COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

ASSESSMENT OF KNOWLEDGE OF STROKE RISK FACTORS AND WARNING SYMPTOMS AMONG ADULTS WITH TYPE II DIABETES MELLITUS IN SELECTED HOSPITALS, ADDIS ABABA, ETHIOPIA, 2021.

BY: REDIET AKELE (BSc)

A THESIS SUBMITTED TO THE NURSING DEPARTMENT, SCHOOL OF NURSING AND MIDWIFERY, COLLEGE OF HEALTH SCIENCE, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS IN ADULT HEALTH NURSING.

JUNE, 2021

ADDIS ABABA, ETHIOPIA

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BY: REDIET AKELE (BSc)

ADVISORS:

FEKADU AGA, RN, PHD

TADESSE BADADA, RN, MSc

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SCHOOL OF NURSING AND MIDWIFERY

POSTGRADUATE PROGRAM

Name of principal investigator	**Name:** Rediet Akele (BSc) **E-mail:** Redietakele@gmail.com **Cell phone:** 09 21 92 26 62
Name and description of the primary advisor	**Name**: Fekadu Aga, RN, PHD **E-mail:** fiqaaduuagaa@yahoo.com
Name and description of the secondary advisor	**Name:** Tadesse Badada, RN, MSc **Email**: tadesseb2@yahoo.com
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This thesis by Rediet Akele (BSc Nurse) is accepted in its present form by board of examiners as satisfying thesis requirement for the degree of masters in Adult Health Nursing.

EXAMINER:

_____	_____	_____	_____
NAME OF EXAMINER	RANK	SIGNATURE	DATE

NAME OF ADVISORS:

_____	_____	_____	_____
PRIMARY ADVISOR	RANK	SIGNATURE	DATE

_____	_____	_____	_____
CO-ADVISOR	RANK	SIGNATURE	DATE

DEPARTMENT HEAD:

_____	_____	_____	_____
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STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical guidelines in the in the preparation, planning, data collection, analysis, and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that all sources used in this document have been cited and referenced. Every attempt has been made to prevent plagiarism in the preparation of this thesis. I solemnly declare that this thesis has not been submitted to any other organization anywhere for the award of any academic degree, diploma or certificate.

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NAME OF STUDENT	SIGNATURE	DATE

NAME OF ADVISORS

_____	_____	_____	_____
PRIMARY ADVISOR	RANK	SIGNATURE	DATE

_____	_____	_____	_____
CO-ADVISOR	RANK	SIGNATURE	DATE

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ABBREVIATIONS AND ACRONYMS

AAU	Addis Ababa university
BSc	Bachelor of Science
CDC	Centre for disease control and prevention
CVD	Cardiovascular disease
DM	Diabetes mellitus
ETB	Ethiopian birr
GBD	Global burden of diseases
NCD	Non-communicable chronic disease

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background: Stroke is a major public health concern that affects people all over the world. It is a major contributor to morbidity, mortality and disability in both developing and developed countries. Increasing knowledge regarding cerebrovascular diseases and tackling risk factors are important to reduce the rising worldwide burden of stroke.

Objective: The main aim of this study is to assess knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in selected hospitals, Addis Ababa, Ethiopia, 2021.

Methods and materials: Institutional based cross-sectional study was conducted among adults with type II diabetes in selected governmental hospitals of Addis Ababa, Ethiopia. Systematic random sampling was used to select eligible 499 study participants. The data coding, entry and clearance was made by using Epi data software version 4.6.0 and exported to SPSS software version 25 for analysis. Simple and multiple linear regression analysis were done to explore the association between independent with the dependent variables.

Result: Of the calculated sample size, total of 470 respondents were interviewed with response rate of 94.2%. Majority (54.9%) of study participants were females and the mean age of respondents were 50.6 ($\pm$12.9). The mean score of knowledge of warning symptoms and risk factors of stroke was 63.9% and 67.2% respectively. Younger age (B= -0.021; P= 0.01), higher level of education (B= 1.873; P= 0.000) and know someone diagnosed with stroke (B= 3.64; P= 0.000) shows statistically significant association with knowledge of stroke warning symptoms. Similarly, higher level of education (B= 2.007; P= 0.000), know someone with stroke (B= 3.328; P= 0.000) and living with others (B= 2.28; P= 0.000) shows statistically significant association with knowledge of stroke risk factors.

Conclusion and recommendation: In general, from this particular study, knowledge of diabetic patients towards stroke risk factors and warning symptoms was inadequate. Therefore, the importance of stroke education concerning its risk factors and warning symptoms via social media, health education sessions, and posters should be emphasized.

Keywords: knowledge, stroke, risk factors, warning symptoms

1. INTRODUCTION

1.1. Background of the study

Stroke is one of the common cerebrovascular disorders characterized by an acute clinical episode of focal or global neurological disturbance associated with impairment of cerebral circulation. When the vessels are unable to supply oxygen and to remove waste products, brain cells quickly begin to die (1).

Stroke is a global public health concern and a major contributor to morbidity, mortality and disability in both developing and developed countries. With an incidence of nearly 15 million cases, stroke continues to be the third leading cause of death globally. its fatality rate is higher in Sub-Saharan African countries, which accounts for 85% of all stroke deaths worldwide (2).

According to CDC report, stroke is the leading cause of preventable mortality and long-term severe disability worldwide (3). It has enormous emotional and socioeconomic burden for patients, their families and health services. The major contributing factors to this problem is the aging of the population, lack of knowledge regarding cerebrovascular disease and increased frequency of the risk factors, mainly hypertension and diabetes (4,5).

Currently, the burden of stroke is drastically increasing across the world. The data from global burden of diseases, injuries, and risk factors study (GBD) showed that stroke is the leading cardiovascular disease which causes mortality and disability in Sub-Saharan African and other developing countries (1). Studies in Ethiopia showed that stroke is the most common cause of admissions (45%) from other neurological disorders and is responsible for 28,320 (4.71%) of the country's total deaths (2).

Type II diabetes is one of the significant risk factors for the development of stroke. Compared with non-diabetic patients, those with type II diabetes have a 1.5 to 3 times higher chance of getting stroke (6). However, the development of stroke can be prevented in patients with type II diabetes with lifestyle modification, optimum self-care practice, glycemic control, and anti-cholesterol treatment. Adhering to these

therapeutic regimens require the patient to have good understanding or knowledge of stroke risk factors.

1.2. Statement of the problem

Stroke is a global public health concern and a major contributor to morbidity, mortality and disability in both developing and developed countries. Despite the advances that have been made in stroke research and treatment and the overall reduction in stroke mortality, it continues to be the third leading cause of death after heart diseases and cancers and the second leading cause of cardiovascular deaths after ischemic heart disease with an incidence of approximately 15 million cases per year (2,4).

Studies found that, every 40 seconds someone in the U.S. suffers from stroke on average, and at least one person dies from a stroke every 4 minutes (7). According to WHO report in 2012, about 17.3 million people died of cardiovascular diseases representing 31% of all global deaths, from which stroke accounts for 6.7 million deaths. Among them four out of five deaths occurred in the low and middle income countries with men and women being equally affected (4).

According to latest estimate of GBD there is further shift from communicable diseases, nutritional and maternal causes towards non-communicable diseases like stroke (8). Non communicable chronic diseases accounts for 63% of all fatalities. Total deaths in the NCD, such as stroke, are predicted to rise by an additional 17% over the following decade if no essential measures are taken (9). This impact is more likely caused by an increase and aging of the world's population. Currently, about 3-4% of total health care expenditures in Western nations are spent on stroke. It is estimated that the mean lifetime cost of stroke per person, including inpatient treatment, follow-up care and rehabilitation is 140,048 dollar in the United States (8).

Stroke has a considerable impact on the burden of disability and loss of quality adjusted life years. Its mortality is more pronounced in Sub-Saharan Africa countries, which accounts for 85% of all stroke related deaths globally (10). Many studies in Ethiopia have found that stroke is the commonest cause of hospitalization (45%) from other neurologic disorders, accounting for 28,320 (4.71%) of total deaths in this country (2).

This unseen chronic disease burden epidemic is another emerging challenge to socio-economic development, particularly in developing countries including Ethiopia (9).

A recent study done in Ethiopia found that, the median time from onset of stroke symptoms to hospital admission is 23.50 ± 13.14 hours (11). Another similar study conducted at Tikur Anbessa Specialized hospital revealed that, among patients with stroke, only 15% arrived to the hospital within three hours of symptom onset (12).

Type II diabetes is among the risk factors for the development of stroke. Type II diabetes represents the most common metabolic disease in adults. According to estimates of the International Diabetes Federation in 2019, diabetes shows higher prevalence (19.9%) in people older than 65 years (13).

The need to assess and increase public awareness of stroke risk factors and warning symptoms has been identified as a key to address the gaps in knowledge. From which promoting awareness about the seriousness of stroke, and the value of timely evaluation to maximize therapeutic effect are included. Known that older people are the most vulnerable groups at risk for stroke, it is significantly important that the factors associated with low awareness are understood (14).

Although different studies were conducted worldwide concerning awareness of stroke risk factors recognition and warning symptoms, this specific study among type II diabetic patients is not well researched in our country. Therefore, the purpose of this study is to show the gap between unhealthy behaviors that increase the incidence of stroke and decrease pre-hospital delay caused by lack awareness on recognition of stroke warning symptoms.

2. LITERATURE REVIEW

2.1. Overview of stroke

Stroke occurs when there is a disruption of blood supply to the brain as a result of blockage of the cerebral artery or bleeding into the brain tissue causing decreased in oxygen rich blood supply to the brain, which lasts longer than 24h resulting in death with no known cause other than vascular origin. Without adequate blood to supply oxygen and to remove waste products, brain cells quickly begin to die (1,15).

Stroke risk factors may be categorized as modifiable and non-modifiable. Age, sex, family history and ethnicity are non-modifiable risk factors; while hypertension, smoking, diet, and physical inactivity are among some of identified modifiable risk factors. The high burden of stroke and other vascular diseases could increasingly affect Africa due to health transitions in line with ever-changing social and economic patterns. Furthermore, the poor are increasingly affected by stroke, which can be attributed to the changes in population risk factors and inability to afford the high cost of stroke treatment (1).

2.2. Knowledge of warning symptoms of stroke

A study done on Luxemburg noted that 35.5% of study participants mentioned paralysis or weakness as a warning symptoms of stroke followed by speech disorder 32.1%, facial nerve palsy 15.7%, vertigo 15.2%, vision disorder 15.0%, loss of consciousness 14.1%, headache 12.9%, disorientation 11.2%, nausea/vomiting 9.1%, pain 5.5%, memory loss 5.2%, sensory symptoms 5.8%, death 1.9% and only 1.4% of respondents mentioned double vision as warning sign of stroke whereas 10.2% of respondents didn't knew any warning symptoms of stroke at all (16).

A study done among diabetes patients from Germany and Turkey in a primary care and diabetes practice center revealed that, 48.5% of respondents mentioned motor symptoms as warning sign of stroke followed by speech difficulty 36.6%, general symptoms 27.6%, vision 11.2%, sensory 6%, cranial nerve 24.6% and coma 8.2% (17).

A study conducted in Central Pennsylvania revealed that speech difficulty (92.6%) was the commonest warning symptom mentioned by respondents followed by droopy face (88.3%), weakness on the arm (82.2%) and loss of balance (77.3%). Regarding distractors, neck pain (34.4%) and chest pain (33.1%) were commonly misidentified warning symptoms whereas back pain (16.6%) was the least misidentified warning symptom of stroke among respondents (18).

A study done on Cameroon revealed that the main warning signs and symptoms stated by respondents were speech disturbances (98.3%) followed by numbness or paralysis of one part of the body (98%), facial deformity (97.8%), sudden visual disturbance (91.2%) and headache (85.9%) (19).

A cross sectional study done on Africa, Nigeria showed that from 239 respondents, 208 (87.0%) had good knowledge of the signs or symptoms of stroke. The warning symptoms commonly known by study participants were sudden and severe headache (86.2%), weakness on one side of the body (85.3%) and difficulty in speech (83.3%). Less than half of those surveyed (41.0%) recognized sudden loss of vision as a warning symptom of stroke and only 30.5% of participants knew reduced sensation in the body and sudden weakness all over the body (38.1%) weren't warning symptoms of stroke (4).

Another hospital-based cross sectional study done on Nigeria noted that paralysis on one side of the body was identified by (24.4%) of the respondents while (13.3%) identified dizziness, loss of balance or coordination as a warning sign and symptom. 60.4% of the respondents didn’t knew any warning sign of stroke while at least one sign was identified by 39.6% of study participants (20).

A study done on Bahir Dar, Ethiopia revealed that around 77.3% of respondents did not recognized any warning symptoms of stroke. On the other hand, 14.4% of them recognized 5 and more warning symptoms, 5.4% recognized 4 warning symptoms and 0.7% recognized 3 warning symptoms. The most widely recognized warning symptoms of stroke by respondents were (35.9%) paralysis or weakness on one side of the body and (16.2%) severe headache (2).

2.3. Knowledge of stroke risk factors

A study done on Luxemburg stated that, among 420 in and outpatients in neurology department 40.2% of study participants mentioned smoking as stroke risk factor followed by arterial hypertension 32.4%, alcohol 32.1%, nutrition 27.6%, cholesterol 26.4%, stress 22.6%, lack of physical exercise 19.3%, overweight 14.3%, hyperlipidemia 13.1%, peripheral arteriopathy 7.9%, hereditary factors 7.1%, diabetes mellitus 6.2%, poor circulation 4.3% and age 3.8%. While 10.5% of respondents didn't knew any risk factors of stroke at all (16).

Similarly, a survey study done on African Americans regarding knowledge of stroke risk factors identified that majority of respondents didn't know how lifestyle such as lack of physical activity, excessive alcohol consumption, diabetes, smoking, and high cholesterol influences the occurrence of stroke. Evidences showed that modifying those risk factors of stroke will significantly reduce the incidence of stroke by 80% (15).

A study done among diabetes patients from Germany and Turkey noted that 35.8% of respondents recalled hypertension as a risk factor of stroke followed by smoking 35.1%, hyperlipidemia 6.7%, diabetes mellitus 17.9%, alcohol 15.7% and only 3.7% of respondents stated heart disease as a risk factor of stroke. Their study discovered the lack of knowledge of stroke risk factors among diabetics in natives and migrants in Germany. They also noted that, patients younger than 61 years had better stroke knowledge than those older (17).

A study conducted in Central Pennsylvania showed that smoking (78.5%) was the commonest risk factor mentioned by respondents followed by hypercholesterolemia (75.5%), hypertension (73.6%) and diabetes (72.4%). Whereas older age (62.6%)was the least identified risk factor of stroke among respondents (18).

A study conducted in Cameroon noted that the main risk factors mentioned by study participants were hypertension (98.5%) followed by overweight (97.8%), lack of physical activity (97.7%), stress (95.1%), family history of stroke (87.4%), unhealthy diet (85.5%), alcoholism (64.2%), smoking (60.6%), and hypercholesterolemia (44.4%) (19).

Another study done on hypertensive and diabetic patients revealed that, more than half of respondents (86.6%) had good knowledge towards stroke risk factors. The most frequently reported stroke risk factors were hypertension (92.0%), too much fat consumption (85.7%), overweight (84.9%) and not exercising regularly (80.8%). Less than half of study participants recognized aging (42.3%) and use of oral contraceptives (42.3%) as risk factors of stroke (4).

According to the study done on Bahir Dar, Ethiopia, the most common risk factor of stroke mentioned by respondents were physical inactivity (21.6%) followed by obesity (20.1%) and drinking alcohol (18.7%). Majority (77%) of survey participants could not recognize any stroke risk factors; 14% recognized 5 risk factors; 3.6% recognized 4 risk factors; whereas only 1.8% recognized 3 risk factors of stroke (2).

2.4. Participants reactions to various stroke symptoms

Evidences studied respondents' response to the event of stroke and each stroke warning symptom. A recent study done on Iran among 2712 respondents revealed that, 59% of respondents would call emergency medical service followed by 30.5% transfer to hospital, 6.5% call family, 3.15% transfer to clinic and 0.2% transfer to physician office while 0.1% of respondents call physician (21).

Another study conducted on Luxemburg revealed that, 89% of respondents would call an ambulance, 76.4% knew that they had to be admitted to a hospital in case of an acute stroke, 73.4% knew that stroke therapy should be started immediately, 7.9% would reach out general practitioners help, 6.7% would put the patient into a stable lateral position, 5.5% didn't knew what to do, 4% would deliver first aid, 2.4% would try to calm the patient, and 15.8% didn't know when to start stroke therapy (16).

Another similar study conducted on Shiraz, Iran examined respondent's reaction in a case of acute stroke. Among 385 study participants, 369 (95.8%) of respondents mentioned going emergency room as a reaction in acute stroke followed by neurologist office 327 (84.9%) and call an ambulance 290 (75.4%) (5).

According to the study conducted on Central Pennsylvania, (95.7%) of respondents mentioned calling emergency medical service followed by (12.9%) drive the patient to emergency room, (4.9%) call a physician, (3.7%) take the patient to a clinic and (1.2%) wait few hours till recovery (18).

A cross sectional study done on Malaysia revealed that, 74.2% of respondents go to hospital within 4.5 h as a reaction in acute stroke followed by 82.1% go to hospital within same day, 31.6% visit alternative health care providers, 47% combination of hospital and tradition and 54% seek spiritual healing (22).

2.5. Sources of stroke information

Study done on Northwest India revealed that majority of subjects had heard about stroke from friends 302(32.1%), relatives 376(39.9%), television 85(9%), radio 10(1.1%) and newspaper 60 (6.4%). But, only 34(3.6%) of respondents had received information about stroke from doctors (23). Another similar study showed that majority of respondents mentioned mass media as source of information (82%), followed by family/friends (45%), and by general physicians (20%) (24).

Another similar study done in Iran revealed that family and relatives (38.1%) are the most frequently mentioned source of knowledge about stroke followed by television (24.3%), previous stroke (16.7%), physicians (11.5%), newspaper and magazines (9.6%), medical books (3.9%), medical staffs (2%) and radio (0.8%) (21).

A study done on Luxemburg noted that 41.1% of study participants obtained their knowledge on stroke from the media, 38.1% from family and friends, 23.6% from school, 9.3% from personal experience, 6.2% from brochures, 4.3% considered it general knowledge, and 4.3% derived their knowledge from personal interest while only 2.6% of participants got their knowledge from a neurologist and 2.6% from general practitioner (16).

According to the study done on Central Pennsylvania, the most common source of knowledge stated by respondents was relative who had stroke (33.7%) followed by social media (31.9%), medical books (27%) and families and friends (21.5%). Unexpectedly, only (20.2%) of participants obtain their information from health professionals (18).

A study done on Cameroon among 1,025 participants showed that, the most common sources of stroke information reported by respondents were internet 99%, health professionals 83.4%, newspaper/ magazines 16.4%, radio 8%, by someone in the close entourage 8%, school 7.7% and television 2.2% (19).

2.6. Factors Associated with Knowledge of type II diabetic Patients towards Stroke

A study conducted on Korea revealed that lower level of education and older age were significant predictors of poor knowledge of stroke risk factors (25). Study done in Omani also found that younger age (3.05 times), being male (2 times) and completing highest educational level (7.42 times) were significantly associated with knowledge of organs affected by stroke (26). Likewise, a study conducted in Central Pennsylvania noted knowing someone diagnosed with stroke was significantly associated with knowledge fatality of stroke. The study also revealed that completing higher educational level increases odds of recognition of stroke risk factors by 0.21 times (18).

A population based survey conducted in German revealed that the maximum of naming 4 correct risk factors was significantly associated with family history of stroke, higher educational level and receiving information about stroke risk factors during past one year. However older age and living alone was inversely associated with having good knowledge of risk factors and warning symptoms of stroke (24).

Another similar study conducted on Cameroon revealed that younger age, male sex, lower level of education and previous experience of stroke education were significantly associated with lower level of knowledge on stroke (19). Similarly, a study done on Nigeria examined that the only predictor for good knowledge of warning symptoms of stroke and stroke risk factors was having formal education. Respondents with formal education were four times more likely than those with none to have good knowledge of warning symptoms and risk factors of stroke (4).

A recent study done on Bahir Dar, also revealed that patients who were able to read and write were seven times more knowledgeable than those who weren't. Concerning age, younger respondents were two times more likely to have higher knowledge of stroke than older respondents. Likewise, respondents with sufficient monthly income were three times more likely to have higher knowledge of stroke than their counter parts (2). A study done on Debre Tabor also showed that younger age is an independent predictor of good knowledge of stroke risk factors and warning symptoms (27).

Conceptual frame work

This conceptual frame work was developed by the researcher based on the review and synthesis of concepts from different literature sources (2,14,15,17). This frame work clearly describes factors that are associated with knowledge of stroke risk factors and warning symptoms. As shown in the figure below, knowledge of stroke can be directly affected by socio-demographic factors, life style factors, source from which information is obtained and reactions to various stroke symptoms. And indirectly socio-demographic factors would have an impact on life style factors, sources of stroke information and reactions to various stroke symptoms.

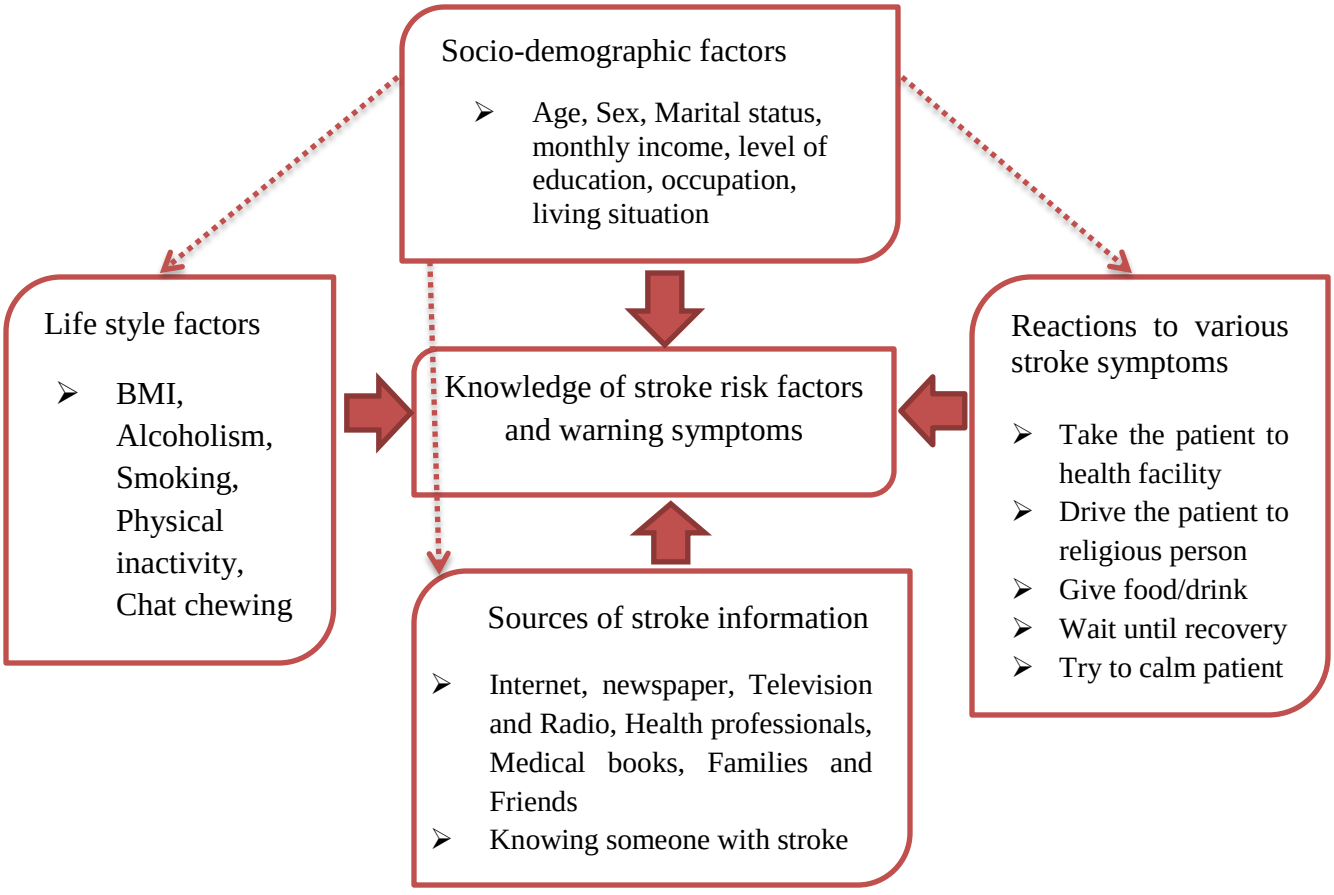

Figure 1: Conceptual framework on assessment of knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in selected hospitals, Addis Ababa, Ethiopia, 2021.

JUSTIFICATION OF THE STUDY

In countries like Ethiopia where little is spent on health care expenditures, stroke killed thousands of people and remained one of the major cause of morbidity and mortality. These deaths are easily preventable though cost effective measures when the community have good understanding of stroke risk factors and warning symptoms. Although different studies conducted worldwide regarding awareness of stroke, this specific study among type II diabetic patients is not well researched in our country. To the best of my knowledge, there is no study conducted in Ethiopia regarding knowledge of diabetic patients towards stroke risk factors and warning symptoms. Therefore, the purpose of this study is to show the gap between unhealthy behaviors that increase the risk of stroke and decrease pre-hospital delay caused by lack of understanding of stroke warning symptoms and risk factors.

SIGNIFICANCE OF THE STUDY

The findings of this study will contribute to fill the gap in understanding the possible risk factors, to help nursing profession and other health care providers to enhance quality of health care and to implement health prevention and promotion programs related to DM and stroke, to assist healthcare providers, policy makers, educators, families, and communities who are searching for more information related to the nature and complexities of this growing problem.

The outcomes of this study may also provide substantial contribution for managers and policymakers on how to raise community awareness regarding stroke risk factors and warning symptoms. In addition to this, the outcome of this study can be used as a secondary data source for researchers who needs to do their study on the attitude and practice of diabetic patients towards prevention of stroke.

3. OBJECTIVES

3.1. General objective

To assess knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in selected hospitals, Addis Ababa, Ethiopia, 2021.

3.2. Specific objectives

- To assess knowledge of stroke risk factors among adults with type II diabetes in Addis Ababa, Ethiopia, 2021.
- To assess knowledge of stroke warning symptoms among adults with type II diabetes in Addis Ababa, Ethiopia, 2021.
- To identify factors associated with knowledge of stroke risk factors and warning symptoms among type II diabetes patients in Addis Ababa, Ethiopia, 2021.

4. METHODS AND MATERIALS

4.1. Study area and period

The study was conducted in Tikur Anbessa, Menelik II, Zewditu memorial and Yekatit 12 hospitals in Addis Ababa, Ethiopia from February 1 to February 30, 2021. Addis Ababa is the capital city of Ethiopia and the total population is now estimated at 5,005,524 in 2021 (28). The city is divided in to 11 sub-cities containing 116 woredas and lies at an altitude of 7,546 feet (2,300metres). The city has 12 governmental hospitals. Five hospitals owned by Addis Ababa Health Bureau, 4 by Federal Ministry of Health, one is under the ministry of Education (AAU), 2 by defense force according to Addis Ababa city health office.

Tikur Anbessa specialized hospital is the largest referral hospital which serves beyond 700,000 patients each year through 77 organized case teams and holds above 700 beds. It was established in 1972. Menelik II hospital is one of the governmental hospitals in Addis Ababa which was established in 1910 and it's located around Kebena. Zewditu memorial hospital was launched in 1976 and currently it's operated under Ministry of health. Yekatit 12 hospital is one of the tertiary hospitals in the country. Currently the hospital is highly recommended for its burn care. All of the above hospitals provides outpatient, in patient and emergency medical services for both adults and pediatrics age groups.

4.2. Study design

Institutional based cross sectional study was conducted in selected governmental hospitals of Addis Ababa.

4.3. Population

4.3.1. Source population

The source population was all type II diabetic patients who were on follow up at governmental hospitals in Addis Ababa.

4.3.2. Study populations

All type II diabetes patients attending diabetic clinic at Tikur Anbessa, Menelik II, Zewditu memorial and Yekatit 12 hospitals in Addis Ababa.

4.3.3. Study unit

Each individual with type II DM attending diabetic clinic in Tikur Anbessa, Menelik II, Zewditu memorial and Yekatit 12 hospitals during the study period.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

The inclusion criterion includes all type II diabetes patients who had a follow-up visit for at least six months and respondents whose age is ≥ 18 years old.

4.4.2. Exclusion criteria

The exclusion criterion includes patients who already developed stroke before data collection period, pregnant women with gestational DM, respondents who were critically ill, respondents with severe mental illness and not capable of independent communication.

4.5. Sample size determination

The sample size was determined using single population proportion formula with the following assumptions in mind: Proportion of patients, who have good knowledge to wards stroke from the study done on Bahir Dar (P value=18.3%) (2), 95% confidence level, 5% margin of error and 10% of non-response rate.

$n = \frac{(Z\ x/2)^2\ p\ (1-p)}{(d)^2}$, where

n = the required sample size

P = Proportion of patients having good knowledge towards stroke (18.3%)

d = margin of error (level of precision), 0.05

zx/2 = Standard normal variable at x/2

Confidence level of interval = (1.96)

$n = \frac{(1.96)^2\ (0.18)\ (1-0.18)}{(0.05)^2} = 227$

Taking design effect of 2 in to consideration; the sample size was increased to

$$227 * 2 = 454$$

Adding 10% of non-response rate, the final sample size was 454+45 = 499

4.6. Sampling procedure

Multi stage sampling technique was used. First by using simple random sampling, the researcher has selected four governmental hospitals. Then systemic random sampling was used to study respondents from selected governmental hospitals.

K^{th} value = N/ nf where: kth= the interval by which respondents was interviewed

N = the expected number of diabetic patients per month

nf = the calculated final sample size

Kth value = N/nf 2301/499= 5 Hence, using the order of patients' medical records which was registered in follow-up appointment as a sampling frame, individuals were chosen at 5^{th} number intervals until the total sample size was reached and the first participant was chosen by lottery method.

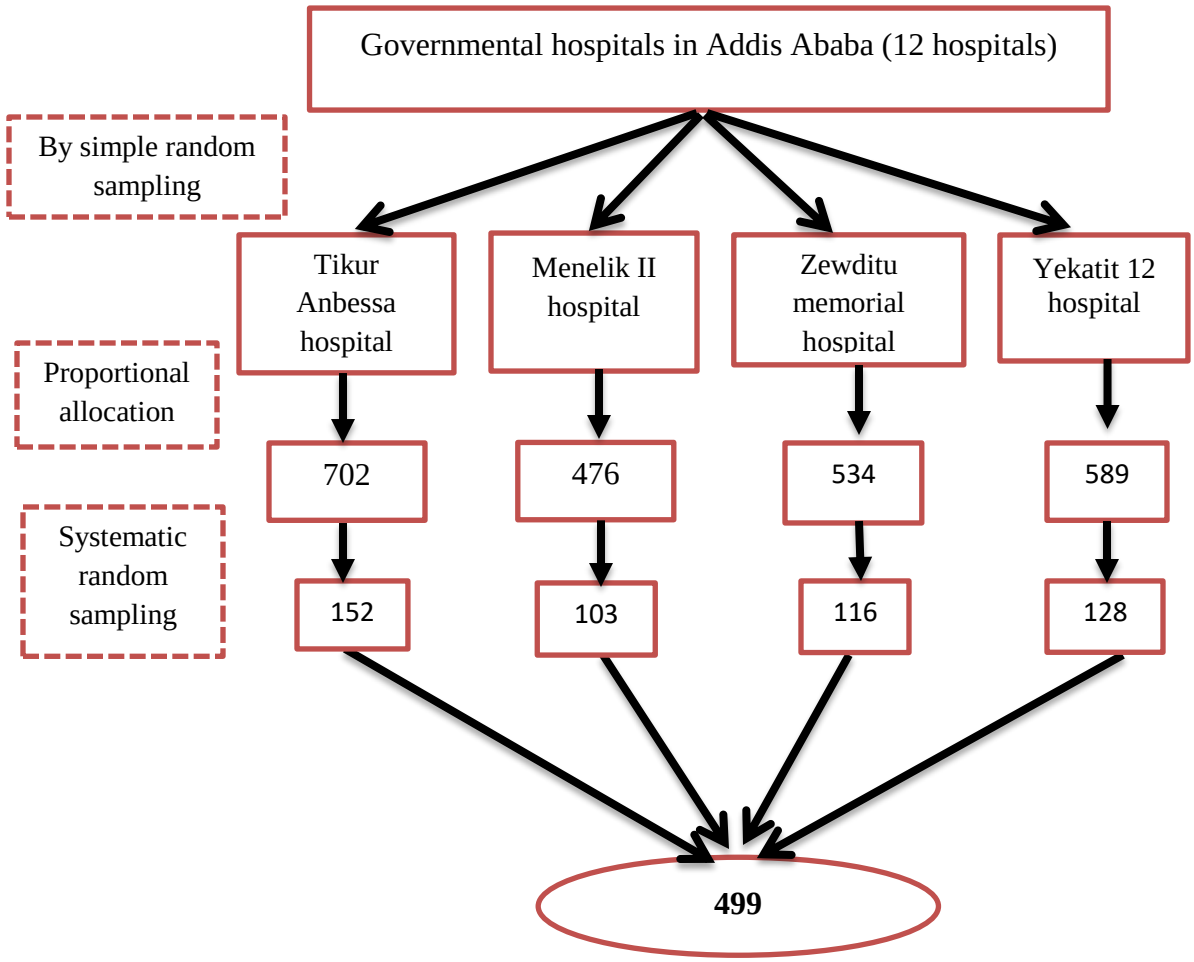

Figure 2: Schematic representation of sampling procedures of the study, Addis Ababa, Ethiopia, 2021.

4.7. Study variables

4.7.1. Dependent variable

- Knowledge of stroke risk factors
- Knowledge of warning symptoms of stroke

4.7.2. Independent variable

- Socio-demographic factors (age, sex, marital status, monthly income, level of education and occupation)
- Life style factors (BMI, smoking, alcoholism, chat chewing and physical inactivity)
- Reactions to various stroke symptoms
- Sources of stroke information (Internet, newspaper, television and radio, health professional, medical books, families and friends) and knowing someone with stroke

4.8. Operational definition

Body Mass Index (BMI): is the weight in kilogram divided by the height in meter square. Respondents having a BMI of 18.5-25 were considered normal, those with a with BMI 25-30 were considered over weight, and those with a BMI >30 were considered as obese (2).

Physical Inactivity: refers to participants who didn't engage in physical exercise for 30 – 60 minutes three to four times a week on average (2,31).

Alcohol drinker: refers to individuals who consume an alcoholic beverage greater than 2 drinks each day (15).

Smoker: refers to individuals who use any type of tobacco products like cigarettes or rolled tobacco (15).

Knowledge of stroke risk factors: respondents understanding of stroke risk factors. The participants understanding was measured by 19 yes or no measuring items. Knowledge of stroke risk factors was scored by the proportion of correctly answered items. The total knowledge score ranged from 0 to 100.

Knowledge of stroke warning symptoms: respondents understanding of stroke warning symptoms. Respondents' understanding was measured by 20 yes or no measuring items. Knowledge of stroke warning symptoms was scored by the proportion of correctly answered items. The total knowledge score ranged from 0 to 100.

4.9. Data collection tool and procedure

For this study, Stroke Recognition Questionnaire (SRQ) was adapted from one used in previous studies to assess knowledge of stroke risk factors and warning symptoms. It includes: socio-demographic variables, stroke risk factors, and stroke warning symptoms. It comprises twelve stroke risk factors, seven non-stroke risk factors, ten stroke related symptoms and ten symptoms which aren't stroke-related (31). Study participants identify whether items on the list represent stroke symptoms or risk factors.

Pretest was done on 5% of the sample size in randomly chosen type II diabetic patients who were on follow up at Alert hospital before actual data collection period. Data was collected by interviewer administered questionnaire. The interview was held by Amharic language since majority of the population can speak it. The data was collected by 4 BSc nurses who were properly trained for three days about the instrument and ways of approaching to the participants and how to obtain consent before data collection.

4.10. Data quality assurance

The questionnaire was pretested on 5% of the sample in randomly chosen type II diabetic patients who were on follow-up at Alert hospital. During the pre-test, the questionnaire was evaluated for its clarity, sensitivity and cultural acceptability. To test internal consistency, reliability statistics was computed using Cronbach's alpha (0.793). Ambiguous questions were identified based on the obtained results from the pretest and necessary modifications were done on those questions.

The questionnaire was translated from English to Amharic by language expert who is fluent in both language to create better understanding between interviewer and interviewee. Then in order to keep consistency of the contents of the instrument, the Amharic version was translated back to English after interview. After the trainee was evaluated for their understanding of the questionnaire, training was given for data collectors on the portions of the questionnaire which were not clear enough.

During data collection, on-site supervision and technical assistance was provided by principal investigator. Finally the questionnaire was checked daily for its completeness, accuracy, clarity, and consistency by principal investigator and any incomplete information was excluded from entry after data collection.

4.11. Data processing and analysis

After the completion of the data collection process required and collected data was categorized, coded, cleaned and recorded. The data entry was made by using epi data software version 4.6.0 to prevent data entry error and it was transferred to SPSS software version 25 for the analysis of study variables. Descriptive analysis was employed to describe the percentage and number distributions of the respondents for socio-demographic characteristics and knowledge of stroke risk factors and warning symptoms.

Multi-categorical independent variables were dummy coded before running the regression models. Normality was tested using histogram and p-p plots to make sure linearity assumptions were fulfilled. Multicollinearity was also tested. The Variability inflation factor (VIF) values were below 10, implying there was no multicollinearity among predictor variables.

Simple and multiple linear regression analysis were used to show the association between independent with the dependent variables. Those variables whose p value < 0.25 were entered in to multiple linear regression analysis and variables with p value < 0.05 at 95% confidence interval were presented as they have significant association with the outcome variable. After analysis the results were presented in tables, figures or graphic forms as appropriate.

4.12. Ethical consideration

Ethical clearance was received from Institutional Review Board (IRB) of Addis Ababa University, College of health Science, School of Nursing and Midwifery. After approval of the proposal, letter of cooperation was written from School of Nursing and Midwifery to all selected hospitals. Ethical clearance was also obtained from Addis Ababa health bureau and at individual level after describing the aim of the study, verbal consent was received from all participants before their participation in the study.

The data was collected in a way to ensure confidentiality of the respondents. The information will not be used for other researches and never be exposed to third party without their consent. As well as the participants were informed that their participation in the study was voluntary and they have the right to stop responding to the interview at any moment.

4.13. Dissemination of the finding

The findings of the study will be submitted to Addis Ababa University, College of Health Science, School of Nursing and Midwifery. The finding and recommendations will be distributed to all governmental hospitals, Addis Ababa city health bureau and other organizations working on related area to be used as a baseline for intervention. The result will be submitted to reputable peer reviewed journal for publication.

5. RESULT

5.1. Socio-demographic characteristics

Of the calculated sample size, total of 470 respondents were responded completely with a response rate of 94.2%. Table 1 shows more than half (54.9 %) of study participants were females, the mean age of the respondents were 50.6 (SD 12.9) and 182 (38.7%) of the respondents were completed College or University.

Table 1: Socio-demographic characteristics of participants in Addis Ababa, Ethiopia, 2021. (n=470).

Variable		Frequency (N)	Percentage (%)
Age	(Mean ± SD)	50.6 ± 12.9	
Sex	Male	212	45.1
	Female	258	54.9
Marital status	Single	88	18.7
	Married	345	73.4
	Divorced	16	3.4
	Widowed	21	4.5
Income	< 2250 ETB	206	43.8
	2250 – 8900 ETB	214	45.5
	>8900 ETB	50	10.6
Educational status	Do not read and write	37	7.9
	Read and write	41	8.7
	Primary school	73	15.5
	Secondary school	137	29.1
	College/ University	182	38.7
Occupation	Government employer	110	23.4
	Merchant	45	9.6
	Housewife	92	19.6
	Student	5	1.1
	Daily laborer	16	3.4

	Farmer	4	0.9
	Retired	41	8.7
	Self employed	127	27
	Unemployed	30	6.4
Living	Living alone	80	17
situation	Living with others	390	83

5.2. Life style related factors

Of the total study participants, more than half (53.4%) of them were not engaged in physical activities and 41.5% of respondents had comorbid medical conditions. (See Table 2)

Table 2: Life style related factors of participants in Addis Ababa, Ethiopia, 2021 (n=470).

Variables		Frequency (N)	Percentage (%)
BMI	Normal	286	60.9
	Over weight	151	32.1
	Obese	33	7
Smoking	Yes	30	6.4
	No	440	93.6
Alcoholism	Yes	54	11.5
	No	416	88.5
Chat chewing	Yes	16	3.4
	No	454	96.6
Physical activity	Yes	219	46.6
	No	251	53.4
Comorbidity	Yes	195	41.5
	No	275	58.5

5.3. Knowledge of warning symptoms of stroke

The minimum and maximum score for knowledge of warning symptoms of stroke ranges from 0 to 100. The mean score of knowledge of warning symptoms of stroke was 63.9% ± 15.4.

Majority 433 (92.1%) of study participants, identified trouble coordination as warning symptom of stroke, followed by sudden unilateral numbness/weakness of the body 427 (90.9%). Whereas confusion is the least 328 (69.8%) known warning symptom among respondents. The remaining 3 (0.6%) hadn't recognized any stroke warning symptoms. (See Table 3)

Table 3: Warning symptoms of stroke identified by type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

Variables	**Category**	**Frequency**	**Percent**
Slurred speech	Yes	362	77
	No	91	19.4
	I don't know	17	3.6
Numbness on one side of the face	Yes	392	83.4
	No	66	14
	I don't know	12	2.6
Weakness on one side of body	Yes	427	90.9
	No	35	7.4
	I don't know	8	1.7
Trouble walking	Yes	421	89.6
	No	38	8.1
	I don't know	11	2.3
Loss of balance	Yes	400	85.1
	No	57	12.1
	I don't know	13	2.8
Trouble coordination	Yes	433	92.1
	No	32	6.8
	I don't know	5	1.1
Confusion	Yes	328	69.8
	No	120	25.5
	I don't know	22	4.7
Sudden unexplained dizziness	Yes	409	87
	No	49	10.4
	I don't know	12	2.6

Double vision	Yes	370	78.7
	No	84	17.9
	I don’t know	16	3.4
Sudden severe headache	Yes	390	83
	No	63	13.4
	I don’t know	17	3.6

5.4. Knowledge of stroke risk factors

The minimum and maximum score for knowledge of risk factors of stroke ranges from 0 to 100. The mean score of knowledge of risk factors of stroke was 67.2% ±17.1.

The most identified stroke risk factor by respondents were hypertension 425 (90.4%), followed by obesity 410 (87.2%), stress 402 (85.5%), smoking and lack of physical activity 401 (85.3%) and alcohol 395 (84%). Whereas only 299 (63.6%) of respondents mentioned older age as a risk factor for stroke. The remaining 2 (0.4%) hadn't recognized any risk factors of stroke. (See Table 4)

Table 4: Risk factors of stroke identified by type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

Variables	**Category**	**Frequency**	**Percent**
Hypertension	Yes	425	90.4
	No	38	8.1
	I don't know	7	1.5
Diabetes	Yes	373	79.4
	No	84	17.9
	I don't know	13	2.8
High blood cholesterol	Yes	376	80
	No	64	13.6
	I don't know	30	6.4
Smoking	Yes	401	85.3
	No	54	11.5
	I don't know	15	3.2
Alcohol	Yes	395	84
	No	56	11.9
	I don't know	19	4
Obesity	Yes	410	87.2
	No	42	8.9
	I don't know	18	3.8
Lack of physical activity	Yes	401	85.3
	No	60	12.8
	I don't know	9	1.9
History of having a heart attack	Yes	345	73.4
	No	88	18.7
	I don't know	37	7.9

Irregular heart beat	Yes	387	82.3
	No	61	13
	I don't know	22	4.7
History of neck vein disease	Yes	327	69.6
	No	101	21.5
	I don't know	42	8.9
Stress	Yes	402	85.5
	No	58	12.3
	I don't know	10	2.1
Older age	Yes	299	63.6
	No	155	33
	I don't know	16	3.4

5.5. Distractors misidentified as warning symptoms of stroke

Majority 401 (85.3%) of study participants misidentified extreme tiredness as warning symptom of stroke. Followed by leg cramps 365 (77.7%), sudden pain in one arm 364 (77.4%), difficulty breathing 259 (55.1%), fever 249 (53%), chest pain 249 (53%), heart burn 178 (37.9%), swollen ankles 173 (36.8%) and cough 84 (17.9%) whereas, only 30 (6.4%) of respondents misidentified diarrhea as warning symptom of stroke.

5.6. Distractors misidentified as risk factors of stroke

Among the study participants, more than half 358 (76.2%) of them misidentified trouble sleeping as risk factor of stroke. Followed by hypoglycemia 228 (48.5%), exposure to too much sunlight 198 (42.1%), varicose veins 192 (40.9%), low levels of calcium in diet 183 (38.9%) and living close to a power plant 137 (29.1%). On the contrary, only 124 (26.4%) of respondents misidentified iron deficiency as a risk factor of stroke.

5.7. Sources of stroke information

Regarding source of information, more than half 281 (59.8%) of respondents heard about stroke from friends and relatives, followed by TV and radio 128 (27.2%). Surprisingly, only 74 (15.7%) individuals had received information about stroke from health professionals. (See Figure 3)

Out of the total study participants, majority of them 369 (78.5%) know someone diagnosed with stroke.

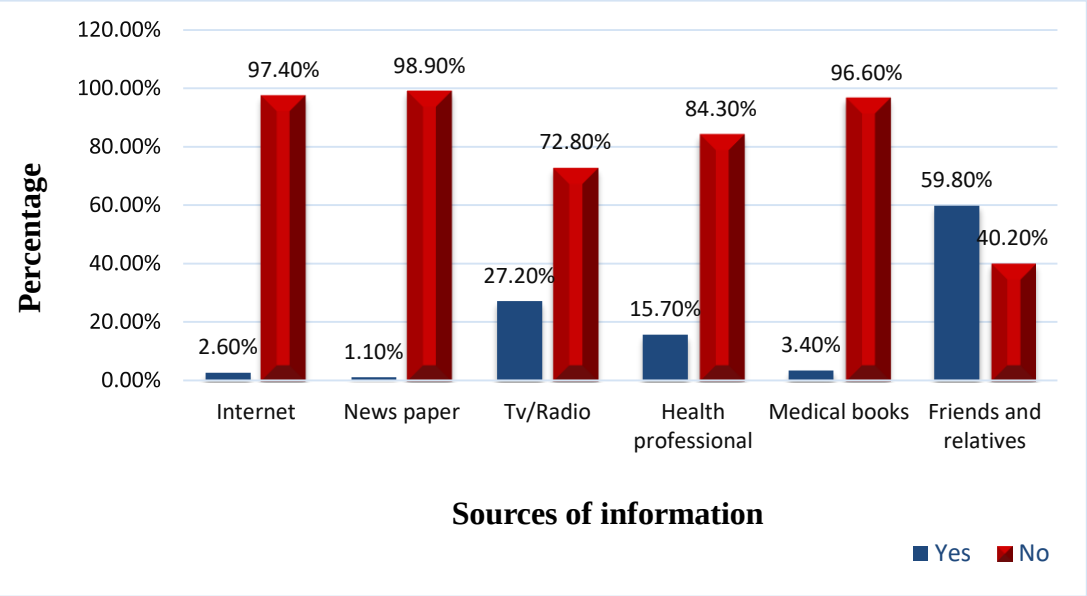

Figure 3: Source of information regarding stroke among type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

5.8. Participants reactions to various stroke symptoms

Of the total study participants, more than three quarters 407 (86.6%) of them responded that they would take the patient to the nearest health facility or call an ambulance; followed by 39 (8.3%) of the respondents try to calm the patient if they thought someone was having an event of stroke. (See Figure 4)

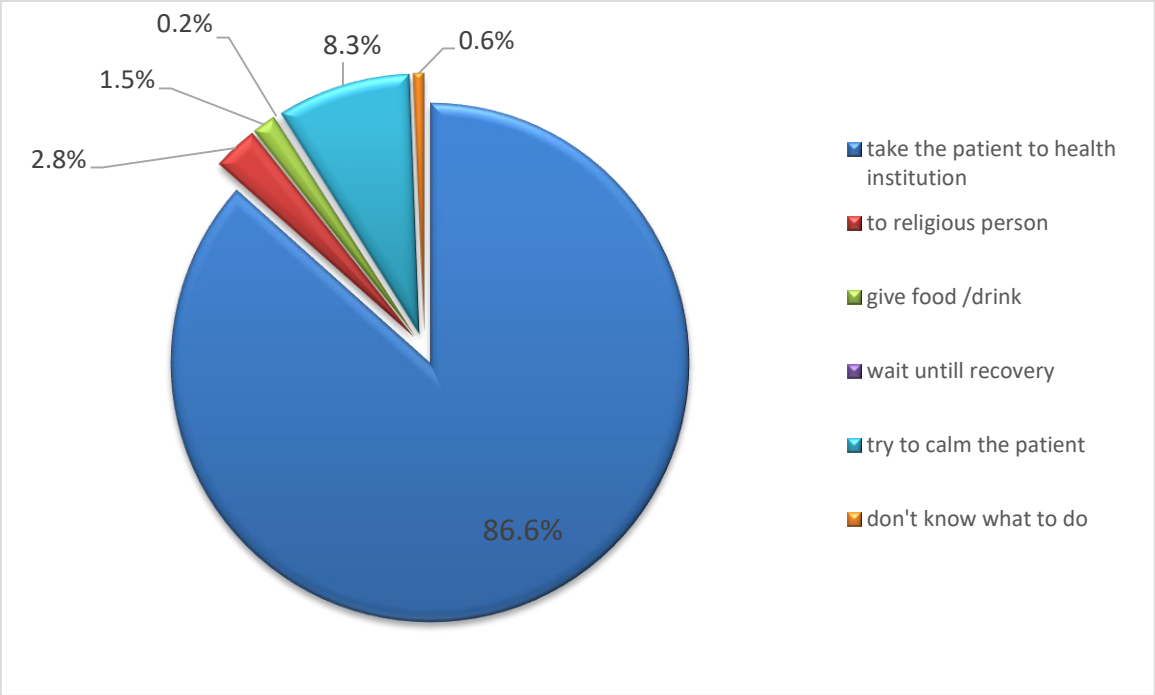

Figure 4: Reactions to various stroke symptoms among type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

5.9. Factors associated with knowledge of Diabetic patients towards warning symptoms and risk factors of stroke

In this study, variables with P value < 0.25 were entered in to multiple linear regression analysis and variables with P value < 0.05 at 95% confidence interval were presented as they have significant association with the outcome variable.

In multiple linear regression analysis, younger age, higher level of education and know someone diagnosed with stroke shows statistically significant association with knowledge of stroke warning symptoms. Similarly, higher level of education, living situation and know somebody diagnosed with stroke shows statistically significant association with knowledge of risk factors of stroke.

Holding other variables constant, study participants who completed College/University education compared to the other educational categories had significantly higher knowledge score of warning symptoms of stroke (B= 1.873; 95% CI= 1.017-2.73, P= 0.000). Likewise, respondents who knew someone diagnosed with stroke had significantly higher knowledge score of warning symptoms of stroke than those who didn't (B= 3.64; 95% CI= 3.079-4.2, P= 0.000). The other independent predictor which was significantly associated with knowledge of warning symptoms of stroke was age. For every unit increase in age, knowledge score of warning symptoms of stroke decreased by 2% (B= -0.021; 95% CI= -0.038 to -0.005, P= 0.01).

Concerning knowledge of risk factors, respondents who completed College/University education compared to the other educational categories had significantly higher knowledge score of stroke risk factors (B= 2.007; 95% CI= 1.101-2.914, P= 0.000). Regarding living situation, respondents who live with others had significantly higher knowledge score of stroke risk factors compared to their counter parts (B= 2.28; 95% CI= 1.606-2.954, P= 0.000). Similarly, respondents who knew someone diagnosed with stroke had significantly higher knowledge score of stroke risk factors than those who didn't (B= 3.328; 95% CI= 2.734-3.922, P= 0.000).

Table 5: Multiple linear regression analysis of factors associated with knowledge of warning symptoms of stroke among type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

Variable	B	Std. Error of B	β	T	P	95% CI for B	Collinearity statistics	
							Tolerance	VIF
Age	-0.021	0.008	-0.09	-2.603	**0.01****	(-0.038,-0.005)	0.87	1.14
Level of education								
Read and write	0.312	0.494	0.029	0.633	0.527	(-0.658,1.282)	0.51	1.96
Primary school	0.757	0.445	0.089	1.702	0.09	(-0.117,1.632)	0.38	2.63
Secondary school	1.236	0.431	0.183	2.869	0.004	(0.389,2.083)	0.26	3.87
College/ University	1.873	0.436	0.296	4.297	**0.000****	(1.017,2.73)	0.22	4.56
Know someone diagnosed with stroke (Yes)	3.64	0.285	0.486	12.7	**0.000****	(3.079,4.2)	0.72	1.39

Table 6: Multiple linear regression analysis of factors associated with knowledge of risk factors of stroke among type II diabetes patients in Addis Ababa, Ethiopia, 2021. (n=470).

Variable	B	Std. Error of B	β	T	P	95% CI for B	Collinearity statistics	
							Tolerance	VIF
Level of education								
Read and write	1.039	0.522	0.091	1.989	0.047	(0.012, 2.065)	0.51	1.96
Primary school	0.596	0.471	0.067	1.264	0.207	(-0.33,1.522)	0.38	2.63
Secondary school	1.158	0.456	0.163	2.54	0.011	(0.262,2.054)	0.26	3.87
College/ University	2.007	0.461	0.302	4.351	**0.000****	(1.101,2.914)	0.22	4.56
Living situation								
Living with others	2.28	0.343	0.265	6.645	**0.000****	(1.606,2.954)	0.66	1.5
Know someone with stroke (Yes)	3.328	0.302	0.422	11.02	**0.000****	(2.734,3.922)	0.72	1.39

6. DISCUSSION

The high burden of stroke and other vascular diseases increasingly affect the world due to health transitions in line with ever-changing social and economic patterns. To tackle those global hidden social and economic burdens of stroke; prevention is the backbone in both developing and developed countries (1). Identification of the main stroke risk factors and warning symptoms has a significant implication for prevention and rapid intervention of stroke with the possible therapeutic measures. So, the purpose of this study was to assess knowledge of stroke warning symptoms and risk factors among adults with type II diabetes in governmental hospitals, Addis Ababa, Ethiopia.

This study found that majority of respondents identified trouble coordination (92.1%) followed by sudden unilateral numbness/weakness of the body (90.9%) and trouble walking (89.6%) as warning symptom of stroke. Whereas confusion is the least (69.8%) recognized warning symptom of stroke among participants. The remaining 3(0.6%) of them hadn't recognized any stroke warning symptoms. This result is higher than the finding from Bahir Dar (2) which revealed that only 35.9% of study participants recognized paralysis on the side of the body as warning symptom of stroke and majority (77.3%) of them hadn't identified any warning symptoms of stroke. This discrepancy might be due to urbanization of the community in the study area in which access to internet and other social medias is easy. This difference may also be due to variability in health care systems regarding delivery of health education.

This finding is also higher than the cross sectional study conducted in Nigeria (20), in which, only 24.4% of respondents identified sudden weakness on one side, followed by trouble coordination 13.3%, confusion 7.6% and majority (60.4%) of respondents didn't mentioned a single warning symptom. The possible reason might be due to difference in economical-status of the study participants, availability of health institution in the area and sample size difference.

Likewise, the results of this study is also comparable with the study done on Ireland (14) and Luxemburg (16), in which, majority of respondents recognized paralysis on one side of the body (38%) and (35.5%) as warning symptom of stroke respectively. However, both studies showed less than half of the study participants identified those established warning symptoms. This discrepancy might be due to difference in sample size.

This result is comparable with the study done on North West India, Central Pennsylvania, Omani and Nigeria, in which majority (62.2%, 82.2%, 65% and 85.3% respectively) of respondents mentioned paralysis on one side of the body as warning symptom of stroke (4,18, 23,26). Similarly, this finding goes in line with the study done on Cameroon (19), in which, most respondents mentioned speech disturbance (98.3%), followed by paralysis on one side of the body (98%), sudden visual disturbance (91.2%) and headache (85.9%) as warning symptoms of stroke.

This study showed that majority (90.4%) of respondents identified hypertension as a risk factor of stroke, followed by obesity (87.2%), stress (85.5%), smoking and lack of physical activity (85.3%), alcohol (84%), cholesterol (80%) and diabetes (79.4%). On the other hand only 63.6% of respondents mentioned older age as a risk factor for stroke. The remaining 2 (0.4%) of them hadn't mentioned any risk factors of stroke. This result is relatively consistent with another study done on hypertensive and diabetic patients (4), in which, hypertension (92.0%), too much fat consumption (85.7%), overweight (84.9%) and not exercising regularly (80.8%) are most frequently recognized risk factors. Whereas less than half of study participants recognized aging (42.3%) as risk factors of stroke. The findings of this study is also comparable with the study done on Pennsylvania (18), in which smoking (78.5%) was the commonest risk factor mentioned by respondents. This might be due to similarity with study design.

The finding of this study is also in line with the study conducted in Cameroon (19), in which, more than three fourth of respondents mentioned hypertension (98.5%) as a risk factor of stroke followed by overweight (97.8%), lack of physical activity (97.7%), stress (95.1%), alcoholism (64.2%), smoking (60.6%), and hypercholesterolemia (44.4%).

This finding is comparable with the study done among diabetes patients from Germany and Turkey (17), in which, majority (35.8%) of respondents recalled hypertension as a risk factor of stroke followed by smoking 35.1%, hyperlipidemia 6.7%, diabetes mellitus 17.9% and alcohol 15.7%. This finding is also relatively consistent with another study done on Luxemburg (16), in which, most (40.2%) of respondents mentioned smoking as stroke risk factor followed by hypertension (32.4%), alcohol (32.1%), cholesterol (26.4%), stress (22.6%), lack of physical exercise (19.3%), overweight (14.3%) and diabetes mellitus 6.2%. However, both studies showed less than half of the respondents identified those established risk factors. The possible reason might be due to sample size difference.

In contrast, the finding of this study is higher than the study done on Bahir Dar (2) which revealed that physical inactivity (21.6%), being obese (20.1%), and drinking alcohol (18.7%) were most commonly mentioned risk factors of stroke. Whereas majority (77%) of the study participants did not recognized any risk factors of stroke. This discrepancy might be due to individuals who resides in the study area are exposed to new information; most of them have easy access to social media, and due to increment in prevalence of chronic diseases like Diabetes they are interested to know it's complications, they have access to health care, and educational opportunities.

Regarding source of information, more than half (59.8%) of respondents in this study heard about stroke from friends and relatives, followed by TV and radio 27.2%. Surprisingly, only 15.7% individuals had received information about stroke from health professionals. This finding is similar with the studies done on North West India (23), Iran (21), and Luxemburg (16), in which, majority of study participants heard about stroke from families, relatives and medias. Whereas only 3.6%, 11.5%, 2.6% of respondents got information about stroke from health professionals respectively. In contrast with the current finding, the study done on Cameroon noted that 99% and 83.4% of respondents heard about stroke from internet and health professionals respectively. The possible justification for this gap might be due to variability in health care system and easy access to internet.

Concerning reactions to various stroke symptoms majority (86.6%) of respondents in this study responded that they would take the patient to the nearest health facility or call an ambulance; followed by (8.3%) of respondents try to calm the patient if they thought someone was having an event of stroke. Whereas only 0.6% of respondents expressed that they don't know what to do. This finding is relatively consistent with the studies done on Iran (21), Luxemburg (16), Central Pennsylvania (18), Malaysia (22) and another similar study done on Iranian population (5), in which, majority of respondents (89.5%, 89%, 95.7%, 74.2% and 75.4% respectively) would call an ambulance or take the patient to health institution if they thought someone was having stroke.

The present study have found a positive relationship between knowledge of warning symptoms of stroke with age, educational level and knowing somebody with stroke. Younger respondents, those who completed College/ University education and those who knows someone diagnosed with stroke had significantly higher knowledge score of warning symptoms of stroke. These findings are consistent with previous studies (2,4,18–20,25,26,32,33). Concerning knowledge of risk factors, highest educational level, know someone with stroke and living with others are independent predictors of higher knowledge score of stroke risk factors. These finding is consistent with previous studies (2,4,20,24,26,32–34).

The possible justification might be lower educational level and older age may lead to minimal interaction with the community and therefore results in lack of interest in following medical advices, low level of health care awareness and attitude towards stroke. Likewise, respondents who know someone previously diagnosed with stroke definitely recognize warning symptoms by hearing and seeing from those patients around them. Similarly, living with other people increases interaction among society, create a way for sharing information and subsequently increases the level of awareness among them.

6.1. Strength and limitation

6.1.1. Strength of the study

- Study subjects were recruited from different health institutions. As a result, the findings can be generalized.
- The sample size was large enough to be representative.

6.1.2. Limitation of the study

- Since, the study was confined to governmental hospitals, diabetic patients who are considered economically secured might have follow-up at private hospitals and the study didn't address them.
- The study didn't address whether there is a causal relationship between stroke knowledge and behavior such as risk factor modification and rapid seeking of medical attention in the event of stroke symptoms.
- The quantitative nature of the study using structured questions with "yes" or "no" answers also did not probe the reasons why patients hold a certain outlook about stroke.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

In general, the mean score of knowledge of warning symptoms and risk factors of stroke was 63.9% and 67.2% respectively. The commonest warning symptom identified by respondents were trouble coordination, followed by sudden unilateral numbness/weakness of the body. Poor recognition of other symptoms might contribute to low threat perception of stroke. The most identified stroke risk factor by respondents were hypertension and obesity.

Younger age, higher level of education and know someone diagnosed with stroke shows statistically significant association with knowledge of warning symptoms of stroke. Similarly, higher level of education, know someone diagnosed with stroke and living with others were independent predictors of knowledge of stroke risk factors.

7.2. Recommendation

- For the health system:-
    - To create inter-sectorial link and joint action with Ethiopian broadcasting authority to organize more health related programs so that, the community can easily reach out.
- For health professionals:-
    - To organize awareness campaigns at the national level to increase knowledge regarding stroke via social media, health education sessions, and posters since this will benefit the community at large.
- For researchers:-
    - Since this study was institutional based, researchers should undertake other community based and multi-centered studies on stroke risk factors and warning symptoms.
    - Further studies should be conducted at regional and national set up regarding attitude and practice of stroke.

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ANNEX

ANNEX 1: Subject Information Sheet (English Version)

Title of the Research: Assessment of knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in selected hospitals, Addis Ababa, Ethiopia, 2021.

Name of the Organization: Addis Ababa University, College of health science, School of Nursing and Midwifery, department of Nursing.

Purpose of the Research Project: To assess knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in selected hospitals, Addis Ababa, Ethiopia, 2021.

Procedure: To achieve the above objectives, information that is needed for the study will be taken from adults with type II diabetes attending in DM clinic of selected governmental hospitals.

Risk and discomfort: The study will not inflict any harm to the patients. The name or any other identifying information will not be documented on the questionnaire and all information received from the patient will be kept strictly confidential. The information retrieved will only be used for the study purpose.

Benefits: There is no direct benefit for study participants from this study. However, the study has indirect benefit for the participants and other clients. This is because if program planners are preparing a predicted plan there is a benefit for clients in the program of getting appropriate care and treatment services. Moreover, the research work has a paramount direct benefit for health care planners and managers.

Confidentiality: To reassure confidentiality the data will be collected without the name of the patients and the information collected from this research will be kept confidential. In addition, it will not be exposed to a third party except the principal investigator and advisor.

Person to contact: This research project will be reviewed and approved by the institutional review board of the College of Health Science, School of Nursing and Midwifery, Addis Ababa University.

If you have any questions you can contact any of the following individuals.

Rediet Akele (principal investigator): (BSc in Nursing)

Telephone: 09 21 92 26 62

Email: Redietakele@gmail.com

Dr. Fekadu Aga (RN, PHD): main Advisor, Addis Ababa University, College of Health Science, School of Nursing and Midwifery, Department of Nursing.

E-mail: fiqaaduuagaa@yahoo.com

ANNEX 2: Subject Information Sheet (Amharic Version)

የጥናቱ ርእስ፡ አዲስ አበባ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ ክትትል ያላቸውን የስኪር ህመምተኞች ስለ ስትሮክ የመጀመሪያ ምልክቶችና ስትሮክን ስለሚያመጡ ጉዳዮች ያለቸውን የግንዛቤ ደረጃ ማጥናት 2013 ዓ.ም

የድርጅቱ ስም ፡ በአዲስ አበባ ዩንቨርሲቲ የጤና ሳይንስ ኮሌጅ በነርሲንግ የትምህርት ክፍል

የጥናቱ አላማ ፡ አዲስ አበባ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ የስኪር ህመምተኞች ስለ ስትሮክ ያላቸውን ግንዛቤ ማጥናት

ጥናቱ እንደት ይካሄዳል? የጥናቱን አላማ ለማሳካት በአዲስ አበባ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ ያሉ አይነት 2 የስኪር ህመምተኞችን በመጠየቅ

ጥናቱ የሚያስከትለው ጉዳትና ጥቅም ፡ ጥናቱ ምንም የሚያስከትለው ጉዳት የለም ።ጥናቱ በቀጥታ የጥናቱን ተሳታፊዎች ባይጠቅምም በተዘዋዋሪ በጤና ጥበቃ ስር እቅድ ለሚያወጡ ሰዎች እንዲሁም እናንተንም ጨምሮ ለሌሎች የስኪር ህመምተኞች ጠቃሚ ነው።

ምስጢር ጠባቂነት ፡ የጥናቱን ተሳታፊዎች ምስጢር ለመጠበቅ ሲባል ስማችሁን መፃፍ የተከለከለ ነው፡ ፡ እንዲሁም የምትሰጡት ማንኛውም መረጃ ከጥናቱ ባለቤት እና ከአማካሪ መምህራን ውጪ ለሶስተኛ አካል አሳልፈን አንሰጥም ።

ለማንናውም ጥናቱን ለሚመለከት ጉዳይ ከዚህ በታች ያሉትን ሰዎች ማናገር ትችላላችሁ

ረድኤት አከለ (የጥናቱ ባለቤት)

ስልክ ቁጥር፡ 09 21 92 26 62

ኢሜል፡ Redietakele@gmail.com

ዶክተር ፈቃዱ አጋ (ዋና የጥናቱ አማካሪ መምህር)

ኢሜል፡ fiqaaduuagaa@yahoo.com

ANNEX 3: Consent Form (English Version)

Informed verbal consent letter

Dear respondent, my name is _____. I am a graduating master's student in Addis Ababa University, College of Health Science, Department of Nursing and Midwifery. The purpose of the study is to assess knowledge of stroke risk factors and warning symptoms among adults with type II diabetes in Addis Ababa, Ethiopia. This questionnaire is designed for a research work which will be approved by AAU, college of Health Science institutional review board. I hope your honest and genuine participation and response to the questions will be very help full in identifying the problem related to the issue. Therefore, if you are voluntary to be included in this study I am going to ask you some questions about stroke risk factors, warning symptoms and its associated factors which will not take more than 30 minutes. There may be some words that you don't understand, so please ask me anything that is vague to you I will take time to explain. I would very much appreciate your participation in this interview. I assure you that the interview process will not bring any harm to you. Whatever information you provide it will be kept strictly in secret, and will not be shared to anyone other than the principal investigators of this study. Would you be willing to participate in the study?

Agree _____ Disagree _____

Supervisor's Name _____ Signature _____

ANNEX 4: Consent Form (Amharic Version)

ውድ ተጠያቂ ፡

ስሜ ---------- የተባልኩኝ በአዲስ አበባ ዩንቨርሲቲ በጤና ሳይንስ ኮሌጅ በነርሲንግ የትምህርት ክፍል በማስተርስ ዲግሪ ፕሮግራም ተመራቂ ነኝ ። የጥናቱ አላማ አዲስ አበባ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ የስኳር ህመምተኞች ስለ ስትሮክ ያላቸውን ግንዛቤ ማጥናት ነው ። የእናንተ ታማኝነትና ተሳተፎ እንዲሁም ለጥያቄዎቹ የምትሰጡት መልስ ከጉዳዩ ጋር ተያይዘው ለሚከሰቱ ችግሮችን ለመለየትና መፍትሄ ለመስጠት አስፈላጊ ነው። በመሆኑም በጥናቱ ላይ ተሳታፊ ለመሆን ፈቃደኛ ከሆኑ ከ30 ደቂቃ በላይ የማይወስድ ጥያቄ እጠይቅዎታለሁ ። ማንኛውም አይነት ግልፅ ያልሆነ ጥያቄ ካለ ለማብራራት ዝግጁ ነኝ። በቃለ መጠይቁ ወቅት ምንም አይነት ጉዳት እንደማይደርስብዎት ላረጋግጥለዎት እወዳለሁ፡ ፡ የምትሰጡት ማንኛውም አይነት መረጃ በምስጢር የተጠበቀ እና ለሶስተኛ አካል የማይደርስ መሆኑን ላረጋግጥልዎት እሻለሁ ።

በጥናቱ ለመሳተፍ ፍቃደኛ ነህ/ነሽ? 1. አዎ 2. አይደለሁም

ስም---------- ፊርማ ----------

ANNEX 5: Questionnaire (English Version)

PART I: Socio-economic and demographic characteristics of the respondents

No	Questions	Response
1.	How old are you?	_____
2.	What is your sex?	1) Male 2) Female
3.	What is your marital status?	1) Single 2) Married 3) Divorced 4) Widowed 5) Cohabited
4.	What is your monthly income?	_____
5.	Level of education?	1) Do not read or write 2) Read and write 3) Primary school (1- 8^{th}) 4) Secondary school (9 - 12^{th}) 5) College/University
6.	What is your occupation?	1) Government worker 2) Merchant 3) House wife 4) Student 5) Daily laborer 6) Farmer 7) Others (specify)_____
7.	Living situation	1) Living alone

		2) Living with others (specify) _____

PART II: Knowledge of warning symptoms of stroke

The following are list of symptoms; some are warning symptoms of stroke some are not. Please check yes if you think it is a warning symptom of stroke. Check no if you think it is not a symptom of stroke.

No	Symptoms	Yes	No
1.	Diarrhea		
2.	Difficulty breathing		
3.	Confusion		
4.	Chest pain		
5.	Double vision		
6.	Weakness on one side of body		
7.	Swollen ankles		
8.	Numbness on one side of face		
9.	Heartburn		
10.	Loss of balance		
11.	Trouble walking		
12.	Sudden severe headache		

13.	Fever		
14.	Slurred or garbled speech		
15.	Cough		
16.	Sudden pain in one arm		
17.	Leg cramps		
18.	Sudden unexplained dizziness		
19.	Extreme tiredness		
20.	Trouble with coordination		

PART III: Knowledge of risk factors of stroke

The following are list of risk factors; some are risk factors for stroke and some are not. Please check yes if you think it is a risk factor of stroke and check no if you think it is not a risk factor of stroke.

No	Risk factors	Yes	No
1.	Alcohol use greater than 2 drinks each day		
2.	Irregular heartbeat such as atrial fibrillation		
3.	High blood pressure		
4.	Diabetes		
5.	High blood cholesterol		
6.	Iron deficiency		
7.	Lack of physical activity		
8.	Trouble sleeping		
9.	Overweight/ Obesity		
10.	Low levels of calcium in diet		
11.	History of having had a heart attack		
12.	Smoking cigarettes		
13.	Varicose veins		
14.	Living close to a power plant		
15.	Exposure to too much sunlight		

16.	History of neck vein disease or carotid artery disease		
17.	Hypoglycemia		
18.	Stress		
19.	Older age		

PART IV: Life style factors related to stroke

No	Life style factors	Response
1.	BMI	_____ kg/m^2
2.	Smoking	A. Yes B. No
3.	Alcoholism	A. Yes B. No
4.	Chat chewing	A. Yes B. No
5.	Physical inactivity	A. Yes B. No
6.	Comorbidities (i.e. chronic illness)	A. Yes B. No

PART V: Source of stroke knowledge among respondents

No	Question	Response
1.	Do you heard about stroke before?	A. Yes B. No
2.	If yes to the above question, from where did you hear the information about stroke?	A. Internet B. Newspaper C. Television/Radio D. Health professional E. Medical books F. Families and friends
3.	Do you know somebody who was diagnosed with stroke?	A. Yes B. No

PART VI: Reactions to various stroke symptoms

No	Question	Response
1.	If you thought someone was having a stroke what would you do?	A. Call an ambulance (take the patient to health institution) B. Drive the patient to religious person C. Give a drink/food D. Wait until recovery E. Try to calm the patient F. Didn't knew what to do G. Others (specify)_____

ANNEX 6: Questionnaire (Amharic Version)

ክፍል አንድ፡- አጠቃላይ የግለሰቡ የግል እና የቤተሰብ መረጃ

ተ.ቁ.	መጠይቅ	መልስ
1.	እድሜሽ/ህ ስንት ነው?	_____
2.	ፆታህ/ሽ ምንድን ነው?	1) ወንድ 2) ሴት
3.	የትዳር ሁኔታ	1) ያላገባ 2) ያገባ 3) ትዳሩን የፈታ 4) የትዳር አጋሩ የሞተበት 5) ሳይጋቡ አብረዉ የሚኖሩ
4.	ወርሃዊ ገቢ	_____
5.	የትምህርት ደረጃ ስንት ነው?	1) ማንበብ እና መጻፍ የማይችል 2) ማንበብ እና መጻፍ የሚችል 3) የመጀመሪያ ደረጃ (ከ1-8) 4) ሁለተኛ ደረጃ (ከ9-12) 5) ኮሌጅ/ዩኒቨርሲቲ
6.	የስራ ዓይነት	1) የመንግስት ሰራተኛ 2) ነጋዴ 3) የቤት እመቤት 4) ተማሪ 5) የጉልበት ሰራተኛ 6) ገበሬ

		7) ሌሎች(ይገለጽ)_____
7.	የአኗኗር ሁኔታ	1) ብቻዉን የሚኖር 2) ከሌሎች ጋር የሚኖሩ (ይገለጽ)_____

ክፍል ሁለት፡- ስለ ስትሮክ ምልክቶች ያላቸዉ ግንዛቤ

ከዚህ በታች የተዘረዘሩት ምልክቶች በከፊል የስትሮክ ምልክቶች ሲሆኑ በከፊል ደግሞ አይደሉም። የስትሮክ ምልክቶች የሆኑትን "አዎ" የሚለዉን ምልክት በማድረግ ያልሆኑትን ደግሞ "አይደለም" የሚለዉን ምልክት ያድርጉ።

ተ.ቁ	**ምልክቶች**	**አዎ**	**አይደለም**
1.	ተቅማጥ		
2.	የመተንፈስ ችግር		
3.	ግራ መጋባት		
4.	የደረት ህመም		
5.	ድርብ እይታ		
6.	የግማሽ ጎን ሽባ መሆን		
7.	የቁርጭምጭሚት ማበጥ		
8.	የግማሽ ፊት መደንዘዝ		
9.	የልብ ማቃጠል		
10.	የሰዉነትን ሚዛን መሳት		

11.	በእግር መሄድ ችግር		
12.	ድንገተኛ የራስ ህመም		
13.	ትኩሳት		
14.	ግራ የተጋባ ንግግር		
15.	ሳል		
16.	አንድ እጅ ላይ የሚከሰት ከፍተኛ ህመም		
17.	የእግር ህመም		
18.	መፍዘዝ		
19.	ከፍተኛ ድካም		
20.	የሰዉነት አለመታዘዝ		

ክፍል ሦስት፡ ስትሮክን ስለሚያመጡ መንስኤዎች ያላቸው ግንዛቤ

ከዚህ በታች የተዘረዘሩት መንስኤዎች በከፊል የስትሮክ መንስኤዎች ሲሆኑ በከፊል ደግሞ አይደሉም። የስትሮክ መንስኤዎች የሆኑትን "አዎ" የሚለዉን ምልክት በማድረግ ያልሆኑትን ደግሞ "አይደለም" የሚለዉን ምልክት ያድርጉ።

ተ.ቁ	መንስኤዎች	አዎ	አይደለም
1.	የአልኮል መጠጥ መውሰድ		
2.	ያልተስተካከለ የልብ ምት		
3.	ከፍተኛ የደም ግፊት		
4.	የስኳር ህመም		
5.	ከፍተኛ የደም ኮሌስትሮል		
6.	የአይረን እጥረት		
7.	አካላዊ እንቅስቃሴ አለማድረግ		
8.	የእንቅልፍ ችግር		
9.	ከመጠን ያለፈ ውፍረት		
10.	በምግብ ውስጥ ያለ ዝቅተኛ የካልሺየም መጠን		
11.	ከዚህ በፊት የልብ ድካም መኖር		
12.	ሲጋራ ማጨስ		
13.	ግትርትር ደምመላሽ ቧንቧዎች		

14.	ለኤሌክትሪክ ምንጪ ቅርብ የሆነ ቦታላይ መኖር		
15.	በተደጋጋሚ ለፀሀይ ብርሀን መጋለጥ		
16.	የአንገት የደም ስር በሽታ		
17.	ዝቅተኛ የሆነ የደም ስኪር		
18.	ጭንቀት		
19.	እርጅና		

ክፍል አራት፡ ከስትሮክ ጋር የተያያዙ የህይወት ዘይቤ ምክንያቶች

ተ.ቁ	**የህይወት ዘይቤ ምክንያቶች**	**መልስ**
1.	የሰውነት ክብደት መለያ	_____ ኪግ/ሜ^2
2.	ሲጋራ ታጨስለህ/ሽ	1) አዎ 2) አይደለም
3.	አልኮል ትጠጣለህ/ሽ	1) አዎ 2) አይደለም
4.	ጫት ትቅማለህ/ሽ	1) አዎ 2) አይደለም
5.	አካላዊ እንቅስቃሴ ታደርጋለህ/ሽ	1) አዎ 2) አይደለም
6.	ሌሎች ተዘማጅ በሽታዎች አሉብህ/ሽ	1) አዎ 2) አይደለም

ክፍል አምስት፡ ስለ ስትሮክ የመረጃ ምንጮች

ተ.ቁ	መጠይቅ	መልስ
1.	ከዚህ በፊት ስለ ስትሮክ ሰምተው ያዉቃሉ ?	1) አዎ 2) አልሰማሁም
2.	ለላይኛው ጥያቄ መልስዎ አዎ ከሆነ መረጃውን ያገኙት ከየት ነው?	1) ኢንተርኔት 2) ጋዜጣ 3) ቴሌቪዥን /ሬድዮ 4) ከጤና ባለሙያ 5) ከጤና መፃህፍት 6) ከቤተሰብ/ከጓደኛ
3.	የስትሮክ ህመምተኛ የሆነ ሰው ያዉቃሉ?	1) አዎ 2) አላውቅም

ክፍል ስድስት፡ የስትሮክ ምልክቶችን ሲያዩ የሚያድጓቸው ተግባራት

ተ.ቀ	መጠይቅ	መልስ
1.	የስትሮክ ምልክቶችን ሰው ላይ ቢመለከቱ ምን ያደርጋሉ?	1) አንቡላንስ ጠርቶ ወደ ጤና ተቋም መውሰድ 2) ወደ እምነት ተቋማት መውሰድ 3) ምግብ /መጠጥ መስጠት 4) እስከሚሻላቸው መጠበቅ 5) ህመምተናውን ለማረጋጋት መሞከር 6) ምን ማድረግ እዳለብኝ አላውቅም 7) ሌላ (ይገለጽ)_____

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