

Epidemiological, Clinical and Angiographic Profile of Chronic Coronary Syndromes in the Catheterization Room. Single-Centre Study Carried Out in the Cardiology Department of the Chu Aristide Le Dantec in Dakar (Senegal)

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Abstract

Background: Ischaemic heart disease is the cause of 7.4 million deaths per year. Their prevention is based on the management of cardiovascular risk factors, but also on the early detection and management of chronic coronary syndromes (CCS), for which few data are available in Africa. The main objective of our study was to determine the factors related to significant coronary artery disease in patients undergoing coronarography for suspected chronic coronary syndrome (CCS). **Methodology:** We conducted a retrospective descriptive and analytical study over 2 years (from January, 1st, 2018 to December 31st, 2019) in the Cardiology Department of the University Hospital Aristide Le DANTEC in Dakar. All patients admitted for coronary angiography for suspected chronic coronary syndrome were included. **Results:** One hundred and fifty-two patients were included with a mean age of 60.79 ± 9.73 years, the most represented age group was 60 - 69 years. Advanced age was the most frequent risk factor (77.63%) followed by sedentary lifestyle (56.58%) and hypertension (41.45%). Diabetes was present in 17.1% of cases. A history of angioplasty was found in 1.97% of patients. Typical pain was found in 71.05% of cases, atypical pain in 19.74% and exertional dyspnoea in 2.63%. The pre-test probability was intermediate in 67.1% of cases, low in 25% and high in 7.9%. Significant coronary lesion was found in 52.63% of the patients, while coronary angiography was normal in the remaining cases. Tri-

troncular status was observed in 37.50%, it was bitroncular in 26.25% and monotoncular in 36.25% of cases. Factors associated with significant coronary artery disease were age ($p = 0.0001$), diabetes ($p = 0.006$), previous angioplasty ($p = 0.023$), previous myocardial infarction ($p = 0.018$), typical angina ($p = 0.001$), intermediate pretest probability ($p = 0.001$). Low pretest probability was significantly correlated with the absence of a coronary lesion with a $p = 0.001$. **Conclusion:** Our study shows that screening for chronic coronary disease should be done especially in diabetics, elderly subjects and those with previous angioplasty taking into account symptoms and pretest probability to avoid unnecessary invasive procedures.

Keywords

Chronic Coronary Syndroms, Coronarography, Aristide Le Dantec Hospital, Dakar

1. Introduction

Cardiovascular disease is the leading cause of death in the world with 17.7 million deaths per year, more than three quarters of which occur in low- and middle-income countries. Of these deaths, 7.4 million are attributable to ischaemic heart disease, also known as coronary heart disease [1].

For a long time considered rare in black African populations, coronary heart disease has steadily increased with the occidentalization of lifestyle and the influence of cardiovascular risk factors [2]. However, we are faced with a poverty of epidemiological data. The hospital prevalence of acute coronary syndroms (ACS) was estimated in 2009 at 7.61% and in 2015 at 16.7% [3] [4]. In 2011, a transversal study conducted in Saint-Louis of Senegal, in the general population, found a prevalence of coronary heart disease of 9.9% [5].

The prevention of these acute coronary syndroms relies above all on the management of cardiovascular risk factors, but also on early detection and improved management of chronic coronary syndroms (CCS). The diagnostic approach of these CCS should be personalised, depending on symptoms, patient characteristics, pre-test diagnostic probability (PTP), local expertise and the availability of imaging and/or functional tests [6]. Selective coronary angiography remains the gold standard for adequate visualisation of coronary anatomy. However, being invasive, it is only recommended as an alternative test for diagnosing coronary artery diseases in patients with a high clinical probability, with severe symptoms, or in the cases of typical angina at a low level of exercise and a clinical assessment indicating a high risk of event [6].

In this context, we were interested in chronic coronary syndroms (CCS). The main objective of our study was to establish the epidemiological profile of patients admitted in the angiography room for suspected chronic coronary syndrom.

Specifically, we aimed to

- describe the sociodemographic, clinical and para-clinical aspects of patients admitted for suspected CCS;
- give the results of coronary angiography in these patients;
- investigate the relation between the different patient's characteristics and the existence of significant coronary lesion.

2. Methodology

The study was carried out in the Cardiology Department of the university hospital Aristide Le DANTEC of DAKAR/SENEGAL. It was a retrospective, descriptive and analytical transversal study which performed over a period of 02 years, from January 1st 2018 to December 31st 2019.

2.1. Study Population

2.1.1. Inclusion Criteria

All patients received for suspected CCS who had undergone coronary angiography during the study period were included. We selected files whose indications met the definition of chronic coronary syndrome proposed by the European Society of Cardiology (ESC) in 2019, namely the 6 following scenarios:

- 1) Patients with suspected coronary artery disease (CAD) with "stable" angina or dyspnoea.
- 2) Recent heart failure or LV dysfunction with suspected CAD.
- 3) Asymptomatic patients or symptomatic patients with stabilised symptoms, evolving within 1 year of ACS or recent revascularization.
- 4) Asymptomatic or symptomatic patients with stabilised symptoms, more than 1 year after initial diagnosis of CAD or revascularization.
- 5) Angina patients with suspected vasospastic or microvascular disease.
- 6) Asymptomatic subjects in whom coronary artery disease is detected during "silent ischaemia" screening.

2.1.2. Exclusion Criteria

We excluded all patients who had an incomplete file, in particular, clinical parameters and angiographic results.

2.2. Data Collection Procedure

The data, for each patient, had been recorded on a pre-established collection sheet.

Sources of collection were the coronary angiography and echocardiography reports stored in a computer for this purpose. In those reports were recorded the indications and final result of the examinations. The civil status, clinical and biological data, the results of the ECG and those of the ischemic tests were obtained by the paper files of each patient, available in the archives.

2.3. Parameters Studied

We analysed epidemiological data such as age and sex, cardiovascular risk fac-

tors (diabetes, smoking, hypertension, dyslipidemia, sedentary lifestyle). The clinical parameters studied were mainly symptoms (typical pain, atypical pain, non-anginal pain and dyspnoea) and the pre-test probability of coronary heart disease assessed according to the ESC guidelines in 2019. We also searched for a coronary history (acute coronary syndrome, coronary angioplasty, bypass surgery, ischaemic heart disease).

On the paraclinical level, data from the electrocardiogram, echocardiography and stress tests (stress ECG and stress cardiac echography) were reported.

Concerning angiographic parameters, the existence or not of a significant coronary lesion and the number of arteries involved (mono, bi or tritruncular status). Angioplasty data were also studied, including the type of stent (bare metal or drug eluting stent), the number of stents used, and the final procedure result.

2.4. Statistical Analysis

Data entry was done with Epi info7 software and analysis with STATA version 15.1. The Chi-square test was used for comparison of proportions. The difference was statistically significant when the p-value was strictly less than 0.05.

2.5. Ethical Clearance

Data anonymity and confidentiality were respected. Any patient was involved in the design, recruitment, and conduct of the study. The authors declare no conflict of interest.

3. Results

3.1. General Characteristics of the Study Population

During the study period, 894 patients were admitted to the cathlab for a coronary angiography.

One hundred eighty (180) patients responded to our inclusion criteria of which 28 were excluded for incomplete data; this gave us a study population of 152 patients.

The mean age was 60.79 ± 9.73 years with extremes of 27 and 85. The age group 60 - 69 years was the most represented (42.11%).

Regarding cardiovascular risk factors, advanced age was found in 77.63% of cases, hypertension in 41.45%, type 2 diabetes in 17.1% and dyslipidemia in 19.73% of cases. A coronary antecedent was found in 15 patients (9.89%), of whom 09 had already undergone angioplasty. More details in **Table 1**.

3.2. Clinical Data

About symptoms, typical angina was found in 108 (71.05%) patients, atypical pain in 30 (19.74%) and exertional dyspnoea in 04 (2.63%). Dyspnoea and chest pain were associated in 04 patients and 06 patients were asymptomatic.

The pre-test probability assessed in all patients was intermediate in 102 patients or 67.1%, low in 38 patients (25%) and high in 12 patients (7.9%).

Table 1. General characteristics of the study population.

Parameters studied	Effectifs	Percentages (%)
General population	152	
Mean Age	60 ± 9 ans (27 - 85 ans)	
Sex		
Men	104	68.42
Women	48	31.58
Sex ratio M/W	2.16	
Cardio-vascular risk factors		
Age	117	77.63
HBP	63	41.45
Sedentary lifestyle	86	56.58
Diabetes	26	17.10
Dyslipidemia	30	19.73
Smoking	12	7.89
Symptoms		
Typical angina	108	71.05
Atypical angina	30	19.74
Pain + dyspnea	04	2.63
Dyspnea	04	2.63
Asymptomatic	06	3.9
Pre-test probability		
Low	38	25
Intermédiaire	102	67.10
High	12	7.90
Coronary antecedents		
Any coronary antecedent	126	82.89
Myocardial infarction (MI)	09	5.92
Ischemic cardiomyopathy	08	5.26
Angioplasty in context of MI	06	3.95
Angioplasty out context of MI	03	1.97

HBP = High Blood Pressure, M = Men, W = Women, MI: Myocardial Infarction.

3.3. Paraclinical Data

Ischemic tests

The echocardiography data recorded in 62 patients showed a correct Left Ventricular Ejection Fraction (LVEF) in 59 patients (95.16%), it was severely reduced in 03 patients (4.84%). A hypokinesia was present in 08 patients, or 12.9% of cases.

Some patients had at first undergone an ischemic test. This was a stress electrocardiogram in 56 patients which was positive in 51 of them (91.07%) and negative in the other 5. The stress echocardiography performed in 12 patients was positive in all cases.

Angiographic data

Coronary angiography was normal in 72 patients (47.37%) and pathological in 80 patients (52.63%). A tritruncular status was observed in 30 patients (37.50%), it was bitruncular in 26.25% and monotruncular in 36.25% of cases.

A chronic occlusion was found in 10 patients (12.5%), a TIMI 2 flow in 09 patients (11.5%) and a TIMI 3 flow in 61 patients (76.25%).

Thirty-seven patients (24.34%) had undergone angioplasty. Drug eluting stent was implanted in 34 of them or 70.09% and bare metal stent in 09 patients or 20.93%. Thirty-one patients received 1 stent and 06, two stents.

The artery treated was the left anterior descending in 31 patients or 72.09% of cases, the circumflex in 03 patients or 6.98% and the right coronary artery in 09 patients or 20.93% of cases. Angioplasty was successful in all patients at the end of procedure.

3.4. Factors Associated with Significant Coronary Artery Disease

A bivariate analysis using the Chi 2 test for the comparison of the proportions showed a significant association between age and significant coronary disease with a clear predominance of significant coronary lesion in elderly subjects (61.86% vs 20.59%; $p = 0.0001$). Same findings are observed for diabetes with respectively 76.92% and 47.62% for patients with and without diabetes and $p = 0.006$.

Our study established a significant difference between patients having or not an antecedent of myocardial infarction with a prevalence of significant coronary disease respectively at 88.89% and 50.35% ($p = 0.023$). Just as for antecedent of angioplasty, we found a prevalence of 100% for patient with history of angioplasty and 51.68% for those without ($p = 0.018$).

Among the clinical data, coronary artery disease prevalence was higher in patients with typical angina (45.39% vs 7.24%; $p = 0.001$). We also find a significant difference between patients with an intermediate pre-test probability and those without (45.39% vs 7.24%; $p = 0.001$).

However, we note a very low prevalence of significant coronary artery disease in patients with a low pre-test probability at 0.66% versus 51.97% for the others. This difference is significant with $p = 0.001$. This means that low pre-test probability is strongly correlated with normal coronary angiography.

There was no relationship between a positive stress test and coronary damage, $p = 0.764$ (Tables 2-4).

4. Discussion

This study is one of the rare of its kind conducted in sub-Saharan Africa. The objective was essentially to determine the epidemiological aspects of patients admitted for chronic coronary syndrome by looking for a relationship between the different clinical and paraclinical characteristics and the existence of coronary disease confirmed by coronary angiography, which constitutes the gold standard. The other objective was to assess our past practices against the 2019

CCS recommendations. We fixed all those objectives, in the hope of better improving of our practice, in order to screen patients more about the various tools available in our country where accessibility to complementary examinations remains expensive and limited.

Table 2. Factors related to significative coronary artery disease.

	Coronary artery disease				Total	p value
	Yes		No			
	N	%	N	%		
Cardio-vascular risk factors						
advanced age						0.0001
Yes	73	61.86	45	38.14	118	
No	7	20.59	27	79.41	34	
Smoking						0.106
Yes	9	75.00	3	25.00	12	
No	71	50.71	69	49.29	140	
HBP						0.590
Oui	31	50.00	31	50.00	62	
Non	49	54.44	41	45.56	90	
Diabetes						0.006
Yes	20	76.92	6	23.08	26	
No	60	47.62	66	52.38	126	
Dyslipidemia						0.747
Yes	15	50.00	15	50.00	30	
No	65	53.28	57	46.72	122	
Sedentarity						0.220
Yes	49	56.98	37	43.02	86	
No	31	46.97	35	53.03	66	
Coronary antecedents						
myocardial infarction						0.023
Yes	8	88.89	1	11.11	9	
No	72	50.35	71	49.65	143	
MI + Angioplasty						2.06
Yes	5	83.33	1	16.67	6	
No	75	51.37	71	48.63	146	
Angioplasty out context of MI						0.018
Yes	3	100.00	0	0.00	3	
No	77	51.68	72	48.32	149	
Ischeamic cardiomyopathy						0.192
Yes	74	51.39	70	48.61	144	
No	6	75.00	2	25.00	8	

Table 3. Relation between symptoms and significative coronary artery disease.

	Coronary artery disease				Total	p-Value
	Yes		No			
	N	%	N	%		
Typical angina						0.001
Yes	69	45.39	39	25.66	108	
No	11	7.24	33	21.71	44	
Dyspnoea						0.055
Yes	4	2.63	0	0.00	4	
No	76	50.00	72	47.37	148	
Pain + dyspnoea						1.055
Yes	2	50	2	50	4	
No	78	52.70	70	47.30	148	
Atypical angina						0.355
Yes	4	2.63	26	19.74	30	
No	76	50.00	46	27.63	122	

Table 4. Relation between pre-test probability and significative coronary artery disease.

	Coronary artery disease				Total	p-Value
	Yes		No			
	N	%	N	%		
Low						0.001
Yes	1	0.66%	37	24.34%	38	
No	79	51.97%	35	23.03%	114	
Intermediate						0.001
Yes	69	45.39%	33	21.71%	102	
No	11	7.24%	39	25.66%	50	
High						0.016
Yes	10	6.58%	2	1.32%	12	
No	70	46.05%	70	46.05%	140	

Age and sex

Male predominance has been found in coronary disease in Africa by various authors. Steyn K [7] in the INTERHEART study found a percentage of male sex between 65% and 80%, and Diao M [8] a sex ratio of 2.17 in favour of men. We have similar findings in our study with a predominance of men evaluated at 68.42%. This difference between the two sexes could be explained by the cardio-protective effect of oestrogens which women benefit from before the menopause [9]. However The effect of menopause on coronary heart disease risk remains uncertain. In the Study of Women's Health across the Nation (SWAN)

analysis [10], some risk factors such as total cholesterol were driven by ovarian ageing whereas others were driven by chronological ageing emphasising the need for a “tailored” risk stratification strategy. Following extensive review of evidence, BANKS and al found that hormone replacement therapy (HRT) in post-menopausal women does not reduce the risk of ischaemic heart disease (IHD) [11]. Also, this male predominance should not lead to underestimating the symptoms in women because, commonly, in the chronic situation, symptoms that women describe are often referred to as “atypical”, this may cause an under appreciation of risk associated with this presentation [12].

The mean age of our patients was 60.79 years, which is quite similar to the results of other studies carried out in Senegal by Diao M [7] and Aw F [13] who found respectively 58.39 and 58.8 years. In Ivory Coast, KRA [14] found a slightly younger age. A clear difference is noted with western series such as that of MARCAGGI which found an average age of 68 years. This could be explained by the absence of an effective prevention program in our context [15]. Age remains to be important non-modifiable risk factors for atherosclerosis and a predictor of poorer outcomes. In fact, coronary artery disease (CAD) is a major cause of mortality and morbidity in this population. Our study shows an important correlation between age and CCS and proves the importance of prevention and early detection of CAD in this population

Cardiovascular risk factors

In our study diabetes was strongly correlated with the presence of coronary lesions ($p < 0.006$) with a prevalence of 17.11%. It has been proven that although being metabolic disease, diabetes is often revealed by its cardiac complications. It is a major independent risk factor for coronary heart disease, which accounts for 50% of deaths in this population. In post-infarction, secondary prevention, both pharmacological and non-pharmacological, is remarkably effective, but too often incorrect or neglected. The emphasis should therefore be on primary prevention, and therefore diabetics with chronic coronary disease, symptomatic or asymptomatic, should be diagnosed early, if necessary, by non-invasive exploration, the indications for which should be discussed by the diabetologist and the cardiologist [16].

Smoking is a major and independent risk factor for coronary heart disease. According to the World Health Organization (WHO), the risk of coronary heart disease is 2 to 4 times higher in smokers than in non-smokers; even adults exposed to passive smoking see this risk increase by 25% to 30%. Nevertheless, in our series, we do not find a significant relationship between smoking and significant coronary disease. This can be linked to the prevalence which is 7.89%, a rate which is not negligible but which remains lower than those found in certain European countries such as Germany where there are approximately 39% of men and 31% of adult women (age 18 - 60 years) who continue to smoke despite explanations of the negative health consequences [17]. However, despite this relative low prevalence in our study, because of the harmful effects of tobacco, it

remains essential to fight against this cardiovascular risk factor which stay powerful.

A history of myocardial infarction was present in 12 patients (7.90%) and correlated with the existence of coronary lesions ($p = 0.026$). This can be explained by the fact that coronary disease is a dynamic process that evolves throughout the life of the coronary patient [9]. Collet JP [18] in his study showed a high rate of serious cardiovascular events in the long term, with 30% of patients developing a coronary recurrence within a median time of five years. These recurrences were most often related to the development of coronary neo-lesions in sites that were initially free of disease, demonstrating the aggressive nature of the disease. More than 10% of patients in his study have suffered multiple recurrences, with a premature mortality rate of up to 5% in the first eight years of the disease. Although the initial course is often favorable, patients have a poor long-term prognosis, which requires regular, lifelong follow-up for all coronary patients, as well as secondary prevention of risk factors.

The development of cardiac rehabilitation sector is a good perspective and could provide to patients a better understanding of coronary artery disease and better follow-up, leading to better long-term outcomes.

Clinical presentation

Regarding symptoms, the majority of patients (71.05%) had typical angina which correlated with the existence of a coronary lesion ($p = 0.001$). This finding allows us to say that a good clinical evaluation based at first on a meticulous questioning remains important and permit to guide the diagnostic strategy in patients with a suspected coronary artery disease [9].

In addition, we noted a significant proportion of atypical pain (22.37%), which should encourage us to better evaluate the pre-test probability, which could limit inappropriate prescriptions of diagnostic tests. This was demonstrated in our study where an intermediate probability was strongly correlated with the existence of coronary lesions ($p = 0.001$), justifying coronary angiography, while 25% of patients had a low pre-test probability and that was correlated with the absence of coronary lesions ($p = 0.001$). According to the 2019 ESC recommendations on CCS these patients should not benefit from a coronary angiography at the first line.

These data then provide evidence for the applicability of the pre-test probabilities in the black African population and demonstrates the importance of PTP when we know the invasive nature of coronary angiography but also the significant cost it requires, especially in our low-income countries.

Angiographic findings

Eighty patients or 52.63% had coronary lesion in our study, and a non-negligible proportion 47.37% was free of angiographically significant coronary lesion. This could be explained by the number of patients with low PTP. However, except for these patients with low PTP, normal coronary angiography does not exclude coronary artery disease. Indeed, although coronary disease (CAD) is due to atherosclerotic lesions in the majority of cases, there is also a proportion of

CAD with normal coronary arteries (microvascular coronary artery disease, vasospastic angina). The latter, although rare (less than 10%), should be sought out, diagnosed and treated [19]. This raises the problem of other diagnostic tools such as MRI, which remains very inaccessible in our routine practice.

Elsewhere, among the patients with coronary disease, the majority had a tri-truncular status, which could mean that there is not a strict correlation between clinical presentation (Chronic coronary syndrome) and anatomical lesions, hence the importance of mass awareness of cardiovascular risk factors and the early detection of symptoms.

5. Limitations of the Study

The main limitation of our study was its retrospective nature explaining the absence of some data from the history and biological examinations.

6. Conclusion

Our study shows the value of early screening for coronary artery disease, particularly in some patients at-risk, such as the elderly, diabetics and men. However, this screening should be based at first on the correct evaluation of the PTP as proposed by the ESC, which could lead to reduce the unreasonable prescription of coronary angiography, which remains an invasive examination not free of complications. As coronary disease is a progressive process over time, our study is a proof that secondary prevention is also important in subjects who have previously undergone coronary angioplasty.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] World Health Organization (2021) The Top 10 Causes of Death. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
- [2] Touze, J.E. (2007) Les maladies cardiovasculaires et la transition épidémiologique du monde tropical. *Tropical Medicine and Health*, **67**, 541-542.
- [3] Ellis, S.G., Vandormael, M.G., Cowley, M.J., *et al.* (1990) Coronary Morphologic and Clinical Determinants of Procedural Outcome with Angioplasty for Multivessel Coronary Disease. Implications for Patient Selection. Multivessel Angioplasty Prognosis Study Group. *Circulation*, **82**, 193-202. <https://doi.org/10.1161/01.CIR.82.4.1193>
- [4] Ba, S.A. (2017) Syndrome coronaire aigue: Etude CORONAFRIC 2. Extrait de la session des JESFC de 2017: Coronaropathies en Afrique. <https://www.cardio-online.fr/Congres/JESFC-2017/Cardiopathies-en-Afrique-subsa-harienne>
- [5] Coly Bah, S.M. (2011) Prévalence des coronaropathies chez les sujets âgés de 40 ans et plus en population générale: Etude transversale réalisée à Saint-Louis au Sénégal. Thèse de médecine, Université Cheikh Anta Diop Dakar, Dakar.

- [6] Knuuti, J., Wijns, W., Saraste, A., *et al.* (2019) 2019 ESC Guidelines for the Diagnosis and Management of Chronic Coronary Syndromes: The Task Force for the Diagnosis and Management of Chronic Coronary Syndromes of the European Society of Cardiology. *European Heart Journal*, **41**, 407-477. <https://doi.org/10.1093/eurheartj/ehz425>
- [7] Steyn, K., Sliwa, K., Hawken, S., *et al.* (2005) Risk Factors Associated with Myocardial Infarction in Africa. The INTERHEART Africa Study. *Circulation*, **112**, 3554-3561. <https://doi.org/10.1161/CIRCULATIONAHA.105.563452>
- [8] Diao, M., Dioum, M., Diouf, M.T., *et al.* (2019) Résultats à court et moyen terme de l'angioplastie coronaire : A propos de 91 cas colligés à la clinique cardiologique du Centre Hospitalo-Universitaire Aristide Le Dantec de Dakar. *Cardiologie Tropicale*. <http://tropical-cardiology.com/Accueil/index.php/fr/2013-08-10-06-44-55/n-157-juil-aout-sep-2019/371-resultats-a-court-et-moyen-terme-de-l-angioplastie-coronaire-a-propos-de-91-cas-colliges-a-la-clinique-cardiologique-du-centre-hospitalo-universitaire-aristide-le-dantec-de-dakar>
- [9] Leclercq, F. (2015) Maladie coronaire de la femme: Caractéristique et spécificité. *EM-Cardiologie*, **10**, 1-10.
- [10] Matthews, K.A., Crawford, S.L., Chae, C.U., *et al.* (2009) Are Changes in Cardiovascular Disease Risk Factors in Midlife Women Due to Chronological Aging or to the Menopausal Transition? *Journal of the American College of Cardiology*, **54**, 2366-2373. <https://doi.org/10.1016/j.jacc.2009.10.009>
- [11] Banks, E. and Canfell, K. (2009) Invited Commentary: Hormone Therapy Risks and Benefits—The Women's Health Initiative Findings and the Postmenopausal Estrogen Timing Hypothesis. *American Journal of Epidemiology*, **170**, 24-28. <https://doi.org/10.1093/aje/kwp113>
- [12] Crilly, M.A., Bundred, P.E., Leckey, L.C., *et al.* (2008) Gender Bias in the Clinical Management of Women with Angina: Another Look at the Yentl Syndrome. *Journal of Women's Health*, **17**, 331-342. <https://doi.org/10.1089/jwh.2007.0383>
- [13] Aw, F., Ndiaye, M.B., Mbow, T., *et al.* (2019) Apport des explorations non invasives et résultats de la coronarographie dans l'angor stable au service de cardiologie du CHU Aristide Le Dantec de Dakar. *Revue africaine de Médecine Interne*, **6**, 27-32.
- [14] Kra, A. (2014) Cardiologie interventionnelle en côte d'ivoire: Etude des 100 premières angioplasties coronaires réalisées à l'Institut de Cardiologie d'Abidjan. Thèse de médecine. Université Felix Houphouët Boigny.
- [15] Espérance de vie occidentale 2017. <https://www.ined.fr/fr/tout-savoir-population/chiffres/europe-pays-developpes/esperance-vie/>
- [16] Passa, P. (2008) Should the Coronary Diabetic Patient Benefit from Specific Management? The View Point of the Diabetologist. *Journal of Cardiology*, **54**, 317-321.
- [17] Heitzer, T. and Meinertz, T. (2005) Prevention of Coronary Heart Disease: Smoking. *Zeitschrift für Kardiologie*, **94**, iii30-iii42. <https://doi.org/10.1007/s00392-005-1306-y>
- [18] Collet, J.P., Zeitouni, M., Procopi, N., *et al.* (2019) Évolution à long terme de la maladie coronarienne prématurée. *Journal of the American College of Cardiology*, **74**, 1868-1878. <https://doi.org/10.1016/j.jacc.2019.08.1002>
- [19] Crea, F., Camici, P.G. and Merz, C.N. (2014) Coronary Microvascular Dysfunction: An Update. *European Heart Journal*, **35**, 1101-1111. <https://doi.org/10.1093/eurheartj/ehz513>