



Knowledge of hypertension and impacts of dietary habits of hypertensive patients on blood pressure control in cardiology departments in the Kara region

Machihude PIO^{1,2}, Lihanimpo DJALOGUE², Dibéka NAGNANE^{1,2}, Abalo Mario BAKAI^{1,2}, Eyram Makafui Yoan Yawo AMEKOU², TCHEROU Tcha^{1,2}, Borgotia D ATTA^{1,2}, Yaovi Mignazonzon AFASSINO³, KAZIGA Wiyau Dieu-Donné³

¹Teaching and Research Unit in Cardiology and Vascular Diseases, University of Kara, Togo

²University Hospital of Kara (CHU Kara), Kara, Togo.

³Teaching and Research Unit in Cardiology and Vascular Diseases, University of Lomé, Togo.

Correspondence

PIO Machihude

Training and Research Unit (TRU) of Cardiology and Vascular Diseases, University of Kara, Togo.

Tel: 00228 90 95 59 94

E-mail: pimae2002@yahoo.fr

- Received Date: 15 Oct 2022
- Accepted Date: 18 Nov 2022
- Publication Date: 23 Nov 2022

Copyright

© 2022 Science Excel. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Abstract

Introduction: Hypertension is a major public health problem because of its prevalence and mortality, to which unhealthy diet contributes 30%. The objective of this study was to determine the associated risk factors and to evaluate their knowledge and the impact of dietary habits of hypertensive patients on the control of the pathology.

Patients and methods: This was a descriptive and analytical study which took place from June to August 2021 and which concerned hypertensive patients followed for at least one year in the cardiology departments of the CHU and CHR Kara.

Results: The study included 186 hypertensive patients with a mean age of 55.59 years. The age group of [50 - 59 years] was the most represented with 30.11% of the cases. The male/female sex ratio was 0.92. The main associated risk factors were physical inactivity (67%), pathological waist circumference (65%) and overweight (53%). The BP control rate was 41.94%. An average level of knowledge was noted in the patients. Excessive salt consumption (90%) was the risk factor most known by patients. Insufficient intake of vegetables and fruits (26%) was the least known. Only 21% of patients adopted healthy dietary habits. The adoption of healthy dietary habits was significantly associated with a high rate of BP control (72%, $p < 0.001$). Daily consumption of vegetables (20%) and fruit (5%) was considered low. However, this consumption was associated with a high rate of BP control; 58% ($p = 0.014$) and 67% ($p = 0.073$) respectively. In 52% of regular garlic consumers, 60% had controlled BP compared to 22% of non-consumers of this spice ($p < 0.001$). Knowledge of the effect of foods on BP was not accompanied by healthy consumption of these foods.

Conclusion: This study confirmed the need to adopt healthy dietary habits and/or a healthy lifestyle to control hypertension. Substantial consumption of vegetables and fruits and garlic is highly recommended while alcohol, salt, and fast foods should be consumed in moderation. The adoption of these dietary habits by the general population will contribute to the decrease in the prevalence of hypertension in Togo.

Introduction

Because of its high prevalence and mortality, hypertension is an important public health problem worldwide [1,2]. More than a quarter of the world's adult population is hypertensive, and this proportion is expected to rise to 30% by 2025 if mechanisms to respond to and control hypertension are not effective [2]. First major cardiovascular risk factor, hypertension is a chronic condition, often asymptomatic, which sometimes reveals itself through complications. In Africa, about 15% of the population suffers from hypertension [3]. In Togo in 2010, the STEPS study found a national prevalence of hypertension of 19%

with 51.6% of respondents never having had a Blood Pressure (BP) measurement before [4]. The hypertension control rate varies according to geographical region: 55% in France [5]; 64% in the United States of America [6]; In Africa, this rate is 36.8% in Benin [7] and 38.8% in Burkina-Faso [8].

The emergence of hypertension is a major public health concern. Hygiene-dietetic measures constitute the common and essential basis for the care of hypertension both curatively and preventively. Unhealthy diet and physical inactivity contribute to almost 30% of morbidity and mortality due to hypertension [9]. In developing countries including Togo.

Citation: Pio M, Djalogue L, Nagnane D, Bakai AM, Tcherou T, Atta DB. Knowledge of hypertension and impacts of dietary habits of hypertensive patients on blood pressure control in cardiology departments in the Kara region. *Cardiol Vasc Med.* 2022;2(1):1-6.

The general objective of our study was to evaluate the knowledge of hypertension, dietary habits of hypertensive patients on BP control. More specifically, the aim was to describe the risk factors associated with hypertension and their impact on BP control; to determine the relationship between patients' knowledge of the hypertensive's diet and their dietary habits; To determine the relationship between dietary habits of hypertensive patients and BP control.

Methods

Our study took place in the cardiology departments of two hospitals in the prefecture of Kozah, namely: the Regional Hospital of Kara (CHR-K) and the University Hospital of Kara (CHU-K). The latter is the reference center for the entire northern part of Togo.

This was a cross-sectional and analytical study that took place from June to October 2021

The study involved hypertensive patients followed in the cardiology departments of CHU-K and CHR-K.

Hypertensive patients over 18 years of age who had been on treatment for at least 1 year and who gave their consent to participate in this study were included in the study.

Hypertensive patients who had not given their consent to participate in this study were not included in this study. Patients diagnosed with hypertension and followed for less than 1 year; hypertensive pregnant women; and hypertensive patients unable to answer questions because of any neuropsychiatric disability.

Our sample size (n) was estimated using the classic Schwartz formula:

$n = z^2 \times q(1-q) / e^2$ Where: • z is the coefficient to reach a 95% confidence interval threshold ($z = 1.96$). • q is the estimated prevalence. The prevalence of hypertension in Togo was estimated to be 19% ($q = 0.19$) based on the STEPS Togo study published in 2012 [4]. • e is the margin of error. The margin of error used was 5% ($e = 0.05$). This gives us for: $n = 1.96^2 \times 0.19(1-0.19) / 0.05^2 = 3.8416 \times 0.19 \times 0.81 / 0.0025 = 236$ people.

The data collection techniques used were: direct measurement of anthropometric parameters (weight, height, waist circumference) and blood pressure, followed by individual face-to-face interview with the patient before his or her follow-up visit to the cardiologist. The data were collected on a survey form previously established after a broad review of the literature.

- BP was taken in a seated position in both arms after a rest of at least 10 minutes using an electronic tensiometer, the average of the two measurements was retained. It was considered controlled when it was $<140/90$ mmHg, as recommended by the Eighth Joint National Committee 2014 [10].

- A respondent was considered obese when his BMI ≥ 30 kg/m² and overweight when his BMI was between 25 and 29.99 kg/m² [11].

- **Android obesity** was defined as a waist circumference (WC) greater than 94 cm in men or 80 cm in women [12].

- **Excessive alcohol consumption** corresponded to drinking alcohol at least 4 days a week and **moderate alcohol consumption** to drinking less than 4 days a week.

- Consumption of **at least 3 servings of vegetables and one serving of fruit** per day was considered acceptable, alongside the WHO recommendation of 5 servings of vegetables and fruit [13].

- **The average level of physical activity** corresponded to a moderate intensity physical activity (walking, cycling, rural activities ...) practiced regularly at least once a week. **Sedentary lifestyle (physical inactivity)** was defined as no physical activity or physical activity less than once a week.

- The level of knowledge was evaluated by a series of 10 questions scored out of 10 points and was considered «**Low**» when the respondent had a total score < 5 points, «**Medium**» when he obtained a total score ranging from 5 to 7 points and «**Good**» when the total score obtained was ≥ 8 points.

- Dietary habits were evaluated by a series of 9 questions scored out of 9 points and were classified as «**Healthy**» when the cumulative score was ≥ 6 points and «**Unhealthy**» when the cumulative score was < 6 points.

- After the interview with the patient, his medical file was consulted for more information on the notion of recent weight gain and the existence of certain associated risk factors (diabetes, dyslipidemia, smoking).

Table I. Distribution of patients according to Sociodemographic characteristics

Modalities	Numbers (Total=186)	Percentage (%)
AGE		
< 40 years	22	11.83
40 – 49 years	38	20.43
50 - 59 years	56	30.11
60 – 69 years	42	22.58
≥ 70 years	28	15.05
SEX		
Female	97	52.15
Male	89	47.85
EDUCATIONAL LEVEL		
Uneducated	46	24.73
Primary	39	20.97
Secondary	80	43.01
University	21	11.29
PROFESSIONAL OCCUPATION		
Craftsperson/worker/ farmer	15	8.06
Trader	19	10.22
Employee	49	26.34
Unemployed	47	25.27
Retired	56	30.11
MARITAL STATUS		
Single	3	1.61
Divorced	12	6.45
Married	132	70.97
Widower	39	20.97
PLACE OF RESIDENCE		
Urban	105	56.45
Semi-urban	39	20.97
Rural	42	22.58

Ethical consideration

Verbal informed consent was required from the patient. Each survey form had a unique patient identification number to preserve anonymity.

Data entry and statistical processing

Data were entered and analyzed on the «Epi Info version 7.2.4.0» software. The variables analyzed were presented as means plus or minus (±) standard deviation for quantitative variables, or as percentages for qualitative variables. The differences between variables are evaluated with Student's t-test after checking the normal character of the distribution. Statistical significance was reached when the probability value $p < 0.05$. Zotero software was used to export bibliographic references.

Results

Sociodemographic characteristics

A total of 186 patients were included in the study out of the 236 expected, i.e. a participation rate of 78.8%. This sample was composed of 105 (56.45%) patients registered at CHR-K and 81 (43.55%) at CHU-K. The mean age of our study population was 55.59 ± 13.28 years with extremes ranging from 30 to 95 years. The sex ratio (male/female) was 0.92 Table I represents the

distribution of the 186 patients according to sociodemographic characteristics.

Control and duration of hypertension

The mean SBP of the patients was 145.86 ± 18.43 mmHg with extremes ranging from 108 to 238 mmHg. The mean DBP was 90.11 ± 12.17 mmHg with extremes ranging from 61 to 141 mmHg. Of the 186 patients surveyed, we obtained 78 (41.94%) controlled patients. The duration of hypertension was greater than 5 years in 79 patients..

BP control rates according to associated risk factors

In our study, the predominant risk factor was physical inactivity in 67.20% of cases. A significant proportion ($p=0.012$) of patients with normal waist circumference (WC) had controlled BP (53.03%) compared to patients with android obesity (35.83%) (Table II).

Knowledge of hypertension

Level of knowledge of hypertension

With a mean score of 5.91 ± 2.22 points out of 10 with extremes ranging from 1 to 9, our study sample had an overall « average » level of knowledge about their disease. Of the 186 patients, only 54 (29.03%) had a score ≥ 8 points out of 10 or a « Good » level of knowledge.

Table II. Comparison of BP control rate and the presence or absence of associated risk factors

Associated risk factors	YES		NO		P
	n	(%)	n	(%)	
Overweight	34	(34.34)	44	(50.57)	0.013
Android obesity	43	(35.83)	35	(53.03)	0.012
Diabetes	09	(30.00)	69	(44.23)	0.049
Dyslipidemia	07	(34.62)	71	(44.38)	0.043
Smoking	05	(35.71)	73	(42.44)	0.110
Excessive drinking	29	(36.71)	49	(45.79)	0.125
Sedentary lifestyle	49	(39.20)	29	(47.54)	0.142
Family history of hypertension	41	(38.68)	37	(46.25)	0.261

Table III. Evaluation of patients' knowledge of hypertension risk factors

Risk factors	Numbers n=186	%
Obesity/Overweight	109	58.60
Excessive salt consumption	168	90.32
Excessive intake of bad fats	136	73.12
Excessive alcohol consumption	129	69.35
Insufficient intake of vegetables and fruits	49	26.34
Smoking	89	47.85
Stress	167	89.78
Diabetes	73	39.25
Physical inactivity	103	55.38
Family history of hypertension	77	41.40

Concerning the sources of information, 105 patients (56.45%) obtained information about their disease from «health professionals»

Table III summarizes patients' knowledge of the risk factors for hypertension, and dietary habits. Excessive salt consumption was known by 90.32% of hypertensive patients, the best known risk factor.

Dietary habits of hypertensive patients

Evaluation of patients' dietary habits

Thirty-eight patients (20.43%) regularly consumed at least three servings of vegetables per day, compared with 148 (79.57%) who consumed less (Table IV).

Relationship between dietary habits and BP control

Regular consumption of garlic, vegetables with salt moderation was associated with good control of hypertension (Table V).

Classification of patient dietary habits and BP control

With a mean score of 4.34 ± 1.60 points out of 9, the dietary habits of our study population were classified as «Unhealthy» in general.

Of the 186 hypertensive patients, only 40 (21.51%) adopted «healthy» dietary habits

Adoption of « Healthy » dietary habits 29 (72.5%), was associated with BP control compared to « Unhealthy » dietary habits; against 49 (33.56%) (p<0.001).

Discussion

Sociodemographic characteristics

We recorded 56.45% of our participants at CHR-K against 43.55% at CHU-K.

The average age of our study population was 55.59 ± 13.28 years with a female predominance, results close to studies on hypertension in our country [14-16].

Control and duration of hypertension

The BP control rate in this work was 41.94%. Similar results were obtained in 2019 in Benin by SONOU et al (36.8%) [7], and in 2016 in an Argentine study (40%) [17]. This shows once again that the poor control of hypertension is known worldwide.

Evaluation of patients' knowledge of hypertension

Only 58.60% of patients were aware that being overweight is a risk factor and elevation of blood pressure. This result is comparable to that of hypertensive patients in Ghana and Botswana, among whom 54.2% and 60.3%, respectively, were aware that obesity predisposes to hypertension [18,19].

Table IV. Evaluation of patient dietary habits (n=186)

Consumption	Healthy		Unhealthy	
	n	(%)	N	(%)
Vegetables ≥ 3 servings/day*	38	(20.43)	148	(79.57)
Fruit ≥ 1 serving/day*	9	(4.84)	177	(95.16)
Fish ≥ 5 days*	144	(77.42)	42	(22.58)
Good quality fats a ≥ 5 days*	125	(67.20)	61	(32.80)
Poor quality fats b < 3 days*	82	(44.09)	104	(55.91)
Salt in moderation	86	(46.24)	100	(53.76)
Alcohol in moderation or abstention	107	(57.53)	79	(42.47)
Fast food < 3 days*	110	(59.14)	76	(40.86)
Garlic ≥ 5 days*	97	(52.15)	89	(47.85)

*= during the last 7 days; a= Sunflower oil, peanut oil, Nioto oil, etc.; b= charcuterie, meat, butter, mayonnaise, etc.

Table V. Comparison of BP control rate between healthy and unhealthy consumption of each food

Consumption	Healthy		Unhealthy		P
	n	(%)	n	(%)	
Vegetables ≥ 3 servings/day	22	(57.89)	56	(37.84)	0.014
Fruit ≥ 1 serving/day	6	(66.67)	72	(40.68)	0.073
Fish ≥ 5 days	64	(44.44)	14	(33.33)	0.101
Good quality fats ≥ 5 days	52	(41.60)	26	(42.62)	0.440
Poor quality fats < 3 days	34	(41.46)	44	(42.31)	0.452
Salt in moderation	45	(52.33)	33	(33.00)	0.018
Alcohol in moderation or abstention	49	(45.79)	29	(36.71)	0.112
Fast food < 3 days	54	(49.09)	24	(31.58)	0.009
Garlic ≥ 5 days	58	(59.79)	20	(22.47)	<0.001

n = Number of patients controlled; % = Blood pressure control rate

Obesity is unfortunately considered in our societies as a sign of ease and well-being. However, this obesity is the source of several cardiovascular diseases. It predisposes to the risk of drug under treatment because the therapeutic doses are lower than the excessive weight of these obese patients. So we need a change of mentality in our societies.

Insufficient intake of vegetables and fruits (26.34%) and diabetes (39.25%) were less known by our respondents. This would result from the low interest given to these factors during patient education. Hypertensive patients from Benin were also in the minority (47.4%) to know that cohabitation with diabetes was not favorable to the control of hypertension [20]. VANITHA et al in Ghana also found that the need to increase fruit (15%) and vegetable (33%) intake was not well known by hypertensive patients [21].

Patient knowledge level

With an average score of 5.91 points out of 10, the overall level of knowledge of our patients was average.

Only 29% of our respondents had a good level of knowledge, which could be explained by the low level of education observed in this work. Due to data variability and methodological differences, it is not easy to compare available studies on knowledge of hypertension between them. The level of knowledge in this work is similar to that observed in a peripheral health center in South West Benin where only 21% of hypertensive patients had a good knowledge of their disease [20].

In contrast, higher rates of good knowledge were obtained in the United States of America (81.8%) [22]. There may be multiple reasons for these differences. People living in developed countries such as the United States of America have a higher level of education, better access to media and health education programs than those living in our developing countries, which could improve their knowledge of hypertension.

In this study 56.45% had been informed about their disease by «health professionals». Given the organization of our African societies, we believe that we must involve our traditional chiefs, customary chiefs and train them as peer educators in the fight against cardiovascular diseases, particularly hypertension.

Evaluation of patient dietary habits and relationship with BP control

In our series, only 20.43% of patients consumed 3 or more servings of vegetables daily, but this consumption was significantly associated with better BP control (57.89%; $p=0.014$). We also observed a significant correlation between regular garlic consumption and BP control: of the 52.15% of hypertensive regular garlic consumers, 59.79% were controlled ($p<0.001$). In addition, despite its very low prevalence (4.84%), a daily diet including one or more servings of fruit was accompanied by better BP control (66.67%; $p=0.073$). The low consumption of vegetables and fruits could be explained not only by the low socioeconomic level of the patients who blamed the cost of these foods, but also by the ignorance of the impacts of vegetables and fruits on BP regulation.

In fact, vegetables, fruits and spices such as garlic are excellent natural sources of antioxidants needed to manage stress, soluble and insoluble dietary fiber, potassium, calcium and magnesium. Dietary fiber regulates blood sugar and lowers BP. Potassium stimulates endothelial nitric oxide production, which leads to arteriolar vasodilatation and subsequent lowering of BP [23]. Calcium improves arterial compliance. Garlic in particular contains an active substance, allicin,

a thiosulfate that has an inhibitory effect on angiotensin converting enzyme in vitro [24].

In Ghana, VANITHA et al found no daily consumers of even one serving of fruit among hypertensive patients where only 3% took three servings of vegetables daily [21]. The impact of a substantial consumption of vegetables and fruits on BP reduction was already demonstrated in hypertensive patients [25]. The same is true for garlic [26]. The need to promote public policies that encourage substantial consumption of vegetables, fruits and spices in the interest of health promotion in general and primary prevention and control of hypertension in particular is evident. The people of sub-Saharan Africa should not suffer from the consumption of fruits and vegetables because they flood our streets, fields and homes and often these fruits grow spontaneously. It is therefore a problem of information and education.

In our study 90.33% had knowledge about the harmful role of excess salt in the diet; but only 52.33% of patients consumed salt in moderation. In the HOUEHANOU et al study in Benin, the authors noted that 68% of hypertensive patients added salt to the table during their meals [27]. In Botswana, only 59 of the hypertensive patients had a low-salt diet [18]. It is still a cultural problem and dietary habits acquired since childhood that must be fought by campaigns against hypertension.

Relationship between dietary habits and knowledge of food impacts on BP

In our study, as in that of VANITHA et al in Ghana [21], knowledge of the impact of foods (salt, unhealthy fats, alcohol, vegetables and fruits) on BP was not sufficient to adopt healthy dietary habits towards these foods. Indeed, no high prevalence of healthy consumption of these foods was obtained in a group of patients who were informed of their impacts. These results highlight the need to place greater emphasis on therapeutic education for hypertensive patients and to provide them with support (establishment of patient associations, support groups) in the care of hypertension. Also, the implementation of a nutritional education program for hypertensive patients and their families seems relevant.

The rate of BP control was significantly higher in patients who adopted healthy dietary habits compared to those with unhealthy dietary habits (72.50% versus 33.56%; $p<0.001$). These results confirm the interest of emphasizing on the nutritional care of hypertensive patients targeting all food groups.

Conclusion

We collected risk factors associated with hypertension, knowledge of hypertension, and dietary habits of hypertensive patients and evaluated their impact on BP control at the University Hospital of Kara and the Kara regional Hospital.

The results indicate that the main associated risk factors were physical inactivity, overweight, excessive alcohol consumption and diabetes. BP control rates were low. In addition, patients' knowledge of hypertension was moderate. Vegetables and fruits were consumed daily by a minority of patients. The proportion of patients who adopted healthy eating habits was low. Knowledge of the impacts of foods on BP, however, was not accompanied by healthy consumption of these foods. This study confirmed the need for healthy dietary habits and a healthy lifestyle to control BP. The adoption of healthy dietary habits by the Togolese population would certainly reduce the prevalence of hypertension in Togo.

References

1. Wang H, Naghavi M, Allen C, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet*. 2016;388(10053):1459-544.
2. World Health Organization. Global brief on hypertension. [En ligne]. WHO 2013. [cité 21/11/2021]. Disponiblesur :http://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/fr/.
3. Perrine A-L, Lecoffre C, Blacher J, Olié V. Etude Esteban 2014 - 2016: L'hypertension artérielle en France : prévalence, traitement et contrôle en 2015 et évolutions depuis 2006. *Revue de Biologie Médicale*. 2019;347:1-11.
4. Foti K, Wang D, Appel LJ, Selvin E. Hypertension Awareness, Treatment, and Control in US Adults: Trends in the Hypertension Control Cascade by Population Subgroup (National Health and Nutrition Examination Survey, 1999-2016). *Am J Epidemiol*. 2019;188(12):2165-2174.
5. Sonou A, Houehanou CNY, Hugues Dohou S, et al. Résultats d'un dépistage de masse de l'hypertension artérielle chez des adultes volontaires dans 02 régions du Bénin (May Measurement Month, 2018). *Bénin, J Société Biol Clin*. 2019;(30):6-11.
6. Hien H, Tahita I, Dabiré E, et al. Poids Epidemiologiques Des Maladies Non Transmissibles Au Burkina Faso. Enquete Nationale STEPS 2013 [Epidemiologic Weight Of Noncommunicable Diseases In Burkina Faso : National STEPS Survey 2013]. *Mali Med*. 2019;34(1):35-39.
7. World Health Organization. (2013) . A global brief on hypertension : silent killer, global public health crisis: World Health Day 2013. Available: <https://apps.who.int/iris/handle/10665/79059>
8. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;311(5):507-520.
9. WHO. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organ Tech Rep Ser*. 2000;894:i-253.
10. Alberti KGMM, Zimmet P, Shaw J. Metabolic syndrome—a new world-wide definition. A consensus statement from the international diabetes federation. *Diabetic medicine*. 2006;23(5):469-80.
11. World Health Organization. 2018. Healthy diet : key facts. Available at <http://www.who.int/en/news-room/fact-fiches/details/healthy/diet>. Accessed on 21/11/2021.
12. Pio M, Baragou S, Afassinou Y, et al. Age vasculaire et risque cardiovasculaire chez les patients hypertendus noirs africains à Lomé. *Histoire de la médecine*. 2013; 65(1-2) :1-7.
13. Damorou F, Pessinaba S, Tcherou T, Yayehd K, Ndassa SM, Soussou B. Arterial hypertension in black subjects over 50 years of age in Lomé: epidemiological aspects and evaluation of cardiovascular risk (prospective and longitudinal study of 1485 patients). *Ann Cardiol Angeiol (Paris)*. 2011;60(2):61-66.
14. Pessinaba S, Yayehd K, Pio M, et al. Obesity in cardiology consultation in Lomé: prevalence and risk factors associated with cardiovascular disease - study in 1200 patients. *Pan Afr Med J*. 2012;12:99.
15. Irazola VE, Gutierrez L, Bloomfieldy G, et al. Hypertension prevalence, awareness, treatment, and control in selected LMIC communities: results from the NHLBI/UHG Network of centers of excellence for chronic diseases. *Global heart* 2016;11(1): 47-59.
16. Zungu L, Djumbe F. Knowledge and lifestyle practices of hypertensive patients attending a primary health care clinic in Botswana. Botswana, South Africa: Institutional Repository. 2013;13(2):2-10.
17. Anowie F, Darkwa S. The knowledge, attitudes and lifestyle practices of hypertensive patients in the cape coast metropolis-Ghana. *Journal of scientific research and reports*. 2015;8(7):1-15.
18. Adjagba P, Codjo LH, Sonou A, et al. Connaissances, attitudes et pratiques sur l'hypertension chez les patients d'un centre de soins primaires du sud-ouest du Bénin. *J Société Biol Clin*. 2019 ;(30):6-11.
19. Durai V, Muthuthandavan AR. Knowledge and practice on lifestyle modifications among males with hypertension. *Indian Journal of Community Health*. 2015;27(1):143-9.
20. Oliveria SA, Chen RS, McCarthy BD, Davis CC, Hill MN. Hypertension knowledge, awareness, and attitudes in a hypertensive population. *J Gen Intern Med*. 2005;20(3):219-225.
21. Geleijnse JM, Kok FJ, Grobbee DE. Blood pressure response to changes in sodium and potassium intake: a meta-regression analysis of randomised trials. *Journal of human hypertension*. 2003;17(7):471-80.
22. Sharifi AM, Darabi R, Akbarloo N. Investigation of antihypertensive mechanism of garlic in 2K1C hypertensive rat. *J Ethnopharmacol*. 2003;86(2-3):219-224.
23. Appel LJ, Moore TJ, Obarzanek E. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative research group. *N Engl J Med* 1997; 336(2):1117-24.
24. Ried K, Frank OR, Stocks NP, Fakler P, Sullivan T. Effect of garlic on blood pressure: a systematic review and meta-analysis. *BMC Cardiovasc Disord*. 2008;8:13.
25. Houehanou NCY, Amidou AS, Sonou AJD, et al. Knowledge, Attitudes and Practices towards Hypertension among Hypertensive Patients in Rural Area, Tanvè (Benin). *Universal Journal of Public Health*. 2020;8(4):120-6.