi:10.1186/s12889-022-14403-2

3. Linz D, Gawalko M, Betz K, et al. Atrial fibrillation: epidemiology, screening and digital health. *The Lancet Regional Health – Europe*. 2024;37. doi:10.1016/j.lanepe.2023.100786

4. Dai H, Zhang Q, Wu J, et al. Global, regional, and national prevalence, incidence, mortality, and risk factors for atrial fibrillation, 1990-2017: results from the Global Burden of Disease Study 2017. *Eur Heart J Qual Care Clin Outcomes*. 2020;7. doi:10.1093/ehjqcco/qcaa061

5. Odutayo A, Hsiao AJ, Emdin CA, Altman DG, Hopewell S, Wong CX. Atrial fibrillation and risks of cardiovascular disease, renal disease, and death: systematic review and meta-analysis. *BMJ*. 2016;354. doi:10.1136/bmj.i4482

6. Nattel S, Zhou L, Dobrev D, Heijman J. Molecular Basis of Atrial Fibrillation Pathophysiology and Therapy: A Translational Perspective. *Circ Res*. 2020;127. doi:10.1161/circresaha.120.316363

7. Ehrlich JR, Hohnloser SH, Chartier D, et al. Cellular electrophysiology of canine pulmonary vein cardiomyocytes: action potential and ionic current properties. *J Physiol*. 2003;551. doi:10.1111/j.1469-7793.2003.00801.x

8. Haïssaguerre M, Takahashi A, Le Mouroux A, et al. Spontaneous initiation of atrial fibrillation by ectopic beats originating in the pulmonary veins. *New England Journal of Medicine*. 1998;339. doi:10.1056/nejm199809033391003

9. Abu HO, Wang W, Gurwitz JH, et al. Perception of atrial fibrillation symptoms: Impact on quality of life and treatment in older adults. *J Am Geriatr Soc*. 2022;70. doi:10.1111/jgs.17954

10. Wynn GJ, Mcshane J, Gupta D, et al. The European Heart Rhythm Association symptom classification for atrial fibrillation: validation and improvement through a simple modification. *Europace*. 2014;16. doi:10.1093/europace/eut395

11. Kvist LM, Vinter N, Diederichsen ACP, Urbonaviciene G, Frost L, Lindholt JS. Diagnostic accuracies of screening for atrial fibrillation by cardiac nurses versus radiographers. *Open Heart*. 2019;6. doi:10.1136/openhrt-2018-000942

12. Hall A, Simpson RFG, Mitchell ARJ. Biomarker Assays for Personalised Stroke Risk Assessment in Atrial Fibrillation. *Cardiovasc Hematol Disord Drug Targets*. 2017;17. doi:10.2174/1871529x17666170104120746

13. Berg DD, Morrow DA, Ruff CT. Biomarkers for Risk Assessment in Atrial Fibrillation. *Clin Chem*. 2020;67. doi:10.1093/clinchem/hvaa298

14. Alkhouli M, Alvi M, Holmes DR, Aljohani S, Alqahtani F. Burden of Atrial Fibrillation-Associated Ischemic Stroke in the United States. *JACC Clin Electrophysiol*. 2018;4. doi:10.1016/j.jacep.2018.02.021

15. Hu WS, Lin CL. Weekend versus weekday hospitalization and clinical outcomes in atrial fibrillation patients with and without stroke. *Postgrad Med J*. 2022;129. doi:10.1136/postgradmedj-2022-141684

16. Ozdemir H, Abdul-Rahim AH, Lip GYH, Sagris D. Stroke in Atrial Fibrillation and Other Atrial Dysrhythmias. *Curr Cardiol Rep*. 2023;25. doi:10.1007/s11886-023-01862-1

17. Beri A, Punnam SR. Anticoagulation in Patients with Acute Ischemic Stroke and Atrial Fibrillation—a Balance of Risks and Benefits. *Cardiovasc Drugs Ther*. 2008;22. doi:10.1007/s10557-008-6122-y

18. Gatzoulis K, Laina A, Doundoulakis I, et al. Impact of Atrial Fibrillation on the Severity, Progress, and Disability of the Ischemic Stroke Patients. *Heart and Mind*. 2022;6. doi:10.4103/hm.hm_27_21

19. D.M Akpanova -, S.F Berkinbayev -, A.T Mussagaliyeva -, D.A Ospanova -. Prevalence and Major Risk Factors for Atrial Fibrillation. *Journal of Pharmacy and Nutrition Sciences*. 2019;9. doi:10.29169/1927-5951.2019.09.02.6

20. Friberg L, Bergfeldt L. Atrial fibrillation prevalence revisited. *J Intern Med*. 2013;274. doi:10.1111/joim.12114

21. Friberg L, Terént A, Lindgren A, Rosenqvist M, Asplund K, Norrving B. High prevalence of atrial fibrillation among patients with ischemic stroke. *Stroke*. 2014;45. doi:10.1161/strokeaha.114.006070

22. Renati S, Stone DK, Almeida L, Wilson CA. Predictors of Atrial Fibrillation in Patients With Cryptogenic Stroke. *Neurohospitalist*. 2018;9. doi:10.1177/1941874418819619

23. Ushkalova EA, Dumchenko E V, Zyryanov SK. APPROACHES TO ANTITHROMBOTIC THERAPY IN ELDERLY PATIENTS WITH ATRIAL FIBRILLATION. *Rational Pharmacotherapy in Cardiology*. 2017;13. doi:10.20996/1819-6446-2017-13-2-275-283

24. Palaiodimou L, Stefanou MI, Katsanos AH, et al. Timing of oral anticoagulants initiation for atrial fibrillation after acute ischemic stroke: A systematic review and meta-analysis. *Eur Stroke J*. Published online May 14, 2024. doi:10.1177/23969873241251931

25. Meinel TR, Branca M, De Marchis GM, et al. Prior Anticoagulation in Patients with Ischemic Stroke and Atrial Fibrillation. *Ann Neurol*. 2021;89(1):42-53. doi:10.1002/ana.25917

26. Varughese CJ, Halperin JL. Prevention of stroke in patients with atrial fibrillation. *Journal of Interventional Cardiac Electrophysiology*. 2012;35. doi:10.1007/s10840-012-9677-2

27. Bang OY, Park KM, Jeong DS. Occurrence of Ischemic Stroke in Patients With Atrial Fibrillation Receiving Non-Vitamin K Oral Anticoagulants: Causes and Prevention Strategies. *J Stroke*. 2023;25. doi:10.5853/jos.2022.03552

28. Phong PD, Tung BN, Hung PM, et al. Prevalence and Factors Associated with Atrial Fibrillation in Patients with Transient Ischemic Attack or Ischemic Stroke in Northern Vietnam. *J Clin Med*. 2023;12. doi:10.3390/jcm12175516

29. Yang Q, Churilov L, Fan D, Davis S, Yan B. 1.4 times increase in atrial fibrillation-related ischemic stroke and TIA over 12 years in a stroke center. *J Neurol Sci*. 2017;379. doi:10.1016/j.jns.2017.05.022

30. Abdelnabi M, Saleh Y, Özden Tok Ö, et al. Frequency of de novo atrial fibrillation in patients presenting with acute ischemic cerebrovascular stroke. *The Egyptian Heart Journal*. 2020;72. doi:10.1186/s43044-020-00050-8

31. Giralt-Steinhauer E, Muiño-Acuña E, Jiménez-Conde J, et al. New-Onset Paroxysmal Atrial Fibrillation Diagnosis in Ischemic Stroke Patients. *Eur Neurol*. 2015;74. doi:10.1159/000441187

32. Song J. The Chinese burden of atrial fibrillation review of atrial fibrillation studies in China. *Ann Noninvasive Electrocardiol*. 2022;27. doi:10.1111/anec.12957

33. Furberg CD, Psaty BM, Manolio TA, Gardin JM, Smith VE, Rautaharju PM. Prevalence of atrial fibrillation in elderly subjects (the Cardiovascular Health Study). *Am J Cardiol*. 1994;74. doi:10.1016/0002-9149(94)90363-8

34. Yuyun MF, Ngantcha M, Bonny A, et al. A Systematic Review of the Spectrum of Cardiac Arrhythmias in Sub-Saharan Africa. *Glob Heart*. 2020;15. doi:10.5334/gh.808

35. Chen Y, Alphonce E, Mujuni E, et al. Atrial fibrillation and mortality in outpatients with heart failure in Tanzania: a prospective cohort study. *BMJ Open*. 2022;12. doi:10.1136/bmjopen-2021-058200

36. Fan J, Man Q, Suo C, et al. Global Burden, Risk Factor Analysis, and Prediction Study of Ischemic Stroke, 1990-2030. *Neurology*. 2023;101. doi:10.1212/wnl.0000000000207387

37. Ding Q, Liu H, Liu S, Han L, Cai T, Yao Y. Global, Regional, and National Burden of Ischemic Stroke, 1990-2019. *Neurology*. 2021;98. doi:10.1212/wnl.0000000000013115

38. Krishnamurthi R V, Feigin VL. 14 - Global Burden of Stroke. *Stroke*. Published online April 23, 2021. doi:10.1016/b978-0-323-69424-7.00014-4

39. Adoukonou T, Agbétou M, Preux PM, et al. Stroke case fatality in sub-Saharan Africa: Systematic review and meta-analysis. *International Journal of Stroke*. 2021;16. doi:10.1177/1747493021990945

40. Hertz JT, Sakita FM, Mmbaga BT, et al. The burden of acute coronary syndrome, heart failure, and stroke among emergency department admissions in Tanzania: A retrospective observational study. *Afr J Emerg Med*. 2019;9. doi:10.1016/j.afjem.2019.07.001

41. Rizos T, Jenetzky E, Wagner A, et al. Paroxysmal Atrial Fibrillation Is More Prevalent than Persistent Atrial Fibrillation in Acute Stroke and Transient Ischemic Attack Patients. *Cerebrovascular Diseases*. 2011;32. doi:10.1159/000330348

42. Noubiap JJ, Nyaga UF. A review of the epidemiology of atrial fibrillation in sub-Saharan Africa. *J Cardiovasc Electrophysiol*. 2019;30. doi:10.1111/jce.14222

43. Kamdem F, Monkam Y, Dzudie A, et al. Epidemiologic Aspects of Atrial Fibrillation in a Tertiary Hospital in a Sub-Saharan Africa Setting. *OAlib*. 2017;04. doi:10.4236/oalib.1103384

44. Namale G, Cras P, Ddumba E, et al. Risk Factors for Hemorrhagic and Ischemic Stroke in Sub-Saharan Africa. *J Trop Med*. 2018;2018. doi:10.1155/2018/4650851

45. Jacobs MS, Van Hulst M, Adeoye AM, Tieleman RG, Postma MJ, Owolabi MO. Atrial Fibrillation in Africa—An Under-Reported and Unrecognized Risk Factor for Stroke: A Systematic Review. *Glob Heart*. 2019;14. doi:10.1016/j.gheart.2019.04.003

46. Kayima J, Charles L. PM009 Atrial fibrillation in Africa: Clinical Characteristics and Management Patterns in Uganda. *Glob Heart*. 2014;9(1, Supplement):e62-e63. doi:https://doi.org/10.1016/j.gheart.2014.03.1431

47. Roberts SE. Case fatality rates after admission to hospital with stroke: linked database study. *BMJ*. 2003;326. doi:10.1136/bmj.326.7382.193

48. Zou C, Wei C, Wang Z, Jin Y. Sex differences in outcomes and risk factors among elderly patients with ischemic stroke. *Oncotarget*. 2017;8. doi:10.18632/oncotarget.21967

49. Bindawas SM, Alhaidary H, Mawajdeh H, Vennu V. Functional outcomes by age after inpatient stroke rehabilitation in Saudi Arabia. *Clin Interv Aging*. 2017;12. doi:10.2147/cia.s145402

50. Sienkiewicz-Jarosz H, Gtuszkiewicz M, Pniewski J, et al. Incidence and case fatality rates of first-ever stroke – comparison of data from two prospective population-based studies conducted in Warsaw. *Neurol Neurochir Pol*. 2011;45. doi:10.1016/s0028-3843(14)60073-6

51. Abreu P, Correia M, Silva MC, Baptista D, Azevedo E, Magalhães R. Readmissions and Mortality During the First Year After Stroke-Data From a Population-Based Incidence Study. *Front Neurol*. 2020;11. doi:10.3389/fneur.2020.00636

52. Goulart AC, Bensenor IM, Fernandes TG, Alencar AP, Fedeli LM, Lotufo PA. Early and One-Year Stroke Case Fatality in Sao Paulo, Brazil: Applying the World Health Organization's Stroke STEPS. *Journal of Stroke and Cerebrovascular Diseases*. 2011;21. doi:10.1016/j.jstrokecerebrovasdis.2011.04.017

53. Owolabi M, Sarfo FS, Akinyemi R, Gebreyohanns M, Ovbiagele B. The Sub-Saharan Africa Conference on Stroke (SSACS): An idea whose time has come. *J Neurol Sci*. 2019;400. doi:10.1016/j.jns.2019.03.026

54. Waweru P, Gatimu SM. Stroke Epidemiology, Care, and Outcomes in Kenya: A Scoping Review. *Front Neurol*. 2021;12. doi:10.3389/fneur.2021.785607

55. Makubi A, Hage C, Lwakatare J, et al. Contemporary aetiology, clinical characteristics and prognosis of adults with heart failure observed in a tertiary hospital in Tanzania: The prospective Tanzania Heart Failure (TaHeF) study. *Heart*. 2014;100(16):1235-1241. doi:10.1136/heartjnl-2014-305599

56. Kongbunkiat K, Kasemsap N, Travanichakul S, Thepsuthammarat K, Tiamkao S, Sawanyawisuth K. Hospital mortality from atrial fibrillation associated with ischemic stroke: a national data report. *International Journal of Neuroscience*. 2014;125. doi:10.3109/00207454.2014.986266

57. Keller K, Hobohm L, Wenzel P, Münzel T, Espinola-Klein C, Ostad MA. Impact of atrial fibrillation/flutter on the in-hospital mortality of ischemic stroke patients. *Heart Rhythm*. 2019;17. doi:10.1016/j.hrthm.2019.10.001

58. Dong C, Nobo U, - -, et al. Disparities and Temporal Trends in Stroke Care Outcomes in Patients with Atrial Fibrillation: The FLiPER-AF Stroke Study. *Int J Cerebrovasc Dis Stroke*. 2019;2. doi:10.29011/2688-8734.100017

59. Ogawa H, Senoo K, An Y, et al. Clinical Features and Prognosis in Patients with Atrial Fibrillation and Prior Stroke: Comparing the Fushimi and Darlington AF Registries. *EBioMedicine*. 2017;18. doi:10.1016/j.ebiom.2017.03.022

60. Buhari H, Tu K, Jackevicius CA, et al. Stroke risk in women with atrial fibrillation. *Eur Heart J*. 2023;45. doi:10.1093/eurheartj/ehad508

61. Kim TH, Jang E, Lee MH, et al. Age Threshold for Ischemic Stroke Risk in Atrial Fibrillation. *Stroke*. 2018;49. doi:10.1161/strokeaha.118.021047

62. Hirsh BJ, Copeland-Halperin RS, Halperin JL. Fibrotic Atrial Cardiomyopathy, Atrial Fibrillation, and Thromboembolism: Mechanistic Links and Clinical Inferences. *J Am Coll Cardiol*. 2015;65. doi:10.1016/j.jacc.2015.03.557

63. Zhang JC, Bhat A. Atrial Cardiopathy: Redefining Stroke Risk Beyond Atrial Fibrillation. *Am J Cardiol*. 2023;201. doi:10.1016/j.amjcard.2023.06.002

64. Hirsh BJ, Copeland-Halperin RS, Halperin JL. Fibrotic Atrial Cardiomyopathy, Atrial Fibrillation, and Thromboembolism: Mechanistic Links and Clinical Inferences. *J Am Coll Cardiol*. 2015;65. doi:10.1016/j.jacc.2015.03.557

65. Hirsh BJ, Copeland-Halperin RS, Halperin JL. Fibrotic Atrial Cardiomyopathy, Atrial Fibrillation, and Thromboembolism: Mechanistic Links and Clinical Inferences. *J Am Coll Cardiol*. 2015;65. doi:10.1016/j.jacc.2015.03.557

66. Calenda BW, Halperin JL, Fuster V, Granger CB. Stroke risk assessment in atrial fibrillation: risk factors and markers of atrial myopathy. *Nat Rev Cardiol*. 2016;13. doi:10.1038/nrcardio.2016.106

67. Liu R, Yang X, Li S, Jiang Y, Wang Y, Wang Y. Novel composite scoring system to predict unknown atrial fibrillation in acute ischemic stroke patients. *Brain Res*. 2017;1674. doi:10.1016/j.brainres.2017.08.005

68. Sezenöz B, Yalçın Y, Caglayan HB, et al. Predictive Value of Supraventricular Short Runs for New-Onset Atrial Fibrillation in Patients with Ischemic Stroke. *Ann Indian Acad Neurol*. 2023;26. doi:10.4103/aian.aian_308_23

69. Etgen T, Mundel M, Freudenberger T, Hochreiter M. Insertable Cardiac Event Recorder in Detection of Atrial Fibrillation After Cryptogenic Stroke. *Stroke*. 2013;44. doi:10.1161/strokeaha.113.001340

70. Pedersen KB, Chemnitz A, Madsen C, Bak S, Sandgaard NCF, Brandes A. Low Incidence of Atrial Fibrillation in Patients with Transient Ischemic Attack. *Cerebrovasc Dis Extra*. 2016;6. doi:10.1159/000451035

71. Ghrooda EM, Dobrowolski P, Ahmad A, et al. Abstract 25: Paroxysmal Atrial Fibrillation is Common in Patients With Defined Etiology for Stroke: Prolonged Monitoring of Cardiac Rhythm for Detection of Atrial Fibrillation After a Cerebral Ischemic Event (PEAACE) Study. *Stroke*. 2014;45. doi:10.1161/str.45.suppl_1.25

72. Alvarado-Bolaños A, Lippert C, Ayan D, et al. Differences in Stroke Recurrence Risk Between Atrial Fibrillation Detected on ECG and 14-Day Cardiac Monitoring. *Stroke*. 2023;54. doi:10.1161/strokeaha.123.043672

73. Choe WC, Passman RS, Brachmann J, et al. A Comparison of Atrial Fibrillation Monitoring Strategies After Cryptogenic Stroke (from the Cryptogenic Stroke and Underlying AF Trial). *Am J Cardiol*. 2015;116. doi:10.1016/j.amjcard.2015.06.012

74. Wallmann D, DelacréTaz E, TüLler D, et al. Frequent Atrial Premature Beats Predict Paroxysmal Atrial Fibrillation in Stroke Patients. *Stroke*. 2007;38. doi:10.1161/strokeaha.107.485110

75. Kang J, Lee SJ, et al. Hospital Volume and Mortality in Acute Ischemic Stroke Patients: Effect of Adjustment for Stroke Severity. *Journal of Stroke and Cerebrovascular Diseases*. 2020;29. doi:10.1016/j.jstrokecerebrovasdis.2020.104753

76. Van Hooff RJ, Mariën P, De Raedt S, et al. Unassisted Assessment of Stroke Severity Using Telemedicine. *Stroke*. 2013;44. doi:10.1161/strokeaha.111.680868

77. Furlanis G, Ajčević M, Stragapede L, et al. Ischemic Volume and Neurological Deficit: Correlation of Computed Tomography Perfusion with the National Institutes of Health Stroke Scale Score in Acute Ischemic Stroke. *Journal of Stroke and Cerebrovascular Diseases*. 2018;27. doi:10.1016/j.jstrokecerebrovasdis.2018.04.003

78. Asmedi A, Sebayang DP, Putri DPA, et al. Quantitative EEG Correlates with NIHSS and MoCA for Assessing the Initial Stroke Severity in Acute Ischemic Stroke Patients. *Open Access Maced J Med Sci*. 2022;10. doi:10.3889/oamjms.2022.8483

79. Freitas S, Santana I, Marôco J, Simões MR, Alves L. Construct Validity of the Montreal Cognitive Assessment (MoCA). *Journal of the International Neuropsychological Society*. 2011;18. doi:10.1017/s1355617711001573

80. Sala G, Ishioka Y, Ikebe K, et al. The Psychometric Properties of the Montreal Cognitive Assessment (MoCA). *Swiss Journal of Psychology*. 2020;79. doi:10.1024/1421-0185/a000242

81. Gu Z, He X, He X, et al. Automatic quantitative stroke severity assessment based on Chinese clinical named entity recognition with domain-adaptive pre-trained large language model. *Artif Intell Med*. 2024;150. doi:10.1016/j.artmed.2024.102822

82. Phong PD, Tung BN, Hung PM, et al. Prevalence and Factors Associated with Atrial Fibrillation in Patients with Transient Ischemic Attack or Ischemic Stroke in Northern Vietnam. *J Clin Med*. 2023;12(17). doi:10.3390/jcm12175516

83. Rizos T, Güntner J, Jenetzky E, et al. Continuous Stroke Unit Electrocardiographic Monitoring Versus 24-Hour Holter Electrocardiography for Detection of Paroxysmal Atrial Fibrillation After Stroke. Published online 2012. doi:10.1161/STROKEAHA.111

84. Elbarbary AI, Kilany A, Salem MB, Sakr MA. Paroxysmal atrial fibrillation incidence in acute ischemic stroke or Paroxysmal atrial fibrillation incidence in acute ischemic stroke or transient ischemic attacks detected by 48-h Holter monitoring transient ischemic attacks detected by 48-h Holter monitoring. *Menoufia Medical Journal*. 2021;34(3):63. doi:10.4103/mmj.mmj_122_21

85. Wright JD, Folsom AR, Coresh J, et al. The ARIC (Atherosclerosis Risk In Communities) Study: JACC Focus Seminar 3/8. *J Am Coll Cardiol*. 2021;77(23):2939-2959. doi:10.1016/j.jacc.2021.04.035

86. Wańkowicz P, Nowacki P, Gołąb-Janowska M. Atrial fibrillation risk factors in patients with ischemic stroke. *Archives of Medical Science*. 2021;17(1):19-24. doi:10.5114/aoms.2019.84212

87. Adeoye AM, Ogah OS, Ovbiagele B, et al. Prevalence and Prognostic Features of ECG Abnormalities in Acute Stroke: Findings From the SIREN Study Among Africans. *Glob Heart*. 2017;12(2):99-105. doi:10.1016/j.gheart.2017.01.002

88. Ibrahim Hassan H. *DEPARTMENT OF CLINICAL MEDICINE AND THERAPEUTICS THE PREVALENCE OF ATRIAL FIBRILLATION AMONG PATIENTS WITH ACUTE ISCHEMIC STROKE AT KENYATTA NATIONAL HOSPITAL*.; 2023.

89. friberg-et-al-high-prevalence-of-atrial-fibrillation-among-patients-with-ischemic-stroke.

90. Sarfo FS, Ovbiagele B, Gebregziabher M, et al. Stroke among young West Africans: Evidence from the SIREN (stroke investigative research and educational network) large multisite case-control study. *Stroke*. 2018;49(5):1116-1120. doi:10.1161/STROKEAHA.118.020783

91. Connolly SJ, Ezekowitz MD, Yusuf S, et al. Dabigatran versus Warfarin in Patients with Atrial Fibrillation. *New England Journal of Medicine*. 2009;361(12):1139-1151. doi:10.1056/nejmoa0905561

92. Effect of Clopidogrel Added to Aspirin in Patients with Atrial Fibrillation. *New England Journal of Medicine*. 2009;360(20):2066-2078. doi:10.1056/NEJMoa0901301

93. Alloush TK, Ibrahim MH, Azmy HA, et al. Effect of Atrial Fibrillation on Acute Ischemic Stroke Severity. *Open Journal of Medical Imaging*. 2014;04. doi:10.4236/ojmi.2014.42013

94. Dulli DA, Levine RL, Stanko H. Atrial Fibrillation Is Associated with Severe Acute Ischemic Stroke. *Neuroepidemiology*. 2003;22. doi:10.1159/000068743

95. Fernandez V, Hamblin J, Zeller M, et al. Silent Atrial Fibrillation after Ischemic Stroke or Transient Ischemic Attack: Interest of Continuous ECG Monitoring. *Eur Neurol*. 2014;71. doi:10.1159/000357561

APPENDICES

APPENDIX 1. INFORMED CONSENT FORM- ENGLISH VERSION

Introduction

My name is Dr. Moza Masoud Salim. I am a postgraduate student of Internal Medicine at Kairuki University. This statement informs you about a research study that I am conducting. This research is part of the requirements for the fulfillment of the degree of Master's in Internal Medicine.

Purpose of the study

I am doing a research study on the predictors of Atrial Fibrillation among patients with acute ischemic stroke attending Regional Referral Hospitals in Dar-es-salaam, Tanzania.

Benefits of the study

The results of the study will help provide information and raise awareness about Atrial fibrillation among ischemic stroke patients in Tanzania and thus help policy makers, clinicians, and other specialties, that are involved in providing care to these patients to be able to diagnose, treat, and manage these conditions among those affected more effectively.

Risks and costs incurred

Participation in this study is entirely voluntary and as per your own choice. No harm is involved in participating in the study. There are no risks for participating in this study and no costs will be incurred by the patient.

Procedures followed in the study

This study will take 30 minutes of your time. Should you accept to participate, the following is a summary of what the study involves:

1. Obtaining demographic, clinical and laboratory information such as age, sex, weight, history of medical conditions and medications used, cigarette smoking and alcohol use.
2. Performing ECG as diagnostic procedure for Atrial fibrillation.
3. Administration of NIHSS to assess severity of stroke.

Assurance of Confidentiality

All your responses, results and information gathered in this study will be highly confidential and will be used only by the principal investigator (myself) and with your primary health care physician.

Your rights as a participant

1. Your participation in this research is voluntary and in the event that you refuse to participate in this study your treatment will not be affected.
2. You are free to terminate the interview and withdraw from the study at any time.
3. You are free to ask questions before signing the consent form.

Benefit to you as a participant

Your primary health care physician will be informed of any findings relevant to your medical care. The results obtained from this study will help improve clinical decisions and patient care in this facility.

Compensation

You will not receive any monetary compensation for participating in this study.

Questions

People to contact in case of any questions or concerns

Principal investigator: Dr. Moza M. Salim

Contacts: 0652- 406062

Head of department of internal medicine: Prof Yassin Mgonda

Contacts: 0754-277554

Chairperson of IREC: Prof. Columba Mbekenga

Contacts: 0784-645777

PARTICIPANT'S STATEMENT

I have read the foregoing information or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntary to participate as a participant in this research.

Name of Participant: _____

Signature of Participant: _____

Signature of Investigator: _____

Date: _____

APPENDIX 2: INFORMED CONSENT FORM - SWAHILI VERSION

FOMU YA RIDHAA

Utangulizi

Mimi naitwa Dr. Moza Masoud Salim, ni mwanafunzi wa udhamili wa udaktari katika chuo kikuu cha afya na tiba Kairuki. Lengo la utangulizi huu ni kukueleza juu ya utafiti ninaofanya na kuomba ruhusa ya kushiriki katika utafiti. Utafiti huu ni moja ya mahitaji ya kupata shahada ya udaktari.

Dhumuni la utafiti huu

Utafiti huu unalenga kujua ukubwa wa na visababishi vya shida ya mapigo ya moyo yasiyo ya kawaida katika wagonjwa wa kiharusi katika hospitali za rufaa za mkoa wa Dar-es-salaam, Tanzania.

Manufaa ya utafiti huu

Matokeo ya utafiti huu yatasaidia kupata taarifa, kuongeza ufahamu, na kutambua mambo ya msingi kuhusu ugonjwa huu hapa nchini. Haya matokeo yatasaidia watengeneza sera za afya, watafiti, na watoa huduma za afya kuelewa huu ugonjwa vizuri na pia kuweza kugundua na kutibu kwa wagonjwa walioathirika.

Madhara na gharama kwa mshiriki

Hakuna madhara yanayotrajiwa wala gharama yoyote atayepata mshiriki katika utafiti huu.

Utaratibu wa Utafiti

Ushiriki wako katika utafiti huu utachukua dakika 30 wa muda wako.

Endapo utakubali kushiriki katika tafiti huu, maelezo yafuatayo yatahitajika:

1. Taarifa zako binafsi, uzito, urefu, magonjwa uliokuwa nayo, dawa unazotumia na maelezo na historia ya magonjwa mengineyo uliyo nayo.
2. kufanyiwa kipimo cha ECG kinachoweza kugundua shida ya mapigo ya moyo yasiyo ya kawaida

Usiri

Taarifa zote zitakazokusanywa kwenye utafiti huu zitahifadhiwa katika hali ya usiri na utatumika tuu katika utafiti huu tu.

Haki yako kama mshiriki

1. Ushiriki katika utafiti ni wa hiyari,

2. Mshiriki yoyote ana haki ya kuamua kujitoa katika utafiti wakati wowote.

3. Unaruhisiwa kuuliza maswali kabla ya kuweka sahihi katika fomu ya ridhaa

Faida za kushiriki kwenye utafiti:

Endapo utagundulika na ugonjwa wa mapigo ya moyo yasiyo ya kawaida, daktari wako atajulishwa ili kuweza kukutibu. Tunatumaini kwamba taarifa zinazopatikana zitawanufaisha wengine pia.

Fidia

Hautopata fidia ya aina yoyote kwa kushiriki katika utafiti huu.

Maswali

Watu wa kuwasiliana nao kwa maelezo zaidi

Mtafiti mkuu: Dr. Moza M. Salim

Mawasiliano: 0672- 406062

Mkuu wa idara ya mgonjwa ya ndani: Prof. Yassin Mgonda

Mawasiliano: 0754-277554

Mwenyekiti wa IREC: prof. Columba Mbekenga

Mawasiliano: 0784-645777

Uthibitisho wa mshiriki

Nimesoma maelezo ya hapo juu na kuyaelewa vizuri. Nimepewa nafasi ya kuuliza maswali niliyokuwa nayo na pia nimeridhika na majibu niliyopewa. Mimi nimekubali kushiriki kwenye utafiti huu.

Jina la mshiriki: _____

Sahihi ya mshiriki: _____

Sahihi ya mtafiti: _____

Tarehe: _____

APPENDIX 3: DATA COLLECTION FORM ON SOCIO-DEMOGRAPHIC AND CLINICAL INFORMATION – ENGLISH VERSION

QUESTIONNAIRE NUMBER: _____

SOCIODEMOGRAPHIC INFORMATION

QN1. What are your names? _____

QN2. What is your Hospital Registration Number _____

QN3. What is your age? _____

QN4. What is your gender?

1. Male

2. Female

QN5. What race are you? _____

QN6. Do you have any history of smoking? If No, skip to Qn 8.

1. Yes

2. No

QN 7. If Yes, How many pack years of smoking? (No, of cigarettes/20 times duration in years) _____

QN8. Do you have any history of Alcohol intake?

1. Yes

2. No

QN9. What is your Marital Status?

1. Single / widowed

2. Married

QN10. What is your level of education?

1. Not attended school

2. Primary level

4. Secondary level

5. College / university level

CLINICAL INFORMATION

QN 1. Do you have hypertension?

1. Yes
2. No

QN 2. Do you have Diabetes Mellitus?

1. Yes
2. No

QN 3. Have you ever been diagnosed with Atrial fibrillation?

1. Yes
2. No

QN 4. Have you ever had stroke before?

1. Yes
2. No

QN.5 Do you suffer from Heart failure

1. Yes
2. No

QN.6 Do you suffer from chronic kidney disease?

1. Yes
2. No

QN 7. do you suffer from thyroid disease?

1. Yes
2. No

QN 58. Are you using any of the following medications?

1. Warfarin
2. Rivaroxaban/ apixaban / dabigatran
3. Aspirin/clopidogrel
4. Atorvastatin/ rosuvastatin
5. Both antiplatelet and statin
6. None of the above medications
7. Poor adherence to medications

HOSPITAL RECORDS

BP/ History of hypertension……..

FBG/ History of Diabetes……..

Medication history……

NHISS SCALE SCORE

1. A level of consciousness

0- alert, keenly responsive

1. Not alert but arousable by minor stimulation

2. Not alert, requires repeated stimulation

3.Unresponsive or responds only with reflex

1b. Level of consciousness questions

ie what is your age? What month is it?

0-answers two questions correctly

1-answers one question correctly

2-answers neither questions correctly

1c. Level of consciousness commands

ie open and close your eyes, grip and release your hands

0-performs both tasks correctly

1. Performs one task correctly

2. Performs neither task correctly

2. Best gaze

0-normal

1-partial gaze palsy

2- forced deviation

3. Visual

0-no visual loss

1-partial hemianopia

2-complete hemianopia

3-bilateral hemianopia

4.Facial palsy

0-normal symmetric movements

1-minor paralysis

2-partial paralysis

3-complete paralysis of one or both sides

5. Motor arm

0-no drift

1-drift

2-some effort against gravity

3-no effort against gravity

4-no movement

5. Motor leg

0-no drift

1-drift

2-some effort against gravity

3-no effort against gravity

4-no movement

7. Limb ataxia

0-absent

1-present in one limb

2-present in two limbs

8. Sensory

0-normal, no sensory loss

1-mild to moderate sensory loss

2-severe to total sensory loss

9.Best language

0- no aphasia

1- mild to moderate aphasia

2- severe aphasia

3- mute, global aphasia

10. Dysarthria

0- normal

1- mild to moderate dysarthria

2- severe dysarthria

11. Extinction and inattention

0- no abnormality

1- visual, tactile, auditory, spatial or personal inattention

2- profound hemi-inattention or extinction

TOTAL SCORE……

ECG FINDINGS

1-normal ECG findings

2-Atrial fibrillation, YES OR NO

3-Other features: ……

APPENDIX 4: DATA COLLECTION FORM ON SOCIO- DEMOGRAPHIC, CLINICAL AND LABORATORY INFORMATION - SWAHILI VERSION

TAARIFA ZA KIJAMII, KLINIKI NA MAABARA

NAMBA YA FOMU: _____

TAARIFA ZA KIJAMII NA DEMOGRAFIA

Swali 1. Majina yako: _____

Swali 2. Namba yako ya Hospitali: _____

Swali 3. Una miaka mingapi? : _____

Swali 4. Jinsia yako?

1. Mwanamme

2. Mwanamke

Swali 5. Una Kabila gani? _____

Swali 6. Je, una historia ya uvutaji wa sigara?

1. Ndiyo

2. Hapana

Swali 7. Je, una historia ya unywaji pombe?

1. Ndiyo

2. Hapana

Swali 8. Hali yako ya ndoa ni ipi?

1. Sijaoa/Sijaolewa/mjane

2. Nimeoa/Nimeolewa

Swali 9. Ni kiwango gani cha elimu ulichofikia?

1. Sijaenda shule

2. Nimemaliza elimu ya msingi

3. Nimemaliza elimu ya sekondari

4. Elimu ya juu/chuo kikuu

HABARI ZA KITABIBU

QN 1. Je, una shinikizo la damu?

1. Ndiyo

2. Hapana

QN 2. Je, una Ugonjwa wa Kisukari?

1. Ndiyo

2. Hapana

QN 3. Je, umewahi kugunduliwa kuwa na mapigo ya moyo yasiyo ya kawaida?

1. Ndiyo

2. Hapana

QN 4. Je, umewahi kupata kiharusi hapo awali?

1. Ndiyo

2. Hapana

QN.6 je unaugua ugonjwa wa moyo?

1. Ndio

2. Hapana

QN.7 je unaugua ugonjwa wa kufeli kwa figo?

1. Ndio

2. Hapana

QN.8 je unaugua ugonjwa wa tezi ya shingo(thyroid)?

1. Yes

2. Hapana

QN 9. Je, unatumia dawa yoyote kati ya zifuatazo?

1. Warfarin

2. Rivaroxaban/ epixaban/ dabigatran

3. Aspirini/clopidogreal

4. Atorvastatin/rosuvastatin

5. natumia dawa ya kulainisha damu na ya kupunguza mafuta

6. situmii dawa yoyote

7. situmii dawa sawasawa

Rekodi ya hospitali

BP/ Historia ya presha ya kupanda……..

Rekodi ya sukari/ historia ya ugonjwa wa kisukari…….

Rekodi ya Dawa anazotumia mgonjwa…….

Alama za NHISS…….

Matokeo ya ECG……

APPENDIX 5: ETHICAL CLEARANCE FORM

KAIRUKI UNIVERSITY (KU)

70 Chwaku Street,
Mikocheni,
P.O BOX 65300,
Dar es Salaam,
Tanzania.

Tel: +255-22-2700021/4
Fax: +255-22-2775591
Email: irec@ku.ac.tz
Website: www.ku.ac.tz

Ref. No. KU/IREC/27.10/581 **18 July, 2025**

Dr. Moza Masoud Salim,
Kairuki University,
70 Chwaku Street,
Mikocheni,
P. O. Box 65300.
Dar es Salaam, Tanzania.

RE: ETHICAL CLEARANCE CERTIFICATE FOR CONDUCTING HEALTH RESEARCH

I am pleased to inform you that the research titled: **Factors Associated with Atrial Fibrillation among Patients with Acute Ischemic Stroke in Tertiary Hospitals, Dar es Salaam (Salim, M. M., 2025)** has been granted ethical approval.

This approval is in effect for one year from the above date.

- Any changes in the procedures should be reported to the Institutional Research Ethics Committee.
- Significant changes will require the submission of a revised request for ethical approval.
- You will be required to submit **a study progress report** every six months.

Permission to publish your findings should be sought from the National Institute for Medical Research (NIMR) before submission to a publisher and not concurrently.

CHAIRPERSON

Name: Prof. Frederick Kaijage

Signature:

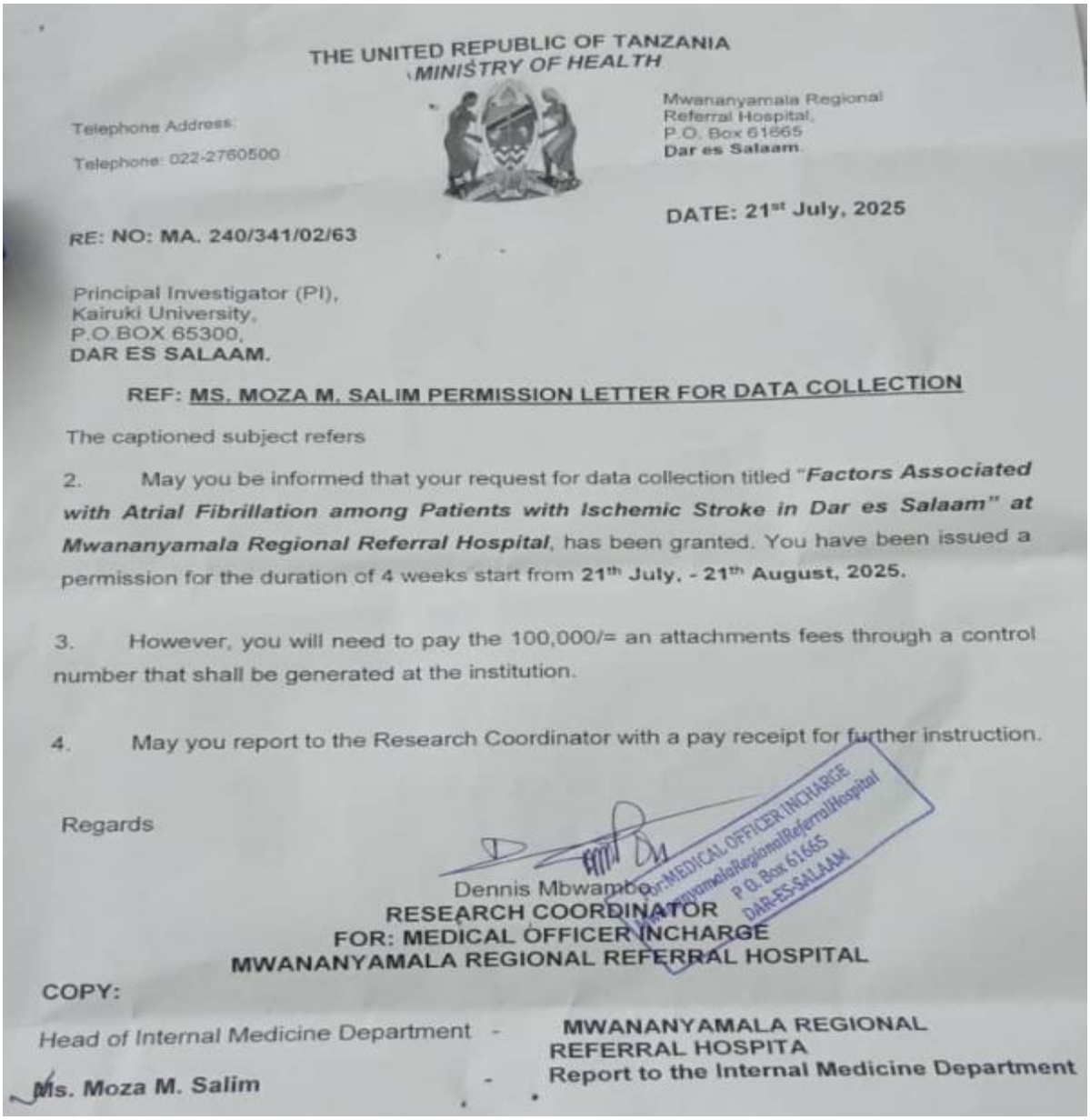
SECRETARY

Name: Prof. Columba Mbekenga

Signature:

DIRECTOR POSTGRADUATE STUDIES AND RESEARCH INSTITUTE
KAIRUKI UNIVERSITY
P. O. Box 65300, DSM

APPENDIX 6: PERMISSION LETTERS FOR DATA COLLECTION



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

Telephone Address:
Telephone: 022-2760500

Mwananyamala Regional
Referral Hospital,
P.O. Box 61665
Dar es Salaam.

DATE: 21st July, 2025

RE: NO: MA. 240/341/02/63

Principal Investigator (PI),
Kairuki University,
P.O.BOX 65300,
DAR ES SALAAM.

REF: MS. MOZA M. SALIM PERMISSION LETTER FOR DATA COLLECTION

The captioned subject refers

2. May you be informed that your request for data collection titled "***Factors Associated with Atrial Fibrillation among Patients with Ischemic Stroke in Dar es Salaam***" ***at Mwananyamala Regional Referral Hospital***, has been granted. You have been issued a permission for the duration of 4 weeks start from **21th July, - 21th August, 2025.**

3. However, you will need to pay the 100,000/= an attachments fees through a control number that shall be generated at the institution.

4. May you report to the Research Coordinator with a pay receipt for further instruction.

Regards

Dennis Mbwambo
RESEARCH COORDINATOR
FOR: MEDICAL OFFICER INCHARGE
MWANANYAMALA REGIONAL REFERRAL HOSPITAL

COPY:

Head of Internal Medicine Department - MWANANYAMALA REGIONAL REFERRAL HOSPITA

Ms. Moza M. Salim - **Report to the Internal Medicine Department**

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA AFYA.
HOSPITAL YA RUFAA YA MKOA YA TEMEKE
Baruapepe:barua@temekerrh.go.tz,S.L.P 45232 Dar es Salaam,Simu: 0222856007

Kumb. Na. MA. 472/554/02/93 **Tarehe: 18/07/2025**

Moza Masoud Salim,
Kairuki University,
S.L.P 65300,
DAR ES SALAAM.

YAH: OMBI LA KUFANYA UTAFITI (RESEARCH) "FACTORS ASSOCIATED WITH ATRIAL FIBRILLATION AMONG PATIENTS WITH ACUTE ISCHEMIC STROKE IN TERTIARY HOSPITALS, DAR ES SALAAM"

Husika na somo tajwa hapo juu.

2. Tumepokea barua yako ya tarehe **18/07/2025** kuhusu ombi lako la kufanya Utafiti (Research) **"Factors Associated With Atrial Fibrillation Among Patients With Acute Ischemic Stroke in Tertiary Hospitals, Dar es Salaam"** katika Taasisi yetu.

3. Ombi lako limekubaliwa, utatakiwa kulipa ada kiasi cha **Tshs 100,000/=** Hivyo wasiliana na mhasibu wa mapato wa Hospitali **Ndg. Lusajo Nsajigwa** kwa namba **0717 959495** ili akupatie control Number kwa ajili ya malipo ya ada hii ili uweze kuruhusiwa kufanya utafiti.

4. Asante kwa ushirikiano.

MKURUGENZI MSAIDIZI
HOSPITALI YA RUFAA YA MKOA WA TEMEKE
27 AUG 2025

Dkt. Husna Msangi
Kny: MKURUGENZI
HOSPITALI YA RUFAA YA MKOA YA TEMEKE

Nakala: CSCO - ***Tafadhali hakikisha taarifa ya utafiti inabaki hospitalini***

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

AMANA REGIONAL REFERRAL HOSPITAL

Telegram "HEALTH", DODOMA
Phone No.: +255 026 – 2323267
Email: ps@afya.go.tz

P.O. Box 25411
DAR ES SALAAM
Phone: 022—2861903

REF. NO. MoHCDGEC/ARRH/R.1/VOL VI/

Date: 20/07/2025

Director, Postgraduate Studies and
Research Institute,
Kairuki University,
P.O. Box 65300,
DAR ES SALAAM.

Re: PERMISSION FOR DATA COLLECTION

Refer to your letter which requested us to allow **Dr. Moza Masoud Salim** to conduct research and collect data in our institution.

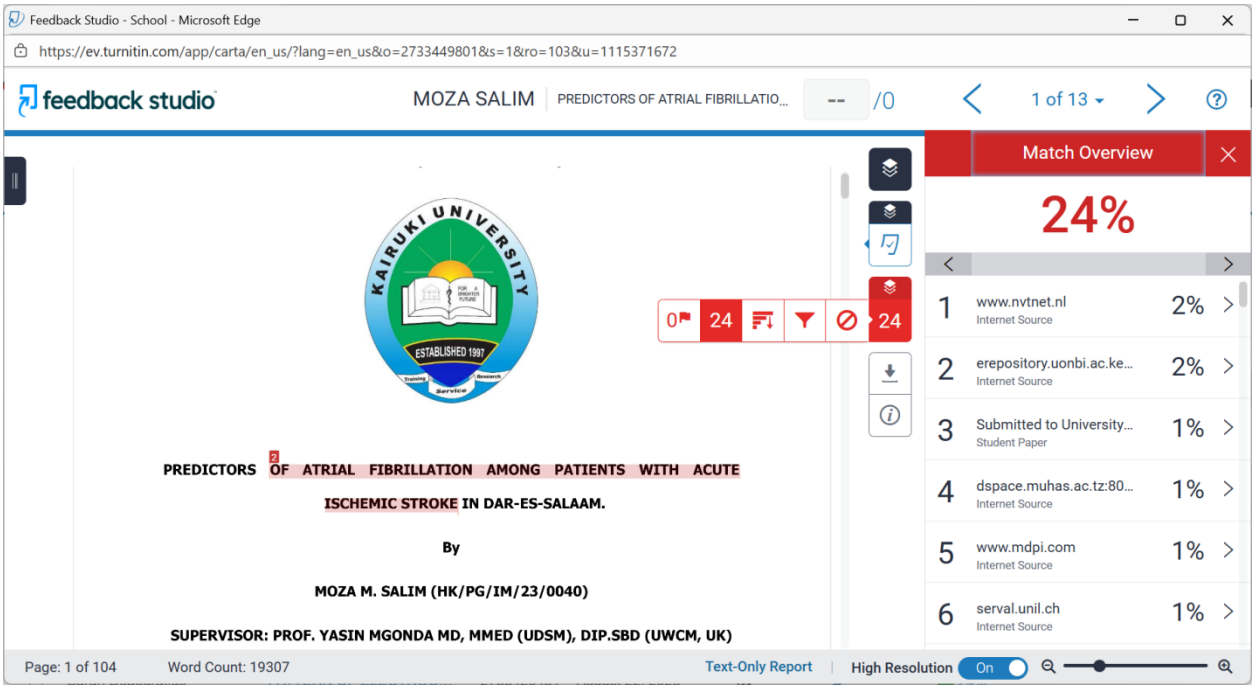
We are here to acknowledge your request with the following conditions, that he must submit the results of his research after completion of analysis in order the hospital to make use of data's to solve hospital problems.

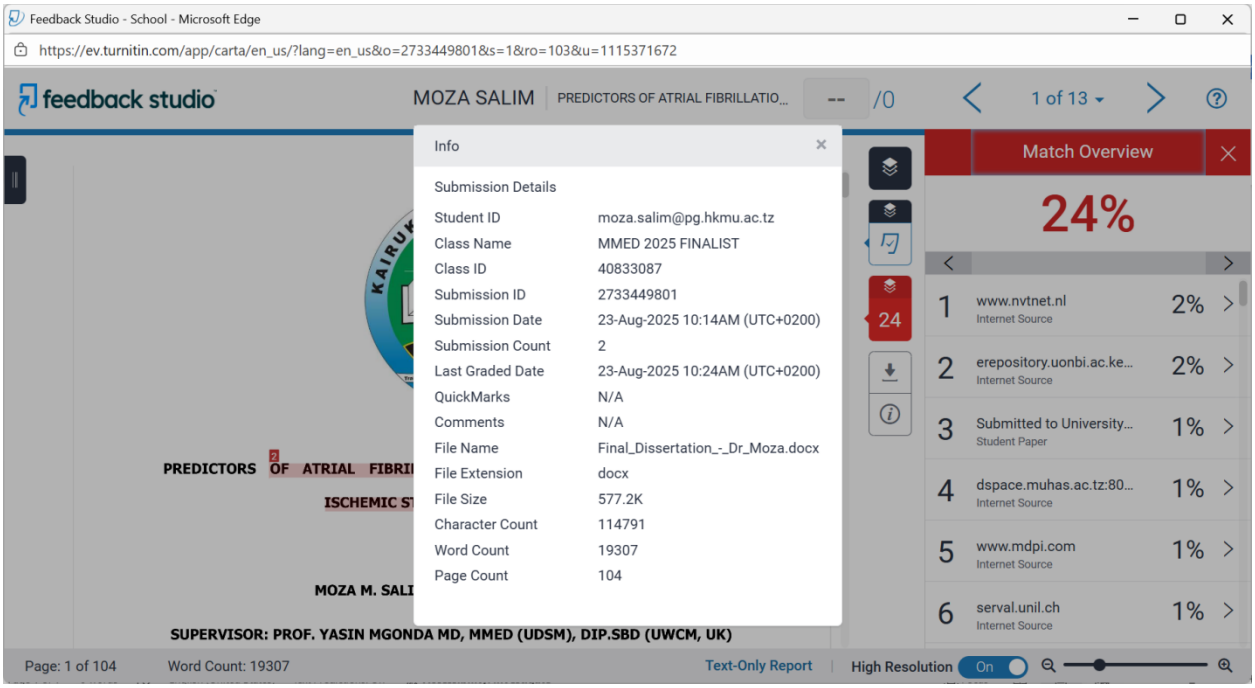
Regards.

For
MEDICAL OFFICER I/C
AMANA REGIONAL REFERAL HOSPITAL
P. O. Box 25411
DAR ES SALAAM

Dr. Rose Ntambuto
FOR: MEDICAL OFFICER INCHARGE
AMANA REGIONAL REFERRAL HOSPITAL

APPENDIX 7: PLAGIARISM REPORT





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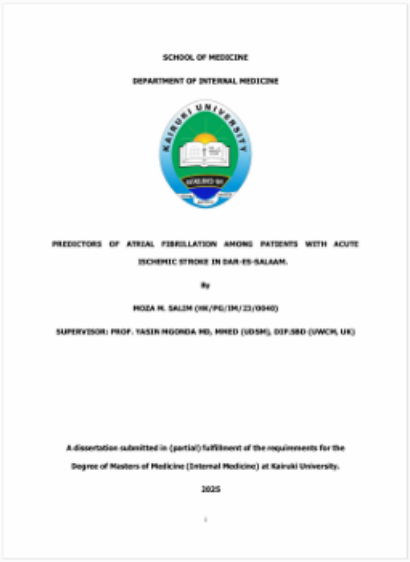
Assignment title:	Research Proposal
Submission title:	PREDICTORS OF ATRIAL FIBRILLATION AMONG PATIENTS WIT...
File name:	Final_Dissertation_-_Dr_Moza.docx
File size:	577.2K
Page count:	104
Word count:	19,307
Character count:	114,791
Submission date:	23-Aug-2025 10:14AM (UTC+0200)
Submission ID:	2733449801



SCHOOL OF MEDICINE

DEPARTMENT OF INTERNAL MEDICINE

PREDICTORS OF ATRIAL FIBRILLATION AMONG PATIENTS WITH ACUTE ISCHEMIC STROKE IN DAR-ES-SALAAM.

By

MOZA M. SALIM (HK/PG/IM/23/0340)

SUPERVISOR: PROF. YASIN NGONDA MD, MMED (UDSM), DIP.SBD (UWCM, UK)

A dissertation submitted in (partial) fulfilment of the requirements for the Degree of Masters of Medicine (Internal Medicine) at Kairuki University.

2025