

Epidemiology, Clinical, and Therapeutic Aspects of Chronic Coronary Syndromes in Yaounde-Cameroon: A 10-year Cross-sectional Study

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Abstract: *Background:* Cardiovascular diseases (CVDs) are increasing worldwide with the greatest burden in low-income countries where there is a gradual epidemiologic transition from infectious diseases to non-communicable diseases. There is a paucity of data on CVDs in our setting. This study aims to describe the epidemiology, clinical, and therapeutic aspects of chronic coronary syndromes (CCS) in the Cameroonian cardiology setting to highlight the current state of practice to guide efficient epidemiological interventions. *Methods:* We retrospectively analyzed the records of patients hospitalized in two cardiology units of referral hospitals in the city of Yaoundé between 2010 and 2019 (10 years). *Results:* Of the 2756 records retrieved, 47 (1.7%) had CCS according to the 2019 European Society of Cardiology guidelines. The mean age was 58 ± 12 years and 63.8% were men. The most common cardiovascular risk factors were hypertension (78.7%), overweight or obesity (84.9%), dyslipidemias (80.9%), smoking (68.1%), and diabetes (67.7%). Chest pain on exertion (74.5%) and exertional dyspnea (70.2%) were the main symptoms. Repolarization disorders (83%) were the most frequent ECG signs. Sequelae of necrosis sequelae were found on ECG in 34% of cases and rhythm disorders in 21.3%. The therapeutic modalities were essentially anti-platelet (95.7%), statins (91.5%), beta-blockers (89.4%), and angiotensin-converting enzyme inhibitors (70.2%). Interventional treatments were rarely performed (2.1%). *Conclusion:* Although chronic coronary syndromes seem uncommon in cardiology hospitalization in Cameroon, public health policies must work to improve the current state of care particularly interventional care.

Keywords: Epidemiology, Chronic Coronary Syndrome, Cameroon

1. Introduction

The impact of cardiovascular diseases (CVD) is constantly increasing in the world in general and in sub-Saharan Africa (SSA) in particular [1]. Their incidence in SSA is progressively surpassing the incidence of infectious diseases

which once predominated [1]. The situation is all the more critical as most patients suffering from CVD in SSA are increasingly young, having been diagnosed late, and very often during complications. This is combined with an insufficient technical platform in many countries with low incomes and limited resources [1]. CVDs are thus associated

with high morbidity and mortality.

Coronary artery disease is the second leading cause of CVD mortality in SSA after stroke [2]. They include acute coronary syndromes (ACS) and chronic coronary syndromes (CCS). The latter form is more frequent but with less spectacular clinical manifestations than the first [3]. The prevalence of CCS varies according to the populations studied. *Tuppin et al.* found a prevalence of 2.7% in a Caucasian population [4]. Data from the Centers for Disease Control and Prevention in the United States found a higher prevalence of 6% of CCS [5].

In SSA in general and in Cameroon in particular, the difficulties of access to standard diagnostic methods—namely coronary angiography, and exercise electrocardiogram (ECG)—limit screening and consequently delay treatment [6]. In Cameroon, *Tchoumi et al.* in 2013 found in an interventional cardiology center in a rural environment, a prevalence of 2.4% of coronary diseases including 1.5% of CCS [7]. However, there is a need to obtain more recent epidemiological data on a broader population profile to best guide epidemiological interventions in our context. This study has compiled data over 10 years in two reference hospitals in Yaounde–Cameroon and the analysis of these data will contribute to improving knowledge on the epidemiological profile of patients suffering from CCS seen in Cameroonian hospitals and countries with similar health systems.

2. Methods

2.1. Study Design and Setting

We carried out a retrospective cross-sectional study over 10 years (January 2010 to December 2019) using the medical records of patients received in the Cardiology Units of the Yaounde Central Hospital (YCH) and the Internal Medicine department of the Yaounde General Hospital. (YGH). These are two reference hospitals in the city of Yaounde and serve as University Teaching Hospitals for specialist doctors, general practitioners, and allied health personnel. Data collection took place over 5 months (January 2020 to May 2020). Yaounde is the political capital of Cameroon, sub-Saharan Africa (SSA), with a catchment population of over 2 million inhabitants. The population is cosmopolitan reflecting the diversity of Cameroon.

2.2. Participant Characteristics

We reviewed all patient files—irrespective of age and gender—received in the hospital for the specified period in search of those with a diagnosis of CCS according to the recommendations of the European Society of Cardiology (ESC) 2019 [8]. We excluded patient records with insufficient data.

2.3. Data Collection

Data from medical records were collected using a pre-established data collecting sheet. We collected the following

information: Socio-demographic data (age, sex, profession). Cardiovascular risk factors (consumption of tobacco, alcohol, sedentary lifestyle, arterial hypertension, diabetes—fasting blood sugar ≥ 1.26 g/L, obesity—defined according to body mass index, dyslipidemia). History of vascular events (history of ACS, coronary revascularization, heart failure due to ischemic heart disease, chronic coronary syndrome, exertional angina). Clinical presentation: functional signs (chest pain on exertion, dyspnea on exertion), vital parameters (blood pressure, heart rate, respiratory rate). Paraclinical parameters: chest X-ray (cardiothoracic index), results of the ECG and stress test, abnormalities on echocardiography, CT scan, and coronary angiography. The treatments received (pharmacological, surgical, and instrumental).

2.4. Statistical Analysis

The data collected were analyzed using SPSS version 20.0 software. Continuous variables are presented with their means and standard deviations. While the categorical variables are presented with their numbers and proportions.

3. Results

3.1. Prevalence of Chronic Coronary Syndrome

We screened 2756 files of patients hospitalized during the study period. There were 55 patient files with clinical suspicion of CCS and 47 files had a confirmed diagnosis of CCS according to the criteria of the 2019 ESC. The prevalence of chronic coronary syndrome was thus 1.7% in hospitalized patients.

3.2. Sociodemographic and Clinical Characteristics of Patients with CCS

Patients diagnosed with CCS were between 37 and 81 years old, with an average age of 58 ± 12 years. There was a male predominance (63.8%) with a sex ratio of 1.76. Most of them were retired (31.7%) or employed in the private sector (25.6%).

The most common cardiovascular risk factors were high blood pressure (78.7%), overweight or obesity (84.9%), tobacco consumption (68.1%), and diabetes (67.7%). Nine patients (19.1%) had had an ACS in the year preceding their admission, and 11 (23.4%) were carriers of heart failure following ischemic heart disease.

Chest pain on exertion (74.5%) and dyspnea on exertion (70.2%) were the most common clinical signs. The sociodemographic and clinical data are presented in Table 1.

3.3. Paraclinical Characteristics of Patients

The findings of the complementary tests performed are shown in Table 2. The most common paraclinical sign was cardiomegaly on chest X-ray (42.2%). On the ECG, sinus rhythm was seen in 78.7% of cases. Repolarization disorders were seen in 83% of cases, with T-wave inversion in 74.4%. Necrosis sequelae were found in 34% of cases and

arrhythmias were found in 21.3% of cases. On echocardiography, all the patients presented with signs compatible with the diagnosis of ischemic heart disease, among which 80.9% of the participants had hypokinesia, 55.3% had signs of left ventricular hypertrophy, and 63.7% left ventricular systolic dysfunction. On exercise ECG, 40.4% presented with chest pain on exertion and 27.7% with ST-segment depression. Biochemical tests showed that 80.9% of participants had elevated LDL cholesterol levels.

Table 1. Sociodemographic and clinical characteristics of patients diagnosed with the chronic coronary syndrome.

| Variables | Frequency (N=47) | Percentage (100%) |
|---|------------------|-------------------|
| Males | 30 | 63.8 |
| Profession | | |
| Retired | 15 | 31.9 |
| Private sector employee | 12 | 25.6 |
| Housewife | 10 | 21.3 |
| Public sector employee | 7 | 14.9 |
| Others | 3 | 6.3 |
| Cardiovascular risk factors | | |
| Arterial Hypertension | 37 | 78.7 |
| Smoking | 32 | 68.1 |
| Type 2 diabetes | 29 | 61.7 |
| Alcohol intake ≥ 10 glasses of 25cl/week | 15 | 31.9 |
| Sedentary lifestyle | 12 | 25.5 |
| Menopause | 11 | 23.4 |
| Overweight | 34 | 72.3 |
| Obesity | 6 | 12.6 |
| Vascular history | | |
| Acute Coronary Syndrome > 1 an | 9 | 19.1 |
| Ischemic Heart Failure | 11 | 23.4 |
| Chronic Coronary Syndrome | 1 | 2.1 |
| Coronary revascularization | 1 | 2.1 |
| Symptoms | | |
| Angina | 35 | 74.5 |
| Dyspnea on exertion | 33 | 70.2 |
| Orthopnea | 19 | 40.4 |
| Lower limb edema | 14 | 29.8 |
| Cough | 10 | 21.3 |
| Palpitations | 1 | 2.1 |
| Resting heart rate | | |
| Bradycardia (HR < 60 bpm) | 3 | 6.3 |
| Tachycardia (HR ≥ 90 bpm) | 28 | 59.7 |
| Blood pressure grade | | |
| Grade 1 hypertension | 6 | 12.7 |
| Grade 2 hypertension | 28 | 59.7 |
| Grade 3 hypertension | 9 | 19.1 |

HR: heart failure; CCS: chronic coronary syndrome; HR: heart rate; bpm: beat per minute.

The grades of hypertension were defined according to the WHO classification of blood pressure.

3.4. Therapeutic Modalities

Anti-platelet aggregation was prescribed in 95.7% of patients. Statin was prescribed in 91.5% of patients. Beta-blocker was prescribed in 89.4% of patients. ACE inhibitors were prescribed in 70.2% of patients. Interventional treatments were rarely performed, with only one patient

having undergone coronary artery bypass surgery abroad. No patient underwent coronary angioplasty (Table 3).

Table 2. Paraclinical characteristics of patients diagnosed with chronic coronary syndrome.

| Variables | Frequency (N=47) | Percentage (100%) |
|---|------------------|-------------------|
| Cardiomegaly (CTI $\geq 50\%$) | 20 | 42.6 |
| Resting ECG | | |
| Repolarization disorders | 39 | 83 |
| ST segment depression | 1 | 2.1 |
| Negative T Wave | 35 | 74.4 |
| Wide, pointed, and symmetric T wave | 3 | 6.4 |
| Sequelae of necrosis | 16 | 34 |
| Conduction disorders | 3 | 6.4 |
| Left bundle branch block | 2 | 4.3 |
| Right bundle branch block | 1 | 2.1 |
| Arrhythmias | 10 | 21.3 |
| Atrial fibrillation | 1 | 2.1 |
| Ventricular tachycardia | 4 | 8.5 |
| Ventricular Extrasystoles | 5 | 10.6 |
| Dyslipidemia | | |
| Hypertriglyceridaemia (≥ 1.5 g/L) | 24 | 51.1 |
| Hypercholesterolemia (≥ 2 g/L) | 29 | 61.7 |
| Low HDL cholesterol (< 0.4g/L) | 28 | 59.6 |
| High LDL cholesterol (≥ 1 g/L) | 38 | 80.9 |
| Cardiac ultrasound | | |
| Hypokinesia | 38 | 80.9 |
| Akinesia | 6 | 12.8 |
| Left ventricular hypertrophy | 26 | 55.3 |
| Right ventricular hypertrophy | 5 | 10.6 |
| Left atrial dilatation | 1 | 2.1 |
| Right atrial dilatation | 2 | 4.3 |
| Valvulopathy | 8 | 17.0 |
| Hypertensive heart disease | 3 | 6.4 |
| Hypertrophic heart disease | 2 | 4.3 |
| Dilated heart disease | 1 | 2.1 |
| Ischemic heart disease | 47 | 100 |
| Altered LVEF (<50%) | 30 | 63.7 |
| Stress test | | |
| Chest pain | 19 | 40.4 |
| ST-segment depression | 13 | 27.7 |
| Negative T wave | 4 | 8.5 |
| Wide pointed and symmetrical T wave | 1 | 2.1 |
| Arrhythmia | 2 | 4.3 |

ECG: electrocardiogramme; HDL: high density lipoprotein; LDL: low density lipoprotein; CTI: cardiothoracic Index; LVEF: Left ventricular ejection fraction.

Table 3. Therapeutic modalities in chronic coronary syndrome.

| Variables | Frequency (N=47) | Percentage (100%) |
|--|------------------|-------------------|
| Pharmacological treatments | | |
| Béta-blockers | 42 | 89.4 |
| Angiotensin-Converting enzyme inhibitors | 33 | 70.2 |
| Calcium channel blockers | 6 | 12.8 |
| Diuretics | 29 | 61.7 |
| Nitrates | 13 | 27.7 |
| Statins | 43 | 91.5 |
| Anti-platelet agents | 45 | 95.7 |
| Low Molecular Weight Heparin | 23 | 48.9 |
| Amiodarone | 2 | 4.3 |
| Digoxin | 2 | 4.3 |
| Acénocoumarol | 1 | 2.1 |
| Surgical treatment (coronary bypass) | 1 | 2.1 |

4. Discussion

The Cameroonian health system, like that of several SSA countries, must adapt to the epidemiological transition making CVD the first cause of mortality. The diagnostic and therapeutic management of coronary artery disease in general and chronic coronary syndrome, in particular, remains a topical issue. We conducted a 10-year retrospective cross-sectional study in two cardiology units of referral hospitals in Cameroon. The prevalence of chronic coronary syndromes (CCS) was 1.7% of all cardiology admissions. We noted a low use of diagnostic and therapeutic interventional techniques.

The prevalence of CCS in our study is consistent with that reported by *Tchoumi et al.* at the Cardiac Center of St. Elizabeth Catholic Hospital in Shisong in 2013. They studied the profile of heart disease in Cameroon and its impact on health care services and reported a prevalence of 1.5% [7]. Higher frequencies of CCS were reported by *Cassar et al.* in 2010 in the United States (6%) [6]. These observed differences could be explained by the fact that accessibility to standard diagnostic methods for this condition, namely coronary angiography, and stress electrocardiogram are limited in our context, hampering the detection of coronary heart disease in our setting [6].

The mean age was 58 \pm 12 years with a male predominance (63.3%). This was comparable to that reported by *Yao et al.* (53.2 \pm 10.8 years) in Côte d'Ivoire in 2019 [9]. On the other hand, *Steg et al.* reported an older age (66.5 \pm 9.9 years) in the Caucasian population [10]. These observed differences could be explained by the fact that life expectancy is higher in their context due to a better health system. The male predominance was also reported by *Drissi et al.* during a retrospective study in 2017 on the angiographic profile of ischemic heart disease in Morocco [11]. This can be explained by the way of life, implying a strong tendency to alcoholism and smoking in men, coupled with hormonal protection (estrogen) in women until menopause.

Among the cardiovascular risk factors, hypertension (high blood pressure) tops the list in our series affecting 78.7% of patients, followed by smoking (68.1%), and diabetes (61.7%). These results are similar to that reported by *Drissi et al.* in 2017 where hypertension also ranked first with a prevalence of 57% followed respectively by smoking 45% and diabetes 36% [11]. The most common forms of dyslipidemia were LDL hypercholesterolemia in 80.9% of patients followed by HDL hypocholesterolemia in 59.6% of patients. These findings were similarly reported by *Mboup et al.* in 2014 in Senegal [12]. Patients with a history of ischemic heart disease represented 23.4% and those with a history of acute coronary syndrome (ACS) for more than a year represented 19.1%. 2.1% of patients had a history of CCS and coronary revascularization. This result is similar to that reported by *Bamouni et al.* in 2018 in Burkina Faso. In their study on the contribution of stress testing in the management of ischemic heart disease at the Yalgado Ouédraogo

University Teaching Hospital, they found a history of coronary artery disease in 42% of patients—1.7% stable angina, 21% ischemic heart disease, and 20.3% ACS [13].

Chest pain was the main symptom. This is the reason for consultation in 74.5% of cases. However, this symptom was mostly atypical in 57.2% of patients. This was similar to the 2013 ESC classification with 58.7% of patients presenting with atypical pain [14]. This result is also similar to that reported by *Malek et al.* in 2016 in Morocco where anginal pain was the major symptom in 93.3% of cases with 52% of atypical pain [15]. On echocardiography, 80.9% of our patients presented with hypokinesia and 63.7% with impaired left ventricular ejection fraction (LVEF). These results are in line with that reported by *Mboup et al.* who found hypokinesia and an altered LVEF respectively in 74% and 58% of the patients [12]. Indeed, ischemic heart disease is one of the main causes of heart failure and the majority of patients with heart failure have an impaired LVEF [16]. On the resting ECG, we found 83% of patients with repolarization disorders with a predominance of subepicardial ischemia in 74.4% of cases. Sequelae of necrosis were seen in 34% of patients. This result is also similar to that of *Mboup et al.* who found ischemia and sequelae of necrosis respectively in 65% and 21.6% of patients [12]. While on the exercise ECG, the major functional sign was chest pain in 40.4% of patients. The most common repolarization disorder was ST depression in 27.7% of cases. *Mboup et al.* also reported chest pain as a major symptom in 25% of cases on stress ECG. ST-segment depression was the most common repolarisation disorder seen in 18.7% of patients [12].

The pharmacological treatment prescribed complied with international recommendations [2, 16] and consisted mainly of beta-blockers (89.4%) and ACE inhibitors (70.2%). Patients on nitrates accounted for 27.7% of cases. Antiplatelet agents and statins represented respectively (95.7%) and (91.5%) which agrees with the results of *Malek et al.* who reported the use of B-blockers in 80.7%, followed respectively by ACE inhibitors (53.3%), nitrates (22.4%), antiplatelet agents (82.7%), and Statins (80%) [15]. However, there is a crucial lack of diagnostic and therapeutic interventional cardiology techniques.

However, the interpretation of the data from this study must take into account certain limitations, in particular the lack of information on the prognosis of patients in the short, medium, and long term due to the retrospective collection of data. This raises the need for prospective studies in the community to have a better appreciation of the epidemiology of CCS in our setting.

5. Conclusion and Recommendations

We sought to describe the epidemiology of chronic syndromes (CCS) in a low-income setting undergoing epidemiologic transition from communicable to non-communicable diseases. We found a low rate of CCS in patients hospitalized in the cardiology units of two tertiary hospitals. The

patients displayed high rates of the classic cardiovascular risk factors. Even if CCS is infrequent in cardiology hospitalization, they pose a problem of care given the lack of resources for interventional treatments. Public health authorities must work to improve the state of current care.

Abbreviations

SSA: Sub-Saharan Africa; ECG: électrocardiogramme; ESC: *European Society of Cardiology*; YCH: Yaoundé Central Hospital; YGY: Yaoundé General Hospital; CCS: chronic coronary syndrome (CCS); ACS: Acute coronary syndrome.

Declaration

Authors' Contribution

Conception and design: APM, LMK, BH,
Data collection: ADS
Data analysis and interpretation: LMK, JRN, APM,
Manuscript drafting: LMK, APM, BH, JRN, AMJ
Manuscript revision: MKL, MAP, BH, JRN, AMJ
Approval of the final manuscript: All the authors.

Availability of Data and Materials

The datasets used for this study are available from the corresponding author on request.

Ethical Approval and Consent to Participate

The study was approved by the Institutional Ethical Review Board of the University Yaoundé I (Cameroon). All the participants read and signed informed consent before their inclusion in the study.

Competing Interest

The authors declare that they have no competing interests.

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