ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

ASSESSMENT OF KNOWLEDGE OF CARDIOVASCULAR RISK FACTORS AND LIFESTYLE BEHAVIORS AMONG HYPERTENSIVE PATIENTS IN SELECTED HOSPITALS, IN ADDIS ABABA, ETHIOPIA

BY: RIBKA GETACHEW

ADVISORS: FEKADU AGA, (RN, PhD, Associate Professor)

Co ADVISOR: AKLIL HAILU (RN, BScN, MScN)

A RESEARCH THESES SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL OF NURSING AND MIDWIFERY FOR PARTIAL FULFILLMENT MASTER OF SCIENCE (MSc) IN CARDIOVASCULAR NURSING

ADDIS ABABA ETHIOPIA

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APPROVAL SHEET

This thesis is my original work in the partial fulfilment of the requirement for the degree of Master of Science in Cardiovascular Nursing.

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This theses has been submitted with my/our approval as university advisor(s).

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LIST OF ACRONYMS AND ABBREVIATIONS

BP: blood pressure

CVD: cardiovascular disease

DHS: demographic and health surveillance

DM: diabetes mellitus

DALYs: disability-adjusted life years

DVT: deep vein thrombosis

EPHI: Ethiopian Public Health Institute

GBD: global burden disease

GDP: gross domestic product

HDL-C: high-density lipoprotein cholesterol

KAP: knowledge attitude practice

LDL: low-density lipoprotein

LMIC: low middle -income countries

NCD: non-communicable disease

RF: risk factor

SMART: Substitutable Medical Apps, Reusable Technology

TC: total cholesterol

TG: triglycerides

YLL: years of life lost

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ABSTRACT

Background: Hypertension is a preventable cardiovascular disease (CVD) risk factor. In both developed and developing nations, CVDs is the major cause of mortality. In Africa CVD contributes for greater than 1 million deaths. CVD is a major public health problem in Ethiopia.

Objective: to assessment of knowledge of CVD risk factors and lifestyle behaviors among hypertensive patients in teaching hospital in Addis Ababa, Ethiopia.

Methods: A cross-sectional study was conducted in 352 hypertensive patients from January to March 2023. For this study a structure questioners was administered to assess knowledge of risk factors. For the statistical analysis linear regression was used to determine factors associated with knowledge of CVD risk factors.

Result: Mean age was 55.0 years (±11.3 SD) and 60.8% of the study participants were male. Ten percent (10%) of the patients had college and above level of education. The study showed the mean CVD knowledge score was 68.4% with a range of 56.7-79.6%. Among the lifestyle behaviours 5.4% and 38.1% were current smokers and consumed alcohol in the past 30 days respectively. Male patients had 0.047 units higher mean knowledge score of CVD than female patients ($\beta = 0.047$, $p < 0.001$) while, in every one unit increase in age >65, the mean knowledge score of CVD decreases by 0.043 units ($\beta = 0.043$, $p = 0.023$). In addition, level of education is associated with knowledge of CV risk factors ($\beta = -0.151$, $p < 0.001$).

Conclusion and recommendation: Sex, age and level of education status were associated with knowledge of cardiovascular risk factors. Implementation of CVD prevention programs and health education should be considered for the disease prevention policy agenda in Ethiopia.

Key: *Hypertension, cardiovascular disease, risk factor, knowledge, and CVD prevention*

1. INTRODUCTION

1.1. Background

Hypertension is a life threatening disease that increases the risk of heart, brain, kidney disease and other disorders. Hypertension is estimated to affect 33% of adults aged 30 to 79 years globally, with two-thirds of them residing in resource limited countries (1). A study showed 18.92% prevalence of hypertension in Ethiopia (2) . Facility based cross-sectional study reported 34.7% prevalence of hypertension in Addis Ababa (3).

Cardiovascular diseases and injuries have an impact on the cardiovascular system and its supporting structures. The most common CVDs are coronary heart disease, congestive heart failure, angina, peripheral artery disease, deep vein thrombosis (DVT), and stroke. Heart attacks and stroke account for 85 percent of CVD deaths (4,5).

Cardiovascular disease (CVD) is one of the leading causes of premature death and disability, posing a significant burden on populations worldwide (6) . Cardiovascular disease is the leading cause of death worldwide. According to global burden of disease (GBD) studies published in 2017, CVD killed approximately 17.8 million people worldwide, resulting in 330 million years of life lost and an additional 35.6 million disability adjusted life years (DALYs) (7) . Total CVD prevalence from 1990 to 2019, the population has nearly doubled (8) . CVD is widespread, has a low survival rate, and is on the rise globally. Cardiovascular disease is responsible for more than one million deaths in Africa (9) . Each year by 2030, over 22.2 million people will die from cardiovascular disease. Developing countries account for 75% of CVD deaths, resulting in a 7%

decrease in GDP (10) . According to a global disease burden study conducted in Ethiopia between 1990 and 2017, the age standard prevalence of CVD is 5534 per 100 000 population (11) .

CVD is primarily caused by metabolic, behavioral, environmental, and social risk factors (8) . An accurate assessment of the risk of cardiac failure would help to prevent severe heart attacks and improve the safety of patients (5) . The Ethiopian Public Health Institute (EPHI) estimated that, about 4.7% of adults aged 40-69 years (4.5% in rural and 5.3% in urban) have more than 30% risk of developing CVD events over the next 10 years including those with established CVD events (12) .

CVDs are multifactorial disorders that result from a complex interaction of numerous risk factors (4,13) . Hypertension is one of the major CVD risk factors that can be modified (5) . Obesity, sedentary lifestyle, smoking, diabetes, and high dietary fat intake are also other modifiable CVD risk factors. This is due to modernization, rapid urbanization, and globalization (14). Non-modifiable CVD risk factors are those that cannot be improved and these include a person's age, ethnicity and genetic, among other factors. People can reduce their chances of developing cardiovascular disease by making certain lifestyle changes. Smoking, diet, and exercise are a few examples (14,15) .

Knowledge of CVD risk factor has been highlighted as a requirement for change, and preventative efforts frequently target this knowledge. Monitoring the public's understanding of risk factors can aid in the development of public health strategies (13) .

1.2. Statement of the Problem

The other major modifiable CVD risk factors apart from hypertension are dyslipidemia, diabetes, obesity, unhealthy food, physical inactivity, smoking, and excessive alcohol consumption (16,17) . According to the 2015 GBD report, CVD risk factors are the biggest contributor to the global disease burden (measured as disability-adjusted life years) (18) . A longitudinal prospective cohort study of 155722 people from 21 countries found that risk factor measurement was 11.1 percent in high-income countries, 65.9 percent in middle-income countries, and 23 percent in low-income countries, with 70 % modifiable (5) . A cross-sectional facility-based study conducted among diabetes patients in south west Ethiopia showed that burden of cardiovascular risk factors including obesity, dyslipidemia, physical inactivity and current smoking was 23.4%, 63.5%, 55.1% and 5.5% respectively (19) . Most cardiovascular diseases can be prevented by addressing behavioral risk factors. People who are at high risk of CVD require early identification and care, which may include education and medications treatment.

Awareness and knowledge of cardiovascular disease risk factors are thought to be prerequisites for implementing healthy lifestyle practices (13,20) . Shaping person's attitudes have shown to be difficult; thus, it is critical to include a person's views or ideas about CVD. Cardiovascular disease is preventable and reversible through awareness creation concerning the modifiable risk factors. To adopt a new habit, people must be aware of the condition, view themselves as vulnerable to the disease, and think that they are capable of doing anything to prevent o}” cure the disease. Knowledge by itself is not sufficient to overcome behavior, but knowledge is seen to be a precondition for change (21) .

Addressing knowledge of behavioral risk factors might be critical in preventing and controlling CVD (22) . Study conducted among workers in a Nigerian University revealed that 49.0% of the study participant had poor knowledge about CVD risk factors (23) . Another, study conducted in India on the knowledge of CVD among hypertensive, diabetic, and dyslipidemia patient showed that the participants had poor knowledge in CVD (24) . A cross-sectional study on confirmed cases of CVD carried out at two tertiary care hospitals in Eastern Ethiopia found that nearly half of the participants had an inadequate understanding of CVD risk factors (25) . A thorough understanding of CVD risk factors is the first step toward developing effective preventive strategies to combat the population's CVD burden (23) . However, there is little research evidence concerning the knowledge of CVD risk factors and lifestyle behaviors among at risk population including hypertensive patients in Ethiopia in general and in Addis Ababa in particular. As a result, the goal of this study is to assess the knowledge of cardiovascular risk factors and lifestyle behaviors among hypertension patients in selected hospitals in Addis Ababa.

1.3. Significance of the Study

The study will be utilized to detect and offer unambiguous findings about hypertensive patients' knowledge of cardiovascular risk factors and lifestyle behavior. The study's findings will assist health professional to teach patients about cardiovascular risk factors and related lifestyle behaviors in order to support them bring change in health behavior. The outcomes of this study will serve as a foundation for future studies in the area.

2. LITERATURE REVIEW

This literature review highlights what are known and not known about knowledge on cardiovascular risk factors and lifestyle behaviors at global, regional, and local level. It provides a thorough overview of the prevalence of CVD risk behaviors, which are major contributors to the CVD burden in poor and middle-income nations. This literature review focuses on the prevalence of smoking, alcohol drinking, insufficient fruit and vegetable consumption, and physical inactivity as CVD risk factors. Moreover, this chapter shows an overview of research on hypertensive populations' awareness of CVD and related risk factors, which is critical for practitioners and policymakers seeking to reduce the rising CVD burden.

2.1. Burden of Cardiovascular Diseases

Cardiovascular diseases are the top cause of mortality each year. In 2017 CVD accounted for 32% of global deaths (26) . The number of CVD death has gradually climbed from 12.1 million in 1990 to 18.6 million in 2019,there is also a dramatically increment in disability-adjusted life years (DALYs) and years of life lost (YLL) from 17.7 million to 34.4 million (8) . Despite because of CVD mortality rates have declined in high-income regions in recent decades, low- and middle-income nations account for 50% of CVD mortality and 80% of the CVD burden worldwide (27) . Low-income countries function poor in the prevention of Non-Communicable Diseases (NCDs) , allowing these disorders to become the primary causes of premature death (28) . Though no nationwide study has been conducted, some reports from regional level showed that CVD is the most common cause of morbidity and mortality in Ethiopia (29) . Findings from a demographic and health survey (DHS) study indicate that 41.8% of NCD deaths in northern

Ethiopia are due to CVD (30) and in a facility based study conducted in Addis Ababa cardiovascular disease accounted for 24% of deaths (31) . In a study conducted in pregnant woman attending antenatal clinic at St. Paul hospital in Addis Ababa, the prevalence of cardiovascular disease was 10.3% (32).

2.2. Knowledge of CVD Risk Factors

Understanding and managing a chronic disease like CVD requires foundational knowledge, which is a precondition. Individual knowledge evaluation allows researchers and clinicians to identify misinformed groupings. This data may then be utilized to customize specific interventions to achieve desired behavioral changes (13,20) . In developing countries, there has been limited study on CVD risk factors (33,34) . Cross-sectional study conducted on KAP (knowledge , attitude and practice) regarding the risk of cardiovascular diseases in Malaysia, 86% of the study obtained a knowledge score of 60.75% (35) . In a Polish interventional study of 1,126 participants, over 35% could not name a single risk factor (RF), and 14% named only 1-2 RFs. Only about 40% named 3-5 RFs, while only 12% named 6 or more. 2 Roughly half of those polled incorrectly identified 1-8 characteristics as being linked to an increased risk of CVD. The strongest predictor of knowledge was one's level of education. Male rural and small-town residents knew less, whereas women with a CVD family history knew more about some CVD RFs (36) . A systematic review study on cardiovascular risk knowledge, awareness, and perception Sub-Saharan Africa performed poorly in terms of risk factor knowledge and awareness, proportion of respondents unable to name a single risk factor (33) . And another Facility -based cross sectional study in Tanzania showed on 1063 participant 80.0%

had good knowledge of CVD risks (34) . A hospital-based cross-sectional survey was conducted in two referral hospitals in Ethiopia 287 patients were enrolled in the study had optimal knowledge of risk factors scored 70.0% whereas 46% exhibited suboptimal knowledge levels in this area Higher knowledge scores for cardiovascular risk factors were associated with urban residency, whereas never married, no ordinary education or low level of education were outlined as indicators of lower knowledge scores (25) .

And additional A cross -sectional study in Ethiopia 432 university students the study revealed that good knowledge as they scored more than or equal to 70% for knowledge among study 80 percent of respondents who provided the correct answer includes “Regular physical activity will reduce a person's risk of achieving heart disease ” 89.4%,“Smoking is a risk factor for heart disease” 88.7%,and eating "Fatty foods have no effect on blood cholesterol levels" 83.7% , The majority of study participants (70 %) failed to know that exercise was beneficial (37) .

2.3. CVD Risk Factors

CVD development has long been linked to known risk factors, so identifying one's risk factors is critical to stemming the tide (13) . CVD is currently considered a major problem for developed countries, However, the population of low and medium-income countries (LMIC) continues to face an elevated CVD burden. More than 75% of CVD is preventable, and risk factor modification can greatly lower the rising CVD burden on both individuals and healthcare systems. Hypertension, hyperlipidemia, smoking, being overweight, living a sedentary lifestyle, and eating a poor diet are all traditional CVD risk factors (14,15) .

2.3.1. Hypertension as CVD Risk Factor

Hypertension is a preventable risk factor for cardiovascular disease. Hypertension can be defined as systolic pressure ≥ 140mm Hg and diastolic blood pressure ≥ 90mm Hg or with antihypertensive medication (38) . Hypertension causes the extensive force of the blood against the arterial walls, resulting in microscopic tears in the artery walls, which then results in scar tissue and accelerates the arterial wall hardening process that occurs with aging. Although there is no known cause for the majority of hypertension, the disease can be easily distinguished through screening and treated in a variety of methods (39) .

Even if it is a co-morbid illness with life-threatening complications, hypertension is not only one of the key risk factors for CVD (21) . Each 20 mm Hg elevation in systolic blood pressure nor 10 mm Hg elevation in diastolic blood pressure in people aged 40 to 70 years doubles the risk of CVD over the full blood pressure range of 115/75 to 185/115 mm Hg (40) . In clinical studies, antihypertensive management was related with a 35% to 40% decrease in stroke incidence, a 20% to 25% reduction in myocardial infarction, and a more than 50% reduction in heart failure. Changes in lifestyle are a crucial component of hypertension prevention and treatment. Among the therapies indicated are dietary management, weight loss, and exercise (4,40).

Hypertension is directly accountable for 42% of coronary heart disease mortality and 57% of all stroke mortality in India. In the USA, hypertension was the major cause of CVD deaths, accounts for more than any other modifiable CVD risk factor and ranking second to cigarette smoking as a cause of mortality for any reason (41) . Cross-sectional, population-based study performed in Nevadans individuals with hypertension were 3.74 times more likely to have reported CVD compared to those who did not have hypertension. This relationship increased its magnitude of risk to 6.18 times more likely in 2017 (42) . And Cohort study in Saudi Arabia performed on 550

patients who has cardiovascular risk factor 47.5% are hypertensive (43) . Substitutable Medical Apps, Reusable Technology **(**SMART) health Extend study in Indonesia was 10-year CVD risk between 10% to 29% combined with a systolic blood pressure of > 140 mmHg (44) . Another a cross-sectional population-based survey study showed, of 3317 participants in Ghana prevalence of hypertension is (OR 3.2, 95% CI: 2.6–4.0) (45) . Institution-based cross-sectional study in Ethiopia revealed that hypertension (62.7%) was the most predominant cardiovascular disease risk factor found among diabetes patients (46) .

2.3.2. Dyslipidemia as a CVD Risk Factor

Dyslipidemia is defined by an increase in serum total cholesterol (TC>190 mg/dL) , low-density lipoprotein cholesterol (LDL-C>115 mg/dL) , or triglycerides (TG>150 mg/dL) and a decrease in 1serum high-density lipoprotein cholesterol (HDL-C) in male <40 mg/dL and in female <46 mg/dL) (47) . Low-density lipoprotein cholesterol (LDL-C) has been shown to contribute to plaque development, whereas high-density lipoprotein cholesterol (HDL-C) is athero protective (21) .

The level of HDL-C is used to determine cardiovascular risk and is inversely related to CVD and coronary death, impartial to other known risk factors. Dyslipidemia has been linked to the development of atherosclerosis. It is a complex disease that increases the risk of adverse cardiovascular events. Myocardial infarction (MI) and stroke are associated with high levels of low-density lipoprotein (LDL) and low levels of high-density lipoprotein (HDL) (48) . An HDL-C level just under 40 mg/dL (1.03 mmol/L) indicates an increase in atherosclerotic incidents, and each 1-mg/dL (0.02-mmol/L) reduction rises coronary risk by 2%–3% (49). Although the aging process is a risk factor for dyslipidemia, the elderly are at a higher risk of getting CVD. As a

result, preventive strategies such as regular serum lipid screening and early treatment should be expanded among the elderly (50) . A prospective cohort study in Mashhad showed Unadjusted baseline serum LDL-C levels were positively associated with the risk of total CVD events among the entire population (HR: 1.54, 95% CI: 1.19–2; *P*-value< 0.01)(47) . A cross-sectional observational study on 7641 Dyslipidemia patients was conducted in Europe, and the proportions of patients were greater in population groups assessed to be at high risk of cardiovascular disease (51). In Saudi Arabia, a cohort study was carried out on 550 individuals with cardiovascular disease, of which 68.6 percent had dyslipidemia (43) . A systematic review and meta-analysis of studies performed in Australia on 520 patients who have cardiovascular disease around 4 in 5 individuals have total cholesterol ≥4.5 mmol/L (86%) and low-density cholesterol ≥2.5 mmol/L (78%) (52) . An institutional-based cross-sectional study performed in eastern Ethiopia Dyslipidemia (90.6%) was the most prominent cardiovascular disease risks factors (46) . An institutional-based cross-sectional study in southwest Ethiopia on 950 patients reported 63.5% of dyslipidemic patients have cardiovascular risk factors (19) .

2.3.3. Hyperglycemia as a CVD risk factor

Diabetes is a metabolic illness marked by elevated blood glucose levels. Diabetes is diagnosed using one of the following criteria: Fasting 2 (at least 8 hours) plasma glucose 126 mg/dL on two successive measures, Random glucose level of 200 mg/dL in a patient with hyperglycemia symptoms, Oral glucose tolerance test (75 grams glucose in water) with 2-hour glucose value 200 mg/dL (53) .

CVD is the primary cause of mortality in diabetes, not only due to the micro-vascular complications coupled with prolonged elevated blood glucose levels, but also due to risk factor

similarities. Peoples diagnosed with diabetes die eight years earlier than people not having diabetes, primarily as a result of CVD. A diabetic person is at a 2- to 4-fold increased risk of CVD. Diabetes affects approximately one in every ten people with CHD (30 %) (52) . A cohort study reported in 155722 individuals from 21 high-income, middle-income, and low-income countries, With respect to metabolic risk factors of cardiovascular disease ,15 900 (10·2%) had diabetes (12). Community-based cohort study performed in Sweden there were positive associations between arterial stiffness and genetic risk scores for type 2 Diabetes (β=0.03, P=0.04) and fasting plasma glucose (β=0.03, P=0.03) (54) .

2.3.4. Smoking as a CVD risk factor

Tobacco use contributes significantly to the global illness burden, notably CVD. Tobacco use is the second largest risk factor for worldwide mortality (9%) after hypertension. Every year, smoking kills 5 million people globally, with an estimate expected to rise to at least 8 million by 2030. Furthermore, smoking doubles the chances of heart disease in middle-aged men and women, with men dying 13 years earlier and women dying 14.5 years earlier than non-smokers Moreover when smoking is integrated with other risk factors, The synergistic effect considerably raises the risk of CVD (21) . According to one study, the 5-year risk of stroke, myocardial infarction (MI) , or death among stroke patients who stopped smoking is 15.7%, compared to 22.6 percent for patients who continue to smoke (55) . Epidemiological study in Africa on cardiovascular risk burden 16% were smokers and Male smoking prevalence was at least three times that of females (56) . According to a statistical study of cardiovascular disease study in Ethiopia, individuals who do not smoke tobacco die at a rate of 61.3%, whereas smokers die at a

rate of 37.7% (57) and another cross-sectional study showed in Jimma, Ethiopia from CVD patients 11.8% among males 2% among females were smokers (58) .

2.3.5. Alcohol drinking as a CVD risk factor

Alcohol is a stimulating and harmful substance that can lead to addiction. Alcohol intoxication affects a wide range of central nervous system structures and functions, increasing the likelihood of deliberate and inadvertent injury as well as severe social effects (59) . According to the American Heart Association (AHA), light to moderate alcohol use in middle age is associated with a decreased risk of CVD in both men and women. The causality of this association, as well as significant concern about other risks associated with alcohol consumption, make this recommendation controversial. Higher rates of CVD are associated with alcohol consumption in excess of 40g per day (60) . According to world health organization (WHO) harmful use of alcohol is responsible for 5.1% of the global burden of disease (59) . Study done in Sub-Sahara Africa 4.5% among patients with hypertension are Heavy alcohol consumer as a risk factor for CVD (33) .Cross-sectional facility-based study done in Tanzania 18.5% were alcohol drinkers, 3.2% were current smokers from out-patients attending cardiovascular centers (34) . An institutional based cross sectional study on cardiovascular risk factors in southwest Ethiopia from 85.1% DM patients are 5.5% are alcoholic (19) . A cross-sectional study performed in two institutional based cross-sectional study on cardiac risk factor 54 (18.8%) were current alcohol drinkers and 3 (1%) were current smokers (25) .

2.3.6. Physical Inactivity as a CVD Risk Factor

Since the 1970s, Physical inactivity has been established as a risk factor for cardiovascular disease. It has been connected to risk factors for both hypertension and obesity. In addition, physical inactivity has an impact on the lipid profile, particularly high-density lipoprotein cholesterol (HDL-C) (61) . Given these considerations, physical inactivity, like obesity, has the potential to influence not only these related risk factors but also overall cardiovascular risk. Including men and women, a sedentary lifestyle is an independent risk factor for CVD. Physical activity reduces CVD death in both healthy and metabolically risky individuals. 150 minutes of vigorous exercise per week reduces CVD risk by 14%. Improving vigorous exercise to 300 minutes per week reduces CVD risk by 20% (62) . Cardiovascular prevention intervention study in Poland performed on 1,126 participants women are physically inactive than men (36.2% and 29%, respectively; $p < 0.05$) (36) . A cross -sectional study among 1063 caretakers in Tanzania 47% were physically inactive (34) . Facility –based cross sectional study in southwest Ethiopia reported 55.1% from 85.1% total cardiovascular risk patients were physical inactivity (19).

2.3.7. Obesity as a CVD Risk Factor

Obesity is significant risk factors for CVD. Obesity is characterized by elevated of weight gain that impairs health, according to BMI ≥ 30 kg/m^2 (63) . Since 1993, the prevalence of obesity has steadily increased and forecasts that by 2030 more than 51% of the population will be obese .Obesity raises the relative risk of CVD by 46% for men and 64% for women (62) . Obesity was more widespread in Korea across all ages, regardless of gender, according to a cohort study conducted in Korea and Japan. Men were found to be more obese throughout their middle years (47.1% and 36.9% at age 40-49 in Korea and Japan, respectively), but women became more fat as they aged (42.1% and 26.9% at age 70 in Korea and Japan, respectively) (64) . A cross-

sectional study in Ghana found that among urban dwellers, females were 2.9 times more likely to be overweight and 5.2 times more likely to be obese than men ($p<0.0001$) . Prevalence of obesity urban women are 35% (45) . A cross sectional study in Ethiopia prevalence of obesity is 23.5% (19) . And another cross-sectional survey in two main referral hospitals in West- Ethiopia was reported 16.9% of patients were obese (57) . Additional a community –based cross sectional study in Ethiopia , Jimma town from 70% respondent 26.8 % were obese (58) .

2.3.8. Insufficient Fruit and Vegetable Consumption

Nutrition plays a significant role in the development of cardiovascular disease. In studies, an increased diet of fruits, vegetables, and legumes has been associated with a lower risk of CVD. In 2013, Between 5.6 and 7.8 million people die prematurely were attributed to a fruit and vegetable diet of less than 500 and 800 grams per day, respectively (65) . A cross-sectional study conducted in Nepal, When comparing those who consumed 3 servings of fruits and vegetables per day to those who consumed none, the adjusted odds of having a history of major cardiovascular events were 2.22 (95% CI, 1.06-4.66) fruit and veggie servings per day (66) . Cross section study in Tanzania 82.2% are consume insufficient that is majority of the participants (34) . A longitudinal cohort study performed in six low-and middle-income countries insufficient fruit and vegetable intake was in South Africa and Ghana were 68.5 and 68.9%, respectively (10) . Cross sectional facility- based study in Eastern Ethiopia reported from total patient (287) most patients had inadequate consumption of fruit and vegetables (25) .

2.4. Factors Associated with Knowledge of Cardiovascular Risk Factors

Several studies have found that improved education and health literacy are related to changes in health behavior. Besides, a study found that health knowledge is linked to healthy behaviors in CVD patients (67,68) . Preventive intervention study in Poland there were significant differences

in knowledge on RFs by education, with the highest proportion of participants who had knowledge in the group with university education (36) . Study in India it observed a negative relationship between education and risk and it says that patients with less education have more risk and it was found to significant (24) . A cross-sectional Study in Ethiopia, Urban residents had 12.84 units higher mean knowledge score than rural residents (25) .

2.5. Conceptual Framework of the Study

This conceptual framework is adapted and modified after reviewing different literatures (10, 41). This shows the effect of independent variables categorized under modifiable and non-modifiable socioeconomic factors and cardio metabolic factors on knowledge of CVD risk factors and lifestyle behaviors.

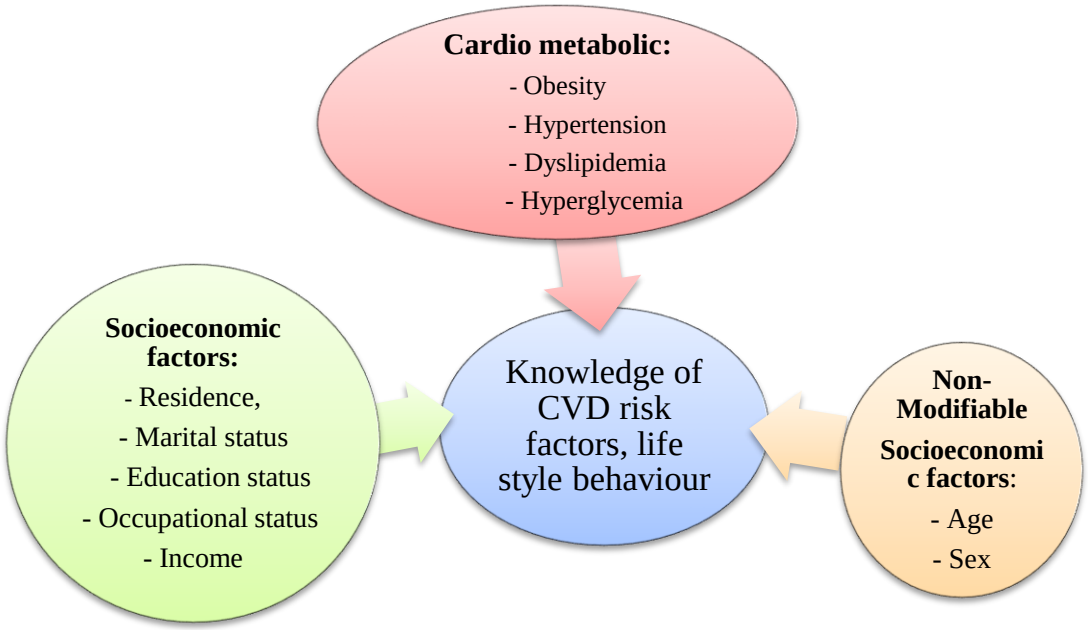

Fig 1: A conceptual framework for Patient Knowledge of Cardiovascular Risk Factors and Life Style Behavior in hypertensive Patients 2022.

3. OBJECTIVES

3.1. General objective

- The general objectives of this study is to assess knowledge of cardiovascular risk factors and lifestyle behaviors among hypertension patients in selected hospitals in Addis Ababa, Ethiopia

3.2. Specific objective

- To determine knowledge of cardiovascular risk factors among hypertensive patients visiting selected hospitals
- To identify lifestyle behaviors of hypertensive patients visiting in the selected hospitals
- To identify socio-demographic factors associated with knowledge of CVD risk factors among hypertensive patients visiting selected hospitals

4. METHOD AND MATERIALS

4.1. Study Area and Period

The study was conducted in government hospitals providing hypertension outpatient services in Addis Ababa city administration. The city includes 11 sub-cities and a total area of 527 square kilometers, administratively divided into 11 sub-cities and 121 districts (known locally as "woreda's"), with a population of over 4.8 million people and a growth rate of 4.4 percent (global population growth rate, world population review, 2020. The city administration of Addis Ababa contains 12 public hospitals, 40 private hospitals, 96 health centers and more than 800 clinics which are providing health services. From 13 government hospitals spread across 11 sub-cities (five federal hospitals, six under the Addis Ababa health bureau, one operated by the police force, and once owned by the armed forces). This study was conducted in three health facilities, namely: Tikur Anbessa Specialized Hospital (TASH), St. Paul's Hospital, and Yekatit 12 Hospital.

Tikur Anbessa Specialized Hospital (TASH) was established in 1972. It is an 850 bed with 130 specialists, 50 non-teaching doctors. It is tertiary care teaching hospital of Addis Ababa University. This hospital offers diagnosis and treatment for approximately 370,000 - 400,000 patients per year. Every year, around 80,000 patients visit the emergency department. On the other side, as the country's largest teaching hospital, it educates a huge number of undergraduate and graduate students. It is also an institution that provides specialized therapeutic services to the entire nation that is not available in other public or private institutions.

Yekatit 12 Hospital, located in Arada Sub-city of City Government of Addis Ababa, was established in 1915 E.C with a total of 25 beds and 37 health professions. It is a teaching

Hospital and managed under Addis Ababa City Administrative Health Bureau. According to the information obtained from the Hospital, currently, the Hospital has 725 health professionals and 375 administrative staff with around 272 beds and provides different medical services for around 4 million people. This clinic provides service for around 50 patients per day.

St. Paul's Hospital Millennium Medical College in Addis Ababa is Ethiopia's second-largest hospital. Emperor Haile Selassie erected the hospital in 1969 with the assistance of the German Evangelical Church. Its goal was to help the impoverished. In 2007, a medical college was established. The hospital, which has 350 beds, has a yearly average of 300,000. It serves a population of about 5 million people and employs 1200 clinical and non-clinical workers. Since the hospital's inception, the cardiac clinic has been in operation.

4.2. Study Design

An institution-based cross-sectional study design was used to conducted the study between January to March, 2023

4.2.1. Source Population

Source population was all adult hypertensive patients visiting governmental hospitals in Addis Ababa.

4.2.2. Study population

The study population was adult hypertensive patients visiting the outpatient department of TASH, St Paul's Hospital, and Yekatit 12 Hospital.

4.3. Eligibility Criteria

4.3.1. Inclusion Criteria

Inclusion criteria was hypertensive individuals 18 years old or above and provide informed consent.

4.3.2. Exclusion Criteria

Exclusion criteria was severely ill hypertensive patients who were unable to respond, acute life-threatening conditions, and severe injury, including patients with head injuries

4.4. Sample Size Determination

The size of study participants who were recruited in to the study was calculated using the single population proportion formula by considering prevalence rate from previous study 0.347 (3) level of confidence 95% and marginal error of 0.05.

The formula to calculate sample size was

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

Z = confidence interval at 95%=1.96
P= prevalence rate
d= margin of error=5%

$$n = \frac{(1.96)^2 x\ 0.347(1-0.347)}{(0.05)^2}$$

$$n = \frac{0.8705}{0.0025}$$

n = 349

The total hypertensive patients (N) who had follow up at selected government hospitals during the data collection period was 7609 which was less than 10,000. The correction formula was as follows

$n_f = \frac{n}{1+\frac{n}{N}}$ n=349, N=7609

By substituting the values in to the above formula and we got 334 and when 10% non - response rate was added and final sample size was **367**.

4.5. Sampling Technique

Three public health facilities were selected using a random sampling or lottery method from the 12 government hospitals in Addis Ababa that provided hypertension follow-up for hypertensive patients. The hospitals chosen by lottery was received a proportional allocation of the sample size, which was determine the number of study units. Below, the sampling process was described.

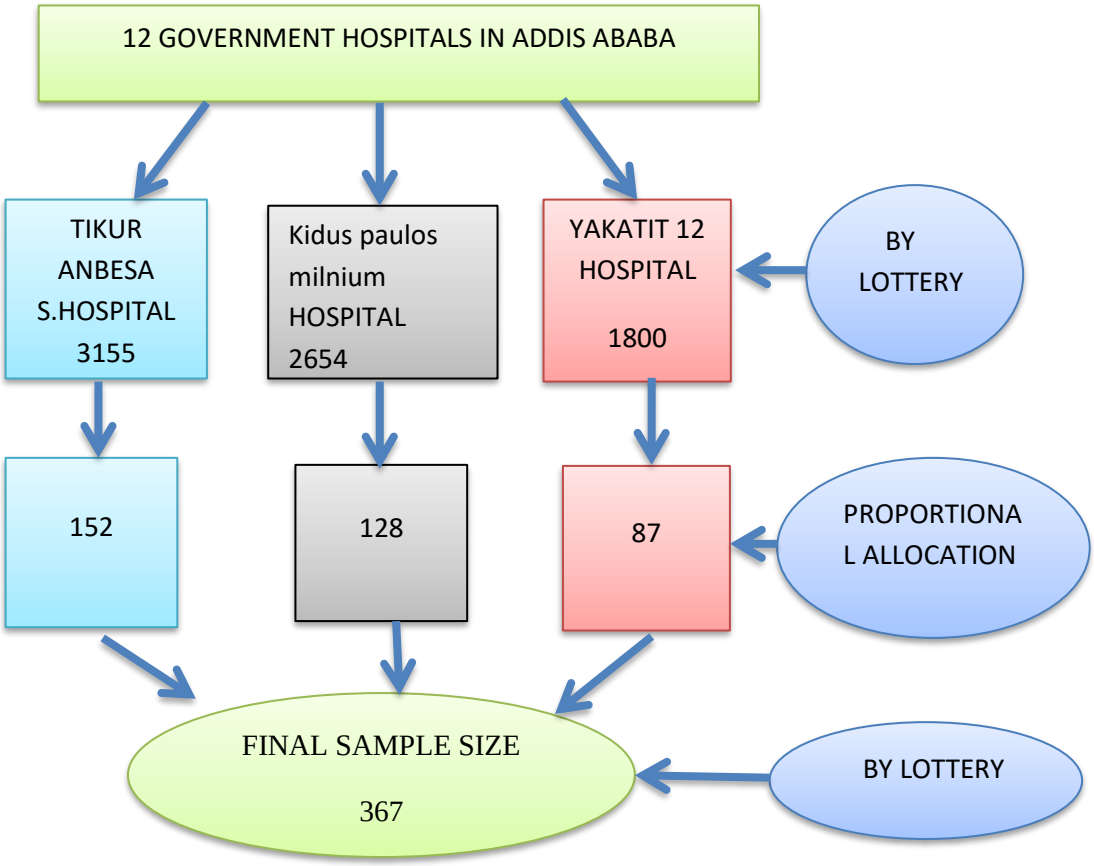

Fig2. Schematic presentation of sampling procedure was used to select study subjects from three government hospitals in Addis Ababa, 2023

4.6. Variables of the Study

4.6.1. Dependent Variables

- Knowledge of CVD risk factors
- Lifestyle behaviors

4.6.2. Independent Variables

- Age, sex, income, educational level, marital status, occupation, and monthly income

4.7. Operational definition

Hypertension: having systolic blood pressure of ≤140 mm Hg, diastolic blood pressure of ≤ 90 mm Hg, or taking hypertension medication (38) .

Knowledge of CVD risk factors: can be described as a patient's understanding of CVD risk factors as measured by the Heart Disease Fact Questionnaire (HDFQ). The total score of the HDFQ ranges from 4 to 100. Higher score shows better knowledge of CVD risk factors

Lifestyle behaviors: are the following factors:

Current smoker: an individual who was smoking at least half pack during the last one year of study period (21).

Alcoholism: defined broadly as any drinking that causes substantial mental or physical health disorders. Alcoholism is not a diagnosable condition. Alcohol use disorder or alcohol dependence is the most common diagnostic classifications. (69) .

4.8. Data Collection Methods and instrument

4.8.1. Data Collection Tool

The data was gathered using two validated tools, WHO STEPs instrument, and the Heart Disease Fact Questions (HDFQ). The questionnaires included items assessing behavioral risk factors as well as patients' understanding of CVD risk factors. The questionnaire had three parts. Part one is socio-demographic which is locally adapted version of WHO STEPs instrument was translated and was used to assess socio-demographic variables contains seven questions (70). Part two were a questionnaire was assessed the CV risk behaviors including cigarette smoking, alcohol consumption, and fruit and vegetable consumption which were 25 items of tool. Part three was

knowledge of cardiovascular risk factors among hypertensive patients with was used to assess the patient's knowledge of CV risk factors which were sixteen items of questions (71) .

4.8.2. Data Collection Procedure

Data was collected by pre-coded face-to-face interviewer-administered questionnaire. Three qualified BSc nurses were collect data and one BSc nurse supervisor was trained for two days by the principal investigator. They were trained on the purpose of the study, how to use data collection tools; and how to keep the confidentiality of study units. Those three BSc Nurses were assigned to the selected hospitals separately to collect the data. The pre-test was done on the same participants and was not included in the main study. The principal investigator and supervisor were supervising data collection procedure every day.

The study participants were asked to choose 'true', 'false' or 'I don't know', with 'I don't know' also being marked as a wrong answer. Scores was calculated by adding the total number of correct answers. Incorrect response and "I don't know" were given a score of zero and correct answers as 1. Higher scores indicated higher level of knowledge. The total score ranged from "0" to "100" when the number of correct responses were multiplied by four (23) .

4.8.3. Data Quality Assurance

The data, quality were ensured using a questionnaire, which was translated from English to Amharic and then back to English. The pre-test was conducted on 5% of the samples from St. Petr's Hospital that were not included in the final study, there were two-day training for data collectors, and completed questionnaires were verified on a regular basis to ensure their

completeness and appropriateness. Extensive supervision was provided during data collection. On the other hand, accurate blood pressure readings was assured by instructing the patient to maintain the optimal sitting position for BP measurement as well as instruction on the proper place for BP measurement (left hand, leg).

4.9. Statistical analysis

The data was collected with Koobo tool data collection kit (https://www.kobotoolbox.org) and transported to email then to Microsoft Excel. Data cleaning and completeness were checked by Excel and exported to SPSS version 22 (SPSS statistics IBM Corp. Armonk, NY, USA) for statistical analysis. For this study frequency table was used to describe the socio demographic status and risk behaviors of the respondents. The normality of the data was checked by histogram and the data was normal. Therefore, linear regression model was used to determine the association between cardiovascular knowledge score and independent variables. Variables which had a *p*-value <0.25 in binary linear regression were included in the analysis multivariable linear regression analysis. The association between dependent variable and independent variable were estimated in 95% confidence interval (CI) and *p*-value was less than 0.05 as statistically significant.

4.10. Ethical consideration

The ethical review board of AAU School of Nursing and Midwifery approved the proposal before the actual data collection. An official letter was delivered to the hospitals. Written informed consent was obtained from study participants. The study respects the potential participant's right to refuse participation or withdraw from participation. Confidentiality was maintained by avoiding access to the information given by participants other than authorized

personnel and used only for this research. The participant could terminate the interview at any point during the data collection time.

5. RESULT

A total of 352 patients diagnosed with hypertension who attended the chronic follow up care were enrolled in the study; 137 patients from TASH, 128 patients from St. Paul's Hospital, and 87 patients from Yekatit 12 Hospital. Mean age was 55.0 years (±11.3 SD) and 60.8% of patients were of the male. Ten percent (10%) of the patients had a college and above level of education. The sociodemographic characteristics of the participants are depicted in **Table 1**.

Table 1. Socio demographic characteristics of patients attending chronic follow up care in Addis Ababa Ethiopia, 2023

Variable	**Number**	**%**
Mean age ± SD	55.01±11.29	
Sex		
Male	214	60.8
Female	138	39.2
Marital status		
Married	195	55.4
Divorced	63	17.9
Single	43	12.2
Widowed	51	14.6
Education		
College and above	34	9.7
Secondary	68	19.3
Primary	117	33.2
Unable to read and write	133	37.8
Occupation		
Government	56	15.9
Non-governmental organization	25	7.1
Own business	103	29.3
Housewife	92	26.1
Unemployed	51	14.5
Retired	25	7.1
Monthly income (in Birr)		
< 5000	104	29.5
5000_10000	110	31.3
>10000	138	39.2
Address		
Rural	111	31.5
Urban	241	68.5

5.1. Knowledge of CVD risk factors

The study showed the mean CVD knowledge score was 68.4% with a range of 56.7-79.6%.The majority of patients showed knowledge about age related CVD 244 (69.3%), being overweight 234 (66.5%), high cholesterol 234 (66.5%), and high blood pressure 291 (82.7) were risk factors for cardiovascular disease. Besides, patients had lacking knowledge about the fact that eating fatty foods 250 (71%) does affect blood cholesterol levels. Of the respondents, 48 (13.6%) of them did not understand that keeping blood pressure under control reduces the risk of developing cardiovascular disease, and 68 (19.3%) assume only exercising at a gym or in an exercise class lower the chance of developing cardiovascular disease (Table 2).

5.2. Lifestyle behaviors

In this study 127 (36.1%) patients had used tobacco in their life, and 19 (5.4%) of them were current smokers. The majority of participants 221 (62.8%) 221 had consumed any alcoholic product in the past, 134 (38.1%) had consumed alcohol in the past one month and seven days. Of the total patients, 150 (42.6%) had not consumed fruit in a typical week, and the majority 247 (70.2%) of the patients consumed vegetables on 1–3 days a week, 66 (18.7%) consumed these on 4–7 days a week and 40 (11.4%) did not consumed vegetables in a typical week. Almost all patients did not meet the WHO recommendation for fruit and vegetable consumption (more than five serving daily). Regarding physical activity, more than half of the patient 229 (65.0%) involved in vigorous physical activity in the past 7 days, and 327 (92.9%) of the patients walked for at least 10 minutes (Table 3). Concerning cumulative risk behaviour, more than half of 190 (54%) participants had one risk behaviour, 50 (14.2%) had two risk behaviours, and 14 (4.0%) had three or more risk behaviours. Out of the total recruited patients, 64 (18.2%) had multiple risk behaviours (two or more behaviours).

Table 2: Knowledge of CVD risk factors among hypertensive patients in selected public hospitals in Addis Ababa, Ethiopia, 2023

Variables	N (%)		
	True	False	Don't know
A person having heart disease is always well-aware of it	127 (36.1)	160(45.5)	65 (18.5)
An individual is more likely to acquire heart disease if there is a family history of the condition	130 (36.9)	85 (24.1)	137 (38.9)
An individual's chance of developing heart disease increases with age	244 (69.3)	52 (14.8)	56 (15.9)
Does smoking put one at risk for heart disease?	189 (53.7)	96 (27.3)	67 (19.0)
Giving up smoking lowers a person's risk of heart disease	233 (66.2)	60 (17.0)	59 (16.8)
High blood pressure increases the risk of heart disease	291 (82.7)	28 (8.0)	33 (9.4)
Keeping blood pressure under control lowers the chance of heart disease in individuals.	313 (88.9)	16 (4.5)	48 (13.6)
One of the risk factors for heart disease development is high cholesterol.	234 (66.5)	66 (18.7)	52 (14.8)
Blood cholesterol levels are unaffected by consuming fatty food.	250 (71.0)	23(6.5)	79 (22.4)
If your 'good' cholesterol (HDL) is high you are at risk for heart disease	130 (36.9)	59 (16.8)	163 (46.3)
If your 'bad' cholesterol (LDL) is high you are at risk for heart disease	211 (59.9)	41 (11.6)	100 (28.4)
An individual's risk of heart disease is increased by being overweight	234 (66.5)	42 (11.9)	76 (21.6)
Engaging in regular physical activity can reduce an individual's risk of developing heart disease	267 (75.9)	25 (7.1)	60 (17.0)
Exercise at a gym or fitness class is the only way to reduce one's risk of heart disease	68 (19.3)	235(66.8)	49 (13.9)
Exercises like walking and gardening are thought to help reduce a person's risk of heart disease	298 (84.7)	30 (8.5)	24 (6.8)
Heart disease can be exacerbated by diabetes	188 (53.4)	61 (17.3)	103(29.3)

Table 3: Lifestyle Behavior among hypertensive patients towards CVD in selected public hospitals in Addis Ababa, Ethiopia, 2023

Variables	N (%)	
	Yes	No
Smoking		
Have you ever used tobacco product	127 (36.1)	225 (63.9)
Current tobacco smoking status	19 (5.4)	333 (94.6)
In the last 30 days did someone smoke in your home	128 (36.4)	224 (63.6)
Alcohol Consumption		
Have you ever consumed any alcoholic product	221 (62.8)	131 (37.2)
Did you consume alcohol in the past 7 days	134 (38.1)	218 (61.9)
Did you consume alcohol in the past 30 days	134 (38.1)	218 (61.9)
Did you consume alcohol in the past 12 months	221 (62.8)	131 (37.2)
Diet, Fruit and Vegetable Consumption		
Number of days on which patients eat the fruit in a typical week		
None	150 (42.6)	202 (57.4)
1-3 days	187 (53.1)	165 (46.9)
4-7 days	15 (4.3)	337 (95.7)
Servings of fruit per day		
0	150 (42.6)	202 (57.4)
1-4	202 (57.4)	150 (42.6)
Number of days on which patients eat vegetables in a typical week		
None	40 (11.4)	312 (88.6)
1-3 days	247 (70.2)	105 (29.8)
4-7 days	66 (18.7)	286 (81.3)
Servings of vegetables per week		
0	40 (11.4)	312 (88.6)
1-4	310 (88.1)	42 (11.9)
Did you add salt on the top your plate	75 (21.3)	277 (78.7)
Physical Activity (During the last 7 days)		
Vigorous intensity physical activities	229 (65.0)	123 (34.9)
Moderate-intensity physical activities	207 (58.8)	145 (41.2)
Walking for at least 10 minutes at a time	327 (92.9)	25 (7.1)

5.3. Bivariate linear regression analysis of factors associated with knowledge towards CVD

In bivariate linear regression analysis sex, age group, address, marital status, level of education, occupation and monthly income were risk factors significantly associated with knowledge of CVD. Male patients had 0.091 units higher mean knowledge score of CVD than female patients (β = 0.091, 95% CI 0.063 to 0.119; $p< 0.001$). Patient from urban area had 0.074 units higher mean knowledge score of CVD than patients from rural area (β = 0.074, 95% CI 0.044 to 0.104; $p < 0.001$). In addition, divorced patients had 0.059 units higher mean knowledge score of CVD than those who were currently married (β = 0.059, 95% CI 0.020 to 0.098; $p = 0.003$).

However, patients who were above 65 years of age had -0.110 less mean knowledge score of CVD compared to those who < 40 years of age (β = -0.110, 95% CI -0.149 to -0.071; $p < 0.001$). In addition, level of education is associated with knowledge of CV risk factors ($p < 0.001$), those who had no formal education had -0.204 units lower mean knowledge score of CVD compared to those who completed college or above (β = -0.204, 95% CI -0.249 to -0.160; $p < 0.001$). Those who attained primary school education had -0.180 units less mean knowledge score of CVD compared to those who completed college or above (β = -0.180, 95% CI -0.225 to -0.135; $p < 0.001$). Moreover, monthly income were associated with knowledge of CVD ($p < 0.001$), those who expended 5000-10000 birr had -0.051units lower mean knowledge score of CVD compared to those who expended above 10,000 birr per month (β = -0.051, 95% CI -0.085 to -0.018; $p = 0.003$). Those who expended less than 5000 birr had -0.089 units less mean knowledge score of CVD compared to those who expended above 10,000 birr per month (β = -0.089, 95% CI -0.123 to -0.055; $p < 0.001$) (Table 4).

5.4. Multivariable linear regression analysis of factors associated with knowledge towards CVD

Variables such as sex, age group, address, marital status, level of education, occupation and monthly income were eligible for multivariable linear regression analysis because the *p*-values were < 0.25 in the bivariate linear regression analysis. The multivariable linear regression demonstrated, knowledge of CV risk factors were significantly associated with sex, age group, and level of education only. Male patients had 0.047 units higher mean knowledge score of CVD than female patients (β = 0.047, 95% CI 0.021 to 0.072; $p< 0.001$). For every one unit increase in age >65, the mean knowledge score of CVD decreases by 0.043 units (β = -0.043, 95% CI -0.080 to -0.006; $p= 0.023$). In addition, level of education is associated with knowledge of CV risk factors ($p < 0.001$), those who had no formal education had -0.151units lower mean knowledge score compared to those who completed college or university (β = -0.151, 95% CI -0.199 to -0.103; $p< 0.001$). Those who attained primary school education had -0.128 units less knowledge score compared to those who completed college or university (β = -0.128, 95% CI -0.177 to -0.079; $p< 0.001$) (Table 5).

Table 4. Bivariate linear regression analysis of associated factors of knowledge of CVD risk factors in Addis Ababa selected hospitals

Variables	β	95% CI	*p*-value
Sex			
Female	Reference		
Male	0.091	0.063, 0.119	**0.0001**
Age group (in years)			
< 40	Reference		
41-65	-0.031	-0.064, 0.002	0.067
>65	-0.110	-0.149, -0.071	**0.0001**
Address			
Urban	0.074	0.044, 0.104	**0.0001**
Rural	Reference		
Marital status			
Married	Reference		
Divorced	0.059	0.020, 0.098	**0.003**
Single	0.027	-0.018, 0.073	0.236
Widowed	-0.004	-0.046, 0.038	0.846
Level of education			
Collage and above	Reference		
Secondary	-0.053	-0.102, -.005	**0.031**
Primary	-0.180	-0.225, -0.135	**0.0001**
Illiterate	-0.204	-0.249, -0.160	**0.0001**
Occupation			
Government	Reference		
Non-governmental organization	-0.012	-0.072, 0.048	0.687
Own business	-0.131	-0.173, -0.090	**0.0001**
Housewife	-0.155	-0.197, -0.113	**0.0001**
Unemployed	-0.085	-0.133, -0.036	**0.001**
Retired	-0.097	-0.157, -0.037	**0.002**
Monthly income (in Birr)			
>10000 birr	Reference		
5000-10000 birr	-0.051	-0.085, -0.018	**0.003**
<5000 birr	-0.089	-0.123, -0.055	**0.0001**

β: Beta coefficient, CI: Confidence interval

Table 5. Multivariate linear regression analysis of associated factors of knowledge of CVD risk factors in Addis Ababa selected hospitals

Variables	β	95% CI	*p*-value
Sex			
Female	Reference		
Male	0.047	0.021, 0.072	**0.0001**
Age group (in years)			
< 40	Reference		
41-65	-0.014	-0.043, 0.016	0.355
>65	-0.043	-0.080, -0.006	**0.023**
Address			
Urban	0.018	-0.011, 0.046	0.224
Rural	Reference		
Marital status			
Married	Reference		
Divorced	0.015	-0.018, 0.048	0.375
Single	0.012	-0.027, 0.051	0.546
Widowed	-0.013	-0.049, 0.023	0.469
Level of education			
Collage and above	Reference		
Secondary	-0.043	-0.090, 0.005	0.079
Primary	-0.128	-0.177, -0.079	**0.0001**
Illiterate	-0.151	-0.199, -0.103	**0.0001**
Occupation			
Government	Reference		
Non-governmental organization	0.037	-0.018, 0.091	0.189
Own business	-0.031	-0.075, 0.012	0.156
Housewife	-0.033	-0.080, 0.014	0.163
Unemployed	-0.004	-0.052, 0.043	0.857
Retired	-0.006	-0.063, 0.052	0.848
Monthly income (in Birr)			
>10000 birr	Reference		
5000-10000 birr	-0.024	-0.053, 0.005	0.098
<5000 birr	-0.008	-0.041, 0.025	0.635

β: Beta coefficient, CI: Confidence interval

6. DISCUSSION

In the present study level of knowledge of cardiovascular risk factors and lifestyle behavior among known hypertensive patients who were attending chronic follow up care at three public hospitals in Addis Ababa, Ethiopia were examined. The study demonstrates that the mean CVD knowledge score was 68.4%, 5.4% of the patients were current smokers and 37.5% were consume alcohol. However, the multivariable linear regression analysis revealed knowledge of CV risk factors was significantly associated with sex, age group, and level of education.

The study showed the mean CVD knowledge score was 68.4%. This finding is comparative with study 69.4% in Nottingham,(72). However, it was lower than studies 75% in South African (73), 75.4 in Antwerp (72) and 78.2 in Tanzania (34), while, it was higher than study conducted in Cameroon (47.5%)(74) and in Nigeria 44% (75). The discrepancies between the studies might be due to different measurement tools, difference in socioeconomic background, lack of awareness creation events, poor patient counselling, and lack of effective communication with physicians.

In this study 5.4% of patients were current smokers. The finding is lower than study conducted in Ghana 7.2% (76), in **B**elgian 11% (77), in multiple centers across Europe 18.4% (78) and in Kathmandu 22% (79) . In the contrary, it is higher than study conducted in Eastern Ethiopia 1% (25), Tanzania 3.2% (34). In general the prevalence of smoking in Ethiopia is lower than the developed countries. The inconsistent of smoking prevalence might be due to social, cultural and religious factors, given that religion and social taboo are considered as the main deterrents to smoking in Ethiopia. This study also demonstrated that 37.5% had consumed alcohol in one month. The result of this study is consistent with study conducted in Kathmandu 31% (79),

while, lower that in eastern Ethiopia 19% (80), and higher that in Bolivia, 42.76% (81). The discrepancy might be explained in terms of sociocultural factors.

This study showed male patients had 0.047 units higher mean knowledge score of CVD than female patients (β = 0.047, 95% CI 0.021 to 0.072; $p< 0.001$). And age of the patient has significantly associated with CVD knowledge score. For every one unit increase in age >65, the mean knowledge score of CVD decreases by 0.043 units. Moreover, those who had no formal education and primary education had -0.151 and -0.128 units lower mean knowledge score compared to those who completed college or university, respectively. Different studies from elsewhere demonstrated that a higher level of education is associated with healthy lifestyle and appropriate self-care behaviors (82–84). In addition, evidence from a review revealed that a lower educational level is associated with lower knowledge of CV risk factors (33), and this also concurs with the finding of the current study.

7. LIMITATIONS OF THE STUDY

This study may be subject to bias. Firstly, the study is subject to the limitations of patient recall and social desirability bias, and the self-reported measurement of risk behaviors may have underestimated the CV risk behaviors. However, this underlines that the real-world problem may be even worse in developing countries, and that a call for action is required. Secondly, the use of cross-sectional study design does not establish causal relationships.

8. CONCLUSION AND RECOMMENDATION

The burden of CV risk behaviors is increasing whilst the patients' understanding of associated risk factors is limited. The study demonstrates that more than half of hypertensive patients have

suboptimal knowledge regarding CV risk factors, 5.4% of the patients were current smokers and 37.5% were consume alcohol, male patients has high mean knowledge score, elderly patient has low mean knowledge score and educational status was significantly associated with the mean knowledge score of CVD. Therefore, this study is important to demonstrate the need for implementing an effective prevention program. In line with intensive patient counseling and education to improve awareness regarding CV risk factors, implementation of multidisciplinary, innovative interventions and systematic nurse-led lifestyle counseling is indeed important to effectively assist CV patients in adopting positive lifestyle behaviors. Moreover, implementation of CVD prevention programs should be considered for the disease prevention policy agenda in Ethiopia.

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