Knowledge and Practice of Dietary Recommendations among Cardiovascular Disease Patients Attending Ngaoundere Regional Hospital, Adamawa Region, Cameroon

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Abstract: *Objective*: To assess the level of awareness and adherence of patients to dietary recommendations in the management of Cardiovascular Diseases (CVDs).

Methods: This cross-sectional study included CVD patients on medical visits at the cardiology unit of Ngaoundere Regional Hospital. Well informed and consenting participants filled a pre-tested questionnaire on dietary knowledge and practice.

Results: 129 patients were retained in this study out of 151 enrolled. 58.9% of participants knew that the consumption of vegetables is beneficial for their status. Fruit consumption recorded the same level of awareness. All other dietary variables studied revealed less than 50% level of awareness among participants. Concerning recommended dietary practices, 73.64% of participants consumed oils rich in saturated fatty acids. Meat and fish consumption were recorded at 62.01% and 65.12% respectively, with a 94.57% preference to red meat consumption. Almost 19.38% of the study population consumed eggs more than 3 times per week, 31.78% and 41.09% consumed vegetables and fruits at least thrice and twice a week respectively. The overall mean adherence to the studied cardiovascular disease dietary recommendations was 38.31%, with only fish, vegetable and tea/coffee recommendations recording adherences of 50% and above.

Conclusion: The findings demonstrate a low level of awareness and adherence to dietary recommendations in the management of CVDs, thus the need for the strengthening of health promotion programs and improvement of the nutritional advices in our context.

Keywords: Cameroon, Ngaoundere Regional Hospital, Cardiovascular diseases, Diet, Knowledge, Practice.

INTRODUCTION

The World Health Organization (WHO) defines Cardiovascular Diseases (CVDs) as a set of disorders affecting the heart and blood vessels [1]. Currently, CVDs are the leading cause of death worldwide with an estimated 17.5 million global CVD deaths, accounting for 31% of global deaths, with 7.4 million deaths for coronary heart disease and 6.7 million deaths from stroke [1-3]. According to the WHO, if appropriate measures are not taken to curb these CVD trends, about 23.6 million people will die of cardiovascular disease by 2030 [1]. Cameroon is no exception, as these diseases are rapidly gaining grounds as a major leading cause of mortality and disability among other noncommunicable diseases with a prevalence rate varying between 9% and 11% depending on authors [4, 5].

Simultaneously with CVDs, cardiovascular disease risk factors such as diabetes, obesity, physical inactivity and poor dietary are increasing, with the Cameroonian population thus progressively becoming more prone to cardiovascular events [6-8]. In Ngaoundere, CVDs have been reported to be the most important causes of admissions from non-communicable diseases in hospital setting, their nosological forms being dominated by hypertension, heart failure and stroke [5].

It has been shown that, a diet rich in saturated fats and poor in fruits and vegetables, increase the risk of cardiovascular events [9]. Consequently, the management of heart disease should not only entail pharmacologic methods in controlling cardiovascular risk, but also by encouraging adequate and appropriate nutrition and lifestyle modification with the goal of preventing the occurrence of CVD complications [10]. Health promotion programs have previously been implemented in our context and the country at large, but without any previous data on the level of

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awareness and dietary adherence. The objective of this work was to determine, in the case of patients under follow-up in the Ngaoundere Regional Hospital, the level of dietary awareness and assess the degree of adherence to dietary recommendations in patients with CVDs in view of contributing relevant data for evidence-based decision making towards strengthening of health promotion programs and consequently CVD management.

METHODS

Study Area

The study was carried out from June to September 2015 at the Ngaoundere Regional Hospital. This is the reference healthcare institution of the Adamawa Region in Cameroon, located in Ngaoundere city, the administrative headquarters of the region. Geographically, the Adamawa region of Cameroon is neighbors to the Nigeria and Central African Republic respectively. Economically, this region depends on cattle rearing, while crops like millet, maize, groundnuts, cassava, yams and cocoyams are mostly cultivated on subsistence levels [11].

Study Design, Population and Sample Size

This cross-sectional study involved a random and progressive selection of participants which included patients previously or currently diagnosed with any form of CVDs at the Ngaoundere Regional Hospital. Nosological forms of CVDs encountered comprised of hypertension, stroke, lower extremity artery disease, cardiac insufficiency, and angina pectoris.

The sample size of this study was estimated with the help of the Lorenz formula [12]:

$$N = [p.q\,(z_\alpha)^2]/d^2$$

Where: N= sample size; p= prevalence of CVDs in a hospital milieu in Adamawa, 9.9%; q=1-p, 90.1%; d= error margin, 5%; Z_α=Z-score, 1.96 for 95% confidence level.

Inclusion criteria

Patients were enrolled if they had either a previous or current diagnosis of any form of CVDs, attended the Ngaoundere Regional Hospital and consented in writing to participate in this study.

Exclusion criteria

Patients suffering from CVDs who refused to sign a written consent form were excluded from this study.

Study Variables

Parameters considered in this work comprised of sociodemographic characteristics including, age, gender, marital status, level of education, profession and religion. Dietary knowledge and practice the same as the level of adherence to dietary recommendations were also studied.

Data Collection

Data were collected with the help of a pre-tested questionnaire following a one-on-one encounter with each participant. Participants who could read and write, self-responded and completed the questionnaire, while those who could not, were aided by any of the investigators, with communication done in their mother tongue. The French, English and Fulfulde (traditional) languages were the principal languages of communication.

The questionnaire consisted of identification of participants, awareness on cardiovascular disease risk factors and dietary habits. It was established according to the nutrients of interest and with respect with the food habits of the participants. The frequencies of consumption were recorded as number of times per day or week. Each participant was expected to choose the frequency closest to his/her usual level of consumption for each food type.

Knowledge and practice were studied to determine whether the implementation of dietary recommen-dations was related to the knowledge on food factors, and secondly to deduce the level of dietary adherence. The questionnaire consisted of a set of questions on knowledge and practice of certain dietary habits to which individuals had to answer "yes" or "no".

Dietary recommendations were adapted from the Capital Health-Food and Nutrition service's heart healthy eating tips [13]. Practice of dietary recommen-dations was accorded a 'yes' response when:

Fish consumption was at least twice per week;

Fruit consumption was at least twice per week;

Vegetable consumption was at least thrice a week;

Legume consumption was at least thrice a week;

Tea/coffee consumption was at most 3 cups daily;

Meat consumption was at most twice a week;

Participant consumed white meat and oils rich in unsaturated fatty acids;

Participant did not consume oils rich in saturated fatty acids;

Level of adherence was calculated in accordance with the propositions of Avira and Sabin [14] as follows: Level of Adherence = $(K_p \times 100) / (K_P + K_{NP})$

Where K_p= Knowledge and practice, K_{NP}= Knowledge without practice

Ethical Considerations

Administrative and ethical clearances were obtained from the Ngaoundere University (Ref: 2015/158/UN/ DFS/CD-SBM) and the ethical committee of the Ngaoundere Regional Hospital (Ref: 1078/L/RC/RA/ DSP/HR/NGD/CLE) respectively. Participation was voluntary and discontinuity of participation free without any form sanction or discrimination. Patient data obtained were treated confidentially.

Data management and Analysis

Data were collected, registered, and processed using Microsoft Excel 2013 spreadsheets. Data were presented principally as percentages with the Chi-square test used to determine association between knowledge and practice of dietary recommendations.

RESULTS

General Characteristics of Study Population

Some general characteristics of the study population are presented in Table **1**.

Out of 151 persons recruited, a total of 129 persons met out inclusion criteria, 65 (50.39%) males and 64 (49.61%) females recording a 1.01 sex ratio (M/F). The age of study participants ranged from 27 to 89 years with mean age being 56.68±12.34 years. Following age stratification, the age group 55-75 years (55, 03%) was the most represented. A majority of the study population was married (77.52%). Compared to a wide range of other occupations encountered, the study recorded a vast predominance of housewives (42.64%). Regarding the educational levels, it was observed that 68.22% of the participants had acquired less than a secondary level education. Furthermore, Muslim faithfuls constituted about two-thirds of the study population compared to their Christian counterparts.

Table 1:   General Characteristics of Study Population

Variables	Total	Proportions of total population (%)
Age (years)		
≤35	7	5.43
36 – 55	44	34.11
56 – 75	71	55.04
>75	7	5.43
Marital Status		
Unmarried	7	5.43
Married	100	77.52
Widowed	16	12.40
Divorced	6	4.65
Profession		
Farmers	11	8.53
Traders	12	9.30
Housewives	55	42.64
Salary earners (formal)	20	15.50
Retired workers	12	9.30
Others (informal)	19	14.73
Level of Education		
Uneducated	62	48.06
Primary	26	20.16
Secondary	35	27.13
Higher	6	4.65
Religion		
Christian	44	34.11
Muslim	85	65.89

Selected Dietary Patterns of Participants

Results of selected dietary pattern of study participants can be seen in detail in Table **2**.

It was recorded that 73.64% of participants consumed oils rich in saturated fatty acids. Meat consumption (mainly cow meat) was frequent among participants with 62.01% consuming more than twice a week. In addition, participants (94.57%) predominantly practiced red meat consumption. Weekly fish consumption of at least twice was estimated at 65.12%. We went further to examine the frequency of consumption of eggs, vegetables and fruits per week. We recorded the following: while 19.38% of the study population consumed eggs more than 3 times a week, 31.78% consumed vegetables at least thrice weekly and 41.09% ate fruits at least twice weekly. We also

Table 2:   Distribution of Dietary Habits of Study Participants

Dietary Parameters	Categories	Total (n)	Proportion of total population (%)
Oil type consumed	Does not consume	3	2.33
	Rich in saturated fatty acids	95	73.64
	Rich in unsaturated fatty acids	8	6.20
	Consume both	23	17.83
Weekly frequency of meat consumption	Does not consume	5	3.88
	1 to 2 times	44	34.11
	3 to 6 times	76	58.91
	More than 6 times	4	3.10
Weekly frequency of fish consumption	Does not consume	7	5.43
	1 time	38	29.46
	2 to 6 times	71	55.04
	More than 6 times	13	10.08
Preferred meat type consumed	Does not consume	5	3.88
	Red meat	122	94.57
	White meat	2	1.55
Weekly frequency of egg consumption	Does not consume	51	39.53
	1 to 3 times	48	37.21
	More than 3 times	25	19.38
	I don't know	5	3.88
Weekly frequency of Vegetable consumption	Does not consume	4	3.10
	1 to 2 times	84	65.12
	More than 2 times	41	31.78
Weekly frequency of fruit consumption	Does not consume	15	11.63
	1 time	61	47.29
	More than 2 times	53	41.09
Daily frequency of tea/coffee consumption	Does not consume	72	55.81
	1 – 3 cups	40	31.01
	4 cups	2	1.55
	I don't know	15	11.63

took into effect records of tea/coffee consumption and recorded a 32.56% daily consumption of at least a cup.

Knowledge and Practice of Dietary Recommendations in CVD Management

Participants were interrogated on selected dietary recommendations in CVDs in a bid to assess their level of awareness and knowledge on the subject. Apart from the knowledge on the fact that vegetables possess beneficial characteristics, the level of awareness on the contribution of fish (29% compared to meat in general), tea/coffee consumption (31%), type of meat (5%) and oils (9%) consumed was generally low.

In order to ascertain "true" awareness on dietary recommendations for the management of CVDs, participants' knowledge was subsequently evaluated based on their implementation of selected recommended dietary practice (knowledge and practice). With the exception of the encouragement of the consumption of vegetables, every other

Table 3:   Association between Knowledge and Practice on the Consumption of some Selected Foods

Do you know the consumption of:		Do you practise it?		Total	P-value
		Yes n (%)	No n (%)	n (%)	
Oils rich in saturated fats is discouraged?	Yes n (%)	9(7.0)	24(18,6)	33(25.6)	0,001
	No n (%)	2(1.6)	94(72.9)	96(74.4)	
	Total	11(8.5)	118(91.5)	129(100)	
Oils rich in unsaturated fats is encouraged?	Yes n (%)	9(7.0)	18(14.0)	27(20.9)	0,001
	No n (%)	2(1.6)	100(77.5)	102(79.1)	
	Total	11(8.5)	118(91.5)	129(100)	
Meat in general is discouraged?	Yes n (%)	26(20.2)	27 (20.9)	53 (41.1)	0,030
	No n (%)	23(17.8)	53(41.1)	76(58.9)	
	Total	49(38.0)	80(62.0)	129(100)	
White meat is advised?	Yes n (%)	6 (4,7)	11(8,5)	17(13,2)	0,015
	No n (%)	14(10,9)	98(76,0)	112(86,8)	
	Total	20(15,5)	109(84,5)	129(100)	
Red meat frequently is discouraged?	Yes n (%)	5(3.9)	12(9.3)	17(13.2)	0.002
	No n (%)	7(5.4)	105(81.4)	112(86.8)	
	Total	12(9,3)	117(90,7)	129(100)	
Fish is encouraged?	Yes n (%)	29(22.5)	24(18.6)	53(41.1)	0.038
	No n (%)	55(4.,6)	21(16.3)	76(58.9)	
	Total	84(65.1)	45(34.9)	129(100)	
Vegetables are encouraged?	Yes n (%)	51(39.5)	25(19.4)	76(58.9)	0.078
	No n (%)	43(33.3)	10(7.8)	53(41.1)	
	Total	94(72,9)	3 (27,1)	129(100)	
Fruits are encouraged?	Yes n (%)	23(17.8)	53(41.1)	76(58.9)	0.003
	No n (%)	30(23.3)	23(17.8)	53(41.1)	
	Total	53(41.1)	76(58.9)	129(100)	
Tea/Coffee is discouraged?	Yes n (%)	31(24,0)	15(11,6)	46(35,7)	0,049
	No n (%)	41(31,8)	42 (32,6)	83(64,3)	
	Total	72(55,8)	57(44,2)	129(100)	

recommended dietary practice recorded low levels of "true" awareness (Table **3**).

Level of Dietary Adherence

The individual and mean adherence levels for the dietary recommendations studied are presented in Figure **1**.

It was important to determine the level of adherence to dietary recommendations in CVD management towards ascertaining the degree of knowledge and practice (to know and practice) among participants. We adapted a formula to our study according to Avira and Sabin [14]. In all, only fish, vegetable and tea/coffee recommendations recorded adherences of 50% and

above, moreover the overall mean adherence was 38.31%.

DISCUSSION

Nutritional adjustments and overall lifestyle changes are central to non-pharmacological management of CVD risks and CVDs. Poor dietary habits especially when accompanied with a sedentarily lifestyle accentuates CVD risk and CVD complication in the general population [7]. A hospital-based study was carried out among patients with any form of CVD in a bid to evaluate their dietary habits and in conformity with commonly recommended dietary adjustments for CVD management.
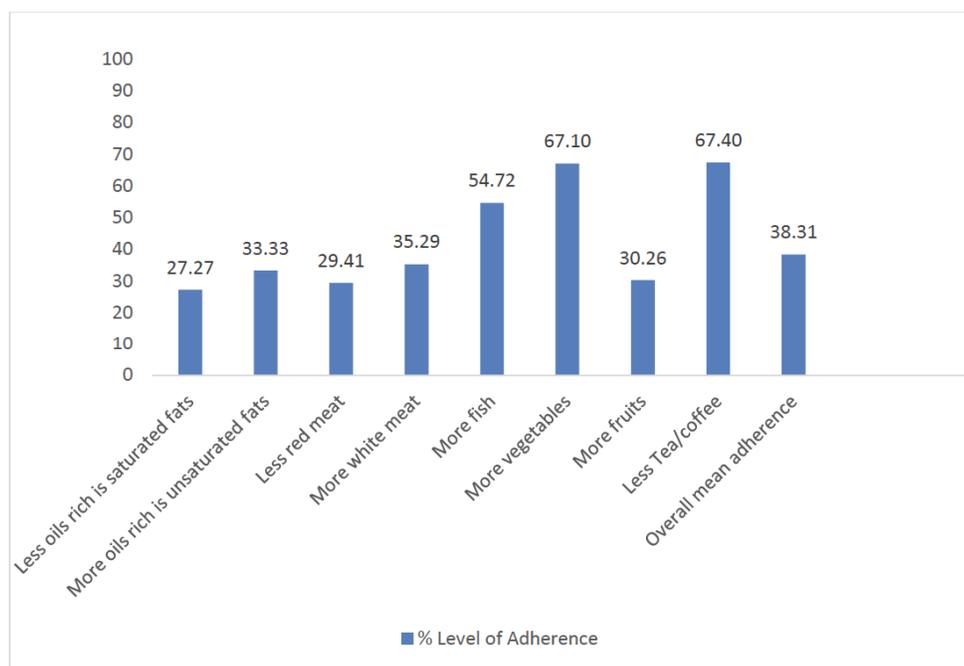
Figure 1: Level of adherence to dietary recommendations.

The study recorded high consumption rates of oils rich in saturated fatty acids (73.64%) compared to those rich in unsaturated fats (6.2%). At the same time, participants exhibited an elevated weekly meat consumption compared to fish consumption, with preference for red meat. 62.01% of individuals consumed meat more than twice a week compared to 13.96% of fish consumption. In the same line, 19.38% of persons consumed eggs more than thrice a week. This can be explained by the relativity and variation of food choices between persons. Also, high frequency of fish consumption (at least once a week) was observed, although few patients had dietary knowledge in this regard. It may be that, the accessibility, availability, and affordability of this commodity on the market, and individual convenience, but not the respect of dietary recommendations have contributed to the observed high frequency of fish consumption.

The Adamawa region of Cameroon is socioeconomically reputed for its dominant cattle breeding capacity, and provides for meat and other dairy products both within the country and abroad. This promotes the availability and affordability of meat and wide range of dairy products in our population [15].

Meat is an important source of proteins and lipids. The frequency of its consumption and the types consumed are vital in the management of CVD [16, 17]. Meat lipids consist mainly of saturated fatty acids favoring cholesterol synthesis, and in greater quantities compared to fish, although the composition of meat lipids, however, varies according to the type of meat. It is recommended to consume fish at a frequency of at least twice a week and to reduce or abstain from red meat consumption. A replacement with white meats, vegetable proteins and fish improves clinical outcomes in the management of patients with CVDs [17-19]. The association between fish consumption and risk of CVDs has been extensively studied. Fish are sources of omega-3 fatty acids (eicosapentaenoic and docosahexaenoic acids) which are important in preventing CVDs [20].

Eggs are foods highly rich in LDL cholesterol, and the moderation of its consumption contributes immensely in the reduction of blood cholesterol, an important parameter in the management of CVDs. In order to avoid complications due to excess serum cholesterol, egg consumption should be limited to 3 whole eggs per week [21]. Cesar *et al*. [21] reported that excessive intake of cholesterol altered chylomicron metabolism in young normolipaemic males while comparing cholesterol levels in egg-consuming and non-consuming individuals [22].

Fruits and vegetables are imperative in the management of CVDs by virtue of their being rich in nutrients such as soluble and insoluble fibers, phenolic compounds with antioxidant properties and minerals [17, 23]. The level of awareness and consumption of fruits and vegetables were fairly encouraging, with

vegetable consumption being high even when a frequency of more than 3 times weekly were considered. This may be a direct consequence of the dietary habits of the Adamawa population. In fact, vegetables are an essential part of almost all staple and traditional foods in the Adamawa region. They are widely available in large quantities on the market with a high relative affordability. In addition, more than half of the study participants were aware that the consumption of vegetables was beneficial.

Participants further portrayed a high frequency of consumption associated with a wide variability in the types of tea beverages consumed, ranging from locally grown plant leaves to commercially acquired coffee. Tea is a stimulant frequently containing catechin compounds and caffeine which affect cardiac function. High consumption of tea has a positive inotropic effect and increases the secretion of noradrenaline favoring an increase in blood pressure and heart rate. It is therefore necessary to limit its consumption to at most three cups per day in both patients with or at high risk to CVDs [16].

Investigating the association between knowledge and practice of dietary recommendations, only in the case of fish, vegetable and tea/coffee consumption the level of practice reflected the level of awareness. This in turn recorded less than 50% adherence to all the studied dietary recommendations except for fish, vegetables and tea/coffee consumption.

LIMITATIONS

The study faces major difficulties with the verification of self-reported patient data which definitely was subjected to varying levels of bias between participants although several control questions were included in our questionnaire. For instance, mild disparities were recorded between weekly and daily frequencies and the level of practice of dietary recommendations. Also, the study took into consideration the frequently consumed staple foods characteristic of the study population, but not exhaustive enough to include foreign food types.

CONCLUSION

In summary, our findings from the assessment of knowledge and practice of selected dietary recommendations in CVD management depicted under 50% awareness on all the selected dietary recommendations studied. Considering participants

who responded "yes" to being aware of the dietary implications of studied variables, the levels of adherence to recommended dietary practices were under 50% in a majority of cases, with the exception of fish, vegetable, and tea/coffee consumption.

PERSPECTIVES

In view of the role of nutrition status and dietary practices in the control of CVD risk, management of CVDs and the prevention of CVD complication, many more operational research works are required to identify the factors inhibiting the respect and adherence to dietary recommendations, which can be socioeconomic, cultural, patient or caregiver related. Also randomized control trials will be imperative in formulating and adapting staple food types to internationally recommend nutritional standards, and testing their dietary potentials within selected CVD risk groups.

AUTHORS CONTRIBUTIONS

CT, OMP, MMT, conceived and designed the study.

JM, LSBB, conducted, collected and managed data.

JM, LSBB, performed the laboratory analysis

JM, LSBB, carried out the data analysis and interpretation of results.

OMP, MTT, JON, prepared the manuscript.

CT reviewed and corrected the manuscript.

CONFLICT OF INTEREST

None declared.

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