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Hygienic and Dietary Measures in Cameroonian Hypertensive Patients Followed at the Douala General Hospital: Knowledge, Compliance and Effect on Blood Pressure Control

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Abstract

Introduction: The management of hypertension is mostly based on pharmacotherapy and hygienic and dietary measures (HDMs) for which little data is available in Cameroon. The concern to improve the quality of life of hypertensive patients led us to study the knowledge, compliance and effect of HDMs among Cameroonian hypertensive patients. **Methods:** This was a cross-sectional study carried out at the Douala General Hospital; the census of patients was carried out from 05 March to 10 May 2018. The data evaluated were knowledge and compliance with HDMs with an inference of their effect on blood pressure control. **Results:** We recruited 330 participants at mean age of 60 ± 11 years, 37.9% men; 57.3% with blood pressure (BP) controlled. Out of 330 subjects, 308 (93.3%) who had been educated about dietary health measures for hypertension were assessed on knowledge, compliance and effect of these measures against 22 (6.7%) who had never heard about them. Around 85.7% of participants had good knowledge of HDMs and 78.9% had good compliance with them. There was no statistically significant influence of knowledge and compliance with HDMs on blood pressure control. **Conclusion:** The level of knowledge and adherence to HDMs of hypertensive patients at the Douala

General Hospital was appreciable. It is however appropriate for physicians to intensify patient education on HDMs and BP control.

Keywords

Hypertension, Hygienic and Dietary Measures, Blood Pressure Control, Knowledge, Compliance

1. Introduction

According to the definition of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII), High Blood Pressure is defined as systolic blood pressure (SBP) greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg (DBP) [1]. This condition is still poorly controlled; indeed, less than 20% of patients treated have their blood pressure controlled [2]. Hypertension is a public health problem that is clearly on the rise worldwide, particularly in developing countries, as a result of a genuine epidemiological transition [3]. It is associated with high morbidity and mortality and high costs, mainly due to visceral complications [3].

Numerous epidemiological studies have reported the relationships between lifestyle, diet and blood pressure in different populations [4]. Non-medicinal measures should be systematically integrated into the therapeutic procedure as they have a complementary effect [5]. In addition to the blood pressure lowering effect, dietary measures contribute to the control of cardiovascular risk factors and other clinical conditions [6].

In Africa, a few authors who have dealt with the subject of dietary health measures in the management algorithm for hypertension reveal that the low-salt diet was the most widely known by hypertensive patients. In this vein, the study by Boombhi *et al.* [7]conducted in a hospital in the city of Yaoundé (Cameroon) on a population of 148 subjects in 2017 reported that out of 97.3% of hypertensive patients declaring that they were aware of the hygienic-dietary measures, 95.9% of them understood the usefulness of the low-salt diet. The same source reports that in this sample of 148 hypertensive subjects, the level of knowledge of dietary hygiene measures was insufficient in 62.8% of them [7]. A cross-sectional study carried out in a hospital setting in the city of Douala including 404 patients in 2015 revealed that only 26.2% of patients had good compliance [8].

In order to improve or even reinforce the quality of life of hypertensive patients, we proposed to carry out a cross-sectional study with an analytical aim on the knowledge, compliance and effect of hygienic and dietary measures in Cameroonian hypertensive patients followed at the Douala General Hospital.

2. Methods

This was a cross-sectional descriptive study conducted over a period of 03 months

from March 5 to May 10, 2018, at the cardiology outpatient unit of the Douala General Hospital in Cameroonian hypertensive patients diagnosed or normalized by the current treatment and who consented to participate. Patient recruitment was made using a consecutive non-probabilistic sampling method. Data on dietary health measures were collected using a structured questionnaire assessing knowledge, compliance and effect on blood pressure control. A minimum sample size of 297 participants has been calculated based on Cochran's formula, with 26.2% prevalence of therapeutic compliance on hypertension previously found by Essomba *et al.* in 2017 [8] with 5% precision and level of significance. Patients were recruited using a consecutive sampling strategy for all the patients coming spontaneously to the cardiology consultation. An explanation session was conducted on the purpose, procedure, advantages and disadvantages of participating in the study and the answers to the various concerns. Participants aged at least 18 years and who accepted to sign the inform concern were enrolled in the study. In addition to the request for ethical clearance made to the Institutional Ethics and Research Committee of the University of the Mountains and the research authorizations of the Douala General Hospital, the research was carried out with respect for the human dignity of the interviewees, anonymity and strict respect for medical confidentiality.

Data collection was carried out using a pre-established questionnaire completed by the survey officer with the participant. The data was collected following an interview prior to the consultation. The variables were collected through the anamnesis, and we used the medical record to obtain additional information; the purpose of this anamnesis was to: identify the patient; specify the history of hypertension; to investigate the patient's personal medical history; to assess the level of knowledge of hygienic and dietary measures for hypertension of each patient through a structured questionnaire. Participants were tested on their knowledge of non-pharmacological treatment of hypertension including: alcohol, tobacco, weight, fat and salt reduction, physical activity practice and potassium supplementation. Each question was answered by yes/no/don't know. Compliance of participants was tested on alcohol and tobacco consumption, weight loss, physical activity practice, dietary salt and fat consumption. Level of alcohol consumption was assessed using the AUDIT-C questionnaire (Bush *et al.*, 1998) [9] and participants were classified as non, low and high consumers. Physical activity was considered sufficient of at least three sessions of 30 minutes per week (Attias, 2015) [10].

Physical examination included the following data: the weight in kilograms, obtained with a mechanical scale (Medisana PSD-150 kg) in the patient standing, unshod and in light clothing, the height in centimeters, taken with a wall scale in the patient unshod, standing and placed dorsally against the wall, the body mass index (BMI) calculated as the ratio of weight to the square of the height and expressed in kg/m^2, overweight was defined for a BMI ≥ 25 and <30 kg/m^2 and obesity for a BMI ≥ 30 kg/m^2. Waist circumference was measured in centimeters at mid-distance between the iliac crest and the costal margin on the

mid-axillary line, and abdominal obesity was defined by a waist circumference ≥ 94 cm in men and ≥80 cm in women. The blood pressure (BP) in millimeters of mercury was taken in the patient sitting quietly, the measurement taken on the left arm (arm at heart level) and done at a distance from any event likely to modify the blood pressure figures such as stress, physical effort, eating a meal. The value was recorded on the basis of the average of at least two measurements taken at 5 minutes intervals using an electronic blood pressure monitor (OMROM HEM-907) with a standard or obese adult size cuff as appropriate.

Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg [11] and/or the use of anti-hypertensive drugs.

Diabetes was defined according to the International Diabetes Federation (IDF) 2005 for patients who had blood glucose ≥ 1 g/L or treated diabetes [12].

At the end of the interview, we gave a quick education session on the hygienic and dietary measures for hypertension to each participant individually.

Definitions of concepts: good knowledge of hygienic and dietary measures: knowledge of more than 3 health and diet measures; **poor knowledge of health and diet measures**: any hypertensive patient with a number of known measures ≤ 3; **good compliance with health and diet measures:** any hypertensive patient complying with more than 3 health and diet measures; **poor compliance with health and diet measures:** any hypertensive patient with a number of measures practiced ≤ 3; **effect of hygienic-dietary measures:** result of the implementation of hygienic-dietary measures on blood pressure figures and the results of hypertension assessments.

Statistical analysis

Data were treated and analyzed using SPSS 20 software. Quantitative data were presented as mean ± standard deviation while qualitative data were presented as counts and frequencies. Comparison of quantitative and qualitative data between BP controlled and uncontrolled participants were performed using Student-t and Chi-square tests respectively. Multivariate logistic regression was used to determine factors associated to BP uncontrolled in the sample. Differences were considered significant for $p < 0.05$.

3. Results

We recruited 330 participants aged 60 ± 11 years with 37.9% of men. The frequency of participants with blood pressure (BP) controlled was 57.3% (189 participants).

Table 1 shows sociodemographic, anthropometric, clinical characteristics as well as past history of participants. Data are compared between Blood Pressure (BP) controlled and BP uncontrolled participants. Data in brackets represent percentages for qualitative variables. Mean systolic and diastolic BP in the sample was 138 ± 21 mmHg and 86 ± 13 mmHg respectively. Frequency of overweight/obesity, abdominal obesity and diabetes in the sample was 76.3%, 57.5% and 13.6% respectively. 21.2% of participants have already faced a cardiovascular

Table 1. Characteristics of the sample.

	Total (N = 330)	BP uncontrolled (N = 141)	BP controlled (N = 189)	p
Age, years	60 ± 11	59 ± 12	60 ± 11	0.234
Male gender	125 (37.9)	65 (46.1)	60 (31.7)	**0.011**
Married status	215 (65.2)	99 (70.2)	116 (61.4)	0.121
Rural residency	61 (18.5)	21 (14.9)	40 (21.2)	0.191
Systolic BP, mmHg	138 ± 21	157 ± 17	125 ± 12	<0.0001
Diastolic BP, mmHg	86 ± 13	95 ± 13	78 ± 8	<0.0001
Weight, kg	78.8 ± 15.0	80.5 ± 15.9	77.5 ± 14.2	0.082
Height, m	1.67 ± 0.08	1.68 ± 0.08	1.66 ± 0.08	0.213
BMI, kg/m^2	28.3 ± 4.9	28.6 ± 5.2	28.0 ± 4.8	0.244
Overweight/obesity	235 (76.3)	98 (74.2)	137 (77.8)	0.549
WC, cm	96 ± 12	97 ± 14	95 ± 11	0.064
Abdominal obesity	177 (57.5)	79 (59.8)	98 (55.7)	0.518
Diabetes	42 (13.6)	24 (18.2)	18 (10.2)	**0.030**
CVD outcomes	70 (21.2)	23 (16.3)	47 (24.9)	0.081

BP: Blood Pressure; BMI: Body Mass Index; WC: Waist Circumference; CVD: Cardiovascular Diseases.

disease outcome. Frequency of male participants was significantly greater in participants with BP uncontrolled than in controlled participants (p = 0.011). Frequency of diabetes was also significantly greater in participants with BP uncontrolled (0.030).

On the 330 participants, 308 (93.3%) knew about diet measures against hypertension while 22 (6.7%) have never hear about. Data on knowledge and practice of diet measures against hypertension have been obtained only on those 308 participants.

Table 2 shows knowledge of participants on diet measures. More than 50% of participants had good knowledge on all the items. The lowest frequency of knowledge was "No smoking" with 51% and 40.9% of the participants did not even know about that measure. The highest frequency of knowledge was noticed of "dietary salt reduction" with 97.1% of participants. Participants with sufficient knowledge on diet measures (total score > 3) represented 85.7% of the sample (264 participants).

Table 3 shows practice of participants on diet measures to reduce hypertension. The frequency of participants with no alcohol consumption was 50.6% while 3.9% of participants had a high consumption of alcohol. Smoking and physical inactivity represented 3.3% and 39.9% respectively. Dietary salt intakes ≤ 6 grams, fat and potassium consumption represented 68.2%, 45.5% and 96.4%

Table 2. Knowledge of diet measures.

Variable	Yes		No		Unknown	
	n	%	n	%	n	%
Alcohol reduction	185	60.1	107	34.7	16	5.2
No smoking	157	51.0	25	8.1	126	40.9
Regular PA	267	86.7	34	11.0	7	2.3
Weight loss	216	70.1	78	25.3	14	4.6
Dietary salt reduction	299	97.1	8	2.6	1	0.3
Fat reduction	252	81.8	44	14.3	12	3.9
Potassium diet	272	88.3	27	8.8	9	2.9

PA: Physical Activity.

Table 3. Observance of diet measures.

		n	%
Alcohol consumption	**No**	156	50.6
	Low	140	45.5
	High	12	3.9
Smoking	**No**	298	96.7
	Yes	10	3.3
Physical activity	**No**	123	39.9
	Low	35	11.4
	High	150	48.7
Dietary salt intakes	**≤6 gr**	210	68.2
	>6 gr	98	31.8
Fat	**No**	168	54.5
	Yes	140	45.5
Potassium	**No**	11	3.6
	Yes	297	96.4
Weight loss	**No**	224	72.7
	Yes	84	27.3

respectively. Weight loss represented 27.3%. Participants with sufficient practices on diet measures (total score > 3) represented 78.9% of the sample (243 participants).

Table 4 shows association of knowledge on diet measures against hypertension with blood pressure uncontrolled in the sample. We found no significant association of different knowledge items with BP control. Frequency of blood

Table 4. Association of BP uncontrol with knowledge of diet measures.

		BP ≥ 140/90 mmHg	Univariate	p	Multivariate	p
		n (%)	OR (95% CI)		AOR (95% CI)	
Alcohol reduction	**No**	73 (59.3)				
	Yes	103 (55.7)	1.16 (0.73 - 1.85)	0.524	1.03 (0.64 - 1.66)	0.901
No smoking	**No**	96 (59.3)				
	Yes	80 (54.8)	1.20 (0.76 - 1.89)	0.429	1.10 (0.69 - 1.74)	0.691
Regular PA	**No**	23 (56.1)				
	Yes	153 (57.3)	0.95 (0.49 - 1.85)	0.885	0.78 (0.39 - 1.54)	0.468
Weight loss	**No**	63 (63.0)				
	Yes	113 (54.3)	1.43 (0.88 - 2.33)	0.151	1.47 (0.89 - 2.41)	0.131
Dietary salt reduction	**No**	6 (66.7)				
	Yes	170 (56.9)	1.52 (0.37 - 6.18)	0.561	1.59 (0.38 - 6.59)	0.524
Fat reduction	**No**	35 (62.5)				
	Yes	141 (56.0)	1.31 (0.72 - 2.38)	0.371	1.15 (0.62 - 2.12)	0.653
Potassium diet	**No**	23 (63.9)				
	Yes	153 (56.3)	1.38 (0.67 - 2.83)	0.386	1.23 (0.59 - 2.56)	0.578
Knowledge score > 3	**No**	28 (63.6)				
	Yes	148 (56.1)	0.73 (0.38 - 1.41)	0.348	0.44 (1.74 - 0.71)	0.879

BP: Blood Pressure; PA: Physical Activity; OR: Odd Ratio; AOR: Adjusted Odd Ratio (adjusted for age and gender); CI: Confident Interval.

pressure uncontrol in participants with more than 3 total knowledge score was 56.1% and was not significantly different from the others (63.6), p = 0.348. After adjustment to age and gender, knowledge total score > 3 remained not significantly associated with BP uncontrol (p = 0.879).

Table 5 shows association of practices on diet measures against hypertension with blood pressure uncontrol in the sample. In univariate analysis, we found no significant association of practices with BP uncontrol. High alcohol consumption and low physical activity were however slightly significantly associated with blood pressure uncontrol (p = 0.088 and p = 0.053 respectively). After

Table 5. Association of BP uncontrol with diet observation measures.

		BP ≥ 140/90 mmHg	Univariate	p	Multivariate	
		n (%)	OR (95%CI)		AOR (95%CI)	
Alcohol consumption	**No**	88 (56.4)	1	0.218	1	0.135
	Low	78 (55.7)	0.97 (0.61 - 1.54)	0.904	1.10 (0.68 - 1.76)	0.706
	High	10 (83.3)	3.86 (0.82 - 18.22)	0.088	4.99 (1.03 - 24.05)	**0.045**
Smoking	**No**	5 (50)	1		1	
	Yes	171 (57.4)	1.35 (0.38 - 4.76)	0.644	1.04 (0.29 - 3.79)	0.952
Physical activity	**No**	65 (52.8)	1	0.154	1	0.078
	Low	25 (71.4)	2.23 (0.99 - 5.04)	0.053	2.53 (1.10 - 5.82)	**0.028**
	High	86 (57.3)	1.2 (0.74 - 1.94)	0.458	1.37 (0.83 - 2.25)	0.216
Dietary salt intakes	**≤6 gr**	117 (55.7)	1		1	
	>6 gr	59 (60.2)	0.83 (0.51 - 1.35)	0.459	1.25 (0.50 - 3.14)	0.633
Fat	**No**	90 (53.6)	1		1	
	Yes	86 (61.4)	0.72 (0.46 - 1.14)	0.166	1.41 (0.88 - 2.26)	0.158
Potassium	**No**	5 (45.5)	1		1	
	Yes	171 (57.6)	0.61 (0.18 - 2.06)	0.429	0.58 (0.17 - 1.98)	0.385
Weight loss	**No**	129 (57.6)	1		1	
	Yes	47 (56.0)	0.94 (0.56 - 1.55)	0.796	1.04 (0.63 - 1.74)	0.868
Practice score > 3	**No**	27 (56.3)	1		1	
	Yes	149 (57.3)	1.04 (0.56 - 1.94)	0.892	1.14 (0.60 - 2.13)	0.694

BP: Blood Pressure; OR: Odd Ratio; AOR: Adjusted Odd Ratio (adjusted for age and gender); CI: Confident Interval.

adjustment for age and gender, that participants with high consumption of alcohol had a significantly greater odd of having BP uncontrol compared to those with no alcohol consumption (OR = 4.99; $p < 0.045$). Association was also significant for low physical activity (OR = 2.53; $p = 0.028$). Other variables were not significantly associated with BP uncontrol.

4. Discussion

The aim of our study was to assess the knowledge and compliance of hypertensive subjects with regard to dietary health measures for hypertension and to determine the effect of these measures on blood pressure control. We identified 308 (93.3%) patients who declared to have heard of dietary health measures and 22 (6.7%) who had never heard of them; consequently, data on knowledge and compliance with HDMs were determined only in these 308 participants.

More than 50% of the participants had a good knowledge of all HDMs. The least known measure was smoking cessation by 51% of the participants, while 40.9% of them did not even know it was a measure. The most well-known measure was reducing salt consumption by 97.1% of the participants. In total, 85.7% of the participants had a good knowledge of health and diet measures. These results are similar to those of Boombhi *et al.* [7], where 97.3% of the hypertensive patients stated that they were aware of the health and diet measures, the best known measure being the reduction of salt consumption by 95.9% of the study population. The least known measure, on the other hand, was to stop smoking (34.2%) and to engage in regular physical activity (30.8%). El Gbouri *et al.* in Morocco [13], in a prospective study, found that 99.64% of patients knew the usefulness of a low-salt diet and up to 90.64% knew the value of smoking cessation as a non-drug treatment.

In sum, our results can be explained by the fact that during patient consultations, cardiologists would insist on the benefits of non-drug treatment of hypertension.

With regard to compliance with the HDMs, 68.6% of participants had a recommended daily salt intake of ≤6 g in accordance with the DASH approach [14], 50.6% did not consume alcohol against 3.9% who consumed excessively; this frequency differs from that of Doumbia in 2006 [15] who found alcoholism in 45 patients or 28.66% in the population not complying with the diet and was non-existent in the patients complying with the diet.

Smoking and physical inactivity accounted for 3.3% and 39.9% of the participants respectively. These latter results differ from those of Atoba *et al.* in 2014, in whom smoking was still a cardiovascular risk factor for 31.4% of their population [16] and physical inactivity was noted in 29.7% versus 12.3% of them.

Our results would be due to our choice to recruit only treated hypertensives followed by cardiologists emphasizing the cessation of smoking on the one hand, and on the other hand, they demonstrate that our hypertensive subjects are increasingly aware of the importance of integrating physical activity into their daily lives, particularly walking.

The consumption of food rich in potassium was the measure most observed by 96.4% of our population; this can be explained by the fact that our mainly urban population seems to have easier access to certain foodstuffs, in this case, fruit and vegetables. We had 78.9% of participants with good compliance with dietary and health measures. This rate is higher than that of Koné [17] who had

a good compliance rate of 29.91% compared to 70.09%. This rate reflects the difficulty of compliance among hypertensive patients in sub-Saharan Africa. In our case, the high rate of good compliance may reflect the appreciable rate of good knowledge, which is the result of fairly good teaching by our cardiologists.

At the end of our analysis we did not detect any significant association between the rate of good knowledge (>3) and BP control; nor between compliance and BP control. However, after adjusting for age and sex we found that participants with heavy drinking had a statistically significant elevated frequency of non-control of BP compared to those who did not drink ($p < 0.045$). A significant association was also found in those with low physical activity. The other variables did not have a significant association with uncontrolled BP.

The major limitation of our study is that it has been conducted using a hospital-based setting and cannot draw conclusion on the general population. More studies on the general and larger population are needed.

5. Conclusion

At the end of our work, we found that the majority of patients had an appreciable level of knowledge of dietary health measures (85.7%). The level of compliance was also appreciable for 78.9% of the population; knowledge and compliance with HDMs were not associated with blood pressure control. As the rates of poor knowledge and poor compliance are not negligible, we suggest that patient education be intensified.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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