

Original Research

The dietary practices of hypertensive adults admitted to the cardiology department at Deido District Hospital in Cameroon

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ABSTRACT

Objective

To assess the dietary habits of patients suffering from hypertension in Cameroon in the context of nutrition transition (Nutrition transition is the shift in dietary consumption and energy expenditure that coincides with economic, demographic, and epidemiological changes. Specifically, the term is used for the transition of developing countries from traditional diets high in cereal and fiber to more Western pattern diets high in sugars, fat, and animal-source food).

Methodology

A cross-sectional descriptive study was carried out during six months on 206 hypertensive patients attending the Deido district hospital. BMI was calculated using body weight and height. Hypertension was defined as the 2017 ACC/AHA guidelines (SBP \geq 130 mmHg, or DBP \geq 80 mmHg). Eating habits and food consumption score were assessed by using Food Questionnaire validated by the Laboratory of Nutrition and Nutritional Biochemistry (University of Yaounde 1, Cameroon). Food mineral contents were also evaluated.

Results

Patients suffering from hypertension consumed all groups of food as fruits (pawpaw, avocado, pineapple, water melon and orange), vegetables (folong, okok and carrots), tubers (plantains, cassava, unripe banana and yam), cereals (rice and white bread), legumes (egusi, beans and groundnuts), fats (margarine and refined palm oil), spices (onion and garlic) and animal proteins (fish, red meat, milk, eggs and dairy products). Results of consuming foods rich in micronutrients revealed that hypertensive patients mostly eat foods rich in sodium. The food consumption score is limit means that the global quality diet is inadequate quality and adequate quantity.

Conclusion

Patients suffering from hypertension have inadequate quality of diet and most consume foods rich in sodium.

Keywords

Food habits; Hypertension; Hospital

INTRODUCTION

Overweight and obesity because of their strong prevalence and their implications as major risk factors of chronic diseases related to nutrition, type 2 diabetes, cardiovascular diseases, and hypertension are today the most significant threats of public health on a worldwide scale.¹ Indeed, many developing countries have experienced a very significant increase in the prevalence of obesity, type 2 diabetes, cardiovascular diseases, and hypertension.¹ In 2005, 58 million deaths occurred worldwide; over 35 million deaths were attributed to the chronic diseases.² According to world health organization (WHO),³ hypertension comes in second position, after smoking but before alcoholism, on the list of the factors decreasing the number of years of life in good health. Moreover, high blood pressure increases morbidity and cardiovascular mortality.¹ The recent data of the WHO indicate that nearly a billion people in the world suffer from hypertension. Because of the aging of the population, the forecasts suggest that this number could increase to 1.5 billion in 2025. According to the Cameroon Heart Foundation, the statistics relating to arterial hypertension are worrisome. This arterial hypertension causes 17.3 million deaths in the world. Among those, 80% occur in the countries with average or weak incomes. Africa in general and Cameroon in particular are not saved by high prevalence of hypertension because epidemiologic studies reveal the strong prevalence of obesity, diabetes and high blood pressure.⁴ In Cameroon, 35% of the adult population suffers from arterial hypertension; 17,000 people there die each year.⁵ In Cameroon, the situation of people suffering high blood pressure is alarming; besides, it worth noting that the nutritional management is neglected even non-existent in hospitals. Nowadays, in spite of the free screening and public awareness campaigns, more and more of people die of this pathology either by negligence or by ignorance, or even for lack of nutritional follow-up.

The aim of this study is to assess the dietary habits of patients suffering from hypertension in Cameroon.

METHODOLOGY

This cross-sectional and descriptive survey was conducted in Douala (economic town of Cameroon) particularly in Deido District Hospital.

The survey covered a sample of 206 Cameroonian hypertensive patients. The study proceeded between August 2015 and February 2016.

Hypertension was defined based on the 2017 American Heart Association/American College of Cardiology (AHA/ACC) guidelines (observed systolic BP (SBP) ≥ 130 mmHg, or diastolic BP (DBP) ≥ 80 mmHg).⁶ Pregnant women, breastfeeding women and normotensive patients (SBP < 130 mmHg and DBP < 80 mmHg) were excluded. Blood pressure and anthropometric measurement were taken before the administration of the Food Frequency Questionnaire.

Anthropometric Measurements

Body weight was measured to the nearest 100 g, with participants

in light clothing and without shoes, using an electronic scale of 150 kg capacity (TANITA BC 543). Height was measured to the nearest 0.5 cm using a portable locally built stadiometer, with the participants standing upright on a flat surface without shoes, with the back of their heels and the occiput against the stadiometer. Body mass index (BMI) was calculated as weight (in kilograms) divided by the square of height (in meters). Nutritional status was defined as follows⁷: underweight: BMI equal to 18.5 kg/m²; normal weight: BMI ranged to 18.5 and 24.9 kg/m²; overweight: BMI range to 25.0 and 29.9 kg/m²; obese: BMI ≥ 30.0 kg/m².

Blood Pressure Measurement

Blood pressure was measured using electronic radial tensiometer (OMRON M3 Comfort). Blood pressure was measured by the first author with acalibrated tensiometer on the right arm of seated participants after a minimum of 10 min rest. Systolic and diastolic pressures were measured twice with an interval of 10 min between the first and the second measurement. The mean of the two readings was used in the analyses. Hypertension for individuals without a prior diagnosis was defined as systolic blood pressure SBP ≥ 140 mmHg and/or diastolic blood pressure DBP ≥ 90 mmHg.⁸

Age

Age is a cardiovascular risk factor independently of other factors.⁹ In this study, age was represented in sections of 24-30-years, 31-40-years, 41-50-years, 61-70-years, 61-70-years and 71-80-years, 81-90-years.

Measurement of Eating Habits and Food Consumption Score

Measurement of eating habits: The eating habits of the participants were explored using a pretested food frequency questionnaire validated by the laboratory of nutrition and nutritional biochemistry (University of Yaounde 1, Cameroon). This questionnaire included 09 groups of foods in which frequency was characterized as: at least once a week, 1-3 times a week, more than 4 times a week. For each participant, we documented during seven days period the frequency of “Western” food, “traditional” food consumption; consumption of fat and sugar.

Food consumption score (FCS): Food consumption score represents the quality of diet. It is used as an indicator of access to the feeding.¹⁰ It is based on a 7-days recall on the food types/groups (diversity) and the food frequency of consumption. To measure this score, 09 groups of food were aggregated into 08 groups of food necessary to build a food consumption score. Each group of food was affected by a weighting, thus the score obtained was the product of the weighting and the number of days of consumption during the last 7-days. The resulting food consumption score was calculated as the sum of the scores representing the number of groups of consumed food. The higher the score, the more the feeding was regarded as adequate.

Thus, FCS < 21 : Poor (inadequate quantity and quality of diet)

21.5 $<$ FCS $<$ 35: Limit (inadequate quality and adequate quantity of diet)

FCS>35: Acceptable (adequate diet)

Measurement of Food Mineral Content

Four minerals implied in hypertension were chosen: potassium, sodium, calcium, and magnesium. It was evaluated using a food frequency questionnaire instrument, and the most food consumed by hypertensive patients was selected. The mineral composition of these foods was evaluated using the dietary composition tables. The presence of one group of mineral was noted « 1 » and his lack noted « 0 ». We considered that consumption of food rich in one of the selected micronutrients is regular when the patients consumed higher than 4 foods rich in one of selected mineral.

Statistical Analysis

Software SPSS (Statistical Social Package for Sciences) version 11.5 for Windows was used to carry out the statistical analyses. The descriptive statistics made it possible to calculate the frequencies. The tables and the histograms were obtained using Excel.

Ethical Approval

One month preceding the survey, the communities and their leaders were informed by the study investigators about the goals, the importance and the benefits of the study. Participation in the study was voluntary. All the participants gave their free and informed consent to participate in the study. This study was approved by the administration and ethical committee of this hospital (Registry number N°960/AV/MINSANTE/DRSPL/SSDD/HDD).

RESULTS

In this study, 30.1% of patients are in the age between 41-50 years, 62.6% were women. Based on ACC/AHA guidelines, the prevalence of hypertension (130/80 mmHg) was 77.09%. The hypertensive population included 67 males and 107 females. It is constituted by 38.3% of obese and 30.3% of overweight persons. The prevalence of systolic hypertension was 97.4% and diastolic hypertension was 78%.

The results of *t*-test of Student showed a significant difference in height and BMI between female and male of hypertensive population (Table 1).

Food Habits of Hypertensive Patients

Hypertensive patients are divided according to the consumption of the groups of food, individual food by groups of food and consumption of foods rich in minerals.

Food Consumption

The population of study is divided according to the consumption of fruits, vegetables, tubers, cereals, animal proteins, legumes, fats, drinks, spices and sweet foods.

We observed that 70.3% of patients regularly consumed fruits. The more consumed Fruits (>3times/week) in the hypertensive patients population are: pawpaw (*Carica papaya*) (52.0%)

Table 1. Anthropometric and Hemodynamic Characteristics of Hypertensive Population

Parameters	Gender	Means	p value
Age (years)	Male	50.33±1.70	p>0.05
	Female	50.01±1.15	
Weight (Kg)	Male	78.01±1.82	p>0.05
	Female	79.92±1.73	
Height (m)	Male	1.68±0.009	(p<0.01)
	Female	1.63±0.006*	
BMI (Kg/m2)	Male	27.63±0.70	(p<0.05)
	Female	29.97±0.66*	
SBP (mmHg)	Male	158.84±2.17	p>0.05
	Female	157.06±1.83	
DBP (mmHg)	Male	96.36±1.36	p>0.05
	Female	95.29±1.23	
Pool (bat/min)	Male	81.51±1.46	p>0.05
	Female	83.94±1.60	

Table 2. Distribution of Hypertensive Patients Based on Consumption of Fruits

Fruits	Never n (frequency)	Rarely (1 - 2 times/ week n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Pawpaw	34 (19.4)	50 (28.6)	91 (52.0)		
Soursop	114 (65.1)	33 (18.9)	28 (16.0)		
Pineapple	38 (21.7)	39 (22.3)	98 (56.0)		
Watermelon	41 (23.4)	47 (26.9)	87 (49.7)		
Orange	34(19.4)	43 (24.6)	98 (56.0)		
Grapefruit	100 (57.1)	48 (27.4)	27 (15.4)		
Sweet banana	57 (32.6)	55 (31.4)	63 (36.0)	70.3%	29.7%
Mangoe	93 (53.1)	37 (21.1)	45 (25.7)		
Avocado	47 (26.9)	41 (23.4)	87 (49.7)		
Lemon	76 (43.4)	48 (27.4)	51 (29.1)		
Apple	73 (41.7)	39 (22.3)	63 (36.0)		
mandarine	74 (42.3)	50 (28.6)	51 (29.1)		
guava	80 (45.7)	43 (24.6)	52 (29.7)		
kassemango	85 (48.6)	46(26.3)	44 (25.1)		

avocado (*Persea Americana*) (49.7%), pineapple (*Ananas comosus*) (56.0%), watermelon (*Citrus lanatus*) (49.7%) and orange (*Citrus X sinensis*) (56.0%) (Table 2).

On the other hand, 66.3% of patients regularly consume vegetables like: zom (*Solanum nigrum*) (46.8%), ndole (*Vernonia amygdalina*) (49.1%) and carrots (*Daucus carota* sub sp sativus) (58.8%), cabbages (47.8%) and tomatoes (58.3%) (Table 3).

Concerning cereals, 86.3% of patients consumed cereals like rice (*Oryza sativa*) and white bread (Table 4).

Concerning starchy foods, the results showed a weak consumption (35.4%). The most consumed foods are Irish po-

Table 3. Distribution of Hypertensive Patients Based on Consumption of Vegetables

Vegetables	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Folong	66 (37.7)	71 (40.6)	38 (21.7)	66.3%	33.7%
Okok	68 (38.9)	51 (29.1)	56 (32.0)		
Sanga	78 (44.6)	52 (29.7)	45 (25.7)		
Zom	43 (24.6)	50 (28.6)	82 (46.8)		
Kpem	78(44.6)	62 (35.4)	35 (20.0)		
Ndole	34 (19.4)	55 (31.4)	86 (49.1)		
Eru	91 (52.0)	42 (24.0)	42 (24.0)		
Djamajama	97 (55.4)	34 (19.4)	44 (25.1)		
Cocoyam leaves	104 (59.4)	36 (20.6)	35 (20.0)		
Melon leaves	96 (54.9)	37 (21.1)	42 (24.0)		
Tomatoes	38 (21.7)	35 (20.0)	102 (58.3)		
Cabbages	51 (29.1)	41 (23.4)	83(47.4)		
Carrots	32 (18.3)	40 (22.9)	103 (58.8)		
Green beans	51 (29.1)	54 (30.9)	70 (40.0)		

Table 4. Distribution of Hypertensive Patients Based on Consumption of Cereals

Cereals	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Maize and products	26 (14.9)	59 (33.7)	90 (51.4)	86.3%	13.7%
Rice	20 (11.4)	38 (21.7)	117 (66.9)		
Pasta	25 (14.3)	57 (32.6)	93 (53.1)		
White Bread	19 (10.9)	31 (17.7)	125 (71.4)		

Table 5. Distribution of Hypertensive Patients Based on Consumption of Starchy Foods

Starchy foods	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Plantain	98 (56.0)	13 (7.4)	64 (36.6)	66.3%	33.7%
Cassava	104 (59.4)	25 (14.3)	46 (26.3)		
Unripe bananas	106 (60.6)	26 (14.9)	43 (24.5)		
yams	114 (65.1)	23 (13.1)	38 (21.8)		
Yams	114 (65.1)	33 (18.9)	28 (16.0)		
Irish potatoes	101 (57.7)	24 (13.7)	50 (28.6)		
Sweet potatoes	121 (69.1)	25 (14.3)	29 (16.6)		
Ponded yams	126 (72.0)	31 (17.7)	18 (10.3)		

tato (*Solanum tuberosum*) (28.6%), plantain (*Musa paradisiaca*) (36.6%), cassava (*Manihot esculenta*) (26.3%), unripe banana (*Musa acuminata*) (24.5%), and cocoyam (*Dioscorea sp*) (21.8%). (Table 5).

Patients (61.7%) regularly consumed legumes like Egusi (*Cucumis sp*) (58.3%), beans (*Phaseolus vulgaris*) (52.0%) and peanuts (*Arachis hypogaeae*) (61.1%). All of this is present in their diet three times per week. (Table 6).

Table 6. Distribution of Hypertensive Patients Based on Consumption of Legumes

Legumes	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Peanuts	35 (20.0)	33 (18.9)	107 (61.1)	61.7%	38.3%
Soya	117 (66.9)	33 (18.9)	25 (14.2)		
Egusi	20 (11.4)	53 (30.3)	102 (58.3)		
Beans	34 (19.4)	50 (28.6)	91 (52.0)		

Table 7. Distribution of Hypertensive Patients Based on Consumption of Animal Proteins

Animal proteins	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Eggs	42 (24.0)	43 (24.6)	90 (51.4)	77.1%	22.9%
Red meat	27 (15.4)	43 (24.6)	105 (60.0)		
White meat	21 (12.0)	52 (29.7)	102 (58.3)		
Meat products	77 (44.0)	64 (36.6)	34 (19.4)		
Fish	12 (06.9)	34 (19.4)	129 (73.7)		
Sea products	26 (14.9)	38 (21.7)	111 (63.4)		
Milk	41 (23.4)	56 (32.0)	78 (44.5)		
dairy products	62 (35.4)	47 (26.9)	66 (37.7)		

From this study it comes out that 77.1% of hypertensive patients regular consumed animal proteins. The foods consumed up to 3 times per week are fish (73.7%), red meat (60.0%), white meat (58.3%), sea products (63.4%) and eggs (51.4%) (Table 7).

Table 8. Distribution of Hypertensive Patients Based on Consumption of Fats and Oils

Fats and oils	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular consumption (%)	Irregular consumption (%)
Crude palm oil	55 (31.4)	41 (23.4)	79 (45.1)	26.3%	73.7%
Refine palm oil	26 (14.9)	37 (21.1)	112 (64.0)		
Cotton oil	137 (78.3)	19 (10.9)	19 (10.8)		
Soya oil	110 (62.9)	25 (14.3)	40 (22.8)		
Maize oil	168 (96.0)	07 (4.0)	00 (0.0)		
Olive oil	101 (57.7)	26 (14.9)	48 (27.4)		
Butter	113 (64.6)	30 (17.1)	32 (18.3)		
Margarine	92 (52.6)	29 (16.6)	54 (30.8)		

In our study, only 26.3% of hypertensive patients consumed fats and oils. The fats and oils most used by patients 3 times/weeks are refined palm oil (64.0%), crude palm oil (45.1%) and margarine (30.8%) (Table 8).

Concerning spices, the study revealed that 82.9% of hypertensive patients consumed spices in their diet like onion (*Allium cepa*) (85.7%) and garlic (*Allium sativum*) (81.7%) (Table 9).

Table 9. Distribution of Hypertensive Patients Based on Consumption of Spices

Spices	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular con- sump- tion (%)	Irregular consump- tion (%)
Onion	07 (04.0)	18 (10.3)	150 (85.7)	82.9%	17.1%
Garlic	08 (04.6)	24 (13.7)	143 (81.7)		
White pepper	35 (20.0)	36 (20.6)	104 (59.4)		
Ginger	30 (17.1)	72 (41.1)	73 (41.7)		
Djajangsang	24 (13.7)	46 (26.3)	105 (60.0)		
Chili pepper	31 (17.7)	58 (33.1)	86 (49.1)		

Table 10. Distribution of Hypertensive Patients Based on Consumption of Pastries and Sugary Foods

Pastries and sugary foods	Never n (frequency)	Rarely (1 - 2 times/ week) n (frequency)	>3times/ week n (frequency)	Regular con- sump- tion (%)	Irregular consump- tion (%)
Cakes	85 (48.6)	38 (21.7)	52 (29.7)	17.7%	82.3%
Donuts	61 (34.9)	32 (18.3)	82 (46.8)		
Pizza	148 (84.6)	15 (08.6)	12 (06.8)		
Hamburger	136 (77.7)	22 (12.6)	17 (09.7)		
Hot dog	149 (85.1)	14 (08.0)	12 (06.8)		
Chocolate	83 (47.4)	48 (27.4)	44 (25.1)		
Ice cream	136 (77.7)	17 (09.7)	22 (12.6)		
Chips	119 (68.0)	32 (18.3)	24 (13.7)		
Confit peanuts	116 (66.3)	44 (25.1)	15 (08.6)		
Candies	137 (78.3)	26 (14.9)	12 (06.8)		

The consumption of pastries and sugary foods showed that 17.7% of hypertensive patients regular eat pastries and sugary foods particularly donuts (46.8%), cakes (29.7%) and chocolate (25.1%) (Table 10).

Distribution of Hypertensive Patients According to the Consumption of Foods Rich in Micronutrients

The study revealed that 44.6% of patients regularly consumed food rich in potassium, 43.4% consumed food rich in magnesium, 80% consumed food rich in sodium and 39.4% consumed food rich in calcium (Table 11).

Table 11. Distribution of Hypertensive Patients Based on Consumption of Food Rich in Micronutrients Important for Hypertension

Food rich in micronutrients important for hypertension	Foods rich in Potassium (%)	Foods rich in Magnesium (%)	Foods rich in Calcium (%)	Foods rich in Sodium (%)
Regular consumption	78 (44.6)	76 (43.4)	69 (39.4)	140 (80.0)
Irregular consumption	97 (55.4)	99 (56.6)	106 (60.6)	35 (20.0)

Evaluation of Food Consumption Score

The evaluation of global quality of diet showed that 82.1% of patients have a limit Food consumption score (21.5<FCS<35) (Table 12).

Table 12. Distribution of Hypertensive Patients According to Food Consumption Score (FCS)

Food Consumption Score (FCS)	n (frequency)
Acceptable (adequate quality and quantity): FCS>35	07 (04.0)
Limit (inadequate quality and adequate quantity): 21.5<FCS<35	08 (04.6)
Poor (inadequate quality and quantity) : FCS<21.5	35 (20.0)
Total	30 (17.1)

DISCUSSION

The studies of Raschke V, Cheema B¹¹ showed that actually, the dietary choices are oriented towards the abandonment of traditional foods habits and an increase of consumption of food known as “Western,” are controlled by several factors that seem to join together the majority of the countries in the process of development such as Cameroon. The results of the dietary habits showed that 42% of hypertensive patients regularly consumed fruits, 56.2% consumed vegetables, 29.4% consumed tubers, 80.4% consumed cereals, 54% consumed legumes, 73.6% consumed animal proteins, 76.2% consumed fats, 61.5% consumed spices, and 83.4% consumed sweet foods. In our population of study, tastes could be justified by the standardized choices of available and attractive food rich in energy (sugar, fat).¹²

Several studies established an association between a food rich in lipids or simple sugars, or salt, and high blood pressure,¹³ whereas food rich in plants and fruits would be associated with a weak prevalence of hypertension.¹⁴

In addition to the great availability of these Western or industrial foods and their attraction, the food choices could be justified by the economic environment. Thus, the people of the socio-economic low-level, with the limited resources, would choose food rich in energy, rich in manufactured cereals, sugars and rich in fat, in order to save money.¹⁵

The results of the consumption of food rich in micronutrients showed that 45.9% of hypertensive patients have a regular consumption of foods rich in potassium (fruits: like banana, avocado papaw and local vegetables like zoom (*Solanum Nigrum*), folong (*Amaranthus hybridus*), and ndole (*Vernonia amygdalina*)). This could explain the prevalence of the diastolic blood pressure which is 52.9%.

Epidemiological studies have established a negative relation between low potassium intake and tension level. Clinical trials showed that a diet rich in potassium attenuates the increase in the blood pressure induced by the sodium loading; while a low potassium diet induces the opposite effect.¹⁶ This effect of the increase in the potassium intake can result from various mechanisms: increase in the natriuresis with sodium depletion, reduction of the pressure to circulating noradrenalin, reduction in the renin activity, vasodilatation. The consumption of food rich in potassium is better than the drug supplementation.¹⁷

According to the literature, persons who can have hypertension are those at which diet is poor or insufficient in cal-

cium. We have also those particularly elder people at which intestinal absorption and/or the renal reabsorption of calcium are decreased.¹⁷ The study revealed that 36.6% of patients regularly consumed foods rich in calcium. This result could explain the frequency of patients having a personal history of pains to the legs (38.3%). These results are similar to those of¹⁷ which showed that the ingestion of food calcium was less to the hypertensive patients than the normotensive patients. It also showed that calcium intake higher than 800 mg/day is associated with the reducing of the particular pains and hypertension.

The study also revealed that 43.4% of hypertensive patient regularly consumed foods rich in magnesium (Folong, okok, ndolè, avocado, banana, groundnuts, plantain, milk, white pepper and rice) and 56.6% irregularly. The irregular consumption of magnesium, could explain the appearance of pains (hyperalgy) and muscular cramps in study population (38.3%). Experimental works suggested that an insufficient food magnesium could be associated with HBP, and some studies noted an improvement of hypertension after magnesium supplementation; particularly if the diet is rich in salt.¹⁸ The explicative mechanism is the role of magnesium in the regulation of cellular physiology. However, it should be noted that the daily consumption of 350 or 400 mg of magnesium would have a favorable effect on hypertension.

In this study we noted that 77.1% of hypertensive patients consumed animal proteins, and 26.3% consumed fats. Many studies established the link between hypertension, consumption of fat and animal proteins. These studies revealed that excessive consumption increased the blood viscosity, bad cholesterol level and the systolic blood pressure.¹⁹

Moreover, 38.3% of hypertensive patients were obese and 30.3% were overweight. This could be explained by the excessive consumption of fats and animal proteins by patients associated with being sedentary because 50% of subjects did not do a physical activity. Studies of,¹⁹ defined the hypercholesterolemia like a too high cholesterol rate in blood. Consumption of animal proteins, fats, certain plant proteins (groundnuts) leads to a deposit of cholesterol excess on the arterial walls, forming atherosclerosis plates, which thicken with the time.²⁰

Contrary to being sedentary, the regular physical exercise leads to decrease blood pressure and cardiovascular risk, and that remains valid at any age.²¹ These beneficial effects are primarily related to the fall of the blood pressure by the weight loss.¹⁷ It would involve also a significant fall of the left ventricular mass.²²

It is also shown in the study that 80% of the patients consume foods rich in sodium (amount of sodium for food); this could be explained by a constant rise in tensional parameters of patients. Other studies showed that the response of the blood pressure to variations of the sodium intake is heterogeneous and has a family character. Indeed, certain patients known as “salt – sensitive” have increased blood pressure with an increased salt intake thus leading to a higher risk of cerebrovascular and coronary heart diseases.²²

According to,²³ if the blood contains many salt, the kidneys retain more water and excrete some lesser quantities. The increased blood volume which results from it leads to an increase in the blood pressure which leads to hypertension. A modest reduction of the sodium intake (6 g NaCl/day) can facilitate control of tension to the hypertensive patient in order to reduce the number of antihypertensive drugs. The Results of the food consumption score (FCS) that 82.3% of hypertensive patients have a limit food consumption score (FCS) which according to²⁴ shows that diet is inadequate quality; this result will be able to explain the prevalence of obesity (38.3%) and overweight (30.3%) observed in the population of study.

CONCLUSION

This study revealed that patients suffering from hypertension consume all groups of foods. Most foods consumed are rich in sodium. In addition, the quality diet of these patients is inadequate. This study could contribute to defining a new strategy in the management of hypertension focused on nutritional habits particularly on the reduction of food rich in sodium and promotion of foods rich in magnesium, potassium, and calcium.

ACKNOWLEDGMENTS

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AVAILABILITY OF DATA AND MATERIALS

The primary data and materials of this study are available in Deido district hospital. Official registration is required to access the database *via* secretariat of Director. The datasets analyzed during the study are available from the corresponding author.

AUTHORS' CONTRIBUTIONS

NBCF and MMP designed the study protocol and wrote the first manuscript draft. NBCF led the statistical analyses and contributed to the manuscript drafting. NEVB and medical personnel of hospital contributed to data collection. NBCF and MMP critically contributed to the analysis, discussion and interpretation of the data and NEVB, NBCF and MMP contributed to data interpretation and the writing of the manuscript. All authors reviewed and approved the final manuscript draft.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted according to the principles of the Declaration of Helsinki and approved by the Deido District Hospital (Registry number N°960/AV/MINSANTE/DRSPL/SSDD/HDD). Participation to the study was voluntary and written informed consent was obtained from each participant.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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