PREVALENCE OF HIV INFECTION AMONG PATIENTS WITH STROKE AND ASSOCIATED RISK FACTORS AT MUHIMBILI NATIONAL HOSPITAL

BY

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A dissertation submitted in partial fulfillment of requirements for degree of Master of Medicine (Internal Medicine) of the Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
2009

Certification

The undersigned certify that he has read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled: **"PREVALENCE OF HIV INFECTION AMONG PATIENTS WITH STROKE AND ASSOCIATED RISK FACTORS IN MUHIMBILI NATIONAL HOSPITAL,"** In partial fulfillment of requirements for the degree of Master of Medicine (Internal Medicine) of the Muhimbili University of Health and Allied Sciences.



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Date: 29th October 2009

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Acknowledgement

I am deeply indebted and thankful to my supervisor Dr. Muhammad Bakari for the guidance and patience as he devoted his spare time to make this work successful.

I am grateful to my colleagues and friends Dr Albert Komba and Dr. Fabian Pius, who assisted me in the initial stages of this dissertation with their opinion and advice. I would like to thank Dr. Candida Moshiro, Mr. Kagaruki and Dr. A. Komba for their assistance in statistical and epidemiological issues.

I am thankful to Dr Said Aboud and all MUHAS HARVARD laboratory staffs who assisted me in doing laboratory work, also Ms Mary Marcus, Ms Lilian Shija and Mr. Sylvester Kezilahabi from MOI laboratory for processing Blood Chemisty for all patients.

I extend my sincere thanks to all patients who agreed to participate in the study, clinicians and nursing staff at MNH medical wards for their contributions to my work. I would also like to thank my colleagues Dr. Luggajo and Dr. Chale for their good cooperation during the entire training period.

Special thanks to Prof. Mugusi, Prof Matuja and the entire staff of the department of internal medicine who contributed in one way or other to this work.

Much appreciation goes to my wife Mrs. Alberta Mlay, my son Samuel Mkunde, my mother, brothers and friends for being there for me. May God bless you all.

Last but not least, thanks to the almighty God for making this possible. Glory, praise and honor to his name. AMEN

Dedication

I dedicate this work to my parents the late Prof. Samuel M. Mlay and Mrs. Rose Mlay, who provided me with a good education foundation which brought me to where I am today.

Abstract

Background

Stroke is more common in the elderly; however, in 25% they do occur in young adults in whom HIV may be the major risk factor. Although data from developed countries confirm HIV infection as a risk for stroke the exact underlying mechanism is still unclear. Mechanisms directly related to HIV infection, as well as those consequent to underlying immunodeficiency have been proposed. Little data exist on the subject in developing countries including Tanzania.

Objective

To determine the prevalence of HIV infection in stroke patients and the associated risk factors at Muhimbili National Hospital.

Study Design and Setting

A cross sectional study was conducted among stroke patients admitted at Muhimbili National Hospital medical wards between May and November 2008

Data Collection

Patients were clinically evaluated through history and physical examination. Blood samples were taken for the determination of HIV by ELISA, CD4 count by flowcytometry. Complete blood counts, including Haemoglobin as well as lipid profile and blood glucose were performed.

Results

A total of 215 patients with stroke, constituting 6.8% of the admissions, were analyzed. The prevalence of HIV among patients with stroke was 20.9% (45/215).

The overall mean (±SD) age for stroke patients who were HIV positive was 47.2 (± 14.5) years, while that among stroke patients who were HIV negative was 56.1 (±15.1) years, p-value < 0.001.

Hypertension as a risk factor for stroke was present in 53.3% (24/45) of patients with stroke and HIV infection; as compared to being in 80.6% (137/170) patients with stroke and no HIV, p-value= <0.001. Furthermore, fever, anemia, diarrhoea, TB and Kaposi's sarcoma were significantly commoner among stroke patients with HIV compared to those with no HIV.

Although HIV infected patients with stroke had a longer mean duration of hospital stay of 10.3 days compared to that of 7.3 days among HIV un-infected patients with stroke, (p-value 0.001), the outcome in terms of recovery, residual disability or death did not differ.

While on univariate analysis both fever and anemia were associated with mortality, on multiple logistic regression analysis it was only presence of fever that emerged to be significantly associated with mortality among HIV infected stroke patients.

Conclusion and recommendations

It is concluded that the prevalence of HIV infection among stroke patients was high, and that stroke patients with HIV were younger and presented with other HIV-related illnesses. The presence of fever and anemia were associated with an increased risk of mortality among stroke patients with HIV infection.

It is recommended that HIV infection should be screened in all patients with stroke. Voluntary Counseling and Testing (VCT) should be encouraged so that HIV infection is picked early in order to prevent occurrence of many HIV-related complications including stroke. A community-based case control study is needed to assess the association of HIV and stroke.

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Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANGAZA	HIV voluntary counseling and testing services in Tanzania
ARV	Anti retro viral drugs
BP	Blood pressure
BMI	Body Mass Index
CTC	Care and Treatment Clinic
ELISA	Enzyme-Linked Immunosorbent Assay
HAART	Highly active anti retroviral therapy
HIV	Human Immunodeficiency Virus
GCS	Glasgow Coma Score
MNH	Muhimbili National hospital
MOI	Muhimbili Orthopedic Institute
MoHSW	Ministry of Health and Social Welfare
MUHAS	Muhimbili University of Health and Allied Sciences
NACP	National AIDS Control Programme
WHO	World Health Organization
VCT	Voluntary Counseling and Testing

1.0 INTRODUCTION AND LITERATURE REVIEW

1.1 Stroke as a Problem

Stroke and other non-communicable diseases are on the increase worldwide. Among things that have caused an increase in the prevalence and incidence of stroke is the changing of life style and the fact that majority of people are moving to towns[1].
Indeed cardiovascular diseases are predicted to overtake infectious diseases as a cause of morbidity and mortality in Sub Saharan countries by the year 2020 [2, 3]. Since stroke can be the presentation of an underlying cardiovascular disease (CVD), which has resulted from among others, high blood pressure, stroke can therefore be used as an appropriate model to assess the burden of CVD.

In Tanzania data for the actual magnitude of stroke are limited; however information from the few studies that have been done shows that the trend is on the increase. In order to determine the type of stroke one needs to do computer tomography (CT) imaging, however due to its high cost, its availability is very limited in Tanzania. This further restricts availability of information on the prevalent pathological type of stroke.

However the Siriraj stroke score developed in Thailand can be used to determine the stroke subtype. The score is based on clinical parameters and has been shown to have good predictive value [4,5] . Several studies have been done to validate the score, for example a study done in North-east Nigeria [5] revealed the score to have a sensitivity and predictive value of 76.2% and 93% for infarction; and 94.4% and 85% for hemorrhagic stroke respectively, with an overall accuracy of 84.6%. In the study the also found that level of consciousness (coma) and diastolic blood pressure are discriminant variables in differentiating cerebral infarct and cerebral hemorrhage [5]. They hence concluded that Siriraj score can be used in areas with limited resources like ours.

It is known however, that among blacks, stroke is more common, more severe, and carries a higher mortality when compared with other races. Blacks also have increased frequency of risk factors for stroke such as diabetes mellitus, hypertension, and obesity [6, 7, 8].

Furthermore, the risk for cerebral vascular disease is increased in individuals with diabetes. It is reported that there is an approximately threefold increase in stroke incidence among patients with diabetes as compared to non-diabetic patients [9]. Patients with Diabetes Mellitus do have elevated levels of palsminogen activator inhibitors and fibrinogen, which enhances the coagulation process and inhibits fibrinolysis, hence causing formation of thrombosis [10, 11].

Diabetes is also associated with a dysfunction of endothelial vascular smooth muscles as well as that of platelets leading to increased primary and secondary platelet aggregation [12, 13, 14] increased platelet activation [15] with release of the contents of alpha-granules, including thromboglobulin and platelet factor [16], enhanced binding fibrinogen to the glycoprotein IIb/IIIa complex located on the platelet surface an effects which may be due in part to an increase in the number of glycoprotein IIb/IIIa receptors on the platelet surface. All these cause coronary thrombosis . The altered platelet activation in diabetes may be mediated in part by elevated blood glucose.

In one study of 42 patients with stable coronary artery disease, the fasting blood glucose was an independent predictor of platelet-dependent thrombosis [17]. Hypertension is the risk factor most often reported in patients with stroke. In a study done in Zimbabwe it was found that the frequency of high blood pressure in patients with stroke was 93%. This was reported as a frequency of hypertension among 27 patients out of 29 with hemorrhagic stroke [18]. Unfortunately, in most cases with stroke, the presence of high blood pressure has not been known before and therefore not treated [18, 19].

Another known risk factor for stroke is obesity. Obesity is a chronic disease that is increasing in prevalence in adults, adolescents, and children, in both developing and developed countries. Indeed it is now considered to be global epidemic. In most populations studied, the prevalence of overweight and obesity has steadily increased over the past 20 years. In the United States, the lifetime risk of becoming overweight or obese is approximately 50 and 25 percent, respectively [20]. Obesity is known to be associated with an increase in mortality and risk of many disorders including diabetes mellitus, hypertension, dyslipidemia, heart disease, stroke, sleep apnea, and cancer. Conversely, weight loss is associated with a reduction of obesity-associated morbidity. To a large extent, obesity is simply related to lifestyle issues, especially when one leads a sedentary life and has increased calorie intake. Some drugs are also reported to cause weight gain and obesity as exemplified by insulin, sulfonylurea, and antipsychotics. The age of onset of obesity is also of some importance in determining risk. Children with a low birth weight and those whose weight rises more rapidly in the first 10 years of life are at a higher risk for diabetes as adults [21]. Furthermore, the risk for a higher degree of obesity seem to be greater in patients whose obesity begins before the age of 40, probably because of the longer time period over which co morbid conditions, such as diabetes and hypertension, can develop[22].

Hypertriglyceridemia is another factor associated with an increased risk for cardiovascular diseases. In a meta- analysis of prospective population- based studies that evaluated the association between the serum triglyceride concentration and incident cardiovascular disease, a pooled analysis of 46,413 men enrolled in 16 studies was associated with a univariate risk ratio for triglyceride of 1.32 (95% CI 1.26-1.39) [23].

On the other hand, the five studies of nearly 10,800 women were associated with a univariate risk ratio of 1.76 (95% CI 1.50-2.07) [24]. Hypercholesterolemia is associated with cardiovascular disease because it promotes atheroma development in arteries

(atherosclerosis). This disease process leads to myocardial infarction, stroke and peripheral vascular disease [25].

Available literature suggests that the majority of strokes are ischemic in type, and its prevalence could be increasing. In South African blacks the prevalence was estimated at 71.2% [26]. However data in Tanzania appears to suggest otherwise. In a study done by Matuja et al, it was found that among 89 patients with stroke, the CT scan revealed that 60.9% had hemorrhagic type of stroke [27]. Although a more widespread use of brain CT scan will unravel the proportional magnitudes of hemorrhagic or ischaemic stroke types, age is thought to have an impact on this. It is reported that hemorrhagic stroke is more likely to be the case in younger ages as compared to ischemic ones [28]. On the other hand, it would appear that the prevalence of stroke is not significantly different by gender. Most studies report equal proportions of females and males affected [29].

Of striking reality now is the fact that much as stroke continues to primarily occur among the elderly, especially those who are hypertensive, there is also a trend whereby stroke is now increasingly being seen in young adults with human immunodeficiency virus infection [30]. *Engestrom et al* conducted a retrospective study of 1600 patients with HIV/AIDS and recorded 12 strokes (0.75%) in five years. Comparing this number with the annual incidence of stroke among young adults (aged 35- 45 years) in the general population of 0.025%, they concluded that patients with AIDS seem to be at a higher risk for stroke [31].

1.2 HIV and AIDS in Tanzania

AIDS was first diagnosed in Tanzania about 23 years ago in the Kagera region and since then the number of cases has been increasing yearly. According to National AIDS control programme (NACP), 13,285 AIDS cases were reported from 21 regions during the year 2005. This resulted into cumulative total of 205,773 reported cases since 1983 when the first 3 cases were identified in the country [32]. Using estimation and projection

package (EPP) and spectrum model developed by WHO, it is estimated that, in the year 2005, 1,770,383 people were living with HIV. Of these 656,180 are from urban and 1,114,203 are from rural areas [33].

Heterosexual sex has been reported to be the main mode of HIV transmission accounting for 81.6% of all reported cases in 2005. Maternal-to-child transmission and blood transfusion contributed 3.7% and 1.5% respectively of the reported cases. Majority of the reported cases are between 20-49 years indicating that infection occurs at the age of maximum sexual activity [32]. In 2005, of all reported cases of AIDS 55.7% were married, while 22.0% were single. These data reflect the proportion of cases among the different marital categories of patients with AIDS [33]. The prevalence of HIV in blood donors was estimated to be 7.9%. There were no differences between the prevalence of HIV among blood donors for the year 2004 (7.7%). Among Antenatal Clinics attendees the prevalence was 8.2% in 2005 [33]. The overall HIV prevalence using data from VCT in health facility based sites was 26.7% while it was 11.0% using data from the 34 ANGAZA sites, which are distributed in some areas of the country. The prevalence of HIV infection in health facility based sites ranged from 5.3% in Manyara to 46.3% in Iringa region [32].

According to new information the national HIV prevalence is now 5.7%, fewer men are now HIV positive as compared to four years ago, current 4.6% as compared to 6.3% [34]. For women it is 6.6% from 7.7%. Also noted that women are affected at early age as compared to men by the age of 20-24 years 6.3% of women are already affected as compared to only 1.7 % men. 16% of men and women aged 15-49 years in Iringa and 9% of same years in Dar es Salaam and Mbeya are affected [34].

1.3 Stroke in HIV/AIDS

Although stroke is more common in the elderly, in 25% they do occur in young adults in whom HIV may be the major risk factor [6, 35]. In a retrospective study done in USA,

HIV was associated with stroke. Among these patients with stroke, cerebral infarction was more prevalent in HIV infected patients than in HIV seronegative patients (20 [80%] of 25 vs. 48 [56%] of 88, P = .04). It was then concluded that HIV infection is associated with an increased risk of stroke, particularly cerebral infarction in young adults [36].

In another study conducted in the medical ward of Queen Elizabeth Central Hospital in Blantyre, Malawi from October 2001 to July 2002 it was found that among 98 patients with stroke, 47 (48%) subjects had HIV infection [37].
Although data from developed countries confirm HIV infection as a risk for stroke, [38, 39] the exact underlying mechanism is still unclear. It is proposed that since HIV may cause dilated cardiomyopathy and predispose to meningitis, this would lead to an increased prevalence of well established risk factors such as cardiac embolism and meningitis [37, 40, 41]. Others have suggested that HIV patients have elevated systemic inflammation making them prone to atherosclerosis [42].

Also HIV can induce vascular damage causing coagulopathy by induction of autoantibodies and protein S deficiency [43]. In half of AIDS patients, transient neurological deficit or cerebral infarction can be found [44]. The common causes of cerebral infarction in these patients are thrombotic endocarditis that is non-bacterial and opportunistic central nervous infections like toxoplasmosis, cryptococcal meningitis and tuberculosis. The real pathogenesis still is unclear, though as described earlier HIV/AIDS patients have a potential vascular mechanism for cerebral infarction and neurological deficit as a result of toxic effects of viral antigen or vasculopathy. Due to all these factors, HIV infected patients with low CD 4 cell counts are reported to have a higher risk for coronary events in terms of atherosclerosis.

In one study aimed at identifying the predictors of carotid intima- media thickness in HIV patients, carotid intima-media thickness was found to be higher in HIV patients than age- matched control subjects and progressed much more rapidly than previously

reported rates in non-HIV cohorts. In HIV patients, carotid intima-media thickness was associated with classic coronary risk factors and with nadir CD 4 counts $\leq$ 200, suggesting that immunodeficiency and traditional risk factors may contribute to atherosclerosis [45]. These findings are important since stroke is also associated with atherosclerosis.

1.4 HAART and Lipid Abnormalities

Although the use of highly active antiretroviral therapy (HAART) has dramatically increased the life expectancy in HIV infected individuals, several metabolic complications have been reported to be associated with its use including dyslipidemia [46]. This disordered lipid metabolism has an impact on the cardiovascular system and it has to be taken care of once someone is started on HAART. Hypercholesterolemia and hypertriglyceridemia known are risk factors for the development of coronary heart disease. The multiple risk factor intervention study showed a strong and graded relationship between the level of cholesterol and coronary heart disease related death that was independent of blood pressure and smoking [47]. Protease inhibitors have been strongly associated with development of dyslipidemia, which is the risk factor for developing stroke. In the Tanzanian guidelines for the treatment of HIV infection protease inhibitors such as lopinavir/ritonavir (kaletra) are recommended as components of second line drugs. In one study, the use of lopinavir/ rotonavir was associated with a mean increase in total cholesterol of +49mg/dl and that of triglycerides of +111mg/dl at 48 weeks of follow-up [48].

2.0 PROBLEM STATEMENT

Stroke is a common health problem in sub Saharan African countries. The trend shows that the problem is on the increase [1]. The disease is potentially very fatal and it is on record that the fatality rate is 30% [18], which could be higher in developing countries. Furthermore majority of stroke survivors are left with permanent disabilities, a fact that could have important negative impact on the development activity of the nation.

Surprisingly, for a problem that has been described to exhibit a change in age trend, there is limited data on the problem and the association with other potential causes. The change of the trend could be due to change of lifestyle that is sedentary and urbanization [49].

HIV/AIDS is said to be a risk for stroke [38], exploring for its association in our set up is an important stepping stone towards better understanding of the pathogenesis of this problem as it is reported that HIV patients have elevated systemic inflammation making them prone to atherosclerosis. Also HIV can induce vascular damage causing coagulopathy by induction of autoantibodies and protein S deficiency [43].

3.0 RATIONALE

There is evidence that HIV/AIDS is strongly associated with cerebral vascular accident. Use of ART in HIV infection is also associated with metabolic complications such as lipodsytrophy and deranged lipid metabolism (dyslipidemias). All these add to an increased risk of stroke among HIV infected patients. However, there is limited data on the prevalence of HIV in stroke in general, and in Tanzania in particular, hence a need for the present study.

4.0 OBJECTIVES

4.1 Broad Objectives

To determine the prevalence of HIV infection in stroke patients and the associated risk factors.

4.2 Specific Objectives

1. To determine the proportion of patients presenting with stroke among admitted patients.
2. To determine the prevalence of HIV among patients presenting with stroke.
3. To determine the degree of immunodeficiency among stroke patients with HIV
4. To determine the factors associated with an increased risk of stroke among stroke patients with HIV compared to those without HIV infection: They will include:
    a. Sociodemographic features
    b. Clinical features
    c. Other known risk factors (e.g. hypertension, diabetes mellitus, hyperlipidemia and obesity)
    d. Use of anti-retroviral therapy
5. To compare the outcome of patients with stroke between those who are HIV infected and those who are not HIV infected.

5.0 METHODOLOGY

5.1 Study Design

This was a descriptive cross sectional study.

5.2 Study Site

The study was conducted at the Muhimbili National Hospital (MNH) in Dar es Salaam, Tanzania. This is the largest and only tertiary referral hospital in Tanzania, as well as a University teaching hospital for the Muhimbili University of Health and Allied Sciences (MUHAS). Approximately 2 - 4 patients with stroke are admitted in a day. Patients come from all over Dar es Salaam, and are referred from both public and private health facilities. The hospital also receives few patients with stroke referred from neighboring and regions.

5.3 Study Population

These were all patients admitted into the Muhimbili National Hospital medical wards with a diagnosis of stroke during the study period.

5.4 Duration of the Study

The study was conducted from 21st May, 2008 to 18th November, 2008.

5.5 Inclusion Criteria

Patients admitted in medical wards with provision diagnosis of stroke.

5.6 Sample Size

The sample size was obtained using the formula,

$$N=\frac{z^2 p\,(100-p)}{\varepsilon^2}$$

Where, N is sample size

Z=, standard, corresponding to 95% confidence, equals to 1.96

ε= maximum likely error taken as 7%

P = Prevalence of HIV infection among stroke patients. In a study of differential diagnoses and causes of stroke done in Malawi by Kumwenda, J.J., et al., the prevalence of HIV infection among stroke patients was 48% [37]. This proportion has been used for calculating sample size.

$$\text{Therefore } N=\frac{(1.96)^2 0.48\ \ (1-0.48)}{(0.07)^2}$$

$$N=200$$

The minimum sample size for cases was 200 patients. The sample size was increased by 10% to allow for non-response, incomplete investigations and other factors that could decrease the yield of response, total number of cases was 220 patients.

5.7 Sampling of Study Subjects

All patients admitted at MNH medical wards who fulfilled the inclusion criteria were consecutively recruited for the study until the sample size was attained.

5.8 Data Collection Methods

Information about the study was explained to patients or relative or guardian for those who were unconscious or mentally incapable of giving informed consent prior to recruitment. After ensuring that the patients/relative understood and gave written consent to participate in the study then the obtained information on history and physical examination and laboratory results were entered into a designed structured questionnaire.

For those without the ability to give consent like the unconscious or under-aged, consent was sought from the guardian or a close relative.

5.8.1 Clinical Assessment

All Patients were examined by the study physician (investigator) to elicit symptoms and signs of stroke and HIV and any other disease.

Blood pressure was measured with a mercury sphygmomanometer. Blood pressure was measured on the left arm, two times at 5 minutes interval. The 1st and the 5th Korotokoff's sounds were used to determine the systolic (SBP) and diastolic blood pressure (DBP) measurements respectively. The second blood pressure measurement was used as the blood pressure for the individual.

Weight was measured using a weighing machine and recorded to the nearest 0.5 kgs. Height was measured using a tape measure to the nearest centimeters. The waist circumference was measured using a tape measure. About 5mls of venous blood was taken for laboratory studies.

Since Computerised brain scanning (CT-scan) is very expensive and majority of patients in developing countries can not afford it, the Siriraj stroke score developed in Thailand was used to determine the stroke subtype. The score is based on clinical parameters and has been shown to have good predictive value [4, 5]. Several studies have been done to validate the score, for example a study done in North-east Nigeria [5] revealed the score to have a sensitivity and predictive value of 76.2% and 93% for infarction; and 94.4% and 85% for hemorrhagic stroke respectively, with an overall

HEMOCUE HB 201+. Blood glucose levels was done on the spot after collection using *HEMOCUE Glucose 201+*

5.9 Treatment

Stroke patients who were found to have HIV-infection, diabetes mellitus, hypertension received appropriate treatments while admitted. On discharge, they were referred to the respective clinic for further managements and follow-ups.

5.10 Definition of Terms

- Stroke patient was defined as any patient presenting with features of acute neurological deficit in the absence of a history of trauma [50]
- Diabetes mellitus was defined as a Fasting Blood Glucose of more that 7.0 mmol/L or a Random Blood Glucose of more than 11.1 mmol/l [51]
- Hypertension was defined as a Systolic Blood Pressure (SBP) ≥140 and/or a Diastolic Blood Pressure (DBP) of ≥90 mmHg or the use of hypertensive medications prior to onset of stroke.
- Obesity was defined as waist circumference ≥ 88cms in women, ≥ 102 cms in men [52]
- Immunodeficiency was defined as an absolute $CD4^+$ cell count of less than 200cells/μl.
- Anemia is defined as hemoglobin of less than13 and 12g/dl in men and women respectively.

5.11 Ethical Considerations

Ethical clearance for the study was obtained form the Muhimbili University of Health and Allied Sciences (MUHAS) Higher Degree, Research and Publications Ethics Committee.

Newly diagnosed patients with HIV-infection were then referred to care and treatment clinics for proper management and follow-up.

5.12 Data Analysis

Data was computerized and the analysis was done using a Statistical Package for Social Sciences (SPSS) version 10.5. Comparison of proportions was done using the Chi square test, and fisher's exact test was adopted when the expected value in a cell was less than five.

Statistical significance for differences was considered if the p-value was less or equal to 0.05.

6.0 RESULTS

During the study period 3,255 patients were admitted in the Medical wards, of these 220 (6.8%) had stroke and all were enrolled in the study. One hundred and thirteen (51.4%) were males and 107 (48.6%) were females.

Five (2.3%) of the patients with stroke had in-determinate HIV results both on ELISA and Western blot tests. They were excluded in further analysis. The remaining 215 stroke patients were further analyzed.

6.1 Stroke and HIV infection

The overall prevalence of HIV infection among patients presenting with stroke was 20.9% (45/215). The proportion of female patients with stroke who had HIV-infection was 55.6% as compared to 46.5% of those who were HIV negative p= 0.18.

As shown in table 1, the overall mean (SD) age for stroke patients who were HIV positive was 47.2 (± 14.5) years, while that among stroke patients who were HIV negative was 56.1 (±15.1) years, an observation which was statistically significant (p-value < 0.001).

Male stroke patients with HIV had a mean (SD) age of 46.3 (14.5) years, while the mean age was 56.6 (14.5) years among stroke males without HIV infection, p<0.01. The corresponding figures were 47.9 (14.8) and 55.5 (17.4) among females with and without HIV infection respectively, p-value 0.05.

The age groups most affected by HIV infection among the study subjects were those of between 45-54 years, followed by the age group between 55 and 64 years. The least prevalence was observed on age group less than 25 years with prevalence of 6.7%, p-value 0.18.

Among stroke patients 73.3% (33/45) of married patients had HIV as compared to single and widowed. This was statistically significantly (p value 0.004). Table 1

Table 1: Social Demographic Characteristics of patients presenting with stroke by HIV status

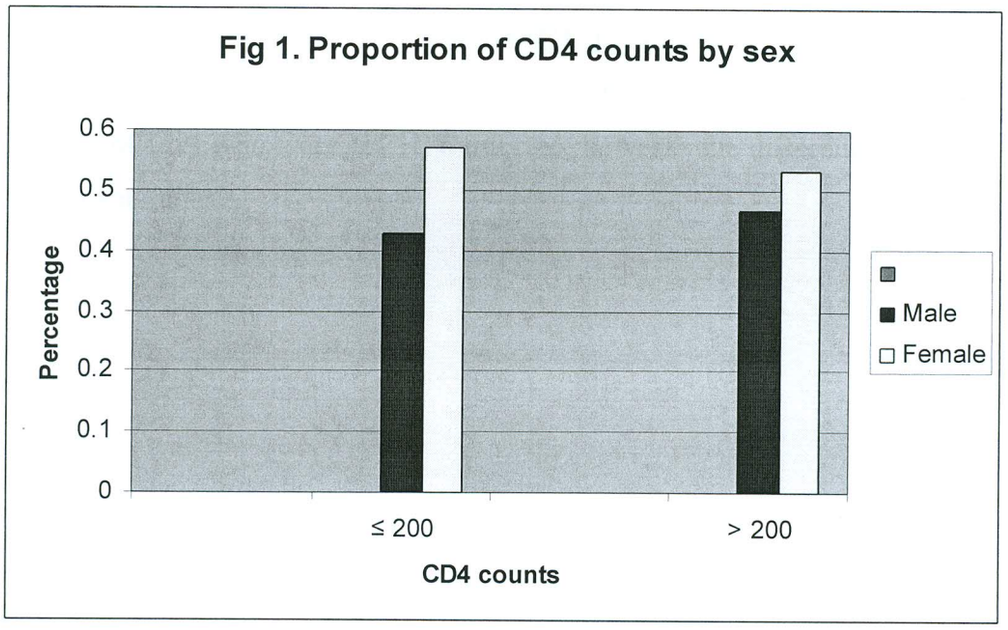
	ELISA FOR HIV		
	Reactive, n=45	**Non reactive, n=170**	**P-value**
Sex			
Male	20 (44.4%)	91 (53.5%)	
Female	25 (55.6%)	79 (46.5%)	0.18
Mean (SD) age			
All	47.2 (14.5)	56.1 (15.1)	<0.001
Male	46.3 (14.5)	56.6 (14.4)	<0.01
Female	47.9 (14.8)	55.5 (17.4)	0.05
Age Distribution			
< 25	3 (6.7%)	6 (3.5%)	
25-34	5 (11.1%)	10 (5.9%)	
35-44	8 (17.8%)	17 (10.0%)	0.18
45-54	13 (28.9%)	50 (29.4%)	
55-64	10 (22.2%)	37 (21.8%)	
> 64	6 (13.3%)	50 (29.4%)	
Marital status, n (%)			
Single	11 (24.4%)	12 (7.1%)	
Married	33 (73.3%)	152 (89.4%)	0.004
Widow/widower	1 (2.2%)	6 (3.5%)	
Occupation, n (%)			
Student	2 (4.4%)	4 (2.4%)	
Housewife	5 (11.1%)	41 (24.1%)	
Businessperson	7 (15.6%)	31 (18.2%)	0.32
Employed	10 (22.2%)	31 (18.2%)	
Peasant	21 (46.7%)	63 (37.1%)	
Education, n (%)			
Primary	28 (62.2%)	106 (62.4%)	
Secondary	11 (24.4%)	41 (24.1%)	0.53
Tertiary	6 (13.3%)	23 (13.5%)	

* P-value denotes differences between HIV positive and HIV negative patients with stroke.

6.2 Degree of Immunodeficiency

For logistical reasons (machine breakdown) it was only possible to determine the levels of CD^+ T- lymphocyte counts (CD4 counts) in 36 (80.0%) out of the 45 HIV infected patients with stroke. Among these, 58.3% (21/36) had CD4 counts of less than 200 cell/µl. Their distribution by sex is shown in figure 1.

The median CD4 counts for males and females was 140 and 123 cell/µl respectively



6.3 Risk Factors for Stroke

A higher proportion of patients with stroke were found to have hypertension as a risk factor to stroke as compared to other known and assessed risk factors such as diabetes mellitus, obesity and hypercholesterolemia.

Indeed 74.9% of the 215 patients with stroke had pre existing hypertension. As shown in table 3, the proportion of patients with stroke and HIV infection who were hypertensive were 53.3% (24/45) as compared to those without HIV infection who were 80.6% (137/170), p-value= <0.001.

The proportion of stroke patients who were obese, diabetes mellitus and hypercholesterolemia was 20.5% (44/215), 17.2% (37/215), 19.1% (41/215) respectively. Of these who had obesity, 13.3% (6/45) had HIV infection as compared to 22.4% (38/170) who were not HIV infected, however the difference was not statistical significant, table 2.

Table 2: Comparison according to HIV status of Hypertension, Obesity, Diabetes Mellitus, Triglyceride and Cholesterol levels among stroke patients

	ELISA FOR HIV		
Factor	**Reactive, n= 45**	**Non reactive, n=170**	**P-value**
Hypertension	24(53.3%)	137(80.6%)	<0.001
Obesity	6(13.3%)	38(22.4%)	0.13
Diabetic	5(11.1%)	32(18.8%)	0.16
Hypertriglyceride	7(15.6%)	18(10.6%)	0.58
Hypercholestrolemia	9(20.0%)	32(18.8%)	0.50

6.4 ARV Use

Of the 45 patients with stroke and HIV, only 6 (13.3%) were on ARV's. Of these four patients were using triomune 30 (Stavudine + Lamivudine + Nevirapine), other two were using Duovir (Zidovudine + Lamivudine) and efavirenz. Those who were using triomune 30, two were using for about four months and two for more than six months. Those on duovir were using the drugs for more than six months. It is of note that none of the patients was on a Protease inhibitor.

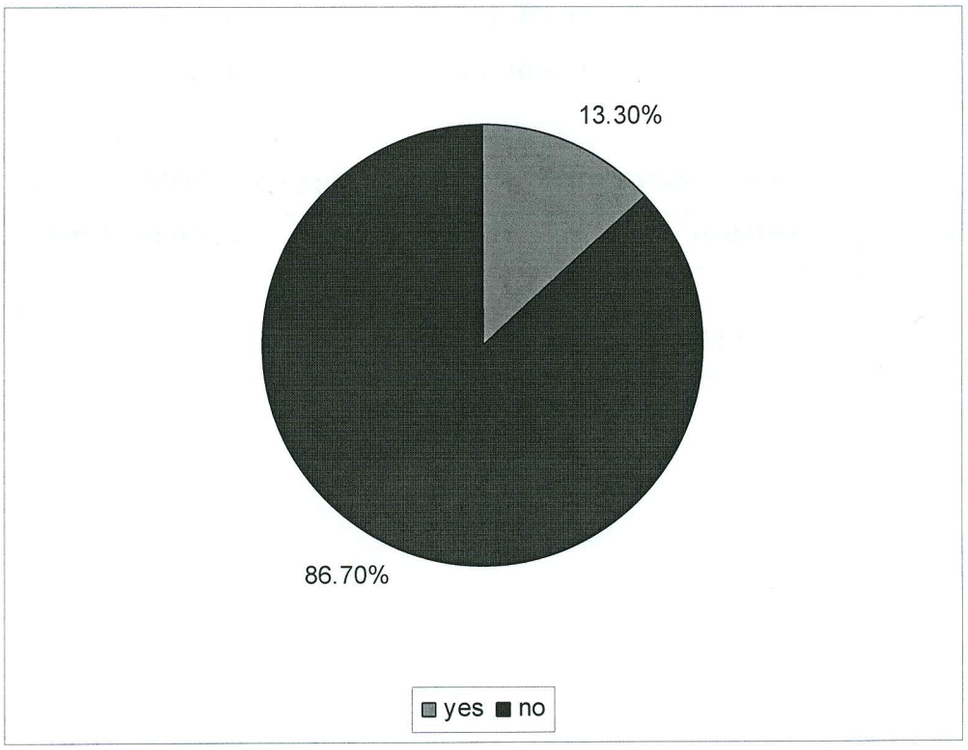


Fig 2. Distribution of ARV use among HIV infected patients

6.5 Presenting Symptoms and Physical Findings

Fever was present in 44.4% (20/45) of subjects with HIV, as compared to 24.7% (42/170) of subject who were HIV negative, p value= 0.01.

Clinical anemia was observed in 26.7% (12/45) subjects with HIV infection as compared to 7.6% (13/170) of those who were HIV un-infected, p- value 0.001.

Diarrhea was present in 20.0% (9/45) subjects with HIV infection while 2.9% (5/170) had diarrhea and were HIV not infected, p value < 0.001.

Tuberculosis was present in 13.3% (6/45) subjects who were HIV infected while 1.2% (2/170) of HIV un-infected stroke patient had tuberculosis, p-value 0.001.

Karposis sarcoma was observed in 6.7% (3/45) subjects who were HIV infected as compared to none in HIV un-infected stroke patients p-value= 0.009

Table 3: Stroke subtype according to Siriraj stroke score

Stroke subtype	HIV positive	HIV negative	P Value
Ischaemic	34(75.6%)	105(61.8%)	0.08

Table 4: Clinical features and physical findings among stroke patients in relation to their HIV sero-status

	ELISA FOR HIV		
Clinical Feature	**Reactive, n= 45**	**Non Reactive, n=170**	**P-value**
Fever	20(44.4%)	42(24.7%)	0.01
Fits	2(4.4%)	12(7.1%)	0.41
Aphasia	12(26.7%)	70(41.2%)	0.05
Anaemia	12(26.7%)	13(7.6%)	0.001
Numbness	24(53.3%)	73(42.9%)	0.14
Headache	23(51.1%)	94(55.3%)	0.37
Facial asymmetry	20(44.4%)	100(58.8%)	0.06
Neurological deficit			
Monoplegia	5(11.1%)	15(8.8%)	0.4
Hemiplegia	40(88.9%)	153(91.2%)	0.42
Loss of consciousness	7(15.6%)	43(25.3%)	0.12
Diarrhea	9(20.0%)	5 (2.9%)	<0.001
Tuberculosis (PTB)	6(13.3%)	2 (1.2%)	0.001
Karposis sarcoma	3(6.7%)	0(0.0%)	0.009

6.6 The outcome on discharge/death following hospitalization

Following admission into the hospital wards, the mean (95% CI) duration of stay in hospital by stroke patients was 7.1 (6.1, 8.0) days for males and 8.8 (7.6, 10.0) days for females respectively, p-value 0.02.

Patients who had stroke and were HIV infected had longer mean duration of hospital stay of 10.3 (8.2, 12.5) days compared to mean duration of 7.3 (6.5, 8.0) days among HIV un-infected patients with stroke, p-value 0.001.

Proportions of stroke patients who had disability on discharge were 68.9% (31/45) among those with HIV and 65.9% (112/170) among those who were HIV seronegative. On the other hand, mortality was 28.9% (13/45) among stroke patients with HIV, while it was 31.2% (53/170) among the stroke patients with no HIV. It should be noted though that the outcome following stroke was not statistically different between stroke patients with HIV and those with no HIV.

Table 5: Outcome following hospitalization of patients with stroke by HIV Sero-status

	HIV positive	HIV negative	Total	p-value
Mean {95% CI} duration of hospital stay in days				
Overall	10.3{8.2, 12.5}	7.3{6.5, 8.0}		0.001
Males	8.7{5.5, 11.8}	6.7{5.8, 7.7}	7.1{6.1, 8.0}	0.12
Females	9.1{7.1, 11.0}	8.7{7.3, 10.2}	8.8{7.6, 10.0}	0.8
Died	13(28.9%)	53(31.2%)	66(30.7%)	0.9
Suffered a disability	31(68.9%)	112(65.9%)	143(66.5%)	
Recovered	1(2.2%)	5(2.9%)	6(2.8%)	

An attempt was made to determine factors associated with mortality as an outcome on discharge among patients who had stroke.

Following logistic regression analysis, the features that were independently associated with mortality of patients were presence of fever and anaemia as shown in table 5.

Table 6: Analysis of Logistic Regression for stroke patients and mortality

Variable	Odd Ratios	95% Conf. Interval	P value
Fever	6.91	3.39 —14.122	0.00
Weight loss	1.88	1.01 — 8.77	0.23
Cough	0.64	0.66 — 5.30	0.48
Dyspnea	2.01	0.19— 2.21	0.14
Loss of consciousness	0.92	0.75 — 3.64	0.25
Anaemia	2.97	1.01— 8.77	0.04

Table 7: Logistic Regression Analysis for HIV positive and Patient Mortality

Variable	Odds Ratios	95% Conf. Interval	P value.
Fever, n (%)	5.40	1.28 – 22.95	0.02*
Weight loss, n (%)	2.10	0.36 – 12.33	0.41
Anaemia, n (%)	1.94	0.29 – 12.86	0.49

* Fever was independent factor associated with hospital mortality.

7.0 DISCUSSION

Stroke classically presents with an acute onset of neurological weakness usually in previously fit individuals. The burden of cardiovascular disease is on the increase. Since stroke can be the presentation of an underlying cardiovascular disease (CVD) it can possibly be used as an appropriate model to assess the burden of CVD [53]. In this study the prevalence of stroke among admitted stroke patients in MNH during the study period was found to be 6.8%. Indeed, this prevalence is higher as compared to findings of a study done in Saudi Arabia where it was found that prevalence of stroke was 3% among admitted patients in a teaching University hospital in western region [54].

Similarly, another study done in Asia found the prevalence to be 3.6% [55]. The difference seen could be partly explained by the fact that Muhimbili National Hospital is the national hospital and hence most of referral cases are seen here. However when comparing to other studies done here in the past the trend is at increase. For example Kalluvya S. E when he did his study at the then Muhimbili Medical Center found that only 80 patients had stroke in a period of 1 year [56]. Also in another study of stroke among African people in Dar es Salaam by Prof. Matuja, the number of stroke patients was 299 in a period of one year [57]. Therefore as suggested in previous studies there is a need to step up preventive measures so as to reduce the number of stroke patients.

In this study due to financial constraints it was difficult to do CT- Scan so as to determine the stroke subtypes. However based on clinical features, and Siriraj score [4, 5] it was possible to say that probably 75.6% of HIV-infected stroke patients had ischemic type while among those who were HIV negative 61.8% of them had ischaemic type. However, the difference was not statistically significant. This is in keeping with other studies whereby ischaemic type of stroke is common in stroke patients irrespective of their HIV serostatus [37].

The mean age of stroke patients in this study was 54.2 years; this is similar to a study done by Prof. Matuja whereby the overall mean age was 51 years [57]. However other studies in developed world have suggested otherwise, whereby about half of stroke cases occur in those aged above 75 years [58]. This may be explained by differences in age structure between Tanzania and developed countries. Also, the fact that HIV is contributing to the occurrence of stroke makes it plausible for a lower mean age of stroke among the studied patients. This is so because the mean age for HIV in Tanzania is 24.3 years [34].

7.1 Prevalence of HIV in Stroke Patients

This study has shown that the prevalence of HIV infection among stroke patients was 20.9%. This is higher than the prevalence of HIV infection in the general population. The TACAIDS estimated that the average national prevalence of HIV infection to be 5.7% [34]. This finding suggests that HIV infection is a significant and important risk factor for stroke. Similar results have been reported from Malawi whereby the prevalence of HIV infection was as high as 48.0% in stroke patients [37]. Furthermore, it was noted in this study that females had higher HIV prevalence compared to males, being 55.6% versus 44.4% respectively. Though not statistically significant, this was similar to other studies done in Tanzania demonstrating an overall higher prevalence of HIV infection among females as compared to males [34].

The age group most affected by HIV infection was 36-55 years, similar findings were reported in the Tanzania's National AIDS Control programme surveillance report [32]. Also, similar findings were reported in another study done in stroke in black South African HIV positive- patients by Mochan et al (2003) [59].

The mean age of 47.2 years for stroke patients with HIV infection found in this study was significantly lower as compared to the mean age of 56.1 years among those who were not HIV infected. This was also true with the mean ages by gender in keeping with

other studies [6, 35, 37, 60, 61]. It shows that when stroke occurs in young age, and especially when there is no other risk factor, HIV infection is a possibility. It was found in this study that 73.3% of stroke patient with HIV infection were married. This can be explained with the fact that HIV in our setting HIV infection is common in married couples [32].

Although not reaching statistical significance, it was noted that HIV infected patients with stroke in MNH who were least educated had highest prevalence, while those with advanced education had least prevalence. Similar results were reported in others studies [62].

7.2 Degree of Immunodeficiency among Stroke Patients with HIV

Despite of the fact that it was possible to have CD4 counts in 36 individuals, the finding that 58.3% of them had CD4 counts of less than 200 cell/µl (severe immunodeficiency) is of concern. Similar results of a higher number of patients with low CD4 counts in patients presenting with stroke was also observed in a study done in South Africa by Ortiz G et al[61]. It is indeed known that a CD 4 count of less than 200 cell/µl is associated with a higher risk for stroke [38]. In one study it was found that carotid intima thickness was higher in HIV patients and rapid progression was more likely in those with immunodeficiency [45]. So is of importance to detect early patients with HIV disease and follow them up so that treatments are initiated early so as to avoid development of AIDS and consequent added risk for stroke [38].

7.3 Risk factors associated with stroke among HIV infected

7.3.1 Use of ARV's

In this study, none of the patients was on a Protease inhibitor, a class of ARV that has been strongly linked with development of dyslipydemia that adds to the risk for stroke.

Only 13.3% of HIV infected patient were on ARV, contrary to the study by Ortiz G et al [61] where it was found that 61% of HIV infected stroke patients were using ARV. This point further illustrates the need for enhanced campaigns for HIV testing at community level.

Majority, 58.3% were indeed eligible for ART, but were unaware of their HIV serostatus. This shows that most of our patients came late to health facilities and once they do come the disease is already at an advanced stage with a lot of complications. So there is need for increasing public awareness on the importance of early and routine medical checkups so that the diseases are diagnosed early and appropriate measures taken.

7.3.2 Traditional risk factors

Hypertension was found to be relatively common among stroke patients [63, 64]. The prevalence was 80.6% among those with non-HIV stroke patients as compared to 53.3% among those with HIV-infected stroke patients. This is in keeping with a study done by Dr. Tipping and colleagues who found hypertension to be not significant in HIV-infected stroke patients [60].

As noted in this study, the previously quoted reference also found the prevalence of obesity and other derangements in lipid profile not to differ significantly between stroke patients with HIV and those without HIV.

On the other hand, the prevalence of patients with diabetes was higher though not statistically significant in the HIV un-infected group contrary to other studies where the HIV infected group had higher prevalence [65]. This could be due to the fact that diabetes mellitus by its own is a risk factor for cardiovascular events irrespective of the HIV status [9].

Although reaching no statistical significance, in this study it was found that patients with dyslipydemia were more in HIV group as compared to those without HIV

infection. Dyslipydemia that is anomalies of lipid metabolism have been increasingly recognized among HIV infected and AIDS patients. The mechanism contributing to these lipid abnormalities remains unknown. These abnormalities occur independently of ARV therapy [66]. Grunfeld et al found that HIV infection was associated with elevated triglyceride levels that worsened with progression of HIV-related disease [67].

7.4 Clinical Presentation of Stroke in Presence of HIV

It was found in this study that stroke patients with HIV were more likely to present with anaemia and fever as compared to those without HIV. Similar results were found in other studies where anaemia was reported to occur in greater frequency in patients with stroke [68, 69, 70]. Anaemia was also found to be most frequent abnormality seen in HIV positive patient at Muhimbili National Hospital in a study done by Lyimo, M [71].

Other features which were common in the HIV infected group included presence of Karposis sarcoma, and diarrhea, a reflection of underlying lowered immunity with concomitant other opportunistic illnesses. This is in keeping with other studies, which also found concomitant illnesses to be common among stroke patients with HIV infection [60]. It follows that the presence of such conditions in a stroke patient should alert clinicians for the possibility of HIV.

The overall mean days of hospital hospitalization was 10.3 days and 7.3 days among HIV stroke patients and HIV negative stroke patient respectively. The difference was statistically significant. This is similar to other study whereby hospital duration of stay for stroke patients was longer as compared to HIV negative stroke patients [72]. This is due to the fact that stroke patients with HIV-infection are more likely to have concomitants illness at same time.

It is interesting that the outcome (death or alive) following hospitalization with stroke in the HIV and non-HIV infected stroke patients was similar. The proportions who died, and those who suffered a disability were similar among the two groups. Similar findings were reported from the study done in Malawi [37]. This may suggest that HIV-infection does not have an effect on mortality in patients with stroke.

Fever and anemia were found to be independent factors associated with poor outcome in study subjects, and this is similar to other studies [73]. Clinicians should therefore make aggressive efforts in managing these complications in stroke patients with HIV.

8.0 Study Limitation

Financial constraints limited this study as it was difficult to confirm the sub-types of stroke due to inability to do the CT-scan of the brain.

9.0 CONCLUSION

1. Prevalence of HIV in stroke patients was high.
2. Stroke patients with HIV are younger and may present with other HIV related illnesses.
3. Overall hypertension remains greatest risk for strokes in HIV/non HIV stroke patients
4. Presence of fever and anemia were associated with an increased risk of mortality among stroke patients with HIV.

10.0 RECOMMENDATIONS

1. It is recommended that HIV infection should be screened in all patients with stroke.

2. A community-based case control study is needed to assess the association of HIV with stroke.

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APPENDICES

Appendix I

CONSENT FORM TO PARTICIPATE IN THE STUDY

TITLE: PREVALENCE OF HIV INFECTION AMONG STROKE PATIENTS

Greetings! My name is Dr. Mkunde Mlay, a senior resident in the department of Internal Medicine. I would like to conduct a study mentioned above for my dissertation.

Purpose of the Study

The aim of the study is to determine the magnitude of HIV infection among stroke patients. This will help in improving future management of other patients with stroke.

How to Participate

Patients who meet the inclusion criteria were recruited into the study.

They were interviewed using a questionnaire, which included their social demographic characteristics, medical history and anthropometric measurements. Then blood was taken for laboratory investigations. HIV test was performed after pre-test HIV counseling and obtaining your permission to do so. Consent was obtained from close relatives or guardians of patients who are themselves unable to do so as a result of disease, or if under-age.

Risks

There are no risks associated with taking these measurements and tests, although slight pain will be felt when blood is drawn from a blood vessel (venopuncture).

Benefits

Patients found to have HIV infection were counseled and advised to join the CTC clinics.

Confidentiality

Any patient's results were not be revealed to anybody except attending doctors and the person him/herself or the designated close relative or guardian.

Cost

No payment is requested from you. The researcher covered for all the costs associated with this study only

Person to contact in case of further questions or problems

Dr. Mlay (Tel: 0754-311061) Department of Internal Medicine, MUHAS

I..... have read/been told of the contents of this form and understood its meaning. I agree/I give permission for my relative to participate in this study.

Signature..... (Participant/Representative) Date.....

Signature..... (Researcher) Date.....

Appendix II

IDHINI YA KUSHIRIKI KATIKA UTAFITI

Nambari ya Usaili.....

Ndugu, hujambo?

Mimi naitwa Dr Mkunde Mlay, mwanafunzi wa shahada ya uzamili Chuo Kikuu cha Tiba Muhimbili. Nafanya utafiti kuhusu " **TATHMINI YA KITABIBU YA UGONJWA WA UKIMWI KWA WATU WENYE UGONJWA WA KIHARUSI KATIKA HOSPITALI YA TAIFA YA MUHIMBILI".**

Madhumuni ya Utafiti

Katika utafiti huu lengo ni kujua ukubwa wa tatizo la ukimwi katika wagonjwa wenye kiharusi. Utafiti huu utasaidia kuboresha matibabu ya Ugonjwa wa kiharusi.

Ushiriki wa wagonjwa

Kama unakubali kushiriki katika utafiti huu utaombwa kujibu maswali kadhaa na kupimwa kitabibu damu kwa ajili ya ukimwi na rehabu, sukari.

Utunzaji wa siri

Taarifa zote zitatunzwa kwa siri na mtafiti.

Madhara na athari

Hakuna madhara yoyote yanayotegemewa kutokana na ushiriki kwenye utafiti huu, isipokuwa kwa maumivu kidogo wakati wa kuchukua damu.

Uhuru wa kushiriki

Ni hiari ya mgonjwa kushiriki kwenye utafiti huu na pia anaweza kujitoa wakati wowote. Hata hivyo kutoshiriki au kujitoa kwenye utafiti hakumnyimi mgonjwa haki

yake ya kupata huduma za matibabu. Mgonjwa aliyejitoa kushiriki utafiti akiamua kurudi atapokelewa na kuendelea kupata huduma zote kwa mujibu wa utaratibu uliopo.

Faida za utafiti

Mgonjwa atafaidika kwa kupimwa na mtafiti na taarifa za vipimo vya kitabibu zitarudishwa kwa Daktari wake wa awali ikiwa ni pamoja na ushauri wa kitaalamu wa uboreshaji wa matibabu ya mgonjwa.

Ni matumaini kwamba taarifa za utafiti huu zitasaidia kuboresha tiba kwa wagonjwa wengine siku za baadaye.Kuna kamati ya kusimamia udhibiti wa utafiti

Kamati hii hutoa taarifa za matokeo ya utafiti ambayo hutoa elimu kubwa kuhusu tatizo hili.

Taarifa

Endapo utahitaji kupata maelezo kuhusu haki zako au kutoa taarifa ya madhara ambayo unahisi yametokana na kipimo hiki cha moyo, wasiliana na Prof E.Lyamuya, Mwenyekiti wa kamati ya Maadili na Utafiti,S.L.P 655001, Dar es Salaam. Namba ya simu: Ofisi; 255222152489, Binafsi;0754495933. Na/au

Dr Mkunde Mlay, Idara ya Tiba, MUHAS, Namba ya simu, 0754 311061.

Je unakubali kushiriki kwenye utafiti? (weka alama) Ndiyo.....

Hapana.....

Mimi.....nimeelezwa/nimesoma maelezo haya.Maswali yangu yamejibiwa.

Nimekubali kushiriki kwenye utafiti huu

Sahihi ya mgonjwa.....

Sahihi ya ndugu/shahidi.....

Sahihi ya Mtafiti.....

Tarehe.....

Appendix III

QUESTIONNAIRE

Prevalence of HIV among stroke patients

Identification No: ..... Registration No: .....

Name of Interviewer.....

Date of Interview.....

Part I: Social Demographic Characteristics

No:	ITEM	TO BE FILLED BY RESEARCH ASSISTANT	TO BE CODED BY MAIN RESEARCHER
1.	Age of patient	[ ]	1.[ ]
2.	Sex	1. Male 2. Female	2.[ ]
3.	Marital status	1. Single 2. Married 3.Unstable relationship	3. [ ]
4.	No. of yrs spent at school by patient	1. 0 2. 1-4 3. 5-7 4. 8-14 5.>14	4. [ ]
5.	Occupation of patient	1.student 4. Employed 2. Housewife 5. Peasant 3. Businessman/woman.	5. [ ]

Part II: History

No:	ITEM	TO BE FILLED BY RESEARCH ASSISTANT	TO BE CODED BY MAIN RESEARCHER
6.	When did your stroke occur? (It has to be ≤ 3 months)	[ ]	6. [ ]
7.	Do you know your HIV status? If yes go 8	1. yes 2. no	7.[ ]
8.	Are you currently using ARV?	1. Yes 2. No	8.[ ]
9.	Which ARV? Mention	9. _____	9.[ ]
10.	For how long (Months)	10. _____	10.[ ]
11.	Have you been previously diagnosed to have high blood pressure?	Y/N	11. [ ]
12.	Are you using antihypertensive drugs?	Y/N	12.[ ]

13.	Have you been previously diagnosed with diabetes mellitus?	Y/N	13. [ ]
14.	Do you smoke?	Y/N	14. [ ]
15.	How many cigarettes/day	_____	15. [ ]
16.	For how long you have being smoking	_____	16. [ ]

Part III: Clinical characteristics

No:	ITEM	TO BE FILLED BY RESEARCH ASSISTANT	TO BE CODED BY MAIN RESEARCHER
17.	Weight loss	Y/N	17. [ ]
18	Diarrhoea	Y/N	18. [ ]
19.	Mouth ulcers	Y/N	19.[ ]
20.	Abdominal pain	Y/N	20. [ ]
21.	Skin itching	Y/N	21.[ ]
22.	Cough	Y/N	22.[ ]
23	Dyspnea	Y/N	23.[ ]
24.	Numbness	Y/N	24.[ ]
25	Headache	Y/N	25.[ ]
26.	Fever	Y/N	26. [ ]
27.	Fits	Y/N	27. [ ]
28.	Facial asymmetry	Y/N	28. [ ]
29.	Loss of consciousness	Y/N	29. [ ]

30.	limb weakness	Y/N	30. [ ]
31.	aphasic	Y/N	31. [ ]
32.	Karposis Sarcoma lesion?	Y/N	32. [ ]
33.	TB	Y/N	33. [ ]
34.	Atrial Fibrillation	Y/N	34. [ ]
35.	Carotid bruit	Y/N	35. [ ]

Part IV: Physical examinations

o:	ITEM	TO BE FILLED BY RESEARCH ASSISTANT	TO BE CODED BY MAIN RESEARCHER
36.	Body temperature	_____	36. [ ]
37.	GCS	[ ]	37.[ ]
38.	Blood Pressure	1st reading_____ 2nd reading_____	38.[ ]
39.	Clinical anaemia (Y/N)		39.[ ]
40.	Body weight (kg) [ ] Height (m2) [ ] BMI	[ ]	40. [ ]
41.	Lymph node enlargement	Y/N	41. [ ]
42.	Pallor	Y/N	42. [ ]
43.	Jaundice	Y/N	43. [ ]
44.	Oedema	Y/N	44. [ ]
45.	Outcome on discharge	Y/N 1. Disability 2. Death 3.Others Mention_____	45. [ ]

Part V: Investigations

No:	ITEM	TO BE FILLED BY RESEARCH ASSISTANT	TO BE CODED BY MAIN RESEARCHER
46.	ELISA FOR HIV	[ ]	46. [ ]
47.	CD4 Counts	[ ]	47. [ ]
48.	RBS	[ ]	48. [ ]
49.	LIPID PROFILE	1.Total cholesterol [ ] 2.Trigleceride [ ] 3.HDL [ ] 4.LDL [ ]	49. [ ]

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