

Prevalence and Risk Factors of Cardiovascular Diseases in the Congo-Brazzaville Pygmies

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Received 27 May 2016; accepted 4 July 2016; published 7 July 2016

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Abstract

Objective: To evaluate the prevalence and determinants of overall cardiovascular risk among the pygmies of Congo Brazzaville. **Methods:** Cross-analysis of anthropometric data, clinical and laboratory 273 indigenous subjects including 54 patients with cardiovascular disease (CVD) and 183 without CVD, aged 29 to 69 years. The cardiovascular risk stratification table WHO/ISH 2003 was used to assess overall cardiovascular risk level. Multiple logistic regression was used to assess the independent determinants of cardiovascular risk using the global left ventricular hypertrophy as a marker. **Results:** Fifty-four subjects had cardiovascular disease (CVD), including 31 women (36.7%). They were aged 51.9 ± 12.4 years ($p < 0.05$) and showed a high blood pressure in short-long (100 ± 77 vs 32 ± 48 months; $p < 0.001$). It was also found a pulse pressure, PPO (58 ± 8 vs 51 ± 4 mmHg). In multivariate analysis, HDL-C levels, fasting glucose, age greater than 50 years and the higher parity or equalizes to 5 among women have emerged as key determinants of CVD risk. **Conclusion:** Whatever the stage, arterial hypertension in this study is associated at the risk of cardiovascular diseases (CVD) high at the Pygmies of Congo, emphasizing the need for a more aggressive follow-up strategy.

Keywords

Cardiovascular Risk, Determinants, Prevalence, Pygmy Congo

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1. Introduction

Cardiovascular diseases (CVD) represent worldwide the leading cause of death both in developed countries [1]-[3] and in developing countries [4] [5]. In Congo, hospital studies report a frequency of around 32.5% [6]. The main factors involved are the bad habits (his meals above standards, red meat consumption...), the reduction of physical activity and the deterioration of the lifestyle. However, patients studied in most of these works come from Bantu ethnic groups scattered throughout the urban and rural areas of the country. But there is a segment of the Congolese population that is indigenous (or pygmy). It occupies at the habitat forests of the Congo Basin from the Atlantic to northern Congo. Its diet is based on consumption of game, fruit and vegetables with diversified hygienic. Indeed, the environment is not suitable for agriculture (apart from cassava and banana) and livestock, giving their consumption patterns.

Moreover, studies conducted by Makosso *et al.* [7] in pygmy areas along the Conkouati-Douli National Park, in the Mayombe forest, revealed that these populations lived in the whole of bushmeat. She was eaten fresh or smoked.

To better understand the nutritional quality of that meat fat, Mananga *et al.* [8] in their study of the physiochemical composition of these have found polyunsaturated fatty acid ratios (PUFA)/saturated fatty acids (SFA), 100 g meat, values of 0.40 to 0.826 for fresh meat and smoked meat. Now it is known that metabolic availability of PUFA has a major impact on human health and is linked among other changes, with mortality by cardiorespiratory disease?

Hence the interests of this study that fixed objectives are to evaluate the prevalence of cardiovascular diseases in the indigenous population of the Congo and to determine risk factors.

2. Material and Methods

2.1. Physical Framework

Located in the southwest part of Congo, the study area in the Mayombe forest extends between 3°23S - 4°18S and 11°06E - 11°43E [9]. It covers an area of 504,950 hectares [10]. His relief, Appalachian guy with metamorphic soils, sandy schist series, calcareous marl and shale and limestone, resulting in a rugged and dissected slopes and deep ravines and valleys. The Kouboula and Mavencée Mountains are the highest channels of the zone. In moist forests where these populations live, periods of water shortage will not normally last more than one month to two years. This forest has about 1600 espèces plants (80% of which are endemic) and fauna full of more than 1000 species [10].

2.2. Topics

The study, transversal and case-control, took place from 21 October 2015 to 17 February 2016. The number of the indigenous population of the study area was based on statistical data from the capital of the District Madin-gou-Kayes, Kouilou Prefecture. In total, the census 2014 to 1756 evaluated 1246 subjects women. Subjects were recruited during a national campaign for health monitoring with medical vehicle, Congolese indigenous people, in villages or camps listed in the zone. In the study subjects from the Aboriginal population aged 29 to 69 years after history have been included, for our study. Any subject not belonging to the Bantu pygmy group was excluded from the study.

2.3. Methods

Determining the lifestyle was based on physical activity and tobacco consumption, practice commonly found in these populations. Data on the duration of high blood pressure (hypertension) and traditional antihypertensive medication were sought. The following measurements were performed in all patients after 12 hours fasting: triglycerides and blood sugar. The left ventricular hypertrophy (LVH) was determined by electrocardiography (EEG-HVG) has been set for a higher value to 13 mm [11]. As diagnostic criteria, were considered hypertensive subjects with abdominal circumference (PA) was greater than or equal to 94 cm for women and 80 cm for men. Selecting threshold values for triglycerides are those greater than or equal to 1.69 mmol/L (150 ml/dl) for hyperglycemia superiority or equal to 5.6 mmol/L (100 mg/dl). As regards the pressure, it was selected for a systolic blood pressure (SBP) greater than or equal to 140 mmHg or a diastolic blood pressure (PBO) greater than or equal to 90 mmHg. Ultimately, 237 subjects were recruited for this work, responding to the ethical

guidelines of the National Ethics Committee on Research in Health Sciences (CNERSSA) and those of Helsinki II.

2.4. Statistical Analysis

Data are expressed as mean \pm SD or relative frequency (%). The difference between quantitative variables, hypertensive versus non-hypertensive, made use of the U test of Mann Whitney Wilcoxon this for hematological variables and the Student's t test for anthropometric and hemodynamic. As regards the comparison of percentages, the McNemar test was used. The determinants of cardiovascular risk, taking into account the lifestyle, food (biochemical determinants) and the level of gravidity of women in forest environment were searched using a logistic regression analysis by the coast through ratio (OR) accompanied by a confidence interval (CI). p value < 0.05 was accepted as statistically significant. All data were analyzed on the logiciel Mathcad 6.0, after input on Epi-Info version 12.5.1.

3. Results

Clinical and laboratory characteristics of hypertensives and non-hypertensives are shown in **Table 1** and **Table 2**. Of the 237 examinees, 54 of them (22.8%) had hypertension including 31 women (36.7%). This prevalence varied between 37.0% and 14.8%, the highest prevalence is found among their patients over 5 years of age (37.0%) and lowest among those with concentrations of cholesterol/HDL exceeded 1.03 mmol/L (**Table 3**). Their average age was 59.1 ± 12.4 years. Mean BMI amounted to 27.2 ± 4.1 kg/m² in hypertensive patients: 20.1 ± 0.5 kg/m² in others (p = 0.038). Superiority in systolic blood pressure was observed in hypertensive: 152 ± 11 mmHg versus 124 ± 8 mmHg (p < 0.001) and diastolic blood pressure (98 ± 6 mmHg against 85 ± 2 mmHg; p =

Table 1. Anthropometric determinants of blood pressure of subjects studied.

	Presence of CVD (n = 54)	Lack of CVD (n = 183)	p
Sex, M/W	31/23	124/59	
Age (years)	59.1 ± 12.4	42.0 ± 2.8	p < 0.05
Physical activity (%)	15.8	84.2	p < 0.001
Smoking (%)	13.1	3.0	p = 0.059
BMI (kg/m ²)	27.3 ± 4.1	20.1 ± 0.5	p = 0.038
abdominal circumference (cm)	78.7 ± 5.1	64.2 ± 1.5	p = 0.24
Report abdomen/hips	1.36 ± 0.04	0.72 ± 0.02	p = 0.049
Pas (mmHg)	152 ± 11	124 ± 8	p < 0.001
Pad (mmHg)	98 ± 6	85 ± 2	p < 0.001
PP*	53 ± 8	51 ± 4	p = 0.038
FC (mmHg)	80.2 ± 11	71.3 ± 1.0	p < 0.05
HVG (%)	26.6	73.4	p = 0.030

BMI: Body Mass Index; No: Systolic blood pressure; Pad: Systolic blood pressure; PP*: arterial pulse pressure; FC: Heart Rate; HGV: left ventricular pressure.

Table 2. Biochemical determinants.

	Presence of CVD (n = 54)	Lack of CVD (n = 183)	p
Total cholesterol (mmol/L)	4.11 ± 0.67	3.08 ± 0.41	0.0024
LDL-C (mmol/L)	3.01 ± 0.09	2.29 ± 0.12	0.015
HDL-C (mmol/L)	1.15 ± 0.11	0.91 ± 0.06	0.017
TG (mmol/L)	1.03 ± 0.04	0.90 ± 0.08	0.039
Blood glucose (mmol/L)	3.21 ± 0.09	1.83 ± 0.12	0.026

LDL-C (mmol/L): Low-Density Lipoproteins in Cholesterol; HDL-C (mmol/L): lipoprotein-cholesterol in high density; TG (mmol/L): Triglycérides; CVD: Cardiovascular Disease.

Table 3. Risk factors for cardiovascular disease.

Risk factors	Effective	Prevalence (% sur 54)	Association with CVD (n = 183)		OR
			χ^2	p	
Age \geq 45 years	20	37.0	24.58	0.0001	2.84
Parity (women) \geq 5	16	29.6	12.81	0.001	3.56
Obesity (RAH \geq 1.3)	14	26.0	10.47	0.001	4.31
Smoking	13	24.0	9.62	0.001	3.32
Sedentary lifestyle	11	20.4	8.81	0.001	2.15
TTG \geq 1.69 mmol/L	8	14.8	7.25	0.039	2.17

TTG: Triglycerides.

0.036). The finding was similar to pulse pressure ($53 \pm 51 \pm 8$ mmHg against 4 mmHg; $p < 0.05$) and heart rate ($80.2 \pm 71.3 \pm 11$ bpm against 1.0 bpm; $p < 0.001$). In addition, the proportion HVG proved significantly higher in hypertensive patients: 73.4% versus 26.6% ($p = 0.030$).

Waist circumference and abdomen-hip ratio in hypertensive ranged respectively in hypertensive 78.7 ± 5.1 cm ($p = 0.24$) and 1.36 ± 0.04 ($p = 0.043$). Moreover, physical activity was more practiced by non-hypertensive patients: 84.2% against 15.8% for hypertensive. By cons, smoking was more found in hypertensive (13.1% against 3%) versus 26.6% with no significant difference ($p = 0.059$).

4. Discussion

The aim of this study was to evaluate the prevalence of cardiovascular diseases and determine the risk factors in an Aboriginal population in Congo (Brazzaville). The main results show firstly that the prevalence is 22.8%. This prevalence is lower than that found in the non-indigenous Congolese population: 32.5% in Brazzaville [6] and 36.4% in Pointe Noire [12].

Overall, the prevalence of patients with CVD was 29% for women against 20% for men. This varied significantly (χ^2 McNemar = 6.01; $p = 0.001$) according to the association of risk factors. Regarding the latter, age greater than 50 years, the top parity or equal to 5 in women, physical inactivity, serum HDL cholesterol and higher glucose respectively 1.15 ± 0.11 mmol/L 3.21 ± 0.09 mmol/L were the main determinant in predicting CVD risk depend in Aboriginal populations studied. However, the interpretation of our results is facing some limitations which the first is related to the cross-sectional nature of the study. In addition, the targeted location in the study area to that of the southern part of the forest of Mayombe is a second limit. Indeed, the Congolese indigenous peoples are found in four areas: 1) forest part of the prefecture Lekoumou (border between Congo and southern Gabon); 2) northern West Cuvette the prefecture (northern border with Gabon); 3) the western part of the prefecture of Sangha (border with Cameroon); 4) northern prefecture of Likouala (bordering the Central African Republic). All these areas are integrated throughout the great Congolese forest basin (Cameroon, Congo, Gabon, Equatorial Guinea, Central African Republic, and Democratic Republic of Congo). Therefore, the data from this study cannot be extrapolated to all the indigenous peoples of the Congo. However, the fact that this work is the first of its kind in Central Africa is the power of this study.

The results show that CVD patients are older, which joined the literature data [13] [14]. Indeed, age is well known as primary risk factor for CVD [15], as the level of blood pressure is associated with old age. The deleterious effects induced by age on cardiac function are supposed to be related with cardiovascular remodeling processes [15]-[18] and the association of multiple risk factors [19]. Cardiovascular remodeling, according to several studies, is associated with arterial stiffness [18] [19] and the subsequent increase in pulse pressure, an important factor for CVD occurred [20]. In the present work, increased pulse pressure can be attributed to the negative impact of the aging process and the risk factors associated with the alteration of the blood vessels. Another explanation is the deficit of the differential control of systolic and diastolic blood pressure due to the high impact on the reduction of systolic blood pressure [21] [22].

In addition, our patients are characterized by high levels of LVH; however, these rates are lower than those reported in the literature in Congolese patients from both banks of the Congo River, hypertensive and not from indigenous populations: 53.3% in the Republic of Congo [6] and 68% in the Democratic Republic of Congo [23]. Nevertheless, the negative impact of aging and persistent high blood pressure associated with cardiovascular risk

factors, may explain the observed increase in left ventricular mass [24]. In addition, the high value of blood pressure in subjects could induce insulin resistance often found in high blood pressure [25]. However, the use of traditional medication by our subjects, based on infusions of some bark and/or leaves of trees, probably have lower cardiovascular risk levels. Indeed, after many ethno botanical and pharmaceutical ethno surveys in the Congolese forest basin, it is reported the existence of anti hypertensive antipyretic plants used by traditional healers in these environments [26]. The Congolese forest is full of about forty kinds; some of them are endemic to the Congo. However, in vitro antihypertensive activity of various extracts of these plants on serum samples of hypertensive individuals in our sample does not allow objectified our hypothesis.

In regard to physical activity, it is weak in women, given their vested roles (maintains housekeeping, meal preparation, etc.). As against it is significantly higher in men, particularly those aged 20 to 50 years. It resulted in the forest hunting, including the slaughter of bush meat. This hunt is characterized by races fast slow pace on trips strewn with various pitfalls (lianas, dead tree trunks, etc.) and different topographies. In addition, physical activity related to hunting nowadays is more intense because of the growing demand for bush meat by vendors in urban areas [7]. Thus, when the animals disappear locally, indigenous hunters do not hesitate to venture farther and spend more time on hunting expeditions for the desired game. In this activity, are added those of leisure (traditional dances and games) considered by our people as a practical form of physical activity.

Compared with serum concentrations of HDL cholesterol and glucose values recorded in our patients amounted to 1.15 ± 0.11 mmol/L and 3.21 ± 0.009 mmol/L respectively. These HDL cholesterol concentrations are a risk factor for CVD. The results of Mananga *et al.* [8] on the chromatographic profile of the AG of the oil extracted from the fresh bush meat in this direction. Indeed, the existence of the C10:0 in the second position is not nutritionally beneficial because its presence exposes the individual to the risk of hypercholesterolemia and atherosclerosis. By cons, other authors report that high concentrations of HDL-c provide protection against CVD by inhibiting the oxidation of LDL cholesterol [27]. This fact is also suggested for high glucose concentrations. Finally, this protective effect, apparently paradoxical, can be attributed to epidemiological phenomenon unlike traditional risk factors found in chronic diseases [28].

5. Conclusion

The present study has shown, despite some limitations, that cardiovascular diseases in Aboriginal populations have a relatively high prevalence, especially among women. Risk factors are within the food and the quality of life. However, data from this study need to be confirmed and validated by other more elaborate works, including a more representative sample of hypertensive patients from different walks of life of the Congolese indigenous people.

Conflicts of Interest

No.

Author Contributions

MSI designed the study and participated in the implementation of the experimental procedure. BKJM was involved in the acquisition of field data. MF has validated the experimental procedure and wrote the first version of the article. MA performed the statistical analysis of data and reread the final version of the article.

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