



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

SCHOOL OF PUBLIC HEALTH

ETHIOPIA FIELD EPIDEMIOLOGY TRAINING PROGRAM (EFETP)

LEVEL OF ADHERENCE TO LIFESTYLE MODIFICATIONS AND
ASSOCIATED FACTORS AMONG HYPERTENSIVE PATIENTS
ATTENDING OUTPATIENT DEPARTMENT AT BISHOFTU GENERAL
HOSPITAL, OROMIA REGION, ETHIOPIA

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This thesis by **Girma Mideksa** is accepted in its present form by the board of examiners as satisfying the thesis requirement for the degree of Master's in Public Health in Field Epidemiology

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Abbreviation and Acronyms

AOR: Adjusted Odd Ratio

BP: Blood Pressure

BSC: Bachelor of Science

CI: Confidence Interval

CVD: Cardiovascular Diseases

DASH: Dietary Approaches to Stop Hypertension

EDHS: Ethiopian Demography and Health survey

HTN: Hypertension

HC: Health Center

JNC7: Seventh Report of Joint National Committee

Mm Hg: Millimeters of Mercury

MPH: Master of Public Health

NCD: Non-Communicable Disease

SPHMMC: St. Paul's Hospital Millennium Medical College

WHO: World Health Organization

Abstract

Background: Hypertension is a major public health problem affecting over one billion people worldwide. Many people live unhealthy lifestyles, which are regularly undetected and poorly controlled for hypertension. To address this issue, adherence to lifestyle modification approaches is regularly overlooked as the cornerstone of hypertension prevention and control.

Objective: To assess the level of adherence to lifestyle modifications and associated factors among hypertensive patients attending outpatient departments at Bishoftu General Hospital, in 2022.

Methods: A hospital-based cross-sectional study design was conducted among 301 hypertensive patients between January and March 2022. A systematic random sampling technique was used. The data were collected through face-to-face interviews with participants using a structured questionnaire by trained data collectors. Data were entered into Epi-info 7.2.1.0 and exported to SPSS version 26 software for further analysis. Data were analyzed by using descriptive statistics and identified predictors of the outcome using a bivariable and multivariable logistic regression model (adjusted odds ratios with p-value <0.05 and 95% CI).

Results: The study included 301 respondents with 100% response rate. 158 (52.5%) were females and median age was 57 (± 12.4 SD) years. The overall adherence in this study was only 26.9%. The study found that the patients Age older than 55 years (AOR= 2.81; 95% CI: 1.35-5.84), formal education (AOR: 0.52; 95% CI: 0.28 - 0.96), the patients who had hypertension with 5 to 10 years diagnosis time (AOR = 2.33; 95% CI: 1.01–5.37), co-morbidity (AOR=2.06; 95% CI: 1.21,3.49) and good knowledge about healthy lifestyle (AOR:0.42; 95% CI: 0.24-0.74) have an independently associated with adherence to lifestyle modifications.

Conclusions: The Level of adherence to recommended lifestyle modification among hypertensive patients was low in this study. Age, education, duration of hypertension, having co-morbidities and knowledge of lifestyle were identified as predictors of the outcome. Therefore, the health sector needs to develop intervention strategies to improve adherence to recommended lifestyle modifications for hypertensive patients.

Keywords: Adherence, lifestyle modification, Hypertension.

1. Introduction

1.1. Background of the study

Hypertension is one of the major important risk factors for cardiovascular diseases. It is the largest cause of death worldwide, accounting for 10.8 million deaths per year (1,2). Globally, 1.39 billion people had hypertension, and one-third of adults have the condition. These 349 million people live in high-income countries, while 1.04 billion live in low- and middle-income countries, indicating a considerable increase in morbidity and death. The prevalence of hypertension is rising globally owing to the aging of the population and increases in exposure to lifestyle risk factors including unhealthy diets (3). Among all World Health Organization (WHO) regions, the prevalence of hypertension is highest in the African region (46%) and lowest in the Americas region (35%) (4). In terms of economic burden, poorly controlled hypertension is a fairly important public health concern among the elderly worldwide. Some studies have shown that most hypertensive patients do not have sufficient knowledge about lifestyle modification (5).

Approximately 74.7 million people in sub-Saharan Africa (SSA) suffer from hypertension, which is expected to reach 125.5 million and will hinder the target set to reduce by 25% the prevalence of hypertension globally by 2025 (6,7). In 2016, WHO and the United States Centers for Disease Control and Prevention launched the Global Hearts Initiative to support governments in helping and treating cardiovascular disease. Ethiopia is one of the countries starting the Global Heart Initiative to address risk factors associated with non-communicable diseases (NCD) (8).

Most behavioral risk factors, such as tobacco use and drinking, were more common in men than in women. To reduce the risk of developing hypertension, it is highly recommended lifestyle modifications, such as avoiding drinking alcohol or smoking (9).

Patients with hypertension are expected to be able to modify their lifestyles. But little is known about the importance of a healthy lifestyle, as many studies on hypertension have been conducted in Ethiopia. Therefore, the study aimed to assess level of adherence to lifestyle modifications and their associated factors among hypertensive patients attending Bishoftu General Hospital, Oromia region, Ethiopia.

1.2. Statement of the problem

Hypertension is a major public health problem worldwide, affecting more than 1 billion people worldwide. The prevalence of hypertension is 35% lower in high-income countries than in low-income countries and 40% lower in middle-income countries due to appropriate public policies and health care services (10). In France, hypertension was 0.76% for 2-factor, 0.47% for 3-factor, and 0.35% for all healthy-lifestyle factors compared with none or one healthy-lifestyle factor. Adherence to any or all of these was found to be associated with a lower risk of hypertension (11).

According to a survey by the Kingdom of Saudi Arabia, exercise, healthy eating, and dosing compliance rates were 20.1%, 11.8%, and 34.7%, respectively. Monthly income levels were found to be strongly associated with adherence to both a healthy diet and regular exercise (12).

In Zimbabwe, a study conducted only 5.1% of participants adhered to all recommended lifestyle guidelines. Overall, adherence to the recommended lifestyle known to be effective in controlling hypertension in Mutare was poor (13). Another study in Malaysia showed a lower prevalence among participants of 83.3% followed the recommended low-salt diet, 65% of participants were non-smokers, and 90% abstained from alcohol (14).

Hypertension can be an important modifiable factor in cardiovascular disease. Proper management of hypertension can reduce the risk of stroke by up to 42% and the risk of coronary artery disease by about 14% (15). However, in developing countries like Ethiopia, awareness, treatment, and control of hypertension have been very poor. In this country, the prevalence of hypertension among adults was very high, increasing with age and urbanization in inner-city areas, where the fruit is not consumed, obesity exists, and physical inactivity is not known to be a risk factor for hypertension and by Policymakers need to consider integrating prevention and control of hypertension through raising public awareness, regular community screening, appropriate preventive and interventions in hypertension patients (16,17).

In Ethiopia, 206 (53.6%) hypertensive patients did not adhere to the recommended lifestyle changes. A high percentage of hypertensive patients do not have adherence to lifestyle modification, gender, and age are significantly associated with lifestyle modification adherence, and in another study, it has been shown that only 56 (27.3%) of patients have had lifestyle changes and age, educational status, monthly income, duration of hypertension and co-morbidities are significant with lifestyle modifications (18,19).

EDHS 2011 results on behavioral risk factors (tobacco use and alcohol consumption) showed that 7% of men use tobacco products. 45% of women and 53% of men reported drinking alcohol for the rest of their lifetime (20). In Western Oromia, a 2019 study of hypertension epidemiology revealed that approximately 19.9% to 25.2% of hypertensive patients are unaware of their blood pressure status and that various factors are associated with hypertension. (21).

Ethiopia has a national good strategy to reduce the burden, prevent, and control non-communicable diseases by promoting people to live healthy lifestyles. Lifestyle modifications, such as diet, exercise, quitting smoking, and consuming alcohol in moderation, are strongly recommended to lower the risk of developing hypertension.

One component of the chronic disease management model aims to improve the health of hypertension patients through lifestyle, dietary interventions, health education, behavior change communication (BCC), and enhanced surveillance activity. However, there have been few previous studies in Ethiopia on adherence to lifestyle modifications. As a result, this study will assess opportunities for health promotion through lifestyle modifications and as input for the development of non-communicable diseases (NCD) guidelines and health promotion approaches as a guide for further study.

1.3. Significance of the study

Hypertension is a major public health issue in developing and developed countries such as Ethiopia. Hypertension, if not managed properly, and poor adherence to a healthy lifestyle can lead to disability and mortality. According to some studies, 53.6% of cases of hypertension did not adhere to the recommended lifestyle modification (22,23). Hypertensive patients are expected to be able to modify their lifestyles. But little is known about the magnitude of healthy lifestyles since many of the studies were conducted on hypertension in Ethiopia. So, this study was to assess level of adherence to lifestyle modifications and their associated factors among hypertensive patients attending Bishoftu General Hospital. This study links the evidence-based cost-effective intervention among hypertensive patients. More specifically, the findings will help hospitals, program managers, and policymakers design intervention strategies to improve the implementation prevention and control of hypertension. In addition, this study has important implications for health care providers and hypertensive patients in the study area. Finally, this study can serve as a baseline for further studies.

2. Literature Review

2.1. Overview of Hypertension

Hypertension is defined as an elevated blood pressure (systolic blood pressure > 140 mmHg and/or diastolic blood pressure > 90 mmHg). Another 90% of the cause of hypertension is unknown, but several factors can increase the likelihood of developing the condition. Hypertension has many risk factors that could affect adherence to lifestyle modifications, including socio-demographic, social, and behavioral factors that may impact patients. Approximately 45% of global cardiovascular disability and mortality. Hypertension is the "silent killer" because there are no warning signs, and many people don't know they have it (24,25).

A study in China showed that 18.5% was the prevalence of hypertension, and with increasing age, the prevalence was 39.2% in people above the age of 65 years. As the awareness and treatment rates of hypertension increased, the number of deaths from hypertensive cardiovascular disease decreased year by year in 2017 to 275 (39.55 per 100,000 people) (26).

The results of a study conducted in Ethiopia showed that about 37-78% of hypertensive patients were unaware of their blood pressure status. Hypertension, is more common in an urban setting, and different factors such as the family history of hypertension, age, gender, alcohol consumption, and low regular exercise are associated with hypertension, and another study in Ethiopia shows that 44. 0% of all cardiovascular deaths were associated with a poor diet (27,28).

In a study conducted at the Bale zone Public Hospital in the Oromia region, more than half of the patients, 56.7%, had uncontrolled hypertension, 61% adhered to the hypertension medication protocol, and 37.0% had a low-salt diet. The prevalence of uncontrolled hypertension was high in the study area, where there was a lack of awareness about hypertension and a lack of knowledge on a healthy lifestyle regarding hypertension (29).

2.2. Adherence to the recommended Healthy Lifestyle modifications

Few studies have assessed overall adherence to recommended lifestyle recommendations. In a Zimbabwe study evaluating five recommended lifestyle behaviors, only 5.1% of participants adhered to all recommended lifestyle behaviors (diet, smoking cessation, alcohol consumption, and regular exercise) (13). In Ghana, of 300 participants, 216 (72.0%) adhered to lifestyle modifications, while 28.0% did not (30).

According to research from Eastern Ethiopia, only 28.7% of respondents who adhered to a healthy lifestyle adhered to all six recommended healthy lifestyles. Among the respondents, 62.3% adhere to exercise, 81.8% adhere to a diet, 81.5% adhere to smoking, 95.8% adhere to drinking, and 98.5% adhere to salt (31). In another study conducted in Addis Ababa, Ethiopia, Adherence to the recommended diet around 234 (60.9%) respondents always incorporated grains, vegetables, and fruits in their diet after being diagnosed with hypertension, and 145 (37.8%) and 175 (45.6%) never consumed salty and spicy food, respectively (23).

2.2.1. Adherence to related-dietary

In a study conducted at Columbia, adherence to healthy lifestyle behaviors varied among those with hypertension; fewer than 2% reported standards when assessed collectively 14.1% consumed the recommended amounts of fruits or vegetables (32). Studies in Zimbabwe show that participants who did not add salt to the table had reduced odds of having uncontrolled hypertension by 40% (13). In Korea, 77.5% (107/138) of dietary recommendations for hypertension identified factors related to dietary adherence in community-dwelling adults with or without hypertension (33). A study in Addis Ababa, Ethiopia, found that of the 286 subjects, dietary respondents had an adherence level of 64.7%. This indicates that patients have better diet-related adherence (34).

2.2.2. Adherence to related-Exercise

In one study conducted in Saudi Arabia, the rate of exercise adherence of 144 patients was 20.1%. It was found that the level of monthly income and the presence of other morbidities are strongly associated with adherence to regular exercise (12). Study in Bangladesh, 46% of people approved of physical activity, and of the 307 participants, 135 engaged in less than 2.5 hours of physical activity per week (35). In another study in Georgia, 46.6% of people engaged in the recommended amount of physical activity (32). In a study conducted in Addis Ababa, Ethiopia, the total number of hypertensive patients who adhere to physical activity was 384, of which 33.9% were people who regularly exercised (18).

2.2.3. Adherence to moderation of Alcohol intake

Study in South Korea Of all people with hypertension, adherence to moderate alcohol intake was 80% (36). Malaysian study shows that 90% of people abstain from alcohol, and 56.7% of respondents are free of any disease (14). In a study conducted in Addis Ababa, Ethiopia, 74.8% of respondents reduced their alcohol consumption (37).

2.2.4. Smoking cessation

Studies conducted in different parts of the world show variable figures regarding smoking cessation. A study conducted in Turkey results shows 83% adherence to recommendations for smoking cessation (38). In Zimbabwe, almost 97% of the participants in this study adhered to the smoking cessation recommendations (13). As a result of a survey conducted in southern Ethiopia, 187 (91.2%) of the total 205 participants were not smokers (19).

2.3. Factors associated with Adherence to healthy Lifestyle modifications

2.3.1 Socio-demographic-related factors

In an Asian study conducted, 215 participants (47.2% Chinese, 26.0% Malays, and 26.8% Indians), age, ethnicity, lower level of education, and unemployment were factors significantly associated with hypertension (39). A study in Saudi Arabia found that patients under the age of 65 were more adhered to a healthy diet compared to the elderly (12). A study in Eritrea found that factors related to educational level, marital status, duration of disease, and being educated about lifestyle modifications were found to have a significant association with lifestyle modification and two times more lifestyle modifications in patients with secondary education and above compared to patients with low education (40).

In the study conducted in Addis Ababa, Ethiopia, 404 participants were found to be six times more adherent than respondents in the older adult group (37). A study in southern Ethiopia found that 56 (27.3%) of the participants adhered to lifestyle modifications, the study found that age, educational background, monthly income, and illness duration were significantly associated with adherence to lifestyle modifications. In addition, another study in Gondar, Ethiopia had not yet received any formal education 35% less likely to adhere to lifestyle modifications than those with a formal educational level (19,41).

2.3.2. Health profile of the patients and Individual -related factors

In the study conducted in China, patients accounted for 68.24% of hypertension and the majority of all three comorbidities (diabetes 69.36% and coronary heart disease 57.32%) (42). In Ghana, 72.0% of the 300 participants adhered to lifestyle modifications. Of these, participants who have had hypertension for 5 to 10 years are 2.9 times more likely to adhere to lifestyle modification (30).

A study conducted in southern Ethiopia showed that individuals treated for 5 to 10 years were 2.5 times more likely to make lifestyle changes than those treated for less than 2 years (19).

In Saudi Arabia, the presence of other comorbidities is an important factor in adhering to a healthy lifestyle (12). This study in northeastern Ethiopia showed that adult hypertensive patients with comorbidities were twice as likely to adhere to recommended lifestyle changes as those without comorbidities (43).

2.3.3. Knowledge of a healthy lifestyle

In Europe, approximately 85% of patients have properly identified hypertension. Patients with low knowledge of hypertension were less likely to reduce salt intake than those with high knowledge of hypertension (44). In a study done in Gondar, Ethiopia, Hypertension patients, who had poor knowledge were 45% times less likely to practice recommended lifestyle modifications than those who had good knowledge. In another study in eastern Ethiopia, formal-educated participants were almost four times more likely to have sufficient knowledge of lifestyle modifications than non-formally educated participants (41,45).

2.4. Conceptual framework

The conceptual framework is adapted from literature reviews such as socio-demographic factors, the health profile of the patients, and individual factors that are associated with adherence to lifestyle modifications.

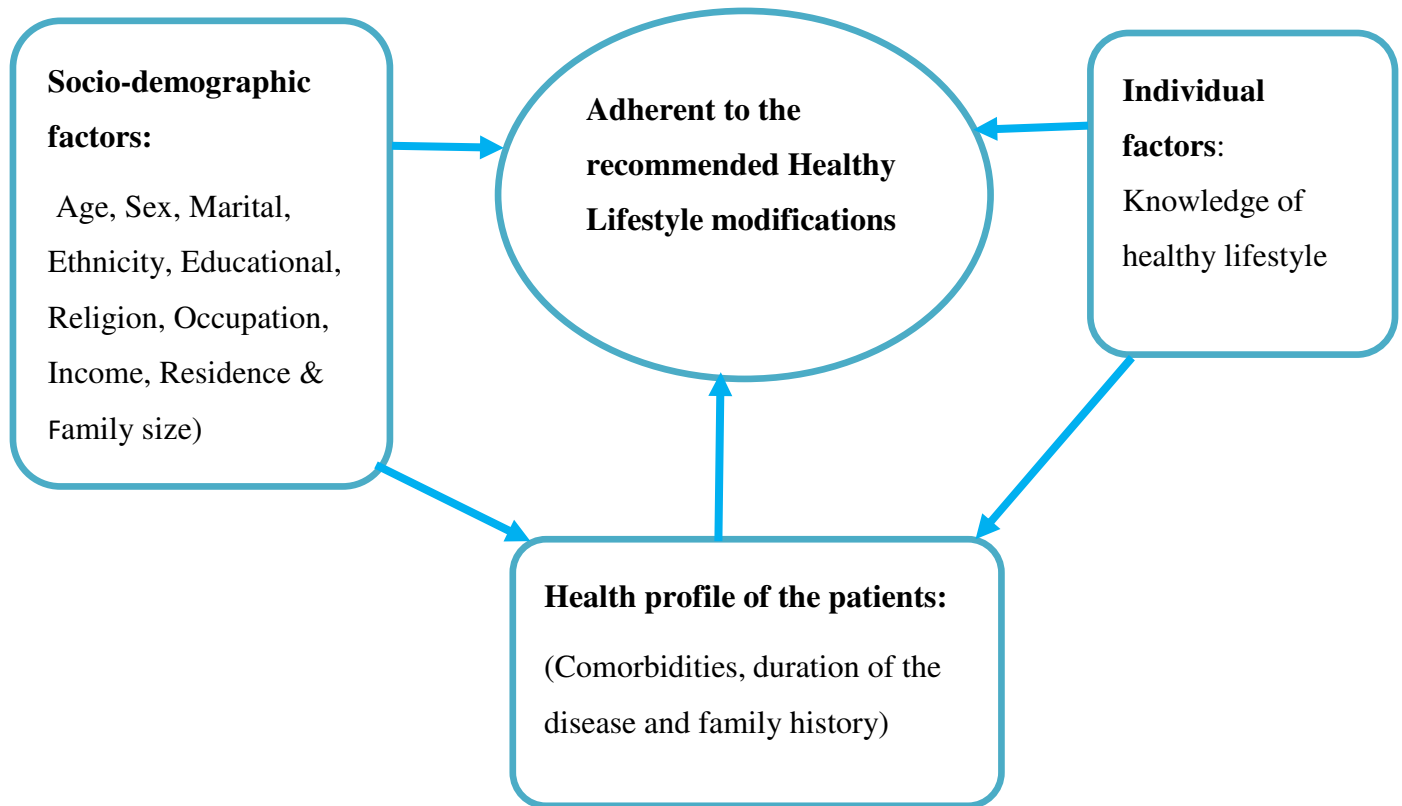


Figure 1: Conceptual framework of the study at Bishoftu General Hospital, Oromia Region, Ethiopia, 2022.

3. Objectives

3.1. General objective

To assess the level of adherence to lifestyle modifications and associated factors among hypertensive patients attending outpatient department at Bishoftu General Hospital, Oromia region, Ethiopia, in 2022.

3.2. Specific objectives

1. To assess the level of adherence to recommended lifestyle modifications among hypertensive patients attending the outpatient department at Bishoftu General Hospital.
2. To determine factors associated with adherence to lifestyle modifications among hypertensive patients attending the outpatient department at Bishoftu General Hospital.

4. Methods and Materials

4.1 Study Setting

The study was conducted at Bishoftu General Hospital in Bishoftu town, Oromia region, Ethiopia. The town of Bishoftu is located 47 kilometers east of Addis Ababa. The town is bordered by East Shoa zone of Ada'a District in the east, south, and north and Dukem town in the west. The town has an area of 182,878 hectares and has a temperature range of 11.18^{oc} to 26.5^{oc}. The administrative town of Bishoftu has 1 general hospital, 5 health centers, 5 health posts, 14 kebeles, 58 private clinics, 1 Ethiopian Air Force clinic, 1 Federal Air Force primary hospital, and 2 traditional healers. The population of the town was 193,340, of which 101,108 (51%) are females. The general hospital acts as a referral hospital that includes parts of the rural areas of the East Shoa Zone. The hospital serves more than 1 million people living in the catchment area.

4.2. Study Period

From 30 January to 29 March 2022

4.3. Study Design

A hospital-based cross-sectional study was conducted.

4.4. Population

4.4. 1. Source Population

All adult hypertensive patients were followed up at Bishoftu General Hospital.

4.4.2 Study Population

All selected adult hypertensive patients in the outpatient department who fulfilled the inclusion criteria and were available during the study period were the study population.

4.4.3. Eligibility criteria

4.4.3.1 Inclusion Criteria

All hypertensive patients ≥ 18 years of age and older who were on medical treatment for at least six months period before the beginning of the study were included in the study.

4.4.3.2 Exclusion Criteria

Patients with hypertension who were unwilling to perform a 24-hour recall at home and pregnant women were excluded from the study.

4.5. Sample size determination and sampling procedures

4.5.1. Sample size determination using adherence to lifestyle modifications

The sample size was calculated using a single population proportion formula by assuming 23.6% for the proportion of adherence to lifestyle modification with hypertensive patients from a study conducted at the Dessie Referral Hospital (43), with a 5% marginal error, and a 95% confidence level (CL).

$$\text{The sample size is } (n) = \frac{(Z_{\alpha/2})^2 * p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 * (0.23 * 0.77)}{(0.05)^2}$$

$$n = 273$$

4.5.2. Sample size determination using risk factors associated with adherence to life style modifications among hypertension patients.

The sample size required by using double population proportions to identify risk factors associated with adherence to lifestyle modifications among hypertensive patients was detected at a confidence level of 95%, variables significantly associated with hypertension in previous studies, and the power was fixed at 80% of the study. From a previous Ethiopian study, I have addressed a few factors that are strongly associated with lifestyle modifications in hypertensive patients. In a study of selected hospitals in southern Ethiopia (19), adherence to recommended healthy lifestyle was 25.9% for patients aged over 65 years and 5.4% for patients under 65 years, with an adjusted odds ratio (AOR) of 0.27, and an analysis of similar studies recommending lifestyle modifications showed 32.2% of patients without formal education and 20.7% with formal education, with an adjusted odds ratio (AOR) of 2.00. In the Northeastern Ethiopia study, (43) adherence to recommended lifestyle modifications was 9.3% in adult hypertensive patients with comorbidities and 14.3% in those without comorbidities, with an adjusted odds ratio (AOR) of 2.37.

The sample sizes calculated accordingly were 205, 210, and 273. The sample size of the first objective was larger than the sample size of the second objective. Therefore, the final sample size was adjusted by adding a 10% non-response rate, and finite population adjustment, resulting in a total sample size of 273. Accordingly, the sample size calculated in this study was 301. Hence the sample size of 301 was the final sample size for the present study as it would suffice to address all objectives of the study.

4.5.2. Sampling technique and procedures

Patients found during the study period at Bishoftu General Hospital who met the inclusion criteria were included in the study and exclusively for lifestyle modification adherence. Participants in the study were selected using a systematic random sampling technique of patients with hypertension who visit the hospital at chronic follow-up departments known to be hypertensive patients based on monthly hospital reports. In 2021, a total of 3,111 hypertensive patients were divided by the sample size ($n = 301$) to obtain $k=10.3$. Finally, participants were selected for the study using a systematic sampling method, with every tenth client selected from the daily flow of interval clients based on their outpatient follow-up, and the first case being randomly selected from 1 to 10 clients.

4.6. Measurement

4.6.1. Variables

4.6.1.1. Dependent variable

Level of adherence to lifestyle modifications

4.6.1.2. The independent variables

Socio-demographic factors: -Age, sex, marital status, religion, ethnicity, level of education, occupation, residence, monthly income, and family size.

Health profile of the patients: -Presence of co-morbidity (such as diabetes mellitus and chronic kidney disease), duration of the disease, and family history of hypertension.

Individual factors: - knowledge of lifestyle modification.

4.6.2. Data collection instruments and procedure

Data were obtained using a structured, validated, and pretested interviewer-administered questionnaire modified from questions found in the literature and the WHO STEPS questionnaire

survey (46). There is no standard questionnaire available to assess adherence to lifestyle modifications. The questionnaire contains information about variables related to socio-demographic, personal, and knowledge of lifestyle modifications. These variables can be expressed in terms of adherence to a dietary approach to stop hypertension (DASH), regular exercise, limiting alcohol consumption, and quitting smoking.

Measurements: Dependent variables, which are adherence to lifestyle modifications, were evaluated by adapting tools from similar studies. In this study, the components of lifestyle changes were measured on the Likert scale (always, most of the time, some time, and never). For each element (regular exercise, diet, smoking cessation, drinking limitation), participants always had specific questions to answer from some time options, never, and never did so (14,47).

4.7. Data collection and data collectors

Data was collected through face-to-face interviews. Investigators are responsible for the overall management of the study. Data were selected by three Bachelor of Science (BSC) professional nurses based on their experience in outpatient clinics, and a Master of Public Health (MPH) professional was recruited for supervisory activities. The study protects patient privacy by allowing for anonymity and voluntary participation.

4.8. Data quality control

Both data collectors and supervisors were trained on the objectives, research methodology, and approach to data collection for one day. The purpose of the training was to ensure that all data collectors had the same information about the research tool and followed the same interview procedures. The training focused on the purpose of the study, confidentiality, how to approach and promote questions to clients. The questionnaire is primarily prepared in English and translated into Afaan Oromo and then translated into English by another person to verify consistency. Preliminary testing was carried out in 15(5%) of samples in health facilities that were not included in the final study. Based on the finding, grammatical sequences of questions will be arranged on questionnaires. The Principal Investigator and Supervisor checked the completeness, accuracy, and clarity of the daily data collection with the data collectors, and any necessary corrections were made before the start of the next data collection day. Finally, the data was cleaned, coded, and cross-checked using the Epi-info software before data analysis.

4.9. Data processing and analysis

To minimize logical errors, the data was cleaned, coded, edited, and entered into Epi-Info version 7.2.1.0, and then exported to SPSS version 26 for further analysis. To assess adherence to lifestyle modifications and associated factors among hypertensive patients, bivariable and multivariable analysis was employed. The assumptions for binary logistic regression were checked to ensure that all potential confounders were controlled and values less than 0.25 in the bi-variable analysis were considered as candidate variables for multivariable logistic regression. Using the collinearity diagnosed test by a variance inflation factor (VIF) and tolerance test, we checked multicollinearity to see if there was a high correlation between the independent variables. The model goodness of fit was assessed using the Hosmer Lemeshow test. The association between the different independent variables and with dependent was measured using a bivariable and multivariable logistic regression model (adjusted odds ratios with p-value <0.05 and 95% CI).

4.10. Ethical considerations

Ethical clearance was obtained from the institutional review board (IRB) (*Ref.No.PM23/345/2022*) of St. Paul's Hospital Millennium Medical College and Oromia Regional Health Bureau. An official letter was sent to Bishoftu general hospital. After obtaining permission from the hospital to participate in the study, an informed, voluntary, written, and signed consent was obtained for the participation of both the hospital manager and the patients. The patient's privacy and confidentiality were ensured through an interview in a non-public place, and they will be aware that their participation in the study would not be an incentive or harm. Finally, the identity of the participants remained anonymous throughout the process of data collection and analysis.

4.11. Operational definitions and Measurements

Lifestyle modification: The adoption of a healthy lifestyle which was recommended by JNC 7 as non-pharmacological management of hypertension measured using physical exercise, (DASH) diet, moderation of alcohol intake, and stopping smoking (47).

Adherence to lifestyle modifications: According to JNC 7 recommended healthy lifestyles, were measured based on respondents who adhere to (DASH) diet usually or always ate a diet rich in vegetables, grains, and fruits; rarely or never ate salt, rarely or never ate saturated fat;

aerobic physical activity for >30 minutes per day at least five times per week; stop smoking, and never consumed alcohol or alcohol consumed limited to 2 standard drinks a day for men and 1 standard drink a day for women. In this study, the participants who adhered to all these four healthy lifestyles were considered adherent or otherwise non-adherent (48).

Diet-related adherence: Respondents who usually or always ate a diet rich in vegetables, grains, and fruits, rarely or never ate salt; rarely or never ate saturated fat at least 3 times per week were considered to be adherent (48).

Exercise-related adherence: Respondents who engage in aerobic physical activity (including brisk walking, jogging or running, riding a bicycle and swimming) for >30 minutes per day at least five times per week. The respondents were considered adherent to the physical activity recommendation if they answered yes to the exercise inquiry and otherwise (14).

Smoking-related healthy lifestyle: Participants who self-reported to have never smoked or quit smoking within the previous 12 months (49).

Alcohol consumption-related adherence: Participants who reported that they either never consumed alcohol or alcohol consumed limited to 2 standard drinks a day for men and 1 standard drink a day for women (1 standard drink is equivalent to 25 ml spirits (e.g. whisky, brandy, vodka) or 125 ml (one standard drink glass) wine or 340 ml beer) were taken as adherent to moderation of alcohol consumption (13).

Knowledge on healthy lifestyle: Respondents with a scores above the mean value on hypertension evaluation of lifestyle and management scale were taken as having good knowledge about a healthy lifestyle otherwise low (43).

4.12. Dissemination of findings

The findings will be presented to the St Paul's Hospital Millennium Medical School (SPHMMC), School of Public Health. After approval by advisors and an external examiner, the findings will be disseminated to the study area of the Bishoftu General Hospital, the town of Bishoftu, and the Oromia regional health bureau. Finally, the findings will be presented at different conferences and published in the journal.

5. Results

5.1. Socio-Demographic characteristics of Participants

Out of the total hypertensive patients who attended the outpatient chronic follow-up department of Bishoftu General Hospital during the study period, 301 hypertensive patients were included in the study, giving a response rate of 100%. The majority of 212 (70.4%) study participants lived in an urban area. The median age of the participants was 57.00 years (± 12.4 SD), slightly higher than half of 162 (53.8%) of the participants were found to be above the age of 55 years. The majority of participants were married 211 (70.1%), females 158 (52.5%), and 242(80.4%) of them attended formal education. Around 138 (45.8%) of the participants were Oromo by ethnicity and 212(70.4%) were Orthodox followers by religion (Table1).

Table 1: Socio-demographic characteristics of hypertensive patients attending the outpatient department at Bishoftu General Hospital, Oromia, Ethiopia, 2022(n = 301)

Variables	Category	Frequency	Percent (%)
Residency	Urban	212	70.4
	Rural	89	29.6
Sex	Male	143	47.5
	Female	158	52.5
Age in years	18-35	20	6.6
	36-45	36	12.0
	46-55	83	27.6
	>55	162	53.8
Marital status	Married	211	70.1
	Single	16	5.3
	Divorced	30	10.0
	Widowed	44	14.6
Ethnicity	Oromo	138	45.8

	Amhara	106	35.2
	Gurage	33	11.0
	Tigre	17	5.6
	Others*	7	2.3
Religion	Orthodox	212	70.4
	Protestant	43	14.3
	Muslim	38	12.6
	Others **	8	2.7
Educational status	No formal education	59	19.6
	Formal education	242	80.4
Occupation	Employed	88	29.2
	Unemployed	65	21.6
	Farmer	65	21.6
	Private business	73	24.3
	Others***	10	3.3
Average monthly income(in birr)	No regular income	59	19.6
	1000 ETB	23	7.6
	1000-1999ETB	49	16.3
	2000-2999ETB	111	36.9
	>3000ETB	59	19.6
Family Size(in number)	<5	163	54.2
	>5	138	45.8

Others (Sidama, Silte and Somale *, Wakefata and Catholic **, House wife and private workers or contract ***)

5.2. Health profile of the Patients and Individual related factors

Of the 301 study participants, 122 (40.5%) have a family history of hypertension and 130(43.2%) were hypertensive for five or more years. Among the study participants, 129 (42.9%) participants had co-morbidities diseases (such as diabetes mellitus and chronic kidney disease) (Table 2).

Table 2: Patient health profile and individual factors of study participants at Bishoftu General Hospital, Oromia, Ethiopia, 2022(n = 301)

Variable	Category	Frequency	Percent (%)
Family history of hypertension	No	179	59.5
	Yes	122	40.5
Duration of hypertension (years)	<2	44	14.6
	2-5	78	25.9
	5-10	130	43.2
	>10	49	16.3
Presence of comorbidity	No	172	57.1
	Yes	129	42.9

5.3. Knowledge on a healthy lifestyle

The knowledge and information on a healthy lifestyle addressing hypertension patients was determined using ten (10) questions for hypertension evaluation on a healthy lifestyle. The average knowledge score was (2.01 ± 0.415) as the cut-off point, indicating that 134 (44.5%) of the 301 participants were good knowledge on a healthy lifestyle (Figure 2).

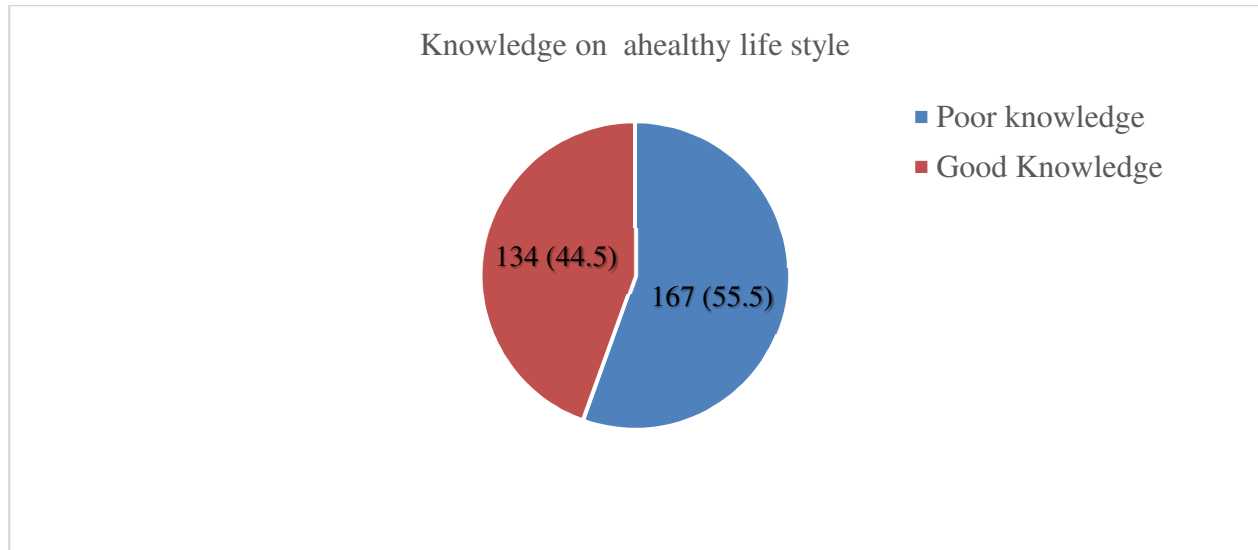


Figure 2: Knowledge on a healthy lifestyle among respondents attending outpatient department at Bishoftu General Hospital, 2022(n = 301)

5.4. Adherence to recommended lifestyle modifications

5.4.1. Adherence to the recommended diet

The majority 174 (57.8%) of participants included fruits, vegetables, and grains in their diet after being diagnosed with hypertension. The average dietary score was found to be (3.246 ± 0.594) . Among 167(55.5%) respondents sometimes ate foods rich in saturated fats, and 85(28.2%) participants rarely ate spicy foods after diagnosis. About 112(37.2%) of participants never eat salt in food during their meals (Table 3).

Table 3: Adherence to the recommended diet among hypertensive patients attending Bishoftu General Hospital outpatient department, Oromia, Ethiopia, 2022 (n = 301)

Variables	Always	Often	Sometimes	Rarely	Never
Included fruits, vegetables, and grains in the diet	71(23.6%)	33(11%)	132(43.9%)	39(13%)	26(8.6%)
Consuming foods that contain high saturated fat	24(8%)	15(5%)	167(55.5%)	59(19.6%)	36(12%)
Consuming spicy foods	31(10.3%)	40(13.3%)	109(36.2%)	85(28.2%)	36(12%)
Consuming salt in your food	7(2.3%)	15(5%)	104(34.6%)	63(20.9%)	112(37.2%)

5.4.2. Adherence to related-Exercise

About 152(50.5%) of participants said they do physical activity, with 69(22.6%) claiming they exercise at least 3 times a week, and about a similar number 66(21.9%) confirming that they engage in an activity that takes greater than 30 minutes of practice. Aerobic exercise (including brisk walking, jogging or running, riding a bicycle and swimming) was the most common physical activity among those found to be consistent at 126(41.9%) (Table 4).

Table 4: Adherence to related-Exercise among hypertensive patients attending Bishoftu General Hospital outpatient department, Oromia, Ethiopia, 2022 (n = 301)

Variables	Category	Frequency	Percent (%)
Do you perform physical exercise?	No	149	49.5
	Yes	152	50.5
Frequency of exercise in a week	<Three times per week	44	14.6
	Three times per week	69	22.9
	>Three times per week	44	14.6
Duration of exercise per session	Less than 30 minutes	35	11.6
	From 30 minutes to 1 hour	66	21.9
	More than 1 hour	58	19.3
Type of exercise performed	Aerobics(walking, Jogging)	126	41.9
	Weight-bearing	15	5.0
	Driving	13	4.3
	Dancing	5	1.7

5.4.3. Alcohol consumption

All 273 (90.7%) hypertensive patients were adhere to moderation in alcohol consumption. About 105(34.9%) of the participants consumed less than one drink per week and 25(8.3%) of the participants consumed more than seven drinks per week. Approximately 128 (46.9) of these participants confirmed that a relative/health care professional was concerned about their alcohol use and advised them to reduce their alcohol consumption during the last year (Table 5).

Table 5: Participant response to alcohol consumption among hypertensive patients attending outpatient follow-up at Bishoftu General Hospital, Oromia, 2022 (n = 301)

Variables	Category	Frequency	Percent (%)
Alcohol consumption	Not moderated	28	9.3
	Moderated	273	90.7
How often do you usually drink alcohol	<1 drink a week	105	34.9
	1-3 drinks a week	96	31.9
	4-6 drinks a week	47	15.6
	≥ 7 drinks a week	25	8.3
	Never	28	9.3
Tried to quit Alcohol consumption	No	145	53.0
	Yes	128	46.9

5.4.4. Smoking cessation

Of the 301 participants, 274 (91.0%) had never smoked, while 27 (9.0%) of them are still smokers. Among the 27 participants who still smoked cigarettes, 18 (66.7%) had tried to quit smoking (Table 6).

Table 6: Participant response on Smoking cessation among hypertensive patients attending the outpatient department at Bishoftu General Hospital, Oromia, 2022 (n=301)

Variables	Category	Frequency	Percent (%)
Ever smoked cigarette	No	274	91.0
	Yes	27	9.0
Advice by a health worker to quitting smoking	No	3	11.1
	Yes	24	88.9
Tried to quit smoking	No	9	33.3
	Yes	18	66.7

5.4.5. Overall adherence to recommended lifestyle

The overall the level of adherence to recommended lifestyle (including diet, exercise, moderation of alcohol consumption, and smoking cessation) in this study found that only 26.9% of participants adhere to all recommended lifestyle modifications. About 174(57.8%) of participants adhere to recommendations related to the diet. Most 177(58.8%) participants did not engage in regular exercise at least 3 days per week, with a minimum duration of 30 minutes. About 274 (91.0%) participants did not smoke, and 273(90.7%) participants remained with moderate alcohol consumption (Table 7).

Table 7: Overall adherence to recommended lifestyle modifications for hypertensive patients attending outpatients at Bishoftu General Hospital, Ethiopia in 2022 (n = 301)

Variables	Category	Frequency	Percent (%)
Diet-related adherence	Non-adherent	127	42.2
	Adherent	174	57.8
Exercise-related adherence	Non-adherent	177	58.8
	Adherent	124	41.2
Alcohol moderation	Not moderated	28	9.3
	Moderated	273	90.7
Smoking	Ceased	274	91.0
	Did not ceased	27	9.0
Overall adherence to recommended lifestyle	Non-adherent	220	73.1
	Adherent	81	26.9

5.5. Factors associated with adherence to lifestyle modifications

In Bivariable logistic regression analysis study showed that age, marital status, educational status, occupational status, family membership, duration of hypertension, having co-morbidities, and knowledge about lifestyles were significantly associated with adherence to recommended lifestyle modifications at a p-value ≤ 0.25 . The Hosmer and Leme show the goodness of fit test gave a p-value = 0.212 suggestive of evidence of fitness of the model. After controlling for the

influence of other factors (confounders) in a multivariable logistic regression, age, educational status, duration of hypertension, having co-morbidities, and knowledge about lifestyles were found to be significantly associated with adherence to recommended lifestyle modifications at a p-value ≤ 0.05 .

Respondents in the elderly group were found to be nearly three times more adherent than respondents in the young age group (AOR 2.81; 95% CI: 1.35, 5.84). Formal education respondents were 48% less likely to be adherent to lifestyle modification (AOR = 0.52; 95% CI: 0.28, 0.96) compared to respondents with no formal education. Patients who had hypertension for long-duration were almost twice as likely to adhere to patients as short as diagnosis (AOR = 2.33; 95% CI: 1.01–5.37). Adult hypertensive patients with co-morbidities were about two (AOR=2.06; 95% CI: 1.21-3.49) times more likely to adhere to recommended lifestyle modifications than patients without co-morbidities. Patients with good knowledge about lifestyles were 58% less likely to adhere to recommended lifestyle modifications than those with less knowledge about lifestyles (AOR = 0.42; 95% CI: 0.24-0.74) (Table 8).

Table 8: Bivariable and Multivariable Logistic regression output indicating factors associated with Adherence to recommended lifestyle modifications among patients with hypertension attending the outpatient department at Bishoftu General Hospital, Oromia, Ethiopia, 2022 (n=301)

Variables	Category	Lifestyle adherence		COR (95 % CI)	AOR (95 % CI)	P-value
		Adherent N (81)	Non-adherent N (220)			
Age in years	18-35	7	13	1.00	1.00	
	36-45	10	26	1.28(0.39-4.22)	0.92(0.29-2.85)	0.891
	46-55	11	72	0.97(0.39-2.42)	1.07(0.45-2.51)	0.869
	>55	53	109	0.90(0.16-0.77)*	2.81(1.35-5.84) **	0.006
Marital status	single	6	10	0.45(0.13-1.58)*	0.56(0.14-2.20)	0.408
	Married	47	164	0.47(0.10-2.30)	1.70(0.37-7.79)	0.491
	Divorced	6	24	1.47(0.35-6.15)	1.81(0.53-6.12)	0.340
	Widowed	22	22	1.00	1.00	
Educational status	No- formal education	22	37	1.00	1.00	

Occupational status	Formal-education	59	183	0.48(0.24-0.97)**	0.52(0.28-0.96)**	0.037
	Employed	19	69	1.00	1.00	
	Unemployed	19	46	3.53(0.38-32.41)	0.35(0.04-3.06)	0.349
	Farmer	25	40	3.61(0.39-33.44)	0.26(0.03-2.23)	0.220
	Private business	17	56	10.65(0.94-120.62)*	0.17(0.021-1.48)	0.109
	Other	1	9	3.18(0.34-29.17)	0.32(0.03-2.77)	0.304
Family size (numbers)	<5	47	116	1.00	1.00	
	>5	34	104	0.80(0.37-1.19)*	0.76(0.45-1.28)	0.304
Duration of hypertension (years)	<5	21	75	1.00	1.00	
	5-10	29	89	0.85(0.35-2.09)*	2.33(1.01-5.37)**	0.047
	10-15	15	36	0.20(.07-.53)	1.96(0.88-4.36)	0.099
	>15	16	20	0.79(.36-1.69)	1.61(0.64-4.00)	0.304
Co-morbidities	No	35	137	1.00	1.00	
	Yes	46	83	2.01(1.19-3.73)*	2.06(1.21-3.49)**	0.007
Knowledge level	Poor	58	109	1.00	1.00	
	Good	23	111	0.38(0.24-.80) *	0.42(0.24-0.74) **	0.003

Notes: *Variables having a ($p \leq 0.25$) in bivariable analysis, **statistically significant at ($p \leq 0.05$) in the multivariable analysis.

6. Discussion

This study aimed to investigate the level of adherence to lifestyle modifications and associated factors among patients with hypertension attending the outpatient department at Bishoftu General Hospital, Oromia, Ethiopia. In this study, the level of good adherence to the recommended lifestyle modification among patients with hypertension was found to be 26.9%. Age, educational status, duration of hypertension, having co-morbidities, and knowledge about lifestyle were significantly associated with adherence to lifestyle modification. So, hypertension is the most important public health problem, if poorly managed and poor adherence to a healthy lifestyle this factor that can lead to disability and mortality. As a result, maintaining a healthy lifestyle is an effective strategy for reducing hypertension.

Overall the level of adherence to recommended lifestyle modification in this study was only 26.9%. This is low compared to studies conducted in Ghana and eastern Ethiopia that reported adherence rates of (72%) and (28.7), respectively (30,31). The discrepancy in adherence rates between our study and other studies may be due to the various study methods (like sample size) and inadequate health promotion given to the client regarding knowledge on a healthy lifestyle of hypertension prevention and control. This study found that although many people still don't adhere to a healthy lifestyle, this increases the burden of chronic diseases like hypertension.

In this study dietary adherence was described by including more fruits, vegetables, and grains in the diet, as well as eating low-sodium and low fat. The prevalence of dietary adherence in this study was 57.8%. In contrast, in Korea, this study shows that a majority (77.5%) of the study participants followed dietary modification and another study from Addis Ababa found that only (64.7%) of the respondents were found to be adherent (33,34). Discrepancies in local studies may be due to differences in dietary habits and the place of residence of study participants. Hypertension was successfully reduced in those who followed a recommended diet.

In this finding, exercise-related adherence was 41.2%. Similar studies conducted in Bangladesh and Georgia found slightly higher adherence rates of (46%) and (46.6%), respectively (32,35). This finding is comparable with the adherence level of participants to exercises at a public health hospital in Addis Ababa, in which (33.9%) adhere to exercise regularly (18). Discrepancies in the study area could be the result of hard-working circumstances, a lack of awareness of promotions for those with low educational

attainment, cultural differences, and a lack of organized living conditions. This indicates that a lack of exercise adherence is a leading cause of hypertension and cardiovascular disease.

The majority in this study 90.7% of respondents were found to moderate their alcohol consumption. In similar studies conducted in Malaysia and Korea and almost (90%) and (80%) of the study, participants were limited to alcohol consumption (14,36). Another study conducted in Addis Ababa, Ethiopia, when compare the results shows that (74.8%) of respondents moderated their alcohol consumption (37). This disparity can be explained by social and cultural norms that support the consumption of alcoholic beverages. This means that consuming alcohol raises the risk of hypertension.

The majority in this study 91% had never smoked before twelve months, which is consistent with studies in Zimbabwe (97%) and Turkey (83%) where the majority of respondents were found to be adherent to smoking cessation (13,38). In a similar study in selected hospitals, in southern Ethiopia, 91.2% were non-smokers (19). One of the leading causes of hypertension is smoking. This similarity can be explained by social and cultural practices in society that discourage smoking.

In this study, age, education level, duration of hypertension, having co-morbidities, and knowledge about lifestyles were strongly associated with adherence to the recommended lifestyle modifications.

It was found that older respondents are more adherent to lifestyle modifications than younger age groups. In a similar study conducted in the Kingdom of Saudi Arabia and Addis Ababa, Ethiopia, it was found that individuals above the age of 60 years were more likely to recommend lifestyle modifications (12,37). The reason for the older age differences may be further explained by increased awareness of the management and control of hypertension during visits to health care providers.

Those with formal education were 48% less likely to adhere to lifestyle modification than respondents with no formal education. This study is supported by Eritrea and Gondar, Ethiopia (40,41). A possible explanation may be related to an increase in patients' awareness of the importance of recommended lifestyle modification to prevent hypertension with increasing formal education levels

In this study respondents who reported that they have been diagnosed longer period since diagnosis with hypertension for a short period were found more likely to be adherent. This is comparable to a study from southern Ethiopia and Ghana, which found that Patients on treatment with a long history of hypertension were more likely to adhere to lifestyle modifications (19,30). The results showed that those who have had hypertension for less than five years are less likely to see the condition as life-threatening, while those

with hypertension for more than five years are more likely to adhere to lifestyle modification. The differences are due to the continuous counseling and health education provided by healthcare providers.

This study showed that adult hypertensive patients with co-morbidities were twice as likely to adhere to the recommended lifestyle modifications compared to those without co-morbidities. It is very difficult to control hypertension if it is accompanied by other co-morbidities. This could make it harder for the patient to adhere to a healthy lifestyle, making their conditions worse. The study was conducted in Saudi Arabia and north-eastern Ethiopia (12,43). A possible rationale could be that patients with comorbidities visit health care providers more frequently and pay more attention to their health status, as evidenced by better commitment to lifestyle changes.

This study indicated that knowledgeable patients were 58% less likely to adhere to lifestyle modifications than less knowledgeable patients. Hypertension knowledge is an important part of the chronic care model, and knowing how to prevent and control the disease is an important part of managing it. This finding was consistent with findings of studies conducted in hospitals in Gondar, Ethiopia, and Eastern Ethiopia (41,45). This may be because poor knowledgeable patients may not understand the disease and how to prevent and manage it. It is important to increase patient access to information on risk factors and lifestyle modification recommendations.

7. Strengths and limitations of the study

Strengths of the study

The response rate in this study were 100%. This study can provide valuable information that can serve as a guide for further study.

Limitations of the study

The main limitation of this study it was conducted only at a single public health hospital and did not include patients with hypertension who were seen in private clinics. In addition, research methodologies involving self-reported measures depend largely on individuals. This method is simple but less reliable among those patients who deny poor adherence and social desirability bias, especially among smokers, and recall bias may exist.

8. Conclusions and Recommendations

8.1. Conclusions

This study revealed the level of adherence to recommended lifestyle modifications was low among patients with hypertension. Of the variables studied, age, educational level, duration of hypertension, having co-morbidities, and knowledge about healthy lifestyle were independent predictors of adherence to lifestyle modifications.

8.2. Recommendations

Based on the results of the study, the following recommendations for adherence to lifestyle modifications to prevent and control hypertension are suggested to the concerned bodies working in this area:

- Overall, the level of adherence to recommended lifestyle modifications in this study were very low, the Federal Ministry of Health and the Regional Health bureau should develop intervention strategies to promote a healthy lifestyle for the prevention and control of hypertension.
- Oromia Regional Health Bureau and health facility managers should facilitate training for healthcare professionals about lifestyle modifications to prevent and control hypertension.

- The Bishoftu Town Health Office should coordinate with non-health sectors such as education, agriculture, sport and involve other development partners in implementing modifiable risk factors, such as promoting physical activity, healthy eating habits, limitation of alcohol consumption, and smoking cessation through behavior change communication (BCC) and awareness-raising for the prevention and control of hypertension
- Health professionals should strictly screen and targeting those subgroups noted to be at higher risk factors of poor adherence to healthy life style modifications e.g. elderly age group, respondents who had no formal education, those having co-morbidities and those less knowledgeable and educate on recommended lifestyle modifications at a health facility.
- Health extension workers should provide health education continuously on healthy diet, limit alcohol intake and physical activity at community level.

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10. Annexes

Annex I: Information sheet

Greeting

My name is _____ and I am a member of the research team conducted by **Girma Mideksa**, (Field Epidemiology resident) from St. Paul's Hospital Millennium Medical College, School of public health. I am conducting a study on Level of adherence to lifestyle modifications and associated factors among hypertensive patients attending the outpatient department at Bishoftu General Hospital. The result that will come out of this study will be used by the hospital to base their rational decision to develop appropriate strategies to combat this problem. This Research is intended to benefit the community, including those who participate in this survey and does not pose any risk to the participants. It can take up to 30 minutes to complete the survey. Your participation is completely voluntary and you can stop your research at any time. There is no penalty for not showing willingness to participate. There is no benefit to participating, and there is no risk or harm to participating in this study. Since your name and other personal information are not used, the information we collect from you is completely confidential and will not be disclosed to any third party other than those who participated in this study. If you have any questions, please use this contact information.

Can I start the interview? If yes, continue the interview. If not, thank you. Please cancel the interview. How much do you take antihypertensive drugs? If less than 6 months, please stop the interview. If more than 6 months, continue the interview.

Address of the principal investigator

Name of the principal investigator **Girma Mideksa Legese**

Tele phone/Mobile Number/ +251911991345/+251912452500, Email girmamdks@gmail.com

Name of data collector _____

Date of interview DD_____MM_____YYYY_____ (G.C) Signature_____

Annex II: Data collection tool

Questionnaire identification number _____

PART I – Socio-demography data

Instruction: - I request you kindly go through each question and give your responses by placing a tick **mark** (✓) and writing against the box provided.

S/No	Question	Response	Code	Answer	Skip to
101	Age of the respondent	_____ (age in years)			
102	Residency	a) Urban b) Rural	1 2	() ()	
103	Sex of respondent	a) Male b) Female	1 2	() ()	
104	Marital status of the respondent	a) Single b) Married c) Divorced d) Widowed	1 2 3 4	() () () ()	
105	Occupation of respondent	a) Employed b) Unemployed c)Farmer d)Private business e)Other(specify)_____	1 2 3 4 5	() () () () ()	
106	Ethnicity	a)Oromo b)Amhara c)Gurage	1 2 3	() () ()	

		d)Tigre	4	()	
		e)Other(specify)_____	5	()	
107	Religion	a)Orthodox	1	()	
		b)Protestant	2	()	
		c)Muslim	3	()	
		d)Wake feta	4	()	
		e)Other(specify)_____	5	()	
108	level of education	a)Illiterate	1	()	
		b)Read and write	2	()	
		c)Elementary	3	()	
		d)Secondary	4	()	
		e) Above the secondary	5	()	
109	Family monthly income(in birr)	a) No regular income	1	()	
		b) <999 ETB	2	()	
		c) 1000-1999ETB	3	()	
		d) 2000-2999ETB	4	()	
		e) > 3000 ETB	5	()	
110	What is your family size?	_____(in number)			
111	Average Working hours per day	_____in hours			

PART II – Health-related assessment

This section is about the general health condition of the respondent go through each question and give your responses by placing a tick **mark** (✓) against the box provided.

S/No	Question	Response	Code	Answer	Skip to
201	Have you ever had your blood pressure measured by a doctor or other health worker?	a)Yes b) No c) Don't know	1 2 3	() () ()	
202	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	a)Yes b)No c)Don't know	1 2 3	() () ()	
203	Has any of your family members (biological parents, siblings, or children) ever had raised blood pressure or hypertension?	a)Yes b)No c) Don't know	1 2 3	() () ()	
204	How long has it been since you were diagnosed with hypertension	a)___years__ months b) Don't know	1 2	() ()	
205	How long have you been taking anti-hypertensive medications?	a)___years__ months b) Don't know	1 2	() ()	
206	Do you have any comorbidities (such as diabetes mellitus, stroke, chronic kidney disease, and coronary heart disease)?	a)Yes b)No c) Don't know	1 2 3	() () ()	

PART III– Knowledge of a healthy lifestyle

This section is about knowledge regarding hypertension and its management. Kindly go through the questions given below and **tick** (✓) against the appropriate answer.

S/No	Question	Response	Code	Answer	Skip to
301	What is the normal range of blood pressure?	____/____mm Hg			
302	Is high blood pressure or hypertension preventable?	a)Yes b)No c) Don't know	1 2 3	() () ()	
303	What evidence of target organ damage is present?	a) Liver dysfunction b)Gastrointestinal infection c)Respiratory dysfunction d) Renal dysfunction e) Don't know	1 2 3 4 5	() () () () ()	
304	Which is the risk factor of hypertension given below	a) Stress b) Age c) Hereditary d) Stress, age and heredity e) Don't know	1 2 3 4 5	() () () () ()	
305	Do you know to have whole fruits rather than to have sweets	a) strongly agree b) agree c) disagree d) strongly disagree	1 2 3 4	() () () ()	
306	Do you know stoppage of smoking and alcoholism helps to prevent hypertension	a) strongly agree b) agree c) disagree d) strongly disagree	1 2 3 4	() () () ()	
307	Which of the following methods	a) Diet control	1	()	

	are used to control hypertension?	b) Drug therapy	2	()	
		c) Regular exercise	3	()	
		d)Diet, drug & exercise	4	()	
		e) Don't know	5	()	
308	What is the nutritional intervention for hypertension?	a) Water restriction	1	()	
		b) Decrease salt intake	2	()	
		c) Increase salt intake	3	()	
		d) Decrease calorie reach foods	4	()	
		e) Don't know	5	()	
309	Which of the following food should a hypertensive patient avoid?	a) Salt reach and salty foods	1	()	
			2	()	
		b) Spicy foods	3	()	
		c) Vegetables and fruits	4	()	
		d) Don't know			
310	Which of the following is a salt-rich food?	a) Pickles	1	()	
		b) Milk	2	()	
		c) Vegetables	3	()	
		d) Industry food(Packing food)	4	()	
		e) Don't know	5	()	

PART IV – Adherence to dietary modifications

This section is about adherence to dietary modifications. Kindly go through the questions given below **and tick** (✓) against the appropriate answer. Each correct answer carries 1 mark

S/No	Question	Response	Code	Answer	Skip to
401	Do you include fruits, vegetables, grains, and beans in your diet at least 3 times per week after your diagnosis of hypertension?	a)Always b)Often c)Sometimes d)Rarely e)Never f)Don't know	1 2 3 4 5 6	() () () () () ()	
402	How often do you consume foods that contain high saturated fat (e.g., cheese, coconut oil, cottonseed oil, mutton fat, etc.) since being diagnosed?	a)Always b)Often c)Sometimes d)Rarely e)Never f)Don't know	1 2 3 4 5 6	() () () () () ()	
403	Do you consume spicy foods since being diagnosed?	a)Always b)Often c)Sometimes d)Rarely e)Never f)Don't know	1 2 3 4 5 6	() () () () () ()	

404	How often do you add salt to your food without trying it?	a)Always b)Often c)Sometimes d)Rarely e)Never f)Don't know	1 2 3 4 5 6	() () () () () ()	
405	How important to you is lowering the salt in your diet?	a)Very important b)Somewhat important c)Not at all important d)Don't know	1 2 3 4	() () () ()	
406	Do you think that too much salt or salty sauce in your diet could cause a health problem?	a)Yes b) No c) Don't know	1 2 3	() () ()	

Part V – Respondent’s adherence to Physical activity

S/No	Question	Response	Code	Answer	Skip to
501	Do you perform physical exercise at all?	a)Yes b)No	1 2	() ()	If not go to 601
502	How often do you exercise?	a) <Three times per week b) Three times per week c)> Three times per week d) Don't know	1 2 3 4	() () () ()	

503	What type of exercise do you perform?	a)Aerobics(walking, jogging) b) Weight-bearing c) Driving d) Dancing e)Don't know	1 2 3 4 5	() () () () ()	
504	On the days that you exercised, how many minutes did you usually spend exercising per day?	a) Less than 30 minutes b)From 30 minutes to 1 hour c) More than 1 hour d)Other(specify)_____	1 2 3 4	() () () ()	

Part VI – Adherence to alcohol consumption

This section is about adherence to alcohol consumption. Kindly go through the questions given below and **tick** (✓) against the appropriate answer. Each correct answer carries 1 mark

S/No	Question	Response	Code	Answer	Skip
601	Are you drinking alcohol	a)Yes b) No	1 2	() ()	If no go to 701
602	On average, how often do you usually drink modern alcohol (one portion of alcohol is having at least 1 glass of wine, can/bottle of beer, a shot (50g) of cognac or ouzo)?	a)Less than one drink a week b)One to three drinks a week c)Four to six drinks a week d) Seven or more drinks a week e) Never	1 2 3 4 5	() () () () ()	
603	During the past 7 days, did you consume any alcohol, like Tella, Tej, beer, or Wine?	a) Yes b) No c)Don't know	1 2 3	() () ()	
604	Have you drunk any alcohol in the past 30 months before	a) Yes b) No	1 2	() ()	

	this survey?	c)Don't know	3	()	
605	For how long have you been drinking?	_____ years _____ months			
606	Have you stopped drinking due to health reasons, such as a negative impact on your health or the advice of your doctor or other health/worker?	a) Yes b) No c)Don't know	1 2 3	() () ()	

Part VII – Adherence to a cessation of smoking

This section is about adherence to cessation of smoking. Kindly go through the questions given below and tick (√) against the appropriate answer. Each correct answer carries 1 mark

S/No	Question	Response	Code	Answer	Skip to
701	Do you currently smoke cigarettes?	a)Yes b)No	1 2	() ()	If no skip
702	How long do you smoke?	a)____years____months b) Don't know c) Refuse to answer	1 2 3	() () ()	
703	Do you currently smoke tobacco products before 7 days?	a)Yes b)No	1 2	() ()	
704	How many packs of cigarettes do you currently smoke per day?	a)_____pack cigarettes b) Don'tknow c) Refuse to answer	1 2 3	() () ()	
705	During the past 30 days, did you notice any health warnings on cigarette packages?	a)Yes b)No c)Don't know	1 2 3	() () ()	
706	During any visit to a doctor or other health worker in the past 12 months, were you advised quitting	a)Yes b)No c)Don't know	1 2 3	() () ()	

	smoking tobacco?				
707	During the past 12 months, have you tried to stop smoking?	a)Yes b) No c)Don't know	1 2 3	() () ()	

Ref. No. PM 23 / 345
Date: 11/2/2022

Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College (SPHMMC)

Ethical Clearance

Research Title: Adherence to lifestyle modifications and associated factors among hypertensive patients attending outpatient department at Bishoftu general hospital, Oromia region, Ethiopia,

Principal Investigator: Mr. Girma Mideksa

The IRB of SPHMMC has reviewed the above mentioned research proposal and made the following decision:

- Approved:- _____ x _____
- Approved with recommendation:- _____
- Approved on condition :- _____
- Disapproved:- _____

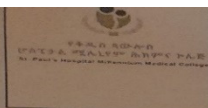
The decision is valid for 12 months and the research should be conducted in compliance with the protocol/proposal approved by the IRB of SPHMMC. Any subsequent revision/amendment of the protocol/proposal needs approval before conduct of the research. The researcher should also submit written summaries of the research status to the IRB every 03 months. Upon the conclusion of the study, manuscripts and thesis work to the final/completed research project needs to be submitted to the IRB.

IRB Chair:
Signature: _____
Date: February/1, 2022

Cc:

- Vice Provost for Academic and Research
- IRB
- Dr. Girma Mideksa

SPHMMC



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1. Tesfaye Chala
2. Fufa Balcha
3. Kedir Geda
4. Girma Mideksa

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In reply please refer to our ref. No

Addis Ababa Ethiopia

Biiroo Eegumsa Fayyaa Oromiyaa
Oromia Health Bureau
Saarbet (Calealii) - Finfinnee

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Guyyaa/Date

BR/HR/2014/1-18/7067
9/6/2014

Hospitaala Waliigala Bishooftuuf

Bishooftuu

Dhimmi: **Deeggarsa akka gootan isin beeksisuu**

Mata dureen akka tuqame "Resident in field epidemiology" biiroo keenya irratti ramadamee jiru **Girmaa Miidhaksaa** kan jedhaman mata duree "Adherence To Life Style Modifications And Associated Factors Among Hypertensive Patients Attending Outpatient Department" jedhu irratti qorannoo gaggeessuu waan barbaadaniif raga barbaachisu akka kennitaniif akkasumas qorannoo kanaaf waan isin irraa tumsa barbaadan akka gootaniif isin hubachiisna.

NagaaWajjin

G/G

- Girmaa Miidhaksaa

BFO



Bishannu Qanaate
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