

Knowledge, Practice, And Associated Factors Towards Stroke Prevention Among Hypertensive Patients At Selected Public Hospitals In Addis Ababa, Ethiopia

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5 ABSTRACT

Background: Stroke is a major global health concern, particularly in low- to middle-income nations. Stroke-related deaths in Ethiopia represent a substantial portion, accounting for 6.23% of total mortality. Studies highlight gaps in knowledge and practice regarding stroke prevention among hypertensive patients.

Objective: To investigate the knowledge, practice and associated factors related to stroke prevention among hypertensive patients in selected public hospitals in Addis Ababa, Ethiopia.

Method: a cross-sectional study involving a sample of 283 participants and using structured questionnaires for data collection. The study recruited hypertensive patients meeting inclusion criteria from SPHMMC and SPSH Cardiac Clinic. Descriptive statistics and binary logistic regression analysis were analyzed. Frequencies, percentages, means, and standard deviations were calculated. Binary logistic regression and multivariate linear regression models were employed to identify key factors associated with stroke prevention knowledge and practices, respectively. Statistical significance was set at a p-value < 0.05.

Results: A total of 283 hypertensive patients participated in the study, their mean age were 59.67 years, with a standard deviation of 13.76, 120 (42.4%) demonstrated a comprehensive understanding of stroke prevention strategies. The count score of stroke prevention practice was 65 (23%). Educational status significantly associated with knowledge of stroke prevention (p<0.001). Factors: older age (p<0.001), female gender (p<0.001), longer duration since hypertension diagnosis (p=0.013), and limited knowledge about stroke prevention (p<0.001) were associated with lower score in stroke prevention practice.

Conclusion: This study found hypertensive individuals generally lack stroke prevention knowledge and face a higher stroke risk. Lower adherence to prevention practices was associated with older age, female gender, and limited knowledge, while higher adherence associated with being married, better education, and greater awareness of stroke prevention

KEYWORDS: knowledge, practice, hypertension, stroke, Ethiopia

CHAPTER ONE

1 INTRODUCTION

1.1 Background

¹¹ Stroke is a leading cause of neurological disability and death, especially ⁹ in low- and middle-income countries (LMICs) [1, 2]. It is typically characterized by neurological impairment resulting from acute focal injury to the central nervous system (CNS) due to a vascular event. This includes cerebral infarction, ⁹ intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH) [2, 3]. ⁹ The five primary risk factors for stroke are high systolic blood pressure, elevated body mass index, high blood sugar levels, smoking, and ambient particulate matter pollution [4]. Among these, ³ hypertension is the most significant vascular risk factor for stroke [5].

¹¹ The global prevalence of stroke was 101.5 million people, with 12.2 million incident cases. Ischemic strokes accounted for 77.2 million, followed by 20.7 million ICH, and 8.4 million SAH [6]. Out of the total population, 143 million people were living with disability-adjusted life years (DALYs). Additionally, global death reports indicate that 3.3 million deaths were caused by ischemic stroke; 2.9 million deaths were caused by ICH, and 0.4 million deaths were caused by SAH. The stroke-related mortality rate has been observed in several countries, both high and low-income [1, 6]. The incidence and mortality rates of stroke are higher in LMICs. Consequently, in order to properly distribute resources which are aimed at tackling this problem in such nations, it is important that actual data regarding local frequency, risk factors and prevalence of stroke are taken into consideration alongside their relationship strengths. [7].

Stroke prevention aims to reduce the incidence of stroke by targeting single or multiple risk factors at the population, community, or individual level [8]. There are three main levels of stroke prevention. The first level is primordial prevention, which deals with healthy lifestyle interventions aimed at reducing the incidence of physiological stroke risk factors in the population by promoting smoking cessation, a healthy diet, increased physical activity, and body weight control (1). The second level of stroke prevention, known as primary prevention, focuses on reducing the risk

factors associated with stroke such as obesity, lack of physical activity, poor diet, excessive alcohol intake, use of nonnarcotic analgesics, and low folic acid intake (2,3).

This primary prevention aims to address these risk factors in individuals who have not yet experienced a stroke or transient ischemic attack (TIA), to prevent a first cerebrovascular event [9-12]. The third level is secondary prevention, which is the most targeted and is only used after a stroke or TIA to prevent a recurrence of the stroke [13, 14] Optimal blood pressure management, reducing by 25-30% is essential for the prevention of stroke recurrence [5].

1.2 Statement of the problem

⁵ Stroke is a significant global health concern, particularly among individuals with hypertension (HTN), contributing substantially to mortality and disability worldwide. Recent data indicate a doubling in the number of stroke cases among individuals aged 30-79 years from 1990 to 2019, reaching 1.3 billion people globally (4). Furthermore, approximately 8.5 million deaths annually are attributed to stroke and related vascular diseases (5). Stroke not only poses a significant threat to individual health but also places a substantial burden on communities and economies. In Ethiopia, stroke-related deaths represent 6.23% of total mortality, with low- and middle-income countries (LMICs) such as Ethiopia experiencing a disproportionate impact (6,7). Studies conducted in Ethiopia reveal that HTN, diabetes mellitus (DM), and atrial fibrillation (AF) collectively contribute to nearly half of the stroke cases, with an overall hospital mortality rate of 18% (6,7).

The prevention of stroke among hypertensive patients involves various activities such as lifestyle modifications and medication adherence, with the effectiveness of these measures heavily reliant on individuals' knowledge and practice (5). Understanding ³ stroke warning signs and risk factors is crucial for prompt recognition and intervention, yet studies indicate a lack of awareness among stroke patients (8,9). Active engagement in preventive behaviors significantly impacts stroke outcomes, but there is a gap in understanding among hypertensive populations regarding stroke prevention (10,11).

Evaluating stroke prevention knowledge and practice among hypertensive patients across various healthcare settings and demographics is paramount for comprehensive healthcare management. This evaluation involves assessing the depth of understanding regarding stroke warning signs, risk factors, and preventive measures among hypertensive individuals (5). Knowledge entails recognizing the signs of a stroke, understanding modifiable risk factors such as hypertension, diabetes, and atrial fibrillation, and being aware of preventive actions like maintaining a healthy lifestyle and adhering to prescribed medications (12).

Alongside knowledge, the practice of stroke prevention encompasses implementing lifestyle modifications, such as adopting a balanced diet, engaging in regular physical activity, managing stress, and avoiding tobacco use, as well as ensuring compliance with medication regimens and attending regular health screenings (13,14).

Successful application of stroke prevention knowledge and practice yields numerous health benefits for hypertensive patients, including a reduced risk of stroke incidence and its associated complications, such as disability and mortality (13). Moreover, effective stroke prevention measures contribute to improved overall health outcomes, enhanced quality of life, and decreased healthcare costs (14). Conversely, the failure to apply these preventive measures can lead to detrimental consequences, including an increased risk of stroke occurrence, exacerbation of hypertension-related complications, and a greater burden on healthcare resources. Therefore, conducting comprehensive evaluations of stroke prevention knowledge and practice among hypertensive patients is essential for identifying gaps and tailoring interventions (15).

The incidence and prevalence of stroke are on a steady rise globally, presenting a significant public health challenge (5). Low- and middle-income countries (LMICs), particularly Ethiopia, bear a disproportionate burden of this escalating crisis. Across the world, including Ethiopia, the prevalence and incidence rates of stroke are alarming, with an increasing number of individuals affected each year. This trend highlights the magnitude of the problem and underscores the urgent need for effective preventive measures and interventions. Additionally, stroke-related deaths in Ethiopia represent a substantial portion, accounting for 6.23% of total mortality (6,7). This grim statistic further emphasizes the severity of the situation and underscores the critical importance of

addressing stroke prevention and management strategies to mitigate the devastating impact on individuals and communities.

Modifiable risk factors for stroke, such as high blood pressure, obesity, and poor diet, can be effectively prevented through a combination of lifestyle modifications and medical interventions (2,14). Lifestyle changes, including adopting a balanced diet rich in fruits, vegetables, whole grains, and lean proteins, can help manage weight and reduce the risk of obesity, thereby lowering the risk of stroke (2).

Regular physical activity is also crucial in maintaining cardiovascular health and reducing the likelihood of hypertension and obesity (5). Moreover, smoking cessation programs and tobacco control measures are essential for reducing the risk of stroke associated with smoking (2). Medical interventions, such as medications to control high blood pressure and cholesterol levels, are often prescribed to manage metabolic risk factors and reduce the risk of stroke (16). Additionally, healthcare professionals play a key role in educating individuals about the importance of managing modifiable risk factors and providing support and resources to facilitate behavior change (16). By promoting healthy lifestyle habits and offering access to appropriate medical treatments, the prevention of modifiable risk factors can significantly reduce the burden of stroke and improve overall public health.

Conversely, non-modifiable risk factors also play a role in stroke incidence and burden (17). These factors, such as age, gender, race/ethnicity, and genetic predisposition, cannot be altered or controlled by individuals. While non-modifiable risk factors may not be as amenable to intervention as modifiable ones, they still contribute to the overall risk profile for stroke. Understanding the significance of non-modifiable risk factors allows healthcare professionals to assess an individual's overall risk profile and tailor preventive strategies accordingly (14). Additionally, recognizing the interplay between modifiable and non-modifiable risk factors is essential for developing comprehensive stroke prevention and management plans that address the diverse needs of patients across different demographic groups and healthcare settings (18). Therefore, both modifiable and non-modifiable risk factors must be considered in stroke risk assessment and management to effectively reduce the burden of this debilitating condition.

The evaluation of stroke risk factors in hypertensive patients plays a crucial role in reducing the incidence of stroke by mitigating modifiable risk factors. This assessment serves as a preventive measure against stroke, which is a leading cause of mortality and disability worldwide (2). Therefore, it is imperative to regularly assess the knowledge of stroke risk factors in hypertensive patients to enable early identification and intervention of modifiable risk factors (14). Healthcare professionals, including physicians, nurses, and other allied healthcare providers, evaluate the stroke risk factors in hypertensive patients (13). They are responsible for performing the assessment as part of routine patient care and management (14). Regular assessment of patients' knowledge of stroke risk factors is indeed important to intervene effectively in stroke prevention.

Through this assessment, healthcare professionals aim to identify modifiable risk factors such as high blood pressure, smoking, and poor dietary habits among hypertensive patients. Interventions for modifiable risk factors may include lifestyle modifications such as dietary changes, smoking cessation programs, regular physical activity, and medication adherence to control hypertension and other metabolic risk factors (14).

The importance of knowledge and practice in stroke prevention cannot be overstated. Studies indicate a lack of awareness among hypertensive patients regarding stroke warning signs and risk factors (5). Patients with inadequate knowledge are less likely to engage in preventive measures such as blood pressure control, smoking cessation, and healthy lifestyle adoption (13).

Education plays a critical role in stroke prevention, with higher levels of education positively influencing knowledge and preventive behaviors (13). Despite this, a considerable proportion of hypertensive patients exhibit inadequate knowledge of stroke prevention, highlighting the urgent need for targeted interventions.

Thus, this study aims to investigate the knowledge and practice regarding stroke prevention among hypertensive patients attending hypertension clinics in selected public hospitals in Addis Ababa, Ethiopia. By identifying gaps in knowledge and barriers to preventive action, this research seeks to inform tailored interventions to mitigate the burden of stroke in the local population.

1.3 Rationale of the study

The burden and contribution of modifiable risk factors of stroke in Ethiopia remain largely unexplored. Understanding this burden and identifying modifiable risk factors are crucial for formulating effective stroke prevention strategies. Recent literature suggests that lifestyle and behavioral modifications play a pivotal role in enhancing the quality of life and reducing the risk of stroke. For instance, a study by Deresse et al. (2015) highlighted the significant impact of hypertension, diabetes mellitus, and atrial fibrillation on the prevalence of stroke in Ethiopia (6). Given the scarcity of advanced medical technologies for stroke care in Ethiopia and the growing economic challenges limiting healthcare access for the predominantly impoverished populations, prioritizing stroke prevention strategies is prudent (7).

Moreover, Feigin et al. (2016) underscored the importance of addressing modifiable risk factors such as high blood pressure, obesity, and poor diet in reducing the incidence of stroke (2). They emphasized the need for lifestyle modifications and medical interventions to mitigate these risk factors and prevent strokes effectively. These findings highlight the urgency of exploring the burden and contribution of modifiable risk factors in Ethiopia to develop targeted prevention strategies.

Addressing modifiable risk factors such as smoking, poor diet, and physical inactivity can significantly reduce the incidence of stroke (2,13). Metabolic factors like high blood pressure, obesity, and elevated cholesterol levels further exacerbate the risk (13). However, effective stroke prevention measures require adequate knowledge and practice among hypertensive patients (5).

Despite the critical role of education in stroke prevention, studies indicate a lack of awareness among hypertensive patients regarding stroke warning signs and risk factors (14). Higher levels of education positively influence knowledge and preventive behaviors, yet a considerable proportion of hypertensive patients exhibit inadequate knowledge of stroke prevention (14).

1.4 Significance of the study

The significance of the study is multifaceted and extends to various stakeholders in the healthcare sector.

Firstly, for healthcare providers, this study offers valuable insights into the gaps in ³ knowledge and practices related to stroke prevention among hypertensive patients. By identifying areas where patients lack understanding or adherence to preventive measures, healthcare providers can tailor interventions and education programs to better support patients in managing their condition and reducing their risk of stroke.

Secondly, for policymakers and program planners, the findings of this study can inform the development of targeted public health initiatives aimed at promoting stroke prevention in Ethiopia. By understanding the factors influencing ³ knowledge and practices related to stroke prevention among hypertensive patients, policymakers can implement policies and allocate resources more effectively to address the specific needs of this population.

Thirdly, for the study settings, ¹¹ public hospitals' hypertension clinics in Addis Ababa, this research provides an opportunity to improve the quality of care provided to hypertensive patients. By integrating the findings into clinical practice, healthcare facilities can enhance their stroke prevention protocols and better support patients in managing their hypertension and reducing their risk of stroke.

Fourthly, for patients, this study empowers them with knowledge and awareness about stroke prevention strategies. By understanding the importance of lifestyle modifications and medication adherence in preventing strokes, patients can take proactive steps to protect their health and well-being.

Lastly, for researchers, this study contributes to the existing body ⁴ of knowledge on stroke prevention among hypertensive patients, particularly in the context of Ethiopia. By building upon previous research and addressing gaps in the literature, this study lays the groundwork for future investigations and interventions aimed at improving stroke prevention outcomes in similar settings.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Pathophysiology of Stroke

A stroke is an abrupt neurological outburst caused by impaired perfusion through the blood vessels to the brain [31]. It is important to understand the neurovascular anatomy to study the clinical manifestation of the stroke [3]. The blood flow to the brain is managed by two internal carotids anteriorly and two vertebral arteries posteriorly (the circle of Willis). Ischemic stroke is caused by deficient blood and oxygen supply to the brain; hemorrhagic stroke is caused by bleeding or leaky blood vessels [32, 33]. Ischemic occlusions are responsible for approximately 85% of stroke cases, while intracerebral bleeding accounts for the remaining cases. Ischemic occlusion occurs when blood flow to the brain is disrupted due to thrombotic or embolic conditions [34].

In thrombosis, atherosclerosis causes the narrowing of the vessels, leading to plaque buildup that eventually constricts the vascular chamber and forms clots. This results in a thrombotic stroke. In an embolic stroke, decreased blood flow to the brain region causes an embolism, leading to reduced blood flow and causing severe stress and untimely cell death (necrosis). Necrosis is followed by the disruption of the plasma membrane, organelle swelling, and leaking of cellular contents into extracellular space, leading to the loss of neuronal function [35]. Inflammation, energy failure, loss of homeostasis, acidosis, increased intracellular calcium levels, excitotoxicity, free radical-mediated toxicity, cytokine-mediated cytotoxicity, complement activation, impairment of the blood-brain barrier, activation of glial cells, oxidative stress, and infiltration of leukocytes are other key events contributing to stroke pathology [32, 33, 36, 37].

Hemorrhagic stroke accounts for about 10–15% of all strokes and has a high mortality rate. In this condition, stress in the brain tissue and internal injuries cause the blood vessels to rupture. This leads to toxic effects in the vascular system that causes an infarction. It is divided into intracerebral and subarachnoid hemorrhage [38]. In ICH, the blood vessels rupture and cause an abnormal

accumulation of blood in the brain. The main causes of ICH are high blood pressure, disturbed blood vessels, excessive use of anticoagulants and thrombolytics. In a subarachnoid hemorrhage, blood accumulates in the subarachnoid space of the brain due to a head injury or cerebral aneurysm [32, 33, 36].

2.1.2 ¹ Risk Factors for Stroke

Stroke ¹ risk factors refer to characteristics or conditions that increase the likelihood of having a stroke. Numerous risk factors for stroke have been identified and are continually being discovered (19). These risk factors can be classified into two categories: modifiable and non-modifiable. Modifiable risk factors are those that can be changed or controlled, such as hypertension, smoking, and physical inactivity (20). Non-modifiable risk factors include age, gender, and genetic predisposition, which cannot be altered (19). Understanding and managing these ³ risk factors is crucial for stroke prevention and health management (20).

A study was conducted in Gorgan, northeastern Iran ⁹ to determine the prevalence of stroke risk factors and their distribution based on stroke subtypes. The study showed that hypertension, diabetes mellitus, and dyslipidemia significantly increased the risk of ischemic stroke [39]. Another case-control study was conducted in Ghana and Nigeria to identify dominant modifiable risk factors for stroke. The study found that hypertension, ¹¹ dyslipidemia, regular meat consumption, stress, physical inactivity, and current cigarette smoking were associated with ischemic stroke and hemorrhagic stroke [40].

A prospective observational study was conducted ⁵ on risk factors, clinical presentations, and predictors of stroke among adult patients admitted to the stroke unit of Jimma University Medical Center, southwest Ethiopia. The most common risk factor identified was hypertension (75.9%), followed by family history (33.6%), alcohol intake (22.4%), smoking (17.2%), and heart failure (17.2%) [41]. It is important to note that ¹ the risk of stroke increases with age and doubles over the age of 55 years in both men and women. The risk is further increased when an individual has an existing medical condition such as hypertension, coronary artery disease, or hyperlipidemia. ¹ Nearly 60% of strokes occur in patients with a history of TIA. Some of the risk factors for stroke are modifiable, while others are non-modifiable.

2.1.2.1 Non-Modifiable Risk Factors

Certain factors can increase the risk of stroke, including age, sex, ethnicity, TIA, and hereditary characteristics. In the United States, the average age of stroke incidence in 2005 was 69.2 years [42]. Recent studies suggest that individuals between the ages of 20 and 54 are at higher risk, possibly due to pre-existing secondary factors [43]. Women are equally or more susceptible to stroke than men, regardless of age. According to research, Hispanic and black populations are at a higher risk of stroke than white populations. Furthermore, the incidence of hemorrhagic stroke is significantly higher in black individuals than in age-matched white populations [44].

2.1.2.2 Modifiable Risk Factors

These are of paramount importance as timely and appropriate medical intervention can reduce the risk of stroke in susceptible individuals. The most important controllable risk factors for stroke are high blood pressure, diabetes, lack of exercise, alcohol and drug abuse, cholesterol levels, dietary habits and genetic factors [13, 32].

Hypertension: It is one of the predominant risk factors for stroke. In one study, a blood pressure (BP) of at least 160/90 mmHg and a history of hypertension were considered equally important predispositions for stroke, with 54% of the stroke-affected population having these characteristics [45, 46]. BP and prevalence of stroke are correlated in both hypertensive and normal individuals. A study reported that a 5–6 mm Hg reduction in BP lowered the relative risk of stroke by 42%. Randomized trials of interventions to reduce hypertension in people aged 60+ have shown similar results, lowering the incidences of symptoms of stroke by 36% and 42%, respectively [47].

Diabetes: It doubles the risk of ischemic stroke and confers an approximately 20% higher mortality rate. Moreover, the prognosis for diabetic individuals after a stroke is worse than for non-diabetic patients, including higher rates of severe disability and slower recovery. Tight regulation of glycemic levels alone is ineffective; medical intervention plus behavioral modifications could help decrease the severity of stroke for diabetic individuals [48, 49].

Atrial fibrillation (AF): AF is an important risk factor for stroke, increasing risk two- to five-fold depending upon the age of the individual concerned [50]. It contributes to 15% of all strokes and

produces more severe disability and higher mortality than non-AF-related strokes [51]. Research has shown that in AF, decreased blood flow in the left atrium causes thrombolysis and embolism in the brain. However, recent studies have contradicted this finding, citing poor evidence of sequential timing of incidence of AF and stroke, and noting that in some patients the occurrence of AF is recorded only after a stroke. In other instances, individuals harboring genetic mutations specific to AF can be affected by stroke long before the onset of AF. Therefore, we need better methods of monitoring the heart rhythms that are associated with the vascular risk factors of AF and thromboembolism [52, 53].

Hyperlipidemia: It is a major contributor to coronary heart disease, but its relationship to stroke is complicated. Total cholesterol is associated with the risk of stroke, whereas high-density lipoprotein (HDL) decreases stroke incidence. Therefore, evaluation of lipid profile enables estimation of the risk of stroke. In one study, low levels of HDL (<0.90 mmol/L), high levels of total triglyceride (>2.30 mmol/L), and hypertension were associated with a two-fold increase in the risk of stroke-related death in the population [54].

Alcohol and drug abuse: The relationship between stroke risk and alcohol intake follows a curvilinear pattern, with the risk related to the amount of alcohol consumed daily. Low to moderate consumption of alcohol (≤ 2 standard drinks daily for men and ≤ 1 for women) reduces stroke risk, whereas high intake increases it. In contrast, even low consumption of alcohol escalates the risk of hemorrhagic stroke [55]. Regular use of illegitimate substances such as cocaine, heroin, phencyclidine, lysergic acid diethylamide, cannabis/marijuana, or amphetamines is related to increased risk of all subtypes of strokes [56]. Illicit drug use is a common predisposing factor for stroke among individuals aged below 35 years. United States of America research showed that the proportion of illicit drug users among stroke patients aged 15–44 years was six times higher than among age-matched patients admitted with other serious conditions. However, there is no strong evidence to confirm these findings, and the relationship between these drugs and stroke is anecdotal [57].

Smoking: Tobacco smoking is directly linked to an increased risk of stroke. An average smoker has twice the chance of suffering from a stroke of a non-smoker. Smoking contributes to 15% of

stroke-related mortality. Research suggests that an individual who stops smoking reduces the relative risk of stroke, while prolonged second-hand smoking confers a 30% elevation in the risk of stroke [58, 59].

Insufficient physical inactivity and poor diet are associated with increased risk for stroke. Lack of exercise increases the chances of stroke attack in an individual. Insufficient physical activity is also linked to other health issues like high BP, obesity, and diabetes, all conditions related to high stroke incidence. Poor diet influences the risk of stroke, contributing to hypertension, hyperlipidemia, obesity, and diabetes. Certain dietary components are well known to heighten risk; for example, excessive salt intake is linked to high hypertension and stroke. Conversely, a diet high in fruit and vegetables (notably, the Mediterranean diet) has been shown to decrease the risk of stroke [60-62].

2.2 Empirical review on knowledge, practice and associated factors

2.2.1 Knowledge about stroke prevention and associated factors

Stroke prevention is crucial in reducing the global burden of stroke-related morbidity and mortality. Effective stroke prevention strategies include managing risk factors such as hypertension, which is a leading cause of stroke (21). Understanding and controlling these risk factors can significantly lower the incidence of stroke. Knowledge about stroke prevention plays a vital role in this process. Patients who are well-informed about the ways to prevent stroke are more likely to adhere to lifestyle changes and medication regimens that mitigate these risks (22).

Studies have shown that hypertensive patients with a higher level of knowledge about stroke prevention are more proactive in managing their condition, thus reducing their risk of experiencing a stroke (15,23). This knowledge includes understanding the importance of maintaining a healthy blood pressure, recognizing the signs and symptoms of a stroke, and knowing the actions to take if a stroke is suspected. Additionally, knowledge about dietary modifications, physical activity, and the cessation of smoking contributes to better stroke prevention practices (24).

Several factors are associated with ⁴ the level of knowledge about stroke prevention among hypertensive patients. These include educational background, access to healthcare information,

and the quality of communication between healthcare providers and patients. Socioeconomic status and cultural beliefs also play significant roles in shaping patients' understanding and attitudes towards stroke prevention (17). For instance, patients with higher education levels and better access to healthcare resources tend to have more comprehensive knowledge about stroke prevention measures compared to those with limited education and access.

In a cross-sectional study conducted at Debre Tabor General Hospital, 423 hypertensive patients were surveyed to assess their knowledge of stroke prevention. Out of the total 410 participants, 24.9% of them had good knowledge of stroke prevention methods. The factors such as young age, urban residence, and having longer followed-up duration were associated with good knowledge on stroke prevention [19]. Similarly, another cross-sectional study conducted at Felege Hiwot Referral Hospital assessed hypertensive patients' knowledge of risk factors and warning signs of stroke. The study found that more than three-fourths (77%) of the participants did not identify any risk factors, and 72.3% did not identify any warning signs of stroke. Only 18.3% of the participants had good knowledge of stroke [64].

2.2.2 Practice of stroke prevention and associated factors

The practice of stroke prevention among individuals with hypertension is a critical aspect of managing cardiovascular health and reducing the burden of stroke-related morbidity and mortality. Hypertension, characterized by elevated blood pressure levels, is a major risk factor for stroke, making effective prevention strategies crucial. Understanding the factors influencing the practice of stroke prevention among hypertensive patients is essential for developing targeted interventions and improving health outcomes.

Studies highlight gaps in knowledge and awareness regarding stroke prevention strategies, such as medication adherence and lifestyle changes, among individuals with hypertension. These findings underscore the need for targeted educational interventions to improve understanding and adoption of preventive measures (15,22).

Factors influencing stroke prevention practices among hypertensive patients in Ethiopia are multifaceted. Firstly, health-seeking behavior plays a crucial role, as noted in research in which identified delays in seeking medical care among hypertensive individuals due to limited access to

healthcare facilities and socioeconomic barriers (25). Secondly, challenges with medication adherence, including medication costs, side effects, and forgetfulness, contribute to suboptimal management of hypertension and increased stroke risk, as observed in studies (26).

Lifestyle modifications, such as dietary changes, regular physical activity, and smoking cessation, are integral to stroke prevention. However, despite awareness of the importance of these changes, studies like that of a report limited adherence among hypertensive patients in Ethiopia, attributed to cultural beliefs and lifestyle constraints (27). Moreover, systemic challenges within the healthcare system, including limited access to affordable medications, inadequate infrastructure for chronic disease management, and knowledge gaps among healthcare providers regarding stroke prevention, as highlighted in studies, further complicate efforts to improve stroke prevention outcomes (15,26).

2.3 Conceptual Framework

The study's conceptual framework aims to pinpoint the primary obstacles to stroke prevention and the association between understanding stroke risk factors and warning signs, and the practice of stroke prevention. Graphic representation of the study's conceptual framework seen in Figure 1.

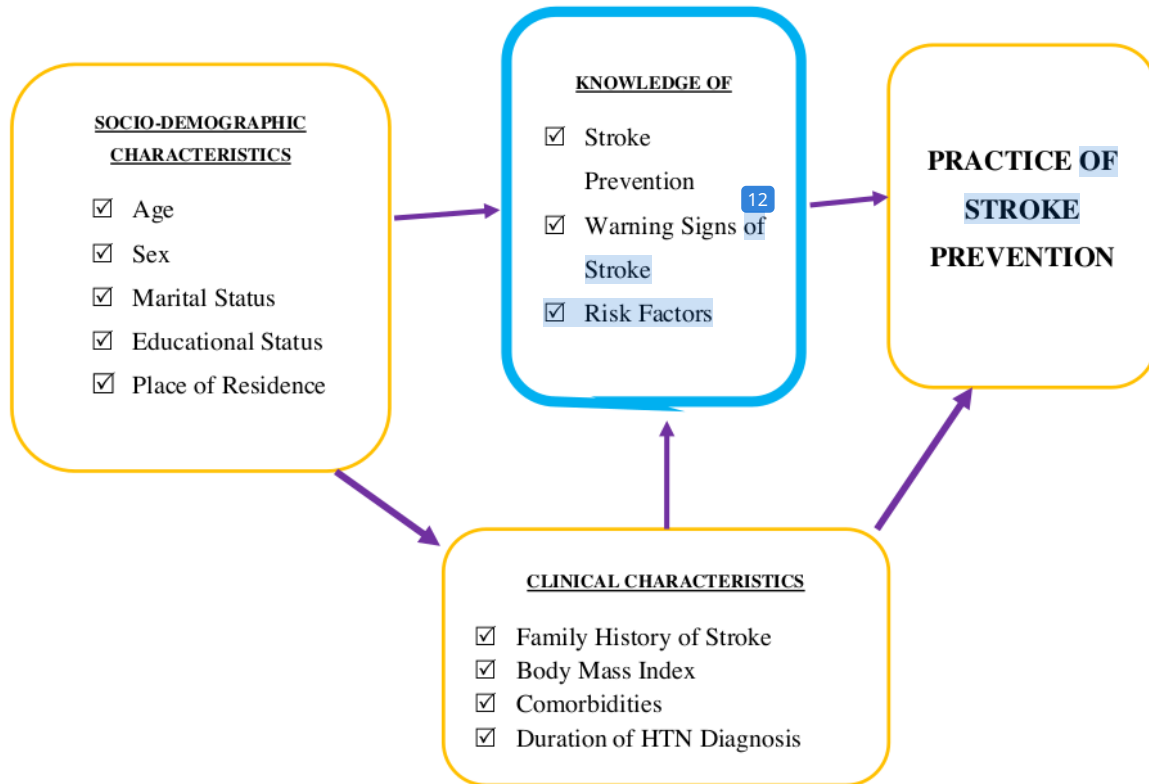


Figure1: Conceptual framework showing the relationship between the factors

CHAPTER THREE

3 OBJECTIVES

3.1 General objective

- ✓ ⁵ To assess the knowledge, practice, and associated factors related to stroke prevention among hypertensive patients at hypertension clinics in selected public hospitals in Addis Ababa, Ethiopia.

3.2 Specific objectives

- ✓ ⁷ To determine the knowledge of hypertensive patients about stroke prevention in the hypertension clinics of public hospitals located in Addis Ababa, Ethiopia.
- ✓ ⁵ To determine the practices of hypertensive patients towards stroke prevention in the hypertension clinics of public hospitals located in Addis Ababa, Ethiopia.
- ✓ ⁷ To identify factors associated with the practices of hypertensive patients towards stroke prevention in the hypertension clinics of public hospitals located in Addis Ababa, Ethiopia.

CHAPTER FOUR

4 MATERIALS AND METHOD

4.1 Study setting

This study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC) and St. Peter's Specialized Hospital (SPSH), where specialized comprehensive and clinical services are provided. SPHMMC is a government hospital with 400 beds and provides diagnostic and treatment services to over 400,000 patients yearly through its Outpatient department (OPD), Emergency, and Inpatient units.

SPSH was founded in 1963 as a center for treating tuberculosis (TB) patients in the country. The hospital currently employs a total of 500 staff, out of which 250 are healthcare professionals. Its primary focus is on the management of TB and TB/HIV patients. Additionally, the hospital also offers internal medicine, dermatology, ophthalmology, pediatrics, maternal and child health, mental health, and dental medicine services. Currently, the hospital has a functioning cardiac catheterization laboratory, echocardiography, critical care unit for cardiac patients with emergency, OPD, and cardiac ward services, which are being provided in collaboration with SPHMMC.

4.2 Study design and period

This institution-based cross-sectional study was conducted to assess knowledge, practice, and associated factors towards stroke prevention among hypertensive patients, attending their healthcare followed-up in the cardiac clinic of SPHMMC and SPSH during the study period from February 01 to August 20, 2022.

4.3 Study and source population

4.3.1 Source population

All hypertensive patients who are on follow-up at SPHMMC and SPSH Cardiac Clinic were the source population.

4.3.2 Study population

The study population was all hypertensive patients who came to SPHMMC and SPSH Cardiac Clinic during the data collection period, and eligible for inclusion criteria.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

Hypertensive patients aged ≥ 18 years old received healthcare in SPHMMC and SPSH Cardiac Clinics and had appointments during the data collection period and patients willing to participate in the study were included.

4.4.2 Exclusion criteria

Patients with hypertension who had previously experienced a transient ischemic attack or stroke, critically ill patients, underlying severe mental illness, or were unable to provide the necessary information on their own were excluded.

4.5 Sample Size Determination

The sample size was calculated using a formula for a single population proportion, assuming an overall prevalence rate of stroke prevention knowledge from a previous study at Debre Tabor General Hospital is 25% [19], with a margin of error of 5%, a confidence level of 95%, and a detection power of 80%.

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

$$n = \frac{(1.96)^2 (0.25)(1-0.25)}{(0.05)^2} = \frac{0.7203}{0.0025} \quad 0.7203/0.0025 = 288.12 \sim 288$$

Where;

n - Is the estimated sample size

p - Is the proportion of patients who have good knowledge of stroke prevention

d - Is the margin of error

After performing a power calculation and accounting for a 5% non-response rate, a ⁴ sample size of 302 was determined to evaluate knowledge of stroke prevention.

4.6 Sampling Methods and Procedures

A simple random sampling technique was used to select 302 study participants from two selected hospitals in proportion to their total population of hypertensive patients attending healthcare. The estimated total population of hypertensive patients attending the selected hospitals is 4108. The proportional allocation of the sample to each hospital was calculated based on the total number of hypertensive patients, who have follow-ups in the respective clinic.

The proportional value will be calculated with the formula:

$$= \frac{\text{Total sample} \times \text{total population of specific area}}{\text{Total population}}$$

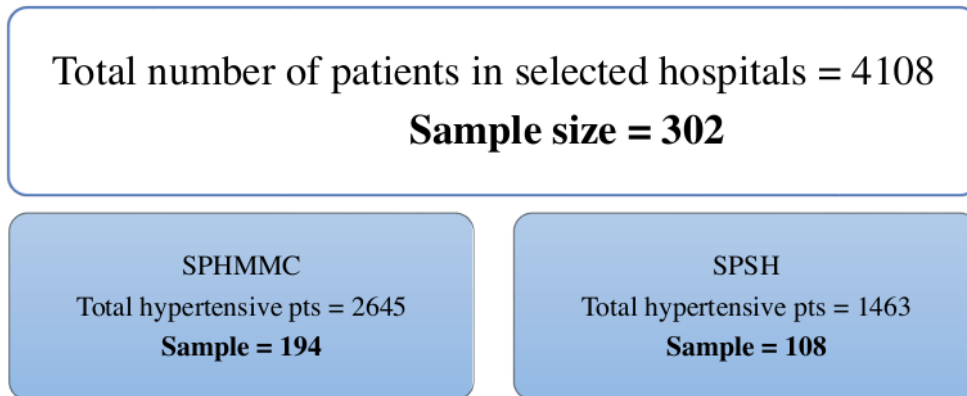


Figure 2: Proportional distribution of hypertensive patients and associated factors in public hospitals follow-up center, Addis Ababa, Ethiopia.

4.7 Study Variables

4.7.1 Dependent variables

- Knowledge of stroke prevention
- Practice of stroke prevention

4.7.2 Independent variables

- Socio-demographic characteristics including age, sex, religion, residence, occupational and educational status, marital status, and income status were recorded.
- Clinical variables such as duration of hypertension, BMI, previous history of stroke, family history of stroke, and diabetes were also noted.

4.8 Data Collection and Management

4.8.1 Data collection instruments

The study used a structured questionnaire to gather information from participants. The questionnaire consists of three sections. Section-I: socio-demographic characteristics of the study participants. Section II: Stroke Prevention Knowledge Questionnaire (SPKQ) consists of questionnaires about stroke prevention knowledge, such as knowledge of stroke warning symptoms and risk factors in HTN patients. Section-III: consists questionnaire of the Health Promoting Lifestyle Profile-II (HPLP-II) constructed based on six domains.

I. Sociodemographic characteristics

The data abstraction format is designed to extract information from the medical record or directly from the patient, such as on socio-demographic characteristics (age, sex, educational status, place of residence, and marital status) clinical (Duration of HTN, family history of stroke, and comorbidity).

II. Stroke Prevention Knowledge Questionnaire (SPKQ)

The SPKQ is a tool that assesses participants' understanding of stroke prevention. It consists of 32 questions divided into three domains: knowledge about stroke prevention, knowledge of warning

signs of stroke, and knowledge of risk factors. Each question was responded with a "yes" or "no" answer. One point was given for every "yes" answer, and "0" point for every "no" answer. The total knowledge score ranged from 0 to 32 points.

III. Health Promoting Lifestyle Profile-II (HPLP-II)

The HPLP-II is a questionnaire consisting of 52 items that measure health-promoting behavior or habits. It includes six domains or factors: health responsibility (nine items), physical activity (eight items), nutrition (nine items), spiritual growth (nine items), interpersonal relations (nine items), and stress management (eight items). Each question was responded using a four-point Likert scale the scale refers: 1 = "never", 2 = "sometime", 3 = "often" and 4 = "routinely". The total calculated score produced ranging from 52 to 208 points.

4.8.2 Data quality assurance

The questionnaire was initially prepared in English and then translated into Amharic by an expert in the English language. Following the translation, it was back-translated into English to ensure accuracy. A pretest was conducted with 5% of hypertensive patients at Tikur Anbessa Specialized Hospital (TASH) to ensure the clarity and understandability of the questions. Based on the pretest findings, appropriate corrections were made before the actual study commenced. Data was collected by two BSc nurses, who received a half-day training from the principal investigator on the study's objectives and the proper use of the data collection tool. To ensure completeness and consistency, the principal investigator reviewed all completed questionnaires daily.

4.9 Statistical Analysis

The data were entered into the Statistical Package for the Social Sciences (SPSS), version 27, for final analysis. Descriptive statistics of the sociodemographic characteristics were calculated, including frequencies, percentages, means, and standard deviations. After checking the assumptions, univariate analysis was conducted to identify candidate variables for the multivariate regression model. This model aimed to determine possible predictors of knowledge and practices of stroke prevention. In the bivariate analysis, factors associated with stroke prevention knowledge and practices with a p-value of less than 0.2 were selected as candidate variables for the binary

logistic regression analysis and multivariate linear regression model. Binary logistic regression and multivariate linear regression models were used to determine the key factors associated with stroke prevention knowledge and practices, respectively. A p-value of less than 0.05 was considered statistically significant.

The linear regression assumptions were thoroughly examined and found to be met. The analysis focused on a dependent variable with continuous data that exhibited a normal distribution, where the data points closely aligned with the diagonal line. Additionally, the residuals, representing the differences between observed and predicted values, displayed an approximately normal distribution, further confirming the normality assumption for linear regression.

Pearson correlation coefficients between various variables were tested for significance at $p < 0.01$ and $p < 0.05$ levels. Strong correlations, both positive and negative, were found between factors such as overall knowledge of stroke prevention, educational status, age, and family history of stroke, indicating meaningful relationships for further analysis.

The analysis revealed no multicollinearity among the independent variables. This was evidenced by the Variance Inflation Factor (VIF) with a mean of 1.816 and tolerance values around 0.681. VIF values above 10 indicate high multicollinearity, suggesting strong correlations among independent variables, while tolerance values near 1 indicate low multicollinearity, signifying minimal correlation among the independent variables.

4.10 Ethical Considerations

Ethical approval was obtained from AAU, CHS, and Department of Nursing Ethical Review Board (Ref No. CHS/NSG/341). Before data collection, a written permission letter to SPHMMC, SPSH, and TASH to obtain permission to conduct the study. Written informed consent obtained from each participant after a brief explanation of the purpose of the study. All personnel information was kept entirely anonymously, and confidentiality was assured throughout the study period.

4.11 Operational Definitions

Knowledge of stroke prevention refers to hypertensive (HPN) patients' knowledge of stroke prevention, as determined by their total score on the knowledge questionnaire. This knowledge was evaluated based on the SPKQ questionnaire score.

The scores were categorized as follows: Participants were assessed using a 32-item questionnaire focused on stroke prevention knowledge. Each correct response was scored as 1, and each incorrect response was scored as 0. A total count score was used to categorize participants into two groups: good or poor knowledge of stroke prevention.

- 4 **Good knowledge of Stroke Prevention:** Participants who correctly answered 19 and above ($\geq 60\%$) of stroke prevention knowledge-related questions (28).
- 4 **Poor knowledge of Stroke Prevention:** Participants who correctly answered less than 19 ($< 60\%$) of stroke prevention knowledge-related questions (28).

The practice of stroke prevention refers to the behaviors, habits, or practices of hypertensive (HPN) patients in their daily lives to prevent strokes evaluated using the HPLP-II score. The total HPLP II score is classified into four levels as follows (29):

- Poor** for the range 52–90
- Moderate** for the range 91–129
- Good** for the range 130–168
- Excellent** for the range 169–208.

4.12 Dissemination of Research Findings

14 The results of this study will be submitted to the Addis Ababa University (AAU) Department of Nursing repository. To disseminate the findings widely, the findings will be published in reputable scientific journals. Subsequently, the results will be presented at relevant seminars, conferences, and workshops.

CHAPTER FIVE

5 RESULTS

5.1. Sociodemographic Characteristics of Study Participants

In this study, 283 hypertension (HTN) patients participated, resulting in a 93.7% response rate. Among the participants, 54.4% were females. The age distribution showed a mean age of 59.67 years ($SD=\pm 13.76$), majority 40.6% were grouped between 50 and 65 years old, followed by 65 or more years old and below 50 years with 27.2%, and 32.2%, respectively. The majority, 48.1% of the participants were married, 46.6% had a normal BMI, 26.9% reported a family history of stroke, and 62.5% knew their diagnosis within less than 10 years (Table 1).

Table 1: Sociodemographic characteristics of the study of hypertensive patients (n = 283).

Variables	Measures	Frequency	Percentage
Sex	Female	154	54.4
	Male	129	45.6
Age (in Years) (Mean ± SD = 59.67±13.76)	<50	77	27.2
	50–65	115	40.6
	>65	91	32.2
Marital Status	Married	136	48.1
	Widowed	64	22.6
	Divorced	60	21.2
	Single (Never married)	23	8.1
Educational Status	Unable to read and write	58	20.5
	Able to read and write	29	10.2
	Primary school (Grade 1-8)	65	23.0
	Secondary school (Grade 9 and 10)	19	6.7
	Preparatory school (Grade 11 and 12)	36	12.7
	Above 12	76	26.9
Religion	Orthodox	182	64.3
	Muslim	51	18.0
	Protestant	46	16.3
	Catholic	4	1.4
Body mass index (in Kg/m²)	Underweight (< 18.5)	2	0.7
	Normal (18.5–24.9)	132	46.6
	Overweight (25.0–29.9)	114	40.3
	Obesity (30.0–34.9)	35	12.4
Family History of Stroke	No	207	73.1
	Yes	76	26.9
Duration of HTN diagnosis (in years)	< 10	177	62.5
	10-20	70	24.7
	>20	36	12.7

5.2. Participants Knowledge about Stroke Prevention

The table 2 presented information regarding stroke prevention knowledge among hypertensive patients. Study participants exhibited a count score of 59 (20.8%) for knowledge of stroke prevention. In contrast, their count scores for awareness of warning signs and risk factors were 84 (29.7%) and 59 (20.8%), respectively. Collectively, participants showcased a count knowledge score of 65 (23%) for stroke prevention. As per the findings, 65 (23%) of the study participants achieved scores $\geq 60\%$ (≥ 19 questions out of 32), signifying a good level of knowledge. Conversely, 218 (77%) of the study participants attained scores $< 60\%$ (< 19 questions out of 32 questions), indicating a lower level of knowledge (poor knowledge).

Table 2: The participants' knowledge of Stroke prevention among hypertensive patients (n=283)

Variables	Yes (%)	No (%)	Correct answer
Knowledge of stroke prevention	137(48.4)	146(51.6)	
1. Engage in regular physical activity	98(34.6)	185(65.4)	Yes
2. Reduce eating fatty food	242(85.5)	41(14.5)	Yes
3. Consume low-salt diet	220(77.7)	63(22.3)	Yes
4. Eating fruits and vegetables regularly	114(40.3)	169(59.7)	Yes
5. Maintain normal body weight	115(40.6)	168(59.4)	Yes
6. Smoking abstinence	8(2.8)	275(97.2)	Yes
7. Avoid excessive use of alcohol	15(5.3)	268(94.7)	Yes
8. Ant-hypertension medication adherence	258(91.2)	25(8.8)	Yes
9. Control blood sugar level	180(63.6)	103(36.4)	Yes
10. Regular BP check-ups	253(89.4)	30(10.6)	Yes
Knowledge of warning signs of stroke prevention	160(56.5)	123(43.5)	
1) Sudden and severe headache	93(32.9)	190(67.1)	Yes
2) Sudden dizziness or loss of balance or coordination	113(39.9)	170(60.1)	Yes
3) Sudden loss of memory	86(30.4)	197(69.6)	Yes
4) Sudden loss of vision	52(18.4)	231(81.6)	Yes
5) Sudden difficulty in speaking	87(30.7)	196(69.3)	Yes
6) Sudden difficulty in swallowing	73(25.8)	210(74.2)	Yes
7) Sudden loss or reduced sensation on one side of the body	164(58.0)	119(42.0)	Yes
8) Sudden loss or reduced sensation all over the body	157(55.5)	126(44.5)	Yes
9) Sudden weakness or paralysis on one side of the body	162(57.2)	121(42.8)	Yes
10) Sudden weakness or paralysis all over the body	157(55.5)	126(44.5)	Yes
Knowledge of risk factors of stroke	109(38.5%)	174(61.5%)	
1) Advancement in age	118(41.7)	165(58.3)	Yes
2) Not exercising regularly	96(33.9)	187(66.1)	Yes
3) Being overweight or obese	95(33.6)	188(66.4)	Yes
4) Cigarette smoking	79(27.9)	204(72.1)	Yes
5) High blood pressure (hypertension)	123(43.5)	160(56.5)	Yes
6) Diabetes mellitus	67(23.7)	216(76.3)	Yes
7) Eating foods containing too much fat	107(37.8)	176(62.2)	Yes
8) Excessive alcohol intake	107(37.8)	176(62.2)	Yes
9) Family history of stroke	57(20.1)	226(79.9)	Yes
10) Heart diseases	58(20.5)	225(79.5)	Yes
11) Use of oral contraceptives for females	19(12.3)	135(87.7)	Yes
12) Too much blood cells in the body (polycythemia)	24 (8.5)	259(91.5)	Yes
Overall knowledge of stroke prevention	125 (44.2)	158 (55.8)	

N.B: The knowledge of each of the three domains comprising the overall knowledge of stroke prevention (Knowledge of stroke prevention, Knowledge of warning signs of stroke prevention, and Knowledge of risk factors of stroke) was categorized into good ($\geq 60\%$) and poor ($< 60\%$) based on the domain-specific mean values. The overall knowledge of stroke prevention among study participants was determined based on the overall counts of correct answers of the 32 questions. CA: correct answers.

The study findings showed that among hypertensive patients, 108 (38.2%) were unable to recognize the warning signs of stroke. Additionally, only 44 (15.5%) of the study participants could correctly identify all ten warning signs of stroke, as illustrated in Figure 2.

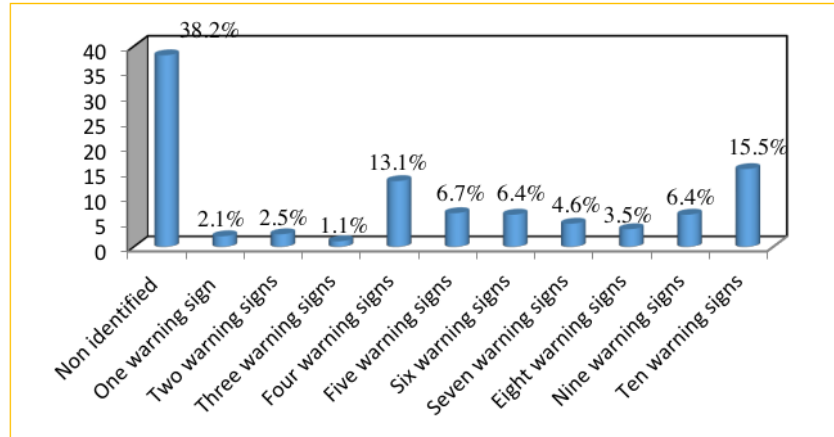


Figure 3: Illustration of stroke warning signs recognized by patients with Hypertension participants showcased a count knowledge score of 65 (23%) for stroke prevention. As per the findings, 65 (23%) of the study participants achieved scores $\geq 60\%$ (≥ 19 questions out of 32), signifying a good level of knowledge.

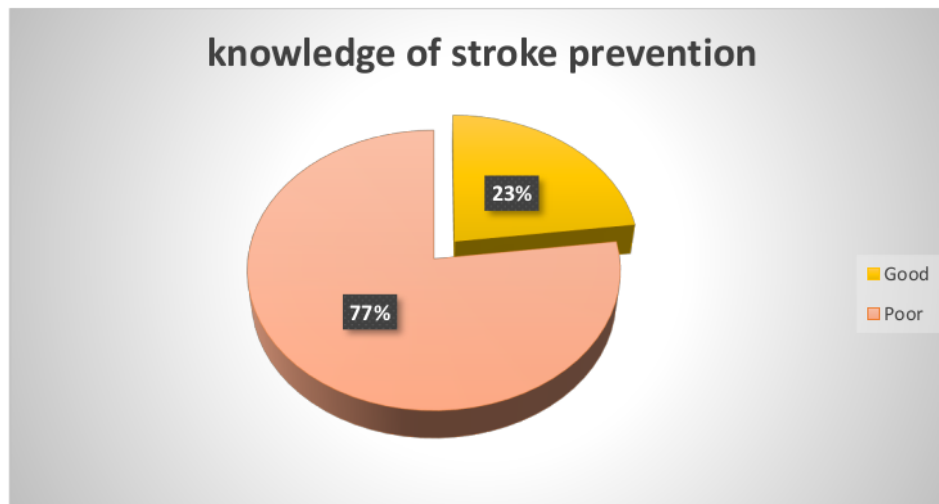


Figure 4: Over all participants knowledge of stroke prevention

5.3. Participants' Response for Stroke Prevention Practice Questions

The study evaluated stroke prevention practices using the Health-Promoting Lifestyle Profile-II (HPLP-II). Among hypertensive (HTN) patients, the mean HPLP-II score was found to be 135.69 ± 25.22 . Examining the various domains of HPLP-II, the highest mean score was identified within the interpersonal relations domain (30.08 ± 4.72), followed by the spiritual growth domain (24.64 ± 5.55). Conversely, the physical activity domain exhibited the lowest mean score (16.21 ± 5.12), closely trailed by nutrition (19.65 ± 4.29).

In this study, participants' levels of stroke prevention practices were as follows: 7 participants (2.8%) had a poor level, 101 participants (35.7%) had a moderate level, 140 participants (49.5%) had a good level, and 35 participants (12.4%) had an excellent level.

Table 3: Mean score of health promoting lifestyle profile-II among hypertensive patients (n=283)

Rank	Variables	N (%)				Mean ± SD
		Never	Sometimes	Often	Routinely	
#1	IR (nine items: Q1, 7, 13, 19, 25, 31, 37, 43, 49)					30.08 ± 4.72
	Q1 (Discuss my problems and concerns with people close to me)	59 (20.8)	48 (17)	41 (14.5)	135 (47.7)	2.61 ± 0.99
	Q7 (Praise other people easily for their achievements)	2 (0.7)	3 (1.1)	51 (18)	227 (80.2)	2.80 ± 0.42
	Q13 (Maintain meaningful and fulfilling relationships with others)	5 (1.8)	6 (2.1)	56 (19.8)	216 (76.3)	2.79 ± 0.50
	Q19 (Spend time with close friends)	38 (13.4)	45 (15.9)	51 (18)	149 (52.7)	2.71 ± 0.89
	Q25 (Find it easy to show concern, love and warmth to others)	0 (0)	3 (1.1)	32 (11.3)	248 (87.6)	2.90 ± 0.34
	Q31 (Touch and am touched by people I care about)	20 (7.1)	33 (11.7)	84 (29.7)	146 (51.6)	2.68 ± 0.77
	Q37 (Find ways to meet my needs for intimacy)	10 (3.5)	27 (9.5)	74 (26.1)	172 (60.8)	2.14 ± 1.36
	Q43 (Get support from a network of caring people)	99 (35)	42 (14.8)	55 (19.4)	87 (30.7)	1.49 ± 0.89
	Q49 (Ask for information from health professionals about how to take good care of myself)	73 (25.8)	42 (14.8)	63 (22.3)	105 (37.1)	1.62 ± 1.01
#2	HR (nine items: Q3, 9, 15, 21, 27, 33, 39, 45, 51)					24.47 ± 5.86
	Q3 (Report any unusual signs or symptoms to a physician or other health professional)	20 (7.1)	46 (16.3)	64 (22.6)	153 (54.1)	2.80 ± 0.80
	Q9 (Read or watch TV programs about improving health)	94 (33.2)	73 (25.8)	44 (15.5)	72 (25.4)	2.44 ± 1.20
	Q15 (Question health professionals in order to understand their instructions)	27 (9.5)	57 (20.1)	82 (29)	117 (41.3)	2.72 ± 0.89
	Q21 (Get a second opinion when I question my health care provider's advice)	144 (50.9)	32 (11.3)	68 (24)	39 (13.8)	1.67 ± 1.01
	Q27 (Discuss my health concerns with health professionals)	20 (7.1)	52 (18.4)	83 (29.3)	128 (45.8)	2.75 ± 0.84

	Q33 (Inspect my body at least monthly for physical)	60 (21.2)	66 (23.3)	58 (20.5)	99 (35)	2.60 ± 1.07
	Q39 (Ask for information from health professionals about how to take good care of myself)	73 (25.8)	42 (14.8)	63 (22.3)	105 (37.1)	1.62 ± 1.01
	Q45 (Attend educational programs on personal health care)	86 (30.4)	94 (33.2)	60 (21.2)	43 (15.2)	2.77 ± 0.58
	Q51 (Seek guidance or counseling when necessary)	3 (1.1)	40 (14.1)	108 (38.2)	132 (46.6)	1.86 ± 1.13
#3	SG (nine items: Q6, 12, 18, 24, 30, 36, 42, 48, 52)					24.64 ± 5.55
	Q6 (Feel I am growing and changing in positive ways)	86 (30.4)	44 (15.5)	70 (24.7)	83 (29.3)	2.30 ± 1.06
	Q12 (Believe that my life has purpose)	57 (20.1)	33 (11.7)	51 (18)	142 (50.2)	2.06 ± 1.16
	Q18 (Look forward to the future)	57 (20.1)	39 (13.8)	34 (12)	153 (54.1)	2.61 ± 0.96
	Q24 (Feel content and at peace with myself)	5 (1.8)	26 (9.2)	50 (17.7)	202 (71.4)	2.88 ± 0.57
	Q30 (Work toward long-term goals in my life)	148 (52.3)	34 (12)	37 (13.1)	64 (22.6)	1.94 ± 1.11
	Q36 (Find each day interesting and challenging)	17 (6)	32 (11.3)	63 (22.3)	171 (60.4)	2.76 ± 0.67
	Q42 (Am aware of what is important to me in life)	18 (6.4)	12 (4.2)	90 (31.8)	163 (57.6)	2.25 ± 1.09
	Q48 (Feel connected with some force greater than myself)	88 (31.1)	17 (6)	36 (12.7)	142 (50.2)	2.76 ± 0.59
	Q52 (Expose myself to new experiences and challenges)	168 (59.4)	36 (12.7)	24 (8.5)	55 (19.4)	1.86 ± 1.13
#4	SM (eight items: Q5, 11, 17, 23, 29, 35, 41, 47)					20.64 ± 5.55
	Q5 (Get enough sleep)	15 (5.3)	52 (18.4)	77 (27.2)	139 (49.1)	2.81 ± 0.80
	Q11 (Take some time for relaxation each day)	149 (52.7)	60 (21.2)	44 (15.5)	30 (10.6)	2.00 ± 1.22
	Q17 (Accept those things in my life which I cannot change)	59 (20.8)	11 (3.9)	31 (11)	182 (64.3)	2.51 ± 0.86
	Q23 (Concentrate on pleasant thoughts at bedtime)	41 (14.5)	76 (26.9)	65 (23)	101 (35.7)	2.75 ± 1.01
	Q29 (Use specific methods to control my stress)	118 (41.7)	34 (12)	55 (19.4)	76 (26.9)	2.09 ± 1.08
	Q35 (Balance time between work and play)	126 (44.5)	62 (21.9)	48 (17)	47 (16.6)	2.77 ± 0.73
	Q41 (Practice relaxation or meditation for 15-20 minutes daily)	120 (42.4)	69 (24.4)	63 (22.3)	31 (11)	2.60 ± 0.67

	Q47 (Pace myself to prevent tiredness)	30 (10.6)	39 (13.8)	51 (18)	163 (57.6)	2.31 ± 0.98
#5	N (nine items: Q2, 8, 14, 20, 22, 32, 38, 44, 50)					19.65 ± 4.29
	Q2 (Choose a diet low in fat, saturated fat, and cholesterol)	27 (9.5)	10 (3.5)	54 (19.1)	192 (67.8)	2.65 ± 0.70
	Q8 (Limit use of sugars and food containing sugar (sweet).	38 (13.4)	57 (20.1)	37 (13.1)	151 (53.4)	2.80 ± 0.91
	Q14 (Eat 6 -11 servings of meals (bread, cereal, rice and pasta) each day)	226 (79.9)	47 (16.6)	3 (1.1)	7 (2.5)	1.56 ± 0.14
	Q20 (Eat 2-4 servings of fruit each day)	176 (62.2)	68 (24)	32 (11.3)	7 (2.5)	1.88 ± 1.27
	Q26 (Eat 3-5 servings of vegetables each day)	74 (26.1)	106 (37.5)	77 (27.2)	26 (9.2)	2.58 ± 1.23
	Q32 (Eat 2-3 servings of milk, yogurt or cheese each day)	194 (68.6)	56 (19.8)	22 (7.8)	11 (3.9)	1.75 ± 1.21
	Q38 (Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day)	153 (54.1)	90 (31.8)	26 (9.20)	14 (4.9)	2.41 ± 1.03
	Q44 (Read labels to identify nutrients, fats, sodium content in packaged food)	208 (73.5)	12 (4.2)	22 (7.8)	41 (14.5)	2.51 ± 1.24
	Q50 (Eat breakfast)	3 (1.1)	45 (15.9)	76 (26.9)	159 (56.2)	2.53 ± 0.52
#6	PA (eight items: Q4, 10, 16, 22, 28, 34, 40, 46)					16.21 ± 5.12
	Q4 (Follow a planned exercise program)	193 (68.2)	34 (12)	31 (11)	25 (8.8)	1.65 ± 1.06
	Q10 (Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber)	206 (72.8)	35 (12.4)	26 (9.2)	16 (5.7)	1.58 ± 1.05
	Q16 (Take part in light to moderate physical activity such as sustained walking 30-40 minutes 5 or more times per week).	71 (25.1)	101 (35.7)	70 (24.7)	41 (14.5)	2.61 ± 1.21
	Q22 (Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).	226 (79.9)	33 (11.7)	19 (6.7)	5 (1.8)	1.12 ± 0.38
	Q28 (Do stretching exercises at least 2 times per week)	181 (64)	50 (17.7)	25 (8.8)	27 (9.5)	1.81 ± 1.19
	Q34 (Get exercise during usual daily activities (such as walking during lunch, using	38 (13.4)	70 (24.7)	107 (37.8)	68 (24)	2.16 ± 1.21

	stairs instead of elevators, parking car away from destination and walking).					
	Q40 (Check my pulse rate when exercising)	191 (67.5)	25 (8.8)	33 (11.7)	34 (12)	2.17 ± 1.22
	Q46 (Reach my target heart rate when exercising)	9 (3.2)	13 (4.6)	59 (20.8)	202 (71.4)	2.75 ± 0.82
Overall HPLP-II (items 1- 52)						135.69 ± 25.22

5.4. ³ Factors Associated with Stroke Prevention Knowledge among Hypertensive Patients

Eight variables (⁵sex, ⁵age, marital status, educational status, religion, body mass index, family history of stroke, and duration of hypertension diagnosis) were entered into the univariate binary logistic regression. Six of these variables (⁵sex, ⁵age, marital status, educational status, family history of stroke, and duration of hypertension diagnosis) showed an association with stroke prevention knowledge among hypertensive patients.

Among the six variables (⁵sex, ⁵age, marital status, educational status, family history of stroke, and duration of hypertension diagnosis) analyzed using multivariate binary logistic regression, only educational status ³was significantly associated with stroke prevention knowledge among hypertensive patients. Those who completed education beyond grade 12 had significantly associated knowledge of stroke prevention, compared to those with only basic literacy skills AOR = 20.38 (95% CI: 5.77-71.99), p<0.001. Patients who completed preparatory school, primary school, and only basic literacy skills show significant association, good knowledge of stroke prevention with an odds ratio of 13.01 (95% CI: 3.48-48.59), p=0.02, and, 4.10 (95% CI: 1.29-13.01), p=0.01, respectively (Table 6).

Table 4: ⁵ Factors associated with stroke prevention knowledge among hypertensive patients (n=283)

Variables	Categories	Stroke prevention knowledge		¹⁰ COR of 95% CI	AOR of 95% CI	p-value
		Poor	Good			
Sex	Female	90	64	1	1	
	Male	56	73	1.83 (1.14-2.94)	1.21 (0.66-2.25)	0.53
Age	< 10 years	33	44	1	1	
	10-20 years	56	59	0.79 (0.44-1.41)	0.81 (0.39-1.69)	0.57
	>20 years	57	34	0.45 (0.24-0.83)	0.79 (0.32-2.01)	0.63
⁴ Educational status	Able to read and write	24	5	1	1	
	Above 12	18	58	15.47 (5.15-46.42)	20.38 (5.77-71.99)	0.00*
	Preparatory school (Grade 11 and 12)	11	25	10.91 (3.29-36.08)	13.01 (3.48-48.59)	0.02*
	Primary school (Grades 1-8)	37	28	3.63 (1.23-10.71)	4.10 (1.29-13.01)	0.01*
	secondary school (Grade 9 and 10)	9	10	5.33 (1.43-19.94)	5.83 (1.42-23.89)	0.86
	Unable to read and write	47	11	1.12 (0.35-3.61)	1.12 (0.34-3.67)	0.00*
Marital status	Married	30	30	1	1	
	Widowed	59	77	1.31 (0.71-2.40)	1.11 (0.53-2.32)	0.77
	Divorced	14	9	0.64 (0.24-1.71)	1.59 (0.43-5.86)	0.482
	Single (Never married)	43	21	0.48 (0.24-1.01)	1.66 (0.64-4.28)	0.29
Family history of stroke	No	104	103		1	
	Yes	42	34	0.82 (0.48-1.39)	0.57 (0.30-1.09)	0.093
Duration of HTN diagnosis (years)	< 10 years	87	90	1	1	
	10-20 years	38	32	0.81 (0.47-1.42)	1.04 (0.53-2.05)	0.91
	>20 years	21	15	0.69 (0.33-1.43)	1.01 (0.41-2.49)	0.99

5.5. Factors affecting Stroke Prevention Practice: Result from Linear Regression Analysis

In the initial univariate analysis, eleven variables (Sex, age, marital status, educational status, religion, family history of stroke, duration of HTN since diagnosed, overall knowledge of stroke prevention outcome, knowledge of stroke prevention outcome, knowledge of warning signs of stroke prevention outcome and knowledge of risk factors of stroke outcome) exhibited p-values below 0.2, rendering them eligible for potential inclusion in multivariate linear regression models. Subsequently, all eleven variables underwent multivariate linear regression analysis.

The linear regression analysis conducted examines the relationships between various independent variables and the dependent variable (Stroke prevention practice). Individuals over 65 years show a significant negative relationship ($\beta = -0.315$, 95% CI [-24.376, -9.628], $p < 0.001$), that being over 65 years old is associated with a decrease in the stroke prevention practice by 0.315 units compared to those under 50. Sex differences reveal that females have a coefficient of -0.223 (95% CI [-17.043, -5.468], $p < 0.001$) compared to males. This significant negative relationship implies that being female is associated with a decrease in the stroke prevention practice by 0.223 units compared to males. Being married is associated with a significant positive relationship ($\beta = 0.447$, 95% CI [12.399, 32.605], $p < 0.001$), suggesting an increase in the dependent variable by 0.447 units. Similarly, being divorced also shows a significant positive relationship ($\beta = 0.304$, 95% CI [7.725, 29.704], $p = 0.001$), indicating an increase by 0.304 units.

A significant negative relationship is found for individuals without a family history of stroke ($\beta = -0.124$, 95% CI [-13.646, -0.408], $p = 0.038$), indicating a decrease in the stroke prevention practice by 0.124 units compared to those with a family history of stroke. Having hypertension for more than 20 years ($\beta = -0.152$, 95% CI [-20.504, -2.487], $p = 0.013$) is significantly associated with a decrease in the stroke prevention practice by 0.152 units. A poor overall SPKQ outcome is significantly associated with a decrease in the stroke prevention practice ($\beta = -0.449$, 95% CI [-

28.100, -17.463], $p < 0.001$). In this case, a β of -0.449 indicates that a poor overall SPKQ outcome is associated with a decrease in the stroke prevention practice by 0.449 units (Table 5).

Table 5: Factors associated with stroke prevention practice (n=283)

Variables	HPLP-II			
	B	95% CI		p-value
		Lower	Upper	
Age (in Years) (Ref= (<50)				
50–65	-0.041	-9.121	4.904	0.554
>65	-0.315	-24.376	-9.628	<0.001*
Sex (Ref=Male)				
Female	-0.223	-17.043	-5.468	<0.001*
Marital Status (Ref=Single)				
Married	.447	12.399	32.605	<0.001*
Divorced	.304	7.725	29.704	0.001*
Widowed	-.055	-14.187	7.601	.552
Educational status (Ref=Unable to read & write)				
Able to read & write	-1.724	-10.166	6.718	.688
Primary school (Grades 1-8)	17.056	10.351	23.761	<0.001*
Secondary school (Grades 9-10)	29.149	19.337	38.961	<0.001*
Preparatory school (Grades 10-11)	34.767	26.891	42.643	<0.001*
Above 12	41.280	34.808	47.752	<0.001*
Religion (Ref=Orthodox)				
Muslim	-0.102	-14.313	0.973	0.087
Protestant	0.211	6.469	22.392	<0.001*
Catholic	0.050	-13.780	34.989	0.393
Family History of Stroke (Ref= Yes)				
No	-0.124	-13.646	-0.408	0.038*
Duration of HTN Since Diagnosed (in Years) (Ref=<10)				
10–20	-0.039	-9.246	4.668	0.518
>20	-0.152	-20.504	-2.487	0.013*
SPKQ Outcome (Overall) (Ref=Good)				
Poor	-0.449	-28.100	-17.463	<0.001*
KSP Outcome (Domain 1) (Ref=Good)				
Poor	-0.119	-11.853	-0.105	0.046*
KSW Outcome (Domain 2) (Ref=Good)				
Poor	-0.364	-24.044	-12.934	<0.001*
KSR Outcome (Domain 3) (Ref=Good)				
Poor	-0.461	-29.249	-18.467	<0.001*

Notes: *p-value<0.05.

CHAPTER SIX

6 DISCUSSION

Prioritizing assessing stroke prevention among hypertensive patients is essential for improving their overall health and quality of life, as well as reducing the occurrence of chronic diseases. This study aimed to assess the knowledge, practices, and factors influencing stroke prevention in this population.

In this study, only 65 (23%) of HTN patients had good knowledge of stroke prevention, which is lower than a study done in Nigeria (49.4%) [66] and University of Gondar Comprehensive Specialized Hospital (40.7%) [60]. On the other hand, the value is higher than in a study conducted at Felege Hiwot Referral Hospital(18.3%) [64], And comparable with a study conducted at Debre Tabor general hospital (24.9 %) [19]. The possible explanation for the differences in this study and College of Gondar Comprehensive Specialized Hospital is that stroke prevention knowledge in HTN patients was used to define stroke knowledge. In other studies, such as Felege Hiwot Referral Hospital [64], the number of warning signs and risk factors mentioned were used to define adequate stroke knowledge, whereas in the study in Debre Tabor [19], stroke knowledge was measured separately using stroke warning signs and prevention practices. On the other hand it is lower than another study conducted in Nigeria (90.8%) [27], Vienna (77%) [67], and Kerala (78.3%) [68]. It is possible that the difference in the socio-demographic characteristics of the study population and the healthcare information access gap could be the reasons for the discrepancy found in the study.

Stroke is a preventable and treatable disease through the prevention of modifiable risk factors and early recognition of warning signs [65]. In this study, only 84 (29.7%) of the participants have good knowledge of the warning signs of stroke, which is lower than in the study conducted at TASH (42.7%) [63] and slightly higher than a study conducted at Felege Hiwot Referral Hospital 61(22.7%) [64]. Sudden loss or decreased sensation on one side of the body 164(58.0%) and sudden weakness or paralysis on one side of the body 162(57.2%) was recognized the most important warning sign of stroke in hypertensive patients, which is comparable to the studies

conducted in TASH were; sudden unilateral weakness of the extremities 142(62.6%) followed by sudden difficulty walking or loss of balance 137(60.4%) and sudden weakness or paralysis on one side of the body (35.9%). On the other hand, in this study sudden loss of vision 52(18.4%) and sudden difficulty in swallowing 73(25.8%) were recognized as the least common warning signs of stroke in hypertensive patients.

Individuals with HTN have a four times greater risk of experiencing a stroke than those with normal blood pressure [73]. HTN is the most common risk factor for stroke that can be modified, and reducing blood pressure can help decrease the risk of recurrent strokes [74]. The present study highlights the prevalence of risk factors for stroke among the participants. It was found that hypertension was the most common risk factor, as reported by 123 participants, accounting for 43.5% of all cases. Advancing age was the second most prevalent risk factor, with 118 participants (41.7%) reporting it. The study underscores the significance of early detection and management of hypertension, particularly in older adults, as a means of reducing stroke risk; due to about 80% of people who have their first stroke have high blood pressure [75].

In this study, it was found that education is significantly linked to having adequate knowledge about stroke. Hypertensive patients who have attended primary education or higher have adequate knowledge about stroke. This finding is consistent with the results of various studies conducted in Ethiopia [63, 64, 76], Nigeria [27, 77], and Beirut [71] where high educational levels were found to be the most significant factor associated with adequate knowledge of stroke among hypertensive patients.

In everyday life, at school or in business, stressful and unfavorable conditions can trigger unexpected physical problems as well as some psychosocial disadvantages. Improving physical activity, promoting healthy eating habits and improving the ability to cope with stress play an important role in maintaining physical and psychosocial well-being [78]. The present study revealed that the mean score HPLP-II for HTN patients was 135.69 ± 25.22 . The results of this study showed that health-promoting behaviors among patients with chronic hypertension had the highest score in interpersonal relations (30.08 ± 4.72), followed by spiritual growth domain (24.64 ± 5.55) and the lowest score in the physical activity dimension (16.21 ± 5.12), which is in line with

¹³ health-promoting behaviors in patients with hypertension in Iran showed that the highest score was for the health responsibility; and in the ¹³ Japan and the United States showed that the lowest score was for the physical activity dimension [79]. ¹³ While physical activity is a very effective factor in lowering blood pressure [80]. In assessing stroke prevention practices among hypertensive (HTN) patients, the study utilized the HPLP-II mean score, which yielded a value of 135.69 ± 25.22 . This score falls within the range indicative of good practice (130-168) out of the four possible outcomes identified in the study.

The study reveals notable associations between demographic and health-related factors and stroke prevention practices, as assessed by the HPLP-II score. Older age, female gender, shorter duration since hypertension diagnosis, and insufficient knowledge about stroke prevention are linked to lower HPLP-II scores. Conversely, being married, attaining higher education levels, identifying as Protestant, having a family history of stroke, and possessing better knowledge about stroke warning signs and appropriate responses correlate with higher HPLP-II scores. These findings highlight the complex interplay of various factors influencing engagement in stroke prevention practices among hypertensive individuals. They emphasize the necessity of tailored interventions that address educational attainment, gender, marital status, religious affiliation, family history, and knowledge deficits to effectively enhance stroke prevention efforts.

6.1. Limitations and Strengths of the Study

6.1.1. Limitations of the study

The study's cross-sectional design poses limitations by constraining the establishment of causal relationships between variables and stroke prevention practices over time. Additionally, reliance on self-reported data for assessing knowledge and practices introduces the possibility of response bias, as participants may provide socially desirable responses or inaccurately recall their behaviors. Furthermore, the study's exclusive focus on hypertensive patients may limit the scope of findings, potentially overlooking the influence of comorbidities or other underlying health conditions on stroke prevention practices.

6.1.2. Strengths of the study

The study's focused objective on examining knowledge, practices, and associated factors related to stroke prevention among hypertensive patients addresses a significant public health concern, offering the potential for targeted interventions within this high-risk population. The study drawn sample from multiple public hospitals in Addis Ababa enhances the study's statistical power and enables robust analyses of factors influencing stroke prevention practices. Since the selected areas are tertiary federal hospitals they do have a wide catchments all over the country so that different patients with different sociodemographic characteristics from different regions of Ethiopia visits them; so that conducting the study in Addis Ababa, Ethiopia, offers valuable insights into stroke prevention practices within the local healthcare system, thereby facilitating the development of context-specific interventions to improve outcomes that can address a wider population. Ultimately, the findings have implications for healthcare policies and practices, informing strategies aimed at enhancing stroke prevention efforts among hypertensive patients and leading to improved health outcomes and reduced disease burden in the community.

CHAPTER SEVEN

7 CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

In this study, findings reveal that there is lower knowledge of stroke prevention. Also, the study showed that a lower awareness of stroke warning sign among participants. The study highlights that individuals with hypertension face a fourfold greater risk of experiencing a stroke compared to those with normal blood pressure. Moreover, hypertensive patients with primary education or higher tended to possess adequate knowledge about stroke. The mean score on the HPLP-II scale for HTN patients indicated good adherence to stroke prevention practices within the study cohort. Notably, older age, female gender, longer duration since hypertension diagnosis, and limited knowledge about stroke prevention were associated with lower HPLP-II scores. Conversely, being married, having higher education levels, identifying as Protestant, having a family history of stroke, and possessing better knowledge about stroke warning signs and appropriate responses correlated with higher HPLP-II scores, underscoring the multifaceted nature of factors influencing stroke prevention practices among hypertensive individuals.

7.2. ⁵ Recommendations

Based on the findings of the study, here are some feasible recommendations to enhance stroke prevention practices among hypertensive individuals:

- ✓ Tailored Educational Programs: Develop tailored educational programs targeting hypertensive patients, with a focus on increasing awareness of stroke prevention practices and recognition of warning signs. These programs should be accessible, culturally sensitive, and delivered through various channels such as community health centers, mobile clinics, and digital platforms to reach a wider audience.
- ✓ Regular Screening and Monitoring: Implement regular blood pressure screening and monitoring programs in primary healthcare settings to detect hypertension early and initiate timely interventions. Encourage hypertensive patients to undergo regular health check-ups

and adhere to medication regimens to effectively manage their blood pressure and reduce the risk of stroke.

- ✓ **Empowerment through Education:** Empower hypertensive patients, especially those with lower education levels, by providing comprehensive education on stroke prevention strategies. Offer educational materials in easy-to-understand formats and conduct interactive sessions to reinforce key messages about healthy lifestyle habits, medication adherence, and recognizing stroke warning signs.
- ✓ **Supportive Family Involvement:** Engage family members of hypertensive patients in educational initiatives to create a supportive environment for stroke prevention. Encourage family participation in lifestyle modification programs, stress the importance of regular follow-up appointments, and promote healthy behaviors within the household to collectively reduce the risk of stroke.
- ✓ **Community-Based Support Groups:** Establish community-based support groups for hypertensive patients to foster peer support, share experiences, and exchange information about stroke prevention. These support groups can serve as platforms for ongoing education, encouragement, and motivation to adopt and maintain healthy lifestyle changes.
- ✓ **Policy Advocacy and Resource Allocation:** Advocate for policies that prioritize stroke prevention efforts and allocate resources to support comprehensive stroke prevention programs. Collaborate with policymakers, healthcare providers, and community leaders to raise awareness, strengthen healthcare infrastructure, and implement evidence-based interventions aimed at reducing the burden of stroke among hypertensive individuals.

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