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Control of Modifiable Atherosclerosis Risk Factors after Acute Coronary Syndrome in Black African: Prospective Study on 152 Cases in Lomé (Togo)

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Abstract

***Objective:** The objective is to assess the level of control of modifiable atherosclerosis risk factors and its determinants after acute coronary syndrome, in our patients in sub-Saharan Africa.*

***Patients and Methods:** It is actually a prospective multicenter study, carried out in the Cardiology Services of the University Hospital Centres Sylvanus Olympio and Campus of Lomé, and the Saint-Esprit Medical Office from January, 1st 2017 to December, 31st 2019. We had selected patients followed-up for acute coronary syndrome for at least six months. All risk factors for modifiable atherosclerosis (high blood pressure, diabetes, dyslipidemia, overweight, sedentary lifestyle, smoking) were identified. To assess their level of control, patients were periodically reviewed for blood pressure, weight, waist circumference, LDL-cholesterol, and glycate hemoglobin. Smoking cessation and physical activity were also assessed. The data were analyzed using EPI INFO 6.0 software.*

***Results:** We had retained 152 patients including 44 women and 108 men. The average age was 55±16.3 years. At admission, modifiable risk factors for atherosclerosis were represented by physical inactivity (92%), hypertension (64.5%), dyslipidemia (42.6%), obesity (41%), diabetes (31.2%) and smoking (21%). At follow-up beyond 6 months, blood pressure was normal in (48%) of hypertensive patients with a level of control positively correlated with age >70 years (p=0.011) and adherence to therapy (p=0.021). The diabetes control rate was 46.3%. It was negatively correlated with the high cost of treatment (p=0.04). In 48.1% of cases, LDL-cholesterol levels were at the therapeutic target, with control positively correlated with the dose of Atorvastatin (p=0.03). Smoking cessation was noted in 90% of smokers. The reduction in obesity remained low even after one year of follow-up.*

***Conclusion:** Our study shows a low-level control of modifiable atherosclerosis risk factors during follow-up after Acute Coronary Syndrome. This requires better care improvement and intensification especially through therapeutic education so as to get rid of any reoccurrences and complications.*

Keywords: *Acute coronary syndrome, modifiable risk factors, sub-Saharan Africa.*

Introduction

Controlling modifiable risk factors for atherosclerosis is the cornerstone of preventing any reoccurrences and complications after an acute coronary syndrome. Thus, the controlling of these factors has been intensively studied since the Framingham investigation that made it possible to identify modifiable and non-modifiable risk factors [1,2]. Despite its high prevalence around the world, as evidenced by the report "Global Health Statistics 2012" [3], few studies on the level of control of these after acute coronary syndrome are held in sub-Saharan Africa. Hence, the interest of our study is to assess the control level of modifiable atherosclerosis risk factors beyond the 6 months following an acute coronary syndrome and to analyze the determinants associated with its control level.

Patients and Methods

It is a prospective multicenter study that was carried out in three centers for the management of cardiovascular diseases in Lomé (Togo): the Cardiology Services of the University Hospital Centre Sylvanus Olympio and Campus of Lomé, and the Saint-Esprit Medical Office, from January 1, 2017 to December 31, 2019. We had selected patients followed for acute coronary syndrome for at least 6 months. Modifiable risk factors for atherosclerosis: hypertension, diabetes, dyslipidemia, obesity (BMI and waist circumference), sedentary lifestyle, smoking, were studied. Thus, patients had been periodically followed up over the medium term of 6 months, and over the long term of 12 months, for blood pressure, weight, waist circumference, LDL-cholesterol and hemoglobin glycate in diabetics. Smoking cessation and physical activity were also assessed. The data were analyzed using EPI INFO 6.0 software. The cost of treatment was estimated based on the prices of the national pharmacy of supply.

Operational Definitions

- Sedentary: sedentary is any individual with low physical activity or walking less than 30 minutes per day for at least 5 days per week, as recommended by the WHO [3,4,5].

- Smoking: It is considered as an active risk factor when the patient is either an actual smoker or has stopped smoking for less than three years [3,4,5].

- High blood pressure: was considered hypertensive any person treated for high blood pressure or any other person presenting blood pressure ≥140/90 mmHg. [5].

- Diabetes: Anyone treated for diabetes or whose fasting blood sugar that is measured twice, is ≥ 1,26 g/l [5].

- Dyslipidemia: defined by the presence of a known history of dyslipidemia and/or one or more of the following abnormalities [6]: hypertriglyceridemia > 1.5 g/l, LDL-cholesterol > 1.6 g/l, HDL-cholesterol < 0.5g/l in women and 0.4 g/l in men.

- Obesity: any person whose BMI calculated by weight ratio (kg) to height square (m) was ≥ 30 kg/m^2

- Abdominal obesity: was defined according to the International Diabetes federation (IDF) by a waist circumference ≥ 94 cm in men and 80 cm in women [8].

The standards adopted for monitoring were:

- Hypertensive: Any hypertensive is being under control if their tensional figures 140/90 mmHg in consultation or 135/85 mmHg in automesure. [5]

- Controlled diabetics: any person treated for diabetes and whose hemoglobin glycate was less than 7% according to the criteria of the American Diabetes Association (ADA) [6].

- Controlled dyslipidemic patient: any subject under treatment whose LDL-cholesterol was < 0.7 g/l.7. [7,8]

- Control of overweight and abdominal obesity: any person with a body mass index (BMI) < 25 kg/m2 or a waist circumference < 94 cm in men or < 80 cm in women [8,9].

- Smoking cessation is considered when the patient confesses to having stopped smoking for more than 3 years. [10,11,12]

- The patient is no longer considered sedentary when he carries out regular moderate physical activity for at least 120 minutes per week. [5].

- The data were analyzed using EPI INFO 6.0 software. Bi-variate analysis was performed using Chi-square (Pearson and Yates) tests for proposal comparisons. The significance level was chosen for a value of $p<0.05$.

Results

We included 152 patients. We observed male predominance with a sex ratio of 2.4. The average age of patients was 54 ±12.1 years (extreme 34-85 years). the most represented age group was between 50-69 and it represented 65.75% (Table 1).

Table1. *Distribution of patients by age and sex*

Age (years)	Men	women	Total	%
[30-40]	2	0	2	1,3
[40-50]	7	5	12	7,9
[50-60]	50	14	64	42,1
[60-70]	32	24	56	36,9
[70-80]	6	7	13	8,5
[80-90]	3	2	5	3,3
Total	100 (65,8 %)	52 (34,2 %)	152	100

At the socio-professional level, our sample included civil servants (33%), housewives (31%), traders (22%), and pensioners (14%). Monthly patient income ranged from 25,000 FCFA (US$50) to 300,000 FCFA (US$600) and was less than 100,000 FCFA (US$200) in 88% of cases (Table 2). Only 27.5% of patients had enjoyed health insurance. Taking into consideration that The General Interprofessional Minimum Wage in Togo was 35,000 CFA francs, or US$70.

Table2. *Distribution of patients by monthly income*

Monthly Revenue($ USA)	Socio-economic level	Total	%
≤ 100	Very Low	34	92,1
101-200	Low	63	64,5
201- 400	Average	41	42,7
401-600	Good	14	41,4
Total		152	100

Please Note: The SMIG (General Interprofessional Minimum Wage) in Togo is $70

At intake, the modifiable cardiovascular risk factors shown in Table 3, were dominated by inactivity (92%) and high blood pressure (64.5%). Among hypertensives, 67% of patients had systolo-diastolic HTA, 25% had pure systolic HTA, and 8% had pure diastolic HTA. mean systolic artery was 138 mmHg and diastolic was 88 mmHg. Grade I HTA was most common (41%), followed by Grade II HTA (36%) and Grade III HTA (23%). The mean levels of LDL-Cholesterol and HDL-Cholesterol were 1.46 0.6 g/l and 0.43 0.15 g/l. The incidence of diabetes was 31% with an average blood sugar level of 1.21 g/l and an average hemoglobin-glycate level of 8.4% ± 2.3. The frequency of metabolic syndrome was 38.6%. The mean BMI in the sample was 26.3 ± 2.7 kg/m^2 (extremes of 18.2 to 35.8 kg/m^2) and the incidence of obesity was 41%. Smoking was exclusively male with an average number of packages/year pressure of 16 (extremes from 2 to 40).

Table3. *Frequency of modifiable atherosclerosis risk factors.*

Facteurs de risque	Effectif	Rate %
Sedentary	140	92,1
High blood pressure	98	64,5
Dyslipidemia	65	42,7
Obesity (BMI≥30 kg/m^2)	63	41,4
Abdominal obesity	48	31,6
Metabolic syndrome	59	38,8
Diabetes	48	31,6
smoking	32	21

Therapeutically, all patients had received therapeutic education, hygienic-dietary and lifestyle measures, and drugs to treat FCS and correct risk factors for atherosclerosis. These drugs are grouped in Table 4. The average cost of monthly treatment was estimated at 20,000 ±5.5 Frs. CFA, or $40 US.

The 6-month and 12-month risk factor control rates are shown in Figure 1.

Table4. *Breakdown by drug use.*

Drugs used	n	%
Conversion enzyme inhibitors	137	90,1
ARA II*	15	9,8
Calcium channel blockers	67	44
Statins	152	100
Oral anti-diabetic	113	74,3
Insulin	39	25,6
Aspirin + Clopidogrel	146	96

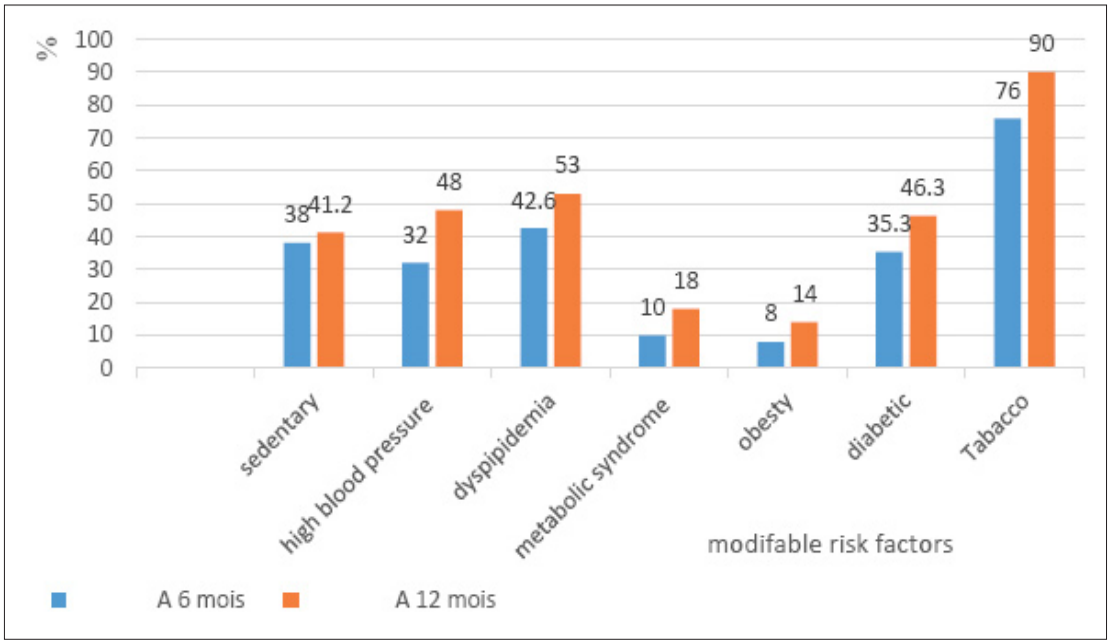

Fig1. *Rate of control of modifiable risk factors at 6 and 12 months.*

The HTA control rate was 32% at six months, and 48% at one year. The diabetes control rate was 35.3% at six months, and 46.3% at one year. The LDL-Cholesterol rate was at target in 42.6% of cases at 6 months and 53% at one year with an average value of 0.63 g/l. HTA was better controlled in patients treated with dual therapy Conversion enzyme inhibitors (IEC) and betabloquants (p=0.013) and tritherapy IEC + Betabloquant + Calcium blocker. Diabetes control was significantly in compliance with hygieno-dietary measures (p=0.03) whereas that of dyslipidemia was significantly correlated to the dose of atorvastatin. This control was better in patients who were taking at least 40 mg of atorvastatin (p=0.002). Active smoking cessation was 90% at 1 year old. Only 41.2% of patients returned to regular physical activity after one year, with a frequency of inactivity increasing from 92.1% to 50.9%. Walking was the most recognizable physical activity. Abdominal obesity was reduced by only 16.7% (normalized waist circumference in 8 out of 152 patients) after 1 year of follow-up.

Discussion

Our sample analysis shows that most of our patients (88%) were of low socio-economic status, considering that the GBIF in Togo during our study period was $70. many of our patients experienced financial difficulties in dispensing and therefore treatment. In our study, the prevalence rate of high blood pressure was 64.5%. In the INTERHEART study carried out in 52 countries around the world, Steyn et al showed that HTA appears more strongly associated with the risk of myocardial infarction in the African population than in the general population [10]. The control rate of The HTA control rate was 32% at 6 months and 48% at 1 year. This control rate is higher than that of Tlemen in semi-urban areas (23.6% at 6 months) [13]. However, this level of control is lower compared to studies in developed countries, particularly Canada (66%) and the United States (56%) [14].This high level of control

reflects better management and a better health system in developed countries.

In our study, 46.3% of diabetics had achieved the objectives of ADA-glycated hemoglobin after one year. This level of ADA control in the Mc Farlane study (26.7%) is better than in the United States [6,11]. In Africa, Belhadj in the Diabcare study in Algeria found that 18.7% of type II diabetics met the ADA targets [15].

The prevalence rate of dyslipidemia was 42.7%. This figure is significantly higher than that found in in the Mahdhaoui et al. series (21%) [16]. and in the CORONAFRIC investigation (35.2%) [17]. The control rate for dyslipidemia was 42.6% at 6 months and 53% at 1 year. This level of control is comparable to or slightly higher than the data obtained in the Mc Farlane study (35.5%) [11]. The Mona Lisa survey in France revealed that of the 47% of patients on treatment, 27.7% were controlled according to the objectives of the Afssaps [18].

Since the Framingham study, smoking has been proven to be a potent and particular cardiovascular risk factor because it promotes both the development of atherosclerosis and the occurrence of its complications [2,10, 12]. The prevalence of active smoking was 21% in our study among men. Most of active smokers (90%) stopped smoking after 1 year of follow-up. However, we achieved a significant decrease in sedentary lifestyle from 92.1% to 50.9% after 1 year of follow-up, probably due to the impact of therapeutic education for a change in patients' lifestyles.

The average cost of medicines is high, accounting for more than half of the SMIG, without mentioning the burden of financial charges related to the additional examinations and care. This is one of the main factors for poor adherence and largely explains the low control of modifiable risk factors such as hypertension, diabetes and dyslipidemia.

Conclusion

Our study shows a high frequency of modifiable atherosclerosis risk factors during acute coronary syndrome. The control (correction) of these risk factors during the medium- and long-term follow-up remains generally insufficient for black Africans. Thus, a better therapeutic education as well as a universal health insurance are needed to significantly promote the development and comprehensive care of the population at risks and to prevent recurrence and complications of acute coronary syndrome in Africa.

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