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Prevalence of Stroke, Coronary Artery Disease, Arrhythmias and Heart Failure: A Community-Based Study in Northern Cameroon

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Abstract: Data on the cardiovascular disease epidemiology in Northern Cameroon remain insufficient. This study aimed at assessing the prevalence of stroke, coronary artery disease (CAD), arrhythmias and heart failure among the Ngaoundere population. This was a community-based study conducted in Ngaoundere from March to June 2018. The study population consisted of adults over 20 years' old who had been living in the city of Ngaoundere for at least one year and who had consented to participate in the study. Data was collected using a structured questionnaire. The questionnaire included socio-demographic (gender, age, occupation, education, marital status, cardiovascular risk factors, personal and family history of CVD), and physical examination. Stroke, CAD, arrhythmias and heart failure were established by a combination of self reporting and the judgment of a cardiologist coauthor according to a physical examination. In total, 948 subjects aged 20 to 89 were included in the study. Their mean age was 39.92±14.75 years. The prevalence of stroke, CAD, arrhythmias and heart failure were 0.74%, 3.06%, 3.6%, and 12.45% respectively in the study population. In conclusion, in this area, prevalence of stroke, arrhythmias and heart failure was high among adult population. However, further studies including instrumental methods of cardiovascular diagnosis are needed to determine trends of CVD's prevalence in Ngaoundere locality.

Keywords: Stroke, Coronary Artery Disease, Arrhythmias, Heart Failure, Prevalence, North Cameroon

1. Introduction

Cardiovascular diseases (CVDs) are the leading cause of death and disability worldwide [1, 2]. They are responsible for approximately one third of global mortality. Otherwise, more than three-quarters of deaths from CVDs occur in low and middle-income countries. Current evidence suggests that CVDs are taking on endemic proportion in Africa and are on a drawn of epidemiological transition through which cardiovascular health will probably become in a few years the first public health priority on this continent. Available projections suggest that in a few decades, CVDs and others non communicable diseases will overtake communicable diseases as the most frequent cause of death in this region particularly due to stroke and coronary artery disease (CAD) [3, 4].

At the same time, while the prevalence and mortality due to CVDs is increasing in Sub-Saharan Africa (SSA), they burden varies with geographic regions [5]. In Cameroon with a few exceptions, studies on the epidemiology of CVDs are scarce in the northern regions. At the same time, in these regions health care facilities are recording more and more CVDs at various stage of their development. Most of them certainly remain undiagnosed due to insufficient resources and poverty. The aim of the present study was to investigate

the prevalence of four main CVDs (Stroke, CAD, arrhythmias and heart failure) in the Ngaoundere area in Northern Cameroon.

2. Material and Methods

2.1. Study Design and Setting

The study was a community-based, cross-sectional study conducted from March to June 2018 in Ngaoundere, Cameroon.

2.2. Study Population

The study involved the population of the city of Ngaoundere estimated at 158,348 inhabitants according to the Third General Population and Housing Census [6]. People aged 20 years and over representing 44.8% of the population, the size of the source population was therefore estimated at 70,940 inhabitants.

The sample size was calculated according to the formula N=P (1 - P) (Z/e)2 (55); with N=sample size, P=target proportion of cardiovascular disease (50% for this study), Z=Z5%=1.96 and e=margin of error=5% for this work. According to this formula, the sample size obtained was N=385 subjects. To reduce the effect of the sample design, we multiplied this size by two to obtain 770 subjects and, taking into account the imponderables, we maximized this figure by 35%, obtaining a total of 948 people to be interviewed.

Adults over 20 years of age, residing in the city of Ngaoundere for at least one year, and having consented to participate in the study, were included.

2.3. Data Collection

Data were obtained using a structured questionnaire. The questionnaire included socio-demographic (gender, age, occupation, education, marital status, cardiovascular risk factors, personal and family history of CVD), and physical examination. Stroke, CAD, arrhythmias and heart failure were established by a combination of self reporting and the judgment of a cardiologist coauthor according to a physical examination.

2.4. Operational Definitions

In this study, stroke was identified by the presence of a focal neurological deficit lasting one month or less, or a yes answer to the question "Have you ever been told by a physician after examination that you suffered a stroke?".

CAD (angina pectoris or myocardial infarction) was established in our study by self-reported history of hospitalization for angina pectoris, myocardial infarction or a yes answer to the question "Has a physician told you in recent weeks that you are suffering from angina pectoris or myocardial infarction?

Cardiac arrhythmias were defined as any complaint of transient, sustained or episodic palpitations that have been present for at least one month.

Heart failure was defined in our study as the presence of New York Heart Association II to IV stage dyspnea for at least one month and associated with a sign of peripheral congestion or a yes answer to the question "Have you been diagnosed with heart failure by a physician?»

Anthropometric characteristics and blood pressure were defined and measured as described in a previous study [7].

2.5. Data Analysis

The data was entered into an electronic form created using Microsoft Excel 2013® software to form a database. This software also helped to carry out a quality control of the data. The data were analyzed using SPSS 20.0® software. The statistical methods used were the calculation of population and proportions for qualitative variables and the calculation of mean and standard deviations for quantitative variables.

2.6. Ethical Consideration

The authorization to carry out this survey was obtained from the Adamawa delegation of public health (Ref. N° 1050/L/HN/DRSPA/SAGE/BPF/NGD). The study protocol was approved by the Ethic committee of the Ngaoundere Regional Hospital (Ref. N° 4540/AR/MINSANTE/HRN/CM), and an informed consent (verbal or written) was obtained from all participants.

3. Results

A total of 948 subjects aged 20 to 89 were included into the study. The average age of the participants was 39.92±14.75 years, with 20 to 39 years as the most represented age group. The proportion of women was higher than men (sex ratio 1.04). Baseline characteristic of the study population is presented in detail in Table 1.

Informal sector workers and housewives were the most numerous (33.44% and 32.59%). In terms of educational attainment, participants with secondary education were the highest in number (33.65%), followed by those with a purely Koranic education (24.05%). Furthermore, the majority of participants were married (61.71%). Regarding anthropometric parameters, the prevalence of overweight and obesity were 27% and 12.55% respectively. In addition, 46.94% and 5.59% of study population presented with high blood pressure (HBP) and diabetes.

Overall 7 subjects (0.74%) had stroke, all with reported history of stroke. the prevalence of CAD, arrhythmias and heart failure were respectively 3.06%, 3.6% and 12.45%. Women reported significantly higher prevalence than men for arrhythmias (5.17 v. 1.94, p < 0. 05) and heart failure (17.77 v 6.90 p < 0. 01). CAD, arrhythmias and heart failure were associated with history of heart failure (p < 0. 01) and history of CAD (p < 0. 01), while heart failure was associated with family history of HPB (p < 0. 01), diabetes mellitus (p < 0. 01) and HBP (p < 0.05). (Table 2)

Table 1. *General characteristics of the study population.*

Parameters	N	%
Gender		
Men	464	48.95
Women	484	51.05
Age (years)		
20 – 39	572	60.34
40 – 64	301	31.80
65 et plus	75	7.91
Occupation		
Civil servants	132	13.92
Traders	91	9.60
Housewives	317	33.44
Informal workers	309	32.59
Others	99	10.44
Education level		
Had not been at school	74	11.16
Primary level	221	23.31
Secondary level	319	33.65
Higher level	106	11.18
Only koranic	228	24.05
Marital status		
Singles	276	29.11
Married	585	61.71
Divorced	51	5.38
Widows	36	3.80
Religion		
Christians	436	45.99
Muslims	508	53.59
Others	4	0.42
Cardiovascular disease risk factors		
Family history of HBP	318	33.54
Family history of DM	179	18.88
Family history of stroke	56	5.90
Family history of HF	163	17.19
Family history of CAD	40	4.21
Overweight	256	27.00
Obesity	119	12.55
HBP	445	46.94
Diabetes	53	5.59

CAD: Coronary artery disease. Diabetes mellitus. HF: Heart failure. HBP: High blood pressure.

Table 2. *Frequency of cardiovascular diseases according to general characteristics of the study population.*

Parameters	Total N (%)	Stroke N (%)	CAD N (%)	Arrhythmias N (%)	Heart failure N (%)
Gender					
Men	464 (48.95)	1 (0.22)	8 (1.72)	9 (1.94)*	32 (6.90)**
Women	484 (51.05)	6 (1.24)	21 (4.34)	25 (5.17)	86 (17.77)
Total	948	7 (0.74)	29 (3.06)	34 (3.6)	118 (12.45)
Age (years)					
20 – 39	572 (60.34)	4 (0.70)	15 (2.62)	19 (3.32)	67 (11.71)
40 – 64	301 (31.80)	3 (1.0)	13 (4.32)	13 (4.32)	37 (12.29)
65 et plus	75 (7.91)	0 (0.00)	1 (1.33)	2 (2.67)	14 (18.67)
Occupation					
Civil servants	132 (13.92)	0 (0.00)	2 (1.52)	4 (0.03)*	17 (12.88)**
Traders	91 (9.60)	2 (2.20)	1 (1.10)	1 (1.10)	12 (13.19)
Housewives	317 (33.44)	3 (0.97)	18 (5.83)	9 (33.44)	28 (8.83)
Informal workers	309 (32.59)	2 (0.63)	8 (2.52)	20 (6.47)	58 (18.77)
Others	99 (10.44)	0 (0.00)	0 (0.00)	0 (0.00)	3 (3.03)
Education level					
Had not been at school	74 (11.16)	0 (75.00)	6 (8.11)	6 (8.11)	2 (2.70)**
Primary level	221 (23.31)	2 (0.90)	6 (2.71)	6 (2.71)	34 (15.38)
Secondary level	319 (33.65)	3 (0.94)	8 (2.51)	11 (3.45)	37 (11.60)
Higher level	106 (11.18)	0 (0.00)	1 (0.74)	1 (0.94)	4 (3.77)
Only koranic	228 (24.05)	2 (0.88)	8 (3.51)	10 (4.39)	41 (17.98)

Table 2. Continued.

Parameters	Total N (%)	Stroke N (%)	CAD N (%)	Arrhythmias N (%)	Heart failure N (%)
Marital status					
Singles	276 (29.11)	2 (0.72)	1 (0.36)*	3 (1.09)*	19 (68.88)**
Married	585 (61.71)	4 (0.68)	22 (3.67)	24 (4.16)	84 (14.38)
Divorced	51 (5.38)	0 (0.00)	4 (7.84)	4 (7.84)	5 (9.80)
Widows	36 (3.80)	1 (2.70)	2 (5.41)	3 (8.11)	10 (27.03)
Others	4 (0.42)				
CVRFs					
Family history of HBP	318 (33.54)	6 (1.89)	10 (3.14)	12 (3.77)	53 (16.67)**
Family history of DM	179 (18.88)	4 (2.23)	8 (4.47)	9 (5.03)	34 (18.99)**
Family history of stroke	56 (5.90)	7 (12.50)	1 (1.79)	1 (1.79)	6 (10.71)
Family history of HF	163 (17.19)	0 (0.00)	21 (12.88)**	21 (12.88)**	39 (23.93)**
Family history of CAD	40 (4.21)	0 (0.00)	29 (75.50)**	29 (72.50)**	16 (40.00)**
Overweight	256 (27.00)	2 (0.78)	5 (1.75)	7 (2.73)	32 (12.50)
Obesity	119 (12.55)	0 (0.00)	5 (4.20)	6 (5.04)	21 (17.65)
HBP	445 (46.94)	4 (0.90)	13 (2.92)	15 (3.37)	51 (10.14)*
Diabetes	53 (5.59)	1 (1.89)	2 (3.77)	2 (3.77)	10 (18.87)

* $p < 0.05$, **$p < 0.01$. CAD: Coronary artery disease. Diabetes mellitus. HF: Heart failure. HBP: High blood pressure. CVRFs: Cardiovascular disease risk factors.

4. Discussion

This study aimed at reporting the prevalence of stroke, arrhythmias, coronary artery disease and heart failure among the Ngaoundere population in Cameroon. The prevalence of CVDs nears 20% of the adult population in this area.

The results revealed that the overall prevalence of stroke was 0.74% in the study population.

This was lower than in Ghana (2.8%), Russian Federation (6.1%), India (2%) and the United States (1.2%) [8, 9], but higher than the one reported in hospital setting (0.5%) in Ngaoundere [10].

This study also showed more stroke cases among females than males, which is in accordance with two hospital based studies conducted in Palestine [11, 12]. However, our result differs from those of Sagui et al and Komolafe et al who reported a masculine predominance of stroke in studies carried out in Sub-Saharan African setting [13, 14].

The overall prevalence of CAD was 3.06%. As compared to western and Indian data [15, 16] the prevalence rate of CAD was lower in our study. These findings are suggestive of relatively low prevalence of CAD in our region compared to that reported in more economically developed countries than ours. Although, this situation may rapidly change due to, urbanization, and increasing rise of the prevalence of CVD risk factors and the alarming low level of awareness of these risk factors in the Ngaoundere locality [17]. In previous studies we showed that awareness of hypertension, diabetes and dyslipidemias was poor in our locality, and even among the aware, control were suboptimal [17, 18].

The prevalence rate of CAD was higher in women than in men (4.34 v. 1.72). Our results are consistent with findings of a study by Ye Ruan et al in which women were more likely to have angina than men [8].

Usually Arrhythmias are defined as disorders of electrical properties of the heart, or abnormalities in the rate, rhythm or both of the heart beat [19, 20]. Arrhythmias were defined in this study as the presence of palpitation among participants. This criterion is not sufficient to define a cardiac rhythm disorder in clinical practice [21]. According to Giada and Raviele [22], a good history, physical examination and an electrocardiogram can determine the majority of cardiac causes of arrhythmias in people complaining of palpitations. Nevertheless, the prevalence of arrhythmias as established in this study was high in the population (3.6%). Use of a resting electrocardiogram (ECG), or ECG rhythm monitoring in the investigation could have clarified the nature of these conditions and permit the estimation of the frequency of those that did not manifest themselves as palpitations.

Regarding heart failure, the prevalence of this condition in Sub-Saharan African setting remains largely unexplored in the general population. Most of the epidemiological data on heart failure in our setting are derived from hospital-based studies. Data from these studies depicted a prevalence rate of heart failure at a little over 30% in cardiology settings and 3% to 7% in general medical services [23-26] In our study population the prevalence of heart failure was 12.45%. The operational definition of heart failure chosen did not take into account radiographic and echocardiographic criteria. This could have contributed to an over-estimation of the prevalence of this condition found in the study population.

5. Conclusion

The prevalence of recent stroke, CAD, arrhythmias and heart failure were 0.74%, 3.06%, 3.6% and 12.45% respectively in our environment. The limitations of our study were as follow: i) data was based on self-reports, which probably lead to recall bias; ii) the cross sectional nature of the study was another important limitation.

Further studies with more stringent diagnosis criteria and more intensive data analysis are needed to determine trends of CVD prevalence in our area.

Conflict of Interest

The authors declare that they have no competing interests.

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