

Research Article

# Aspects of Coronary Angiography in Diabetic Patients at the CHU Mother and Child Luxembourg in Bamako

**Tour é Mamadou<sup>1, 3, 5, \*</sup>, Konat é Massama<sup>1, 2, 5</sup>, Sako Mariam<sup>5</sup>, Sidib é Samba<sup>1, 5</sup>, Mariko Souleymane<sup>4</sup>, Traor é Dj é n é bou<sup>5</sup>, Sow Dj é n é ba Sylla<sup>1</sup>, Thiam Coumba Adiaratou<sup>5</sup>, Sonfo Boubacar<sup>5</sup>, Ba Hamidou Oumar<sup>3, 5</sup>, Menta Ichaka<sup>3, 5</sup>**

<sup>1</sup>Department of Cardiology Mother and Child Luxembourg, University of Sciences, Techniques and Technology of Bamako (USTTB), Bamako, Mali

<sup>2</sup>Department of Medicine, Mali Hospital, Techniques and Technology of Bamako (USTTB), Bamako, Mali

<sup>3</sup>Department of Cardiology Gabriel TOURE Hospital, Techniques and Technology of Bamako (USTTB), Bamako, Mali

<sup>4</sup>Department of Medicine, Timbuktu Hospital, Timbuktu, Mali

<sup>5</sup>Faculty of Medicine and Odonto-Stomatology, USTTB, Bamako, Mali

## Abstract

**Introduction:** Type 2 diabetes is on the increase in Africa as a result of the epidemiological transition. Cardiovascular complications, particularly ischemic complications, are common in diabetic patients. They are life-threatening. It is important to identify the angiographic appearance of the coronary arteries in diabetic patients in order to guide treatment. **Objective:** to identify the results of coronary angiography in diabetic patients. **Patients and method:** Descriptive, cross-sectional study with retrospective recruitment over a three-year period from September 2019 to August 2022. All diabetic patients who underwent coronary angiography at the CHU mother child Luxembourg in Bamako were included. **Results:** We enrolled 371 patients out of 985 during the study period, i.e. a hospital frequency rate of 37.66%. The mean age of the patients was 60.76 +/- 10.26 years, with extremes of 32 and 84 years. They were predominantly male, with a sex ratio of 1.45. The predominant functional signs were typical chest pain (39.4%), atypical chest pain (27.8%) and dyspnea (13.2%). The predominant risk factors were hypertension (74.7%), sedentary lifestyle (48.8%) and smoking (17.5%). The indications for coronary angiography were chronic coronary syndrome (55%) and acute coronary syndrome (45%). Coronary angiography was pathological in 78.4% of patients, with tritruncular lesions in 38% and bi-truncular lesions in 21%. Lesions were located on the common trunk in 5.4%, on the anterior interventricular in 59.8%, on the right coronary in 51.8% and on the circumflex in 47.4%. **Conclusion:** Ischemic heart disease is common in diabetic patients with tri- and bi-truncular lesions.

## Keywords

Diabetes, Coronary Angiography, CHU Mother Child Luxembourg, Bamako

\*Corresponding author: [drmatour@yahoo.fr](mailto:drmatour@yahoo.fr) (Touré Mamadou)

**Received:** 26 February 2024; **Accepted:** 9 March 2024; **Published:** 2 April 2024



Copyright: © The Author(s), 2024. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

## 1. Introduction

Diabetes is a metabolic disease characterized by chronic hyperglycemia. It is growing rapidly in Africa according to the International Diabetes Federation [1]. It is an important risk factor for the development of coronary heart disease [2]. Diabetic patients are at high risk of developing cardiovascular disease with its various manifestations such as ischemic heart disease, heart failure, stroke and peripheral arterial disease [3]. People with type 2 diabetes have a two- to four-fold increased risk of developing cardiovascular disease in their lifetime, including coronary artery disease, stroke, heart failure, atrial fibrillation, as well as peripheral arterial disease [4, 5]. Diabetes is a well-established risk factor for ischemic heart disease, and coronary artery disease accounts for 40–80% of the causes of death in patients with type 2 diabetes [6, 7]. In patients with chronic coronary syndrome (CTS), type 2 diabetes is also associated with an increased risk of cardiovascular events (cardiovascular death, myocardial infarction, or stroke) [8]. Studies have shown that the clinical signs of coronary artery disease in diabetic patients are often less severe and atypical in presentation. In the BARI 2D (Bypass Angioplasty Revascularization Investigation 2 Diabetes) trial in patients with angiography-confirmed coronary artery disease and diabetes with a mean duration of 10.4 years, typical angina, anginal equivalent, or a combination of both were observed in 19%, 21%, and 42% of patients, respectively, while 18% remained asymptomatic [9]. In a study of 510 asymptomatic diabetic patients with a mean age of 53 years with no history of cardiovascular disease, calcium score revealed coronary calcifications considered a reliable marker of coronary atherosclerosis in 46.3% of patients [10]. Diabetes is a major cardiovascular risk factor. Its complications are microangiopathic and macroangiopathic, including cardiovascular involvement. Cardiovascular morbidity and mortality is high in diabetics compared to non-diabetics [6]. Exploration of the heart for coronary atherosclerosis is important in diabetic patients, hence the motivation for this study.

## 2. Patients and Methods

We conducted a descriptive, cross-sectional study with retrospective recruitment that took place over a three-year period from September 2019 to February 2023. All diabetic patients

who underwent coronary angiography at the mother-Child University Hospital in Bamako, Luxembourg were included. Information was collected for each patient on an individual survey sheet. Data were collected from clinical and paraclinical examination with coronary angiography results. This coronary angiography was performed using a General Electric Optima device. Socio-demographic characteristics, functional signs, and indications were collected. Other cardiovascular risk factors, namely high blood pressure (hypertension), smoking, dyslipidemia, sedentary lifestyle, obesity and cardiovascular heredity, were sought. Significant lesions on coronary angiography were defined by the presence of a stenosis greater than 50% in the common trunk and proximal interventricular, greater than or equal to 70% for the other sites and between 50 and 70% with typical angina.

Data were captured from the French version 22.0 of the SPSS software and analyzed with the same software. The word processor was done on Microsoft Office Word 2016.

The statistical test used was the Fisher test and p was statistically significant if  $< 0.05$ . Confidentiality was respected and data processing was anonymous.

## 3. Results

During the study period, 985 coronary angiography angiography was performed in the interventional cardiology unit. Of these patients, 371 were diabetic, representing a hospital frequency of 37.66%. The mean age of patients was 60.76  $\pm$  10.26 years with extremes of 32 and 84 years. The majority age group was 58-71 years with a proportion of 43.7% (Table 1). The predominance was male with a sex ratio of 1.45. The predominant functional signs were typical chest pain 39.4%, atypical chest pain 27.8%, and dyspnea 13.2% (Table 1). The predominant risk factors were hypertension 74.7%; a sedentary lifestyle 48.8% and smoking 17.5% (Table 1). The indications for coronary angiography were chronic coronary syndrome (55%) and acute coronary syndrome (45%) (Table 2). Coronary angiography was pathological in 78.4% with tritruncular involvement in 38% and bitruncular involvement in 21% (Table 2). The lesions were located on the common trunk in 5.7%; on the anterior ventricular interventricular in 58.1%; on the circumflex in 46.5% and on the right coronary in 50.1% (Table 1).

**Table 1.** Epidemiological and clinical features.

Characteristics	Men n= 220		Women n= 151		Total	
	No	%	No	%	No	%
Age range						
[32-45]	17	7,7	13	8,6	30	8,1

Characteristics	Men n= 220		Women n= 151		Total	
	No	%	No	%	No	%
]45-58]	78	35,5	46	30,5	124	33,4
]58-71]	94	42,7	68	45	162	43,7
]71-84]	31	14,1	24	15,9	55	14,8
Cardiovascular Risk Factors						
HTA	161	73,2	116	76,8	277	74,7
Sedentary lifestyle	87	62,3	94	39,5	181	48,8
Smoking	63	28,6	2	1,3	65	17,5
Obesity	19	8,7	20	13,2	39	10,5
ATCD Coronary artery disease	23	10,5	9	6	32	8,6
Dyslipidemia	19	8,6	8	5,3	27	7,3
Functional Signs						
Pain thoracic Typical	94	42,7	52	34,4	146	39,4
Pain thoracic Atypical	61	27,7	42	27,8	103	27,8
Dyspnoea	30	13,7	19	12,6	49	13,2
Asymptomatic	28	12,7	17	11,3	45	12,1

**Table 2.** Characteristics Coronary angiography.

Characteristics Coronary angiography	Men n= 220		Women n= 151		Total		P
	No	%	No	%	No	%	
Directions							
ACS	101	45,9	66	43,7	167	45	0,7
ST +	70	31,8	39	25,8	109	29,4	0,2
ST-	31	14,1	27	17,9	58	15,6	0,3
CCS	120	54,5	84	55,6	204	55	0,9
Pathological coronary angiography	181	82,3	110	72,8	291	78,4	0,02
Mono truncular	40	18,2	32	21,2	72	19,4	0,5
Bi truncular	50	22,7	28	18,5	78	21	0,3
Tritruncular	91	41,4	50	33,1	141	38	0,1
Art ère coupable							
Anterior interventricular artery	139	63,2	83	55	222	59,8	0,1
Right Coronary	118	53,6	74	49	192	51,8	0,3
Circumflex artery	110	50	66	43,7	176	47,4	0,2
Common Core	14	6,4	6	4	20	5,4	0,3
Bisector	14	6,4	3	2	17	4,6	0,03

## 4. Discussion

Diabetes is a metabolic disease that is growing rapidly in Africa due to the epidemiological transition. Among patients who performed coronary angiography during the study period, the proportion of diabetic patients was 37.66%. This proportion is higher than that found by Dioum [11], in Dakar which was 24.5% and that found by N'Guetta [12], in Abidjan which was 18.5%. This difference could be explained by the period of study. Diabetes is a metabolic disease that is growing rapidly in Africa due to the epidemiological transition. Among patients who performed coronary angiography during the study period, the proportion of diabetic patients was 37.66%. This proportion is higher than that found by Dioum [11], in Dakar which was 24.5% and that found by N'Guetta [12], in Abidjan which was 18.5%. This difference could be explained by the period of study. In Nigeria [13], the proportion of diabetics among patients who underwent coronary angiography was 33.8%. In North Africa, particularly Tunisia, the proportion of diabetic patients was about 40% [14]. Diabetes is a major cardiovascular risk factor and its frequency increases with age. In our series, the mean age of patients was 60.76 $\pm$ 10.26 years with extremes of 32 and 84 years. This average age is close to those found by Dioum [11], in Dakar 61.8 years and N'Guetta [12], in Abidjan 58.7 years old. This is a testament to the fact that this pathology affects people who are in employment. Male sex is considered a non-modifiable cardiovascular risk factor. The predominance was male in our patients with a sex ratio of 1.45. The same observation was made in Abidjan [12], with a sex ratio of 7 and in Dakar with a sex ratio of 1.97.

Diabetes is characterized by neuropathy which is part of microangiopathy. The clinical manifestations of ischemic heart disease in diabetics are diverse. In our patients, the predominant functional signs were typical chest pain in 39.4%, atypical chest pain in 27.8%, and dyspnea in 13.2%. In Dakar, Dioum [11], found 70.3% of patients asymptomatic, chest pain in 21.8% and dyspnea in 7.9%. Other cardiovascular risk factors may be associated with diabetes. In addition to diabetes, we have observed in our patients certain predominant risk factors such as hypertension 74.7%; a sedentary lifestyle 48.8% and smoking 17.5%. In West Africa, hypertension was found as a major cardiovascular risk factor associated with diabetes in Abidjan according to N'Guetta with 75%, followed by a sedentary lifestyle 32.5% and smoking 5%. In Dakar, Dioum [11], found that diabetics had the associated risk factors following a sedentary lifestyle (59.4%), followed by hypertension (49.5%) and smoking (9.9%). The motivations for performing coronary angiography in diabetic patients are diverse. In our patients, the indications for coronary angiography were mainly CCS in 55% and ACS in 45%.

This is in agreement with the proportions found by Parvin [15], in Bangladesh which were 71% for SCC and 29% for SCA. In Abidjan, N'Guetta [12], had performed coronary angiography in front of an ACS in 71.2% and in front of a SCC in 26.3%. In

Dakar, according to Dioum's study, coronary angiography was performed in front of an ACS in 48.5% and the CCS in 35.7% [11]. In our series, coronary angiography was pathological in 7 Coronary lesions in diabetics are classically characterized by their diffuse and extensive appearance. The lesions were tritruncular in 38% and bitruncular in 21% in our series. These rates can be superimposed on those of N'Guetta [12] in Abidjan, which were 30% for bitruncular; and 57.5% for tritruncular. In Dakar [11], the lesions were bi-truncular in 42.9% and tritruncular in 38.1%. 8.4%, this rate is close to 85% in Abidjan [12], and 83.1% in Dakar [11]. The damage was localized to the common core in 5.7%; on Anterior interventricular artery in 58.1%; on the circumflex in 46.5% and on the right coronary in 50.1%. In Abidjan [12], 0.8% of students reached the common core; 38.8% for Anterior interventricular artery; 31.4% for the circumflex and 28.9% for the right coronary. In Dakar, the common core was achieved in 28.6% and the Anterior interventricular artery in 69% of cases [11].

## 5. Conclusion

The diabetic patient is at high cardiovascular risk. This cardiovascular risk is related to the risk of coronary artery disease. In our study, coronary angiography was performed in the majority of cases for chronic coronary syndrome. Coronary angiography was pathological in more than 3/4 of patients with diffuse and severe lesions.

## Abbreviations

ACS: Acute Coronary Syndrome

CCS: Chronic Coronary Syndrome

USTTB: University of Science, Technique and Technology of Bamako

## Conflicts of Interest

The authors declare no conflict of interest.

## References

- [1] Magliano DJ, Boyko EJ. IDF diabetes atlas. 2022.
- [2] Kannel WB, McGee DL. Diabetes and glucose tolerance as risk factors for cardiovascular disease: the Framingham study. *Diabetes Care*. 1979; 2(2): 120-6. <https://doi.org/10.2337/diacare.2.2.120>
- [3] Marx N, Federici M, Schütt K, Müller-Wieland D, Ajjan RA, Antunes MJ, et al. 2023 ESC Guidelines for the management of cardiovascular disease in patients with diabetes: Developed by the task force on the management of cardiovascular disease in patients with diabetes of the European Society of Cardiology (ESC). *Eur Heart J*. 2023; 44(39): 4043-140. <https://doi.org/10.1093/eurheartj/ehad192>

- [4] Collaboration ERF. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. *The Lancet*. 2010; 375(9733): 2215-22. [https://doi.org/10.1016/S0140-6736\(10\)60484-9](https://doi.org/10.1016/S0140-6736(10)60484-9)
- [5] Chan JC, Lim LL, Wareham NJ, Shaw JE, Orchard TJ, Zhang P, et al. The Lancet Commission on diabetes: using data to transform diabetes care and patient lives. *The Lancet*. 2020; 396(10267): 2019-82. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)32374-6/abstract#](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32374-6/abstract#)
- [6] Rawshani A, Rawshani A, Franzén S, Eliasson B, Svensson AM, Miftaraj M, et al. Mortality and Cardiovascular Disease in Type 1 and Type 2 Diabetes. *N Engl J Med*. 13 avr 2017; 376(15): 1407-18. <https://doi.org/10.1056/nejmoa1608664>
- [7] Krempf M, Parhofer KG, Steg PG, Bhatt DL, Ohman EM, Røther J, et al. Cardiovascular event rates in diabetic and nondiabetic individuals with and without established atherothrombosis (from the REduction of Atherothrombosis for Continued Health [REACH] Registry). *Am J Cardiol*. 2010; 105(5): 667-71. <https://doi.org/10.1001/jama.2010.1322>
- [8] Mak KH, Vidal-Petiot E, Young R, Sorbets E, Greenlaw N, Ford I, et al. Prevalence of diabetes and impact on cardiovascular events and mortality in patients with chronic coronary syndromes, across multiple geographical regions and ethnicities. *Eur J Prev Cardiol*. 2021; 28(16): 1795-806. <https://doi.org/10.1093/eurjpc/zwab011>
- [9] Krishnaswami A, Hardison R, Nesto RW, Sobel B. Presentation in Patients With Angiographically Documented Coronary Artery Disease and Type II Diabetes Mellitus (from the BARI 2D Clinical Trial). *Am J Cardiol*. janv 2012; 109(1): 36-41. <https://doi.org/10.1016/j.amjcard.2011.08.004>
- [10] Anand DV, Lim E, Hopkins D, Corder R, Shaw LJ, Sharp P, et al. Risk stratification in uncomplicated type 2 diabetes: prospective evaluation of the combined use of coronary artery calcium imaging and selective myocardial perfusion scintigraphy. *Eur Heart J*. 2006; 27(6): 713-21. <https://doi.org/10.1093/eurheartj/ehi808>
- [11] M. Dioum PN JS Mingou, MF Ba, CH Bamba Diop, M Bodian, B Diack, M Bamba Ndiaye, M Diao. La coronarographie chez les patients diabétiques : étude rétrospective à propos de 101 cas colligés au centre de cardiologie interventionnelle du Centre Hospitalier Universitaire Aristide Le Dantec de Dakar. *Cardiologie Tropicale*. juin 2021; n-164.
- [12] N'Guetta R, Yao H, Ekou A, Séri B, N'Cho-Mottoh MP, Soya E, et al. Coronary artery disease in black African patients with diabetes: Insights from an Ivorian cardiac catheterization centre. *Arch Cardiovasc Dis*. mai 2019; 112(5): 296-304. <https://doi.org/10.1016/j.acvd.2019.01.003>
- [13] Falase B, Johnson A, Animasahun B, Akinbileje T, Onabowale Y, Oke D. Clinical and Angiographic Profile of Nigerians with Coronary Artery Disease. *Exp Clin Cardiol*. 1 janv 2014; 20: 398-410.
- [14] Addad F, Gouider J, Boughzela E, Kamoun S, Boujenah R, Haouala H, et al. Management of patients treated for acute ST-elevation myocardial infarction in Tunisia: Preliminary results of FAST-MI Tunisia Registry from Tunisian Society of Cardiology and Cardiovascular Surgery. In: *Annales de Cardiologie et d'angiologie*. 2015. p. 439-45. <https://doi.org/10.1371/journal.pone.0207979>
- [15] Parvin T, Haque KS, Siddique MA, Habib SA, Rahman M, Rahman MH, et al. Angiographic Severity of Coronary Artery Disease in Diabetic and Non-Diabetic Patients in a Tertiary Care Centre. *Univ Heart J*. 20 août 2015; 10(1): 13-7.