



Results of Coronary Angiography in Diabetics at the Niamey General Reference Hospital

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ABSTRACT

Introduction: Diabetes is a worldwide pandemic and a major risk factor in the pathogenesis of coronary lesions. Coronary angiography is an essential examination for the management of these coronary lesions. The aim of our study was to analyze and interpret the results of coronary angiography performed on diabetic patients at the Niamey General Referral Hospital.

Method: This was a retrospective study over two years, from December, 2017 to December, 2019, carried out in the cardiology department of the Niamey General Referral Hospital. All diabetic patients who had undergone coronary angiography during this period were included. Data was entered and analyzed using International Business Machines Statistical Package for the Social Sciences (IBM SPSS) statistic 21. For correlation, the statistical test was Chi-Square (χ^2) with a significance level ($p < 0.05$).

Results: A total of 217 patients came to the department for coronary angiography. It was the only interventional cardiology center in Niger during the study period. Of these patients, 59 were diabetic (27.18%). The mean age was 56 ± 11 years, with extremes ranging from 18 to 84 years. Men predominated (67.8%). Type 2 diabetes was the most common (98.30%). The radial route was the most used (94.92%). Coronary angiography was abnormal in 45.76% of cases. Among the lesions, significant stenosis were the most common in 76.79% of cases and occlusions in 23.21%. The anterior interventricular was the most affected in 33.93% of cases, followed by the circumflex (23.21%) and the right coronary (14.29%). Angioplasty was performed in 25.42% of cases with active stents. The correlations between lesions and diabetes were not statistically significant, probably due to the size of the sample. Patients' clinical condition improved in 94.9% of cases and was stable in 5.08% of cases.

Conclusion: Coronary angiography remains essential for the diagnosis of lesions in coronary artery disease, particularly in diabetic patients. The results of this study are a perfect illustration of this and have made it possible to adapt treatment.

Keywords: Coronary angiography; Diabetics; General reference hospital; Niger

INTRODUCTION

Diabetes occupies a significant place among non-communicable diseases and constitutes a veritable pandemic according to World Health Organization (WHO) [1,2]. In Africa, over a projection of less than 30 years (2017-2045), there will be a 156% increase in the

number of cases of diabetes, making this continent the region of the world with the greatest increase in the disease [3-5]. Coronary artery disease is a vascular pathology whose anatomopathological basis is atherosclerosis. Its development depends on the presence of cardiovascular risk factors, including diabetes.

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Epidemiological data from the Diabetes Control and Complication Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) clearly show that diabetes increases the risk of coronary heart disease 2-fold to 3-fold in men and 3-fold to 5-fold in women [6,7]. The seriousness of coronary artery disease is due to the insidious nature of its progression, the severity and multiplicity of atheroma's and, above all, the association with other lesions (specific cardiomyopathy, cardiac autonomic neuropathy). Parietal infiltration is more diffuse, more distal and more calcified in diabetic patients, as shown by coronary angiography and confirmed by necropsy findings [8].

The recommendations of learned societies place great emphasis on screening for and treating the 3 main complications associated with diabetes: Atheromatous disease, heart failure and chronic kidney disease. These recommendations place the cardiologist at the heart of the management of patients with type 2 diabetes, through the management of their complications, with the aim of improving their prognosis and quality of life [9].

It was for this reason that we conducted this study, the aim of which was to examine the results of coronary angiography in diabetic patients who had undergone coronary angiography in our interventional cardiology unit at the Niamey General Referral Hospital in Niger.

MATERIALS AND METHODS

This was a retrospective, analytical study covering a period of two years from December, 2017 to December, 2019, carried out in the cardiology department of the Niamey General Referral Hospital. The department housed the only interventional cardiology center in Niger during this period. All diabetic patients hospitalized in the cardiology department who had undergone coronary angiography during this period were included in the study. The data were entered and analyzed using IBM SPSS statistic 21 software, with graphs produced using Microsoft Excel 2016 after creating an input mask, and word processing using Word 2016 software. For correlation, the statistical test for categorical variables was χ^2 with a significance level ($p < 0.05$). The difficulty encountered was related to missing data due to the retrospective nature of the study.

Variables studied

Socio-demographic aspects: Age, sex, occupation, level of

education and residence.

Cardiovascular risk factors: Hypertension, smoking, dyslipidemia, overweight, menopause and coronary heredity.

Clinical parameters: Weight, height, body mass index, blood pressure, heart rate, pain, dyspnea, palpitation, etc.

Paraclinical parameters: Blood glucose and glycated hemoglobin, lipid profile, renal function, CBC, troponin, ECG, cardiac ultrasound and coronary angiography results.

The various treatments offered and/or carried out after the coronary angiography.

Operational definition of terms

Type of diabetes: Typing was done based on anamnestic and clinical arguments and/or antibody assays anti Glutamate Acid Decarboxylase (anti-GAD), anti-insulin, anti-Tyrosine Phosphatase (anti IA2) and C-peptidemia.

Myocardial ischemia: Corresponds to a lack of oxygenation of the heart muscle, associated with coronary artery disease.

Coronary angiography: It is an invasive medical imaging test used in cardiology to visualize the coronary arteries (left and right) in cases of suspected coronary disease.

RESULTS

During the period of this study, 217 patients underwent coronary angiography, 59 of whom were diabetics, i.e. a prevalence of 27.18%.

Socio-demographic aspects

Males predominated, with 67.8% of cases, giving a sex ratio of M/F=2 [10]. The mean age of our patients was 56 ± 11 years, with extremes ranging from 18 to 84 years. The most common age group was 50-59 years, found in 40.6% of cases. Among the socio-professional categories, civil servants were in the majority in 38.89% of cases. Patients came from all regions of Niger, but Niamey, the capital, was the most common with 84.61% of cases.

Characteristics of diabetes

Family history: A family history of diabetes was found in 23 patients (38.98%). Cardiovascular risk factors associated with diabetes, hypertension, found in 75% of cases, was the most common risk factor associated with diabetes (Figure 1).

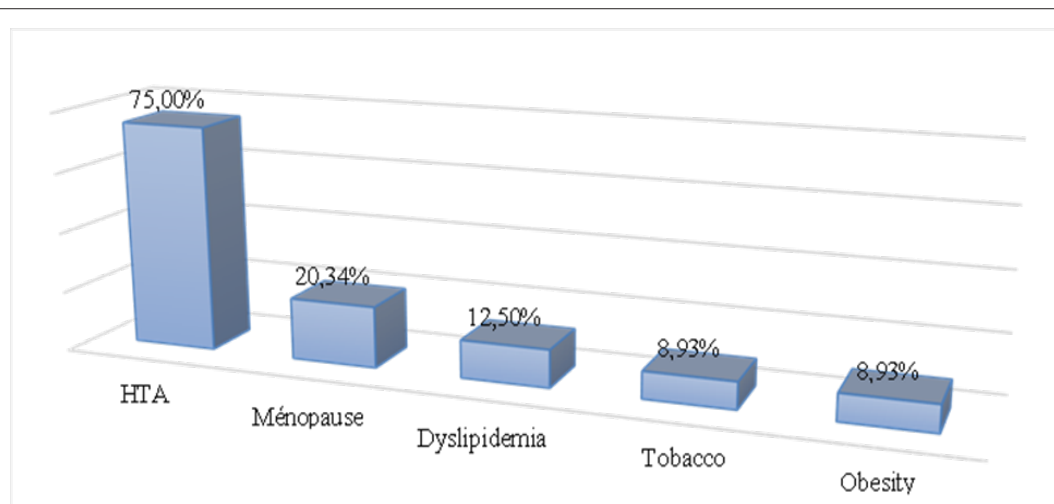


Figure 1: Distribution of patients according to cardiovascular risk factors associated with diabetes.

Type of diabetes

Most patients were type 2 diabetics (58 patients or 98.30%).

Duration of diabetes

The average duration of diabetes was 8 years, with extremes ranging from recent onset to 30 years. Between 0 and 5 years of diabetes progression was found in most cases (38%).

Clinical and paraclinical parameters of diabetic patients

Body Mass Index (BMI): The average Body Mass Index was 27 kg/m², with extremes ranging from 19 to 51.

Functional signs: Chest pain was the most common functional sign in 66.10% of cases (Figure 2).

Electrocardiogram: Primary repolarization disorders were found in 35 patients (85.37%). Subepicardial ischemia was found in 47.22% of cases. The anterior territory was incriminated in 23.73% of cases.

Cardiac doppler ultrasound: Impaired left ventricular systolic function was noted in 54.35% of cases.

Myocardial scintigraphy: Myocardial scintigraphy was positive in 13 diabetics.

Results of coronagraphy

Indication for coronary angiography: The search for ischemic heart disease in symptomatic diabetics was the primary indication

(57.63%) for coronary angiography (Table 1).

Approach: The radial approach was used in 94.92% of cases, at the expense of the femoral approach (5.68%).

Results of coronary angiography: Coronary angiography revealed 45.76% abnormalities and 54.24% insignificant lesions.

Aspects of coronary lesions: The distribution of lesions in the 27 patients with abnormal coronary angiography (45.76%) was as follows: 11 mono-truncular lesions, 6 bi-truncular lesions and 10 tri-truncular lesions (Figure 3).

Summary of coronary lesions by artery affected: The branch most affected was the (Anterior Interventricular) IVA in 33.93% of cases, followed by the circumflex in 23.21% (Table 2). The right coronary artery was totally occluded in 38.46% of cases.

Treatment after coronary angiography: Angioplasty was performed in 25.42% of patients with active stents in 100% of cases.

Bi-variate statistical analysis

Lesion types were unevenly distributed across age groups. The age group 50-59 had the most lesions, with 22.22% of single-trunk lesions, 7.41% of double trunk lesions and 14.81% of tri-vessel lesions (p=0.5715).

Correlation between duration of diabetes and coronary lesions: Patients with a duration of diabetes between 0-5 were the most numerous (39.13%). The correlation was statistically insignificant (p=0.4728).

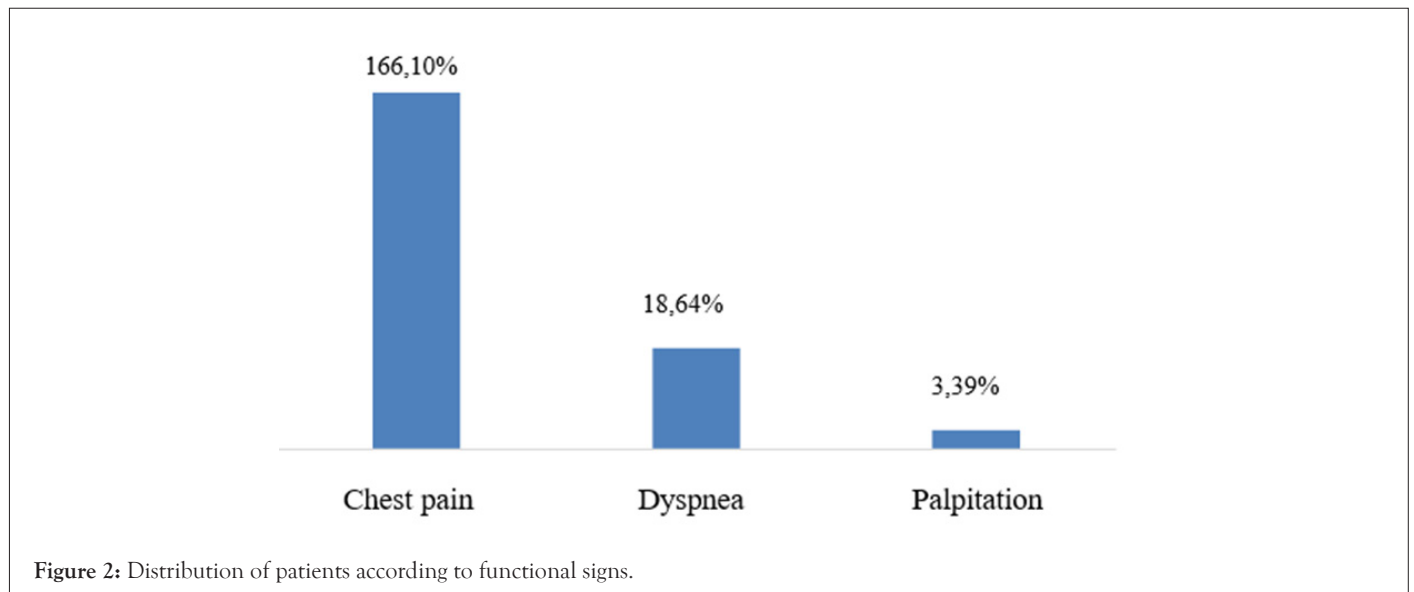


Table 1: Distribution of patients according to indications for coronary angiography.

Directions	Frequency	Percentage (%)
Diabetics symptomatic	34	57,63
Positive scintigraphy	13	22,03
Diabetics asymptomatic	4	6,78
Stent control	1	1,69
Not specified	7	11,86
Total	59	100

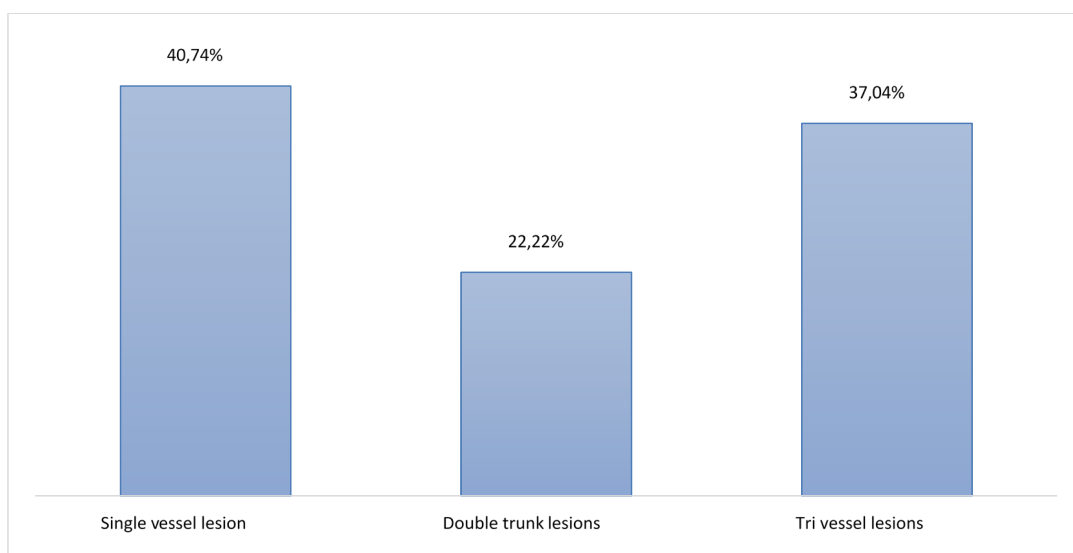


Figure 3: Distribution of patients according to the number of coronary arteries affected.

Table 2: Summary of patients according to the most severely affected arteries.

Affected artery	Stenosis	Total occlusion	Frequency	Percentage (%)
Commun core	1	0	1	1,79
IVA	17	2	19	33,93
Circumflex artery (Cx)	10	3	13	23,21
Diagonal	3	1	4	7,14
Marginal	4	0	4	7,14
Right coronary droite	3	5	8	14,29
Proximal segment of the right coronary artery	3	2	5	8,93
Medial segment of the right coronary artery	1	0	1	1,79
Distal segment of the right coronary artery	1	0	1	1,79
Total	43	13	56	100

DISCUSSION

In this series, the prevalence of diabetes in patients undergoing coronary angiography was 27.18%. This prevalence is higher than that found by Baye in Senegal (11.25%) and lower than that found by Goulhasen in Morocco (50.8%) [11,12]. This disparity could be explained by the fact that coronary angiography was in its infancy in our country and was only performed occasionally (during campaigns with doctors from outside the country), whereas it is available on a permanent basis in other countries. The prevalence of diabetes in Niger rose from 2% in 2002 to 4.3% in 2008, according to the step wise survey. The predominance was male in 67.8% of cases, with an M/F sex ratio of 2.10. This result is higher than that found by Baye (62.2% men and a sex ratio of 1.6) [11]. However, it was different from those of Goulhasen, who found a predominance of women (72% of cases), and those of Debbabi et al., in Tunisia in 2014, where women accounted for 52.3% [10,12]. It should be noted that epidemiological data from the DCCT and the UKPDS show that diabetes increases the risk

of coronary heart disease 2 to 3 times in men and 3 to 5 times in women [6,7]. The mean age of our patients was 56 ± 11 years, lower than those found by Baye (62.27 years), Chaabane et al., (63.5 years), Goulhasen (62.54 years) and Debbabi et al., (62.4 years) [10-13].

These results show that diabetes starts at a relatively younger age in our country than in other studies carried out in these countries.

The age group between 50 and 59 was the most represented, accounting for 40.6% of cases. In 2019, the IDF estimated that more than 463 million diabetics were aged between 20 and 79 [3]. The age ranges found in our study are in line with the IDF's findings.

Patients with diabetes, type 2 diabetes was the most common (98.31%). This result is close to those of Baye (97.8%) and Chaabane, et al., (99%), but higher than that found by Goulhasen (92.2%) [11-13]. All these results are in line with the conclusions of the IDF, which stated that in more than 90% of cases diabetes

is type 2 [3].

The mean duration of diabetes in our series was 8 years, lower than that found by Baye (9.94 years), Chaabane et al., (12.57 years) and Debbabi et al., (12.4 years), but higher than that of Goulhasen (5 years) [10-13].

In our study, hypertension was the main cardiovascular risk factor associated with diabetes in 75% of cases. This result confirms the data in the literature, which found that an association between hypertension and diabetes was frequent.

Chest pain was found in 66.1% of our patients. This result is lower than that of Goulhasen (86%) and higher than that of Baye (52.9%) [11,12].

The electrocardiogram was abnormal in 59.32% of cases in our series, and the negative T wave was the most common abnormality (28.81%). This result is lower than that of Goulhasen, who found negative T waves in 51.1% of cases. The anterior territory (23.73%) was the most affected by repolarization abnormalities [12].

Cardiac ultrasound revealed LV systolic dysfunction in 42.37% of cases. Our result was higher than those found by Baye (35.6%) and Goulhasen (18.27%) [11,12].

All this demonstrates the late nature of screening for ischemic heart disease, which is diagnosed at an advanced stage of the disease in our country due to a lack of resources.

The search for ischemic heart disease in symptomatic patients was the 1st indication for coronary angiography (57.62%) in our series, followed by a positive myocardial scan (22.03%). Recent Myocardial Infarction (MI) was the primary indication for coronary angiography in Baye (37.8%) [11]. This could be explained by the different technical resources available in different countries, although it should be noted that 22.03% of our patients had undergone myocardial scintigraphy despite the high cost [14-16].

The radial route was the most used (94.92%). This result is higher than that found by Goulhasen (54.4%), and different from that of Baye, where the femoral route was the most used (71.1%) [11,12]. The radial route has been the most used in France since 2006, with around 70,000 angioplasties per year. The geographical distribution in the rest of the world is heterogeneous, with significant use in Northern Europe, Western Europe and Canada, and very little use in the United States [17]. The use of this route in our context could be explained by the fact that coronary angiographies were performed during mass campaigns, during which patients had to be discharged from hospital as soon as possible to allow more patients to benefit from this examination, but also by the advantages associated with using this route.

Coronary angiography in our series was abnormal in 45.76% of cases. This rate is lower than those found by Baye (82.2%) and Goulhasen (82%) [11,12].

The IVA was the most affected of the artery in 33.93% of cases. This result is lower than that of Goulhasen who found 70% involvement of the IVA [12].

Single-truncular involvement was predominant in our series, accounting for 40.74% of cases, followed by tri-truncular involvement in 37.04% of cases and bi-truncular involvement in 22.22% of cases. These figures are higher than those found by Baye (31.1% monotruncular, 17.8% bi and tri-truncular) and Goulhasen (26% monotruncular, 22.7% bi-truncular and 33.3% tri-truncular) [11,12]. Chaabane et al., found tri-truncular

involvement in 14% of cases, a lower rate than ours [13].

All these results show that single-truncular involvement was found predominantly in diabetic patients in our respective series, and stenosis was found predominantly in 76.79% of cases, whereas occlusions accounted for 23.21% of cases in our series. In the literature, based on angiographic studies reported by Ledru et al., diabetic patients frequently had significant lesions of the common trunk, multi-truncular involvement and more often diffuse diseases of small-caliber arteries [18].

The treatment of coronary lesions in diabetic patients is complicated by multi-truncular lesions and damage to the common trunk, for which several studies (BARI, SYNTAX and FREEDOMM) have compared surgery with angioplasty, including 5-year survival with death, infarction and stroke as composite criteria, and the development of a Synergy Between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) score to harmonize management [19-21].

CONCLUSION

However, based on the recommendations and the technical feasibility of the facilities available in our country, angioplasty was performed in 25.42% of cases. Coronary angiography is an essential tool in the management of coronary lesions, particularly in diabetic patients, since it provides a definitive diagnosis of the lesion, as our study shows. This allows an optimal choice of treatment to improve the prognosis and quality of life of patients.

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